Medical Waste Management Practices at Healthcare Facilities in Cape Coast Metropolis

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ABSTRACT

Objectives: This study examined the level of knowledge of health hazards associated with medical waste management, among healthcare workers and management staff of healthcare facilities in the Cape Coast Metropolis.

Methods: Three hundred and twenty (320) healthcare workers were surveyed from two public hospitals in the Metropolis and 7 management staff were purposefully selected and interviewed. The participants include nurses, orderlies, administrators, and environmental health officers. Frequency, percentages and linear regression analyses were performed on the data.

Results: The results showed that 95.9% (n = 307) of health professionals recorded good knowledge about management of medical waste in their facilities. However, arrangement for managing medical waste was inadequate at the facilities (Mean = 1.47, SD = 0.221, CV = 15.03%). The finding revealed that compliance with occupational health and safety guidelines was high (Mean=3.99, SD=0.39, CV=9.82%). Moreover, regression analysis indicated that training is a strong predictor of medical waste practices (0.357) even though educational level, working experiences, and age of the workers were also predictors (-0.356; -0.103; 0.010).

Conclusion: Level of knowledge of hospital workers on medical waste health hazards is high, but arrangements for managing such waste are inadequate or weak. Compliance to Ministry of Health's occupational health and safety guidelines is high. Meanwhile, training of healthcare workers would increase their medical waste management practices. A well-structured training with appropriate storage facility and good supervision at the point of waste generation should be prioritized to assist workers to practice safer and proper waste segregation.

Keywords: Medical waste management practices, Healthcare Facilities, Cape Coast Metropolis.

1   Introduction

Healthcare facilities, as treatment settings for illnesses and diseases, can equally become an avenue for the spread of infections. Thus, healthcare workers need to care for patients in the healthcare environment and surroundings that are safe and healthy for patients, other clients, workers, and the society [1]. Activities at the healthcare centres generate a lot of waste that has the potential to cause infections to clients and the surrounding communities [2-4]. Moreover, such waste stands a greater chance of endangering the health and safety of healthcare workers [5-8]. For instance, diseases such as COVID-19, Ebola and other current infectious diseases have increased the demand for effective and efficient provision of healthcare to the community due to the rise in number of patients. Hence, the increased number of healthcare facilities and attendant rise in patients' number result in an increased generation of medical waste globally [4,9].

Medical waste is a unique type of waste that is likely to increase infections and injuries than any other forms of waste [10]. Medical waste is unprocessed waste, either solid or liquid, that is generated through the provision of healthcare, medical research, or veterinary care involving humans or animals [11]. Medical

waste has been a big issue globally, for instance, a survey conducted in Myanmar in Southeast Asia established a strong linked between yearly child mortality and waste-related diseases [12]. In addition, evidence suggests improper disposal of about 16 billion injections administered annually globally [1]. Meanwhile, routine immunisation produced about 300 metric tonnes of injection waste from a population of 17 million children in the West Africa sub-region annually [13].

Medical waste, compared to any other waste, poses a greater threat of harm and injury to human kind. Mostly, healthcare workers, patients, workers from the waste disposal department, members of the public, and scavengers are at various degrees of risk of infections and diseases from improper management of medical waste [5,7,8]. The waste, if not properly managed, exposes people to infections, causing infertility, cholera, HIV and AIDS, Hepatitis and other pathological infections through sharps contaminated with body fluids [6]. For instance, needle pricks can lead to an increase in infections that occur among healthcare professionals, medical waste handlers, and scavengers at facilities' landfills [1,14]. Therefore, using effective and reliable methods for safe waste management is vital to healthcare facilities. Such waste management limitations may be due to limited resources to support waste separate and disposal that prevent a possible threat to the environment and human health. For example, a threat from waste can be observed when disposable biomedical waste is used to irrigate crops by farmers [10]. In 2012, the 37 Military Hospital in Accra allegedly discharged their liquid medical waste into the main sewers of the capital city, Accra, which allegedly affected the health of residents living close to the facility for years [15].

Although some studies on medical waste management have been done in Ghana [16-19], most of them are limited in depth and coverage. Moreover, the Ministry of Health (MOH), Ghana formulated a policy guideline [4] to guide management of waste and other health and safety issues in the health sector. However, there are indications of non-compliance to the policy guidelines including limited training of health workers at the hospitals on waste management practices [3,16,17]. Healthcare settings can achieve efficient management of medical waste when workers are trained and equipped with adequate knowledge and skills to work on waste aappropriately. These actions need to be complemented with a diligent waste management group and documented plans and policies, advanced treatment methods, effective evaluation and management plan, and practices [20]. Even though these guidelines and policies exist, there are inefficiencies in handling medical waste [2,3]. This raises concern and a couple of questions like; are the healthcare facilities aware of these guidelines and policies? Are the workers trained to acquire the needed knowledge and best practices to manage medical waste as required?

