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**Assessment of Knowledge and Factors Affecting  
Health Care Waste Management among Health Care  
Workers at Kalagala Health Centre IV Luweero  
District**

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**ABSTRACT**

Knowledge, attitude and practices factors on health care waste management among health workers at Kalagala HC IV Luweero district. The objectives were to assess the knowledge, attitude and practices of health workers on health care waste management at Kalagala HCIV Luweero district. The study was a descriptive and cross-sectional study done at Kalagala HC IV and targeted different cadres of healthcare workers in which a stratified random sampling method was used and 50 respondents were enrolled on the study. The study showed that the health workers had good knowledge of health care waste management with a majority 46(92%) knowing its definition, and a 27(54%) knowing different various waste disposal waste bins. The study also found a good attitude among health workers towards healthcare waste disposal, with the majority acknowledging that there was a need to sort the waste 27(54%) and put them in the correct bins, 38 (76%). The study however found poor healthcare waste management with the majority 34(68%) saying they didn't have required waste bins and 33(66%) highlighting that the sites in which waste bins are stationed are not frequently emptied. In conclusion, therefore, there was good knowledge, and attitude but poor practices on healthcare waste management among healthcare workers. The study recommends the following measures; there should be workshops for health workers to equip them with more knowledge on healthcare waste management. The health facility should be provided with more waste disposal bins to help in the disposal of waste. The management of the hospital should get human resources who can frequently empty the full waste bins.

**Keywords:** Health care, Waste Management, Health workers, Waste disposal waste bins, Health facility.

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**INTRODUCTION**

Healthcare wastes are considered the second most hazardous waste globally after radiation waste. Healthcare waste encompasses various forms of waste such as sharps, human body parts, blood, chemical wastes, pharmaceutical wastes, and medical devices [1]. These wastes are majorly generated from hospitals and primary care facilities, laboratories, mortuaries, autopsy centers, laboratories, blood banks, and nursing homes among others [2]. The World Health Organization (WHO) defines medical waste as waste generated by health care activities including a broad range of materials, from used needles and syringes to soiled dressings, body parts, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices, and radioactive materials [3]. Healthcare waste is defined as all types of waste produced in health facilities such as hospitals, health centres, and pharmaceutical shops [4]. The majority (85%) of the waste is nonhazardous, compostable/biodegradable, and non-compostable, which does not require

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specialist disposal. The remainder is hazardous waste: 10% infectious and highly infectious and 5% is toxic chemicals, radioactive, and pharmaceuticals, all of which require special care and processing. Placentae are classed as highly infectious in settings such as Uganda, where blood-borne viruses are common, and need to be handled carefully [5]. Globally, 75% to 90% of hospital waste was considered not to entail any particular hazard and are much similar to a household or municipal solid waste the 10% to 25% are hazardous waste which needs special care in their management. However, even the non-hazardous waste needs to be properly managed as it can equally substantially affect the environment and can become a health risk. Waste that is dangerous to a person's health or the environment is referred to as Health Care Risk Waste (HCRW). Improper management of HCRW can have direct and indirect negative impacts on patients, healthcare workers (HCWs), local communities and the environment [6]. Ministry of Health and Social Services (MOHSS) Infection Prevention Control Guidelines state that colour-coded plastic bags that are being used to segregate wastes are red, yellow, green, black and clear transparent [7]. According to World Health Organization (WHO) guidelines, it is expected that all healthcare workers possess knowledge, attitude and practice on waste segregation [8]. In developing countries especially in Africa, healthcare waste has not received the much-needed attention that it deserves [9]. This is because of the inadequate resources in these countries resulting in low priority for HCW management. In many countries, there is limited segregation of hazardous and medical wastes and usually mixed with non-infectious waste. Inadequate knowledge and unsatisfactory management practices among healthcare workers are major challenges in the management of HCWs. Previous research indicates that HCW management may be affected by a lack of formal training, lack of knowledge on HCW management, and limited interest from hospital administration [10]. In low- and middle-income countries, healthcare waste management receives little attention as the health sector competes with other sectors of the economy for very limited resources. In most of these countries, healthcare waste is still handled and disposed of as domestic waste, with the resulting appreciable threat to the waste workers, the public, and the environment. [11]. In Uganda, waste generation in hospitals averages 92 Kg of general and HCW per day, 40 per cent of which is hazardous. A level IV health centre (HC) generates an average of 42 Kg per day while level III and level II HC generate 25 Kg and 20 Kg per day respectively [12]. Moreover, most of these primary health care facilities lack proper HCW management facilities [13]. Despite the policy guidelines on injection and HCW management developed by the Ministry of Health, Uganda, there is sufficient evidence that HCWs including in Kampala health facilities was not properly handled [7]. Although healthcare workers are routinely involved in managing HCW at their workstations, there is little published data on HCW management among health workers and more especially in primary healthcare facilities. According to the Ministry of Health report (2006/07), the country has a total number of 122 hospitals, 165 HC IVs, 904 HC IIIs and 2273 HCIs of which over 90% are public facilities while the rest are, private for Profit (PFP) or Private Not for Profit (PNFP). In addition, there are many pharmaceutical retail outlets owned by the government, private owners, and NGOs. These service delivery areas generate hazardous waste that may be contributing to some of the infectious and communicable diseases (account for 60-80% of the disease burden) in Uganda. Setting up healthcare care waste management practices in a country with such a diverse healthcare provision system requires an integrated approach [14].

