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Healthcare

THE CHALLENGES OF BIOMEDICAL WASTE MANAGEMENT ONGOING COVID 19 PANDEMICS- MINI REVIEW

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ABSTRACT The increasing incidence of COVID 19 has resulted in huge proportion of biomedical waste making the situation vulnerable and dangerous. This sudden increase in infectious waste has made challenges to the existing waste management infrastructure, especially in developing countries. Safe disposal of hospital waste is vital; otherwise, this virus will lead to a major impact on health care delivery system. This mini review aimed to analyze the major challenges faced globally during COVID pandemic. Majority of states have gone through many risks related to incineration, uncontrolled dumping, discharge of raw sewage, lack of capacity of treatment plant and the management of vaccination waste. Public needed more awareness, training of health workers and Capacity of waste has plant to improve.

KEYWORDS :

INTRODUCTION

One of the greatest threats to the world has been waste in its manifold forms. The population explosion and developments have created a pile of waste accelerating the ecocide process. Of the several wastes, biomedical waste has proved the most portent factor to the life and existence of even the microbial. The hazardous nature of the biomedical waste associated with contagious diseases will lead to unredeemable toll on lives. The infectivity adhered on biowaste is sure to pose a high rise of contamination in the ecosystems making the planet a dangerous place to live in, and ill- fitting to life, if human being does not wake up to the call and evolve strategies to contain the threat[1].

The world lay in ruins and COVID 19 has wreaked tremendous disaster to the world. Human being and all the systems have failed and faltered before this microbial virus of an insignificant size of 50 to 200 - nm diameter. Forced lockdowns, quarantines, social distancing and isolations have become the norm. This pandemic has created havocs in every nook and corner of the globe causing unforeseen misery, untold casualties and exponential health and economic loss.[2]

The Bio-Medical Waste (BMW) include the several wastes resulting from health care, research, diagnosis, treatment, immunization and production or testing of biological materials. The waste may include infectious substances, radioactive sediments, genotoxic, cytotoxic and other toxic chemical and biologically aggressive pharmaceuticals. It is impossible to stop the production of waste. What is important is the proper management of the situation. The adverse effects of unsound management of these wastes have been a cause of increased concern.[3]

CAW (Covid Associated Waste) has made the world inhospitable and eerie. The physical and biological characteristics of both solid and liquid waste, particularly related to biomedicine, e-uses and technology have assumed horrifying dimensions. Prior to COVID 19, there was a limit to biomedical waste. The solid waste to do with the pandemic, as for example, masks, aprons, air respirators, hand gloves, face shields, protective gears including PPE kit have accumulated on alarming proportions. It is a pity that the waste is dumped asininely anywhere and everywhere without proper treatment making the world still vulnerable.[4]

Challenges Of Biomedical Waste Management During COVID- 19 Pandemic

Life will prove disastrous and ever new diseases would infect the human unless we respond on an emergency level to the dire situation. There is need to develop more advanced and automated systems for BMW Management. Incorporating artificial intelligence, scientific decontamination process, innovative and sustainable ways for recycling, development of eco-friendly PPE kits, scientific waste management, awareness programs, media campaigns etc. would be resorted to address the situation. It is high time that we do act to arrest this threat and the present study is an attempt to incorporate the issues to do with waste discharges, their potential sources and the possible solutions towards creating a sustainable environment contributory to a symbiotic life in the universe.[5]

A meta -analysis conducted in medical and health care management practices in 78 countries. They identified impediment and challenging facing the integration of medical and waste management into a prospective circular economy according to the statistical correlation with human development index challenges, life expectancy, healthcare expenditure per capita of gross domestic product and environmental performance index. The results highlight the importance of knowledge and awareness of best practice for infection and injury prevention of waste management among workers. An average of 38.9% of medical waste was segregated for proper management and only 41% of workers were trained in service for medical waste disposal. Plastic material constituted approximately 35% of medical waste, presenting an opportunity for sustainable resource recovery and recycling.it is imperative for all countries to adopt environmentally sustainable management for medical waste to prevent cataphoric stock piling of infectious waste during and after pandemics.[6]

1.Increasing Infectious Waste During COVID 19 Pandemic

The onset of COVID-19 pandemic, infectious wastes was generated tremendously worldwide. Everywhere, people were used to wear personal protective equipment's to prevent COVID -19 pandemic. It was increased the panic buying of face masks, gloves, cleaning products. Therefore, Production of PPE was increased. The panic buying, increased the disposal of perishable products left overs. Which will dramatically, increased the waste generation. During COVID 19 pandemic, Capacity of waste handling units was less, this maked challenges for waste handlers as well as the government of India. [7]

