MERIT RESEARCH JOURNALS
www.meritresearchjournals.org

Merit Research Journal of Environmental Science and Toxicology (ISSN: 2350-2266) Vol. 2(2) pp. 027-038, May, 2014
Available online http://www.meritresearchjournals.org/est/index.htm

Original Research Article

An Assessment of Medical Waste Management in Bawku Presbyterian Hospital of the Upper East Region of Ghana

Francis Abugri Akum

Ghana (MPH, CEMBA, PhD Public Health Student of Texila American University)

Email: akumfrancis@gmail.com
Tel: +233 244 767 431

Abstract

Medical waste unlike other ordinary waste poses serious health risk to the handlers, health staff, patients and the community. The area of medical waste management is neglected in most health care facilities in Ghana. The main objective of the study was to assess the Medical Waste management practices in Bawku Presbyterian Hospital of the Upper East Region of Ghana. The study used structured questionnaires, observation checklist and key informant interview guide to collect data from management staff and waste workers. It was observed that there was low knowledge about medical waste among waste workers. Medical waste is not segregated, waste containers not coded/labelled, no secured storage area for waste, no budget specifically for medical waste management and no waste management manual in the hospital. This study has shown that, waste management in the hospital is poor and has health implications to the handlers, staff, patients and visitors.

Keywords: Medical waste, Bawku Presbyterian Hospital, Waste segregation, Waste storage.

INTRODUCTION

Health care services generates waste just like other human activities which has to be managed and dispose in a safe manner to avoid or reduce risks it poses to the health of the healthcare providers, clients and the community within the operational area.

In the management of waste, a healthcare waste has the higher priority due to their hazardous nature. According to World Health Organization (WHO) some part of healthcare wastes are considered most hazardous that can affect human health and pollute the environment badly (World Health Organization (WHO), (2005). In a healthcare setting that has unsafe health care waste management practices, may result an exposure to infectious wastes by Healthcare workers (HCWs), patients, clients that could in turn create infection due to blood borne pathogens.

A good proportion of waste generated by health facilities is not hazardous and can be managed like any other household waste. This constitutes about 75% to 90% of all waste generated in health institutions. However, the remaining10% to 25 % is hazardous and requires special arrangements for management.

Waste management in Ghana is a multi-sectorial approach involving the Ministry of Local Government and the Environmental Protection Agency playing key roles as implementer and regulator respectively. The District, Municipal and Metropolitan assemblies which are directly under the Ministry of Local Government on the one hand and the offices of the Environmental Protection Agency on the other are responsible for ensuring that waste are

managed properly and safely. The definite responsibility for ensuring that waste is disposed of, however, lies with the person or institution that generates the waste in line with the local government policy of waste management (Ministry of Health, 2006). Therefore, health care institutions are responsible for the waste that is generated by their activities and are required to take practical steps to ensure their separation, storage, treatment and safe disposal while enjoying the collaboration and support of the relevant stakeholder ministries and agencies (Ministry of Health, 2006).

In the management of waste, healthcare waste is given a higher priority due to the hazardous nature of it. World Health Organization (WHO) recognised that, some part of healthcare wastes are considered most hazardous and very dangerous to human health and pollute the environment badly (World Health Organization (WHO), (2005). A working environment that have unsafe health care waste management practices may result an exposure to infectious wastes by Healthcare workers (HCWs), patients, clients that could in turn create infection due to blood borne pathogens.

Safe medical waste management in a health facility depends on a devoted waste management team, good administration, careful planning, underpinning legislation, organizational commitment, adequate funding and full participation by trained staff (World Health Organization (WHO), (2005). In addition some authors indicated the importance of other aspects, including the use of appropriate technology for disposal (Lee et al., 2014; Diaz et al., 2014). Others suggested that, an internal management system and training program for related personnel (Silva et al., 2014; Abdulla et al., 2008).

In order to improve medical waste management and develop a management strategy for the Bawku Presbyterian Hospital, it is important to understand and evaluate current practices in medical waste management. Information regarding medical waste management in the hospital is currently insufficient.

The main objective of the study was to assess the Medical Waste management practices in Bawku Presbyterian Hospital of the Upper East Region of Ghana.

The specific objectives are;

1. To assess the knowledge of health care personnel regarding biomedical waste management.
2. To assess the current system of practice of biomedical waste management in terms of segregation, storage, collection, transportation, and disposal in Bawku Presbyterian Hospital.
3. To make recommendations to management for the improvement of medical waste management in Bawku Presbyterian Hospital.

