

# Medical Waste Handling Practice and Associated Factors among Cleaners in Public Hospitals under Addis Ababa Health Bureau, Addis Ababa, Ethiopia

Finot Admassu Mariam<sup>1\*</sup>, Zewdie Aderaw Alemu<sup>2</sup>

<sup>1</sup>Department of Public Health, Gamby Medical Science College, Ethiopia

<sup>2</sup>Department of Public Health, Debre Markos University, Ethiopia

## Research Article

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### \*For Correspondence

Finot Admassu Mariam, Department of Public Health, Gamby Medical Science College, Ethiopia.

Tel: +251913023640

E-mail: finotaddma@gmail.com

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**Abbreviations:** WHO: World Health Organization; HAI: Health Associated Infections; HIV: Human Immuno Deficiency Virus; PPE: Personal Protective Equipment; HBV: Hepatitis B Virus; HCV: Hepatitis C Virus; HCW: Health Care Workers; AAHB: Addis Ababa Health Bureau; FMOH: Federal Ministry of Health; HCF: Health Care Facilities; MWM: Medical Waste Management; SPSS: Statistical Package for Social Science; FMHACA: Food, Medicine and Health Care Administration and Control Authority; AA: Addis Ababa.

### ABSTRACT

**Background:** Medical waste is generated from different medical procedures in a health care facility. Mismanagement of medical waste involves improper handling from the point of generation to its final disposal. Due to mismanagement of medical waste serious health hazards occur to the public and environment. Even though health facility cleaners are responsible for the safe management of medical waste, less attention is given in creating awareness on the risks associated with improper medical waste handling. Taking this in to account this study will assess the medical waste handling practice and associated factors among cleaners in public hospitals under AAHB.

**Methods:** An institutional based cross sectional study design was. All cleaners from the three randomly selected hospitals were included in the study. A pre tested self-administered questionnaire was used for collecting the data. Data were entered and analysed using data entry and analysis software SPSS version 23. Binary logistic regression was used for the analysis. Bivariate analysis was done and variables with a p-value of <0.25 were chosen to enter to the multivariable analysis model. Crude odds ratio (COR) and adjusted odds ratio (AOR) was calculated to assess the strength of association.

**Results:** The result showed that the medical waste handling practice among cleaners was found to be good only among 25.3% of the participants. Presence of waste disposal policy (OR: 2.2; 95% CI; 1.2; 4.1), adequacy of staff (OR: 2.0; 95% CI; 1.1; 3.8) and the type of hospital (OR: 2.8; 95% CI; 1.2; 6.6) were found to have significant association with medical waste handling practice.

**Conclusion:** The finding revealed that majority of the workers in the studied facilities has poor medical waste handling practice. It also showed that the poor practice was mostly associated with institution based factors. Thus, management authorities and responsible bodies should establish waste disposal policy, hire more staff to minimize the work burden, regular training, supervision and monitor the performance of each staff periodically is recommended.

## INTRODUCTION

The term healthcare waste (HCW) includes all wastes generated from medical procedures within healthcare facilities (HCFs). According to WHO (2013) and various other studies, around 80% to 85% of health care waste is general waste. However, 15% to 20% of the waste is hazardous and infectious <sup>[1]</sup>. Medical wastes are materials that are produced in the course of health protection, medical treatment and scientific research <sup>[2]</sup>. Medical wastes unlike other waste products constitute a serious health hazard to its handlers, patients and the community at large <sup>[3]</sup>. Medical wastes constitute a larger portion of infectious wastes, which are potentially dangerous since they may contain pathogenic agents. Some of the pathogenic organisms can be dangerous, because they may be resistant to treatment and possess high pathogenicity or ability to cause disease <sup>[4,5]</sup>.

Mismanagement of hospital waste implies a combination of improper handling of waste during generation, collection, storage, transport and treatment. Improper handling comprises several unsafe actions, such as handling without personal protective equipment (PPE), poor storage, manual transport for longer distances and use of uncovered containers instead of closed plastic bags [6]. Many findings in developing countries on healthcare wastes management revealed that there is poor segregation and personal protective equipment and accessories were not available and not used by HCWs. Moreover, healthcare wastes originating from health care facilities dumped either into their backyard in a simple pit or put in open garbage [7].

Every year an estimated of 16 billion injections are administered worldwide, but not all of the needles and syringes are properly disposed of afterwards, creating a risk of injury and infection and opportunities for reuse [8]. It was stated three million health workers out of 35 million health workers worldwide experience needle stick and sharps injuries annually [9]. A person who experiences one needle stick injury from a needle used on an infected source patient has risks of 30%, 1.8%, and 0.3% of becoming infected with HBV, HCV and HIV respectively. Hospitals and other health care facilities have a responsibility to protect the environment and public health particularly in relation to the waste they produce. They must also ensure that there are no adverse health and environmental consequences as a result of improper waste handling, treatment, and disposal activities [10].

