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MANAGEMENT OF BIO-MEDICAL WASTE DURING COVID -19

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Abstract: As corona virus is spreading day by day, handling and management of biomedical waste generated during management of corona virus has been a serious concern for government. The aim of this review article is to discuss the importance of biomedical waste management in this pandemic and to make some recommendations for safe disposal of COVID infectious waste. A total of 35 articles and newsletters related to COVID-19 and biomedical waste management using different search portal like PubMed, Google Scholar, Nature, and Lancet were reviewed. After thorough literature review, relevant 10 articles and newsletters were taken into consideration for this purpose. Battling this issue has entangled complex humanitarian and environmental challenges which require immediate action. Failure to take appropriate measures can lead to grave consequences which would leave a scar not only for India but for the entire world.

Key Words: COVID-19, Bio Medical Waste

Introduction

The Corona virus disease 2019 (COVID-19) has shaken the entire world lately, after coming into existence in the late 2019 in the city of Wuhan. Till now almost 15.1 million cases of CORONA are reported and 630 thousands deaths around the globe. Currently, India is also one of the worst-hit countries in the world with over 124 thousands positive cases and over 29000 deaths. The Indian data related to coronavirus shows that the peak is yet to come and India has a long way to go to control the virus. While India is fighting with coronavirus threat, there is one more aspect that needs our attention which is the biomedical waste generated from the hospitals and laboratories, for instance. Not all if it is hazardous but even the smaller amount of hazardous waste is enough to spread the virus and hinder our fight against corona. Many researches are going on nowadays to obtain more and more information about the virus. Recent researches have shown that the virus can stay activated on plastic surfaces, cardboard, and even in the air for a varying duration. This survival property in activated form makes it even more formidable and can cause an outbreak through biomedical waste coming out from hospitals after dealing with a coronavirus patient. Hence, biomedical waste must be handled very carefully and should be treated properly in a way that it does not encounter anybody in any way before it gets treated or placed in a safe place until the virus is deactivated from the waste. After the treatment, there are methods discussed in the later section which can be used to dispose of different kinds of waste. Also, various wastes need to be pre-treated or disinfected before disposing of.

The problem in India is not only confined to the pre-treatment or disposing of the wastes but some challenges need to be addressed to make the whole process easier and faster. The Challenges are, for example, proper segregation of the waste, which is not commonly practiced in India, know- how of handling the waste at the staff level, proper disinfection of waste, lack of PPEs to collection staff, etc. The proper solutions to the challenges have been mentioned in the later part of this paper. These solutions are meant to mitigate the burden on our management system and to strengthen the fight against this contagious disease.

The safe management of household waste is also likely to be critical during the COVID-19 emergency. Medical waste such as contaminated masks, gloves, used or expired medicines, and other items can easily become mixed with domestic garbage but should be treated as hazardous waste and disposed of separately. These should be separately stored from other household waste streams and collected by specialist municipality or waste management operators. Healthcare facilities should continue to handle infectious waste following medical waste management procedures. At this time, there are no indications that the presence of the Corona virus at a healthcare facility will create new infectious waste streams requiring special handling. For instance, hospital

waste such as disinfecting wipes, personal protective equipment, or disposable food ware may be disposed of as solid waste in the trash. As per usual guidance, all non-recyclable wastes from households and hospitals should be bagged and tied before placed in a trash receptacle. All of these wastes should be disposed of in a solid waste landfill permitted to accept municipal solid waste.

Materials and Methods

It is a systemic review regarding the relationship between COVID-19 and biomedical waste management. Total 35 articles and newsletters related to COVID-19 and biomedical waste management using different search portal like PubMed, Google Scholar, Nature, and Lancet were reviewed for it. After proper literature review only 10 articles and newsletters which were related to this study were chosen for this systemic review purpose.

The Central Pollution Control Board (CPCB) has recently released specific guidelines for handling and safe disposal of biomedical waste generated during the diagnosis, treatment and quarantine period of patients confirmed or suspected to have the COVID-19. Though the country already had Bio-Medical Waste Management Rules (formed in 2016), the new CPCB guidelines were released to ensure that the waste generated specifically during testing of people and treatment of COVID-19 patients is disposed of in a scientific manner.