Bawku Presbyterian Hospital was selected to conduct the study because, no studies have been conducted on medical waste management in the municipality and this hospital is the largest and serving the entire municipality. The area of biomedical waste management is neglected in terms of research and studies in Ghana. The results of this study could be a factor to rectify the situation of medical waste management, especially after the presentation of the results to the stakeholders in the healthcare industry.

Literature Review

Medical Waste

Medical wastes have been defined as any solid waste that results from the treatment, diagnosis, or immunization of humans and/or animals at hospitals, veterinary and health-related research facilities, and medical laboratories (George, 2013).

Classification of Medical Waste in Ghana

Colour Coding of Biomedical Waste

Biomedical waste is stored in colour coded waste containers and plastic bags to facilitate efficient segregation of waste. The recommended colour coding scheme for Ghana (adapted from W.H.O.) is as follows:

Black

This is for general waste (e.g. kitchen waste, paper, cardboard, sweeping etc)

Yellow

This is used for infectious waste (e.g. sharps, patient waste, human/animal tissue and cultures/specimens) with the biohazard label - Radioactive waste with the radioactive symbol.

Brown

Brown code is for hazardous waste (e.g. vaccines, expired drugs, chemicals etc). Small amounts of chemical wastes generated may be added to the infectious waste.

METHODS

Study Design

The study design was a descriptive cross-sectional study and this is deemed to be appropriate since it measures or

Table 1. Classification of Medical waste in Ghana (Source: Ministry of Health, 2006)

Type	Classification and Description	Content/Examples
A	General/Normal Waste This type of waste is not harmful and is similar to domestic waste except for the fact that it is produced within the hospital environment and therefore requires special handling. It includes waste from corridors, lawns, offices, workshop, stores, waste from kitchen, etc.	Paper, cardboard, plastic materials including those from points of generation, kitchen waste, ash, sawdust, pieces of wood etc.
B	Infectious Waste These types of waste from the hospital have physical and chemical characteristics similar to those of industrial hazardous waste and waste generated by both in-patients/outpatients and animals which is likely to contain pathogenic micro-organisms. It includes materials that can be infectious to patients, health care workers and the public. It therefore requires special management both inside and outside the hospital until it is finally disposed of. This may further be classified under the following sub classification:	1. Laboratory waste generated by microbiological investigation. 2. Potentially infected blood and human and animal tissues. (e.g.Hepatitis B, HIV)
1	Sharps These are sharp-edged wastes with puncture and/or cutting properties that pose risk of injury and infection. They may be stained or contaminated with blood or body fluids from injection rooms, surgical equipment etc.	Needles, syringes, surgical blades, scalpels, test tubes, ampoules, glass instruments, pipettes etc.
2	Patients Waste/ Culture/ Specimen These are wastes generated from in- or out-patient activities and may be contaminated or stained with blood or body fluids from surgical operations, injection room (other than sharps) etc. Clinical specimen, laboratory culture and human tissue.	1.Stained or contaminated Material (e.g. soiled cotton wool, used bandages/dressings, gloves, linen, blood transfusion bags, urine, faeces). 2.Culture plus specimen (e.g. experimental specimen (animals), tissue culture, urine, stool) 3.Urine, faeces (stool) from LaboratoryExperimental specimen (animals)
3	Pathological/Organic Human/Animal Tissues This type of waste includes amputations, other body tissues resulting from surgical operations, autopsy (post-mortem), and birth. These requires special treatment for ethical and aesthetic reasons.	1. Internal body organs, amputated limbs, placentas foetus. 2.Human liquid wastes (e.g. urine, blood products/blood) 3.Effluents from mortuaries
C	Pharmaceutical Waste These are wastes generated from the pharmacy	1.Expired drugs (solid/liquid, plastic or glass containers) 2.Residues of drugs in chemotherapy that may be cytotoxic, genotoxic, mutagenic or carcinogenic
D	Chemical Waste This is basically made up of spent chemicals from research and analytical laboratories, and pharmaceutical companies.	Acid, Alkali, organic substances, solvents, and heavy metals.
1	Radiological Waste Any waste material (solid or liquid) produced from image processing at the radiology department.	1.Chromo sulphuric acid 2.Glacial acetic acid 3.Photographic developer 4.Fixer solution 5.X-ray photographic film
2	Acid	1.Hydrochloric acid 2.Oxalic acid
3	Alkalis	1.Sodium hydroxide 2.Potassium hydroxide
4	Volatile and Organic Solvents	Ethanol, Methanol, Xylene, Chloride tape
5	Heavy Metals	Lead