In 2016, Ghana Health Service (GHS) reported that Central Region, specifically Cape Coast, recorded the highest number of cholera cases with a total of 716 out of 787 nationwide. Also, the region recorded the highest deaths from chronic Hepatitis B (i.e. 16 deaths) nationwide [21]. These infectious diseases could be commonly transmitted in healthcare settings where workers are inadequately trained and facility waste management are poorly managed. Knowing that cholera and Hepatitis B are associated with insanitary conditions and poor handling of waste, it is relevant to study the waste management procedures in some selected healthcare institutions in the Cape Coast Metropolis to identify measures to ensure that the health of patients, community members, hospital workers, and the environment are not endangered. Therefore, the purpose of the current study is to examine the level of knowledge about health hazards associated with medical waste management among healthcare workers and management staff of healthcare facilities in the Cape Coast Metropolis, and to determine institutional arrangements for managing medical waste by the health facilities, examine the occupational health and safety practices among hospital professionals, and determine the extent to which level of knowledge about health hazards are associated with medical waste management at the facilities.

2   Methods

Cape Coast Metropolis has many healthcare facilities, including the Teaching Hospital, (Interbeton), the Metropolitan Hospital, the University Hospital, clinics (including private ones), and Community Health Planning Services (CHPS) zones. The Metropolitan Hospital, the University Hospital and Interbeton are referral centres in the Metropolis. There are also 11 private clinics and a private maternity facility in the Metropolis [22]. In this study, two government-owned healthcare facilities were selected because they receive a large number of clients, (both in-patient and those on admissions), they are big facilities and most importantly they provide many services.

Using a descriptive survey, all the 334 participants were targeted for the study. Again, seven officials were included in the study for interview. These officials included hospital administrators, environmental health officers, and facility heads, which were purposely selected because they have specific knowledge and responsibility relating to healthcare waste management at their facilities. The participants (334) were grouped according to their specialties (i.e. general nurse, enrolled nurse and midwife), orderlies, and other officials in the facilities. Gathering data from all the available participants (census) is advantageous because it allows the researchers to conduct a thorough investigation into a problem [23]. However, the method can be of inconvenient because it takes much time and resources. Regardless of these challenges, the census method was considered suitable for the current study because it helped to obtain accurate data from all the participants.

Data collection involved both survey and interviews. For the survey, a questionnaire was administered by the researchers to the participants, after permission was granted by the hospital authorities. We collected the data from 1st February, 2021 to 2nd April, 2021. Hospital administrators and unit heads were contacted and dates/times were arranged for the data collection. The members of the research team distributed the questionnaire to the participants in-person at the various facilities. Participants who could complete their questionnaire on time submitted them on the spot, but those who seemed busy were given a week to submit. Out of 334, 320 completed copies of the questionnaire were retrieved after the data collection period, indicating a 96% return rate. Participants were not given any monetary rewards for their participation in the study.

Interviews were also conducted with the officials in their offices at the facilities. A formal introduction was done to the research participants to build a rapport with them. Interviews were done with the help of an interview guide and conversations were captured with an audio tape recorder, after the consent of the participants has been sought and approval granted. Furthermore, observation was carried out on the facilities' procedures for the management of medical waste, including their treatment sites or plants and disposal sites.

We developed the questionnaire based on the recommended guide from Environmental Protection Agency [EPA] (Ghana), and the World Health Organisation (WHO) healthcare waste management rapid assessment tool for healthcare facilities [11,24]. The questionnaire is segmented into sections A, B, C, and D. Section 'A' solicited demographic characteristics of the participants (i.e., gender, age, education, years of working experience, and the department they work). Section 'B' comprised 10 items, which assessed hospital staff's knowledge on hazards associated with medical waste management in the facilities and section 'C' measured participants' occupational health and safety practices while at work. The items in sections "B" and "C" are scored on five-point Likert scales; Strongly Agree (5), Agree (4), Undecided (3), Strongly Disagree (2), and Disagree (1). A response of "Strongly Agree" indicated a better understanding and consciousness of safety procedures at work and vice versa. Section 'D' items are on hospitals' arrangements in managing medical waste generated at the facilities. Items in this section are scored on three-point scale; always (2), sometimes (1) and never (0), where a higher score (2) on an item indicates a better waste management procedure by the hospital. For instance, if a participant mark "Always" on the item such as

"Colour coding system is used in the storage of waste in the facility", indicates that the hospital frequently segregated waste by using the colour coding system.