#### Statement of Problem

Healthcare activities exist to protect and save human lives, however, medical waste generated in healthcare facilities can be infectious, toxic and even lethal because of the potential for the transmission of diseases [15]. Biomedical waste carries a higher potential for infection and injury than any other type of waste [16]. Expansion of healthcare facilities as well as the recent trends of using plastic disposables and an increase in medical and surgical interventions have led to an unprecedented burden of biomedical waste (BMW) Unregulated BMW management (BMW) has posed a grave threat not only to humans health and safety but also to the environment for the current and future generations [17]. Waste from healthcare activities can have a long-lasting impact on human health [18], including people handling the waste and the public in general and the environment can be contaminated through underground water sources polluted by untreated medical waste buried in, or drained into, the ground. People can be infected either through direct contact with contaminated waste or infected people, indirectly via contamination of soil, groundwater, surface water or air, or through affected animals. Direct or indirect exposure through environmental contamination by pharmaceutical and laboratory waste can also lead to disease, both in the human and animal populations [19]. Twenty-three per cent of global deaths and 22% of global disability-adjusted life years (DALYs) were attributable to environmental factors in 2012, including, but not limited to waste Bloodborne diseases like HIV and viral hepatitis B can be acquired through mismanagement of hazardous hospital waste [20]. In Uganda, there is no legal framework requiring health facilities to take any special care with their waste disposal, and very limited finance was available to address any such issues, either within the budgets of these facilities or from the government or other funding agencies [16]. It is, therefore, possible that staff working in health facilities and people living

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nearby may be exposed to unnecessary risks, including possible environmental contamination. Therefore, this study critically analyzes factors affecting healthcare waste management at Kalagala HC IV.

#### Aim

The main objective of this study is to explore knowledge, attitude and practices factors on healthcare waste management among health workers at Kalagala HC IV Luwero district.

#### Specific objectives

- ❖ To determine the knowledge of health care workers on medical waste disposal at Kalagala HC IV Luwero district.
- ❖ To explore health care workers' attitudes towards health care waste management at Kalagala HC IV Luwero district.
- ❖ To assess health care workers' practices in compliance with health care waste management at Kalagala HC IV Luwero district.

#### Research Questions

- i. What level of knowledge do healthcare workers have concerning healthcare waste management at Kalagala HC IV Luwero district.?
- ii. What is the attitude of healthcare workers towards the safe disposal of medical waste at Kalagala HC IV Luwero district.?
- iii. What practices are in place in order to manage medical waste at Kalagala HC IV Luwero district.?

### METHODOLOGY

#### Research Design

This study adopted an explanatory descriptive and cross-sectional study in order to assess factors affecting healthcare waste management at Kalagala HC IV. Under descriptive the objective is to obtain descriptive measures with respect to the characteristics of the population under study. This involved collecting primary information by interviewing a sample of students. Each respondent gave their personal points of view.

#### Area of Study

The study was carried out at Kalagala HC IV, a government-funded facility which is found in the Luweero district. The population comprised of Buganda who form the main tribe and other minority tribes include; Banyankole, Bakiiga, Batooro, Bakonjo and Banyarwanda. The main language used is Luganda.