Table 1. Continue

E	Radioactive Waste Liquid, solid, or pathological waste contaminated with radioactive isotopes of any kind.	1. Gloves, solid-papers, Swabs, cotton, needles (sharps), equipment etc. 2. Liquid-patient excreta, gastric content rest of solution administered to patient, 3.Spent radiation sources Technetium generators Radium needles.

estimate the variables attribute of the target population at a particular point in time. The choice for the descriptive cross-sectional design was informed by the aim to describe the Medical Waste Management in Bawku Municipal Hospital not only using quantitative data but also qualitative data. The study was carried out in January in the Bawku Presbyterian Hospital.

Target Population

The study participants included an environmental health officer, waste labourers, management members and key unit heads who are directly concerned in the study.

Data collection Technique

Site visits, key informant interviews and survey questionnaires were employed to collect information regarding knowledge of biomedical waste management, medical waste generation, separation, collection, storage, transportation, and disposal. During site visits, an observation checklist was used based on Ghana ministry of Health medical waste management policy and guided by the literature.

With respect to identifying biomedical waste management problems facing the hospital, key informant interview guide was used for all the management members, key unit heads and environmental officer in-charge and the waste workers head.

Data Processing and Analysis

The quantitative data from the structured interviews was coded and a master sheet prepared before the beginning of data collection to make the data ready for entry into the master sheet using SPSS version 16.0 programme.

On the other hand, qualitative data from the key informant interviews were edited every break of day to get the clear transcriptions of the interviewees' accounts. The various emerging themes were identified and classified.

Ethical Consideration

A formal permission was obtained from management of the hospital to conduct the study on health care personnel in the hospital. The objective of the study was explained to each study participant and they consented to participate.

RESULTS AND DISCUSSIONS

Knowledge of health care personnel regarding biomedical waste management

Hospital Management

Knowledge and practices of hospital Management staff in relation to medical waste is presented in Table 2. All the management members and key unit heads responded having specialized waste workers in the hospital is important. This is seen to be a positive step to improving medical waste management in the hospital, unlike a study done in Yemen where only 20.0% of administrators in government hospitals confirmed the importance of having specialized waste-workers (Al-Emad, 2011). Responding to the issue of availability of specialised waste worker, 5 (45.45%) said there are specialised waste worker, while the other 6 (54.55%) of them stated otherwise. Concerning the necessity and provision of personal safety tool Although all managers claimed that they provided all necessary personal safety tools to their waste-workers, on interviewing workers during the field survey it turned out that only 15% of the waste workers indicated that safety tools were available and, even the tools were not as complete as they should be.

All of the management members and key waste management personnel confirmed that, there were no waste user manuals available. About 5 (45.45%) of the managers and key waste managers in the hospitals claimed to be raising awareness of workers about dealing with medical waste and 6 (54.55%) stated otherwise. With respect to workers being monitored regarding the usage of personal protection tools, 7 (63.64%) of the managers claimed they have been monitoring them, while 4 (36.36%) stated otherwise. Although most of the

Table 2. Hospital management (Source: field survey, 2014)

Item	Frequency N =11	Percentage (%)
Knows importance of availability of specialized waste-workers	11	100.00
Provide personal protection tools for workers	11	100.00
Monitoring the usage of personal protection tools	7	63.64
Training of workers in dealing with biomedical waste	6	54.55
Medical waste user manual available	0	0.00
Workers are sensitised about knowing and dealing with medical waste.	5	45.45
Workers supervised during waste collection	7	63.64
Medical waste budget available	4	36.36
Allocation of biomedical waste budget adequate within hospital cleaning budget.	4	36.36
Waste management department responsible for biomedical waste available within the hospital.	4	36.36
Number of waste workers adequate.	7	63.64

Table 3. Waste workers knowledge on medical waste (Source: Field Survey, 2014)

