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Practices And Challenges of Infectious Medical Waste Management: A Qualitative Approached to Infectious Waste Management in Maiduguri, Borno State Nigeria

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Abstract: *The spread of infectious medical waste has triggered awareness in people about how vital the medical waste management process in every single country can be. The diseases from infectious waste can poses great threats to humans and apparently, leading to a global crisis and challenges on the health, economic and other sectors of human endeavor. Infections Medical waste is any contaminated waste that can cause harm to humans' animals, health or to the Environment. The management of these Waste is vital in other to control the source of infection, and avoid waste been infectious would require a complex and special protocol of handling and managing. Increased infectious medical waste generation will put pressure on storage, collection, treatment and disposal facilities of the wastes. The management of infectious related medical waste requires special standards, which demands that persons involved in handling potentially infectious solid waste shall be properly equipped with personal protective equipment (PPE) used for waste handling. The waste workers (especially collection workers) are required to take occupational health and safety precautions to avoid any possible infections by waste streams/equipment. Nigeria as a country lack sound medical waste collection, treatment and disposal facilities, most often land filling is the only disposal method available. The infectious nature of related waste will further exacerbate the poor medical waste management challenges in the country. Before the outbreak of the covid-19 pandemic, infectious medical waste in most of the health facilities in Borno state are handled by vulnerable junior staff who are mostly illiterate, and lack proper knowledge of sorting out very hazardous medical waste and also lacking proper PPE to protect themselves. In other parts of the country, especially in semi-urban and rural areas, informal collectors and waste pickers are responsible for the collection and disposal of medical waste. Certainly, these categories of people cannot handle the disposal of infectious waste generated in health facilities. The study has examined the challenges of infectious waste management in Nigeria with Borno State as case Study and identified issues that impede a proper infectious waste management, especially in terms of compliance to the*

provisions of the waste disposal guide lines, these is because Infectious waste management practices among health care workers in most hospitals have been questionable and the study therefore, intended to identify issues that impede a proper infectious waste management in these Hospitals. The study was conducted using direct observation, in depths interviews with relevant stake-holders in medical fields which include hospital administrators (Medical Doctors), Nurses, Technicians, Waste collectors and senior management involved in medical waste management. The study, also looked at the processes related to segregation, collection, storage and disposal of infectious waste and identified variety of issues in all the steps. The secondary source of data was also obtained through relevant web-based generic search engines from journals, conferences seminars, workshops, presentations etc. The data generated were then analyzed using content analysis. The study findings reveal that, infectious Waste Management practices among medical workers in most Hospitals in Maiduguri has been a great challenge for Hospital Administration with limited resource settings. Rapid population growth, in the city due to influx of internally Displace persons (IDPs) as a result of Boko-Haram insurgency, Patients load on Hospitals and negligible investment in medical Waste management measures have posed a great serious public health hazards and treat. The study further reveals that serious gaps and deficiencies were observed related to Segregation, collection, storage and disposal of infectious waste, hence proving to be hazardous to the patient's medical workers, caregivers, host communities as well as visitors. Poor safety, insufficient budget, lack of regular trainings, weak monitoring and supervision, and Poor coordination has resulted in improper infectious waste management in most of the hospitals. In addition, the infectious medical waste spread out beyond hospitals vicinities and Maiduguri the state capital has no single or any official approved dumpsite for infectious waste, other challenges include the poor enforcement of infectious waste guidelines and lack of political will on the part of the government. Based on the findings the study recommended the effective enforcement of guidelines on the safe disposal of infectious waste, use of Personal Protective Equipment's (PPE) by all Medical Personnel's and creation of environmentally department in every hospital to handle all infectious waste. The Nigerian national environmental standards and regulations enforcement agency (NESREA), should come up with guidelines for the handling and disposal of all infectious waste related waste in the state and the country at large.