Although waste collectors are more likely to be injured due to their low educational status, low training, less attention from the management, and often have no or inadequate PPE, there is limited information on them worldwide and especially in low-income countries [11]. In Ethiopia although researches on medical waste handling practice and amount of waste generated in hospitals are present still research focusing specifically on cleaners is lacking therefore this study will fill this gap by assessing waste handling practice and factors affecting safe practice among public hospital cleaners under Addis Ababa health bureau.

## **MATERIALS AND METHODS**

### **Study area and period**

The study was conducted in Addis Ababa, the Capital City of Ethiopia, and diplomatic capital of Africa and the seat of numerous international and regional organizations [12]. In the city there are 48 Hospitals, 84 health centers and 647 clinics (Addis Ababa FMHACA). Of the hospitals five of them are specialized and they are under the governance of FMOH, 6 are under Addis Ababa city Administration Health Bureau (ACAHB), one to the defense, one to the police and 35 hospitals are privately owned. The hospitals are involved in providing diagnostic and medical treatments. The study was conducted in hospitals under AAHB from April 1 to July 20, 2017.

### **Study design**

Cross sectional study design was used on selected public hospitals under ACAHB, for the assessment of waste handling practice and factors affecting safe practice among cleaners.

### **Source population**

Source populations of this study were all cleaners who work in hospitals under Addis Ababa Health bureau.

### **Study population**

The study populations were cleaners who work in Minillik, Yekatit 12 and Zewditu hospitals.

### **Sample size determination**

Sample size was calculated for both specific objectives.

For the first objective that is medical waste handling practice a population proportion P=31.5% was taken from a similar study conducted in Gonder, Ethiopia on medical waste handling practice.

By taking single population proportion formula,

$$N = Z \alpha / 2^2 \frac{P(1-P)}{d^2}$$

By taking  $\alpha = 5\%$ ,  $Z \alpha / 2 = 1.96$ ,  $d = 5\%$

$$N = \frac{1.96^2 (0.315)(0.685)}{(0.05)^2} = 331.56, 332$$

For the second objective that is factors affecting practice since it involves association between two variables practice and the factors that might affect practice double population proportion formula was used. Since there are no available studies in similar setting the first proportion  $P_1$  was taken to be 50% for those who didn't take training and have good practice i.e.,  $p_1$  for those

who didn't take training and have good practice=50%,  $(1-p_1)=50\%$ .

For those who take training and have good practice it was taken to be 65% i.e.,  $p_2=65\%$ ,  $(1-p_2)=35\%$  applying double population proportion formula for calculating sample size and by using EPI info the sample size was obtained to be 366.

$$N = \frac{(Z\alpha/2 + Z\beta)^2 (P_1(1-P_1) + P_2(1-P_2))}{(P_1 - P_2)^2} = 331.56, 332$$

Power of the test  $\beta=80\%$

By taking the highest sample size calculated from the two specific objectives, 366 were taken. Since the total population is less than 10,000 by applying finite population correction formula the sample size was found to be 211, multiplying by 1.5 (design effect) and adding 10% non-response rate the final sample size will be 349.

### SAMPLING PROCEDURE

Among the 11 hospitals in Addis Ababa six hospitals are found under AAHB and the rest five hospitals are under FMOH. From the hospitals under AAHB three hospitals were randomly selected. These hospitals are Minilik, Yekatit 12 and Zewditu. All cleaners who work in the three randomly selected hospitals were included in the study. The study mainly focuses on public hospitals since the amount of waste generated is much higher than that of private hospitals according to a research on health care waste generation rate in Addis Ababa [13]. The sampling procedure for the studied hospitals and study participants is indicated in **Figure 1**.

