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Assessment of the Effectiveness of Hospital Waste Management Practices by Public Health Facilities in Garissa County - Kenya

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Abstract: ***Hospital waste management requires an organized systematic channeling of waste through practically appropriate recovery disposal routes, consistent with acceptable public health and environmental safeguards. The Ministry of Health estimates 47% of hospital waste generated cannot be accounted for. This indicates that it is being illegally dumped, buried or burnt somewhere undesignated for the purpose thus risking the health of people and the general environment. The study was aimed to identifying and assessing the effectiveness of waste management practices in public health facilities in Garissa County. The study adopted a cross sectional design. The target population of this study is 2240 management staffs in 32 public health facilities in Garissa County and 500 households around the damp sites. The study used Fisher, Laing and Stockdel (1983) formula to arrive at a total of 340 staff inclusive of 10% respondents to cater for none-response and 271 members of the community. The study employed stratified random sampling where the staff was grouped into job cadres to select the 340 respondents to be included in the study. Garissa County Health workers have different job cadres which were considered as different strata. Descriptive statistics were used to analyze categorical data. Inferential statistics by use of Chi-square test were used to determine the statistical significance of relationships between variables. GraphPad Prism Scientific statistical software version 7.04 was used for statistical the analysis. The data was presented in tables, bar graphs and charts. The results showed that on average proper medical waste segregation occurs in hospitals. Waste storage area were in debilitating conditions and need to be improved. Waste management facilities were available. However, the only available incineration facility was not in good condition. Waste handling equipment available are in a poor condition and require urgent attention. Profession, level of education, number of years worked and training influence proper medical waste handling and management. It was also established that among the persons living around waste dumpsites, young children were at a higher health risk of medical waste related hazards. It was determined that the community around dumpsites were at a higher propensity of medical sharps injuries risk exposure with the greatest chasm at p<0.05. It was also shown that profession of medical staff, education level, and number of years worked and training had a significant influence on proper medical waste management. Doctors, university graduates, those who had been trained on medical waste management were aware and adhered to the set guidelines. Clinical waste management has become a major health and environmental concern worldwide. Appropriate clinical waste management is a vital requirement as it ensures protection of human health and the environment.***

Keywords: Hospital Waste Management Practices, Public Health Facilities

1. Introduction

Hospital waste refers to waste that is generated or produced as a result of the diagnosis, treatment, or immunization of humans or animals; in research pertaining to the treatment, diagnosis, or immunization of humans or animals; or in the production or testing of biological (World Health Organization, 2011). Safe handling of wastes continues to be a matter of serious concern for health authorities all over the world. Thousands of tons of biomedical wastes originating from hospitals, nursing homes, and clinics in the form of cotton swabs and bandages infected with blood, fluid bags, needles, catheters, human tissues, and body parts, among others continue to be dumped in open garbage bins on the roads in most parts of the country. The generation of these dangerous wastes is expected to increase (Ali *et al.*, 2015).

Global figures based on statistical data of the Environmental Protection Agency of America and Japan's Ministry of Health suggested a volume of 1 to 1.5 kg/day/bed for hospitals, while, waste produced has been quoted up to 5.2 kg in developed countries (UN, 2012). However, the problem of hospital waste is more of quality as compared to quantity e g. it is estimated that the total amount of hospital waste in most developing countries is only 1.5% of the total municipal waste stream. Yet, a special obligation to deal with this waste in an effective and safe manner is mandatory due to its composition. Globally, wastes generated from hospitals are now recognized as serious problems that have detrimental effects on the environment and/or human beings through direct or indirect contact. Exposure to hazardous healthcare waste can result in disease or injury (Zafar *et al.*, 2013).

In Africa the situation is more critical as reports from around the continent indicate poor MWM practices. Leonard (2004) and Manyele (2003) described MWM in Tanzania as being poor, further, he posited that the general awareness on issues related to medical waste management was generally lacking among generators and handlers. Even though reported medical waste management systems in Tanzania was said to be poor, more recently, moves to confront the problems posed by poor management led to the construction of 13 pilot SSI in various parts of the country. The success achieved through this program motivated the government to extend the SSI to all referral regional and district hospitals (Manyele, 2004). In South Africa, for instance, medical waste is seen as a mounting problem. In recent times, there have been numerous press statements about medical waste being disposed of in an incorrect manner. This situation has adversely affected the poor,

disadvantaged members of society.

