

Evaluation of the Factors that affect Medical Waste Disposal at Ishaka Adventist Hospital, Bushenyi District, Uganda.

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ABSTRACT

Healthcare institutions/facilities generate different types of infectious and/or hazardous medical waste from different department in the hospital that poses enormous risk to patients, healthcare providers, waste pickers, and the community at large, if their disposal is not comprehensively and scientifically managed, about 5.2 million people (including 4 million children) die each year from waste related diseases and the hazards of exposure to hospital waste. The study purpose was to assess the factors affecting Medical Waste Disposal at Ishaka Adventist Hospital (IAH), Bushenyi District. The study was conducted at IAH, a descriptive cross-sectional study and quantitative methods of data collection were used targeted health workers age 25 years and above which included; midwives, nurses, nursing aides, laboratory technicians, pharmacist, Medical clinical officers and cleaners in IAH. The total of 44 respondents of which Nurses were (59%), others (laboratory technicians and other supporting staffs at the hospital) were 25%, cleaner (11%) and Medical clinical officers (5%) whom some of them prefer depositing waste using bins (64%) to boxes (36%). The most common method of medical waste disposal reported was open pit burning by 48%, incineration with 43% and least used method was ultra-high temperature with 9%. 93.2% respondents reported having got the training on the job, 6.8% said training was through their professional training at school. The Ministry of Health (MoH) should ensure regular and effective support supervision for Health care waste disposal.

Keywords: Medical waste, Hazard, Nurses, Laboratory Technicians.

INTRODUCTION

Medical Waste is considered as the second dangerous waste in the world that needs to be properly disposed by trained health care staff, despite good knowledge, positive attitude and safe practices of medical staff are still very imperative while managing this Infectious and highly Hazardous waste [1]. Healthcare institutions/facilities generate different types of infectious and/or hazardous medical waste from different department in the hospital that poses enormous risk to patients, healthcare providers, waste pickers, and the community at large, if their disposal is not comprehensively and scientifically managed [2]. The [13], report define medical waste disposal as removing and destroying or storing damaged, used or other unwanted medical products and substances. Health-

care waste is classified as Sharp waste (e.g. hypodermic needles, scalpels etc.), Chemical waste (e.g. reagents, solvent etc.), Pathological waste (e.g. human tissues, body parts, fetus, etc.), Infectious waste (e.g. blood and body fluids etc.), Pressurized containers (e.g. gas cylinders, aerosol etc.), Pharmaceutical waste (e.g. outdated medications, etc.), Genotoxic waste (e.g. cytotoxic drugs and genotoxic chemical) and Waste with high heavy metal content (e.g. batteries, thermometers etc.) are the most common one in all health facilities [4][5]. Disposal of healthcare waste includes burning, burial at landfill sites or recycling. There exist critical steps for safe and scientific disposal of medical waste which healthcare establishment can adopt; medical waste may be disposed using different methods

which that country has adopted [3]. The disposal of medical waste needs to be carried out in a way that neither the environment nor the health conditions of people are put at risk as they are hazardous [6]. It has been established that, worldwide, about 5.2 million people (including 4 million children) die each year from waste related diseases and the hazards of exposure to hospital waste can range from gastro-enteric, respiratory, and skin infections to more deadly diseases such as HIV/AIDS, and Hepatitis [2]. In Iran, the majority of problems are associated with an exponential growth in the healthcare sector together with low or non-compliance with guidelines and recommendations [7]. Meanwhile in developing countries such as Nigeria, where health concerns are competing with limited resources medical wastes have not received sufficient attention and the priority it deserves [8].

According to NDA legislation, all pharmaceutical waste should be sorted depending upon the pharmaceutical form of the drugs at the point of generation and packed into containers according to its properties, amount, transportation and treatment before final disposal [9]. The packaging for various categories of pharmaceutical waste differs by color, shape and size. Red color marks infectious waste, red with a black stripe indicates Pathological waste, yellow indicated chemical waste, green is used for pharmaceutical waste, and black and blue indicate communal (general) waste. All packages should be labeled as [9][10][11].

