Cover Page

DOI: http://ijmer.in.doi./2022/11.08.115

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :7.816(2022); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:11, ISSUE:8(6), August: 2022
Online Copy of Article Publication Available (2022 Issues): www.ijmer.in
Digital Certificate of Publication: http://ijmer.in/pdf/e-Certificate%20of%20Publication-IJMER.pdf
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd August 2022
Publication Date:10th September 2022
Publisher: Sucharitha Publication, India

# ASSESSMENT OF HEALTH WORKERS' KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING BIOMEDICAL WASTE DISPOSAL DURING THE COVID-19 PANDEMIC IN JHANSI CITY OF U.P

**Robin Joseph**
Principal
Kamla Modern Nursing Institute
Jhansi, Uttar Pradesh, India

**Abstract**

**Purpose –** The objective of this paper is find out the assess the knowledge, practice, attitude, factors of affecting and challenges on BMW management in Health Care Workers (HCWs) when taking care of patients with COVID-19 in hospital of Jhansi City U.P.

**Design/methodology/approach–** This examine become performed amongst 363 HCWs, actively involved in being caring of COVID-19 patients in healthcare system of Jhansi city, up. Data have been amassed via way of means of on-line questionnaire (via Google Forms) and an observational tick list after choice standards and having consent. The Questionnaire blanketed in socio demographic information, know-how associated with knowledge, attitude and practice of BMW management, observational questionnaire assessing the exercise of HCWs on BMW control and score scale associated with attitudes toward BMW control.

**Findings**–Out of 363 health personnel respondents, 58(15.9%) doctors, 121(33.33%) nurse, 52(14.32%) pharmacist, 23(6.33%) lab technician, 49(13.49%) medical internee and were 60(16.52%) nursing internee. Among HCWs 189 (52.71%) had excellent knowledge, 125 (34.49%) had Average knowledge and 46(12.8%) had poor knowledge.204 (56.19%) respondents consistently adhered to infection control guidelines when treating COVID-19 patients. Most of the HCWs sometimes used her PPE while 97(26.72%) handling the BMW.

**Research scope limitations/implications-** The scope of study cover the working Health Care Workers including doctors, nurses, pharmacists, internees, laboratory technicians including ICU technicians etc. who were aged 20 years and above, both males and females, worked at government or private healthcare sectors with a minimum 6 months professional experience and cared for COVID-19 patients, were included as study participants.

**Sampling and selection-** 5 government and 15 private hospitals in Jhansi city were selected for the study on the basis of maximum biomedical waste generation from March to July 2022.

**Practical implications –** This framework will effectively guide the healthcare waste management comprises the waste generated by healthcare facilities, medical laboratories and biomedical research facilities.

**Social implications–** A best waste management and strategies provides safety for health workers, patients, and community.

**Originality/value–** It also provides useful insights into healthcare solid waste management scenarios during the COVID-19 pandemic and a possible way forward. In addition, this article also assesses the possible solutions to deal with this waste in the rapidly evolving situation of the COVID-19 pandemic.

**Keywords:** Healthcare waste management (HWM), Health Care Workers (HCWs), COVID-19, SARS-CoV-2, Novel corona, healthcare /Bio-medical waste (BMW), Personal protective equipment (PPE).

## Introduction

Good fitness relies upon in component on a secure environment. Practices or strategies that manipulate or save you transmission of contamination assist to defend customers and fitness care people from disorder. Healthcare waste incorporates the waste generated through healthcare facilities, clinical laboratories and biomedical studies facilities. Improper remedy of this waste poses extreme dangers of disorder transmission to fitness people, patients, and the network in standard via publicity to infectious marketers. Poor control of the waste emits dangerous and deleterious contaminants into society.

However, infection of exceptionally contagious marketers together with the COVID-19 virus has created massive instability in healthcare waste managing and next recycling due to the quantity of the waste generated and its contagious nature. Several nations have followed protection measures to fight this infection and control healthcare waste; however, those measures are inadequate and range relying at the context of the country. Bio Medical Waste (BMW) consists of all of the wastes from any clinical technique in healthcare facilities, studies centers, and laboratories for the duration of diagnosis, remedy, immunization of people and animals, and manufacturing or checking out of organic materials (WHO & IRIS, 2017). The World Health Organization (WHO) declared COVID 19 because the 6th public fitness emergency of global concern. The outbreak of COVID 19 has engendered international fitness disaster alongside various influences on economy, society and environment. This pandemic has additionally substantially shot up the amount of BMW technology and has been regularly developing a primary challenge. (Rao et al., 2020)

Cover Page

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :7.816(2022); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:11, ISSUE:8(6), August: 2022
Online Copy of Article Publication Available (2022 Issues): www.ijmer.in
Digital Certificate of Publication: http://ijmer.in/pdf/e-Certificate%20of%20Publication-IJMER.pdf
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd August 2022
Publication Date:10th September 2022
Publisher: Sucharitha Publication, India