In Wuhan, where the novel coronavirus first emerged, officials didn't just need to build new hospitals for the influx of patients; they had to construct a new medical waste plant and deploy 46 mobile waste treatment facilities too. Hospitals there generated six times as much medical waste at the peak of the outbreak as they did before the crisis began. The daily output of medical waste reached 240 metric tons, about the weight of an adult blue whale.

Discussion

Government instructions regarding waste management during COVID-19:-

1. Ensure collection and treatment of healthcare waste.
2. Ensure the collection and treatment of household waste.
3. Maintain in operation incineration and land filling for non-hazardous waste.
4. Maintain in operation hazardous waste treatment.
5. Maintain, as long as possible, the separate collection of household waste (packaging, paper, cardboard, glass)
6. Maintain, as long as possible, in operation the sorting facilities for separately collected household waste.

Safe management of health care waste during COVID-19:- Best practices for safely managing health-care waste should be followed, including assigning responsibility and sufficient human and material resources to segregate and dispose of waste. There is no evidence that direct, unprotected human contact during the handling of health-care waste has resulted in the transmission of the COVID-19 virus. All health-care waste produced during patient care, including those with confirmed COVID-19 infection, is considered to be infectious (sharps and pathological waste) and should be collected safely in clearly marked lined containers and safe boxes. This waste should be treated, preferably on-site and then safely disposed. If waste is moved off-site, it is critical to understand where and how it will be treated and disposed. Waste generated in waiting areas of health-care facilities can be classified as non-hazardous and should be disposed in strong black bags and closed completely before collection and disposal by municipal waste services. All those who handle health-care waste should wear appropriate PPE (boots, long-sleeved gown, heavy-duty gloves, mask, and goggles or a face shield) and perform hand hygiene after removing it.

The volume of infectious waste during the COVID 19 outbreak is expected to increase, especially through the use of PPE. Therefore, it is important to increase capacity to handle and treat this health-care waste. Additional waste treatment capacity, preferably through alternative treatment technologies, such as autoclaving or high temperature burn incinerators, may need to be procured and systems may need to be put in place to ensure their sustained operation. There is no reason to empty latrines and holding tanks of excreta from suspected or confirmed COVID-19 cases unless they are at capacity. In general, the best practices for safely managing excreta should be followed. Latrines or holding tanks should be designed to meet patient demand, considering potential sudden increases in cases, and there should be a regular schedule for emptying them based on the waste water volumes generated. PPE (long-sleeved gown, gloves, boots, masks, and goggles or a face shield) should be worn at all times when handling or transporting excreta offsite and great care should be taken to avoid splashing. For crews, this includes pumping out tanks or unloading pumper trucks. After handling the waste and once there is no risk of further exposure, individuals should safely remove their PPE and perform hand hygiene before entering the transport vehicle. Soiled PPE should be put in a sealed bag for later safe laundering. Where there is no off-site treatment, in-situ treatment can be done using lime. Such treatment involves using 10% lime slurry added as 1-part lime slurry per 10 parts of waste.

Safe management of dead bodies during COVID19:- While the risk of transmission of COVID-19 from handling the body of a deceased person is low, health care workers and others handling dead bodies should apply standard precautions at all times. Health care workers or mortuary staff preparing the body should wear: scrub suit, impermeable disposable gown (or disposable gown with impermeable apron), gloves, mask, face shield (preferably) or goggles, and boots. After use, PPE should be carefully removed and decontaminated or disposed as infectious waste as soon as practicable and hand hygiene should be performed. The body of a deceased person confirmed or suspected to have COVID-19 should be wrapped in cloth or fabric and transferred as soon as possible to the mortuary area.