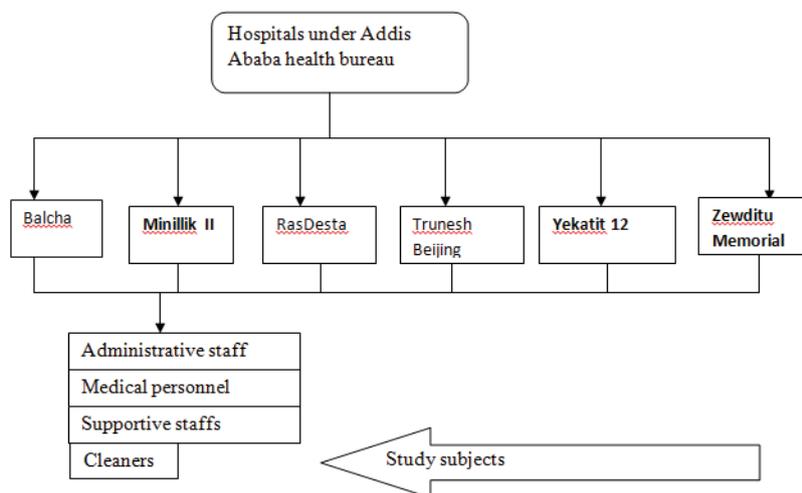


Figure 1. Sampling procedure.

#### Inclusion and exclusion criteria

Inclusion criteria for the research participants were open to all randomly selected hospital cleaners after they were fully provided with the information about the objective of the research. Cleaners not involved in handling medical waste or who work around office where medical waste is not generated were excluded.

#### Study variables

Waste handling Practice (outcome variable), age, sex, marital status, educational background, employment type, work experience, training on MWM, attitude towards medical waste management, Knowledge, presence of waste disposal policy, availability of waste disposal materials, on site transportation methods, storage area adequacy, adequacy of cleaning staff, knowledge on waste management.

### OPERATIONAL DEFINITIONS

#### Waste handling practice

**Good practice:** Out of the 15 medical waste handling and practice those who correctly answered >10 questions. Greater than 60% of the practice related questions were considered as having good practice.

**Poor practice:** Those participants who correctly answered <9 out of the 15 practice related questions or less than or equal to 60% of the questions were considered as having poor practice.

#### Knowledge of waste management

**Good knowledge:** Participants who correctly answered 9 and above out of 13 of the knowledge based questions were considered as having good knowledge.

**Poor knowledge:** Participants who answered correctly less than or equal to 8 out of the 13 knowledge related questions were considered as having poor knowledge.

**Attitude towards medical waste management**

**Positive attitude:** Those participants who responded in the correct way for 5 and above of attitude related questions were considered as having positive attitude.

**Negative attitude:** Those participants who correctly answered for 4 and less of the attitude based questions were considered as having negative attitude.

**Knowledge on PPE**

Knowledge about what is personal protective equipment, how to use PPEs, when to use it, how to disinfect or clean PPEs.

**DATA COLLECTION PROCEDURE AND QUALITY ASSURANCE**

**Data collection**

Self-administered questionnaire was prepared in English and translated into Amharic. The Amharic and English Versions of the questionnaire were communicated for the data collectors. The inclusion and Exclusion criterion of the study participants was also described. The data collection material was distributed to the study participants only after describing the purpose of the study and after obtaining verbal consent from them. Any difficulty in filling the self-administered questionnaire among the study participants was guided by the data collectors.

**Data quality assurance**

A pre-test was conducted to ensure the quality of the data on a hospital that was not used by the research (RasDesta hospital) and based on the finding of the pre-test slight modifications was made on the questionnaire. Data entry was carried out simultaneously as data collection takes place.

**Data management and analysis**

Data were coded and entered in to data entry and analysis software SPSS version 23 and was checked for missing values, incompleteness and mistakes during the data entry process. During analysis the variables were defined and frequencies of different variables were calculated. Descriptive statistics was by using proportion with percentages and also bar graphs were used. The association between the dependent variable with each of the independent variables was analyzed at 95% CI using bivariate analysis Variables with a p value of <0.25 were taken to the multivariable model and association of the variables with the independent variable was assessed in the presence of confounders.

**RESULTS**

**Characteristics of the study area and population**

A total of 320 cleaners who work in three hospitals under AAHB participated in the study giving a response rate of 92%. The study participants were from three hospitals, 110 from Minillik, 123 from Yekatit and 87 from Zewditu with age range from 20 to 51. All the study participants were females. There is equal proportion of married and not married individuals and there are 8.8% divorced individuals, on educational status majority of the study participants lie in educational status of grade 9-12. On their employment types most are permanent employees but there are contract employees particularly in Minillik hospital who are employed by out sourced agencies. Regarding experience most of the cleaners are in midlevel experience or have worked for 2-8 years. The detail of the socio demographic characteristics of the study participants is shown in **Table 1**.