The interview was conducted using an interview guide that was prepared based on the recommended guide from EPA (Ghana) and WHO healthcare waste management rapid assessment tool for healthcare facilities [11,24]. Moreover, visits were made to observe waste management practices of the facilities. Practices at the various sites were captured through photographs and or video recordings. In addition, observations were carried out on waste management practices at the units and wards. Observation is important to this study as it helped us to obtain knowledge of the waste separation practices at these healthcare facilities. Observation data was used to support the information collected with the questionnaire and in-depth interviews.

To ensure reliability of the instruments, the questionnaire was pre-tested using healthcare professionals at Ankaful Leprosy/General Hospital, and yielded coefficient of 0.8. This facility was used because it had healthcare professionals and staff who spoke English and Fante Languages, similar to those in the Cape Coast Metropolis. Moreover, the waste categories generated and their management plans were likely to be the same at these facilities. The initially developed questionnaire was given to two PhD in Health Promotion and a Master of Health Education candidates at the Department of Health, Physical Education and Recreation (HPER), University of Cape Coast (UCC) for validation.

We sought and gained ethical approval from the Institutional Review Board (IRB) at UCC, Ghana (UCCIRB/CES/2020/93), Central Regional Health Directorate (CR/G-263/536), and the Ghana Health Service (GHS-ERC025/09/20) to undertake the study. We also sought and were granted permission by the Directors of the various hospitals to conduct the study. In addition, each participant signed an inform consent form, which spelt out the voluntary participation in the study and anonymity of their information, before taken part in the study.

2.1 Data Analysis

The scores on perceived knowledge level of the healthcare professionals were transformed into frequency and percentage since the responses were in 'yes' and 'no'. Thus, respondents are either having good knowledge or not, based on the items provided. Moreover, means, standard deviations and coefficient of variations were calculated to determine the institutional arrangements for managing medical waste and occupational health and safety practices among health professionals. On a scale of 1 to 3, a mean value greater than or equal to 1.5 was considered high and less than 1.5 was considered low. In addition, linear regression was used to determine the extent to which training and demographic characteristics of the healthcare workers predict their waste management practices at the health facilities. Data were analysed using SPSS version 21 software package.

3 Results

We examined the level of knowledge about health hazards associated with medical waste management among healthcare workers and managers of healthcare facilities in the Cape Coast Metropolis. The results are presented under 6 themes; (1) labelling of waste bins for the identification of waste sources and contents, (2) sources of knowledge acquisition, (3) segregation of waste, (4) contribution of waste to infections like cholera, Hepatitis B & C and HIV, (5) use of PPE to prevent injuries and infections, and (6) common injuries associated with medical waste management at healthcare facilities.

3.1 Characteristics of the research participants

The participants included 40.9% (131) general nurses, 14.0% (45) midwives, 28.4% (91) enrolled nurses and 16.6% (53) orderlies. With the age range of 20-59 years, the working experience was between one and 11 years, and that, 15.0% (48) of staff had basic education, 1.9% (6) secondary/vocational/technical, and 83.1% (266) attained tertiary level education. Females (67.5%; n=216) represented the majority group.

The results from frequency and percentage analysis revealed good knowledge level (95.9%; n=307) of hospital staff (See Table 1).

Table 1: *Knowledge of health professionals associated to medical waste management*

Statement	Response	Frequency	%
Labelling of waste bins helps in the identification of waste sources and contents	Yes	275	85.9
	No	45	14.1
	Total	**320**	**100.0**
Knowledge acquisition through personal reading and on-the-job training	Yes	320	100.0
	No	0	0.0
	Total	**320**	**100.0**
Segregation at the point of origin	Yes	320	100.0
	No	0	0.0
	Total	**320**	**100.0**
Improper medical waste contributing to cholera, Hepatitis B & C and HIV.	Yes	254	79.4
	No	66	20.6
	Total	**320**	**100.0**
Personal protective equipment prevents injuries and infections	Yes	320	100.0
	No	0	0.0
	Total	**320**	**100.0**
Pricks, cuts and pinches as common physical injuries associated with medical waste management	Yes	315	98.4
	No	5	1.6
	Total	**320**	**100.0**
Overall knowledge	Yes	307	95.9
	No	13	4.1
	Total	**320**	**100.0**