Statement of Problem

Medical waste disposal method is still a public health challenge in low-income countries especially to the informal and the formal actors which exposes them to higher risk for pathogenic infection and injury, through handling process during disposals [12]. It has been established that, worldwide, about 5.2 million people (including 4 million children) die each year from waste related diseases. According to World Health Organization [3], reported that in most countries for immediate disposal of waste, plastic

waste bins were used by 94.7% of the health care workers much as they were neither color coded nor had bin liners. Although 75% of the hospital waste is non-hazardous and harmless as any of the other municipal waste, the remaining 25% is hazardous to humans or animals and deleterious to environment but medical wastes may transmit diseases and infections through direct contact or via vectors when not properly disposed [12]. Most small hospitals contribute a lot in the health care facilities, but due to their poor waste disposal, they pose serious biomedical waste pollution [13]. The proper collection and disposal of this waste is of great importance as it can directly and indirectly impact the health risks to both public and the environment [14]. The [15] report that though a majority of healthcare workers had adequate knowledge regarding medical waste disposal, it was not reflected in their practices. In Ishaka Adventist Hospital (IAH) reported over 65% patients of different conditions are admitted daily in both its private and public wings as a result more health care waste is being generated IAH record, 2015. Ishaka Adventist Hospital activities includes 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. The disposals of these medical wastes need to be carried out in a way that neither the environment nor the health conditions of people are put at risk as they are hazardous. Therefore, need to assess the factors affecting medical waste disposal at Ishaka Adventist Hospital, Bushenyi District.

Aim of the study

The study purpose was assessing the factors affecting Medical Waste Disposal at Ishaka Adventist Hospital, Bushenyi District so as to equip the people with knowledge about medical waste and its disposal.

Study objective

To assess the factors affecting medical waste disposal at Ishaka Adventist Hospital, Bushenyi District.

Specific objectives

- i. To assess the knowledge of health workers on medical waste disposal at Ishaka Adventist Hospital, Bushenyi District.
- ii. To find out the practices on methods of medical waste disposal at Ishaka Adventist Hospital, Bushenyi District.

Research questions

- ✦ What is the knowledge of health workers on medical waste disposal at Ishaka Adventist Hospital, Bushenyi District?
- ✦ What are the practices on methods of medical waste disposal at Ishaka Adventist Hospital, Bushenyi District?

Justification of the study

Health Care Waste is considered as the second dangerous waste in the World that needs to be properly disposed by trained health care staff therefore good knowledge, positive attitude and safe practices of medical staff is very imperative while managing this infectious waste [1]. The [3], reported a number of

factors that influence the implementation of health care waste disposal like;- availability of resources, state of the infrastructure, level of organization (cultural, social and economic circumstances) and decentralization of health sub district concept. Despite the establishment of a national policy in Uganda on health care waste and a legal work, training of personnel's and raising of public awareness, selection of safe and environmentally friendly management options to protect people from health care waste when disposal is essential elements in waste management. The findings of this study shall thus provide a platform for both the medical personnel and non-Medical personnel's in IAH get the knowledge about waste disposal and how to control the diseases from poor waste disposal. It is this study that focused on Medical waste disposal at Ishaka Adventist Hospital for proper management. It shall therefore form a useful material for references to other researchers and readers.

METHODOLOGY

Area of Study

The study was conducted in IAH which is one of the hospitals in Uganda. The hospital is located in the town of Ishaka, Bushenyi District in Western Uganda. It is located immediately north of the junction of the Ntungamo-Kasese Road with the Mbarara-Ishaka Road [16]

Its location is approximately 77 kilometers (48 mi), by road, west of Mbarara, the largest city in the sub-region This location lies approximately 360 kilometers (224 mi), by road, southwest of Kampala, the capital of Uganda and the largest city in that country.

Ishaka Adventist Hospital is a 110-bed community hospital that is owned and administered by the Seventh-day Adventist Church in Uganda. It primarily caters to the health needs of the rural subsistence farmers who live in the community where the hospital is located. As of 2010 the hospital's professional staff included 3 Doctor, 4 Medical Clinical Officers and about 43 Nurses, Midwives

and Nurse's aides. The hospital maintains a nurse's training school on the hospital premises. IAH is affiliated with Loma Linda University, in Loma Linda, California in United States of America. The hospital was founded in 1950 It affiliated with the Seventh-day Adventist Church. Besides a School of Nursing, the hospital maintains an elementary school, Ishaka Adventist Hospital Primary School, for the children of staff and the community and a community-based health delivery organization, Ishaka Health Plan.

Study design

The descriptive cross-sectional study and quantitative methods of data collection were used, the above design was chosen because of its proven applicability by other researchers in the same field. This study was carried out for a period of four weeks.

This was done through formulation and use of close ended questions which was

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pre-designed, pre- tested before use in the field.

Study population

The study targeted health workers which included; midwives, nurses, nursing aides, laboratory technicians, pharmacist, Medical clinical officers and cleaners in IAH. These groups were considered for understanding information about the factors affecting the medical waste disposal in the area.

