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Assessment of Compliance with Medical Waste Management Practice in Selected Hospitals in Urban Bauchi, Nigeria

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Abstract

This study assesses compliance with medical waste management practice in hospitals across urban Bauchi. Ten hospitals were randomly selected in each ward, representing the ten administrative wards of urban Bauchi, in which 148 set of questionnaires were administered among the waste handlers in the selected hospitals. In addition, the heads of units in each of the selected hospitals were interviewed. The results were compared with standard guidelines stipulated by the World Health Organization (WHO). It was revealed that the main treatment and disposal method in 50% of the hospitals were incineration and deep burial which were mostly in compliance with the stipulated guidelines. In the remaining 50% of the hospitals, the dominant treatment and disposal methods used were general collection of the waste, open dumping and burning. This is of significant concern because open dumping and open burning are not sustainable practices. Therefore, the study recommends that waste handling manual be developed and provided to all waste handlers to guide on handling medical waste properly.

Keywords: Medical Waste, Hospitals, Compliance, Waste Handlers, Bauchi

INTRODUCTION

Medical waste or clinical waste is categorized as one of the most hazardous wastes in the world. This is due to the potential threat posed in spreading deadly diseases to humans and other living organisms (Sutha, 2018), It is recognize as any waste that is generated during medical activities such as diagnosis, monitoring, and immunization or treatment of human beings or animals. It includes viruses and bacteria that potentially causes diseases which are generated by hospitals, clinics, doctor's offices and other types of healthcare institutions (Tabasi & Marthandan, 2013). Biomedical waste, if not managed properly, can create significant amount of environmental and health impact (Das and Biswas, 2016).

Nigeria, as a less developed country has health issues that are competing for limited resources. It is not amazing that healthcare waste management receives less attention and precedence than it merits (Stephen & Elijah, 2011). There are numbers of challenges in many less developed countries, where there are weak institutional capacities for healthcare waste management. Clinical wastes are sometimes disposed openly in the dumpsite along with municipal waste and the practice make the members of the community gain access to it, which may eventually lead to outbreak of infectious diseases (Abah & Ohimain 2011; Shareefdeen, 2012).

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Poor healthcare waste management practice creates health hazards for health workers, patients and the environment. Identified gaps like lack of color-coded bags for segregation of healthcare waste at point of use, lack of guidelines on segregation and disposal method among health workers lead to poor healthcare waste management in hospitals (Abah & Ohimain 2011; Shareefdeen, 2012). The mismanagement of healthcare waste by healthcare facilities does not only pose health hazard to health workers and patients alone, but to patient's visitors and the community, where they are improperly disposed by contaminating the soil, air and water. Healthcare facilities are supposed to protect the health of people in their environment, not to be creator of potential health hazard for them (Babanyara *et al.*, 2013).

Lack of awareness among health professionals as well as general population regarding proper management of Health Care Waste(HCW), the absence of an effective regulatory framework and national policy, and financial strains are some of impediments of adequate HCW management provided, and all increase the potential risk of environment and public health. (Hasan & Rahman, 2018).Hence, adequate knowledge about the health hazard of hospital waste, proper technique, methods of handling the waste and compliance to standard medical waste management guidelines will help toward securing management of harmful hospital waste (Shivalli & Sanklapur, 2014). This study, therefore, assesses of compliance of medical waste management practice in selected hospitals in Urban Bauchi with the guidelines stipulated by the UNEP/WHO

MATERIALS AND METHODS

Study Area

Bauchi town lies within the western part of Bauchi State and is bounded to the North by Darazo Local Government Area, the East by Alkaleri Local Government Area and the West by Toro Local Government Area. The town is in the Northern Guinea Savannah ecological zone of Nigeria (Haruna *et al.*, 2012). It is located between Latitudes $10^{0}16'$ 30" - $10^{0}21'$ 0" North of the Equator and Longitudes $9^{0}48'$ 0" and 9^{0} 52'30"East of the Greenwich Meridian (Gani *et al.*, 2012). It covers a total land area of 3,687 square kilometers (Ogwuche, 2013). The topography of Bauchi metropolis is relatively flat in the center. (Usman and Mohammed, 2012).