Item	Frequency N =15	Percentage (%)
Able to identify medical waste	5	33.33
Identifies the need to sort medical waste during collection	11	73.33
Know reasons for sorting biomedical wastes	7	46.67
Aware of risks in handling medical wastes	12	80.00
Adequate knowledge of disposal procedures of liquid waste	6	40.00
Adequate knowledge of disposal procedures of expired blood units and by-products waste.	1	6.67
Adequate knowledge of disposal procedures of human tissue remains	8	53.33
Adequate knowledge of disposal procedures of expired medicines	2	13.33
Believes throwing blood waste in domestic waste is an adequate disposal procedure	7	46.67
Believes throwing of human tissue remains in domestic waste is an adequate disposal procedure	2	13.33
Believes throwing expired medicines in domestic waste is an adequate disposal procedure	13	86.67

managers reported that they supervised the use of personal safety tools by their workers, on the contrary actual field observations and workers' reports revealed that less than half of the managers exercised such supervision. This observation is disturbing because; most waste workers do not care to protect themselves and if not properly monitored, they could be exposed to the risk of infections.

Concerning training of waste worker in dealing with biomedical waste, 6 (54.55%) indicated that they are trained and only once in a year, while 5 (45.45%) stated otherwise. Despite most of them are claiming that there was training for workers in dealing with medical waste, the hospital had no formal training programmes. However, this is an encouraging observation, since training is very important aspect in the field of medical waste management but the frequency could be improved to twice or more.

About availability of budget for medical waste management, only 4(36.36%) said they had dedicated budget for waste handling but said it was not allocated enough within the hospital cleaning budget; while 63.64% stated that, there was no budget for medical waste management in the hospital. A similar result was found in Lebanon, where 93% of the hospitals had no budget for waste management or a budget that was judged to be insufficient (Moawad, 1997). This is confirmed from a key informant interview which one nurse incharge stated that *'' we have requested several times from the stores for safety boxes and they are not available and only rubber bins were given for our sharps''Ward incharge*. This is an indication of lack of commitment in dealing with medical waste in the hospital and must be seriously considered for making specific budget for biomedical waste management. 36.36% said there was a department responsible for waste collection in the hospital and 63.64% stated otherwise.

To ensure sustainability and clarity in these manage-

Table 4. Waste Labourers views on waste segregation (Source: Field survey, 2014

Item	Response	Frequency/Percentage N=15
Medical waste segregated	Yes	2 (13.33%)
	No	13 (86.67%)
	Don't know	0 (0.00%)
Category of staff segregating medical wastes	Labourers	8 (53.33%)
	Medical staff	4 (26.67%)
	Both medical & Labourers	2 (13.33%)
	Don't know	1 (6.67%)
Place of waste segregation	Beginning near the source	2 (13.33%)
	After waste is collected	0 (0.00%)
	Do not know	13 (86.67%)

Figure 1. Mixed medical waste with ordinary waste (Source: Field survey, 2014).

ment practices, perfect plans and policies for medical wastes management are encouraged. These need to be incorporated into routine continuing education, employee training and hospital management evaluation processes. The municipal assembly could require waste management plans from all hospitals as a condition for licensing (Basel Action Network (BAN), 2014).

Waste-workers' knowledge of dealing with medical waste

Table 3 shows the knowledge of waste-workers about dealing with medical waste. It was found that only 5(33.33%) of the waste workers were able to identify the types of medical waste they were collecting. This finding could be attributed to inadequate training in safe handling of medical waste and therefore they had little knowledge regarding identification of types of medical waste, the necessity of sorting waste. This observation contradicts majority (54.55%) of management claim that waste workers are being trained on medical waste management. Majority 11 (73.33%) considered it necessary to sort medical waste and 7 (46.67%) indicated they understand the reasons behind sorting medical waste.

With respect to risks that workers could be exposed to during handling medical waste, a good number of them

