

AN ASSESSMENT OF MEDICAL WASTE MANAGEMENT PRACTICES IN AHMADU BELLO UNIVERSITY TEACHING HOSPITAL AND AHMADU BELLO UNIVERSITY HEALTH SERVICES, ZARIA, NIGERIA

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Abstract

Healthcare services are aimed at improving wellbeing and preventing potential human health risks and environmental hazards. In the process, however, wastes that are potentially harmful are generated. Poor management of these healthcare waste (HCW) exposes the health workers, patients, waste handlers and the general public to health risks. Thus, this study assessed HCW management practices at Ahmadu Bello University Teaching Hospital (ABUTH) Zaria and Ahmadu Bello University Health Service (ABUHS) A.B.U. Zaria. The study utilised questionnaire administered to all the heads of waste management units in each of the hospitals (4 at the ABUTH and 1 with the Medical Director at the ABUHS) for assessing the effectiveness of HCW management practices in accordance to the Townend and Cheeseman (2005) guidelines. The study established the total quantity of HCW generated at ABUTH and ABUHS at 845kg and 77kg per day respectively; which translates to 1.18kg and 1.54kg per day per bed at ABUTH and ABUHS respectively. The study revealed the availability of (190 at the ABUTH and 2 at the ABUHS) operational staff specifically responsible for medical waste management and personal protective equipment for use by medical waste handlers in both ABUTH and ABUHS. The study further revealed the availability of well distributed receptacles, storage containers, dumpsites and separation of collection of sharps or infectious materials at both ABUTH and ABUHS. The study, however, also established absence of colour coding, central purpose-built storage facility, recycling on healthcare waste management in both ABUTH and ABUHS. It was concluded that both the ABUTH and ABUHS are classified as Level 2 hospitals based on their operational performance in accordance with the Townsend and Cheeseman (2005) guidelines, which implies that some aspects are considered sustainable while some other aspects considered unsustainable. The study recommended more sustainable practices in the management of HCW. Given the importance of effective healthcare waste management practices and the current unsustainable level of performance, the study recommended further study on the effects of the healthcare wastes from the two hospitals on the environment (soil, water and air).

Keywords: Healthcare, Waste, Management, Practice, Effectiveness

INTRODUCTION

The World Health Organization (WHO) (2002) defined healthcare waste as “any solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or testing of biological, including but not limited to soiled or blood-soaked bandages, culture dishes and other glassware”. United States Environmental Protection Agency (USEPA, 1989) refers to hospital waste as all biological or non-biological waste that is discarded and not intended for further use and this includes pathological, infectious, hazardous chemicals, radioactive wastes, stock cultures, blood and blood products, animal carcasses, pharmaceutical wastes, pressurized containers, batteries, plastics, low-level radioactive wastes, disposable needles, syringes, scalpels and other sharp items. Others include food service, cleaning and miscellaneous waste (Oyeleke

and Istifanus, 2009), toxic chemicals, cyto-toxic drugs, flammable and radioactive wastes that can often be considered infectious (Caltivelli, 1990).

The sustainable management of Healthcare Waste (HCW) has continued to generate increasing public interest due to the health problems associated with the exposure of human beings to potentially hazardous waste arising from healthcare (Tudor, Noonan and Jenkin, 2005). Whilst hospitals and healthcare units are supposed to safeguard the health of the community, the mismanagement of HCW poses health risks to people and the environment by contaminating the air, soil and water resources. Presently, considerable gap exists with regards to the assessment of healthcare waste management practices particularly in Nigeria and in several other countries in sub-Saharan Africa (Adegbite, Nwafor, Afon, Abegunde and Bamise, 2010).

Studies on Hospital solid waste have been carried out by different researchers. (Longe and Williams, 2006) surveyed medical waste management practices and their implications to health and environment in metropolitan Lagos. The study assessed management practices in four hospitals ranging in capacity from 40 to 600 beds. The study established average generation rate of medical waste of 0.562kg/bed/day to 0.670kg/bed/day; with infectious waste accounting for between 26 to 37% of the total volume. Only two of the hospitals investigated carried out treatment of their infectious and sharp waste types by incineration before final disposal.

Nemathaga, Maringa, and Chimuka, (2008) studied hospital solid waste management practice in Limpopo province of South Africa. The author looked at the issues and current short comings faced by many hospitals in the province. According to the study, a major policy implementation gap was identified between the national government and the hospitals. Although modern practices such as landfills and incinerators were reported to be used, daily operations were not carried out in accordance with these minimum standards. The authors also noted that there was no proper separation of waste according to the classification demanded by the national government.

