



REVIEW ARTICLE

HOSPITAL SOLID WASTE MANAGEMENT DURING COVID-19 PANDEMIC IN NEPAL

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ABSTRACT

A newly discovered Novel Coronavirus is spreading across the world and is transforming the way, we sustain every day. COVID-19 pandemic has created challenges for international and national organizational level. Additionally, healthcare institution has many challenges to deal with COVID-19, especially in developing countries. Among the various challenges faced by healthcare institution, management of waste generated from treatment of COVID-19 patients is essential to prevent further impact on environment. Improper management of COVID-19 waste can lead to adverse public health ramification. Thus, good nationwide protocol and policies of waste management can play a vital role in protecting the health of nation and community.

INTRODUCTION

The current situation of the COVID-19 pandemic has made hospitals across the world the centers of attention. Since the hospitals are directly involved in the treatment of patients in such a health emergency, they should be more cautious about COVID-19 waste management so as to avoid any waste disaster. As the world adapts to unprecedented behavioral and societal changes in response to the threat posed by COVID-19 pandemic, day to day operations of waste management must also be update. These essential services such as waste segregation, handling, collection and waste treatment are routine and indispensable activities of healthcare operations. Thus, appropriate waste management plays a key role in mitigating further spread of infection during this COVID-19 Pandemic, especially in developing countries that have poor waste management strategies.^{1,10,14}

Composition of Hospital Waste

One of the main functions of the health care system is efficient functioning of the hospital waste management system. The hospital waste simply refers to any waste that comes out of a hospital in the course of diagnosis, treatment, medication,

and surgical procedures of patients. It also includes chemical wastes, expired drugs, sharp objects like needles, anatomical wastes that come from surgeries or delivery of an offspring, radioactive wastes, food wastes that come out of hospital cafeteria, paper wastes that come out of record files and even technological and biomedical equipment waste that is generated once the technology is no longer in the condition to serve its purpose. Generally, hospital waste comprises 80% general wastes. But what is more important is how the hazardous wastes are being disposed of.²

COVID-19 Pandemic and Waste Management

However, if planned properly, all healthcare institutions can adopt the best possible practices in hospital waste management. Still more this COVID-19 pandemic will continue and will have enormous impact on economy of nation and human health. Hence, it has put a burden on government and healthcare providers to manage this issue to assure health and safety of our citizens and to prevent this crisis into disaster.^{5,7}

During this COVID-19 pandemic many types of infected waste is generated with large volume of non-infected waste. The use of personal protective equipment's and single use plas-

tics also increases the quantity and density of medical waste and improper management of PPEs can significantly increase the spread of COVID-19. Thus, it is essential that proper waste segregation, collection, storage and treatment are followed in all healthcare settings. To achieve this, healthcare workers and waste collection workers need to be protected because they are the most vulnerable part of population who are exposed to infection. Therefore, safe handling and final disposal of waste are the vital element in COVID-19 crisis.^{5,12,14}

Due to the COVID-19 pandemic, the unusual generation of medical waste and spread of virus is increased, which requires modern or alternative treatment options to prevent the potential threat or risk to healthcare workers, waste handlers and other people dealing with contagious waste. In china, due to this global pandemic there was surge in usage of personal protective equipment's which leads to sixfold increase in medical waste than usual and which urges the nation to deployed 46 mobile treatment facilities across china. In Brazil, medical waste increased twofold due to increase use of personal protective equipment such as facemask and gloves, where improper waste management is a major concern. Thus, Ministry of health of Brazil and Brazilian Health Regulatory Agency recommended sustainable measures by use of disposal mask only by health professionals and reusable mask by general people.^{15,18}

According to waste management guidelines issued in 2014, all healthcare facility in Nepal need to follow safe waste management practices efficiently within healthcare settings. Apart from this healthcare institution having isolation wards for COVID-19 patients, need to have separate color-coded bags/ containers for proper segregation and treatment of COVID-19 Waste. Along with this, healthcare personnel and waste collection workers need to wear personal protective equipment's while handling COVID-19 Waste. ^{3,6}