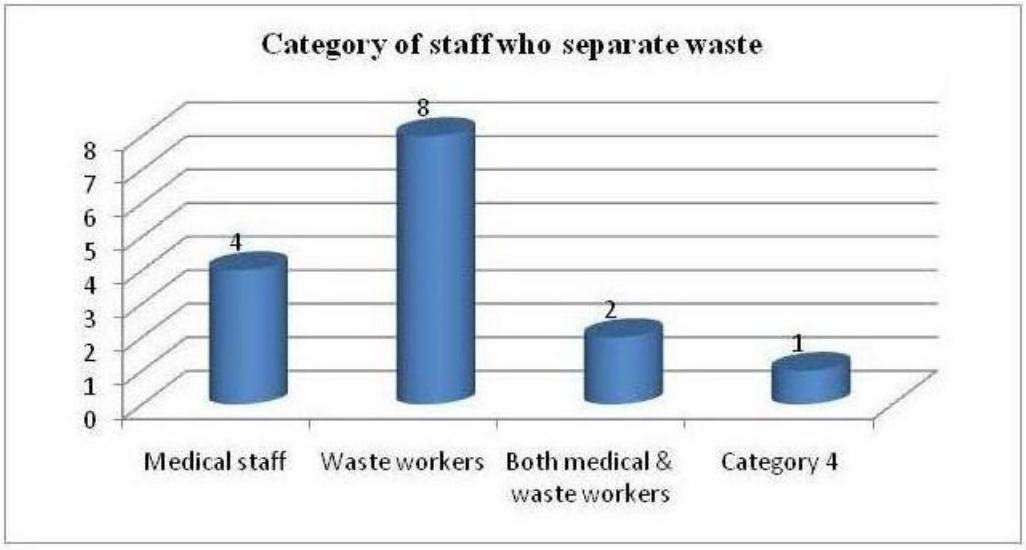

Figure 2. Category of staff who separate medical waste (Source: Field survey, 2014)

12 (80%) of them are aware of these. With regard to knowledge of adequate disposal procedures of liquid waste, expired medicines, expired blood units and human tissue remains, they indicated 40%, 13.33%, 6.67% and 53.33% respectively. Concerning workers who believed that throwing expired blood units, expired medicines and human tissues into the normal domestic rubbish collection was an adequate disposal procedure were respectively 46.67%, 86.67% and 13.33%.

Medical Waste Management

Separation of medical waste

Table 4 show the responses of waste workers responses on the separation of biomedical waste. Among the 15 waste workers interviewed, 13 (86.67%) indicated that waste is not separated prior to disposal to the larger storage containers in the hospital; while 2 (13.33%) responded that, the waste is separated before disposal. This may correspond to an important fact, that most times medical waste is not separated from ordinary waste. All the study participants said wastes from the various units are disposed into the large storage containers without segregation (See Figure 1). The prevailing situation is worrisome and should be reconsidered so as to reach to the full separation of medical waste from the ordinary waste. By improving this, we can reduce the risk of infection and transmission of some disease to the cleaning workers while dealing with medical waste.

With regards to the body that is in charge of the process of waste separation 4 (26.67%) of the respondents indicated that medical staff is carrying on the process of separation,8 (53.33%) indicated that the cleaning workers were responsible, 2 (13.33%) said both the medical and cleaning staff are doing the separation and 1 (6.67%) did not know who carry on the process of separation (See Figure 1).

With respect to the item on the location of separation; 2(13.33%) indicated that the separation takes place at the beginning and near the source of waste and 13 (86.67%) said they do not know.

According to the Environment Quality Authority (EQA) (2005) the results of a survey conducted in the HCFs in the West Bank and Gaza Strip, it was found that only one third of the HCFs in Gaza Strip, have special bags in use for HCW collection; all other facilities consequently collecting all types of HCW together with domestic waste. Sharp items in particular are being collected in special boxes (and sometimes special plastic bottles) as a result of the WHO donating a certain number of boxes; but again this is happening in only a limited number (38%) of HCF. Colour coding of HCW according to its type is recognized as being a useful tool for waste segregation, although only 5% of HCF to currently have system for colour coding.

There is no mechanism established to separate the waste from one another, whether within the wards or whether, after collection in a special assembly in the container outside the ward. (Figure 2)

Containers and bags to collect waste

All the waste labourers said there are no bags being used but waste containers are available and not enough. With regards whether the wastes containers are defined and distinguished; it is noted that only 3 (20%) indicated that it is defined and distinguished but that is only pertaining to

Figure 3. Waste storage place (Source: field survey, 2014)

sharps containers, while 12 (80%) indicated that it is not defined or distinguished.

With regards to how easy waste containers are transferred from the wards to the large storage containers, 1 (6.67%) said it was easy and the rest indicated no. This is not a good indicator because if waste transferring is difficult, there will be an increased possibility of drop of the waste and thus polluting the place around and thus increasing some of health problems of the workers.