**Table 1.** Socio demographic characteristics of cleaners in hospitals under Addis Ababa Health Bureau in May, 2017.

Variable	Category	Frequency	Percent
Age	20-27	144	45%
	28-35	129	40.30%
	36-43	32	10%
	>44	15	4.70%
Marital Status	Married	146	45.60%
	Not Married	146	45.60%
	Divorced	28	8.80%

Educational status	Primary education (1-8)	108	33.80%
	Secondary education (9-12)	157	49.10%
	tertiary education (>12)	55	17.20%
Employment type	Permanent	252	78.80%
	Contract	68	21.30%
Work experience in years	<2 years	120	37.50%
	2-8 years	174	54.40%
	>8 years	26	8.10%

**Usage of Personal protective equipment and safety practice**

According to the response given in the questionnaire regarding usage of personnel protective equipment and safety practice (Table 2).

**Table 2.** Frequency table on usage of PPE and safety practice among cleaners in hospitals under AAHB in May, 2017.

No.	Types	Items	Yes	
			Frequency	%
1	Use of PPE	Gown	246	76.90%
		Glove	306	95.60%
		Apron	234	73.10%
		Google	57	17.80%
		Boots	86	26.90%
		Helmet	78	24.40%
2	Use of water resistant apron		112	35%
3	Type of shoes used by cleaners	Closed shoes or boots	108	33.80%
		Half-closed shoes	193	60.30%
		Sandals	8	2.50%
		Thong	11	3.40%
4	Taking home PPEs for cleaning		37	11.60%
5	Type of glove used for containers with unknown content	Disposable glove	37	11.60%
		Surgical glove	64	20%
		Heavy duty glove	219	68.40%
6	Hand washing practice	When starting work	126	39.40%
		After finishing work	231	72.20%
		Before wearing glove	86	26.90%
		After removing glove	266	83.10%

On usage of PPE the responses showed that personal protective equipment’s such as glove, gown and apron are used by most of the participants whereas apron, goggle and helmet are used by less than 50% of the workers. On the type and quality of PPE used 35% reported that they used water resistant apron, 33.8% use closed shoes whereas the rest of the respondents reported as they used half closed shoes, sandals and thongs. Regarding cleaning place of PPEs such as gown, apron and boots, majority (88.4%) answered they do not take their PPEs home for cleaning. The type of glove used by most (68.4%) of the cleaners is heavy duty gloves. Regarding hand washing practice most of cleaners responded they washed their hands after removing gloves and finishing their work. The study showed that there was lack of adherence to safety such as complete usage of PPE. Based on the responses obtained it was indicated that majority 85.6% don’t use complete PPE while working.

**Institution based factors on waste disposal**

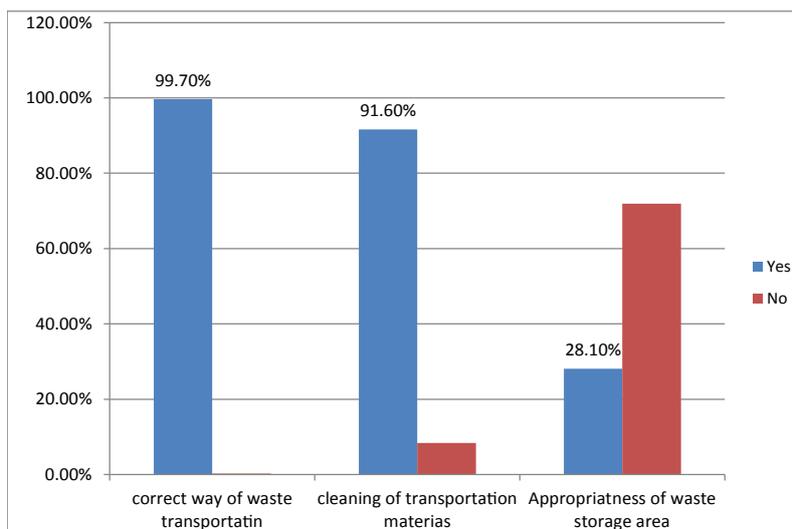
Institution based factors such as availability and adequacy of waste handling materials, adequacy of cleaning staffs, training on medical waste handling were considered. In general the responses showed that 63.1% respondents answered there is adequate PPE, 81.3% showed there is hand washing area, 64.7% responded on adequacy of waste disposal materials, 60.9% showed there is no adequate staff and 76.6% responded there is work over load similarly on training 81.9% of the participants responded they have taken training. Even though the number of cleaners who took infection prevention training was found to be high (81.9%), from the responses it was found that only 10.6% of them had taken re- training. The detail of the finding on institutional factors is shown in Table 3.