#### Study Population

The study population consisted of different cadres of healthcare workers (doctors, clinicians, nurses' laboratory technicians, data clerks, counsellors and the waste handlers in this facility were interviewed.

#### Dependent variable

The dependent variable for this study is healthcare waste management.

#### Independent Variables

The independent variables for this study are Age, sex, Religion, adequacy of knowledge, attitude and practices, presence of HCWM plan, and staff supervision among others.

#### Sampling Procedure & Sample Size Determination

A stratified random sampling method was used to select the required categories of health professionals in this study. A random sample was one in which every element in the population has an equal and independent chance of being selected from the sample. The sample size was determined using the Slovin Formula where N is the population and E represents an error of estimation.

The calculation was as follows:

$$n = \frac{N=57}{1+NE^2} = \frac{57}{1+57(0.05)^2} = 49.89 \text{ approximately equal to } 50$$

With a total population of 57 staff, only 50 respondents were sampled. The confidence level of 95% and a margin error of 0.05 were considered when calculating the sample size. A list of all healthcare workers was requested from the health in charge and was used as a sampling frame. Numbers were allocated to each category. Each number was written on a square piece of paper. The lottery or hat method was used where the numbered pieces of paper were placed in a container [21]. The pieces of paper were mixed thoroughly followed by withdrawing numbered pieces of paper until the desired sample size was reached.

#### Data Collection Instruments

A self-administered questionnaire was used to collect primary data from the respondents. This method was used because it saves time and respondents feel free to give answers thus respecting respondents' self-determination. The

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questions were prepared in a systematic and logical sequence to address the research objectives. A pretested questionnaire was administered to the participants. The researcher distributed and picked questionnaires himself after they had been filled in one day. This aimed at reducing the failure rate of answering questionnaires. It also saved time.

#### **Sources of Data**

The study involved both primary and secondary data. Primary data is a type of data which is collected for the first time from the field. Primary data was collected from respondents directly by use of questionnaires and interviews. Secondary data is a type of data that is got from already existing literature like books, reports, journals, newspapers and the Internet. This data helps to back up primary data from the field.

#### **Data Collection Procedures**

The researcher was select the respondents for the interview from the facility by approaching the in charge of the facility, researcher introduces herself and the team, explains precisely the significance of the study and requested consent to participate in the study. Respondents were interviewed at convenience in their own chosen privacy, one at a time. Respondents were interviewed in English or Luganda language (local language) depending on which language the respondent is conversant with.

#### **Observation method**

In this method, the researcher got physically involved to get a first-hand impression of events by acting as a spectator or participant in all activities as observation proceeds and records of relevant points are taken. This method was relevant in getting the different types of waste generated and how each type of waste is managed. The type of observation method was the open-structured participatory method. This method was used because it gives more reliable and accurate information and also allows the researcher to clarify some questions on the spot.

#### **Interview method**

Interviews were arranged and conducted with some of the relevant persons in the waste management system in the facility. Interviews were used to collect data on attendance trends of patients, policies, regulations and guidelines available for the management of healthcare waste. This method helped the researcher to know whether there are some by-laws and regulations by local authorities. Interviews were also preferred in order to generate first-hand data from persons of interest. Also, ambiguous points and difficult questions were clarified on the spot.

#### **Participatory method**

Using this method, the researcher involved the relevant stakeholders, i.e., the health facility management, and staff in the data collection exercise. The data obtained using this method determines the number of different types of waste generated at the hospital by weighing.

#### **Inclusion and exclusion criteria**

The study included only healthcare workers and waste handlers working at Kalagala HCIV. Exclusion criteria on the other hand referred to characteristics that eliminate elements from being included in a study sample [22]. All healthcare workers who were doing administrative work in the offices and those who were recently employed shall be excluded from the study. Patients who chose to voluntarily participate in the study at the time of the interview shall be excluded as well.

#### **Data Quality Control**

The questionnaire was pre-tested on ten eligible staff before the actual data collection and the necessary corrections made. The filled questionnaires were cross-checked for inconsistencies and incompleteness before the interview termination and clarifications were sought while the study participants are still available.

