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Original Research Article

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Management of COVID-19 waste in a health facility in Ghana

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one health facility for this study.

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ABSTRACT

Background: COVID-19 which has been declared a global pandemic by the World Health Organization (WHO) has affected most countries in the world including Ghana. The first positive case of the disease was confirmed in Ghana on 12th March, 2020 and since then, its number has increased to over 566 as at the end of the study period. The aim of the study was to assess how one of the health facilities manages waste materials generated from COVID-19 patients. Methods: The study lasted for four weeks within which various interviews, independent observations, waste measurements and data analysis with Microsoft Excel were made. A purposive sampling technique was used to select

Results: The facility allocated 36 beds for the COVID-19 patients. A total of 178.80 kg of infectious waste was generated within the four weeks. Waste from the isolation units were placed in bins lined with red bags and plastic sharps containers. The hazardous waste from the facility is finally collected and transported by a private waste medical waste management company for safe treatment and disposal.

Conclusions: The study concluded that, the health facility practiced proper infection prevention and control (IPC) practices at the COVID-19 isolation centre. The study recommends that, awareness should be created for hazardous waste in general through training and advocacy. More centralized medical waste treatment facilities should be established in other parts of the country and there should also be strict enforcement of policies and regulations on healthcare waste management.

Keywords: COVID-19, Ghana, Health facility, Infectious, Management, Treatment facility, Waste

INTRODUCTION

The World Health Organisation (WHO) declared the corona virus disease which is known as COVID-19 a global pandemic on 11th March, 2020. Ghana however officially confirmed its first COVID-19 case on 12th March, 2020. The number of cases has gradually increased over the weeks to over 566 within a duration of four weeks and is however expected to increase over a period of time due to more contact tracing and testing.

COVID-19 causes respiratory disorders in affected persons and can even lead to death as recorded in many countries. 1 Various precautionary measures have been put in place to help reduce the spread of the infection. These include frequent hand hygiene practices, avoiding unnecessary touching of surfaces, social or physical distancing, use of personal protective equipment (PPE) such as face mask, coverall, gloves, protective boots etc.² Ghana has also implemented additional measures such as partial lockdown of some regions in the country, closure of borders, halting of all public gatherings and mass testing of some targeted groups in the society.

Some healthcare facilities have been specially designated by the Ministry of Health to provide medical services to people infected with the novel corona virus disease. Other isolation centres have been created to serve as a place of quarantine and possible treatment of suspected people.

These centres will generate waste as a result of providing medical services to the patients and also protecting the health workers through the use of PPEs and other items. Considering the infectious nature of the disease, it is important to categorise the waste from the COVID-19 patients as potentially infectious hence needs to be managed as such. COVID-19 waste just like any other infectious waste if not properly managed may lead to transmission of pathogens from the waste material surfaces to humans. This can result in nosocomial infections or end up infecting people who may be outside the healthcare facilities.³

The general objective of this study is to assess the management of medical waste especially the waste from COVID-19 patients' wards in one of the specially designated health facilities for the disease in Ghana.

METHODS

Study design

As at the time of this research, there were about 15 testing points, isolation centres and designated health facilities for the novel corona virus disease in Ghana. Due to the restrictions in movement and partial lockdown rules in the research period, the health facility which was closer and easily accessible was purposively selected for this research. To avoid over-exposure to areas of the disease, only one health facility was selected for this research. The study involved visits to the selected facility to measure the quantity of waste generated as well as perform observational survey of their waste management practices after which an analysis of the results was conducted for discussion and conclusion.

Study place

The study was conducted in one of the quasi-government health facilities located in the Greater Accra Region of Ghana. This place was the most suitable for this research since the region had the highest number of cases within the study period.

Study period

This study was conducted within a period of four weeks from the last week of March 2020 to the third week of April 2020.

Inclusion criteria

All health facilities including isolation centres for COVID-19 treatment were eligible for this study.

Exclusion criteria

Health facilities that had not designated a centre for isolation of COVID-19 patients were excluded from the study.

Data collection

Waste measurement

In collaboration with the Health and Safety Officer who is responsible for the management of waste in the health facility, the quantities of the hazardous waste component of the waste were weighed and recorded at the external storage site using a portable hand-held scale during each pick up time for a four-week period. This data was analysed and used for this research.