**Table 3.** Institutional factors on medical waste handling in hospitals under AAHB in May 2017.

No.	Variable	Yes	
		Frequency	%
1	Adequacy of PPE	202	63.10%
2	Availability of hand washing	260	81.30%
3	Training	262	81.90%

4	Adequacy of waste disposal materials	207	64.70%
5	Adequacy of staff	125	39.10%
6	Over load	245	76.60%
7	PPE usage	46	14.40%
8	Waste disposal policy	182	56.90%
9	Appropriate storage area	90	28.10%

Regarding waste transportation and storage the study revealed that the waste was transported to an onsite storage area using wheel trolley and wheel trolleys and waste transporting materials are regularly cleaned. Showing that there is a good adherence to safety standards when it comes to waste transportation, but when it comes to waste storage area it was indicated that the waste storage area doesn't include the requirements for safe waste storage area such as safety sign that prevent unauthorized entry, water supply, hard standing floor with good drainage, lockable, and appropriate location. The waste transportation and storage condition is indicated in **Figure 2**.



**Figure 2.** Waste transportation and storage condition of hospitals under AAHB in May, 2017.

**Knowledge on medical waste handling**

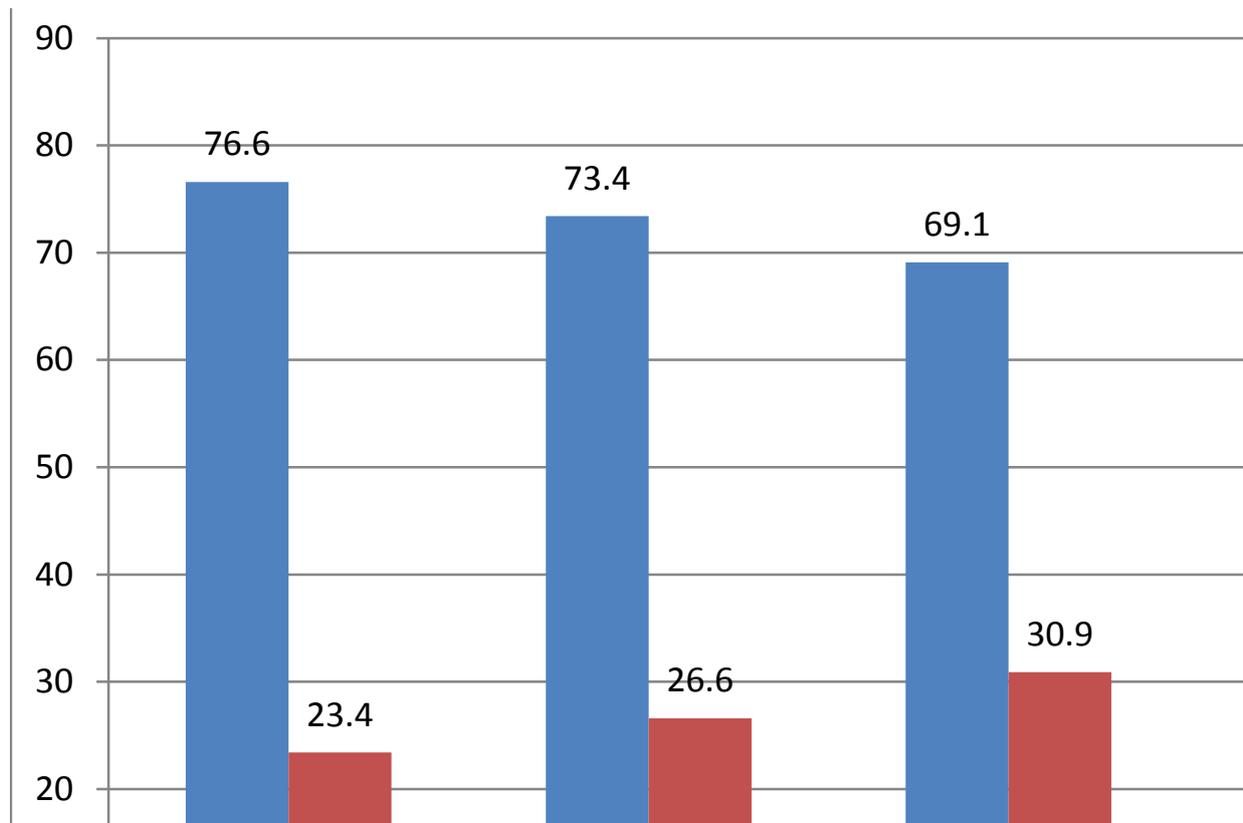
Knowledge on medical waste disposal of the study participants was assessed and it showed that 74.1% of the study participants were found to have good knowledge and 25.9% of the participants were found to have poor knowledge. The detail is given in **Table 4**.

