

Challenges Faced in Biomedical Waste Management by Waste Handlers amidst the COVID-19 Pandemic in a Tertiary Care Hospital: A Qualitative Study

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Abstract:

Introduction : Coronavirus disease 2019(COVID-19) saw an overhaul in the biomedical waste management (BMWM) practices. Waste handlers were at the brunt of these changes. If the challenges pertaining to BMWM at the ground level are better understood, more effective measures to overcome them can be formulated. **Objectives:** 1. To identify myths and concerns regarding BMWM in the context of COVID-19 pandemic. 2. To explore the challenges faced in BMWM amidst the COVID-19 pandemic. 3.To explore opportunities and future perspectives of BMWM. **Method:** In-depth interviews were conducted among 17 purposively selected Class IV health care workers during August to November 2021 in a tertiary care institute in Mumbai. Data was reported using thematic analysis. **Results:** Three major themes - challenges and concerns faced by BMW handlers, enablers/ motivators, opportunities and future practices were generated from the transcripts. Various challenges faced by waste handlers were- difficulties in segregation and transport of BMW, exhaustion from PPE usage and fear of acquiring and spreading COVID-19 from work, stigma faced from public, and handling COVID-19 deaths. Support from family and colleagues, incentives and a positive change in public perception enabled them to work. Forming redressal committees, addressing job security concerns and timely provision of good quality equipment can improve hospital waste management measures in the future. **Conclusion:** It is of utmost importance to address challenges faced by waste handlers in BMWM. Onus should also be on periodic training in BMWM.


Key Words : Bio Medical Waste, COVID-19, Pandemic, Waste Management.

Introduction:

Hospital Waste Management involves a range of activities, such as collection, transportation, operation or treatment of processing systems, and disposal of waste.^[1] Safe and sustainable management of biomedical waste(BMW) is a social and legal responsibility of all associated with health care services. In developing countries like India, appropriate BMW management following stipulated rules^[2,3] has been one of the neglected aspects of

healthcare for years. Poor conduct and inappropriate disposal methods in handling BMW pose significant health hazards and environmental damage due to the infectious nature of the waste.^[4] Amidst the COVID-19 pandemic, the scenario may have worsened with piles of personal protective equipment (PPE) accumulating in the hospitals.^[5]

The Central Pollution Control Board (CPCB), India, published guidelines for the management of waste generated during the treatment/ diagnosis/

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quarantine of COVID-19 patients. These guidelines advocated the use of double layered bags, mandatory labelling of bags and containers as "COVID-19 waste," regular disinfection of dedicated trolleys, and separate record keeping of waste generated from COVID-19 isolation wards, in addition to the recommendation for following existing practices of BMW Management Rules, 2016.^[6]

A proposed rise in the generation of hospital waste due to rigorous sanitation practices triggered by the pandemic, shortage in manpower and a multitude of other factors resulted in an overhaul in BMW management practices.^[7] This may have resulted in improper BMW management practices leading to a rise in hospital-acquired infections (HAI).^[8] This study aims to explore the myths and concerns, and challenges in BMW management faced by the waste handlers amidst the COVID-19 pandemic. Additionally, changes in practices with the advancement of the pandemic, opportunities and future perspectives of BMW management were also identified.

Method:

This qualitative study using in-depth interviews (IDI) was conducted in a tertiary care institute in Mumbai, Maharashtra, India from August to November 2021. The ethical approval was obtained from the Institutional ethics committee [EC/OA-49/2021]. Class IV workers who were employed in the institute for at least the past two years were included. Workers who were not posted in any COVID-19-related setting were excluded from the study. To identify the challenges in different avenues healthcare providers working in the outpatient department including fever screening, inpatient department, isolation ward, intensive care unit, laboratory etc. where BMW is generated were purposively selected. Data saturation was achieved after 17 interviews. All interviews were conducted by a senior researcher with a post graduate degree in public health [Author 1(A1)]. One among the other authors [A2, A3, A4] took running notes during the interviews. The room was closed for privacy. There

was no interference faced during any of the interviews. Confidentiality and anonymity were assured to each participant. Written informed consent was taken from each participant. Interviews were audio recorded after collecting baseline data. No incentives were provided to any participant. Each interview lasted for a period of about 30-40 minutes. For better comprehension the interviews were conducted in the language comfortable to the study participants (Marathi/Hindi). The transcripts were prepared in Hindi/Marathi based on the notes of the IDI and audiotapes. They were then translated to English. Thematic analysis of the transcripts was done. It was coded using the Microsoft word comment feature. Two investigators (A1 and A3) were involved in coding. Individual coding was done by A3 and agreement coding was done by A1. A predominant deductive approach was used to code the IDI transcripts. Both de novo and in vivo types of codes were used. Relationships between codes were identified. Themes and categories were drawn from it.

Results:

A total of 17 in-depth interviews were conducted. The baseline characteristics are shown in table 1. Mean age of participants and mean years of work experience in the institute were 34.67 ± 6.65 years and 8.92 ± 7.88 years respectively, with male to female ratio 1: 0.41. All of them took COVID-19 vaccination whereas Hepatitis-B vaccination was taken by only 58.3% of study participants. Thematic analysis of the transcripts led to the development of three major themes.