In Kenya, a national plan was developed to provide viable technical options as well as a roadmap for the management of healthcare waste for 5 years. The National HCW Management Plan of Action is a document intended for use by health managers and program officers across the health sector (including those in the private health sector). The purpose of developing this plan was to provide a tool that gives health managers guidance in planning, implementing and monitoring the activities of health care waste management in health facilities. This plan describes the situation of hospital waste management on the basis of a desk review and a survey which were conducted in order to document the situation of waste management in Kenya (MOH, 2007).

Garissa County is located in North Eastern region of Kenya. It covers an area of 44,174.5 km2 with an estimated population of 623,604 (Garissa county 2014, 2018 Strategic Policy). The County consists of six Sub-Counties namely Garissa, Dadaab, Lagdera, Balambala, Ijara, Fafi. Rainfall pattern in the County is generally erratic and unreliable. The communities living in Sub-counties are majorly pastoralist (90%), agro-pastoralist (7%) and others relying on formal employment and petty trade at 3% (Kenya Census; 2009). Garissa County is selected as a case based on the author's familiarity and understanding of the local system as well as similarity of the institutional elements to most developing countries.

1.1 Problem Statement

The effectiveness of hospital waste management has continued to generate increasing public interest due to the health problems associated with exposure of human beings to potentially hazardous wastes arising from healthcare (Ferreira, 2008; de Titto, *et al.*, 2012). Whilst hospitals and healthcare units are supposed to safeguard the health of the community, the mismanagement of health wastes poses health risks to people and the environment by contaminating the air, soil and water resources. Pakistan for example is facing this problem and around 250,000 tons of hospital waste is annually produced from all sorts of healthcare facilities in the country. This type of waste has a bad effect on the environment by contaminating the land, air and water resources (OSHA, 2006). In Botswana for-instance an estimated 2 400 tonnes of healthcare risk waste per year, equating to 1.71kg per capita are produced (GoB, 2007). The management of hospital waste is of serious concern in Kenya. Waste is generated both from public and private hospitals. The waste handlers are placed at risk in the absence of protective equipment when handling, collecting and transporting infectious and sharps wastes (Chaerol *et al*., 2008). According to MOH, 2006) out of the quantity of waste generated in Kenya, 39% of the waste was infectious, while 61% was non-infectious. In Garissa County, most of the health facilities dispose of their waste by burying it in the dumpsite without any treatment. Waste from hospitals is mixed with animal carcasses and abattoir waste. The disposal site has no lining, soil cover or gas control (WHO 2014) thus there is potential risk of ground water contamination. The Ministry of Health estimates 47% of hospital waste generated cannot be accounted for. There was need therefore to determine the effectiveness of waste management practices in public health facilities. To this end this study sought to fill this knowledge gap by assessing the effectiveness of waste management practices in public health facilities Garissa County.

1.2 Research Objectives

1) To assess the waste management practices used in public health facilities in Garissa County.
2) To determine knowledge and awareness on hospital waste management among care personnel in public health facilities in Garissa County

2. Literature Review

2.1 Hospital Wastes

World Health Organization (WHO, 2014) defines medical waste as Waste delivered by healing facility exercises including an extensive variety of materials, from utilized syringes and needles to ruined dressings, demonstrative specimens, body parts, pharmaceuticals, chemicals, blood, medicinal gadgets and radioactive materials. Though US Medical Waste Tracking Act (MWTA, 1998), characterizes therapeutic waste as any strong or fluid waste that is delivered in the, treatment, conclusion or inoculation of people or creatures, or in the generation and testing of natural living being. A wide range of squanders which are delivered by, specialist's centers or workplaces, healing centers, research and restorative units are viewed as therapeutic wastes (Srishti, 1998).

Hospital wastes are classified by the world health organization into public waste or general waste and exceptional waste. Public or general waste is all strong waste excluding irresistible, substance, or radioactive waste. This waste stream can incorporate things, for example, bundling materials, bedding waste water from laundries, office supplies and different substances that don't represent an uncommon taking care of issue or danger to human wellbeing or the earth (WHO, 1999).