Keywords: *Infectious waste, management practices, challenges, Medical Workers.*

INTRODUCTION

Infectious Waste is waste that has the proven ability to transmit disease among healthcare workers (HCWs), and other exposed individuals. it can cause serious infectious diseases such as hepatitis B virus (HBV), hepatitis C. virus (HCV), human immunodeficiency virus (HIV) and respiratory, enteric and soft tissue infections. Examples of infectious waste includes anything potentially infectious, such as body fluids or secretions (e.g., blood, pleural fluid, semen, vaginal secretion, vomit, faces or urine), contaminated sharp objects (e.g, contaminated needles, syringes and surgical blades), biological laboratory waste (culture, stocks and growth media), pathological waste (such as human tissue, organs or body fluids), and single-use disposable equipment, utensils and instruments soiled with potentially infectious agents. Waste contaminated with blood and its by-products, cultures and stocks of infectious agents, waste from patients in isolation wards, discarded diagnostic samples containing blood and body fluids,

infected animals from laboratories, and contaminated materials (swabs, bandages) and equipment (such as disposable medical devices); are considered as infectious waste, all wastes that are susceptible to contain pathogens (or their toxins) in sufficient concentration to cause diseases to a potential host.

NESREA, 2020, define Infectious waste as waste that includes the body fluids or secretions (e.g., blood, pleural fluid, semen, vaginal secretions, vomit, feces or urine), contaminated sharp objects (e.g., contaminated needles, syringes and surgical blades), biological laboratory waste (e.g., cultures, stocks and growth media), pathological waste (such as human tissue, organs or body fluids), and single-use disposable equipment, utensils and instruments soiled with potentially infectious agents. Infectious waste generation rates, normally depends on the size of hospital, number of patients coming to that particular facility, number of beds available, segregation steps and kind of care provided to the patients. The Management of infectious waste has been a challenging and critical many developing countries including Nigeria (Ogbonna, 2012).

Medical waste in Nigeria, fall under the categories of infectious waste (FEPA, 1991), these categories of waste houses culture and stock of Infectious agents, Infectious waste comprises 10-25% of all the waste produced in hospital, which cannot be disposed of with the normal domestic waste. However, this is a common observation in many hospitals of the developing countries like Nigeria, where many health concerns are competing for limited resources, it is not surprising that the management of healthcare wastes has received less attention and the priority it deserves (Abah and Ohimain, 2010). Unfortunately, Practical information on this important aspect of healthcare management is inadequate and research on the public health implications of inadequate management of healthcare wastes are few and limited in scope (Abah and Ohimain, 2010).

Although reliable records of the quantity and nature of healthcare wastes and the management techniques to adequately dispose of these wastes has remained a challenge in many developing countries of the world, it is believed that several hundreds of tone of healthcare waste are deposited openly in waste dumps and surrounding environments, often alongside with nonhazardous solid waste (Alagoz and Kocasay, 2007; Abah and Ohimain, 2010).

Infectious waste is potential harmful to healthcare workers (HCWs), patients, community, inhabitants and the environment. Proper handling of these waste can minimize the hazards associate with improper waste management Awodele. 2016, Dehghani, (2008).

However, adequate attention has not been paid to the practices of managing infectious Waste in many healthcare institutions especially in Nigeria. Oyekale (2017) reports from the literature suggest Strict adherence to the professional ethics of Medical Waste Management in Nigeria, showing severe compromise of the internationally, acceptable guidelines on Medical Waste Management. The situation appears worry some at the primary healthcare level. Some of the reasons attributed to poor medical waste Management are poor financing, weak institutional arrangement and governance (Ogbonna, 2012). Little or no capacity building support on Medical Waste Management issues and non-compliance to waste management guidelines or procedures are also contributing factors.

In addition to the above there is no mechanism in placed to monitor adherence or compliance to best practice in Medical Waste Management as the waste management policy in Nigeria Appears to be infantile and verily operational at the health facilities (Longe, 2006).

Infectious waste management is a big challenge for hospital administration in limited resource settings and Borno state is not an exception. Rapid population growth, Boko-Haram insurgency, patient load on hospitals and negligible investment in healthcare waste management measures have posed a serious public health hazard and threat. Insufficient training of health workers results in improper infectious waste handling and disposal (Kumar. 2010).