DOI: http://ijmer.in.doi./2022/11.08.115

**Background of COVID-19**

The outbreak of corona virus disease 2019 (COVID-19) has arisen from the SARS-CoV-2 virus, which reasons an acute breathing sickness; it became first said in Wuhan, China in December 2019(Mol and Caldas, 2020). It has been recounted as a Public Health Emergency of International Concern (PHEIC), and the virus has unfolded to nearly all nations throughout the globe. The pandemic is still extensive public fitness risk worldwide. Thus, the technology of healthcare stable waste has swiftly increased. Additionally, the growth in the quantity of private protecting equipment (PPE) used for the duration of the COVID-19 pandemic, in comparison to regular circumstances, has similarly contributed in the direction of the growth in healthcare stable waste (Haji et al., 2020). Thus, it has end up essential to growth the coping with ability for healthcare waste, due to the fact that incorrect control of the waste may also purpose similarly unfold of the virus.

The entire world in, at the least 5.4 million people, consisting of 4.8 million children, die every 12 months from illnesses originating from unmanaged clinical waste. Considering the worldwide transmission of COVID-19, immoderate biomedical waste has end up a brand-new main risk to public fitness in addition to the surroundings for the duration of this pandemic. The stable waste (i.e. sharps, PPE, and pathological waste) generated through COVID-19 high quality sufferers and the medical doctors and nurses who deal with them must be taken into consideration infectious waste. Techniques inclusive of the use of disinfectant and storing the waste for 9 days had been hired with the intention to disinfect waste (Ilyas et al., 2020; ISWA-Lebanon, 2020); this may lessen the hazard of similarly contamination from COVID-19.

**Literature review**

**Dalui, Banerjee and Roy (2022)** this study was conducted to assess the knowledge, practices, attitudes, and knowledge of BMW management of health care workers (HCWs) caring for patients with COVID-19. 166 HCPs (43.2%) had good knowledge, with an overall mean of 13.5 ± 3.6. Higher mean values (14.4 ± 3.2) were achieved by physicians, followed by nurses (13.6 ± 3.8). In practice, the majority of healthcare workers (52.8%) followed BMW's color coding and 49.5% followed guidelines for waste hazard separation. Doctors (91%) and nurses (81%) were categorized by level of knowledge and education (P = 0.0001), gender (P = 0.001), work experience (P = 0.05), and work area (P = 0.05) it was done. Focus should be placed on raising awareness and training all healthcare workers on proper management of BMWs during this pandemic to prevent transmission of infection.

**Shekoohiyan, Parsaee and Ghayour (2022)** this study aimed to discover the expertise, attitude, and exercise approximately BMW a number of the healthcare personnel of Fasa instructional hospitals using the COVID-19 pandemic. T-check, ANOVA, and Pearson correlation coefficient have been used to check the relationships among and a number of the variables. Their imply ratings of expertise, attitude, and exercise have been 38.8±6.1, 83.0±8.8, and 47.five±14.five, respectively. These values factor to a pleasant stage of every variable when it comes to BMW control. Pearson's correlation coefficient check confirmed a sturdy effective affiliation among expertise and exercise (r = 0.725). ANOVA effects confirmed statistically great divergences in expertise, attitude, and exercise throughout the demographic variables, along with education, position, and employment type (p < 0.05). Also found out that inappropriate waste plans for COVID-19 waste management, BMW training courses should be held continuously and regularly.

**Bansal et al., (2021)** Awareness of biomedical waste management was highest among physicians, followed by healthcare workers and lowest among non-medical staff. Waste management practices in hospitals are largely inadequate, especially in rural areas. This study concludes that regular orientation and reorientation training programs for hospital staff and strict enforcement of biomedical waste management guidelines should be instituted, to protect themselves and others.

**Vinit et al.,(2015)** conducted this study to explore that Across the country, unseparated and untreated biomedical waste is indiscriminately disposed of in municipal containers, landfills, roadsides and bodies of water, or incompletely and improperly incinerated in the open air. In the present study also observe that, biomedical waste was collected from various public and private hospitals in Jhansi city. After collection, various methods for safely disposing of this waste are tested and found suitable for biomedical waste disposal.

**Healthcare waste**

Waste from hospital, research centers, and laboratories related to medical procedures is considered medical waste. Approximately 75-90% of solid medical waste resembles household waste and is therefore classified as 'non-hazardous' or 'general medical waste'. In reality, this waste comes from medical and healthcare facility management, kitchen, and housekeeping functions. The remaining 10-25% of waste is classified as "hazardous waste" which poses serious environmental and health risks. (Yves Chartier et al., 2014). The WHO reports that about 85% of hospital waste is actually harmless, 10% is infectious, and the remaining 5% is non-infectious, but contains hazardous (chemical), pharmaceutical and radioactive Substance waste.