Sample size estimations

The sample size of the participant was calculated using the [17], formula which stated. $n = \left(\frac{Z^2 p q}{d^2}\right)$.

Equation1: Kish and Leslie Formula;

$$n = \left(\frac{Z^2 p q}{d^2}\right)$$

Where; n =desired sample size,

Z = Standard deviation at desired degree of accuracy taken at 1.96 at confidence level of 95%.

p = Proportion of health workers (midwives, nurses, nursing aides, laboratory technicians, pharmacist, Medical clinical officers) and cleaner at IAH (Considered to be 50% of the targeted population). Implying that, $p = 0.5$

q = Standardize, $1.0 - p = 0.5$

d = Degree of error which was accepted at 5%, $d = 0.05$

$$n = \left(\frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}\right)$$

$$n = 384$$

Since the sample population of health workers (midwives, nurses, nursing aides, laboratory technicians, pharmacist, and Medical clinical officers) and cleaner at IAH were less than 10,000. Therefore, N = Total number of health workers (midwives, nurses, nursing aides, laboratory technicians, pharmacist, Medical clinical officers) and cleaner at IAH = 50

Considering;

Equation2: Target population $n_f < 10,000$

$$n_f = \left(\frac{n}{1 + \frac{n}{N}}\right); \quad n_f = \left(\frac{384}{1 + \frac{384}{50}}\right);$$

$n_f = 44$ respondents

Where n_f is sample size for N , population of post-natal mothers less than ($<$) 10,000

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Where n is sample size for N , population less than 10,000

The sample size of 44 respondents who consented and therefore participated in the study.

Sampling procedure

A simple random sampling technique was used in which respondents were chosen from the population with equal chances of selection to participate in the study. The researcher administered both open ended and closed ended questioners to the study population at IAH. This was to ensure easy to administration, and analysis of data obtained from it was straight forward.

Inclusion criteria

All the health workers (midwives, nurses, nursing aides, laboratory technicians, pharmacist, and Medical clinical officers) and cleaners who consented to the study.

Exclusion criteria

Those health workers (midwives, nurses, nursing aides, laboratory technicians, pharmacist, and Medical clinical officers) and cleaners who did not consent to the study, sick, busy during the duty hours and those who were on leave.

Dependent variables

Factors affecting medical waste disposal.

Independent variables

- Knowledge of health workers on medical waste disposal.
- The practices on methods of medical waste disposal.

Confounding variables

The study used confounding variable to strengthen the findings and this includes; Age, profession category, level of education and work experience, awareness of disease transmitted by improper medical waste disposal.

Research instruments

A self-administered questionnaire Written in English were issued to specific respondents who consented to collect information in which respondents were expected to react in English. For the cleaners who didn't understand English with help of a Researcher interpreted and obtained the data. This ensured that a lot of information was collected over a short period of time. A close ended questionnaire was preferred because it

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enabled respondents to give opinions, views independently, without prejudice and at the same time minimizes effects of emotion such as shyness or fear or being known to have released some information.

Reliability and Validity of Instruments

In order to ensure the validity and reliability of instruments, the researcher ensured that both questionnaires were first pretested at KIU-TH and amendments made while as observation and the written documents first were analyzed to ensure that they are consistent with what the researcher intend to collect.

Data collection procedures

The quantitative data collected were entered in the computer and analyzed using computer software called Statistical package for social sciences version IBM® 17. And a Microsoft word and excel 2007 program.

Data management

The collected data was kept confidential between the researcher and the respondents. All data obtained was analyzed and after the analysis, the questionnaires were kept properly to avoid access by unauthorized personnel and losses.

Data analysis and presentation

The quantitative data collected was edited, coded and entered into the

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Statistical Package for Social Science (SPSS) program 17.0 for analysis of variables. The analyzed data were displayed in the form of tables, pie Charts, graphs and frequency distribution tables, which formed the basis for interpretation, discussion and conclusion.

Ethical considerations

- ❖ A letter of introduction was obtained from Kampala International University Western Campus School of Nursing sciences to permit the researcher to carry out the research.
- ❖ Permission was obtained from IAH executive director.
- ❖ All participating mothers were selected on the basis of informed consent.
- ❖ The study was on voluntary basis and information was kept private and confidential, Participants' anonymity was kept, participant were assured that they are free to drop out of the study at any time they want.
- ❖ The study was conducted while upholding the professional code of conduct in a manner that did not compromise the scientific inclinations of the research.