Infectious waste is handled in four steps: segregation, collection and transportation, storage and disposal. This waste must be treated prior to its final disposal by the autoclave or by incineration (Kumar. 2010). Most healthcare workers do not follow the proper waste management guidelines and encounter sharp injuries and infection (Janjua, 2003). One of the WHO study revealed that two thirds of hospitals among 22 countries were not following the proper infectious waste management practices (WHO, 2015). Therefore, a continuous training on infectious waste was suggested for healthcare workers (HCWs) to control the menace of infectious diseases that can potentially endanger the patients, attendants, hospital staff, and residents in the neighborhood (Rasheed, 2005. Ullah, 2011).

This study endeavored to describe the situation of infectious waste management practices among Medical Workers in Maiduguri. The study also identified the hidden issues, and barriers responsible for poor infectious waste handling in these hospitals.

METHODOLOGY

The Study used qualitative and descriptive study with cross sectional design. Two qualitative approaches; direct observation and in-depth interviews were conducted. Direct observation and physical verification was carried out, using validated World Health Organization (WHO) checklist for segregation, collection, storage and disposal of infectious waste (Pruss, 1999). Major Wards and departments of the hospitals were included. In addition, in-depth interviews were conducted till the point of saturation. Principal investigator himself conducted ten in-depth interviews, using WHO semi-structured questionnaire, after taking the appointment and written consent. Respondents include the Medical Doctors, Head of Medical Words, lab-technologist, Nurses and Waste Collectors, dealing with the waste management. Verbatim notes were taken and interviews were recorded, with permission.

Data collected was transcribed and a thematic content analysis was done. Specific nodes were developed for the questions, and significant findings and responses were aggregated as sub-nodes, which were later developed into themes. Information from literature and responses were then triangulated in the discussion section.

JUSTIFICATION FOR THE STUDY

The management of infectious medical waste is a serious concern in many developing countries of the world, its management and treatment is of great concern owing to its potential

hazard to human health and the environment, particularly in developing countries like Nigeria and Maiduguri in particular.

Poor management of health care waste potentially exposes health care workers, waste handlers, patients and the community at large to infection, toxic effects and injuries, and risks polluting the environment. It is essential that all medical waste materials are segregated at the point of generation, appropriately treated and disposed of safely (WHO, 2011).

Nowadays, various technological alternatives are gaining momentum as efficient and favorable waste management options across the world. However, selecting a suitable technology as well as an effective waste management approach for the treatment of infectious Medical Waste is still a challenging task for the municipal authorities in developing countries; lack of awareness among health professionals, the absence of an effective regulatory framework and national policy, financial strains are the major impediments of infectious waste management in Nigeria and Borno state in particular. Mushrooming growth of healthcare facilities (HCFs) in urban areas accentuates the problem to a large extent. However, identification of an appropriate waste treatment technology for the selected site is still a challenging task for the planners and decision-makers, especially in Maiduguri. Maiduguri the Borno State capital is currently witnessing a tremendous increase (influx) in the number of people at an alarming rate since 2009, due to the spillover (externality) activities of Boko Haram insurgency, which lead to the increase in the number of Refuges (Internally Displaced Persons), otherwise, called the IDP's in various camps within Maiduguri. As a result of these, the number of hospitals and the quantity of medical waste generated has been increasing rapidly and steadily. The current medical waste disposal practices are quite unsafe for both clinical and non-clinical waste, as they are being mixed and disposed together unhygienic ally, in addition to improper storage techniques, most of the hospitals and clinics, either public or private, have either a nonexistent or an outdated Medical Waste Management systems. Wastes produced from the Hospitals or clinics in the city are not treated or smashed properly. Instead, they are thrown into dustbins, consequently causing health hazards. These medical wastes products mingled with general solid waste from different households contaminated the air and water as well as the wider environment. There is insufficient awareness on the magnitude of medical waste issues by the concern individuals (the general public) and the medical staff at different levels from directors to waste cleaners or pickers.

In Addition, the resources that are allocated for medical institutions for managing waste are limited and have received little attention and priority it deserves, as most medical facilities especially Privates lack incinerators, and in some has broken down and non-functional, wastes are burn in pits situated within the hospitals vicinity, poor practices is currently observed in some hospitals from the point of generation to disposal, couple with the illegal dumping of wastes in unapproved dumping sites, in addition to the absence of national health policy to guide medical waste management in the host study area, is also a major impediment.