Cover Page

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :7.816(2022); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:11, ISSUE:8(6), August: 2022
Online Copy of Article Publication Available (2022 Issues): www.ijmer.in
Digital Certificate of Publication: http://ijmer.in/pdf/e-Certificate%20of%20Publication-IJMER.pdf
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd August 2022
Publication Date:10th September 2022
Publisher: Sucharitha Publication, India

DOI: http://ijmer.in.doi./2022/11.08.115

**Persistence rate of COVID-19 virus and potential for transmission via medical solid waste**

In reaction to the COVID 19 pandemic in India, the Central Pollution Control Board, Ministry of Environment, Forest and Climate has posted hints for the control of waste generated throughout treatment and quarantine of COVID 19 patients. These hints have recommended use of double layered luggage, obligatory labeling of luggage and packing containers as "COVID 19 waste," everyday disinfection of devoted trolleys, separate report retaining of waste generated from COVID 19 isolation wards, further to the advice for following current practices of BMW Management Rules, 2016. As the virus has the capacity to live on face mask and gloves (NCDC, 2020).

Transmission of the COVID-19 virus occurs through sneezing, coughing, touching objects and physical contact (ISWA-Netherlands, 2020). Information on the survival time of the COVID-19 virus on various substrates is of great importance for formulating appropriate management practices and measures for processing solid medical waste. SARS-CoV-2 has a survival time of hours to days, depending on the type of substrate and environmental conditions. COVID-19 virus survival times after aerosolization on copper, cardboard, plastic, and stainless steel are 3, 4, 24, and 2–3 days, respectively (van doremalen et al., 2020). Other researchers have reported that the virus can survive up to 9 days on inanimate surfaces such as metal, glass, and plastic (Kampf et al., 2020). Good enough information and right strategies of dealing with those infected wastes and exercise of secure disposal can guard the network from contamination throughout this pandemic.

**5. Collection and disposal of biomedical wastes by CPC Jhansi**

CPC collects waste from a registered biomedical waste disposal center in Jhansi with 10 vehicles daily. All vehicles are well covered and well marked with biomedical hazard symbols. All of these vehicles collect waste and transport it to a biomedical waste disposal center. After sorting, combustible waste is incinerated in an incinerator, and non-combustible waste is processed by autoclave sterilization, chemical treatment, and deep burial. Container garbage is also treated as red classification garbage. Here the waste he falls into three categories:

1. Yellow category waste (combustible)
2. Red category waste (non incinerable)
3. Container waste (sharp, scissor, PPE, test kit and scalpel etc.)

**Table 1. Biomedical waste generation by government hospitals**

| S.No. | Hospitals Name | No. of Bed | Biomedical Generation (kg/bed/day) | Waste Rate | Total Waste Generated (kg/day) |
|---|---|---|---|---|---|
| 1 | M.L. B. Medical College | 666 | 0.52 | | 346.32 |
| 2 | Railway Hospital | 205 | 0.50 | | 102.5 |
| 3 | District Hospital | 156 | 0.50 | | 78 |
| 4 | BHEL Hospital | 30 | 0.32 | | 9.6 |
| 5 | District Hospital-Female | 47 | 0.45 | | 21.15 |

**(Source-** https://bundelkhand.in/jhansi-district-government-hospitals-list**)**

**Table 2. Biomedical waste generation by private hospitals**

| S.No. | Hospitals Name | No. of Bed | Biomedical Generation (kg/bed/day) | Waste Rate | Total Waste Generated (kg/day) |
|---|---|---|---|---|---|
| 1 | Germany Hospital | 200 | 0.50 | | 100 |
| 2 | Nirmal Hospital | 100 | 0.45 | | 45 |
| 3 | Rama Hospital | 60 | 0.35 | | 21 |
| 4 | Savitri nursing home | 60 | 0.42 | | 25.2 |
| 5 | Dr. Jialal Memorial Hospital | 50 | 0.31 | | 15.5 |
| 6 | Chitransh nursing home | 50 | 0.32 | | 16 |
| 7 | Shankar Multi Special Hospital | 50 | 0.32 | | 16 |
| 8 | Sudha Nursing Home | 50 | 0.30 | | 15 |
| 9 | Kailash Chandra Jain Hospital | 50 | 0.31 | | 15.5 |
| 10 | Ramsevak Knkne Hospital | 45 | 0.29 | | 13.05 |
| 11 | Raghavendra Hospital | 40 | 0.32 | | 12.8 |

Cover Page

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :7.816(2022); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:11, ISSUE:8(6), August: 2022
Online Copy of Article Publication Available (2022 Issues): www.ijmer.in
Digital Certificate of Publication: http://ijmer.in/pdf/e-Certificate%20of%20Publication-IJMER.pdf
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd August 2022
Publication Date:10th September 2022
Publisher: Sucharitha Publication, India

DOI: http://ijmer.in.doi./2022/11.08.115

| | | | | |
|---|---|---|---|---|
| 12 | Sparsh Children's Hospital and Research Center | 35 | 0.26 | 9.1 |
| 13 | Naja Hospital and Research Center | 30 | 0.21 | 6.3 |
| 14 | Dhanvantari Hospital | 30 | 0.26 | 7.8 |
| 15 | Kapoor Hospital and nursing home | 30 | 0.28 | 8.4 |

**(Source-** https://bundelkhand.in/jhansi-district-private-hospitals-nursing-homes-list**)**
(Calculation of Biomedical waste (BMW) produced by hospitals per day was calculated by following formula: Weight of BMW produced by hospitals/ day = No. of beds × weight of biomedical waste Kg.)