Table 2 contains means, standard deviation and coefficient of variation on the institutional arrangements for managing medical waste generated by the selected healthcare facilities in the Cape Coast Metropolis. The results showed that adherence to medical waste management guidelines for waste management at the various hospitals was low (Mean = 1.37, SD =0.335, CV= 24.45%), but colour coding was widely used as a system for medical waste segregation (Mean =1.71, SD = 0.302, CV = 17.66%), use of medical waste treatment systems was high (Mean=1.69, SD = 0.318, CV = 18.82%) in the two hospitals, training of hospital staff on management of medical waste was low (Mean = 1.33, SD = 0.112, CV =8.42%), and screening, immunization, and PPE provision was the lowest (Mean = 1.23, SD=0.282, CV = 22.93%).

Table 2 also contains results on the occupational health and safety practices among the staff when handling medical waste in the facilities. The results showed that the use of PPE was high (Mean = 3.93, SD = 0.521, CV = 13.26%), application of information and training was the most prevalent (Mean = 4.89, SD=0.517, CV=10.57%), cooperation in matters of health and safety was the least (Mean = 3.59, SD = 0.676, CV = 18.83%) and reporting injuries was also high (Mean = 4.57, SD = 0.649, CV = 14.20%).

Table 2: *Institutional arrangement and occupational health and safety practices in managing medical waste*

Institutional Arrangement in Managing Medical Waste	Mean	SD	CV (%)
Adherence to Medical Waste Management Guidelines	1.37	0.335	24.45
Use of Colour Coding in Segregation of Medical Waste	1.71	0.302	17.66
Use of Medical Waste Treatment Systems	1.69	0.318	18.82
Training on Medical Waste Management	1.33	0.112	8.42
Screening, Immunization and Provision of PPE	1.23	0.282	22.93
Overall Arrangements in Managing Medical Waste	1.47	0.221	15.03

Occupational Health and Safety Practices

Use of PPEs	3.93	0.521	13.26
Application of Information and Training	4.89	0.517	10.57
Cooperation in Matters of Health and safety	3.59	0.676	18.83
Reporting of Injuries	4.57	0.649	14.20
Occupational Health and Safety Practices of Staff	3.99	0.392	9.82

Table 3: *Regression analysis showing the relationship between medical waste management practices, training and demographic variables* ($N = 320$)

	Coefficients		R		F-Test	
	Unstandardized Coefficients	Standardized		Sig	F	Sig
Intercept	0.882			0.000	30.733	0.000
Training	0.707	0.357	0.390	0.000		
Educational Level	-0.109	-0.356	0.387	0.000		
Working Experience	-0.027	-0.103	0.004	0.184		
Age	0.002	0.010	0.066	0.893		

Table 3 contains results of correlation tests that show the relationships among medical waste management practices, training and demographic variables. The results indicate a positive low correlation of medical waste practices with training (r=0.390, p<0.01, n = 320), a negative low relation with educational level (r=-0.387, p<0.01, n=320), and age (r =-0.066, p > 0.01, n=320) and working experience (r=-0.041, p > 0.01, n=320) of the workers. The resultant regression analysis was statistically significant, $F[(4,315) = 30.733, p < 0.01]$, and explained approximately 28.1% of the variation in the medical waste practices at the facilities. Therefore, change in age, training, educational level, and working experience of the healthcare workers could effectively determine how they manage medical waste at their facilities.

4   Discussion

The focus of this study was to examine the level of knowledge about health hazards associated with medical waste management, as perceived among healthcare workers and management staff of healthcare facilities in the Cape Coast Metropolis. Our findings showed that level of knowledge of hospital professionals on medical waste health hazards is good, but arrangements for managing hospital medical waste are inadequate or weak. Moreover, compliance to occupational health and safety issues is high. In addition, training as compared with educational level, working experience, and age of healthcare workers would increase workers' medical waste management practices at their facilities.

The finding indicated the staff's readiness to separate waste into various bins and appropriate liners to categorise the waste generated. Thus, the labelling and the availability of colour-coded bins might have contributed to this good knowledge, which also creates favourable working conditions, and adequate waste practices [6,25]. Also, our onsite observation revealed that containers or waste bins were properly labelled to assist workers and clients to correctly dispose of waste at the facilities (Figures 1 and 2), contrary to previous findings from Ghana [16]. Thus, our observation, as in Figures 1 and 2 indicate that the facilities have colour coded bins that provide direction in which type of waste goes into a particular bin. Also, it was observed that hospitals make reference to the MOH (2006) national policy and guidelines in their management of biomedical waste at the facilities. This finding complements previous ones that lacked of manuals and policies for managing medical waste at healthcare facilities compromised their waste management actions [3,26,27].