Ajimotoke and Aremu (2009), in a study titled "case study evaluation of health-care waste challenges in Hospitals within Ilorin metropolis", found out that about 177.67Kg of waste was generated daily and the average waste generated per bed/per day was 1.56Kg. They further reported that the management of the waste was often poor, with a mixture of potentially infectious and non-infectious waste being a common sight in the hospital waste bins and hospital environment.

Abah and Ohimain (2011), in the study entitled "health care waste management in Nigeria", focused on the estimation of the quantity, evaluation of the waste segregation practice and determination of the knowledge of health care workers regarding healthcare waste management. The findings revealed that the average amount of health care waste was 0.62Kg/person/day at the out patients ward and that the proportions of respondents who had received specific training in the management of healthcare waste was 11.5% (6/52). The number who understood the importance of HCW management in the provision of safety to the public was 46% (24/52).

Toyobo, Baba and Oyeniyi (2012) appraised the medical waste characteristics and management practices in University College Hospital (UCH), Ibadan and Obafemi Awolowo Teaching Hospital Ile-Ife in Nigeria. The authors examined characteristic of waste

generation, identified waste disposal methods, assessed waste management practices, and highlighted possible suggestions towards a healthy environment for patients for the case studies. The study revealed improper waste management handling and open dump disposal methods in the two hospitals. The study subsequently recommended proper trainings and workshops should be conducted to make the resident doctors and waste management teams in the hospitals aware of the issues and practices of hospital waste management. Beside this, the study recommended that the regulation of audit process in this life sensitive issue should be maintained.

Studies on healthcare wastes have not been adequately undertaken and reported in the present study area. It is not clear at this point in time what the nature of HCW is, how much is being generated and how they are managed in the study area. Besides, existing literature (Nemathaga et al., 2008; Toyobo et al., 2012) indicate that there appears to be much difference in the way and manner waste generated in various healthcare institutions are managed in Nigeria, hence, the necessity for this research, designed to compare Ahmadu Bello University Teaching Hospital (ABUTH) and Ahmadu Bello University Health Service (ABUHS) because of the potential high risk to the health of the vast number of people who are mainly students, staff, visitors and the communities at large. The specific objectives of the study were to:

- (i) characterize the nature of the Healthcare Waste (HCW) generated in the two hospitals;
- (ii) determine the quantity of HCW generated in the hospitals;
- (iii) identify and map out the waste dumpsites of the two hospitals; and
- (iv) assess the effectiveness of HCW management practices in the hospitals.

MATERIALS AND METHODS

The data used for the research were:

- (i) Co-ordinates of the waste dumpsites which was sourced from the study area using the Global Positioning System (GPS).
- (ii) Quantity of waste generated per bed per day in each of the hospitals: The amount was calculated using a weight measuring scale.
- (iii) The effectiveness of HCW management practices in the two hospitals collected using structured questionnaires administered to each of the waste management heads in the hospitals.

- (iv) The topographic map sheet of the study area was sourced from the map library of the Department of Geography, Ahmadu Bello University, Zaria.

From the reconnaissance survey, it was discovered that two (2) staff were involved in waste handling at ABUHS while one hundred and ninety (190) staff were involved in waste handling at the ABUTH. The head of the waste management unit and the Medical Director of ABUHS completed the questionnaire while the four heads of waste management units at ABUTH also completed the questionnaire. Purposive sampling technique was used for the survey and frantic efforts were made to collect all the questionnaires.

To characterise the nature of the Healthcare Waste (HCW) generated in the two hospitals. Using the UNEP/WHO (2005) categorization, an inventory of the nature of wastes generated in the two hospitals were collated.

To determine the quantity of HCW generated in the hospitals, the different types of waste generated and collected in the out-patient and in-patient wards over a period of one week were weighed using a

weighing balance to determine the quantity of each type of waste generated per day in each hospital. The entire quantity of waste generated were weighed together each day prior to disposal at the dumpsites and recorded. Calculations of average quantity of waste per bed per day were carried out by dividing the total quantity of waste by the number of beds in each hospital.

In order to assess the HCW management practices of the two hospitals, an overall performance rating was assigned using the approach outlined in the guidelines suggested by Townsend and Cheeseman (2005).

After the dumpsites have been identified in the study area, the GPS was used to pick the coordinates of the dumpsites and these coordinates were transferred to the GIS environment where the base map (topographic map of the study area) was used to generate the dumpsites map using Arc GIS.

RESULTS AND DISCUSSION

The characterization and the nature of the HCW generated in the hospitals using the UNEP/WHO (2005) format is as presented in Table 1.