Wastes are disposed in ordinary waste containers, except in some cases for disposal of sharp instruments which are collected and incinerated. For the truncated human parts, placentas and embryos resulting from abortions, they are dealt with through cultural and religious ways, where they are delivered to their owners to be buried.

From observations during field work, hazardous waste and waste resulting from the high-risk laboratory dishes in the hospital, such as used test tubes, dishes or blood samples are not treated using autoclave until it is sterilized at a certain temperature to get rid of remaining bacteria and to be disposed of with regular and medical waste.

The liquid waste, which contains pathogens, blood and hazardous chemicals, about 10 (66.67%) of the waste labourers said it is disposed in the public sewer system without disinfection. It is likely that the remaining part is disposed of together with solid waste as found in study done in West Bank and Gaza Strip hospitals (Environmental Quality Authority, 2005). A study also done in Accra Metropolis on medical waste disposal practices in some Hospitals and Clinical Laboratories saw that, all the laboratories dispose of their liquid waste into the drains through the sinks and of those who disinfect the liquid waste before disposal were just 10% while majority of them, 90% just poured the liquid waste down the drain without any treatment (George, 2013). This is a direct infringement on the EPA recommended guidelines.

During survey observation in most of the wards and other areas of the hospital where medical waste is generated, the waste bins are either not having covers or not closed tightly and this could be a source of infection to clients and healthcare workers. They can also be seen with waste overflowing and accumulation suggesting infrequent emptying of the bins to the large storage containers. A routine program must be developed for the collection as part of a plan of health care waste management.

Waste storage in the hospital

Concerning waste storage place, all indicated that there is no place for the storage of waste, whether ordinary or medical, but wastes are transferred from within the various departments to two (2) large storage containers by the waste labourers as indicated by the waste labourers and through observation (see Figure 3). This is clear from the study that shows 12 (80%) of the cleaning workers said that the medical waste is transferred using the ordinary waste bins. The other 3 (20%) indicated that needles are put in sharps boxes and kept at incinerator. This is an indication that there is no special place for storing the medical waste in the hospital. It is usually put in a corner till it is transferred to the landfill for final

Figure 4. Safety boxes left outside the incinerated (source: field survey, 2014).

disposal. In addition, all of them answered that the two big storage containers put at a corner where all waste from various department are poured into inside the hospital is not protected.

The other point of interests is that, all the cleaning labourers said there is no special mark distinguishing ordinary waste from the hazardous health waste of the two big containers and every waste is poured into them. It is worth to note that it is not allowed to transfer ordinary and medical waste together in the same vehicle, but it is supposed to allocate vehicle for each of the medical waste and ordinary waste.

Concerning the duration of waste stored in the big container in within the hospital before they are transferred by waste vehicles to the landfill, 11 (73.33%) of the waste labourers indicated that, it takes more than week, 2 (13.33%) said it takes more than two weeks and the 2 (13.33%) indicated that they do not know.

Many studies done in developing countries on healthcare wastes management indicated that segregation, collection of waste using recommended colour coding container and storage of waste in secured area were not satisfactory (Mostafa et al., 2007; Coker et al., 2008; Patwary et al., 2011).

According to W.H.O. regulations, the storage of waste within the hospital in cold areas should not exceed 72 hours in winter and 48 hours in summer. But, in the hot areas, storage should not exceed 48 hours in winter and 24 hours in summer (World Health Organization (WHO), (2005).

Regarding the WHO regulations of medical waste transfer and storage within a hospital setting, it is clear that there exist a huge gab in Bawku hospital. This must be critically looked at by ensuring that wastes do not stay more than at least 72 hours to ensure the safety of the workers, staff, patients and visitors of the hospitals.

It is clear that there is no medical waste burning inside hospital as 13 (86.67%) indicated that and the other 2 (13.33%) said they do not know. This is a positive practice and the issue respiratory problems associated with inhalation of smoke will not be a problem.

Sharp Boxes

Most of the respondents,12 (80%) said vessels used to discard needles do not predispose them to pricks and this is a positive indicator as risk on workers safety will reduce, while 20% stated otherwise. On the other hand, 4 (26.67%) said that these vessels are not difficult to open while 11 (73.33%) indicated it is difficult to open, and this is a good indicator for the health protection of both employee and waste pickers. But another interesting observation in the field indicated that, these safety boxes are carried to the incinerated and left there for many days before incineration is done with some boxes eventually damage (see figure 4). Another positive aspect observed is that, the World Health Organisation (WHO) yellow boxes are used for the sharps at most places in the hospital and therefore everyone seeing such a box knows the content and will be very in handling it.