Checklist to manage COVID-19 Waste^{16,17,19}

Personal Protective Equipment's	PPE should be worn all time while handling and transporting waste from designated area to treatment zone.
	Staff should select appropriate PPE to prevent risk of infection and overuse of PPE
Waste Minimization	Waste Reduction at source
	Preference to recyclable and reusable items
Waste Segregation	Use separate color-coded container/bins to discard generated waste.
	Use double layered waste bags
	Dispose sharps in puncture proof container
Waste Collection and labeling	Seal the bag before transporting
	Spray the bag with 1 % sodium hypochlorite solution before transporting to treatment zone or temporary storage point
Waste Transportation	Place the waste bag in close trolley while transporting to treatment zone or temporary storage point.
	Disinfect the trolley and waste containers with 1% hypochlorite solution daily and after each use.
Waste Storage	Waste should not be stored more than 24 hours in temporary storage area.
Waste Treatment	Treat the waste with Autoclave, Friction Heat system or any other waste treatment technology
	Treat for 60 minutes at 121 to 135 degree Celsius
	If treatment zone is not available within healthcare facility coordinate with waste treatment provider
Waste disposal	Treated waste can be discarded as regular waste.
Personal Protective Equipment's	Safely remove PPE and dispose if it is non- reusable and disinfect if PPE are reusable.

Recommended steps to manage waste generated from COVID-19 patients^{3,4,6,20}

1-Waste minimization: It includes strategies to reduce unnecessary injections, recycling and reusing of some of the materials. Healthcare facilities can adopt many practices that might reduce the waste volume. Some strategies are waste reduction at source; reduction can be achieved through product substitution and modifications and giving preference to reusable and recycling items.

2-Waste segregation: Segregation of waste at source is most important to reduce waste and manage it successfully. Waste segregation to be implemented in healthcare facility as per the waste management guidelines published by Government of Nepal in 2014, along with that COVID-19 related waste need to be segregated in separate color-coded container with double layered bags.

3-Waste Collection: For precaution, double layer bags should be used for collection of waste from COVID-19 isolation wards. Spray the bag with 1% hypochlorite solution before collecting and ensure that the bag has no leakages before collecting. In addition, Labelling as COVID-19 waste should be done before collecting it from COVID-19 Isolation wards.

4-Waste Transportation: The bagged COVID-19 waste is transported to temporary storage point or treatment zone in a closed medical waste transfer trolley. The trolley and waste containers should be disinfectant daily with 1% Sodium hypochlorite solution. If the treatment zone is not available the healthcare facility can get contracted/ memorandum of understanding with approved waste treatment providers.

5-Waste storage: The transported COVID-19 waste must be

stored separately in temporary storage area not more than 24 hours and it should be transported to waste disposal provider as early as possible. If treatment zone is available within healthcare facility, the COVID-19 waste must be treated immediately.

6-Waste Treatment: The method of treatment of COVID-19 waste is done based on the treatment technology available in healthcare facility. The treatment method which can be used for treating COVID-19 waste are autoclaves and friction heat systems, where the waste can treat for 60 minutes at 121 to 135 degree Celsius. Alternative option could be chemical disinfection depending upon local context and resource available.

7-Waste Disposal: COVID-19 waste which are properly treated with autoclaves and friction heat systems are sterilized and have fewer micro-organisms or practically no microorganisms compared to household waste. Thus, after treatment it can be discarded as regular waste in a landfill.

COVID 19 Waste Handlers and Personal Protective Equipment

Based on available evidence COVID-19 is transmitted from human to human by close contact and droplet infection. The people who are in close contact with COVID-19 patients and those

who care COVID-19 patient are at more risk to acquire infections. Thus, additional precautions are required by healthcare workers and waste collection workers to prevent transmission of infection within healthcare setting. Therefore, Healthcare workers caring COVID-19 patients and Waste collection workers handling and transporting waste need to use appropriate PPE (boots, long sleeved gown, apron, mask goggles/ face shield, thick gloves) as per the WHO and Nepal Medical Council guidelines to prevent risk of exposure. Hence PPE should be worn all times while handling waste during care and treatment of COVID-19 patients and it is more important to select proper PPE and being trained how to put on, remove and dispose it. ^{8,9,11}

CONCLUSION

Thus, management of waste related to COVID-19 is very essential because if it is not managed properly, it not only has a negative impact on hospital environment but also has a tremendous impact on health of general public, community, and whole nation. Thus, besides healthcare institutions, government, private sectors, NGOs and INGOs and community need to work together to promote sustainable waste management in Nepal.