Interviews

Interviews were conducted with relevant staff of the health facility. These included the health and safety officer, biomedical engineers, nurses and waste handlers. A special interview session was conducted with the operation officers of the waste management company that manages the waste of the health facility involved. The interview was comprised of a series of questions relating to training in healthcare waste management (HCWM), waste segregation, storage, transportation, treatment and disposal of waste.

Observations

To attain a first-hand information on the waste management practices at the health facility, visits were made to the health facility to observe how the various protocols in HCWM were being implemented. A checklist was designed to aid with this survey.

Data analysis

All the data collected through the various means were compiled and entered into the computer for storage and analysis. Microsoft Excel was used for the analysis.

RESULTS

Status of the health facility

The selected health facility is state of the Art with one of its buildings with 36 beds solely allocated for the treatment of COVID-19 patients. The facility is new and was only providing specialized medical services for particular patients that needed them until the corona virus disease evolved. So majority of the patients in the facility were related to COVID-19.

Waste generation and segregation

The health facility separates their waste into general waste, infectious waste, highly infectious waste and sharps waste in accordance to the colour codes of the Ministry of Health. The building housing the COVID-19 patients have bins lined with only red bags which indicated highly infectious waste. This implies that, the health facility regards all the waste been generated from

the isolation unit as highly infectious. There are plastic puncture proof sharp containers also present for the separation of sharps.

However the other clinical areas had two bins in place for waste segregation in most of the places. In some places, the bins were appropriately lined with black and yellow liners indicating general waste and infectious waste respectively. In other places, the two bins were all lined with black liners which made segregation confusing. Waste segregation in these areas were generally poor since the general and infectious waste were mixed together in the various bins. However, sharps waste were well segregated in the sharps containers. The waste generation in this section of the facility was far lesser since there were few patients as compared to the COVID-19 isolation building.

Figure 1 shows the quantities of hazardous waste (infectious and sharps waste) lifted from the health facility within the four week research period.

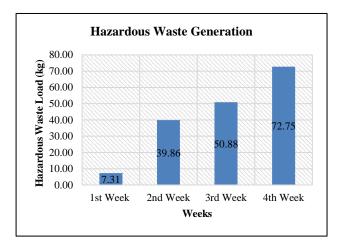


Figure 1: Hazardous waste generation from COVID-19 isolation unit.

Waste storage

There were various sizes of bins in the facility ranging from 30 liter bins to 240 liter bins for internal and external storage of bins. The larger bins were used for external storage of hazardous waste while the smaller ones were for internal storage. There was a roll-on-roll-off container for the external storage of general waste. The bins were red, yellow, ash and black in colour. Waste segregation was mainly based on the colour of the liner not the colour of the bin.

The bins for internal storage of waste were well sited within the health facility. The external storage bins were however not well situated within the premises of the facility. The external bins were exposed to the heat from the sun and easily accessible to the general public since it was in the open space close to the building.

Transportation of waste

The waste handlers remove and tie the waste liners from the various bins when it is full. They usually comply with the three-quarter principle. The tied bags are placed in an internal to external transport bin and sent to the external storage where the bags are transferred into the external storage bins there.

The health facility has contracted two waste companies to collect and transport waste from their premises. One of the companies pick up the general waste while the other handles the hazardous waste. The general waste company uses a roll-on-roll-off truck to pick up the roll-on-roll-off container at least twice a week. The hazardous waste company also uses a non-compaction truck which is airtight and leak-proof for the collection of the waste. Hazardous waste is also picked at least twice a week. Lifting sheets are completed and issued anytime the waste is picked from the health facility for records and billing purposes.

Treatment and disposal

The general waste picked from the health facility goes directly to the landfill site. The hazardous waste component of the waste which is mainly the covid-19 waste is transported to a centralized medical waste treatment facility (CMWTF) located within the city. The CMWTF utilizes an Autoclave and Shredder which are non-incineration systems for the treatment of the hazardous waste. This system uses pressurized steam at high temperatures of about 121°C to 145°C to sterilize the waste within the autoclave for about 40 minutes to one (1) hour. The sterilized waste is then shredded to destroy all sharps and reduce the volume of the waste by about 70%. The waste at this stage is safe for disposal hence sent to the landfill.

Health and safety

The Health and Safety Officer conducts training for the staff with regards to occupational health and safety and other infection prevention control (IPC) practices. The staff of the facility are therefore conscious of safety practices in their duties. They utilize the PPEs that have been provided by the management of the facility especially for the staff that work in and around the COVID-19 isolation building. There is a chlorine bath at the entrance of the facility to help disinfect the shoes of people who go in and out. Hand washing basins and hand sanitizers are made available at vantage points within the facility. The staff of the facility who work at the COVID-19 isolation center were undergoing test for the disease during the period of this research.