Table 1 The character and nature of the HCW in the hospitals

Waste Category	ABUHS				ABUTH			
	Yes	%	No	%	Yes	%	No	%
Recyclable wastes	2	100	0	0	190	100	0	0
Biodegradable wastes	2	100	0	0	190	100	0	0
Other non-risk wastes	2	100	0	0	190	100	0	0
Human anatomical wastes	0	0	2	100	160	84.21	30	15.79
Sharps	2	100	0	0	190	100	0	0
Non-hazardous Pharmaceutical wastes	2	100	0	0	190	100	0	0
Potentially hazardous Pharmaceutical wastes	2	100	0	0	177	93.12	13	6.8
Hazardous Pharmaceutical wastes	2	100	0	0	174	91.58	16	8.42
Cyto-toxic pharmaceutical wastes	2	100	0	0	162	85.26	28	14.74
Blood and body fluids	2	100	0	0	190	100	0	0
Infectious wastes	2	100	0	0	190	100	0	0
Highly infectious wastes	2	100	0	0	165	86.84	25	13.16
Other hazardous wastes	0	0	2	100	180	94.74	10	5.26
Radioactive wastes	0	0	2	100	80	42.11	110	57.89

Source: Author's fieldwork (2020)

From table 1, at the ABUHS, the respondents indicated that all the waste categories according to UNEP/WHO classification were present except radioactive waste, other hazardous waste and human anatomical waste were not present. However, it was recorded that all the waste categories according to UNEP/WHO classification were present at the ABUTH.

The quantity of wastes generated in the two hospitals could not be done using the standard UNEP/WHO (2005) guide because the waste in both hospitals were not sorted. Hence, the quantity of the daily waste generated was done according to the Department/Unit where the waste was generated. These are shown in table 2 for ABUTH and table 3 for ABUHS.

Table 2 Quantity of Healthcare Waste at ABUTH

S/No	Department/Unit	Weight (Kg)
1	Male and Female Medical Wards	237
2	Microbiology, Haematology & Paediatric Wards	81
3	Obstetrics and Gynaecology Ward	76
4	Accident and Emergency & Labour Wards	160.5
5	Chemical Pathology	12
6	Clinical Pharmacology Ward	5
7	Mortuary	22
8	Male and Female Surgical Wards	168.5
9	General Out Patient Department (GOPD) laboratory	74
10	Sharp boxes	9
	Total	845

Source: Author’s fieldwork (2020)

From table 2, the total quantity of HCW generated at ABUTH is shown as 845kg per day. With 717 beds in the ABUTH, the quantity of HCW per bed per day is 1.18kg. The table further shows that male and female medical wards generated the highest quantity of wastes (237kg), followed by the male and female surgical

wards (168.5kg), then the Accident and Emergency & labour wards (160.5kg). The Table also shows that Clinical Pharmacology Ward generated the least quantity of waste (5kg). Figure 1 shows the distribution of the HCW in percentages.

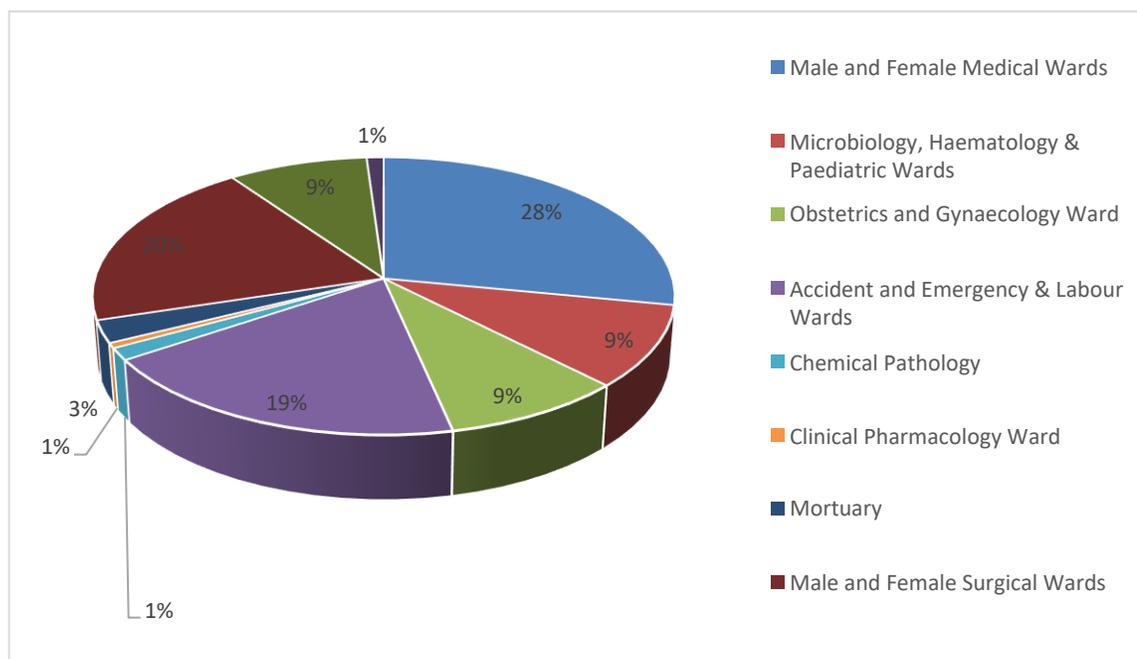


Figure 1 Proportion of Weight of HCW in different locations at ABUTH

Source: Author’s fieldwork (2020)