**Table 4.** Knowledge on medical waste disposal among cleaners in public hospitals under AAHB in May 2017.

No.	Questions or Items	Yes	
		Frequency	%
1	Knowledge on color coded waste bins	173	54.10%
2	Knowledge about when is safety box considered full	236	73.80%
3	Knowledge on biohazard sign	193	60.30%
4	Knowledge about re-usage of sharp container	250	78.10%
5	Knowledge on criteria for sharp container	236	73.80%
6	Do you know about clinical waste management process in the hospital?	260	81.30%
7	Can clinical waste cause risk and health hazard to your health when infected?	293	91.60%
8	Do you know if the hospital has a set of transport schedule for infectious waste within the organization?	220	68.80%
9	Do you know if the storage time for infectious waste is 24-48 h?	178	55.60%

Knowledge on color coding of waste bins and international safety sign showed that 76.6% of the study participants responded correctly the color of waste bin used for noninfectious hospital wastes such as paper and plastic bottle. Among the cleaners

73.1% responded correctly the color of waste bin used for used glove and gauze, and 69.1% answered correctly the color of waste bin used for highly infectious wastes such as used specimen containers. Regarding knowledge on international safety sign that is mostly used on waste container, 60.3% responded correctly what the safety sign stands for **Figure 3**.



**Figure 3.** Knowledge on color coded waste bins and safety sign among cleaners in public hospitals under AAHB in May 2017.

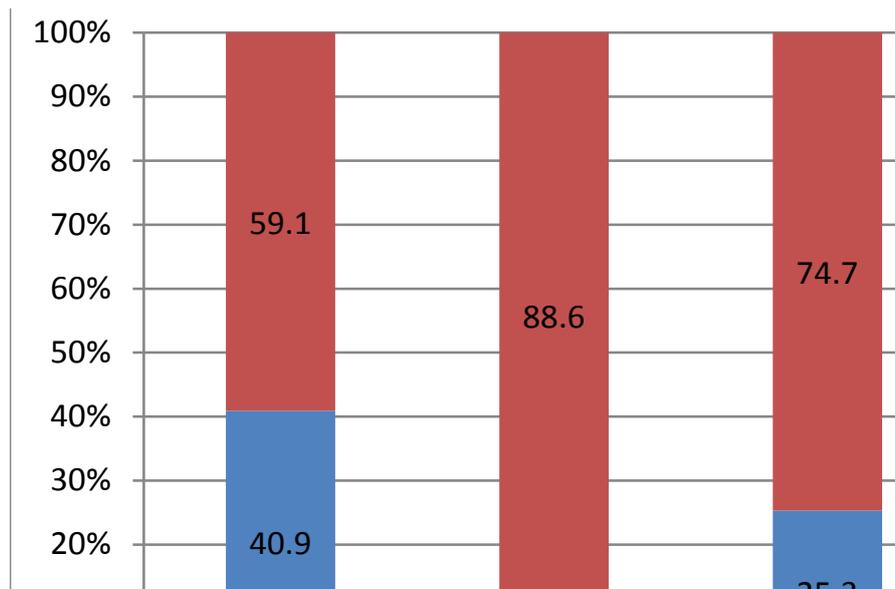
**Attitude on medical waste handling**

The participant’s attitude towards disposal of waste was also asked and the responses showed that majority of the study participants have agreed on the importance of proper waste management and adherence to safety practices such as proper use of PPE and hand washing practice. In general the responses showed that 98.8% have positive attitude towards safety and proper disposal of medical waste. The detail is shown in **Table 5**.

**Table 5.** Attitude on medical waste handling among cleaners in public hospitals under AAHB in May 2017.

No.	Statements or items	Disagree		Agree		Not sure	
		Frequency	%	Frequency	%	Frequency	%
1	Health care waste can cause hazard to the society and the public if not handled properly	10	3.10%	310	96.90%		
2	Waste management is not the responsibility of the hospital administration only	19	5.90%	298	93.10%	3	0.90%
3	Hand washing before starting work and after finishing is mandatory	13	4.10%	303	94.70%	4	1.30%
4	All personnel involved in handling medical waste should be aware of Infection prevention	10	3.10%	305	95.30%	5	1.60%
5	IP guideline is important	4	1.30%	313	97.80%	3	0.90%
6	Each personnel involved in waste handling should know about safety signs	19	5.90%	295	92.20%	6	1.90%
7	Standard precaution takes too much of work time	190	59.40%	89	27.80%	41	12.80%
8	Hand jewellery makes good hand hygiene impossible	28	8.80%	277	86.60%	15	4.70%

From the study the overall medical waste handling practice of the study participants was found that only 25.3% had good medical waste practice while the rest 74.4% had poor practice. The medical waste handling practice of the cleaners in the three hospitals separately is indicated by **Figure 4**.