Infectious waste contains pathogens (bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. This class incorporates societies and supply of irresistible specialists from research center work, squander from surgery and post- mortems on patients with irresistible ailments, squander from contaminated patients in seclusion wards, squander that has been in contact with tainted patients experiencing sew dialysis (e.g. Dialysis hardware, for example, tubing and channels, disposable towels, gowns and aprons, gloves and lab coats) and waste that has been in contact with creatures immunized with an irresistible specialist or experiencing an irresistible illness (WHO,2005). Infection wastes include; pathological wastes, sharps wastes, pharmaceutical wastes, genotoxic wastes and chemical wastes.

Pathological wastes consist of tissues, organs, body parts, human fetuses and animal carcasses, most blood and body

fluids. Within this category, recognizable human or animal body parts are also called anatomical waste. Anatomical waste is also considered as an infectious waste, even though it may also include healthy body parts (WHO, 1999). Sharps are items that could cause cuts or puncture wounds, including needles, syringes, scalpels, saws, blades, broken glass and nails. Whether or not they are infected, such items are usually considered as highly hazardous healthcare waste (WHO, 1999). Pharmaceutical waste comprises of drugs, contaminated and expired chemicals from wards, already used pharmaceutical products such as gloves, drug vials, and bottles with residue, tubings and masks. Genotoxic waste contains carcinogenic, mutagenic and teratogenic properties (WHO, 2005). It raises genuine health issues, both in health facilities and after transfer, and ought to be given specific consideration. Genotoxic waste may incorporate certain cytostatic drugs, regurgitation, pee, or wastes from patients treated with cytostatic medications, chemicals, and radioactive material.

2.2 Hospital Waste Management

Hospital Waste Management is a process that ensures proper hygiene in the health institution and safety of healthcare workers and communities (Sanitation Connection, 2002). According to (Johannessen *et al*., 2000). There are several Hospital waste management practices; The United Nation Environmental Programme (UNEP) has established that only 10% of the healthcare waste is considered to be potentially infectious. The proportion can be further reduced to 1-5% with proper segregation practiced at the sources (UNEP, 2002). According to Cheng *et al*. (2009), segregation refers to separation of waste into designated categories. Blenkharn (2011) also defined waste segregation as a process of dividing garbage and waste products in an effort to reuse and recycle material. In the context of healthcare facilities, it is the first important process in clinical waste management. The safe management of healthcare waste requires that clinical waste should be separated from general waste at source of generation for example from all patient care activity areas, diagnostic service areas, operation theaters, labour rooms and treatment rooms. Segregation of waste happens at the point of generation so that it can be sent through the appropriate route for disposal (Abor *et al*., 2007; Clover, 2009). The responsibility of segregation should be with the generator of biomedical waste for example doctors, nurses, technicians (Sim, 2009). Waste segregation is emphasized as a means of ensuring that healthcare risk waste and healthcare general waste are separated and stored in appropriate containers. This enables those who handle the containers outside the hospital wards to identify and treat them appropriately (Pruss *et al*., 2014). Handling procedures of clinical waste follows after waste has been segregated and placed in plastic bag or rigid containers.

Waste has to be stored before collection and final disposal, and should not accumulate in corridors, wards or places that are accessible to the general public. There is a wide range of containers designed to store different types of waste. These include plastic bags and rigid containers in a variety of sizes. When containers are full to the required capacity, the waste is removed from the collection points on a 24 hourly basis of its generation. Waste is not supposed to be stored for more than 48 hours (Hassan *et al*., 2008; WHO, 2010). According to Pruss *et al*. (2014), location and size of any waste storage depends upon the quantity and type of clinical waste produced and the frequency of collections. Bulk storage areas should be kept locked and access to these areas should be limited to personnel responsible for the handling, transportation, incineration and ultimate disposal of the waste, but kept securely from wild and domestic animals, birds, rodents and insects by means of a locked wire mesh cage. All internal and external storage containers are to be kept clean and disinfected and they should be easily drained. Disinfectants should be placed in close proximity to the waste in case a spill occurs.

