Post-COVID 19 Waste management: Perspective in Bangladesh

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COVID- 19 is not only a pandemic but also now a global challenge in all aspects. Due to its high transmissibility, it causes an increasing number of newly infected patients, more hospitalizations, and more generation of healthcare solid waste materials. Moreover, the increase in the use of personal protective equipment (PPE) during the COVID-19 pandemic has added fuel to the flames in increasing medical solid waste. [1,2] This highly infectious disease can easily spread from contaminated waste materials. These extra waste materials are also linked to environmental consequences and challenges. Therefore, proper healthcare waste management (HWM) is a burning issue to halt the spread of Covid-19 as well as to maintain a healthy environment.[3-5]

Healthcare waste (HW):
Generally, the waste produced from healthcare facilities (HCFs), research centers, and medical laboratories are considered healthcare waste. Approximately 75–90% of healthcare solid waste is similar to waste generated in nonmedical settings and is thus categorized as 'non-hazardous' waste. The remaining 10–25% of waste is designated as 'hazardous waste', which poses serious environmental and health risks.[6]

Classification of Healthcare waste[7]:

A. Hazardous medical waste:

1. Chemical waste: Waste that contains chemical substances, i.e. laboratory reagents, film developing reagents, expired/unused disinfectants, solvents, and waste containing heavy metals (batteries, broken thermometers, etc.) is considered chemical healthcare waste.[6]
2. Infectious waste: Waste that contains infective pathogens for disease transmission is defined as infectious healthcare waste; it comprises materials contaminated with blood and body fluids, human excreta, laboratory cultures, and microbiological products.[8] PPE, i.e long-sleeved gowns, heavy-duty gloves, masks, goggles, boots, and face shields are also considered infectious waste.
3. Pathological waste: Pathological waste is typically a smaller part of any tissue, organ, or body part, taken from surgical or microbiological specimens from human bodies.[6] Basically, this type of waste is like infectious waste, and careful handling is required to manage it during a current pandemic.[8]
4. Radioactive waste: Radioactive wastes are produced from different nuclear technologies used in medical settings, including nuclear medicine, radiology, and reagents for research. These wastes contain radioactive materials such as unused reagents from the radiology department or laboratory. Radioactively contaminated glassware, packages/absorbent paper, and human excreta from patients treated or tested with radionuclides also include radioactive waste materials.[6]
5. Pharmaceutical waste: Pharmaceutical waste can be produced from pharmaceutical industries and drug storage within healthcare settings, i.e. pharmacies, distribution centers, and hospitals. Expired packages of pharmaceutical products are included as pharmaceutical waste.[6]

B. Non-hazardous healthcare waste:
Used plastic bags, bottles, paper, magazines, newspapers, food residue, and packets are considered non-hazardous healthcare solid waste.[9] It is probable that both asymptomatic and symptomatic COVID-19 patenAts generate a huge amount of non-hazardous SARS-CoV-2 contaminated healthcare waste during their daily activities in healthcare facilities, which poses a serious risk of community transmission.[10] C. Other waste: The test kits and waste

generated from different test procedures for COVID-19 is another new type of healthcare waste that has been generated in ample amounts in the current COVID-19 pandemic. The use of rapid test kits for identifying an infected person produces additional waste in the waste stream, as each kit is used only once. There is always a chance that this waste could be contaminated with the COVID-19 virus and contribute to further spread.[10]

Healthcare waste management (HWM) system at Covid-19 pandemic:

Considering the high infectivity of the Covid-19 waste and its huge amount, the Covid-19 HWM becomes overloaded and requires special measures. Therefore, the waste management capacity should also be increased at every stage.[11]

On-site separation and management:

In the Covid-19 pandemic, waste separation at the source is the most important to avoid multiple times handling of infected HW due to high infectivity.[11]

On-site disinfection, treatment, and disposal:

Considering the large amount of waste generated at the HCFs during the Covid-19 pandemic, on-site management including treatment and disposal has been preferred as per international guidelines.[11] According to these guidelines, the Covid-19 HW can be either treated and disposed of on-site or transported off the site for disposal after treatment at the HCFs.

Storage and transportation:

According to UNEP, considering the huge amount of HW generated during the Covid-19 situation, there should have a specific storage location in each HCFs to accumulate the Covid-19 waste at the source.[12]

Disposal:

According to both the Rules and Covid-19 guidelines in Bangladesh, the treated waste should be transported and disposed of in a specific sanitary dumping site, which is consistent with international guidelines.[13] According to UNEP, the Covid-19 MW should never be disposed of at open places at any point to prevent the harmful consequences on human health and the environment.[12]

Healthcare Waste(HW) facts in Bangladesh:

Before the COVID-19 era, the world was already in waste management challenges, where over two billion people lack access to waste collection whereas over three billion people lack access to waste disposal. Hence, the emergence of this pandemic and its corresponding social distancing measures amplify the already burdened sector.[14] Generally, the overall scenario of HW is alarming in Bangladesh due to the increasing number of HCFs generating a huge amount of HW.[15] Though Healthcare waste management (HWM)is a burning issue in a developing country like Bangladesh, policy, and initiatives in this sector are yet to be developed. The first HWM Rules of Bangladesh were declared in 2008. Some pits for disposal were constructed by 2009 and some Non-Government Organizations (NGOs) developed expertise and came forward in this area for proper HWM.[16,17] However, proper application of the Rules regarding the HWM system is yet to be established in Bangladesh.[18]In case of the collection of HW by waste collectors, it is often doneA in open vans, open drums, or garbage trucks, and also the vehicles used for transporting the waste are not instructed accordingly.[19,20] HW is frequently found in municipal dustbins. The openly dumped wastes are then picked up by waste scavengers. These activities increased the risk to the environment and the health of waste handlers as they do not use proper protective methods. For central treatment of HW, there is only one incinerator in Dhaka which is not sufficient even in normal situations. Thus, most of the HW remains untreated. Treated or untreated, these wastes are then dumped in landfills. Alarmingly, the landfills also do not have sufficient capacity.[17]

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