#### **Data Analysis**

Data analysis was the examination of what was collected in the survey/ experiment by making deductions and inferences. It involved scrutinizing the acquired information. The results from the field study were analyzed both qualitatively and quantitatively. Quantitative data from completed questionnaires were entered using Ms-excel. It was then cleaned and checked for errors and corrected, and subsequently transferred to SPSS 20 for analysis. Qualitative data was analyzed through thematic analysis which is summarizing key findings, and content analysis according to the themes.

#### **Informed Consent**

The study put into consideration the freedom and consent of respondents by ensuring that permission will be sought from respondents. The researcher ensured that participation in the study was voluntary and participants had an option of withdrawing at any time. The rights of respondents were protected by informing them about the purpose of the study. No financial rewards or inducements were offered or given to the participants. All interview notes were recorded in a masked way and data obtained shall be treated confidentially at all times. All consenting participants were made to sign an informed consent form.

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RESULTS

Table 1: Social demographic characteristics

Variable	Frequency	Percentage
<b>Age</b>		
18-35	20	40
36-60	18	36
Above 60	12	24
<b>Gender</b>		
Males	31	62
Females	19	38
<b>Cadre</b>		
Clinician	17	34
Laboratory personnel	04	08
Nurse	29	58
<b>Working experience</b>		
Less than 5 years	25	50
5-10 years	17	34
More than 10 years	08	16

From Table 1 above, the respondents were assessed for their demographic characteristics: in regards to age, the majority 20(40%) of the health workers were aged 18-35 years, 18(36%) were between 36 to 60 years, while only 12(24%) were above 60 years. In regards to gender, the majority of the health workers were males 31(62%) with 19(38%) females. More to note was that the majority of the health workers were nurses 29(58%) followed by clinicians, (both doctors and clinical officers), and the least were laboratory personnel.

Table 2: Knowledge of healthcare workers on healthcare waste management

Variable	Frequency	Percentage
<b>Definition</b>		
Correct answer	46	92.0
Wrong answer	04	08.0
<b>Knowledge of the importance of HCW management</b>		
correct	42	84.0
Wrong	08	16.0
<b>Knowledge of container colours</b>		
<b>For biohazards</b>		
Correct (yellow)	32	64.0
Wrong	18	36.0
<b>Leftover foods</b>		
Correct (Black)	39	78.0
Wrong	11	22.0
<b>Soiled gloves.</b>		
Correct (red).	28	56.0
Wrong	22	44.0
<b>Glass vitals</b>		
Correct (blue).	35	70.0
Wrong	15	30.0
<b>Needles</b>		
Correct (safety box).	50	100.0
Wrong	00	0.0

The participants were assessed for their knowledge in which 46(92%) had a correct definition of health care while 04(8%) had a wrong definition. More so, 42(84%) knew the importance of healthcare waste management, while 08(16%) could give a piece of clear information on the importance of HCW management. The participants were

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asked about colour codes for waste disposal bins of which 37(74%) knew various colour codes for 13(26%) could not mention all the colour codes for HCW disposal bins. The health workers were asked about the disposal of various wastes in correlation with waste bins, and when asked about biohazard waste bins, only 32(64%) mentioned yellow colour bins while 18(36%) mentioned other colour bins. When asked about the disposal of leftover foods, 39(78%) mentioned black, while 11(22%) mentioned other colours. When asked about the disposal of soiled gloves, only 28(56%) mentioned black while 22(44%) mentioned other colours. When asked about the disposal of glass vials 35(70%) mentioned blue while 15(30%) mentioned other causes. More so, all the participants knew that needles are disposed of, in a safety box.

**Table 3: The attitude of health workers**

Variable	Agree		Disagree	
	Freq.	%age	Freq.	%age
<b>Question under consideration</b>				
<b>Putting waste in the correct container</b>	38	76.0	12	24.0
<b>Sorting of waste prevents infection</b>	27	54.0	23	46.0
<b>Wearing PPEs reduces the risk of disease</b>	34	68.0	16	32.0
<b>Waste disposal is everyone's duty</b>	20	40.0	30	60.0