Theme 1: Challenges and concerns faced by BMW handlers

The pandemic came with many uncertainties leading to concerns and challenges at the workplace. Availability and procurement of PPE did not feel difficult for the participants. As the pandemic progressed the risk perception of the disease decreased over time, which in turn led to a fall in PPE utilization by the HCWs. Occasionally good quality PPE as well as well fitting PPE would be difficult to

obtain. Wearing PPE for long durations caused physical exhaustion and dehydration due to sweating. A participant (PID 5) narrated this as "PPE was easy to get, but sometimes only smaller sizes were available. They get torn while I use...". Pandemic also affected their mental well being. One such situation came out during the interview when a participant (PID 7) himself narrated "A few neighbours told me not to come home. Some didn't say, but they maintained distance...". The major categories under this theme are explained in Table 2.

Theme 2: Enablers/ Motivators

Certain factors helped the BMW handlers to continue working during the pandemic despite the challenges. Family support, encouragement and appreciation from colleagues and superiors were motivating factors to continue working during the pandemic. Monetary and non monetary incentives were provided during the pandemic. Such measures included provision of free and timely transport, food packets, COVID allowance and acknowledgement certificates. Participant PID 15 said "...We are like a family here, nurses and us. Bus was also arranged when local trains stopped running..." Availability of PPE at all times provided a sense of security.

For handling and transporting of dead bodies of positive patients body bags were readily available, as reported by participant PID 4 "... PPE was for our protection. Even for transferring COVID dead bodies we always got bags." The major categories under this theme are explained in Table 3.

Theme 3: Opportunities and future practices

All the healthcare workers who participated in this study were willing to work with the same vigour given a similar untoward situation in the future. However, few lacunae and suggestions emerged from the IDIs. Many participants did not feel the need to attend training provided in BMW management as they were familiar with it. An induction training in BMW though mandatory, was not attended by all, as reported by PID 1, training was there, but I know everything, so did not attend...". Occasional incidences of bags tearing during handling and

transport caused additional discomfort to the participants. Participant PID 16 explained her method to prevent this: "... I routinely use double bags to prevent tear..." The major categories under this theme are explained in Table 4.

Discussion:

Management of BMW during the COVID-19 pandemic has been an unprecedented challenge worldwide. Due to the infectious nature of the pathogen, waste handlers were at a higher risk of contracting and spreading the virus as well as improper waste management could result in the catastrophic spread of the virus.^[9] IDIs of HCWs were conducted who were handling BMW in a tertiary care hospital in Mumbai to reveal these challenges. Some of the challenges reported were shortage of manpower during the early stages of the pandemic, improper-sized PPE, physical exhaustion due to prolonged PPE usage, stigma from neighbours, and fear of infecting family members. Other studies among BMW handlers revealed challenges such as inadequate training, poor knowledge regarding colour coding and needle stick injuries.^[10]

A key step in COVID-19 waste management is the segregation of BMW from solid waste.^[11] Among the several stages involved in BMW management, segregation of the waste was reported as the most challenging step by a majority of our study participants. Difficulty in the collection, as well as transport of the collected waste, was also reported by some study participants. According to a study conducted by Ojha B et al,^[12] proper segregation, handling, and disposal remained a serious concern for health care facilities across India during the pandemic and before it as well.

Family support, incentives and a positive public attitude towards work can go a long way to motivate people working in difficult jobs such as handling infectious waste during a pandemic. Amidst the numerous challenges the pandemic presented, certain factors encouraged our study participants to continue their work such as support from family members, friends and acquaintances, monetary and

Table 1: Baseline characteristics of the study participants

Participant characteristics	Descriptive Statistics
Age (years)	34.67 ± 6.65 (27-51)
Years of experience	8.92 ± 7.88 years (2-30)
Male: Female	1: 0.41
Duty hours during pandemic (hours/day)	7.83 ± 0.58 (6-8)
Hepatitis B vaccination	58.33%
COVID-19 vaccination	100%
COVID-19 infection	1 (5.9%)

Table 2: Categories and description under Theme 1: Challenges and concerns faced by BMW handlers

