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Title page

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Title: Medical waste management during COVID-19 situation: perspective towards safe environment.

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Medical waste management during COVID-19 situation: perspective towards safe environment

Abstract

The situation in the world of pandemics is rapidly changing, and the second wave of COVID-19 has put a lot of pressure on the government and private sector, which are primarily responsible for controlling the situation. COVID-19 positive cases have increased in recent months relative to last year, and the number of patients admitted to hospitals has also increased, despite the fact that few of them were denied admission due to shortage of beds. Normal people who experience any symptoms immediately isolate themselves and begin taking the COVID medications prescribed by medical personnel and their team. During these times, all domestic people tossed the wrappers and boxes of medicines into the regular trash can, and the waste was handed over to the waste collector, who treated it like any other domestic waste and disposed of it using open dumping or other methods. The goal of this perspective is to suggest the collections of these types of waste from domestics, and protect the natural resources like water, soil, and even living beings like animals from pollution (from the effect of SARS-CoV-2). The main challenge for environmental waste management agencies is determining who has COVID positive and which houses generate these types of waste; thus, proposed strategy may be beneficial to the long-term sustainability of natural resources and animals.

Keywords

COVID-19; Medical Waste; Sustainability; Environment.

Highlights

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- Perspective towards the safe environment by controlling medicines wastes.
- Management of medical waste from houses during pandemic conditions is needed.
- Medical waste generated from houses may higher than hospitals during COVID-19.

Introduction and Discussion

Since December 2019, the COVID-19 global pandemic has had an impact on everyone's life. We had a lot of difficulties last year, and this year (2021) has seen the pandemic's consequences even more. The government and other organisations are putting in a lot of effort to monitor the situation, concentrating on every aspect where COVID-19 has spread. Due to the large volume of medicines and related products consumed, few waste management strategies, particularly for biomedical waste, have been developed [1]. The BMW (Bio Medical Waste) was adequately handled in hospitals and health centres, and the COVID-19 waste is detected and collected separately in safe locations and as per reports, 28,747.91 tonnes of BMWs generated from June 2020 to December 2021 in India [2].

The second wave of COVID-19 is currently affecting people in India and a few other countries, and the number of positive patients has increased. In India, the second wave of COVID-19 is much faster than the first wave, and it has spread to many parts of the world. According to reports, the second wave spreading rate is nearly double that of the first [3]. More than four million positive cases are arriving in India every day (as of May 9, 2021), and India's hospitals are heavily loaded, and few people may not be able to get the vacant beds [4, 5]. Few states and cities were unable to accommodate all optimistic patients due to a lack of hospital beds, and many patients faced significant health challenges. The mortality rate has suddenly risen in recent days, and people's fear of this situation has also skyrocketed [4, 5]. As a result, people who

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haven't had any symptoms and haven't had any tests have begun to take COVID-19-specific medications. Few of these populations are likely to be positive, and even fewer are likely to be negative. The issue is that they are unable to identify positive cases in the general population.

Few places in India, vital medical products such as oxygen, remdesivir injections, and other high-end medicines were in shortage. Many individuals in the large population of COVID positive patients treat themselves at home by using the medications provided by health professionals (mostly concerned through virtually) [4]. Scientists and government organisations, for public awareness or help to people, have also published the details of medicines [1, 5]; as a result, people can use medicines after consulting with family/friends/Doctors/Medical personnel. Individuals in houses collect the waste of all wrappers or boxes of such drugs in domestic dustbins and hand it over to waste collector workers along with usual domestic waste. The waste management agencies used a policy of dumping normal waste because they couldn't identify which houses generated COVID waste and which did not. The main reason for this viewpoint is to protect the spreading of this disease among animals through natural sources, primarily water and soil.

Recently, many scientists and researchers have recently confirmed that SARS-CoV-2 has been detected in waste water samples in India and other parts of the world [6-8]. These studies confirm that the SARS-CoV-2 virus can be found in wastewater in a variety of ways. This would be detrimental not only to humans, but also to animals that drink waste water from different locations. These wastes may also have an effect on water bodies such as rivers, lakes, and even ground water. Rain may also contribute to the spread of these wastes in water bodies. The presence of SARS-CoV-2 in wastewater may be due to the disposal of household medicine waste in open areas or near water sources. The presence of SARS-CoV-2 in soil has not yet been

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investigated, but this waste may pollute the soil environment [9]. Controlling the disposal of domestic waste on open land and near water sources is essential during pandemic condition because it might create problems in the future.

The total number of BMWs produced by Indian hospitals is approximately 136.89 tonnes per day [2]. Because of the second wave of COVID in India, a large number of beds were taken up by COVID positive patients. As of today (May 9, 2021), the total number of positive cases in India is approximately 37,36,648; which is much excess as compared to the available beds. The detail of number of hospitals and beds are shown in Table 1.

Table 1. Number of positive patients who underwent self-treatment at home due to lack of hospital beds [10].

Total number of hospitals (public+private)	Total number of hospital beds (public+private)	Total number of ICU beds (public + private)	Total number of ventilators (public + private)	Total Active Cases (as on May 9, 2021) [5]	BMWs from hospitals (June to December 2020) in tonnes [11]	Per day BMW from hospitals (June to December 2020) in tonnes	If all beds and hospitals are full, then numbers COVID patients who treated self at home (as on May 9, 2021) (approx.)
69,265	18,99,228	94,961	47,481	37,36,648	28,748	136.89	16,94,978

Based on this information, we can say that the number of patients who have treated themselves at home isolation (own houses) is significantly higher (more than 1.6 million). People use more drugs, and the waste produced from them is equal to hospital or even greater (due to India's much larger population). Medicine wrappers and boxes, the amount of such waste is

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unpredictable since almost everyone uses medicines, especially immunity boosters (Vitamin-C, Zinc etc.). As a result, collection of such wastes from individual houses is urgently needed for protection towards sustainability.

The government and private agencies that collect domestic waste from individual homes can notify the public through mike or social media to store medicines waste in separate locations. Such wastes can be stored in any empty closed plastic box or containers, as every house has some kind of empty plastic box, example of such empty box is shown in Fig. 1.

Fig. 1. Typical empty boxes, which may be available in individual homes.

The amount of waste in individual homes is small, but it is enormous when considered for local communities, cities and states. Many places in India are under lockdown on this day (as of May 9, 2021) [5]; in this condition, if a particular household does not have an empty box, they may use a thick empty bottle by cutting the top and then storing the waste and closing it with the remaining bits. After storing the waste, hand it over to waste collector personnel. Waste disposal services could try to collect waste in separate place in vehicles, rather than mixing it with regular household waste. They can also expect to store medication wrappers or boxes in thick polythene (only, when amount of wastes are in excess), as shown in Fig. 2. Following waste collection, handle the waste in the same manner as COVID-related BMW treated for hospitals. The

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technique for treating COVID-related BMW has already been established by government organisations and agencies [2, 11].

Fig. 2. Typical domestic waste collection vehicle (India) with suggestion for collection of medicine wastes.

Now, it's time to prevent and prepare for upcoming conditions that could be far more severe than the current ones, as we are facing a lot more in the second wave of COVID-19 than in the first. The present perspective may help to control the spread of COVID-19 virus in natural sources (water, soil), and animals. It may also be better for waste management for future global sustainability.

Declaration

- The authors have no relevant financial or non-financial interests to disclose.

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- The authors have no conflicts of interest to declare that are relevant to the content of this article.
- All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.
- The authors have no financial or proprietary interests in any material discussed in this article.

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