From table three above, the participants were assessed for their attitude towards HCW management, they were asked if they thought putting waste in correct bin containers was important, majority 38(76%) agreed while at least 12(24%) thought it didn't matter, where a waste is dumped. The participants also if it was necessary to do sorting of healthcare waste prior to disposal, the majority 27(54%) thought it was necessary, while at least 23(46%), thought it was not very necessary to sort the waste. The participants were asked if they thought wearing of PPEs was a form of disease prevention in alignment with proper HCW management, only 34(68%) thought it was important while at least 16(32%) said it doesn't necessarily reduce disease risk, more so the health workers were asked if they thought waste disposal was a duty for all the stakeholders or designated for a particular group, majority 30(60%), though there is a particular group who should be more concerned with waste disposal, at least 20 (40%), said it was a duty of every person in the health facility to ensure proper HCW.

**Table 4: Practices of health workers on HCW management.**

Variable	Frequency	Percentage.
<b>HCW bin available onward</b>		
Yes	16	32
No	34	68
<b>Health workers follow infection control guidelines</b>		
Yes	42	84
No	08	16
<b>Areas around waste dumping bins are frequently cleaned</b>		
Yes	17	34
No	33	66
<b>Disposal containers are caged in one place.</b>		
Yes	24	48
No	26	52

In Table four above, the health workers were assessed for their practices towards HCW management. They were asked if they had waste bins in every ward where they dispose of, the wastes, majority 34(68%) said they don't have waste bins, while at least 16(32%) said they have bins in their wards. The health workers were asked if they were following st guidelines for infection control, majority 42(82%) said they observed them while at least 8 (16%) said they were not necessarily observing them. The health workers were asked if the area around the waste dumping bin is regularly cleaned, 33 (66%) said they never cleaned the places regularly while 17(34%) said it site was regularly cleaned. The participants were asked if they caged in one place in their area where all waste bins are put, only 24(48%) said they did so, while at least 26(52%) said they didn't cage them together, they are in.

## DISCUSSION

### Knowledge of health care workers on health care waste management

The participants were assessed for their knowledge in which 46(92%) had a correct definition of health care while 04(8%) had a wrong definition. More so, 42(84%) knew the importance of healthcare waste management, while 08(16%) could give clear information on the importance of HCW management, this study shows that majority of the healthcare workers know that it is important to have a better health care waste management, when this study is compared with studies, it differs from a study by [23]. who noticed in a study in India that there was poor knowledge of HCWM with proportion ranging between 25.0% and 45.0% across different professions of respondents. The participants were asked about colour codes for waste disposal bins in which 37(74%) knew various colour codes for 13(26%) could not mention all the colour codes for HCW disposal bins, this study shows that the health workers knew that there are various bins designated for different health care wastes, when this study is compared with other studies, it shows a correlation with a study by [24]. who found out that lack of adequate training and awareness in the execution of rules and regulations for handling BMW can lead to a health and environment apprehension, since staff did not follow the best practices. The health workers were asked about the disposal of various wastes in correlation with waste bins, when asked about biohazard waste bins, only 32(64%) mentioned yellow colour bins while 18(36%) mentioned other colour bins. When asked about the disposal of left-over foods, 39(78%) mentioned black, while 11(22%) mentioned other colours. When asked about the disposal of soiled gloves, only 28(56%) mentioned black while 22(44%) mentioned other colours, the study shows that majority had the correct knowledge onto which bin is for a given type, although those who didn't know had also increased, (44%) when this study is compared with studies, it shows a similarity with a study by [25]. who highlighted the disparity in knowledge between core health workers and sanitary staff in health facilities as sanitary staff had a lower mean of 8.30 compared to 12.80 in health staff. When asked about the disposal of glass vials 35(70%) mentioned blue while 15(30%) mentioned other causes. More so, all the participants knew that needles are disposed of, in a safety box, this study shows a good knowledge percentage for healthy working in disposing of needles and sharps, this study shows different from a study done by [26], conducted among health care workers in Agra on medical waste management which indicated a deficiency in information and awareness among hospital employees regarding legislation associated with medical waste management.