The novel Coronavirus (SARS-CoV-2) that has emerged and spread throughout the world causing Corona virus disease-19 (COVID-19) has since its discovery affected not only humans and animals but also the environment. Because of the highly infectious nature of the virus, and the respiratory aerosol transmission route, face masks and personal protective equipment have become mandatory for public and healthcare workers, respectively. At this juncture, there has been increased amount of Biomedical Waste (BMW), and infectious general waste along with plastic disposable recyclable and non-recyclable waste. The increased BMW along with the potentially hazardous plastic waste collection, segregation, transport, and disposal has assumed increased significance during the ongoing pandemic. Therefore, this review attempts to investigate the current scenario of BMW management and strategies to minimize BMW and prevent potential environmental pollution.[8]

The most populous cities like Delhi, Mumbai, Bangalore, Chennai, Hyderabad, etc. are the most affected cities by COVID-19. According to data published by NDTV on September 18, 2020, the country is generating a considerable amount (Above 100 tones/day) of COVID-19 related biomedical waste in the country. Maharashtra contributes for approximately 17% of total COVID-19 related BMW. Now the national daily waste generation is reaching around 850 tones/day. The country does not have sufficient infrastructure and human resources to handle this huge amount of BMW. The presence of 19 CBMWFs and 225 captive incinerators was insufficient to dispose of 700 tons of waste generated in a day. This additional BMW stirred up havoc in the

disposal of BMW. The workers involved in BMW management are pitching in extra hours to cater to this need.11 According to the Supreme Court report, there is an increment in the quantity of BMW ranging from 25 to 349tonnes/day during the month of May–July and it is expected to have doubled during the months of August–October. Presently, there is a poor practice of segregation at the site of generation due to the exponential rise in the generation, thus elevating the risk to the environment. Additionally, inadequate safety measures for the BMW workers continue to remain another major challenge in the Indian At present, around five million sanitation workers are performing their duty and cleaning the country and these laborers (Safai - karamchari) are simultaneously handling the biomedical waste as well. Sadly, they are not provided with the necessary personal protective equipment. These workers are at high risk and subsequently pose a threat to the residing community. According to the evidence from scientific literature, the virus may stay for more than 24 h within the cardboard, boxes, other rigid substances and around 72 hours on the surfaces of metals and sharps, which is a significant threat for the workers collecting the waste for their daily survival. There is an estimated two to four million ragpickers or chorales in India. However, they do not have sufficient information and adequate awareness about the necessary precautions to be taken.12 Consequently, the pandemic has recorded that more than thousands of waste workers have contracted the virus and hundreds of them have lost their lives.[9]

2. USWM (URBAN SOLID WASTE MANAGEMENT SYSTEM) Has Been Facing New Challenges With The Global Spread Of COVID-19

The novel corona virus disease (COVID-19) pandemic tremendously affected the waste sector, with medical waste subjected to uncontrolled dumping and open burning, leading to public health risks. With the potential onset of the third wave, it is important to prioritise a separate collection of the infectious and highly infectious waste in the urban solid waste management system (USWM). It is also crucial to equip the system with essential resources and skills to break the infection chain at the generation stage.[10]

3. Inappropriate Processing And Dumping Of Hazardous Medical Waste

3.1 Incineration Risks

In some cases, particularly when wastes are incinerated at low temperature (less than 800°C) or when plastics containing polyvinyl chloride (PVC) are incinerated, hydrochloric acid (which causes acid rain), dioxins, furans and various other toxic air-borne pollutants are formed. They are found in emissions but also in residual and other air-borne ash and in the effluent gases released through incinerator chimneys. Exposure to dioxins, furans and other coplanar polychlorinated biphenyls can have effects that are harmful to public health. These Substances are harmful to the public health.[10]

Even in high-temperature incinerators (over 800°C) there are cooler pockets at the beginning or the end of the incineration process where dioxins and furans can form. Optimization of the process can reduce the formation of these substances if it is ensured, for example, that incineration takes place only at temperatures above 800°C and if the formation of combustion gas is prevented at temperatures of 200 - 400°C.[10]