Depending on the number of beds, hospitals pay CPC monthly or annually. The study was conducted considering his 5 government hospitals and 15 private hospitals in Jhansi City. Tables 1 and 2 show the biomedical waste generation rate and total amount of each hospital, and the biomedical waste generation rate of government hospitals(557.57kg) is much higher and ultimately higher than that of private hospitals(326.35kg). The plants and machineries used for biomedical waste treatment include incinerator, mechanical shredder/grinder and autoclave. Segregation of biomedical waste is also done at the treatment center. Collection of waste is done from those hospitals, nursing homes, diagnostic centers, pathological laboratories which are the registered members of CPC. Biomedical Waste Treatment Center by Jhansi CPC provides necessary treatment to the biomedical waste generated from several health care units to reduce the adverse effects. The treated waste is then landed or recycled.

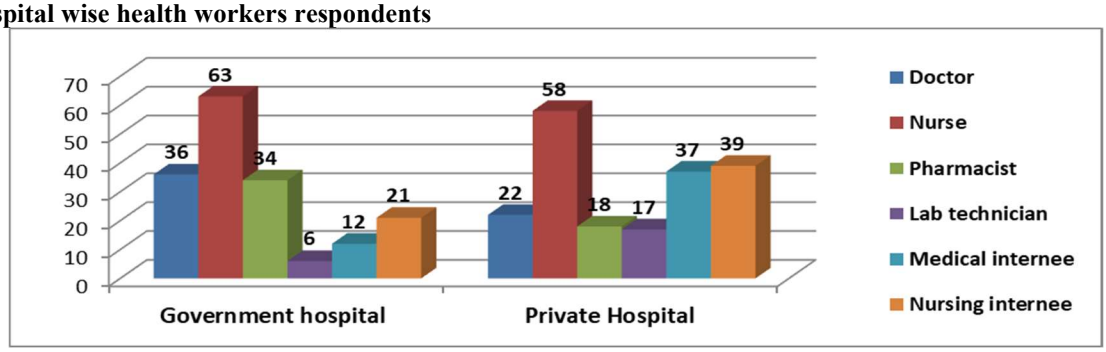
**Analysis and Interpretation of data**

**Table 1.3 - Hospital wise Questionnaire Responses**

The data analysis of table 1.3 depicts designation of health worker respondents that out of 363 respondents, Government and Private Hospitals in same majority of nurse were 63(52.06%) and 58(47.93%) respectively. The analysis also revealed that health care professional of 172(47.10%) Government Hospitals and 191(52.61%) Private Hospitals respectively participated in the study

| Health care Respondents | Government Hospitals (5) | Private Hospitals (15) | Total |
|---|---|---|---|
| Doctor | 36(62.06%) | 22(37.93) | 58 |
| Nurse | 63(52.06%) | 58(47.93%) | 121 |
| Pharmacist | 34(65.38%) | 18(34.61%) | 52 |
| Lab technician | 6(26.08%) | 17(73.91%) | 23 |
| Medical internee | 12(24.48%) | 37(75.51%) | 49 |
| Nursing internee | 21(35%) | 39(65%) | 60 |
| | **172(47.10%)** | **191(52.61%)** | **363** |

**Figure 1.1 Hospital wise health workers respondents**

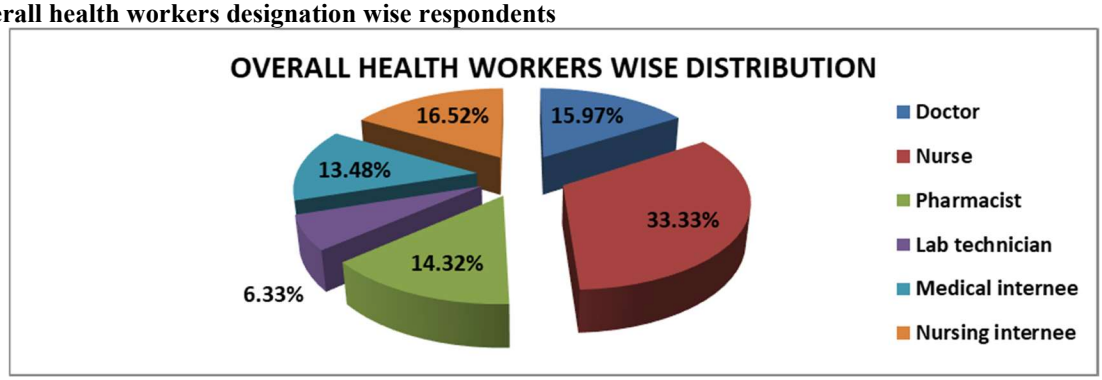


Cover Page

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :7.816(2022); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:11, ISSUE:8(6), August: 2022
Online Copy of Article Publication Available (2022 Issues): www.ijmer.in
Digital Certificate of Publication: http://ijmer.in/pdf/e-Certificate%20of%20Publication-IJMER.pdf
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd August 2022
Publication Date:10th September 2022
Publisher: Sucharitha Publication, India

DOI: http://ijmer.in.doi./2022/11.08.115

**Figure 1.2 Overall health workers designation wise respondents**




Above Figure show that a total of 20 hospitals were selected, of which 5 were from government sector and 15 were from private sector of Jhansi city in UP. Out of 363 health personnel respondents, 58(15.9%) doctors, 121(33.33%) nurse, 52(14.32%) pharmacist, 23(6.33%) lab technician, 49(13.49%) medical internee and were 60(16.52%) nursing internee.