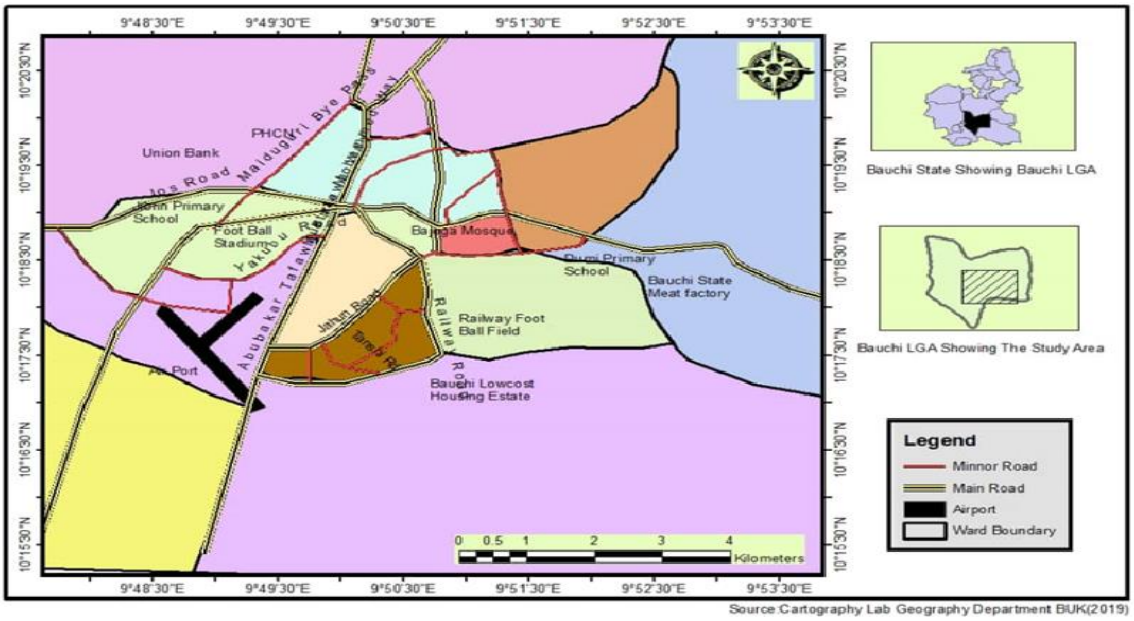

Figure 1: Map of the Study Area

Sampling and data collection

Stratified sampling technique was used to group the population into ten (10) strata to represent the ten (10) administrative wards in urban Bauchi. Among each ward, one (1) hospital was selected, and the sample size was obtained based on Krejcie and Morgan (1970) table. Actual names of the selected hospitals are coded in this article to protect their confidentiality. The hospitals are tagged as A, B, C, D, E, F, G, H, I and J representing each administrative ward, namely, Birshi, Makama A, Makama B, Tirwin, Dan Kade, Dawaki, Dan Amar A, Dan Amar B, Hardo and Dan Iya wards, respectively. A total of 148 set of questionnaires were administered among the waste handlers in the selected hospitals by systematic random sampling technique. Ten (10) interview questions were set to the head of units in each hospital. The results were compared with the guidelines stipulated by UNEP/WHO.

Ethical Consideration and Participants Consent

Ethical approval for this study was obtained from Bauchi State Ministry of Health subsequently; Bauchi State health research Ethics Committee (BASHREC) approval was obtained. The procedures were explained to the participants and then their permission to participate in the study was obtained. The participants that declined not to be part of the study were excluded. Confidentiality was ascertained by excluding all the names of the sampled hospitals.

RESULTS AND DISCUSSION

The result reveals the practices of Medical Waste Management (MWM) in the selected hospitals and how the processes and practice conform or deviate from the guidelines of best practice as suggested by UNEP/WHO for medical waste management.

