Challenges and Opportunities of Effective Solid Medical Waste Management in Post Covid Nigeria

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ABSTRACT

The recent COVID-19 pandemic has distorted the way solid medical waste is generated and disposed of globally. While waste from large healthcare facilities may be subjected to recommended safety measures to lessen risks to human health and the environment, the same cannot be said about facilities in rural areas where waste ends up in landfills and open dumps. Studies have proven that precarious hygienic and sanitary conditions are directly related to the propagation of the novel coronavirus. The unanticipated disparities in waste composition and quantity experienced during this pandemic have posed a lot of environmental as well as health challenges within our communities. Along with the hazardous waste volume, single-use plastic items and personal protective equipment (PPEs) have induced a new type of pollution in the land and aquatic environment. This study therefore aims to bring to light the challenges surrounding solid medical waste disposal and the underlying opportunities that can be exploited to satiate current loopholes in the system. It was concluded that outsourcing healthcare waste management to third-party specialists will result in poverty reduction and job creation, in addition to its primary role of containing hazardous medical waste. The study also suggests some key recommendations to policymakers, which include enforcement of medical waste management regulations as well as training in medical waste management to help properly handle waste in a probable future pandemic.

KEYWORDS: Covid-19, Waste management, Hospital waste, Solid medical waste, Plastic waste

Introduction

According to the European Centre for Disease Prevention and Control (ECDC), the COVID-19 situation worldwide as updated on February 4, 2021 reports

103,446,897 cases of COVID-19 (in accordance with the applied case definitions and testing strategies in the affected countries) and 2,236,386 deaths. In Nigeria, the Nigeria Centre for Disease Control (NCDC) pandemic data up to February 3, 2021 reports a total of 134,690 confirmed COVID-19 cases with 108,657 cases discharged and 1,618 deaths recorded in 36 states and the Federal Capital Territory. Also, additional information from NCDC indicated that a total of 1,138 new cases were recorded on same date, with cases reported from 21 states. In view of this global situation, there is a crucial need for intensified preventive and control measures for the protection of human life.

Human behaviour has played a major part in the spike in COVID-19 cases experienced recently. Federal, state, and local governments, as well as individuals, differ in their response to the pandemic. While some adhere to COVID-19 preventive measures such as physical distancing, hand-washing, and mask-wearing, others, as a matter of personal choice, are rigid in abiding by these measures, thereby contributing to the reoccurrence noticed in the second wave. As a guiding principle for protection against the spread of the coronavirus, a surgical or any other face mask was recommended for use by the general public, and all sorts of personal protective equipment (PPE) for medical practitioners (WHO, 2021). It has been claimed that the proper use of a face mask can help reduce the number of times a person touches his/her face, mouth, or nose with likely contaminated hands, which can considerably cut the chance of infection. Studies have also established the efficiency of face masks in safeguarding against respiratory infections during Hajj (Barasheed et al., 2016). Though a life saver, this protective equipment meant to prevent one from contracting the dreaded coronavirus is a potential danger which, if not properly disposed of, poses an eminent danger of its own. The fear of possible infection and the need for preventive measures to mitigate possible contact with the coronavirus, as well as the stay-at-home orders imposed by different governments, have widely increased the surge in the use of single-use products (Fadare and Okoffo, 2020). As highlighted in his work, Hughes noted that the rise in the use of single-use plastic is inevitable since many countries have lifted or postponed their bans on single-use plastics in the light of the outbreak. Prior to the outbreak of the coronavirus, the production and consumption of single-use PPE was minimal, which gave room for better disposal. Whereas this outbreak has led to the use of one or more disposable PPE every day, mostly by those who, by nature of their job, need to be in contact with COVID-19 related cases.

Hospitals globally have played a vital role in the fight against corona. They have provided both curative and preventive health-related services to society, and this has brought about both positive and negative effects. The positive effect is the restoration of public health, particularly for COVID-19 patients. While the negative effect is the environmental concern caused by rising general waste, medical waste, and liquid waste (Yu, Sun, Solvang, & Zhao, 2020). An increase in the number of COVID-19 cases will lead to hospitalisation and death in some cases, meaning there will also be a surge in the production and use of personal protective equipment (PPE) in an effort to curb the spread of the virus. PPE includes single-use gloves, aprons and gowns, surgical masks, respirators, and face protectors in the form of glasses, goggles, or face shields. PPE represents the most considerable volume of medical waste generated by the COVID-19 pandemic. If the high number of contaminated PPE from treating COVID-19 patients is not properly managed, it can

potentially threaten health and the surrounding environment (Oruonye, Ahmed, 2020). Since we are yet to see an end to COVID-19, this means that effective measures for medical waste treatment are extremely obligatory should we intend to mitigate the proliferation of the virus through improper waste disposal.