**Table 1.4: Knowledge of healthcare workers about bio-medical waste management level (n=363)**

| Health care Respondents | Excellent | Average | Poor | Total |
|---|---|---|---|---|
| **Doctor** | 37(63.79%) | 12(20.68%) | 9(15.51%) | 58(100%) |
| **Nurse** | 59(48.76%) | 47(38.84%) | 15(12.39% | 121(100%) |
| **Pharmacist** | 28(53.84%) | 17(32.69%) | 7(13.46%) | 52(100%) |
| **Lab technician** | 13(56.52%) | 7(30.434%) | 3(13.04%) | 23(100%) |
| **Medical internee** | 23(46.93%) | 19(38.77%) | 7(14.28%) | 49(100%) |
| **Nursing internee** | 29(48.33%) | 23(38.33%) | 8(13.33%) | 60(100%) |
| | 189(52.71%) | 125(34.49%) | 46(12.8%) | 363(100%) |

Table 1.4 shows the Knowledge of bio-medical waste management level of health care worker. The analysis reveals that majority of the health care workers shows their waste management level is excellent but label of poor in lab technician. Among the HCWs 189 (52.71%) had excellent knowledge, 125 (34.49%) had Average knowledge and 46(12.8%) had poor knowledge.

**Table 1.5: Practice of healthcare workers about bio-medical waste management (n=363)**

| Practice on BMW management | Always, n (%) | Sometimes, n (%) | Never, n (%) |
|---|---|---|---|
| Does she/he follow Ministry of Health guidelines for the management of BMW? | 229(63.08%) | 98(26.99%) | 36(9.19%) |
| Does she/he comply with infection control policies when dealing with COVID-19 patients? | 204(56.19%) | 114(31.40%) | 45(12.39%) |
| Does she/he wear PPE when handling biomedical waste? | 110(30.30%) | 156(42.97%) | 97(26.72%) |
| Do you dispose of all personal protective equipment after handling biomedical waste? | 105(28.92%) | 171(47.10%) | 87(23.96%) |
| Do you perform proper hand hygiene frequently before and after each procedure? | 215(59.22%) | 113(31.12%) | 35(9.64%) |
| When disposing of a BMW, do you follow the color coding of the containers according to the type of waste? | 207(57.02%) | 123(33.88%) | 33(9.09%) |
| Do you follow the guidelines for sorting the BMW into harmless waste, hazardous waste and sharps waste? | 187(51.51%) | 143(39.39%) | 33(9.09%) |
| Does she/he maintain BMW records? | 182(50.13%) | 153(42.14%) | 28(7.71%) |
| Does she/he take care to avoid sharp injuries such as Re- used needles? | 218(60.05%) | 111(30.57%) | 34(9.63%) |
| Are you preventing contamination when handling the COVID-19 patient and other belongings of her non-COVID-19 patient? | 204(56.19%) | 129(35.53%) | 30(8.26%) |

Cover Page

DOI: http://ijmer.in.doi./2022/11.08.115

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :7.816(2022); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:11, ISSUE:8(6), August: 2022
Online Copy of Article Publication Available (2022 Issues): www.ijmer.in
Digital Certificate of Publication: http://ijmer.in/pdf/e-Certificate%20of%20Publication-IJMER.pdf
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd August 2022
Publication Date:10th September 2022
Publisher: Sucharitha Publication, India

Above Table 1.5 shows that HCW practice patterns in BMW management. Most healthcare workers (229, 63.8%) consistently followed BMW management guidelines set by the Ministry of Health and Family Welfare and the Ministry of Environment, Forests and Climate Change. 204 study participants (56.19%) consistently adhered to infection control guidelines when treating COVID-19 patients. Most of the HCWs sometimes used her PPE while handling the BMW (97,26.72%) and sometimes discarded all his PPE while handling the BMW (215, 59.22%). 207 (52.02%) health care workers followed the color coding of bins by waste type when disposing of BMWs, and 187 (51.51%) followed the color coding of bins for separating waste into non-hazardous and hazardous waste. In connection with avoiding injuries related to sharps/pointed objects. For example, 218 (60.05%) HCWs are always cautious, such as avoiding resealing used needles and 204(56.19%) HCWs are more cautious about COVID-19 patients and other non-COVID patients.