RESULTS

Demographic data

Table 1: Show the distribution of respondents according to their age group

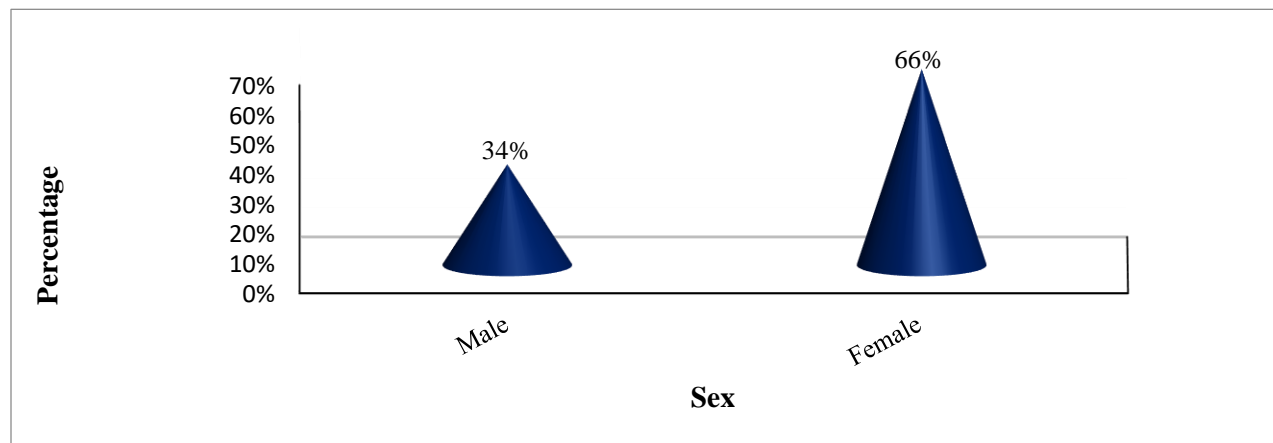
Age group of the respondents in year	Frequency	Percentage
25-35	10	23%
36-45	18	41%
45-55	11	25%
56-65	4	9%
Above 65	1	2%
Total	96	100%

Source: field data, 2016

The results showed that majority 18 (41%) were age group 36-45, followed by 11 (25%) age group 45-55 meanwhile 10 (23%)

were age group 25-35 years, 4 (9%) were age group 56-65 and only with 1 (1%) were age group above 65 years.

Figure 1: A bar graph showing distribution of respondents according to their sex n=44



Source: field data, 2016

Majorities were female with 66% (29) and least was male with 34% (15).

Table 2: Show distribution of respondent according to their duration of work

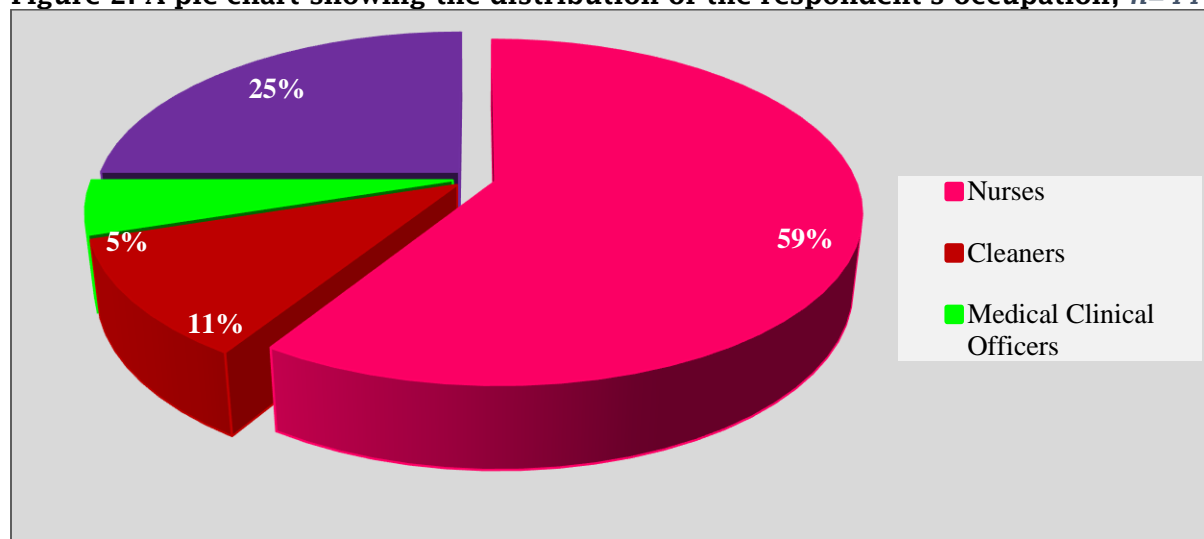
Variable	Frequency (n)	Percentage / (%)
Less than 1 year	16	36
1-2 years	6	14
3-4 years	18	41
Over 4 years	4	9
Total	44	100

Source: field data, 2016

The finding of respondents revealed that majority 18 (41%) of them worked for 3-4 years, 16 (36%) had work for less than 1

year, 6 (14%) for 1-2 years duration and few 4 (9%) for over 4 years.