As noted by Insa *et al*. (2010) medical waste must be transferred from the place where it is generated to the installations where it will be treated and/or disposed of. Collection and transportation of medical waste must be carried out by trained personnel from authorized waste collection companies. Transportation of medical waste depends on the category of waste. Abdulla *et al*. (2008) reported that at all times transportation of medical waste should be controlled via a document that shows at least the amount and type of waste, place of origin of waste and waste collection date, and place of destination. Where waste is transported within the facility, Singh (2001) established that all containers should be covered and labeled as being bio- hazard according to WHO specifications. GoB (2007) added that bags and rigid containers need to be labeled 'clinical waste', the place of production indicated and conveyed by red wheelie bins, trolleys and carts, which are made especially for carrying clinical waste. Kumari *et al*. (2012) also state that transportation routes within a hospital must be specifically designated to avoid passage through patient care areas. Separate times should be dedicated for the transportation of bio-medical waste to minimize chances of it mixing with general waste.

Several core technologies are available for treatment of clinical waste.

According to Ananth *et al*. (2010), different waste categories have to be treated differently. Healthcare waste treatment technologies, especially for infectious waste are often classified into burn and non-burn technologies and have their inherent merits, demerits and application criteria (Hossain *et al*., 2011). The most commonly proclaimed treatment technology for healthcare waste is incineration. Incineration is considered the gold standard treatment process though there is a trend towards its use for only the most difficult waste fraction (Blenkharn, 2011). Mato and Kassenga (1997) define incineration as the controlled combustion process for reducing solid, liquid or gaseous waste primarily to carbon dioxide, other gases and relatively noncombustible residue or ash. The gases are released into the atmosphere (through a chimney) and the residue is disposed of in sanitary land fill. The WHO (2010) suggested incineration as a viable interim solution especially for developing countries where options for waste treatment such as autoclaves, shredders or microwaves are limited.

3. Methodology

The study adopted a cross sectional design. This design was used because it provided a snapshot of the frequency or prevalence and the characteristics of the status of study population at a particular point in time. The study was carried out in Garissa county which is located in north eastern region of Kenya it covers an area of44,174.5km^2 with an estimated population of 623,604 (Garissa county 2014). The target population of this study was 2240 management staffs in 32 public health facilities in Garissa County and community living along the dumpsites These staffs are in-charges of pharmacy, orthopedic, surgical, nursing, laboratory, nutrition and kitchen, records, public health, outpatient departments, x-ray, physiotherapy and occupational, mortuary, stores and procurement, maintenance, laundry and comprehensive care centre in each of the 32 public health hospital facilities in the County (County Health Office, 2016). The study as well targeted the community around the damp sites who are the first hit by the environmental nuisance which arise due to foul odour, flies, cockroaches, rodents, and vermin as well as contamination of underground water by untreated medical waste in the damp sites. These were the 500 households around the damp sites.

The study used Fisher, Laing and Stoeckel (1983) formula. The selection formula is as follows:

Where n= the required sample size
P = proportion of population with the required characteristics of the study
Q = proportion of population without the required characteristics of the study (1-P) N= Total population
e = accuracy level required. Standard error = 5%
Z= Z value at the
level of confidence
of 95% =1.96 n=
1.96∗ 0.5 ∗ 0.5)
n=0. 9604)
n=328

Therefore, the total number of health workers in this study was 328. 328 respondents represent 15% of the target population. The calculated sample size was inflated by ten percent (10%) to cater for non-response. Thus the total number of health workers' respondents will be 361. The sample size of the community households study was determined using the Krejcie & Morgan (1970) sampling frame. This resulted to a sample of 217.

Stratified random sampling was used to select the 361 respondents to be included in the study. Garissa County Health workers have different job cadres that were considered as different strata. The respondents were selected by randomly picking personal numbers from employers list at the County head office for each job cadre using a computer generated random table the respondent per job cadre were selected proportionate to the study population to attain the required sample size as shown below. Eligible respondents from the community around the damp sites were selected as well.

Table 1: Job Strata and Sample Size

Job Cadre	Number	Sample size
Clinical Officer	550	58
Lab Tech	437	48
Nurses	835	174
Doctors	30	7
Dentist	12	3
Student Doctors	10	3
Cleaners	202	45
Mortuary Staff	7	2
Total	**N=2083**	**n=340**