**Table 1.6: Attitudes of medical professionals towards handling biomedical waste (n=363)**

| Attitude questions | Strongly agree | Agree | Neutral | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| Safe disposal of BMW is required in healthcare | 264(72.72%) | 59(16.25%) | 27(7.4%) | 9(2.47%) | 4(1.1%) |
| Management at BMW is teamwork | 203(55.92%) | 79(21.76%) | 45(12.39%) | 27(7.43%) | 9(2.47%) |
| BMW management puts additional burden on daily operations | 46(12.67%) | 87(23.96%) | 143(39.39%) | 56(15.42%) | 31(8.53% |
| BMW management is risk for transmission of any infectious disease | 35(9.64%) | 67(18.45%) | 36(9.91%) | 152(41.87%) | 73(20.11%) |
| Separating hospital waste into different categories is time consuming | 177(48.76%) | 69(19%) | 56(15.42%) | 51(14.04%) | 10(2.75%) |
| PPE is mandatory when handling biomedical waste | 163(44.9%) | 123(33.87%) | 48(13.22%) | 22(6.06%) | 7(1.92%) |
| De contamination and disinfection reduce the infection | 177(48.76%) | 69(19%) | 56(15.42%) | 51(14.04%) | 10(2.75%) |
| Color code is required for garbage separation | 236(65.01%) | 47(12.94%) | 40(11.01%) | 32(8.81%) | 8(2.20%) |
| Good management at BMW improves quality assurance in healthcare | 145(39.94%) | 119(32.78%) | 53(14.6%) | 29(7.98%) | 17(4.68%) |
| Expanding your BMW management knowledge is a must | 168(46.28%) | 89(24.51%) | 63(17.35%) | 31(8.53%) | 13(3.58%) |

The above table revel that as a result, 264 people (72.72%) had a positive attitude towards BMW management and 99 people (27.28%) had a negative attitude. Among them, most doctors (91%) and nurses (81%) had a more positive attitude than others. As shown in Table 1.6, 264(72.72%) healthcare workers clearly agreed that safe disposal of BMWs is medically necessary. His 203(55.92%) of healthcare workers strongly agreed that managing BMW requires teamwork. However, only 31(8.53%) denied the opinion that BMW management is an additional burden of work. A majority of survey participants 152(41.87%) denied that BMW management took the risk of transmitting the disease. However, 10 people (2.75%) did not completely agree that segregating hospital waste into different categories takes time. 163 (44.29%) HCWs strongly believed that he should use PPE when handling BMW and 177(48.76%) strongly believed that decontamination and disinfection reduced infections. Nearly half 168(46.28%) of the survey participants felt it was essential to expand their knowledge of BMW management.

**Finding and discussion**

This study conducted by Mugabi et al. In a study at Hospital in Gaborone, Botswana, there was significant agreement among participants on proper segregation of medical waste at source, with an average score of 4.43 out of 5, and an average score of 4.43 out of 5 for the color-coding system. Scores ranged from 5 to 4.59. In this present study shows that knowledge of biomedical waste management level in health care workers. Analysis show that the majority of healthcare workers are not labeled as laboratory technicians, despite their excellent levels of waste management. HCWs, 189 (52.71%) had good skills, 125 (34.49%) had average skills and 46 (12.8%) had low skills. This result also mirrors similar results from previous studies (Jamal et al, 2021).

In the current study, most HCWs (78.9%) consistently followed the Ministry of Health and Family BMW management policy, and 57.02% of participant's implemented color coding of bins by type of BMW waste (Pandey et al). It also showed that 90%

Cover Page

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :7.816(2022); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:11, ISSUE:8(6), August: 2022
Online Copy of Article Publication Available (2022 Issues): www.ijmer.in
Digital Certificate of Publication: http://ijmer.in/pdf/e-Certificate%20of%20Publication-IJMER.pdf
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd August 2022
Publication Date:10th September 2022
Publisher: Sucharitha Publication, India

DOI: http://ijmer.in.doi./2022/11.08.115

of healthcare workers had awareness about BMW isolation, but 30.5% did not practice it. Another study by Palida et al. In fact, 68% of healthcare workers know that waste separation is the most important step in waste management, and 82% of participants working in this setting agree that were aware of the different color-coded bins used (Palida et al,2018). However, in our have a look at, maximum of them continually used and discarded all non-public protecting gadget even as dealing with biomedical waste and 51.51% observed regulations in setting apart BMW into nonhazardous, hazardous and sharp waste.

In this study, 264 (72.72%) health workers had a positive attitude toward BMW management, and 99 (27.28%) had a negative attitude. Among them, most doctors (91%) and nurses (81%) had a more positive attitude than others. according to this study in India that found doctors (100%) to be more proactive about the need for safe biomedical waste disposal than nurses (60%) and other health care workers (Sachan et al,2012). Although not statistically significant (P = 0.639). Furthermore, the proportion of nurses (92.7%) is significantly higher than that of doctors (83.2%). and LTs (64.3%) agreed that managing BMW requires teamwork and that there is no single group responsible for it (P=0.024) (Balushi, 2018). However, in this survey, 72.72% of HCWs agreed that the safe disposal of BMWs is necessary in the medical field and 55.92% of HCWs strongly agreed that management of BMWs requires teamwork Agreed But only 31% of him categorically reject the idea that managing BMW is an additional burden on his job. Health workers adopt the best possible management approach based on their competencies, resources, and commitments (Singh et al., 2020).