Figure 2: A pie chart showing the distribution of the respondent's occupation, n=44



Source: field data, 2016

The finding in the figure 2 above shows that majority of the respondents were nurses 59% (26), followed by others (laboratory technicians and other

supporting staffs at the hospital) were 25% (11), while the least participants were cleaner 5 (11%) and Medical clinical officers 5% (2) only.

Knowledge of health workers on medical waste disposal at IAH
Table 3: Show whether the staffs were trained on medical waste disposal

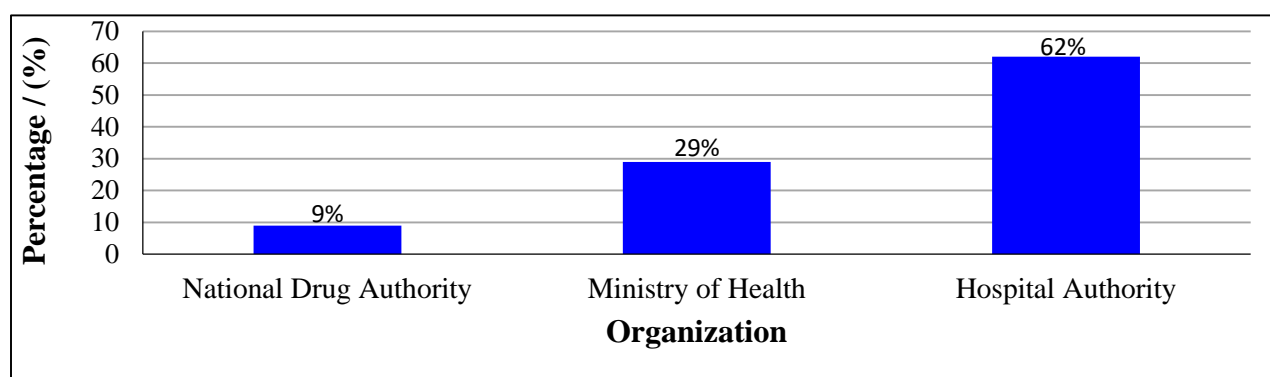
variables	Frequency (n)	Percentage
Yes	34	77.3%
No	10	22.7%
Total	44	100.0%

Source: field data, 2016

77.3% respondents said they were trained on medical waste management and disposal (Yes) while 22.7% respondents

said they were not trained formal education (No).

Figure 3: A bar graph showing organization that provided the training on medical waste disposal, n=34



Source: field data, 2016

Most respondents 62% (21) were trained by the hospital authorities, 29% (10) were trained by Ministry of health and rest 9%

(3) were trained by National drug authority.

Table 4: Show whether the training was included in the curriculum

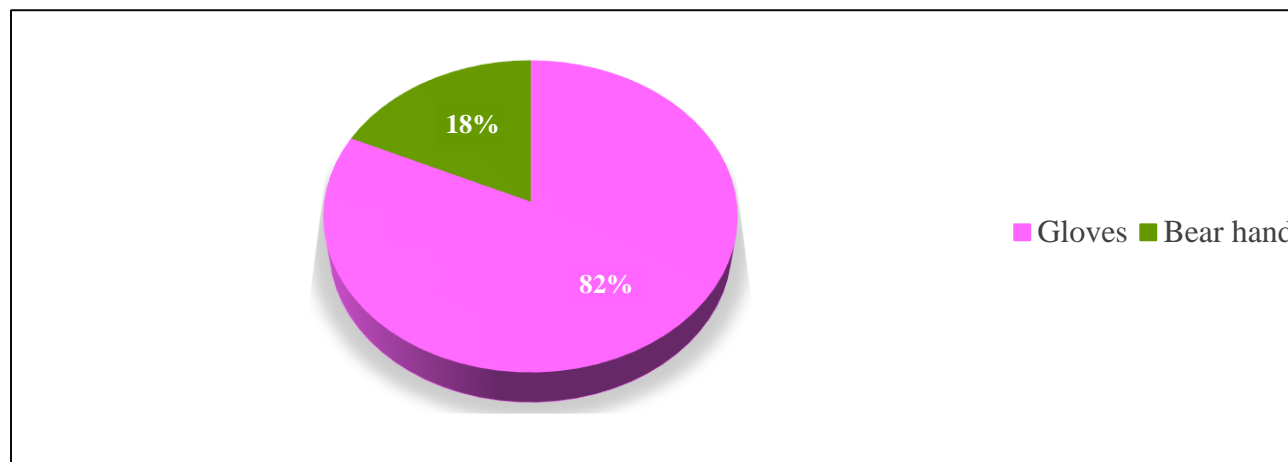
Variables	Frequency (n)	Percentage
Through on job training	41	93.2%
Through professional training	3	6.8%
Total	44	100.0%