The practice of segregation of wastes at hospital F, G, H, I and J were not in accordance with UNEP/WHO (2005) Guidelines. Hence, the wastes were classified as infectious waste. This practice shows that medical waste handlers in the health care centers are at high risk of infection. A similar practice was found in the study conducted by Elinwa (2016) who studied incineration ash for Portland cement in Abubakar Tafawa Balewa University Teaching Hospital (ATBUTH) Bauchi; the study showed that the waste at the facility is considered to be an infectious waste because segregation of the wastes at the points of collections was not practiced, the prevailing practice is general collection of the wastes which are dumped as refuse and later burned openly. Whereas the other five hospitals (A, B, C, D and E) have general storage receptacles which includes red plastic bags, yellow containers, black containers and other receptacles such as pedal bins, black refuse plastic bags and standard metal dust bin. As presented in Figure 2, color-coded containers are only available in five health care centers (A, B, C, D, and E), which are all public sector facilities. The other five centres (F, G, H, I and J) that are all private sector owned, have no coded containers at all. Despite the presence of receptacles at hospital B and C, segregation was not done in all the wards in the hospitals and the segregated wastes were sometimes mixed up at the storage site thereby rendering the whole waste infectious. Based on the findings it is evident that the segregation practice only at hospital A, D and E were in agreements with the Guidelines.

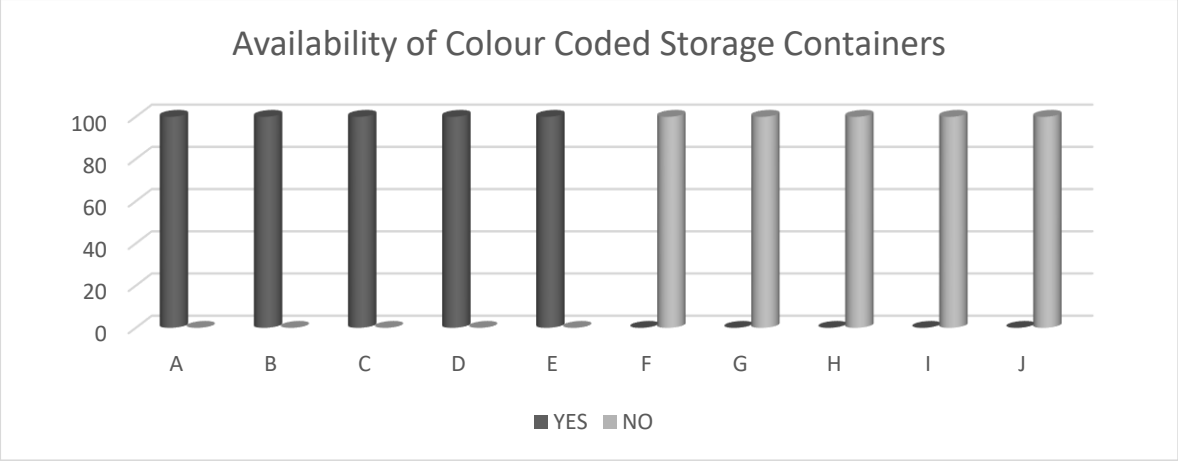

Figure 2 Availability of Color Coding for the Receptacles/ Storage Containers

The treatment and disposal methods for the different categories of health-care waste such as, sharps, infections, human anatomical, pharmaceutical, blood and body fluids, radioactive waste, recyclable and other non-risk waste and laboratory assessed.
Table 1 reveals that sharp and infectious wastes generated at hospital A, B, C, D and E were incinerated, and this practice agrees with the international Guidelines. The finding is in line with the work of Prus*set al.* (1999) who supported incineration of general infectious waste as long as pharmaceutical waste is not more than 1% of the total limit toxic emissions into the air. The result also shows that hospitals F, G, H, I and J practice open dumping/burning of the sharps and infectious waste. These practices of open dumping of the waste by the health care facilities were against the UNEP/WHO Guidelines, which requires sharps and infectious waste to be disinfected and then incinerated. The study also revealed that hospitals A, B, C, D and E incinerate some of their waste, but hospital C do not own incinerator, they transport their infectious waste to hospital A for incineration. From field observation the study also revealed that incinerators found at hospital D was not set to required standard because they were locally constructed. Also, incineration and/ or deep burial is the common disposal practice of human anatomical wastes in all the hospitals. Disinfection and discharge through sewerage system or into a septic tank of non-infectious blood and other body fluids were found to be the main practice in all the hospitals. These treatment and disposal practice were in conformity with the UNEP/WHO Guidelines.