DISCUSSION

The issue about proper management of medical waste in this pandemic has been addressed by international organisations like World Health Organisation and Centres for Disease Control and Prevention (CDC). They recommend that, the COVID-19 waste can be managed like regular medical waste. A few international articles have been written to also discuss the issue and give various recommendations.

This research work is the first assessment of its kind with regards to healthcare waste management in Ghana within this COVID-19 pandemic period to the best of our knowledge. Hence results from this work can only be compared to similar researches in the field of medical waste management but not specifically COVID-19 waste.

From the results of the study, the waste generation of the health facility increased from 7.31 kg in the first week to 72.75 kg in the fourth week. This is a direct reflection of the increase in the number of cases in the health facility. The number of cases in the first week were two and gradually increased to 22 in the fourth week. This is in line with of the various researches that concludes that a rise in population leads to an increase in waste generation.

The issue of poor waste segregation in other areas of the facility is not different from results from Asante et al and Doo et al.^{4,5} This indicates that, on a normal day the waste segregation practices are generally poor.

Results from this study indicates that, the waste from the COVID-19 patients are stored in appropriate bins however, the external bins were not situated in a safe area exposing it to the harsh conditions. This coincides with the results of Asante et al and Doo et al who also indicated that the storage bins within the health facilities were not well secured exposing the waste to unauthorized persons and harsh conditions. This is however not in accordance with the Interim Guidance on Water, Sanitation, Hygiene and Waste Management by UNICEF and WHO for the COVID-19 virus.

The waste collection and transportation practices of the health facility studied was appropriate since it is in accordance with the Policy and Guidelines on Healthcare Waste Management in Ghana. The general waste is collected separately from the hazardous waste by different waste contractors with adequate technology and capacity to handle such waste. This results is contrary to the non-compliance reports by Asante et al and Wiafe et al with regards to waste transportation. Udofia et al also indicated that only 30% of articles reviewed on medical waste management in Africa reported compliance to the recommended vehicles for waste transportation.

The waste treatment and disposal practices of the health facility is appropriate and in accordance with all local and international standards in waste treatment. The hazardous component of the waste is treated using steam sterilization which is effective for destroying viruses and other pathogens. This result does not coincide with the

reports of many other researchers in Ghana like Asante et al, Doo et al and Wiafe et al whose results showed inappropriate ways of treating medical waste such as open burning and use of single chambered incinerators. 4,5,7

The health facility is very cautious and conscious about health and safety. This is very evident in the use of PPEs and other structures put in place to improve IPC practices in their activities. These are in accordance with the IPC recommendations of WHO and it will help reduce the spread of the virus in the process of patient care.

Limitation of the Study was that it focused on health facilities that were designated by the Government of Ghana to manage COVID-19 patients. Due to the partial lockdown during the study period, there was limitation in movement within the city. Therefore the study could only be conducted in the closest health facility that met the selection criteria.

CONCLUSION

This study sought to assess the healthcare waste management practices in a health facility specially designated for COVID-19 isolation and treatment purposes. The assessment has revealed that the healthcare facility has paid much attention to the waste from the COVID-19 treatment building due to the awareness of the infectious nature of the disease. In this regards, appropriate measures have been put in place to properly manage the waste from generation, segregation, storage, transportation, treatment and disposal. However, the shortfall with this facility is the poor segregation practices in the other areas of the facility where there are no COVID-19 patients. This implies that with training and enhanced awareness creation, the situation can be rectified since COVID-19 is not the only infectious disease existent. Hence all forms of hazardous waste should be managed with strict protocols.

Recommendations

Special training sessions should be conducted for all healthcare workers with regards to proper procedures in healthcare waste management to reduce or eliminate the spread of infection within or outside the health facilities. There should be strict enforcement of policies and regulations in HCWM to help keep people safe from irresponsible actions of stakeholders. More centralized medical waste treatment facilities with environmentally friendly treatment technologies should be established in the various regions of the country. Monitoring and evaluation activities with regards to HCWM in health facilities and isolation centers should be enhanced to help identify and rectify any shortfalls in the system.

If the recommendations stated in this study is implemented alongside the various Policies and Guidelines on HCWM, there will be a vast improvement

in the system to help fight the pandemic and eliminate the spread of other infectious diseases through improper HCWM.

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