According to The Daily Star (2020), it is estimated worldwide that at least 5.2 million people, including 4 million children, die each year because of diseases related to unmanaged medical waste. This goes a long way to reiterate the importance of proper medical waste management and disposal as it has a direct impact not just on our environment but also on our health. In addressing these issues, this paper discusses challenges besieging solid medical waste disposal and the opportunities we can take advantage of to improve loopholes in the system.

Overview of Medical Waste

Medical waste, which is sometimes referred to as biomedical waste or hospital waste, is any type of waste that includes waste generated by healthcare facilities such as hospitals, laboratories, medical research facilities, and veterinary clinics. Medical waste can comprise of bodily fluids like blood or other contaminants. Medical waste, on a broader note, includes waste generated during medical research, testing, diagnosis, immunization, or treatment of either human beings or animals. Some examples are cultural dishes, glassware, bandages, gloves, discarded sharps like needles or scalpels, swabs, and tissue. Many developing countries such as Nigeria lack reliable records of the quantity and nature of medical waste generated and the management techniques to effectively dispose of these wastes. It is assumed that several hundred tonnes of medical waste are deposited openly in waste dumps and surrounding environments, often alongside non-hazardous solid waste (Abah and Ohimain, 2010). In the course of the pandemic, besides the normal medical waste generated, additional waste has been branded and treated as medical waste, and this includes:

i. PPE used in healthcare institutions

ii. general waste from hospitals with COVID-19 patients, such as food and dining boxes thrown by patients;

iii. general waste of suspected COVID-19 patients in quarantined areas; and

iv. infusion bottles and bags (usually disposed by nurses for recycling).

Medical waste is an unavoidable part of the medical process and not one that should be taken lightly. Most medical waste is infectious and needs to be disposed of properly. To help in the handling of this waste, medical waste must be classified, or else it would be difficult to know what kind of waste you have.

Classifications of Medical Waste

Category		Constituents
Hazardous waste	Pathological Waste	Tissues, organs, body parts, fetuses, blood and body fluids
	Infectious Waste	Waste contaminated by pathogens from labs, surgeries and autopsies.
	Sharps	Needles, syringes, scalpels, infusion sets, saws & knives, blades, broken glass and any other related items.
	Pharmaceutical Waste	Expired or unused pharmaceutical products, surplus drugs, vaccines, bottles, boxes, gloves, masks, tubes or vials.
	Genotoxic Waste	Cytotoxic drugs and outdated materials, vomitus, feces or urines from patients.
	Chemical Waste	Chemicals from diagnostic/experiments, cleaning/disinfecting materials, broken, discarded and spillage clinical equipment.
	Radioactive Waste	Liquid, solid and gaseous waste contaminated with radionuclides.
Non-Hazardous Waste	Infrastructures and administrative tools	Paper, pens, broken benches and desks, cardboard, packaging, food waste, aerosols, etc.

Table 1: WHO's Classifications of Medical Waste

Medical Waste Management: Reasons for Failure

Waste management can be defined as the activities and actions required to manage waste from its inception to its disposal. This includes the collection, transport, treatment, and disposal of waste, together with monitoring and regulation of the waste management process. The process of medical waste management as recommended by WHO is outlined below:

i. Waste minimization

ii. Segregation

iii. Codification

iv. Handling

v. Transportation

vi. Disposal

In developing countries like Nigeria, the management of medical waste has received less attention than the priority it deserves (Abah and Ohimain, 2010). Neither the government nor hospital authorities give appropriate consideration to the management of their waste. Indiscriminate waste disposal by hospitals, clinics, and health centres poses a serious health hazard to city dwellers and people living within the vicinity of healthcare institutions. The lack of will by policymakers and implementation groups to adopt current technology in healthcare waste (HCW) management is an emerging challenge to HCW management. The healthcare system in Nigeria is not developed, and so is our healthcare waste management system.

Lack of awareness about the health hazards related to healthcare waste, inadequate training in proper waste management, absence of waste management and disposal systems, insufficient financial and human resources, and low priority given to the topic are the most common problems connected to healthcare waste. An essential issue is the clear attribution of responsibility for the handling and disposal of waste.