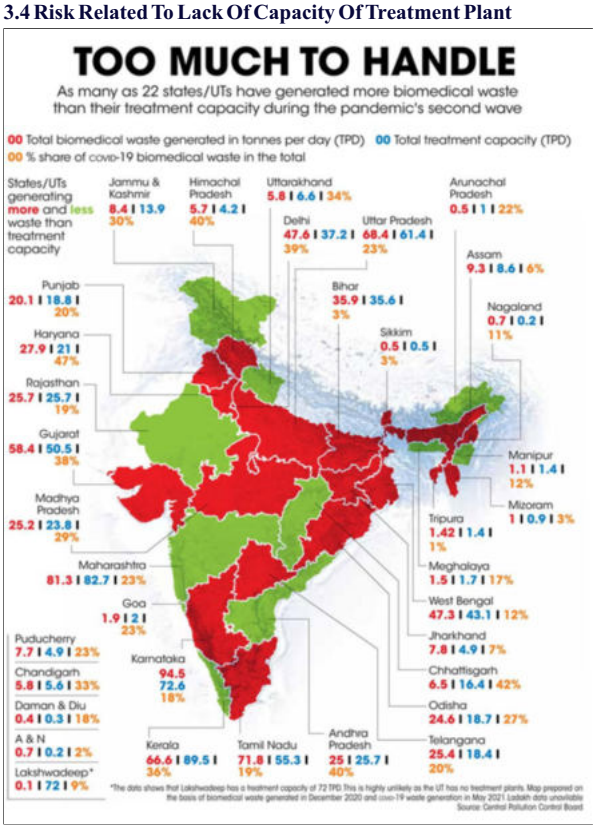
3.2 Risks Related To Random Disposal Or Uncontrolled Dumping

Random dumping and uncontrolled burial are one of the major risks of the environment such as water and soil pollution. This will increase the chances of other infection rather than COVID 19. Mostly people discarded the home quarantine wastes in such a way due to lack knowledge regarding the proper segregation and disposal of waste.[10]

3.3 Risk Related To Discharge Of Raw Sewage

Poor management of wastewater and sewage sludge can result in the contamination of water and soil with pathogens or toxic chemicals. Pouring chemical and pharmaceutical wastes down the drain can impair the functioning of biological sewage treatment plants aseptic tanks. These can end up polluting the ecosystem and water sourcessceptics. Antibiotics and their metabolites are excreted in the urine and feces ofpatients under treatment and end up in sewage. Hospital sewage contains 2 to 10 times more antibiotic-resistant bacteria than domestic wastewater, a phenomenon which contributes to the emergence and propagation of pathogens such as MRSA (methicillin-resistant Staphylococcus aureus).[10]

3.4 Risk Related To Lack Of Capacity Of Treatment Plant



All these are just the tip of the iceberg. There is a clear indication that the 45,954 tons of COVID-19 waste collected by CPCB is a gross underestimation of the actual volume of waste generated so far.[11]

3.5 Risk Related To The Management Of Vaccination Waste

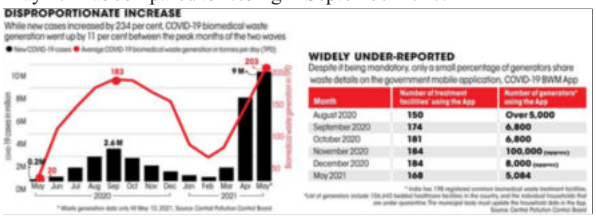
Due to insufficiency of vaccine vial monitors that display key indicators, especially storage temperature while stocking and transportation, a considerable number of vials have to be discarded after four hours of opening. This challenge is prevalent in the rural parts of India. The single use of syringes in hospital and vaccination areas, it will increase vaccination wastes.[11]

Data Of Remarkable Increase In Generation Of Biomedical Waste For Last Two Years In India.

Last year, in September, the country generated 183 tonnes of COVID-19 waste in a day, the highest at the time. This year, the peak was in May with 203 tonnes a day, according to the CPCB. While this increase of 11 per cent suits the narrative of the pandemic's second wave being more infectious than the first wave, it has not kept pace with the COVID-19 caseload that rose by an astounding 234 per cent during the period.[11]

Strangely, the data, when disaggregated, suggests that India's per capita COVID-19 waste generation (waste generated by one infected person) during the second wave has reduced by one-fourth from the first wave. On an average, a COVID-19 patient generated 0.49 kg in

May 2021 as compared to 2.09 kg in September 2020.[11]



CONCLUSION

Biomedical waste management was remarkably increased during COVID 19. The government has faced lots of challenges due to excess amount of infectious waste and its management such as risk related to incineration, risk related to random disposal and uncontrolled dumping, risk related to discharge of raw sewage, and risk related to lack of capacity in treatment plant. Data has shown that, 183 tons of COVID19 was generated in September2020. COVID19 waste was increased 203 tons a day in May, last year. Wastes has increased not only due to COVID -19 pandemic but also Vaccination drive. Biomedical wastes are contagious; therefore, management of these wastes are vital especially during COVID19 pandemic. Government had gone through many challenges during first and second wave. Public needed more awareness regarding proper segregation and disposal of infectious wastes.

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