### The attitude of health workers

The participants were assessed for their attitude towards HCW management, they were asked if they thought putting waste in correct bin containers was important, the majority 38(76%) agreed while at least 12(24%) thought it didn't matter, where waste is dumped. The participants were also if it was necessary to do sorting of healthcare waste prior to disposal, the majority 27(54%) thought it was necessary, while at least 23(46%), though it was not very necessary to sort the wastes, the study shows that there was a good attitude, 54% among health workers about whether to sort the waste materials or not, when compared with other studies, the study shows a difference from a study done by [27]. conducted in the hospitals of Gondar Town in Ethiopia on factors associated with risk perception of health care workers towards medical waste disposal in the hospitals, who revealed that segregation of medical waste is not done and none of the hospitals had got coloured coded containers and medical waste management guidelines. The participants were asked if they thought wearing of PPEs was a form of disease prevention in alignment with proper HCW management, only 34(68%) thought it was important while at least 16(32%) said it doesn't necessarily reduce disease risk, the study shows a good attitude on the use of PPEs, this correlates with willingness to ensure infection prevention and control which correlates with good health care waste management, when compared with other studies, [28] had also observed that mismanagement of HCWs can result into various hospital-acquired infections, occupational health hazards and food contamination. In addition, mismanaged wastes such as sharps contaminated with blood facilitates transmission of infections such as hepatitis B, hepatitis C, HIV/AIDs and other viral infections. More so the health workers were asked if they thought waste disposal was a duty for all the stakeholders or designated for a particular group, the majority 30(60%), thought there is a particular group who should be more concerned with waste disposal, at least 20(40%), said it was a duty of every person in the health facility to ensure proper HCW, this study shows a negative attitude of health workers on taking on the tasks required in ensuring better waste dispose of because they perceive it as a duty supposed to be catered for by another firm, other than health workers themselves when compared with other studies, this study differs from study result by [29]. conducted in Ghana on disposal of medical waste who revealed that both public and private hospitals have got waste management policies and teams.

### Practices of health workers on HCW management.

In Table 4 above, the health workers were assessed for their practices towards HCW management. They were asked if they had waste bins in every ward where they dispose of, the wastes, majority 34(68%) said they didn't have waste bins, while at least 16(32%) said they have bins in their wards. The health workers were asked if they were following

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guidelines for infection control, majority 42(82%) said they observed them while at least 8(16%) said they were not necessarily observing them, the study shows a good practice of health workers since they adhere to prevention guidelines, when compared with other studies, this study correlates with a study by [30-33], who found out that hospital staff was knowledgeable about waste segregation practices, but had poor compliance with national policies. The health workers were asked if the area around the waste dumping bin is regularly cleaned, only 33(66%) said they never cleaned the places regularly while 17(34%) said it site was regularly cleaned, this study shows a poor practice on cleaning of the site where waste bins are collected, this could be because of not having a focal person responsible for the site, this could itself breed infections when compared with other studies, the study differs from study results by [31]. in India, who observed that the majority of hospitals including government and private hospitals, as well as nursing homes, use a common private provider for the collection, management, and disposal of medical waste and at times training regarding medical waste disposal to the health care workers is arranged by the same common provider. The participants were asked if they caged in one place in their area where all waste bins are put, only 24(48%) said they did so, while at least 26(52%) said they didn't cage them together, this shows a poor practice of loitering the waste disposal bins instead of being together in one place when compared with other studies, the study shows a difference from a study by [32, 34-37]. in conducted in Brazil in 2014, on the reality of waste management in primary health care units. The results of this study reveal that waste containers are filled beyond the recommended limits, temporary storage of waste takes place in makeshift areas, usually in more isolated places of the facility and waste was left exposed to potential environmental, human and animal actions.

#### CONCLUSION

The study concludes that the health workers had good knowledge of health care waste management with a majority of 92% knowing its definition, and 54% knowing different various waste disposal waste bins. The study also found a good attitude among health workers towards healthcare waste disposal, with the majority acknowledging that there was a need to sort the waste 54% and put them in the correct bins, (76%). The study however found poor healthcare waste management with the majority 68% saying they didn't have required waste bins and 66% highlighting that the sites in which waste bins are stationed are not frequently emptied. From above, there was good knowledge, and attitude but poor practices on health care waste management among health care workers.

#### RECOMMENDATION

There should be workshops for health workers to equip them with more knowledge on healthcare waste management. The health facility should be provided with more waste disposal bins to help in the disposal of waste. The management of the hospital should get human resources who can frequently empty the full waste bins.

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