Figure 1: *Labelled bins*

Figure 2: *Segregation at point of origin*

Furthermore, the current study suggests that on-the-job training is important in developing staff capacity in medical waste management [28,29]. Moreover, developing plans and procedures for hospital staff will increase their knowledge level, reduce the volume of waste generated through waste minimization practices, and, in a long run, reduce potential health risks to workers and society. Confirming this statement [15,16,30-32] was recommendation that hospital staff should go through formal training to create a strong structure that improves knowledge level and risk mitigation. However, insufficient knowledge is an important factor contributing to poor management of waste [33,34]. For instance, a survey revealed an almost linear association between knowledge and waste management practices (r=0.541; p=0.001), implying that higher level of knowledge of staff positively impacts their medical waste management procedures [35].

A continuous education and training program positively affects medical waste management practices [36]. Waste was separated at the point of generation into detailed containers which was also confirmed from observation data (Figures 1 and 2). Further observation indicated that various waste bins did not have the appropriate liners (plastic bags) which were meant to help avoid the waste from having direct contact with

the waste bins and enhanced safe collection of the waste. This goes in line with a study where liners were not available [2]. Furthermore, the lack of uniformed colour coding for various categories of biomedical waste affected the effectiveness of collection and handling of waste [16]. This issue was a normal challenge to all the hospitals visited as the various liners were limited, hence the black liner was frequently used for both black, brown, red, and brown waste bins at the facilities. Unfortunately, improper medical waste handling can contribute to Cholera, Hep B, and HIV among staff and the public [5-8]. Similar results were found in hospitals where most staff do not utilize the PPE and, if not addressed, could put oneself at danger of becoming infected [37]. Other studies contrary to these findings revealed that most of the staff were using the PPE provided to them in a referral hospital in Bhutan [38]. The staff listed safety PPE used to include hand gloves (disposable and non-disposable), nose covers, uniforms, and safety boots. The PPE supplied is similar to what was supplied to hospital staff [38,39]. Most PPE provided increased healthcare waste generation as a result of an increase in PPE use and dispose immediately after use.

We also found that institutional arrangements for managing medical waste generated in the selected facilities was low. The result revealed a low level of adherence to medical waste management guidelines for waste management at the various hospitals. Also, interview responses pointed to the fact that the individual hospitals do not have waste management manuals. However, they did make reference to the national plans and strategies on medical waste management developed by MOH, which was posted on notice boards at the facilities (Figure 3).

Figure 3: *Medical waste policy guideline*

However, as seen in Figure 3, the guideline is only about colour coding for waste segregation. The policy and guidelines are the standardized operating procedure and for institutional monitoring and performance evaluation. This has become the basis for the MOH to develop the policy for all healthcare facilities in the

country and all healthcare facilities are expected to use or comply with it [4]. For instance, pre-untreated general waste from the facilities is sent to the main metropolitan dumping site which is controlled by Cape Coast Metropolitan Assembly. Moreover, one of the facilities use incinerators which were not furnished with Air Pollution Control Devices (APCDs) such as electrostatic precipitators (ESPs), fabric filters (FF or baghouse), selective catalytic reduction (SCR) and flue gas desulfurization (FGD), demonstrated from other literature [16]. Further findings suggest that burning of waste by incineration was done at dawn where most inhabitants were not around. Also, the chimney helps the fumes to go directly into the atmosphere to limit pollution of the immediate environment.

It is also revealed that training of hospital staff on management of medical waste was low. IPC was mandate to educate, train and take supervisory roles in medical waste management. At University Hospital, mass education and training were conducted for all sanitary workers, though it was frequently done. Combining all sanitary workers made it difficult to have a target group (orderlies) to focus and elaborate on issues concerning medical waste management. Also, Environmental Health Officers (EHO) were seen having training during one of their departmental meetings with orderlies before the change of shift. In the Metropolitan Hospital, staff training was mainly done by the IPC team. However, such trainings are the mandate of EHO in the hospitals, which is in accordance with the MOH guidelines and policy. In contrast to this the IPC team sets and plan training routines as an infection control standard precaution [20]. This implied that training of staff on medical waste management was limited and not enough. Moreover, the unit heads revealed that staff training was not a consistent training routine even though the IPC was present in the hospital, as situation which is confirmed in another study [40]. Even though the number of people who did not receive any form of training was few, it calls for an effective and multifaceted management plan by the hospital to train hospital workers to minimise infections and effectively manage medical waste. Additionally, a study conducted in Egypt reported that all healthcare facilities had no formal training program in biomedical waste management [20], and that the hospitals lacked formal training programs.