As shown in Figure 1, the units with leading proportions are Male and Female Medical Wards

(28%), Male and Female Surgical wards (20%) and Accident and Emergency & Labour wards (19%).

Table 3 Quantity of Healthcare Waste at ABUHS

S/No	Department/Unit	Weight (Kg)
1	Emergency	5
2	Dressing room	4.5
3	Laboratory	45
4	Safety box	3.5
5	Pharmacy	1
6	Injection room	1
7	General Out Patient Department (GOPD) laboratory	17
	Total	77

Source: Author’s fieldwork (2020)

The total quantity of HCW generated at ABUHS was 77kg per day. With the 50 beds capacity, the quantity of HCW at ABUHS per bed per day is 1.54kg. It is of equal importance to point out that several medical activities (such as delivery, surgery, etc) were not being carried out at ABUHS. When there

was a need for these activities, the cases were referred to the ABUTH. The proportion of HCW generated in the different units of ABUHS is shown in figure 2. The locations with leading proportions are laboratory (58%) followed by the General Out-Patient Department laboratory (22%).

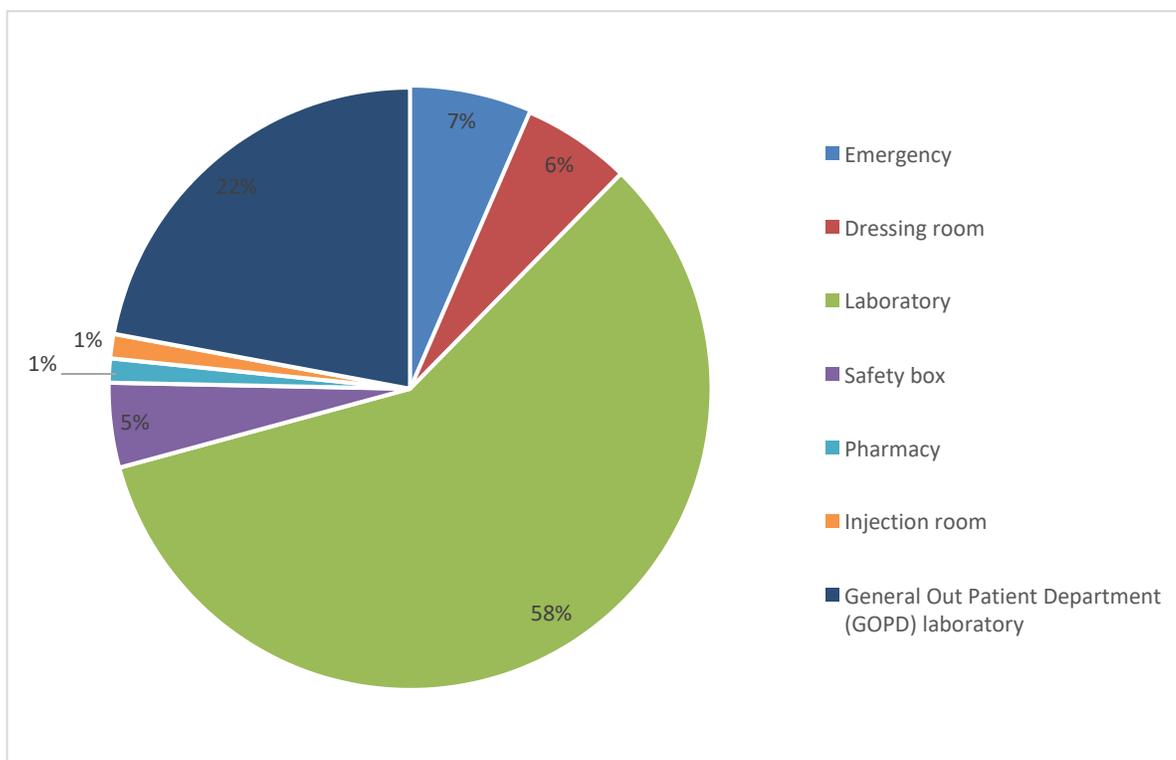


Figure 2 Quantity of HCW from different units at ABUHS
Source: Author’s fieldwork (2020)