Data was collected by the use of questionnaires and observations. The questionnaires comprised of both close ended (structured), and open-ended (unstructured) questionnaires in order to encourage in-depth responses. A checklist as an observational guide was constructed following recommended standards for management of medical waste. The observational guide was used to assess observe practices of handling medical waste in different section of hospitals. The questionnaire were pretested on a selected sample of 15 respondents which were selected randomly. Content validity was established through the extensive process of item selection and refinement in the development of the instrument. The content validity was pre-tested with the specialists in the field including the hospitals management. In addition, test re-test was administered to a group of 10 respondents. The study thus used an alpha value that is at least 0.70 to test the reliability.
The GraphPad prism version 7.04 scientific statistical software was used to analyze the collected data. The qualitative data generated from open ended questions were categorized in themes in accordance with research objectives and presented in prose form. This was done on all the specific objectives of the study. Inferential Statistics by use Chi-square was used to determine the statistical significance of relationship between independent variables. The relationship between waste management practices, community exposure and knowledge and awareness was established. The results were presented in tables.

4. Discussion

4.1 Medical Waste Management Practices in Garissa County Health Facilities

The study requested the health workers to indicate the type of wastes in the health facilities. According to the findings, majority of the respondents (90 %) indicated that the most frequent comprised of general wastes with genotoxic waste being the least frequent (28 %). It was shown that 36 % comprised of anatomical wastes like tissues, organs, body parts, human fetuses, blood and body. Infectious wastes including cultures and stocks of infectious agents from laboratories waste from survey and autopsy and dialysis from infected patients constituted about 73 %. Chemical and pharmaceutical wastes comprised of 75 % and 76% respectively. The study sought to determine whether there the wastes were properly segregated. From the findings, 70 % of the dentists indicated medical wastes were properly segregated, followed by laboratory technologists (66 %). It was noted that student doctors and mortuary staff slightly

agreed that medical wastes were properly segregated with percentage mean scores of 31 % and 17 % respectively. The results were as shown in table 2 below.

Table 2: Waste Management Practices and Correct Waste Segregation

Type of waste		Doctor	Nurse	Clinical officer	Lab technologist	Dentist	Student doctor	Cleaner	Mortuary staff
Infectious	N	7	174	58	48	3	3	45	2
	N	5	120	47	40	2	1	32	1
	n%	71	69	81	83	67	33	71	50
Pathological and Anatomical	N	3	139	24	31	2	0	29	0
	N	1	57	5	18	1	0	12	0
	n%	33	41	21	58	50	0	41	0
Chemical	N	4	153	39	45	1	0	0	0
	N	2	126	20	32	1	0	0	0
	n%	50	82	51	71	100	0	0	0
Pharmaceutical	N	6	169	54	34	3	2	37	0
	n	4	149	50	11	3	1	14	0
	n%	67	88	93	32	100	50	38	0
General (Paper/Food stuff)	N	5	171	56	42	3	2	43	2
	n	4	159	47	38	2	1	39	1
	n%	80	93	84	90	67	50	91	50
Radioactive/Genotoxic	N	6	127	41	36	3	2	0	0
	n	1	15	19	23	1	1	0	0
	n%	17	12	46	64	33	50	0	0
Proper waste Segregation Score	%Mean	53	64	63	66	70	31	40	17

4.3 Availability of Waste Management Facilities

The current study assessed the availability and the conditions of waste handling and management facilities in Garissa county hospitals. It was found that most of the health workers agreed that there were hand-washing facilities with a frequency of 90-100 % except for the support staff who showed a frequency of 57 %. As to whether the hospitals had temporary waste storage facilities, all the laboratory technologists indicated yes as opposed to only 67 % of the student doctors. Generally, 96 % of the responds indicated that there were temporary storage facilities for the medical wastes generated. In regard to the presence of special equipment/facility for medical waste management, it was generally indicated that only 38 % of the respondents agreed. The study sought to determine the presence of specific areas for waste disposal. It was indicated by 51 % of respondents that the hospitals had a specific area where wastes were dumped/held awaiting further transportation to other regions or incinerator. The results were as shown in table 3 below.