Environmental Impact of Single-Use Plastic Items and Personal Protective Equipment (PPEs)

The use of personal protective equipment as a precautionary measure to slow down the spread of Covid-19 from person to person has resulted in increased production to cater for the needs of health workers worldwide and for personal use. This has in turn degenerated into a health and environmental concern as most of these are not properly disposed of. According to WHO estimates, approximately 89 million medical masks are required to respond to Covid-19 each month (WHO, 2020). This demand has led to an extraordinary rise in the global production of face masks. Major players in face mask production have therefore scaled up their output. For instance, China increased its daily production of medical masks to 14.8 million as of February 2020 (Xinhua, 2020). The growth recorded in production and consumption of face masks and other PPEs across the world has given rise to a new environmental challenge, adding to the vast plastic and plastic particle waste in the environment. The presence of face masks of different types and colours can be seen along streets, highways and drainages in our locality and country at large. This new emergence of medical waste as environmental litter, both in terrestrial and aquatic environments, is evidence that the COVID-19 pandemic has increased the challenge of plastic pollution in the environment. Single-use polymeric materials have been recognised as a major source of plastic and plastic particle pollution in the environment (Schnurr et al., 2018). Some of the unfavourable consequences of these pollutants in the environment include threats to aquatic life, which constitute a major part of the food web and support human existence. Another implication of these indiscriminately disposed face masks in the environment is the possibility of their acting as a medium for disease outbreaks. Even though evidence is lacking, handling of contaminated waste has been found to be a risk factor for workers caring for COVID-19 patients. According to research conducted by WHO, the COVID-19 virus is known to contaminate surfaces and can remain viable for up to 72 hours on plastic and stainless steel, up to four hours on copper, and up to 24 hours on cardboard. Also, face masks could harbour infectious SARS-CoV-2, also known as the corona virus, for up to 7 days, remaining contagious even after disposal. Thus, waste should be

considered infectious and properly disposed of and handled during the current pandemic.

Issues and Challenges of Effective Management of Solid Medical Waste

Waste management involves taking all practical steps to protect human health and the environment from hazardous wastes such as medical waste. In spite of the effort made by different stakeholders in the country with regards to handling medical waste, there is still an inadequacy that prohibits managing medical waste in a scientific and more-coordinated manner. Financial and infrastructural challenges remain the number one issue in the management of medical waste in Nigeria. These include the costs of specialised containers, human resources, administrative and regulatory capacity, as well as disposal systems and technologies.

Poverty has been recognised as one of the basic factors that dwarfs the success of Africa's effort in the area of environmental management of hazardous waste. The activities of local scavengers, which are born out of poverty and the need to survive, contribute to the improper management of waste. These vulnerable groups, lacking proper PPE, provide waste collection services in many parts of the country. If these groups are affected by COVID-19, it will have a more direct impact on their livelihoods and on the provision of services in low-income areas.

Findings reveal that most medical waste generation centres do not have access to officially approved dumpsites for the disposal of medical waste. It is common practise for waste management officials to collect waste from households and some healthcare facilities and dump them in numerous illegal open dumpsites in towns and villages. Due to the lack of an officially designated dumpsite, individuals and groups will dispose of their waste (regardless of its contents) anywhere and in any way in open dumpsites. In the event of a pandemic, as experienced, this will translate to directly or indirectly circulating the infection within the community. The findings of the study also reveal that healthcare facilities, mostly in rural settlements, lack proper safe disposal facilities for infectious medical waste. Standard protocols would require disinfecting the waste before disposal, but at the hospital, the waste is usually burnt in open dumpsites.

This study reveals that medical waste is spread beyond hospitals and health facilities. Some people who have the habit of self-medication or taking treatment at home generate medical waste and might not know that the trash they are throwing out could be contaminated. That means people may be generating plenty of infectious waste without knowing it. This poses a serious challenge to sanitation workers, as some viruses and other disease-causing agents can survive for days on surfaces.

Another important challenge to the management of medical waste is the issue of the various myths surrounding the reality of some contagious diseases, such as HIV and the coronavirus. Despite the sensitization and advocacy campaign by government, traditional, and religious leaders, there are quite a number of people who still do not believe that this virus exists. This makes it difficult for people to obey simple safety rules regarding the use and handling of PPEs as well as generated medical waste.

The enforcement of policy regulations is usually slow due to our usual habit of non-adherence in the country. Naturally, the enforcement team is supposed to include mobile courts where offenders are tried on the spot and if any are convicted, then the law takes its course. This poor enforcement leads to ineffective management of medical waste by health facilities in the country. On the part of the government, there seems to be no political will to effectively manage waste. This can be seen in the amount of money allocated for the purpose. With no better option in place, residents are left with no other choice than to dispose of their waste anywhere along the street and drainage, and in some cases, in the illegal open dumpsites within the town.