Source: field data, 2016

As in the table 4 above, 41 (93.2%) of respondents reported having got the training on job, 3 (6.8%) said they got the

training through their professional training at school.

Figure 4: A pie chart showing whether they use Protective gears for medical wastes disposal, n=44



Source: field data, 2016

Most of the respondents 82% put on gloves when disposing the medical waste while the others 18% do use bear hands while disposing medical waste.

Table 5: Showing the respondents' understanding of medical waste disposal

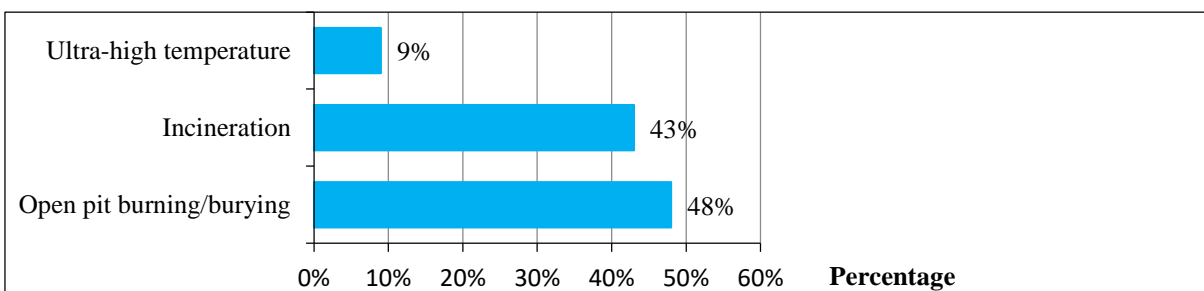
Variables	Frequency (n)	Percentage
Removing and destroying used unwanted medical products	40	91%
Separation of solid from liquid products	4	9%
Total	44	100%

Source: field data, 2016

Majority, 40 (91%) of the respondents understood medical waste disposal as removing and destroying used unwanted medical products while 4 (9%) understood as the separation of solid from liquid products.

Practices on methods of disposing medical waste at IAH

Figure 5: A bar graph showing method of medical waste disposal at IAH, n=44



Source: field data, 2016

As shown in the figure 5 above, the most common method of medical waste disposal was open pit burning 48% (21), followed by incineration 43% (19) and the least used method was ultra-high temperature 9% (4).

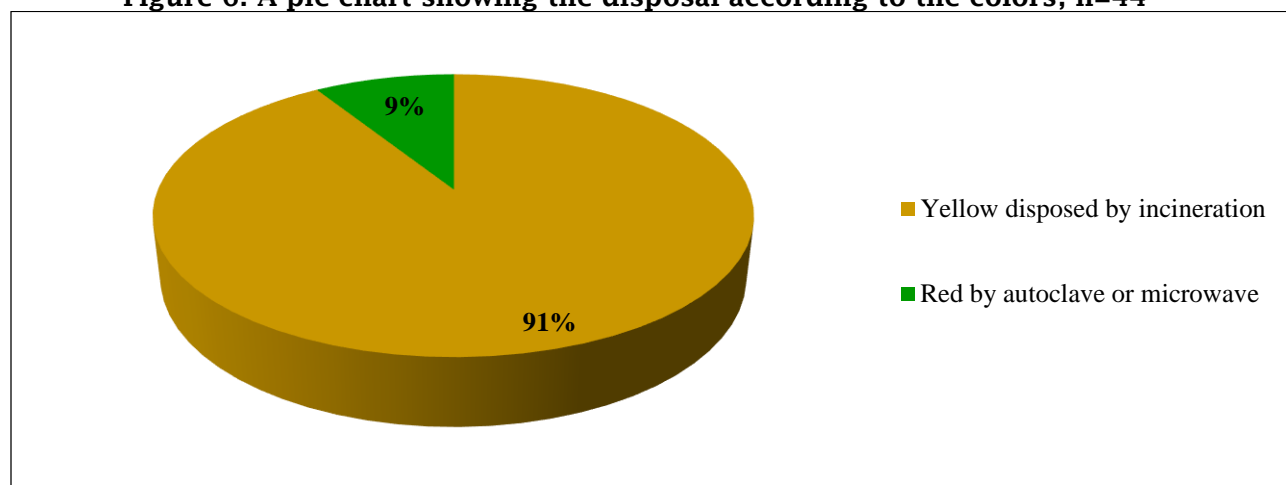
Table 6: Show the containers used to dispose medical waste