Radio-active wastes were only present at hospitals A and I; this category of waste is classified as one of the most harmful waste in the world, but all the waste generated at the radiology department in the hospitals were collected and burnt in an open field. This practice of disposal is not recommended by the WHO guidelines. Recyclable and other non-risk waste were recommended by the Guidelines to be disposed of with the domestic waste if it is segregated. Also, items such as paper and cardboard as well as plastic and metal cans that come from the administration and kitchen can be recycled into valuable compost. However, this practice cannot be achieved in most of the hospitals because most of the wastes in the health facilities were not properly segregated. Laboratory waste generated at hospital A, B, C, D and E were incinerated as per the Guidelines. While, the laboratory waste generated at hospital F, G H, I and J were mixed with general waste and later on dispose in an open field.

The safe management of medical waste can be achieved by ensuring care in dealing with medical waste by waste handlers; hence it is the ethical responsibility of employers or management of hospitals to ensure proper medical waste management practice. This involves

training on health and safety, regular risk assessments, maintenance of workplace injuries, test and vaccinations against diseases.

Table 2 shows that 100% of the respondents from hospitals B, F, G, H and 84.9%, 50%, 33.3%, 77.8% and 83.3% from hospital A, C, J, D and E respectively confirmed that they were trained on safety and health while 15.1%, 50%, 22.2, 16.7%,100% and 66.3% of the respondents from hospital A, C, D, E G, J and E indicated that they were recruited without undergoing any training on safety and health and had never been trained. A study conducted in Malaysia recorded that 87.5% of healthcare workers in the studied District hospitals were reported to have received training and were aware of risks of clinical waste to both human health and the environment (Dasimah *et al.,* 2012). Proper handling of different types of waste is of paramount importance for health and safety at workplace to minimize risks (WHO, 1999). It is therefore important for healthcare workers and operators to be up to date with dangers and hazards that may occur while on their duty. They need to be trained or oriented on the health and safety measures.

Interview result indicated that, majority of the waste handlers from all the hospital were trained on health and safety, although there are limited or no formal training programs in the hospitals or clinics, waste handlers have a good knowledge of medical waste management due to extensive service and practice which would have given them on job-training opportunities.

Table 1: Treatment and Disposal Techniques Used in the Hospitals vs. UNEP/WHO Guidelines