The location of the dump sites within the premises of

the two hospitals is as presented in Figure 3

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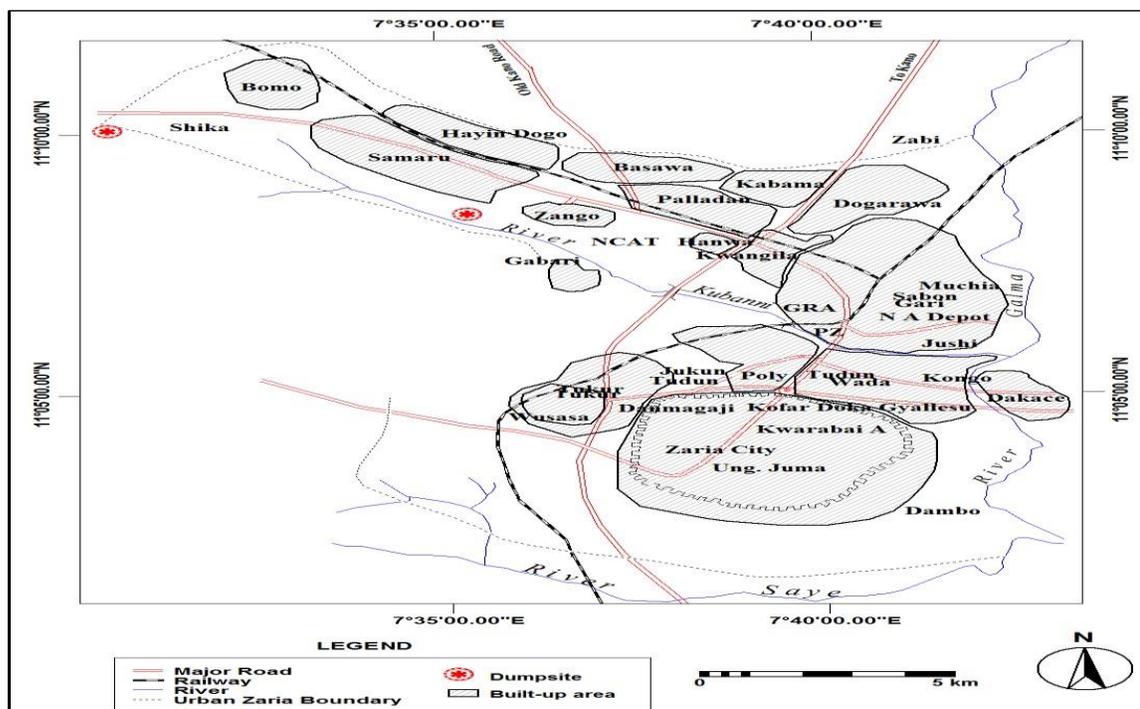


Figure 3 Location of Dumpsites for ABUTH and ABUHS
Source: Modified from Map of Urban Zaria

The effectiveness of HCW management practices in the two hospitals was investigated using the questionnaire administered to the waste handlers and also by another

set of questionnaire administered to the heads of the waste management units at the hospitals. The results are therefore presented in table 5.

Table 5 Assessment of effectiveness of healthcare waste management at ABUTH and ABUHS

Measure	ABUTH	ABUHS
<i>Level of awareness of top management on sustainable development (SD):</i>		
All top management trained in sustainable development	X	X
Some top management trained in sustainable development	X	X
All top management aware of sustainable development	(50%)	X
Some top management aware of sustainable development	(25%)	(100%)
Management unaware of sustainable development	(25%)	X
<i>Level of commitment of top management to sustainable development (SD):</i>		
High level	(50%)	(50%)
Some level	(25%)	(50%)
Minimal level	X	X
No commitment	X	X
Conduct of Mass balance	(100%)	X
Availability of cases of corruption	(25%)	X
<i>Level of awareness of best value:</i>		
Best value undertaken in the hospital	(25%)	X
There is awareness of best value	X	(50%)
There is minimum awareness of best value	(75%)	(50%)
There is a lack of awareness of best value	X	X