We observed that compliance with occupational health and safety guidelines, such as use of PPE, was generally high. Accordingly, nose masks, wellington boots, hand gloves, and overalls were provided and distributed, and though they were not readily available to the staff, the items provided were efficiently utilized, as observed in other studies [3,9]. In contrast, other surveys have indicated low utilization of PPE at hospitals [20,41-43]. The hospitals also provided a station for handwashing and hand sanitizer facilities in and out of the hospital. The hospitals also provided chlorine for staff for disinfection.

Further findings revealed that training was the strongest predictor of medical waste practices with educational level, working experience, and age least determinants. This is an indication that training plays a very significant role in helping hospital staff to comply with MOH medical waste policy and guidelines. This finding confirms assertion that respondents who had been trained had more knowledge on proper means of managing waste than their counterparts who had not been trained and had a low level of knowledge [44]. Furthermore, a study conducted in Kenya reported that only a few of the hospital staff had received education in management of medical waste [45]. Thus, the practice of waste segregation could be affected by the effective training of healthcare professionals at the hospital. Other findings also revealed a strong correlation between training and medical waste management practices of workers [46,47]. Another survey conducted in Nigeria indicated a significant difference between the cadres of healthcare staff in knowledge of waste management and the practice of waste management [47]. Further studies conducted found that the medical waste management practised by nursing staff was higher as compared to technical and housekeeping staff because of training and knowledge in IPC [48]. These findings go in line with results of a study done in Nigeria in 2017 where professionals had insufficient knowledge about medical waste in the health sector despite their profession due to the low training status [47]. This implies that healthcare professionals who have been trained will not only have high knowledge but also exhibit proper waste management practices in the hospital setting. Furthermore, a study conducted in Egypt reported on how

practice mean percentages increased significantly in all the selected units before and after the intervention [48]. The improvement in practice after intervention pointed to the educational intervention, which was very valuable to waste management practices. Therefore, continuous education and training are important to medical waste management practices.

5   Conclusions

This study surveyed healthcare workers on their knowledge on hazards associated with medical waste management practices at healthcare facilities in Cape Coat Metropolis. We found that even though arrangements are there to manage facility waste, the institutional arrangements weak weak, particularly in colour coding, adherence to medical waste guidelines, facility treatment systems, training health professionals, provision of screening, immunization and PPE. However, knowledge level of professionals was high as regular training and seminars were held for health professionals. Compliance with the occupational health and safety practices among health professionals was reported to be high. We found that given regular and appropriate training on medical waste management practices, workers are likely to effectively manage such waste at the hospitals. Therefore, a well-structured training, provision of appropriate storage facilities, and good supervision at the point of generation need to be prioritized by hospital unit heads. This will help staff to practice safer and proper segregation. The EHO should be included in the IPC team to ensure proper management of medical waste. This team could also be mandated to supervise staff's occupational and safety activities. Hence, developmental agencies should be considered to support hospitals. There may be the need to conduct research to record and determine the actual category of infectious waste generated by the facilities.

6   Declarations

6.1   Study Limitations

This study was based on a census sampling of healthcare workers. One limitation was the inability to meet participants in the hospitals at a particular time due to work patterns, annual leave, study leave, and most importantly, the strike action of some hospital staff. For this reason, gathering of data had a few setbacks.

6.2   Acknowledgements

We appreciate the heads of the participating health facilities for permitting access to their facilities. We thank all the workers who took part in the study.

6.3   Ethical Approval

Ethical approval for the study was obtained from the Institutional Review Board (IRB) at University of Cape Coast, Ghana (UCCIRB/CES/2020/93), Central Regional Health Directorate (CR/G-263/536) and the Ghana Health Service (GHS-ERC025/09/20).

6.4   Informed Consent

Each participant signed an inform consent form, which spelt out the voluntary participation in the study and anonymity of their information, before taken part in the study.

6.5   Competing Interests

Authors declare that they have no competing interest to declare in terms of funding, authorship and publication of this study.

6.6   Publisher's Note

AIJR remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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