Types/Category of Waste	Name of Hospital/clinic										UNEP/WHO (2005) Recommended Guidelines
	A	B	C	D	E	F	G	H	I	J	
Sharps	Incineration	Incineration	Transportation to incineration plant	Incineration	Incineration	Open dumping/ Burning	Open dumping / Burning	Open dumping/ Burning	Open dumping/ Burning	Open dumping/ Burning	Disinfection (autoclaving/microwaving/shredding) incineration and landfills
Infectious	Incineration	Incineration	Open dumping	Incineration	Incineration	Open dumping/ burning	Open dumping /burning	Open dumping and burning	Open dumping and burning	Open dumping and burning	Autoclaving/microwaving/incineration
Human Anatomical	Deep burial	Incineration	Deep burial	Incineration	Incineration	Deep burial	Deep burial	Deep burial	Deep burial	Deep burial	Incineration /deep burial
Pharmaceutical	Incineration	Open burning	Open dumping	Incineration	Incineration	Open dumping	Open dumping	Open dumping	Open dumping and burning	Open dumping	Incineration / destruction and drug disposal in secured landfills
Blood and Body fluid	Disinfection	Disinfection	Disinfection	Disinfection	Disinfection	Disinfection	Disinfection	Disinfection	Disinfection	Disinfection	Disinfection/ discharge through sewerage system or into a septic tank
Radioactive	Open burning	-	-	-	-	-	-	-	Open dumping	-	Radioactive waste should be discharged into the sewerage system or into a septic tank after it has decayed to background level in buffer tanks.
Recyclable and other non-risk waste	Disinfection / open dumping /burning	Open burning	Open dumping	Open dumping	Open dumping	Open dumping	Open dumping	Disinfection	Disinfection / open burning	Disinfection	Disposed of with the domestic waste if it is segregated. Items such as paper and cardboard as well as plastic and metal cans that come from the administration and kitchen. Left-over food from the kitchen as well as garden waste (leaves, etc) can be recycled into valuable compost
Laboratory	Incineration/ Disinfection	Incineration/ disinfection	Disinfection/ incineration	Incineration	Incineration	Open burning	Open burning	Disinfection and open dumping	Disinfection/ Open burning	Disinfection and open dumping	Autoclaving/microwaving/incineration

Source: Fieldwork, 2019.

Table 2 reveals that 100% of the respondents from hospital B, E and F, then 65.1%, 25%, 77.8%, 25%, 50% of the respondents from hospital A, C, D, G and H respectively were given a copy of certificate of fitness, while 34.8%, 75%, 22.2%, 75%, 40%, 50% and 100% of the respondents from hospital A, C, D, G, H and I were not given any certificate of fitness.

Table 2 also shows that 100% of the respondents from hospital B, D and H, 73.3%, 75%, 75%, 40%, 22.2% and 50% of the respondents from hospital A, C, F, G and J respectively agree that regular risk assessment were conducted regularly for the status of their working environment, while 26.7%, 25, 50%, 33.3%, 66.7% of the respondents from hospital A, C, F, G, and J made certain that regular risk assessment in the hospitals have never been conducted.

Table 2 shows that 100% of the respondents from hospital B, C, I, D and H respectively, 76.7%, 33.3%, 50% and 33.3% of the respondents from hospital A, E, F, J and respectively agreed that their hospital maintain registration of workplace injuries, 23.3%, 66.7%, 50%, 100% and 66.7% of the respondents from hospital A, E, F, G and J respectively believed that their hospital have no any register of work place injuries.

Table 2: Employer Compliance with Medical Waste Management Practice in Hospitals

Variables	Option	Hospital									
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Employees training on safety and health	Yes	84.9%	100%	50%	77.8%	83.3%	100%		100%	100%	33.3%
	No	15.1%	-	50%	22.2%	16.7%		100%	-	-	66.3%
copy of certificate of fitness	Yes	65.1%	100%	25%%	77.8%	100%	100%	25%	50%	60%	-
	No	34.8%	-	75%	22.2%	-	-	75%	50%	40%	100%
Regular Risk Assessment	Yes	73.3%	100%	75%	100%	100%	50%	66.7%	100%	-	33.3%
	No	26.7%	-	25%	-	-	50%	33.3%	-	100%	66.7%
Register of workplace injuries	Yes	76.7%	100%	100%	100%	33.3%	50%	-	100%	100%	33.3%

CONCLUSION AND RECOMMENDATION

The study concluded that lack of policy, legislation/ regulation, as well as manual guide or documents in most of the hospitals were revealed as some factors influencing against compliance level of medical waste management standards/guidelines. Therefore, the study recommended that waste management policy/ legislation should be in place to regulate how waste should be managed and waste management manual or guide document should be provided to all waste handlers to serve as a guide on how best to handle medical waste, and also healthcare facilities should ensure continuous adequate quantities of different types of receptacles in the hospitals for proper segregation of medical waste and also government should ensure that hospital facilities have good and functioning incinerators or provide a central incinerating facility where these waste could be taking to and treated before final disposal.

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