Transport of waste inside the hospital

With regards to the presence of the means for the trans-

Figure 5. Waste worker carrying medical waste to storage site (Source, field survey. 2014)

fer of medical waste, all survey participants indicated that there is no means of transport to transfer waste to big storage containers from the various units. When asked how the medical waste is transported to the storage containers, they all said they carry on their heads.

The transfer of health-care waste from various departments/units to the storage containers within the hospital must be by wheeled vehicles or by other vehicles or containers fitted with hand wheels that are not used for any other purpose. The transfer means must meet the following standards:

1. Easy loading and unloading.
2. The absence of sharp edges that can cause severe damage to the waste bags or containers during loading and unloading
3. Easy cleaning and must be clean and disinfected every day using the appropriate method. All bags must be closed tightly and must be sound at the end of transport operations (World Health Organization (WHO), (2005).

By these WHO standards, there is a gap in Bawku hospital concerning the availability of means of transport to transfer waste to the storage site within the hospital. (Figure 5)

Hygiene and sanitation

Hygiene and sanitation in hospitals are important items that help in proper healthcare waste management. With regards to the issue the interruption of the water supply during the past two years, 13 (86.67%) indicate yes while 2 (13.33%) said no. This is an indication that, the water supply system is good in the ward as the presence of water is important for cleaning the bins, carts and storage facilities and other equipment used in medical waste management. For the item on the cleanliness of the toilets in hospitals, 7 (46.67%) answered that toilets are not clean and 6 (40%) said always clean, while a 2 (13.33%) indicated sometimes (See figure 6). This is an indication that, the toilets are not clean sometimes. This will increase the risk of infection of workers, patients and visitors.

For the item on the causes of dirtiness of the toilets, 8 (53.33%) answered that the patients are the reason for the toilets to be dirty, 2 (13.33%) answered that visitors are the reason, and 5 (33.33%) answered workers are the reason. There must be a monitoring system to ensure that the toilets are clean all the time. In addition to install guide labels that pay attention of the staff, patients, and visitors to keep all sections including toilets clean.

The task of cleaning is essential to reduce the risks resulting from the circulation of health-care waste, and must provide adequate washing and hygiene and with warm water and soap for the workers associated with this task. The particular importance of these services appears in the areas of storage and incineration.

As waste management is a complementary part of health care for the cleanliness of the hospital and infection control. The health-care waste must be viewed as repository of pathogenic micro-organisms, which can

Figure 6. Cleanliness of toilets (Source: field survey, 2014)

cause pollution and infection. If the management of waste was done inappropriately, these microbial organisms can be transmitted by direct contact, in air or by various insect vectors. The infectious waste contributes -in this way- in the risk of infection for hospital workers and patients and putting them at risk.

Training

Regarding training on medical waste management, 10 (66.67%) answered they received training, while 33.33% answered that they do not receive training.

For those who said they have received training (N=10), all of them said they receive training for a duration of 1-3 days.

The item on the training of new staff, those who said they have received training (N=10), 7 (70.0%) said that new staff is trained; while 3 (30.0%) answered that they are not trained.

The above figures and percentages show that training is not given that importance. It is worth to say that the hours spent in training will reduce the potential of infection.

Training must be in the field of health and safety of workers and their understanding of the potential risks associated with health-care waste, also it must include appropriate training for workers and the provision of equipment and protective clothing and the development of effective occupational health program.

A comprehensive risk assessment of all activities associated with the management of waste during the preparation of health care waste management plan will allow the identification of the protection measures necessary: We must establish such procedures to prevent exposure to hazardous substances or other risk or at least make the exposure within safe limits.

The type of protective clothing depends on the size of the risks associated with health-care waste. However, we must work to provide the following equipment and supplies for all persons who collect or handle health care waste.

CONCLUSION AND RECOMMENDATIONS

The study has demonstrated that medical waste management in Bawku Presbytery hospital is facing many challenges because this sector is almost neglected in terms of segregation, collection, transport, treatment and final disposal. Moreover there is no formal waste management policy direction put in place by management. Currently, the management of infectious waste is normally governed by the activities of largely untrained and uneducated waste handlers from poor backgrounds. The management of hazardous or general wastes is below acceptable medical waste standards.