**Suggestion**

- Health Care Workers (HCWs) who handle BMW should follow an adequate dress code, including wearing PPE, masks, splash proof apron, gloves, gum boots, and safety goggles (WHO, 2020b).
- A waste management team or committee should be formed in order to develop and implement a waste management plan.
- In low-income areas, there should be an infection control committee, with one person responsible for healthcare waste management in healthcare facilities.
- Proper healthcare waste management may help to increase the proportion of recyclable waste.
- Recyclable material can be increased by autoclaving, which may help to reduce the volume of landfill waste during the COVID-19 pandemic. This recycling strategy can reduce the cost of essential safety materials for healthcare during the pandemic.
- Use of disinfectant, such as sodium hypochlorite and alcohol, can inactivate the COVID-19 virus, which can survive for up to 9 days. Therefore, the use of disinfectants and 9-day storage of healthcare waste in an appropriate containment facility can reduce the spread of the virus among healthcare waste handling workers.
- Clearly there is a need for education as to the hazards associated with improper waste disposal.
- An effective communication strategy is imperative keeping in view the low awareness level among different category of staff in the health care establishments regarding biomedical waste management.
- A lesser amount of biomedical waste means a lesser burden on waste disposal work, cost-saving and a more efficient waste disposal system. Hence, health care providers should always try to reduce the waste generation in day-to-day work in the clinic or at the hospital.
- In response to the pandemic, healthcare waste management strategies should include several additional measures in order to ensure appropriate containment for avoiding infection.
- The waste needs to be collected, separated, and stored with special identification labels; it should then be treated, transported, and disposed of properly.
- Personal protection, disinfection, and training should be considered necessary for proper management of healthcare waste (UN, 2020). Waste from confirmed COVID-19 patients, i.e. infectious waste, sharps, and pathological waste should be collected with safety measures and kept in special bags with proper markings.

**Conclusion**

Safe and effective waste management is not only a legal requirement, but also a social responsibility. A good medical waste management system in a healthcare facility includes an assessment of the waste stream and existing environmental practices, an evaluation of waste management options, the development of a waste management plan and an organizational structure with clearly defined staff roles. Dissemination of waste management policies and guidelines is necessary. Responsibility with establishing a waste management organization, allocating human and financial resources, implementing plans, regular training, monitoring, evaluation and continuous improvement are also important for sustainable management of medical waste. Also, COVID-19 Effective waste management depends only on good medical waste management organization and strategies. Regular review of strategies is important and all staff involved in medical waste should be made aware of processes and regular changes (Bharsakade et al., 2021; Thakur, 2021).

Cover Page

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :7.816(2022); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:11, ISSUE:8(6), August: 2022
Online Copy of Article Publication Available (2022 Issues): www.ijmer.in
Digital Certificate of Publication: http://ijmer.in/pdf/e-Certificate%20of%20Publication-IJMER.pdf
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd August 2022
Publication Date:10th September 2022
Publisher: Sucharitha Publication, India