**Figure 4.** Medical waste handling practice among cleaners in the three selected hospitals under AAHB in May, 2017.

**Factors associated with medical waste handling**

Association between the outcome variable and personal and institutional factors was assessed. A Bivariate analysis was performed and variables with a (P-value of less than or equal to 0.25) were chosen to enter to the final multivariable analysis model. In the Bivariate analysis among the personal factors age, marital status, work experience, educational status knowledge and attitude didn't show any statistical association with medical waste handling practice. However employment type of the cleaners showed significant association with medical waste handling practice (COR: 0.414, 95% CI (0.234; 0.733). Variables with a p-value of <0.25 such as knowledge (P-value 0.243) and employment type (P-value 0.002) were taken to a multivariable analysis. Although in the Bivariate analysis employment type was found to be statistically significant, in the presence of cofounders it was found to have no significant association with the outcome variable of medical waste handling practice. Among the institutional factors variables such as adequacy of PPE (COR: 2.308; 95% CI; 1.299; 4.100), availability of hand washing (COR: 3.012; 95% CI; 1.310; 6.929), adequacy of staff (COR: 3.060; 95% CI; 1.820; 5.146), waste disposal policy (COR: 3.060; 95% CI ;1.820; 5.146), hospital type for hospital type 1 (COR: 2.045; 95% CI; 1.106; 3.783) and for hospital type 2 (COR: 0.379; 95% CI; 0.182; 0.793) were found to be statistically significant. After the bivariate analysis was made variables with a p value of <0.25 were selected and taken to the multivariable analysis. These variables include hospital type (P-value of 0.010 and p value of 0.023) for hospital 1 and 2 respectively, waste disposal policy (P value 0.001), adequacy of staff (P-value 0.0001), adequacy of waste container (P-value 0.217), availability of hand washing (P-value of 0.009) and adequacy of PPE (P-value 0.004).

In the multivariable analysis adequacy of staff, presences of waste disposal policy and hospital type were found to have significant association with the outcome variable medical waste handling practice. The adjusted odds ratio and the corresponding 95% confidence interval of the variables is given as follows: For adequacy of staff (AOR: 2.005; 95% CI; 1.057; 3.803), for waste disposal policy (AOR: 2.198; 95%CI; 1.197; 4.141) and hospital type for hospital type 1 or Minillik hospital (AOR: 2.838; 95% CI; 1.205,6.684) and for hospital type 2 or Yekatit 12 (AOR: 0.761; 95% CI; 0.332; 1.745). The analysis result showed that the odd of having good medical waste handling practice is 2 times greater for institutions with adequate medical waste handling staffs than those of with inadequate staffs holding the other factors constant. For waste disposal policy the odds of having good practice is 2 times greater for institutions who have medical waste disposal policy than those who don't have waste disposal policy holding the other factors constant. And for hospital types the odds of having good practice is almost three times greater for individuals who work in Minillik hospital than in Yekatit 12 hospital. The result is shown in **Table 5**.

**DISCUSSION**

Improper handling and disposal of medical waste puts the health worker, the patient and the community at risk through transmission of pathogens. In this study medical waste handling practice and factors affecting safe practice in three randomly selected hospitals under AAHB was studied. The finding showed that out of the 320 public hospital cleaners, 81 (25.3%) have good waste handling practice the rest 239 (74.7%) have poor practice. The poor waste handling practice as obtained from the response showed the criticalness of the issue and its potential environmental and public health hazard such as exposing the medical waste to the surrounding environment and to the people who lived nearby. This indicates the need for further planning for improvement in infection prevention and control measure and strict supervision. The study indicated the low level of practice was mainly due

to the absence of waste disposal policy and absence of adequate cleaning where 60.9% of the study participants agreed that the number of cleaners is insufficient as compared to the work burden in the hospitals. The same is true in a study conducted in public hospitals in Addis Ababa, on challenges of hazardous waste management, where the finding indicated that lack of adequate human resource was the main problem for proper waste management in ALERT and Zewditu hospitals<sup>[14]</sup>. Similarly in a study conducted in Gondar it was found that only 31.5% had good medical waste handling practice, among those 96.9% of the health care workers are found to have no guide line for health care waste management<sup>[7]</sup>.