Conclusively, this study has shown that waste management in the hospital is poor and has health implications to the handlers, staff, patients and visitors and the following recommendations are made to improve the waste management system

- There is need for sustained cooperation among all key actors (Municipal Assembly, the hospital and waste managers) in implementing a safe and reliable medical waste management strategy, not only in legislation and policy formulation, but also particularly in its monitoring and enforcement.
- There should be an obligation for the hospital to ensure a safe and hygienic system of medical waste handling, segregation, collection, storage, transportation, treatment and disposal, with minimal risk to handlers, public health and the environment using colour coding containers, strong waste bags, acquiring means of internal waste transport vehicle and provision of adequate waste protective tools for waste workers.

- All staff and waste handlers in the hospital should be well trained at the beginning of their appointment and regularly updating their knowledge and skills in the form of seminars and workshops.
- Adequate medical waste management budget should be allocated within the general hospital budget.
- The formation of a dedicated committee on medical waste management and ensuring regular meetings.
- Economical, appropriate and environmentally sustainable technological options for waste treatment, which can be well operated and maintained, should be explored for medical waste management.
- There should be a hazardous waste landfill specially designed for the final disposal of treated hazardous healthcare waste.

Competing interests

The author declares that there is no competing interest.

REFERENCES

Abdulla F, Qdais HA, Rabi A (2008). "Site Investigation on Medical Waste Management Practices in Northern Jor- dan," *Waste Management*, Vol. 28, No. 2

Al-Emad AA (2011). Assessment of medical waste management in the main hospitals in Yemen.Eastern Mediterranean Health J. 2011,Vol. 17 No. 10.

Basel Action Network (BAN) (2014). 16. *Eleven recommendations for improving medical waste management. Provided to the technical working group of the Basel convention, by the Basel Action Network (BAN), April 12–14, 1999.* (http://www.ban.org/library /11RECO ~1.PDF, accessed 17January, 2014).

Coker A, Sangodoyin A, Sridhar M, Booth C, Olomolaiye P, Hammond F (2008). Medical waste management inIbadan, Nigeria: Obstacles and prospects. Waste Management 2008; 29(2): 804-811.

Diaz LF, Savage GM, Eggerth LL (2014). "Alternatives for the Treatment and Disposal of Healthcare Wastes in Developing Countries," *Waste Management*, Vol. 25, No. 6, 2005, pp. 626-637. doi:10.1016/j.wasman.2005.01.005 (accessed: 16th January, 2014.

Environmental Quality Authority (2005). Master Plan for healthcare waste management West Bank/Gaza Strip. Palestinian Authority.

George LW (2013). Medical Waste Disposal Practices in some Hospitals and Clinical Laboratories in the Accra Metropolis (Ghana). International Institute for Science,Technology and Education (IISTE).Vol.3, No.11, 2013 P 90 – 98.

Lee BK, Ellenbecker MJ, Moure-Eraso R (2014). "Alter- natives for Treatment and Disposal Cost Reduction of Regulated Medical Waste," *Waste Management*, Vol. 24, No. 2, 2004, pp. 143-151. doi:10.1016/j.wasman.2003.10.008 (accessed 14th January, 2014).

Ministry of Health (2006). MOH Policy and Guidelines for Health Institutions, Accra, Ghana.

Moawad RK (1997). *National survey for the elimination of the solids hospital waste in Lebanon*. Beirut, Pharmacy School, Lebanese University.

Mostafa GMA, Shazly MM, Sherief WI (2007). Development of a waste management protocol based on assessment of knowledge and practice of healthcare personnel in surgical departments. Waste Management 2007; 29 (1): 430-439

Patwary MA, O'Hare TW, Sarker MH (2011). Assessment of occupational and environmental safety associated with medical waste disposal in developing countries: A qualitative approach. Safety science 2011; 49(8-9):1200-1207.

Silva CE, Hoppe AE, Ravanello MM, Mello N (2014). "Medical Wastes Management in the South of Brazil," *Waste Management*, Vol. 25, No. 6, 2005, pp. 600-605. doi:10.1016/j.wasman.2004.03.002 (accessed 12th January, 2014).

World Health Organization (WHO), (2005). Management of Solid Health Waste at Primary Health Care Centers, a Decision-MakingGuide. Geneva.