Categories	Description	Verbatim
Manpower	At the beginning of the pandemic, due to uncertainty, there was a shortage of BMW handlers as people went on unprecedented leaves. Many resumed duties after reassurance from peers and official notice to resume work.	"a lot of people ran away initially..."[Participants ID (PID) 2, 28 years (Y) / male(M), 4 years of work experience (YWE)]
PPE	PPE was available most of the time. Procurement was also not a challenge. However, with decreased risk perception, usage was not as much as in the initial days. The procurement of additional PPE on the same day was difficult due to inventory. Sometimes PPE was of inferior quality or wrong size.	"PPE was easy to get, but sometimes only smaller sizes were available. They get torn while I use..."(PID 5, 38Y/M, 10YWE)
Physical Health	Wearing PPE caused sweating, exhaustion and N-95 masks caused breathlessness.	" I sweat profusely, got exhausted and felt breathlessness after wearing N 9 5 for long duration..."(PID 12, 30Y/M, 6YWE)
Mental Health	They faced stigma from neighbours and rarely from superiors at work too. Fear of infecting family members was present.	"A few neighbours told me not to come home. Some didn't say, but they maintained distance..." (PID 7, 33Y/M, 12 YWE)
BMW Segregation and Transportation	Of the whole process involved in waste handling, segregation was most challenging as HCWs when overburdened with more patients, put the waste in the wrong colour-coded bags. Sometimes bags tore during transportation.	"Other staff in ward misplace waste in the wrong bag, very difficult to rearrange..."(PID 11, 51/F, 30 YWE)

non-monetary incentives and appreciation and comradery from doctors, nurses and colleagues.

During the IDIs all the HCWs expressed complete willingness to work with the same diligence in any such untoward future health

emergencies, albeit a few suggestions also emerged. An induction training mandatory for all was conducted in the early stages of the pandemic but was not attended by all. Similar studies revealed that impetus should be on regular and compulsory

Table 3: Categories and description under Theme 2: Enablers/ Motivators

Categories	Description	Verbatim
Support and appreciation	Support and appreciation from family, colleagues and superiors were motivating factors for almost all waste handlers.	“Family support and encouragement helped me work in these times...” (PID 6, 31 Y/M, 7YWE)
Incentive	Monetary incentives in the form of Rs. 300/- per day COVID allowance, paid isolation and quarantine leaves were given to all HCWs. Non-monetary incentives like free food packets at work, a 'COVID warrior' certificate, and separate buses to enable transportation during the lockdown and separate accommodation during COVID duties were also provided.	“...We are like a family here, nurses and us. Bus was also arranged when local trains stopped running...” (PID 15, 37Y/ M 10YWE)
PPE availability	PPE was available most of the time which gave a sense of security. Procurement was difficult, rarely. Body bags for dead bodies of positive patients were also readily available.	“... PPE was for our protection. Even for transferring COVID dead bodies we always got bags.(PID 4, 27 Y/M, 3 YWE)”

Table 4: Categories and description under Theme 3: Opportunities and future practices

Categories	Description	Verbatim
Training	There was no felt need for training among participants but, as a new type of waste may be generated with new diseases, it is necessary to undergo training. An induction training mandatory was conducted but, not attended by all.	“Training was there, but I know everything, so did not attend...” (PID 1, 39 Y/M, 17YWE)
Double layer bags/ better quality waste bags	Incidences of torn bags were reported which led to spillage of waste and an increase in workload. Therefore, better quality bags can be provided and double-layered bags can be used till then.	“I routinely use double bags to prevent tear...” (PID 16 33/F, 10 YWE)
Employee redressal	Some HCWs felt there was discrimination between permanent and contractual employees. This can be well managed by a redressal committee. Few HCWs also hope to get a permanent job, post working in the pandemic.	“Convert temporary jobs to permanent jobs as a token for working in COVID...” (PID 8, 30/F, 3YWE)

training for HCWs in handling BMW.^[13] Incidences of coded bags tearing while handling / transporting BMW were reported, hence double / better quality bags could be provided. Few participants expressed their discontent to have to continue as temporary employees after working in such demanding circumstances. They also felt discrimination between permanent and temporary employees. Some aspire to get a permanent job as a token for working in the

pandemic. Setting up an employee redressal committee at institutional levels could help tackle such grievances. In a qualitative study conducted in a rural tertiary care institute in India, the participants suggested organizational changes, training and monitoring to address the gap in knowledge and practice of waste management.^[14]

Waste management is critical to human development and health outcomes. Its significance

rose further during the COVID-19 pandemic. The invaluable service provided by the waste management sector ensures that the unusual heaps of waste that pose health risks and escalate the spread of COVID-19 are avoided. Hence, their needs and challenges need to be explored further. With proper training, appropriate equipment, destigmatization, encouragement and multi disciplinary coordination, many of these challenges can be overcome and safe and effective BMW management be ensured.

Conclusion:

This study has important implications regarding policy making and implementation of BMW management rules and strict adherence to it especially during outbreaks of infectious diseases. Compulsory periodical training in BMW management is necessary along with availability of appropriate good quality equipment and provisions for employee redressal. Analytical studies to study the effectiveness of the BMW management training could be done. This study provides an insight into the challenges faced by waste handlers such as shortage of manpower during the early stages of a pandemic, improper-sized PPE, physical exhaustion and fear of infecting family members. Challenges pertaining towards segregation of waste as well as stigma faced by the waste handlers during the pandemic were reported in the study. The waste management sector is one of the most stigmatized and underappreciated jobs in healthcare. Skill development, targeted training and grievance redressal for waste handlers could improve compliance with guidelines and thereby reducing transmission of diseases and environmental spread of hazardous material from Bio-medical waste.

Declaration:

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