REFERENCES:

1. Nghiem LD, Morgan B, Donner E, Short MD. The COVID-19 pandemic: considerations for the waste and wastewater services sector. *Case Studies in Chemical and Environmental Engineering*. 2020;1:100006. [DOI]
2. Adhikari B, Parajuli A. Challenges in managing hospital waste in emerging economies during COVID 19 Pandemic. *Online Khabar* 2020 May 6. Available from: [LINK]
3. Healthcare waste management guidelines-2014- Ministry of Health and Population, Nepal. [Online]. 2014 July 21 [cited 2020 Nov 1]; Available from: [LINK]
4. World Health Organization. Safe management of waste from Health care activities, 2nd edition. [Online] 2014 [cited 2020 Nov 1]; Available from: [LINK]
5. UN environment programme. Waste management an essential public service in the fight to beat COVID 19. [Online]. 2020 Mar 24 [cited 2020 Nov 1]; Available from: [LINK]
6. Guidelines issued by Central Pollution and Control Board of India for handling waste generated during COVID 19 patient's treatment. [Online]. 2020 Apr 21 [cited 2020 Nov 1]; Available from: [LINK]
7. Waste Management in context of coronavirus crisis. [Online]. 2020 Apr 14 [cited 2020 Nov 1]; Available from: [LINK]
8. World Health Organization. Rational use of personal protective equipment (PPE) for coronavirus disease (COVID 19): interim guidance. [Online] 2020 Mar 19 [cited 2020 Nov 1]; Available from: [LINK]
9. Nepal Medical Council. Nepal Medical Council Interim Guidance for Infection Prevention and Control when COVID 19 is Suspected. [Online] 2020 Apr 5 [cited 2020 Nov 1]; Available from: [LINK]
10. UN environment programme. Waste Management during the COVID 19 pandemic: From response to recovery. [Online] 2020 Aug 12 [cited 2020 Nov 1]; Available from: [LINK]
11. World Health Organization. Water, sanitation, hygiene and waste management for SARS- CoV-2, the virus that causes COVID 19 , interim guidance. [Online] 2020 Jul 29 [cited 2020 Nov 1]; Available from: [LINK]
12. Singh N, Tang Y, Zhang Z, Zheng C. COVID 19 waste management: Effective and successful measures in Wuhan, China. *Resour Conserv Recycl*. 2020; 163: 105071. [DOI]
13. Agamuthu P, Barasarathi J. Clinical waste management under COVID 19 Scenario in Malaysia. *Waste Manag Res*. 2020; 734242X20959701. [DOI]
14. Nzediegwn C, Chang SX. Improper solid waste management increases potential for COVID 19 spread in developing countries. *Resour Conserv Recycl*. 2020; 161:104947. [DOI]
15. Sarkodie SA, Owusu PA. Impact of COVID 19 pandemic on waste management. *Environ Dev Sustain*. 2020; 1-10. [DOI]
16. Ilyas S, Srivastav RR, Kim H. Disinfection technology and strategies for COVID 19 hospital and Biomedical waste management. *Sci Total Environ*. 2020; 749:141652. [DOI]
17. Das A, Garg R, Ojha B, Banerjee T. Biomedical waste Management: The challenge amidst COVID 19 Pandemic. *J Lab Physicians*. 2020; 12(2):161-2. [DOI]
18. Urban RC, Nakada LYK. COVID 19 Pandemic: Solid waste and environmental impacts in Brazil. *Sci Total Environ*. 2020; 755 (Pt 1):142471. [DOI]
19. Rhee SW. Management of used personal protective equipment's and wastes related to COVID 19 in south Korea. *Waste Manag Res*. 2020; 38(8): 820-4. [DOI]
20. Government of Nepal. Ministry of Health and Population. Healthcare waste management in the context of COVID 19 emergency. [Online] 2020 Jul 3 [cited 2020 Nov 1]; Available from: [LINK]