Table 5 Contd

Measure	ABUTH	ABUHS
<i>Level of awareness of continuous improvement:</i>		
Continuous improvements undertaken in the hospital	X	X
Some continuous improvements take place	(50%)	(50%)
Minimum continuous improvements take place	(50%)	(50%)
No continuous improvements take place	X	X
Availability of ISO 14001 certification	X	X
Availability of a staff consultative committee	(100%)	(100%)
Availability of a patient consultative committee	(50%)	X
Availability of a health and safety committee	(75%)	X
Availability of a health and safety representative	X	X
Availability of equal opportunities policy and framework	X	X
Availability of Investor in People (or similar) scheme	X	X
<i>Current state of health and safety:</i>		
There is health and safety awareness	(100%)	(50%)
There is a health and safety policy	(25%)	(50%)
There is a health and safety advisor	X	X
There are health and safety posters in use	(75%)	(50%)
There are basic protective clothing	(75%)	(100%)
There are full protective clothing	X	X
<i>Energy and Water usage practice:</i>		
Availability of energy policy	X	X
Conduct of regular checks on energy use	(50%)	(100%)
Use of renewable energy sources	(25%)	X
Conduct of regular checks on level of water consumption	(25%)	X
Availability of insulation in buildings	(25%)	(50%)
Conduct of regular checks to detect water wastage	(25%)	X
Availability of car sharing scheme	(75%)	X
Recovery of heat and power from wastes	X	X
Level of usage of public transport	Medium (100%)	Low (100%)
<i>Current state of purchasing and supply (procurement) of goods:</i>		
Uncoordinated purchasing and supply	X	X
Purchasing and supply is coordinated	(100%)	(100%)
There is some control on suppliers through tendering	X	(100%)
There is usually detailed specifications for goods	X	(100%)
There are usually no detailed specifications for goods	X	X
There are no waste prevention practices	X	X
There are waste prevention practices	X	(100%)
We work with suppliers and service providers to reduce materials used, reduce packaging and use of hazardous chemicals	X	X
We work with suppliers and service providers to reduce materials used, reduce packaging, eliminate heavy metals, reduce use of hazardous chemicals, identify materials for recycling and to reuse recycled products	X	X
There are no regards for clean production practices by suppliers	X	X
We conduct stock management	X	(50%)
There are no regards for rate of use of facilities depending in economic circumstances	X	X
We always conduct life cycle assessments and consider whole life costs of materials	X	X

Table 5 Contd

Measure	ABUTH	ABUHS
Availability of budget for waste management	X	X
Availability of operational staff responsible for waste management	(100%)	(100%)
Availability of strategy or policy for waste management	(25%)	(100%)
Availability of training on waste management	(100%)	(100%)
Venue of waste management trainings	Within the hospital (100%)	Within the hospital (100%)
Availability of Personal Protective Equipment	(100%)	(100%)
Presence of receptacles/storage containers	(75%)	(100%)
Availability of colour coding	X	X
Separation of collection for sharps or infectious wastes	(25%)	X
Availability of central purpose-built facility for waste storage	(25%)	(100%)
Availability of temporary waste storage facility	(100%)	(100%)
Average storage duration at temporary facility	Less than 24hrs (100%)	Less than 24hrs (100%)
Presence of dumpsite within hospital complex	(100%)	(100%)
Dumping of waste in open waste disposal site	(100%)	(100%)
<i>Current waste transportation practice:</i>		
Transportation of all non-hazardous municipal solid wastes collected in open topped vehicles	(100%)	X
Compaction of wastes	X	(100%)
Transportation of all non-hazardous municipal solid wastes collected in enclosed compaction vehicles	(100%)	(50%)
Conduct documentation for Transport of Dangerous Goods (TDG)	X	X
Appointment of TDG advisers	X	X
Separation of segregated wastes in enclosed vehicles	X	X
Availability of dedicated vehicles for hazardous wastes	X	X
Application of Basle Convention Requirements	X	X
Availability of recycling	X	X
Seeking to improve local economy and employment by developing use of recyclables	X	X
<i>Current waste treatment practice:</i>		
Availability of autoclaving of laboratory wastes	X	X
Practice of crude incineration of hazardous wastes	(75%)	(100%)
Use of single cell incineration plant	X	X
Use of multiple-chamber incineration plants	X	X
Recycling of residuals from incineration	X	X
Conduct of incineration according to international standards	X	X
Use of disinfected wastes as renewable fuel after shredding	X	X
Burying of wastes	(100%)	(100%)
Use of chemicals to disinfect body fluids	(100%)	(100%)
Practice of waste pre-treatment	(100%)	(100%)
Use of other advanced waste treatment technologies	X	X

Table 5 Contd

Measure	ABUTH	ABUHS
<i>Waste disposal practice:</i>		
Presence of scavenging and recycling by residents on dumpsites	(100%)	X
Presence of scavenging by animals and insects on dumpsites	(100%)	X
Availability of reports of recycling of syringes for re-use from the dumpsites	X	X
Availability of fencing and security for the dumpsite	X	X
Presence of environmental pollution at the dumpsite	(100%)	(100%)
The dumpsite posing as danger to public health	(100%)	(100%)
<i>Availability of any engineered sanitary landfill for hazardous wastes</i>	(100%)	X
External contracting of waste treatment	(75%)	X
<i>Method of waste transportation:</i>		
Open vehicles	(100%)	X
Enclosed compaction vehicle	X	X
Trolley	X	(100%)
Wheeled Vehicles	X	X
Trucks	X	X
Frequency of outside transportation of waste	Daily (100%)	Daily (100%)
<i>Final destination of wastes</i>		
Open dumpsite	(100%)	(100%)
Landfills	X	X
Shredding	X	X
Buried	X	X