Another highly neglected practise that constitutes a challenge in medical waste management is that of waste segregation in hospitals. It is observed that the resources required to segregate waste in most rural health centres are inadequate, and the front-line health service workers do not segregate waste using available materials. Mostly, the priority attention is given mainly to sharp materials there by ignoring different infectious wastes such as facemasks and other single-use PPEs. Proper segregation of waste can reduce the treatment and disposal costs and the risks of infection for workers handling medical waste.

Waste collection, transportation, treatment, and disposal practises are essential in this time of crisis. Surprisingly, the waste handlers, the priority groups to use PPE, face scarcity of the PPE and this might be due to the lack of awareness-creation strategies such as training, which is to guide them on how to handle waste during COVID-19.

Conclusion

The COVID-19 pandemic took the world by surprise and exposed the precariousness of many sanitation systems. It has also generated some level of consciousness on the crucial role played by medical waste management systems and the negative impact mismanagement creates on our health and environment. It is not understood why medical waste management in Nigeria is not well legislated or proper attention given to it by environmental regulators and health care operators. The issues are to be treated as urgent and very critical by the government. Immediate intervention is also required.

It is also essential to develop safe methods and technologies for treating hazardous medical waste, as opposed to waste incineration, which has already been shown to be ineffective and dangerous. Alternatives to incineration, such as microwaving or autoclaving, greatly reduce the release of hazardous emissions.

Finally, with existing challenges of funding, technical skills, and technological resources, the managers of hospital waste during the post-COVID-19 pandemic must find ways of harnessing local but effective healthcare infrastructure in the discharge of their duty. Other issues such as proper training of all hospital waste stakeholders and outsourcing management of healthcare waste to third party specialists can consequently lead to poverty reduction and job creation besides its primary role of containing the COVID-19 pandemic in the region.

Recommendations

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

1. Measures should be put in place for the enforcement of medical waste management regulations. There should be clearly stipulated rules that apply to all persons who generate, collect, receive, store, transport, treat, dispose of, or handle medical waste in any form. Those who generate medical waste need to be legally responsible.

2. Medical waste handling is a hazardous waste activity which requires a high standard of training. For this reason, a comprehensive integrated health and safety training programme should be developed to provide a cost-effective means of meeting health care waste management needs. The training must not only be continuous, but also comprehensive, integrated and structured with the necessary elements. It must not only be targeted at health workers, but also to focus on education of the public on the need to sort and dispose properly any medical waste.

3. Health facilities should be encouraged to practice environmentally preferable purchasing. Environmentally preferable purchasing (EPP) is the act of purchasing products and services that are less damaging to occupational health and the environment. Waste minimization practices should be implemented by purchasing products with reduced packaging and the procurement of items that are readily recyclable and/or made of recycled content are highly recommended.

4. There should be control measures put in place for handling of medical waste and this includes: elimination of hazardous materials and dangerous activities; substitution of less hazardous materials (e.g. substitute nitrile gloves for latex or vinyl gloves); engineering controls (e.g. lifting devices); administrative controls (such as policies that limit workers' exposure to hazards); and appropriate allocation of personal protective equipment.

5. Contamination control and decontamination strategies and procedures should be well documented, communicated to workers and implemented before workers enter hazardous areas. It should be stressed that decontaminations differ from sanitation in that the former is conducted either in the contamination reduction zone or radiological buffer zone at the worksite, whereas sanitation functions are performed either in the support zone or outside the boundaries of the hazardous waste activities worksite after decontamination has been completed.

6. A comprehensive medical surveillance programme should be designed and implemented by an experienced and qualified occupational health physician. Surveillance data should be used for planning infection control efforts and directing continuing education.

7. To rid the environment of PPE induced pollution, mostly pollution induced by the use of single use plastic material, it is strongly recommended for the replacement of this with reusable PPEs to safe the environment from potentially hazardous medical waste liter.

8. The current waste management systems are unable to efficiently deal with the tons of garbage that is generated every day. Automating the processes of garbage sorting and disposal, by switching to AI for smart recycling and waste management, is expected to bring in better disposal methods to recycle sustainably and in turn reduce human presence in the process which in turn reduces human transmission risk.

9. Within the facilities where waste is generated there is need for proper sorting of medical waste before transfer and transportation. Waste should be Properly segregated between hazardous and non-hazardous waste.

9. As a way of protecting the environment, open disposal of waste should be discontinued.

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