Despite the magnitude of the above problems emanating from poor infectious waste management there is yet to be an implemented legal provision guiding the management of infectious Waste in Borno State in particular. The poor state of waste in our health settings is caused by inadequate facilities, poor funding, and poor implementation of policies as well as lack of

knowledge on Medical waste management practices. There is therefore, an urgent need for raising awareness and education on infectious waste issues in the proposed study area.

BENEFITS OF INFECTIOUS MEDICAL WASTE MANAGEMENT

1. Minimizes the spread of infections and reduces the risk of accidental injury to Medical staff, patients, visitors and the community.
2. Reduces the likelihood of contamination of the soil or ground water with chemicals or micro-organisms, attracts fewer insects and rodents and does not attract animals, helps to provide an aesthetically pleasing atmosphere.

Ethical consideration

Verbal informed consent was obtained from the administration staff of hospitals, after explaining the objectives of the study. Confidentiality and anonymity was assured to all the participants. Data was kept under lock and key with the principal researcher.

RESULTS

DIRECT OBSERVATIONS

We closely observed four recommended steps of infectious waste management in the hospitals which include Segregation, Collection, Storage and Disposal.

1. Segregation

In most of the Hospital Visited which include university of Maiduguri Teaching Hospital, Federal Neuro-psychiatric Hospital, General, Umaru Shehu, Nursing home, Alkomi, Nakowa and Borno Medical Clinic each department/ward has at least four color coded waste bins: red for infectious, black for general, yellow for sharps and white safety box for injection safety; however, there wasn't any proper labeling on the bins in most private Hospitals. Three departments in some private's hospitals were using only two bins of different colors. There were no separate bins for the hazardous waste such as pharmaceutical waste, chemical waste and the radioactive waste. They were using either red or yellow bin for these kinds of wastes. Black waste bin was found at the patient's bed side, and was being used for all sorts of waste. Red bin with infection safety box was although placed at the nursing station, yet it was uncovered. The (HCWs) Health Care Workers were not segregating the infectious waste, as some of the patient's blood stained objects were seen in the general waste inmost government Hospitals have the correct Disposal Bins and color code for Waste.

2. Collection

In Public Hospitals, Wastes are collected and transported thrice a day by the sanitary workers in a simple uncovered trolley. Trolleys with infectious and the non-infectious waste together were driven through the common passages in the hospitals, General waste included common papers, used plastics bags, hard papers and files, food boxes, kitchen items, fruits waste etc. Plastic collection bags were not properly sealed and some of them were not even intact because of being filled beyond their capacity. At three places, only infectious waste was being collected, and that too without labeling. The sanitary workers in some Private Hospitals did not use personal protective equipment (PPE) such as gloves, long rubber boots, aprons and masks during waste collection. Hence, WHO guidelines were not followed at all.

3. Storage

There are separate storage points located in most of the hospitals. General waste was dumped in an open container, which is daily emptied by the municipality or private Disposal firm for final disposal. Nevertheless, used syringes, blood drip sets, medicines vials and urine bags were also found inside general waste containers. There is a storage room for the infectious waste with no temperature control system for pathological wastes. The Health Care Workers (HCWs) in some Hospitals were again found to be violating the guidelines for the storage of waste. The capacity of storage areas in some hospitals (Private) were not enough to hold the quantity of infectious waste produced every day.

4. Disposal

In all hospitals, the autoclave and three chamber incinerators were used for the final disposal of the infectious waste. However, there is no back up for both the machines. Incinerators were installed away from main building, and were fairly well-maintained. Some Hospitals uses land filling for the disposal of general waste. Again Personal Protective Equipment (PPE) was used during the disposal in all hospitals.

Findings from the study reveal that Maiduguri the state capital has no any officially approved dumpsite for infectious Waste. Many waste collectors collect the waste for households and some health care facilities and dump them in numerous unapproved and illegal open dumpsites. The inability of having an officially designated dumpsite will amount to individuals and groups disposing their waste (irrespective of their contents) anywhere and anyhow in the open dump sites. This will equally amount to directly or indirectly circulating infectious diseases within the community.