Source: Adapted from Townend and Cheeseman (2005); *X means 0%

From table 5, 50% of the respondents from ABUTH indicated that all top management were aware of sustainable development, 25% indicated that some top management were aware of sustainable development while 25% indicated that management were unaware of sustainable development. The table also shows that all the respondents indicated that some top management were aware of sustainable development. The table shows that 50% of the respondents indicated high level of commitment of top management to sustainable development at both ABUTH and ABUHS; and that the remaining 50% of the respondents indicated some level of commitment of top management to sustainable development at both ABUTH and ABUHS. The table shows that all of the respondents from ABUTH indicated that mass balance was conducted while all the respondents from ABUHS indicated that mass balance was not conducted. The table further shows that 75% and 100% of respondents indicated that cases of corruption were not available with respect to waste management at ABUTH and ABUHS respectively. The table shows that 75% and 50% of the respondents indicated that there was minimum awareness of best value at ABUTH and ABUHS respectively. Furthermore, 50% of the respondents indicated that there was awareness of best value at ABUHS.

The table reveals that 50% each of the respondents from ABUTH and ABUHS indicated that some continuous improvements took place while the remaining 50% each of the respondents indicated that minimum continuous improvements took place at the two hospitals. The table shows that both ABUTH and ABUHS did not have ISO 14001 certification. The table also shows that 100%, 50% and 75% of the respondents from ABUTH respectively indicated availability of staff consultative committee, availability of patient consultative committee and availability of health and safety committee. The table further shows that 100% of the respondents from ABUHS indicated availability of staff consultative committee. The table shows that there was health and safety awareness (100%), policy (25%), posters in use (75%) and basic protective clothing (75%) at the ABUTH. The table also shows that there was health and safety awareness (50%), policy (50%), advisor (100%), posters in use (50%) and basic protective clothing (100%) at the ABUHS. The table shows that the following energy and water usage practices took place at ABUTH: conduct of regular checks on level of energy use (50%), use of renewable energy sources (25%), conduct of regular checks on level of water consumption (25%), availability of insulation in buildings (25%), conduct of regular checks to detect water wastage (25%) and

availability of car sharing scheme amongst staff (75%). The table also shows that the following energy and water usage practices took place at ABUHS: conduct of regular checks on level of energy use (100%) and availability of insulation in buildings (50%). The table shows that all the respondents indicated medium and low levels of usage of public transport by staff at ABUTH and ABUHS respectively. The table also shows that of all the identified purchasing and supply practices, all the respondents indicated only that purchasing and supply was coordinated at ABUTH. In addition, the table shows availability of the following purchasing and supply practices at ABUHS: that purchasing and supply was coordinated (100%), there was some control on suppliers through tendering (100%), there were usually detailed specifications for goods (100%), there were waste prevention practices (100%) and conduct of stock management (50%). The table shows that all the respondents from ABUTH and ABUHS respectively indicated that there was no specific budget for waste management. This implies overwhelming evidence of non-existence of specific budget for waste management in the case study hospitals. From the table, it is shown that all the respondents from ABUTH and ABUHS respectively indicated that there were operational staff specifically responsible for medical waste management in the hospitals. The table reveals that 25% and 100% of respondents from ABUTH and ABUHS respectively indicated that their hospitals had specific policy or strategy for medical waste management. The table also shows that all the respondents from ABUTH and ABUHS respectively indicated that the hospitals had specific training on medical waste management.

The table further shows that all the trainings workshops conducted on medical waste management by both ABUTH and ABUHS were held in-house within the respective hospitals. The table reveals that all the respondents from ABUTH and ABUHS indicated that there was available personal protective equipment for use by medical waste handlers. The table also shows that 75% and 100% of respondents from ABUTH and ABUHS respectively indicated that there were receptacles and storage containers available in their hospitals for medical waste management. The table further shows that all the respondents from ABUTH and ABUHS indicated that there were no colour coding practices for receptacles in their hospitals for medical waste management. The table also reveals that 75% and 100% of respondents from ABUTH and ABUHS respectively indicated that there were no separations of collection for sharps or infectious materials in their hospitals. The table also shows that

25% and 100% of respondents from ABUTH and ABUHS respectively indicated that there was central purpose-built facility as well as temporary waste storage facility available in the hospitals.