Guidance on management of household waste in COVID-19 cases:-

- ☐ _An individual waste bag should be placed in the patient's room.
- ☐ _Paper tissues and face masks used by the patient should be immediately put in the waste bag that was placed in the patient's room.
- ☐ _Gloves and face masks used by the caretaker and by the cleaner should be immediately put in a second waste bag, placed near the door to the patient's room, when the caretaker or cleaner leave.
- ☐ _The waste bags should be closed before they are removed from the patient's room and replaced frequently; they should never be emptied in another bag.
- ☐ _These waste bags can be collected together and placed in a clean general garbage bag; the closed patient waste bags can be put directly in the unsorted garbage. No special collection activity or other disposal method is necessary.
- ☐ _After handling waste bags, strict hand hygiene should be performed: use water and soap or alcohol based hand disinfectants.

Impacts of Corona Virus on Solid Waste Management:- Regulated medical waste will be produced from the COVID-19 outbreak, which may include needles, sharps, material contaminated with bodily fluids (like gauze, gloves or gowns) and pathological wastes. These wastes are regulated federally by the Occupational Safety and Health Administration (OSHA) for safe handling and the Department of Transportation for transportation as well as at the state level for the management and treatment of these materials before disposal.

According to the U.S. Centres for Disease Control and Prevention (CDC), risk of catching COVID-19 is higher for people who are in close contact with someone who already has the disease. The virus is thought to spread mainly through respiratory droplets (not truly airborne) produced when an infected person coughs or sneezes. It also may be possible that a person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose or possibly their eyes, but this is not thought to be the main way the virus spreads.

However, OSHA states that without sustained human-to-human transmission, most American workers are not at significant risk of infection. Exposure risk may be elevated for some workers, including those involved in solid waste and wastewater management. The CDC has determined that medical waste generated in the treatment of COVID-19 patients and patients under investigation (PUIs) be managed in accordance with routine procedures. According to CDC,

waste generated in the care of PUIs or patients with confirmed COVID-19 does not present additional considerations for wastewater disinfection in the U.S.

Coronaviruses are susceptible to the same disinfection conditions in community and healthcare settings as other viruses, so current disinfection conditions in wastewater treatment facilities are expected to be sufficient.

Guidelines for handling of waste generated during COVID-19:- patient's treatment Guidelines are based on current knowledge on COVID-19 and existing practices in management of infectious waste generated in hospitals while treating viral and other contagious diseases like HIV, H1N1, etc. According to the guidelines, healthcare facilities having isolation wards for COVID-19 patients need to keep separate color coded bins/bags/containers in wards and maintain proper segregation of waste.

As precaution double layered bags (using 2 bags) should be used for collection of waste from COVID-19 isolation wards so as to ensure adequate strength and no-leaks. Collect and store biomedical waste separately prior to handing over the same to Common Bio-medical Waste Treatment and Disposal Facility (CBWTF). Use a dedicated collection bin labelled as 'COVID-19' to store COVID-19 waste and keep separately in temporary storage room prior to handing over to authorize staff of CBWTF. Biomedical waste collected in such isolation wards can also be lifted directly from ward into CBWTF collection van. In addition to mandatory labelling, bags/containers used for collecting biomedical waste from COVID19 wards, should be labelled as 'COVID-19 Waste and general waste not having contamination should be disposed as solid waste as per Solid Waste Management Rules, 2016. Maintain separate record of waste generated from COVID-19 isolation wards. Use dedicated trolleys and collection bins in COVID-19 isolation wards. A label 'COVID-19 Waste' to be pasted on

these items also. The (inner and outer) surface of containers/bins/trolleys used for storage of COVID19 waste should be disinfected with 1 per cent sodium hypochlorite solution daily.

Conclusion:

Proper training to the staff handling and treating might alleviate risk of further transmission of virus through this waste. The central government and the state governments need to be strict and more attentive while considering the waste. General procedures with guidelines based on type of waste must be issued by the government and none should go without treatment following these procedures and guidelines issued by the government. Public awareness for the segregation of waste should also be promoted that might help to segregate the waste like masks and gloves which are used in homes as well to be treated before it can harm any other human beings.

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