Table 3: Availability of Waste Management Facilities

Availability/condition of waste management facility		Doctor & Dentist	Nurse	Clinical officer	Lab technologist	Student doctor	Other Support staff
Study Population	N	10	174	58	48	3	47
	N%	100	100	100	100	100	100
Is there a hand washing facility?	N (Yes)	9	169	57	48	3	26
	N%	90	97	98	100	100	57
Is there a temporary waste storage facility?	N (Yes)	8	170	55	48	2	44
	N%	80	98	95	100	67	94
Is there a special equipment for medical waste	N (Yes)	3	83	9	21	1	12
	N%	30	48	16	43	33	25
Is there a specific area for medical waste disposal?	N (Yes)	2	109	26	17	1	19
	N%	20	63	45	35	33	40

4.4 Assessment of current medical waste handling practices in Garissa County hospitals

According to the study population, 90 %, 91 %, 84 %, 75 %, 67 % and 83 % of doctors and dentists, nurses, clinical officers, laboratory technologist, student doctors and support staff respectively indicated that the generated waste was temporarily handled before undergoing treatment and disposal. Furthermore, 60 %, 74 %, 64 %, 60 %, 33 % and 40 % of doctors and dentists, nurses, clinical officers, laboratory technologist, student doctors and support staff respectively indicated that temporary waste storage facilities are present. Out of 340 health workers, 80 %, 91 %, 81 %, 85 %, 67 % and 91 % of doctors and dentists, nurses, clinical officers, laboratory technologist, student doctors and support staff respectively showed that the wastes are stored for at least one day before they are either treated, disposed or transported for further action. It was noted that 20 %, 36 %, 38 %, 31 %, 0 % and 23 % of doctors and dentists, nurses, clinical officers, laboratory technologist, student doctors and support staff respectively indicated that weighing of the generated wastes by waste handlers took place and that there is a routine schedule for medical waste collection. On the other hand, 100 %, 99 %, 97 %, 90 %, 100 % and 94 % of doctors and dentists, nurses, clinical officers, laboratory technologist, student doctors and support staff respectively showed that plastic bags and containers were being used medical waste packaging and transportation. As to whether

medical waste is collected daily from the health facility, 0 %, 29 %, 33 %, 42 %, 0 % and 47 % of doctors and dentists, nurses, clinical officers, laboratory technologist, student doctors and support staff respectively indicated the presence of routine schedule for waste collection from the hospital to the storage/disposal area. As to whether medical waste is collected daily from the hospital, 70 %, 89 %, 74 %, 29 %, 67 % and 57 % of doctors and dentists, nurses, clinical officers, laboratory technologist, student doctors and support staff respectively stated that waste is collected on a daily basis from the health facility. The study assessed the frequency of waste transportation to the disposal area. From the results, 50 %, 56 %, 66 %, 25 %, 33 % and 38 % of doctors and dentists, nurses, clinical officers, laboratory technologist, student doctors and support staff respectively said the medical waste was transported daily to disposal areas. Concerning the frequency of incineration of medical wastes, 40 %, 44 %, 36 %, 17 %, 0 % and 45 % of doctors and dentists, nurses, clinical officers, laboratory technologist, student doctors and support staff respectively indicated that medical waste was incinerated on a daily basis. The results were as shown in table 4 below.

Table 4: Assessment of Medical Waste Handling Practices

Waste management practice		Doctors	Nurses	Clinical officers	Laboratory technologists	Student doctors	Support staff
Dentists							
Study Population	N	10	174	58	48	3	47
	N%	100	100	100	100	100	100
Is medical waste handled temporarily before treatment and disposal?	N (Yes)	9	158	49	36	2	39
	N%	90	91	84	75	67	83
Is there a temporary waste storage facility?	N (Yes)	6	128	37	29	1	19
	N%	60	74	64	60	33	40
Is medical waste stored for at least 1 day before further action	N (Yes)	8	159	47	41	2	43
	N%	80	91	81	85	67	91
Does a waste handler weigh and Keep records of the waste generated?	N (Yes)	2	63	22	15	0	11
	N%	20	36	38	31	0	23
Are plastic containers/packages used for waste disposal?	N	10	173	56	46	3	44
	N%	100	99	97	90	100	94
Is there a routine schedule for medical waste collection?	N	0	50	19	20	0	22
	N%	0	29	33	42	0	47
Is medical waste collected daily from the health facility?	N	7	155	43	14	2	27
	N%	70	89	74	29	67	57
Is Medical waste transported daily to disposal area?	N	5	95	38	12	1	18
	N%	50	56	66	25	33	38
Does incineration of collected waste take place daily?	N	4	76	21	8	0	21
	N%	40	44	36	17	0	45