The table further shows that all respondents from both ABUTH and ABUHS indicated that the wastes were stored in the temporary waste storage facility for an average of less than 24 hours. The table shows that all the respondents from ABUTH and ABUHS indicated that there were dumpsites within their respective hospitals for medical waste management and that wastes from their hospitals were dumped in open disposal sites. The table also shows that from the identified current waste transportation practices, all the respondents at ABUTH practice transportation of all non-hazardous municipal solid wastes collected in open topped vehicles (100%) and transportation of all non-hazardous municipal solid wastes collected in enclosed compaction vehicles (100%). The table further shows that from the identified current waste transportation practices, the respondents at ABUHS practice compaction of wastes (100%) and transportation of all non-hazardous municipal solid wastes collected in open topped vehicles (50%). The table also shows that all the respondents from ABUTH and ABUHS indicated non-availability of recycling of medical waste management in both hospitals and that no improvement to local economy and employment by developing use of recyclables were sought at both hospitals. The table shows the current waste treatment practices at ABUTH to include of crude incineration of hazardous wastes (75%), burying of wastes (100%), use of chemicals to disinfect body fluids (100%) and practice of waste pre-treatment (100%). The table also shows the current waste treatment practices at ABUHS to include crude incineration of hazardous wastes (100%), burying of wastes (100%), use of chemicals to disinfect body fluids (100%) and practice of waste pre-treatment (100%). The table further shows that 75% and none of the respondents from ABUTH and ABUHS respectively indicated that there was external contracting of waste treatment in their respective hospitals and that open vehicles was the dominant methods for transporting wastes at ABUTH while the use of trolleys was the dominant method at the ABUHS. The table also shows that all the respondents indicated open dump sites as final destinations of wastes from both ABUTH and ABUHS and that the frequency of outside transportation of wastes as daily at both ABUTH and ABUHS. The table shows the waste disposal practices at ABUTH to include presence of scavenging and recycling by residents on dumpsites

(100%), presence of scavenging by animals and insects on dumpsites (100%), presence of environmental pollution at the dumpsites (100%) and the dumpsite posing as danger to public health (100%).

The table also shows the waste disposal practices at ABUHS to include presence of environmental pollution at the dumpsite (100%) and the dumpsite posing as danger to public health (100%). The table shows the disposal methods for different waste categories at the ABUTH and reveals that burial method was popular for disposing human anatomical wastes (75%), potentially hazardous pharmaceutical waste (100%), hazardous pharmaceutical waste (75%), cyto-toxic pharmaceutical waste (100%), blood and body fluids (75%) and radioactive waste (50%). The table also shows that incineration was popular for disposing other non-risk wastes (25%), sharps (100%), non-hazardous pharmaceutical wastes (25%), hazardous pharmaceutical waste (25%), blood and body fluids (25%), infectious waste (100%), highly infectious waste (100%), other hazardous waste (100%) and radioactive waste (75%). The table further shows the open dumping to popular for disposing recyclable waste (100%), biodegradable waste (100%), other non-risk waste (75%) and non-hazardous pharmaceutical waste (75%). The table shows the disposal methods for different waste categories at the ABUHS and that burial method was popular for disposing human anatomical wastes (50%), sharps (100%), potentially hazardous pharmaceutical wastes (100%), hazardous pharmaceutical wastes (50%) and blood and body fluids (100%). The table further shows that incineration was popular for disposing recyclable waste (50%), biodegradable waste (50%), other non-risk waste (100%), non-hazardous pharmaceutical waste (100%) and highly infectious waste (100%). The table also shows that open dumping was popular for disposing biodegradable waste (50%) and other non-risk waste (50%).

Going by the scores obtained from the two hospitals assessed as shown in the table. It is clear that both hospitals were operating in a manner with some aspects that were considered sustainable and others that were considered unsustainable. Hence, in accordance with the Townend and Cheeseman (2005) guidelines, both the ABUTH and ABUHS can be classified as Level 2 hospitals based on their operational performance.

CONCLUSION

Healthcare services are aimed at preventing potential human health risks and environmental hazards as well as improving wellbeing. In the process, however,

wastes that are potentially harmful are generated. Poor management of these healthcare wastes (HCW) exposes the health workers, patients, waste handlers and the general public to health risks. The management practices at ABUTH and ABUHS give room for so much concern considering the fact that both hospitals are classified as Level 2 hospitals based on their operational performance in accordance with the Townend and Cheeseman (2005) guidelines. The hospitals have enormous population influx based on patronage and the availability of high number of students on training should be seen to be high above board in waste management to avoid outbreak of infection.

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