About knowledge of the study participants the study revealed that 74.1% had good knowledge on medical waste handling. This finding opposed the finding that was obtained from a cross sectional study that was made on Mangalore, India which revealed that majority of the sanitary staffs had no knowledge regarding bio medical waste a study in Bangladesh also showed that the sanitary staffs had little knowledge as compared to the other health care workers<sup>[15,16]</sup>. The result finding from the mentioned researches showed that the inadequate level of knowledge is due to low level of training particularly for the cleaning staffs where only 36.3% of the study participants in Mangalore, India have taken training on medical waste handling, however this in this study majority of the health facility cleaners 262 (81.9%) have taken training on medical waste handling, this number is greater than a finding from a study conducted in Gondar and eastern Ethiopia which shows that 47.9 % and 54.4 % of the cleaners had taken training respectively<sup>[7,17]</sup>. Provision of training might be a reason for the relatively high level of knowledge on medical waste management as compared to the other researches. Showing that there are improvements in developing awareness among supportive staffs about infection prevention, but to what extent the trainings are addressing their need is still questionable. The study participants who took training were asked on what was included and the result showed that 43.3% answered it doesn't include about waste disposal policy, 30% answered it doesn't include about what to do in case of accidents, 28.5 % responded it doesn't include about waste storage and transportation and 24.7% answered it doesn't include about PPE usage. Attitude towards medical waste handling also showed that 316 (98.8%) of the study participants have positive attitude towards proper medical waste management, similarly a study conducted in Luknow, India showed that almost all of the sanitary staffs have positive attitude towards proper waste disposal and supported the ongoing process<sup>[18]</sup>. This indicated that cleaners are fully aware of the fact that proper waste management is basic step for maintaining the health of the community and themselves. Regarding proper usage of PPE the study revealed that only 46 (14.4%) of the cleaners used complete personal protective equipment. This finding is similar with the finding obtained from a research conducted on safety practices among hospital laboratories in Oromia regional state, Ethiopia where the finding showed that usage of PPE among the health care workers is very poor or almost nil also the finding of hospital survey in Fars province in Iran regarding PPE indicated that only 33.3% of the cleaners used complete personal protective equipment<sup>[19,20]</sup>. In this study participants were asked if there is adequacy of personal protective equipment and majority of the study participants 63.1% answered that there is adequate personal protective equipment in their facilities, showing that the incomplete usage PPE is due to negligence and not due to shortage of PPE. Also indicate the need for strict supervision to ensure adherence to safety precautions.

Regarding waste disposal methods except body parts, sharps and other medical wastes is disposed mainly using incinerator where 94.1% responded they used incineration, 2.2% used steam sterilization and 3.8% used chemical disinfection. Study participants were asked about status of the incinerator where 94.4% responded that it is in good condition and has a potential of burning completely to ashes. This finding is similar with the finding obtained from Kenya where 80% of the study population answered that the incinerator is in good condition<sup>[21]</sup>. Regarding medical waste disposal site the study revealed that in the three hospitals that were under the study none of them have fence around waste disposal site this finding was justified by observation. The finding is similar with finding obtained from low level health facilities in Tanzania where it was indicated that the disposal sites are not fenced<sup>[22]</sup>. This will make the medical waste disposal site to be exposed to the people who are passing by the area, which will in turn increase treat. In order to prevent that, the medical waste treatment and disposal site should be fenced and should have the necessary safety sign to avoid unauthorized entry.

Regarding onsite transportation system the study showed that 99.7% of the participants have responded they used wheel trolley for transporting the medical waste, this contradict with the study finding obtained in Adama hospitals which showed that most of the materials used for on-site transportations are open and unprotected. Also a study conducted in Tanzania showed that 71% of the facilities in the study used hands to carry the wastes to the disposal sites<sup>[22,23]</sup>. Using wheel trolley for waste transportation and regular cleaning of the waste transportation material indicated a good adherence to safety. Assessment of waste storage area according to the responses indicated that 71.9% of the participants showed that the storage area is in poor condition based on the requirements that has to be fulfilled. This finding contradicts with the finding obtained from Kenya where the storage area fulfills more that 80% of the criteria for efficient storage<sup>[21]</sup>. The response obtained from the study participants indicated that the waste storage area doesn't have hard standing floor with a good drainage which makes it difficult to clean and disinfect.

## **CONCLUSION**

This study showed that the medical waste handling practice is poor among hospital cleaners under the hospitals under AAHB also showing a decrease in proper waste handling practice as compared to the previous studies. This study showed that shortage of staffs as compared to the service given, not having or not knowing the presence of waste disposal policy and the type of hospitals are associated with the decrease in the proper medical waste handling practice.

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