The findings of the study also reveal that some Medical facilities in the State have no proper safe disposal facilities for infectious waste at the moment. The State Specialist Hospital modern incinerator provided by the WHO intervention has broken down. At the moment and is undergoing repairs, the hospital is collecting waste and working out the best practices for handling the collected waste. The standard protocols would require disinfecting the waste before disposal but at the hospital, the waste is usually burnt at a very high temperature before they are buried.

FINDINGS FROM IN-DEPTH INTERVIEWS

Respondents included 14 female and 16 male staff, regular government employees who were overseeing the management of infectious waste as Medical Director, Doctors, Lab-technologist, Nurses and Waste Workers. Thematic results are presented below.

1. Poor safety of the workers

Respondents in most hospitals agreed that the Personal Protective Equipment (PPE) is not available for quite some time. Therefore, the workers are at great risk during waste handling. Medical Staff (Lab-technologist) of one hospital said: “Needle prick injuries are the most common hazard during the infectious waste management at our hospital”.

2. Insufficient Budgeting

The respondents, especially the nursing staff admitted that there should be adequate budget for equipment used in infectious waste management. The hospital management admitted that

the facility doesn't have color coded waste bins for infectious waste, and it results in mixing with non-infectious waste. The Medical Director from one of the hospital said: "Most of the time, we don't have the enough funds for purchasing the PPE and waste bins and patients relatives were ask to buy them".

3. Lack of trainings

Nigeria as a country and Borno State in particular, lack facilities of occupational health training, due to which, drivers or other waste management team members are unaware of the waste composition that they have been dealing with. Inadequate provision of Personal Protective Equipment's (PPEs) for medical workers especially the infectious medical waste collectors and handlers. This is further made worst by the increase in global shortages in PPEs due to Covid-19 pandemic. Most health care facilities do not have well defined policies on waste management.

All the respondents demanded that there should be a regular training on infectious waste management in all hospitals for all cadres of Health Care Workers (HCWs). They believe that training would surely change the practices of staff by increasing their knowledge on infectious waste, and that without training, workers cannot perform in an efficient way. The Medical Staff from one hospital said: "Training would be more beneficial for improving waste management practices at the hospital, if conducted on regular intervals and for every new batch of health personnel (doctors, nurses, paramedics, auxiliary staff etc.) inducted in the hospital".

4. Weak supervision and monitoring

All the respondents were of the opinion that the supervision of Health Care Workers, involved in waste management is extremely important, so that they perform their job diligently. A Medical Doctor from one hospital said: "I am very much concerned about the regular monitoring and supervision during the working hours, and I have directed the Medical Staff to comply with the standards".

5. Poor coordination

Almost everybody felt the need for regular meetings for improving the management of infectious hospital waste. A Medical consultant in university of Maiduguri teaching Hospital said, "Regular meetings result in better coordination between various departments, and we can work better toward infectious waste management".

A Medical` consultant from the State Specialist Hospital (General) shared his experience of such meetings for improving the knowledge of the staff at the hospital.

DISCUSSION

This major finding is consistent with another study conducted in similar setting (Ullah JN, 2011). The need for regular training for building the capacity of hospital workers in infectious waste management has been alluded to, and confirms our observation too in both the hospitals.

Other researches have also recommended that such training is critical for improving the practices of health workers (Yong Z, 2009. Pruss A,1999). Various issues pertaining to segregation of waste at point source, inappropriate collection, transportation, storage place, disposal and lack of Personal Protective Equipment (PPE) were marked first through direct observations, and later mentioned by the respondents. Hospital waste management requires

not only committed and skilled workers, but their close monitoring as well (Mustapha, 2012). Every hospital must keep the environment free from infection (Maltezou. 2012).

Therefore, a periodic evaluation on the disposal methods in hospital would be imperative (Montel, 2012). As explained by the respondent's lack of funds for training for the staff reflects that waste management is a neglected issue, and that authorities perhaps are not sensitized enough on the magnitude of this problem. The non-availability of the waste bins and PPE is the main reason behind the inappropriate practices at the hospitals. It is known that the healthcare workers are the high risk groups in hepatitis B and C infections at the hospitals due to frequent needle prick injuries (Quiser. 2012, Sharma, 2013). The Medical Workers are often unaware about the consequences of poor waste segregation, and that training does improve their knowledge, practices and efficiency about waste management, besides building their confidence. (Johnson, Idowu, 2013).