DOI: http://ijmer.in.doi./2022/11.08.115

**References**


- Balushi, A. A., Ullah, M. M., Makhamri, A. A., & Alawi, F. S. (2018). Knowledge, Attitude and Practice of Biomedical Waste Management among Health Care Personnel in a Secondary Care Hospital of Al Buraimi Governorate, Sultanate of Oman. Global Journal of Health Science , 10 (3), 70-82.
- Bansal, M., Mishra, A., Gautam, P., Changulani, R., Srivastava, D., & Gour, N. s. (2021). Biomedical waste management: awareness and practices in a district of Madhya Pradesh. National Journal of Community Medicine , 2 (3), 452-456.
- Bharsakade, R. S., Acharya, P., Ganapathy, L., & Tiwari, M. K. (2021). A lean approach to healthcare management using multi criteria decision making. OPSEARCH , 58 (2), 610-635.
- Dalui, A., Banerjee, S., & Roy, R. (2022). Assessment of Knowledge, Attitude, and Practice about Biomedical Waste Management among Healthcare Workers during COVID-19 Pandemic in a Health District of West Bengal. Indian Journal of Public Health , 65 (4), 345-351.
- Haji, J. Y., Subramaniam, A., Kumar, P., Ramanathan, K., & Rajamani, A. (2020). State of Personal Protective Equipment Practice in Indian Intensive Care Units amidst COVID-19 Pandemic: A Nationwide Survey. Indian journal of critical caremanagment , 24 (9), 809–816.
- Ilyas, S., Srivastava, R. R., & Kim, H. (2020). Disinfection technology and strategies for COVID-19 hospital andbio-medical waste management. Science of the Total Environment , 749.
- ISWA-Netherlands,2020. Country Specific Waste Management Responses, COVID-19 Response International knowledge sharing on Waste Management, https://www.iswa.org/fileadmin/galleries/0001_COVID/Netherlands_Waste_Management_during_Covid19.pdf: https://www.iswa.org/iswa/covid-19/, 2020.
- Jalal, S. M., Akhter, F., Abdelhafez, A. I., & Alrajeh, A. M. (2021). Assessment of Knowledge, Practice and Attitude about Biomedical Waste Management among Healthcare Professionals during COVID-19 Crises in Al-Ahsa. Healthcare , 36 (7), 2-14.
- Kampf, G., Todt, D., Pfaender, S., & Steinmann, E. (2020). Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. Journal of Hospital Infection , 104 (3), 246-251.
- Kumar, V., Birtharey, S., Gupta, N., Yadav, K. K., & Vishwakarma, S. K. (2015). Study of Biomedical Waste Generation and Management by Government and Private Hospitals in Jhansi City(U.P.), India. JOURNAL OF PHARMACEUTICAL AND BIOMEDICAL SCIENCES , 5 (2), 122-125.
- Mol, M. P., & Caldas, S. (2020). Can the human coronavirus epidemic also spread through solid waste? Waste Managment & research : Journal for a sustianble Circular Economy , 38 (5), 485-486.
- Mugabi, B., Hattingh, S., & Chima, S. C. (2018). Assessing knowledge, attitudes and practices of healthcare workers regarding medical waste management at a tertiary hospital in Botswana: A cross-sectional quantitative study. Nigerian Journal of Clinical Practice , 21 (12), 1627-1638.
- NCDC. (2020, April 18). National Institute of Communicable Diseases (NICD). Retrieved from National Centre for Disease Control: https://ncdc.gov.in/showfile.php?lid=551
- Pandey, A., Ahuja, S., Madan, M., & Asthana, A. K. (2016). Bio-Medical Waste Managment in a Tertiary Care Hospital: An Overview. Journal of Clinical & Dignosis Research , 10 (11), 1-4.
- Parida, A., Capoor, M. R., & Bhowmik, K. T. (2019). Knowledge, attitude, and practices of Bio-medical Waste Management (principle) rules, 2016; Bio-medical WasteManagement (amendment) rules, 2018; and Solid Waste Rules, 2016, among health-care workers in a tertiary care setup. Journal of Laboratory Physicians , 11 (4), 292-299.
- Portal, B. R. (2020, May 16). List of Hospital in Jhansi city. Retrieved from Bundelkhand Research Portal: https://bundelkhand.in/jhansi-district-private-hospitals-nursing-homes-list)
- Rao, D., Dhakshaini, M. R., Kurthukoti, A., & Doddawad, V. G. (2020). Biomedical Waste Management: A Study on Assessment of Knowledge, Attitude and Practices Among Health Care Professionals in a Tertiary Care Teaching Hospital. Biomed and Pharmacology journal , 11 (3), 1737-1743.
- Sachan, R., Pate, M., & Nischal, A. (2012). Assessment of the knowledge, attitude and Practices regarding Biomedical Waste Management amongst the Medical and Paramedical Staff in Tertiary Health Care Centre. International Journal of Scientific and Research Publications , 2 (7), 1-6.
- Shekoohiyan, S., Parsace, F., & Ghajour, s. (2022, April 30). Assessment of knowledge, attitude and practice about biomedical wastemanagement among healthcare staff of Fasa educational hospitals in COVID-19 pandemic. Case Studies in Chemical and Environmental Engineering , 1-7.
- Singh, T., Ghimire, T. R., & Agrawal, S. (2018). Awareness of Biomedical Waste Management in Dental Students in Different Dental Colleges in Nepal. BioMed Research International , 32 (4), 1-6.


Cover Page

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY EDUCATIONAL RESEARCH
ISSN:2277-7881; IMPACT FACTOR :7.816(2022); IC VALUE:5.16; ISI VALUE:2.286
Peer Reviewed and Refereed Journal: VOLUME:11, ISSUE:8(6), August: 2022
Online Copy of Article Publication Available (2022 Issues): www.ijmer.in
Digital Certificate of Publication: http://ijmer.in/pdf/e-Certificate%20of%20Publication-IJMER.pdf
Scopus Review ID: A2B96D3ACF3FEA2A
Article Received: 2nd August 2022
Publication Date:10th September 2022
Publisher: Sucharitha Publication, India

DOI: http://ijmer.in.doi./2022/11.08.115


- Thakur, V. (2020). Framework for PESTEL dimensions of sustainable healthcare waste management: Learnings from COVID-19 outbreak. Journal of Cleaner Production , 287, 1-14.
- WHO, & IRIS. (2017). Report on health-care waste management (HCWM) status in Countries of the South-East Asia Region. Retrieved from Institutional Repository for Information Sharing: https://apps.who.int/iris/handle/10665/258761
- Yves Chartier, J.E., Pieper, Ute, Prüss, Annette, Rushbrook, Philip, Stringer, Ruth, Townend, William, Wilburn, Susan, Zghondi, Raki, 2014. Safe Management of Wastes from Health-care Activities. World Health Organization (WHO).
- Zhou, C., Yang, G., Ma, S., Liu, Y., & Zhao, Z. (2021). The impact of the COVID-19 pandemic on waste-to-energy and waste-to-material industry in China. Renewable and Sustainable Energy Reviews , 139, 1-7.