Containers	Frequency	Percentage
Bins	28	64%
Boxes	16	36%
Total	44	100%

Source: field data, 2016

The results shows, 28 (64%) of the respondents said they used bins as the containers to keep medical waste before

disposal while 16 (36%) said they use boxes.

Figure 6: A pie chart showing the disposal according to the colors, n=44

Source: field data, 2016

As shown in the table above, 91% said yellow containers are used for disposal of waste meant for incineration or deep

burial in landfill while 9% said red is meant for disposal by autoclave or microwave.

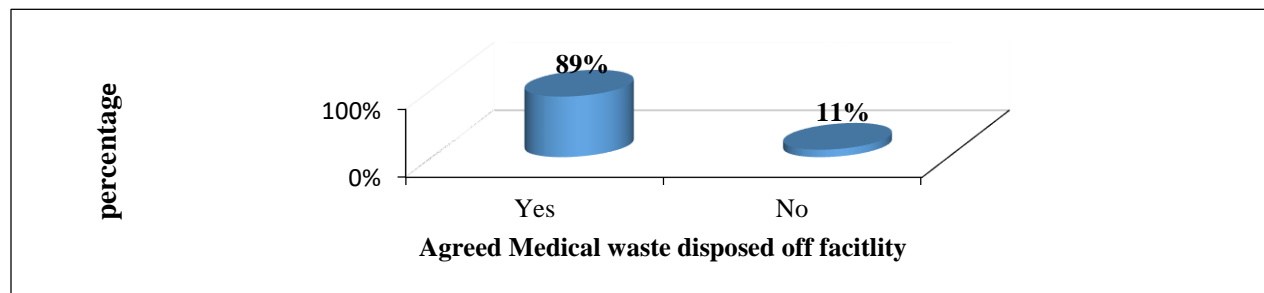
Table 7: Show distribution of the bodies that disposed off waste at IAH

Variables	Frequency (n)	Percentage
Disposed by cleaner	22	50%
Hospital authority	17	39%
Municipal council	5	11%
Total	44	100%

Source: field data, 2016

Results showed, 22 (50%) of the respondents reported that the medical waste were disposed by the cleaners, 17 (39%) said they were disposed by the

hospital authority, and the rest 5(11%) said they were disposed by the municipal council.

Figure 7: A bar graph showing whether medical waste is disposed at facility, n=44

Source: field data, 2016

Results showed majority, 89% (39) of the respondents agreed they disposed off the medical waste at the health facility while

11% (5) said they don't dispose them off at the facility.

DISCUSSION

Demographic data

The study results showed that majority out of 44 interviewed health workers and cleaners, 41% of them were age group 36-45, followed by 25% age group 45-55 meanwhile 23% were age group 25-35 years, 9% were age group 56-65 and only with 1% were age group above 65 years of which among them female were having highest percentage with 66% and least was male with 34%. This study found age as a factor for practicing health care waste segregation properly, out of the total respondents who are in the age group of 56-65 were 9% less likely to be correctly practice the segregation compared to the respondents who are in the age group of 25-35. In contrast, a study conducted in UK revealed that all of the professions that were careless in the practice of segregation were either in the age group of 16-20 or 20-30 [18]. It might be respondents who are in the older age group relative with the other age categories put health care waste in a wrong bin, because there is ignorance and tiredness of health care workers to put health care wastes in appropriate bin. The finding also revealed that majority, 41% of them worked for 3-4 years, 36% had work for less than 1 year, 14% for 1-2 years duration and few 9% for over 4 years. Work experience also has an effect on the practice of health care waste disposal. The respondents who have experience years of over 4 years were 9% less likely to be correctly practice

disposal of health care waste compared to the respondents who have less 1years, 1-2 and 3-4 experience years. The respondents who have below 4 experience years may respect rules and regulation and doing their tasks accordingly and they want to know more and practice than the other former health care workers.