4.5 Knowledge and Awareness on hospital waste management among healthcare care personnel

The current study sought to find out the relationship between profession and proper waste management awareness levels. The findings showed that 70 %, 69 %, 60 %, 33 %, 33 % and 33 % of doctors and dentists, nurses, clinical officers, laboratory technologists, student doctors and support staff respectively indicated that sharps waste s are incinerated when the sharps containers are ¾ full. Fol lowing analysis, this data was significant at χ^2= 33.98; Df=5; N=194; p<0.0001. This was statistically significant at p<0.05) since the p value was less than 0.05. Concerning waste container emptying when ¾ full, 20 %, 38 % and 26 %, 60 %, 50 % and 17 % of doctors and dentists, nurses, clinical officers, laboratory technologists, student doctors and support staff respectively indicated that waste containers are emptied when ¾ full. Th i s d a t a w a s significant at χ^2= 24.21; Df=5; N=118; p=0.0002. This data was statistically significant at p<0.05) since the p value was less than 0.05.

On whether the healthcare personnel recap used needles by their hands, 0 %, 19 %, 9 %, 1 7 %, 0 % a n d 7 % of doctors and dentists, nurses, clinical officers, laboratory technologists, student doctors and support staff respectively indicated that they always recapped used needles by hand. Similarly, 10%, 25%, 40%, 30%, 50% and 80% of doctors and dentists, nurses, clinical officers, laboratory technologists, student doctors and support staff respectively said that they sometimes recap used needles by hand. On the other hand, 90%, 56%, 52%, 53% , 50% and 13 % of doctors and dentists, nurses, clinical officers, laboratory technologists, student doctors and support staff respectively stated they never use hands to recap used needles. This was statistically significant at, χ^2= 59.99; Df=10; N=337; p < 0.0001. This data was statistically significant at p<0.05) since the p value was less than 0.05. The study sought to find out whether the healthcare workers were aware and adhered to the universal precaution rule. The findings showed that 60 %, 83 %, 81 %, 68 %, 67 % and 26 % of doctors and dentists, nurses, clinical officers, laboratory technologists, student doctors and support staff respectively indicated that they were are and adhered to the universal precaution rule on medical waste handling and management. This data was statistically significant χ^2= 62.28; Df=5; N=240; p < 0.0001. This data was statistically significant at p<0.05) since the p value was less than 0.05. The study also sought to determine if the healthcare personnel were aware on the government plan on medical waste management. It was shown that 78 %, 67 %, 64 %, 62 %, 50 % and 4 % of doctors and dentists, nurses,

clinical officers, laboratory technologists, student doctors and support staff respectively were aware of the government plan concerning medical waste management. This data was statistically significant χ^2= 61.56; Df=5; N=192; $p < 0.0001$. This data was statistically significant at $p<0.05$) since the p value was less than 0.05.

5. Conclusions

From this study's findings, it was concluded that on average, medical waste generated from Garissa county health facilities is well segregated. Most of the health-care workers understood the need to sort and segregate wastes according to the correct colour code. It was also concluded that most hospitals in Garissa county lack dedicated waste handlers who adhere to the set waste management guidelines like keeping inventory of waste generated and proper handling. The persons collecting waste from the hospitals neither weighed nor kept records of the waste. This in part may have led to the huge hips of waste in temporary holding areas and dumpsites as important information for formulating mechanisms for waste handling was lacking. Furthermore, many hospitals in Garissa County lack suitable temporary waste holding and treatment areas that are big enough to accommodate the waste, that are well ventilated and that have authorized accessibility-this poses a health risk to the workers and the community at large. No proper waste transportation modes/mechanisms as wheeled trolleys with lids are not enough and the wheelbarrows used may drop infectious wastes like contaminated sharps along the way during transportation. In most hospitals visited, the waste containers are not emptied promptly as they reach ¾ full as required, rather most were overfilled which poses a health risk to the collectors and handlers. It was also concluded that the only available incinerator was in a debilitating condition and requires urgent attention. In terms of the levels of awareness, it was concluded that profession, level of education, number of years worked/experience, and training of healthcare workers influences proper medical waste handling and management. Doctors, university graduates, those who had worked for longer and those who had been trained were more aware and embraced proper medical waste handling practices. Finally, the persons living around waste dumpsites are exposed to a health risk including injuries from contaminated sharps, contaminated ground water and food poisoning as well as skin infections. The most vulnerable category is that of young children who play around and scavenge the dumpsites.

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