Moreover, continuing capacity building of the staff and inculcating attitudinal change can ensure their safety too (Sharkh, 2006). Proper allocation of budget and arrangement of infectious waste management training at any hospital should be spelled out in health policy (Abor, 2008). Continuous supervision and monitoring could increase the motivation of health staff and ultimately affects their better working output on time (Bahalkani, 2011, Kumar, 2013). Regular watch on the health care workers has actually brought good results and improvement in the infectious waste management in the hospital (Samuel, 2010). Hospital should ensure the implementation of waste management plan to avoid the health and environmental hazards (Alam, 2008 & Aljabre.2002).

CHALLENGES OF MANAGING INFECTIOUS MEDICAL WASTE IN BORNO STATE.

Despite all the effort made by different stakeholders in the state and country with regard to managing waste in the country, there has been inadequacy that still prohibits the state and country from managing infectious medical wastes in a scientific and more-coordinated way. The risks of infectious medical waste are beyond comparison to the risks of general non-hazardous wastes. Incineration of hazardous wastes leads to the emission of dioxin, furans, and even mercury is produced. This poses environmental degradation and induces health risks as well.

The study findings reveal that the infectious medical waste is spread out beyond hospitals vicinities, which means people may be infected with the infectious virus without knowing since domestic waste are often mixed with medical waste and dumped together simultaneously in open dump site closed to residential areas. This is a serious challenge to sanitation workers, as the virus can persist for up to a day on cardboard and for longer on metal and plastic surfaces, according to one study of the virus in lab conditions.

Despite all the sensitization and advocacy campaign by government officials using various media houses, traditional and religious leaders, there are quite a number of people who still do not believe that the infectious waste exist.

The enforcement of policy regulations is usually slow because of our usual ways of doing things in the State and country at large. Naturally the enforcement team is supposed to include mobile courts where offenders are tried on the spot and if any is convicted, and then the law takes it

course. So, the poor enforcement leads to ineffective management of infectious waste in the state.

The state does not have the political will to effectively manage waste in the state. This can be seen in the very little or no money allocated for the purpose. Thus, the state and its residents do not want to spend money on waste management issues as it does not consider it very important. Residents dispose their waste anywhere along the street and drainages and in some cases in the illegal open dumpsites within the metropolis.

Infectious medical waste has negative impact on the health of patients, health workers, and the general public. The emissions from the incinerators or different other management techniques contribute to the spread of many infectious disease such corona virus and other infectious diseases.

CONCLUSION

Study has concluded that the poor resources and lack of Medical worker's training in infectious waste results in poor waste management in hospitals.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made;

Since, infectious waste has triggered awareness in people about how vital the hospital waste management process in every single country can be. However, all these problems can be overcome if the hospital waste management policies are strong enough. Not just governmental bodies, but private sectors, Non- governmental Organizations (NGOs), the community need to work together to ensure that sustainable waste management of infectious waste is done in a safe, and efficient manner.

A continuous and a comprehensive training of health personnel in various cadres could improve the infectious waste management practices in the hospitals. However, a waste management plan, appropriate equipment, dedicated staff, and robust monitoring and supervision are some of the pre-requisites. Nonetheless, hospital administration's will is the foremost driver to bring about the change.

1. Every hospital facility (including public and private Hospitals are to be properly disinfected with chlorine disinfectant solution or any other antiviral elements.
2. Effective enforcement of the guidelines on the safe disposal of infectious wastes, Capacity building among health workers should be undertaken from time to time.
3. People handling health care waste in particular should war appropriate gear, (ie. PPE) including boots, aprons, long-sleeved gowns, thick gloves, masks, and goggles or face shields, according to recommendations from the World Health Organization.
5. There is need to have an environmental department in every hospital to handle all infectious medical waste which must be treated before final final disposal.

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