The finding in the figure 2 above shows that majority of the respondents were nurses 59% followed by others (laboratory technicians and other supporting staffs at the hospital) were 25% while the least participants were cleaner 5 and Medical clinical officers 5% only.

Knowledge of health workers on medical waste disposal

The study investigated the understanding of the health workers on the medical waste disposal, nearly 91% of the interviewed respondents understood medical waste disposal as removing and destroying used unwanted medical products while 9% understood as the separation of solid from liquid products. This slightly disagree with the study finding of [19], which reported that in Nigeria the disposal of medical waste was understood by some of the respondents as separation into solids and liquids.

The results found that most of the respondents with average percentage of 62% were trained by the hospital authorities. This could be the outcome of training on job which showed up with highest value of 93.2% of the respondents who reported that the training was not

included in the curriculum, despite most of the health workers didn't have any clear knowledge about medical waste disposal and therefore were trained on job by the hospital authority. This finding is similar to study documented by [20], which indicated that most of them (health workers) acquired these other skills through on job training from seminars and formally through organized talks at work places. As noted through this study, 93.2% of the respondents reported having got the training on job, 6.8% said they got the training through their professional training at school. This findings look similar to the studies documented by [21], which reported that most of them (health workers) acquired this through on job training from seminars and informally through organized talks at work places.

Nearly 82% of the respondents put on gloves when disposing the medical waste meanwhile 18% reported do use bear hands while disposing medical waste. However, according to [22], reported that the waste-workers were disposing medical and non-medical wastes together manually in all hospitals without receiving adequate training and without using proper protection equipment [23][24][25]. Furthermore, the author added that poor knowledge and practices and a high rate of injuries among waste-workers were noted, together with a risk of exposure of staff and visitors to hazardous waste, but the results from this finding disagree with [22], findings because most of the greater number of respondents reported putting on gloves while handing medical waste.

Practices on method of medical waste disposal

These results were based on methods of medical waste disposal, the most common method of medical waste disposal report by the studied participants were open pit burning by 48%, followed by incineration with 43% and the least used method was ultra-high temperature with 9%. These findings was in consistence to NDA documentation which revealed that the common methods used at the moment for the safe disposal of medical and pharmaceutical waste are by; Ultra-high

Temperature incineration and burning and burying in protected soak pit [9]. Also, a study for [23][26] documented; Incineration is the process of destructing waste by burning it at elevated temperatures in furnaces. The process removes hazardous materials, reduces the mass and volume of the waste and converts it into ash that is harmless. Incineration is suitable for wastes that are 60% combustible [27][28] [[9]. Incineration is suitable for pathological and infectious waste or sharp wastes. Incinerators exist in several different types; each type has a specific function, also coincided with [3], report that said in most developing countries, hospital medical wastes are destroyed by use of incineration.

It was also noted that most of the medical waste was disposed using colored containers where 91% said yellow containers are used for disposal of waste meant for incineration or deep burial in landfill while 9% said red is meant for disposal by autoclave or microwave. Of which, 64% of the respondents said they used bins as the containers to keep medical waste before disposal while 36% said they use boxes. This interesting finding also correlated with the study done [24][29], which stated that; in medical centers, infectious and pathological waste, and sharps are placed in different containers. The containers are labeled as "biohazard", closed, water tight and of uniform color for each type of waste. The size of the containers depends on the volume of waste disposed and the containers used are easy to handle and transport. For used needles specially designed containers are used [24].

Much as finding above also agree with a study done in Uganda, according to NDA legislation, all medical waste should be sorted depending upon the medical form of the drugs at the point of generation and packed into containers according to its properties, amount, transportation and treatment before final disposal. The packaging for various categories of medical waste differs by color, shape and size. Red color marks infectious waste, red with a black stripe indicates Pathological waste, yellow indicated

chemical waste, green is used for medical waste, and black and blue indicate communal (general) waste. All packages

should be labeled as "Hazardous waste [9].

CONCLUSION

Most of the health workers at IAH were knowledgeable on the medical waste disposal. Nurses (59%), others (laboratory technicians and other supporting staffs at the hospital) were 25%, while cleaner (11%) and Medical clinical officers (5%) which some of them prefer depositing waste using bins (64%) and the rest preferred boxes (36%).

The most common method of medical waste disposal reported by the studied participants were open pit burning by 48%, incineration with 43% and the least used method was ultra-high temperature with 9%. 93.2% of the respondents reported having got the training on job, 6.8% said they got the training through their professional training at school.

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