Biomedical Waste Management (BMWM) Rules, 2016 - A Short Overview

Pawar Namdev B.

Department of Botany, Mahatma Phule Arts, Science and Commerce College, Panvel, Navi Mumbai - 410206, Maharashtra, India

Received: 24th August, 2022; Accepted: 30th September, 2022; Published online: 11th October, 2022

https://doi.org/10.33745/ijzi.2022.v08i02.066

Abstract: Biomedical Waste Management (BMWM) Rules, 2016 have increased the coverage, simplified the categorization and authorization while improving the segregation, transportation and disposal methods to decrease environmental pollution. Effective implementation of BMWM 2016 Rules will decrease the environmental pollution and ensure the safety of the hospital staff, patients and general public. This review focuses on BMWM Rules, 2016 with respect to: (1) salient features; (2) schedules; (3) schedule II: Colour Coding and Type of Container for disposal of BMW; (4) schedule III: Label for BMW Containers/Bags; (5) schedule IV: Label for Transport of BMW Containers/Bags; and (6) schedule V: Standards for Treatment and Disposal of BMW.

Keywords: Biomedical Waste Management Rules 2016, Biomedical waste, Colour coding, Health hazard, Schedules, Treatment, Disposal


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Introduction

International agreements and convention such as Basel Convention on Hazardous Waste, Stockholm Convention on Persistent Organic Pollutants (POPs), and Minamata Convention on Mercury are pertinent in Biomedical Waste Management (BMWM), environment protection, and its sustainable development (Datta et al., 2018).

Basel Convention on Hazardous Waste is the most inclusive global environmental treaty on hazardous and other wastes. Its objectives are to protect human health and the environment against the adverse effects resulting from the generation, management, and disposal of hazardous wastes, specifically clinical wastes from health care in hospitals, health centers, and clinics (Secretariat of the Basel Convention, 2011).

In India, Ministry of Environment and Forests (MoEF), Government of India in 1998, published a notification entitled 'Biomedical Waste (Management and Handling) Rules, 1998 for sustainable management of biomedical waste (BMW) (MoEF, 1998). WHO (2004) documented that in India, BMW problem was compounded by the presence of scavengers who sort out open,
unprotected health-care waste with no gloves, masks, or shoes for recycling, and second, reuse of syringe without appropriate sterilization.

The BMW 1998 rules were further amended in the years: 2000, 2003, 2011, and in March 2016 by Ministry of Environment, Forest and Climate Change. New BMW 2016 rules have increased the coverage, simplified the categorization and authorization while improving the segregation, transportation and disposal methods to decrease environmental pollution. It has four schedule, five forms and eighteen rules. Under the new rules, coverage has increased to include various health-care related camps such as vaccination camps, blood donation camps, and surgical camps (Datta et al., 2018).

One of the biggest challenges the government hospitals and small health care facilities (HCFs) will face during the implementation of BMW 2016 rules will be due to the lack of funds. To phase out chlorinated plastic bags, gloves, blood bags and to establish a bar code system for bags/containers the cost will be high and time span for doing this i.e. two years is too short. Currently, in India, there are 198 Common Biomedical Waste Treatment and Disposal Facility (CBMWTF) in operation and 28 are under construction (BMWM Rules, 2016; Datta et al., 2018).

Therefore in the present study, an overview of BMWM Rules, 2016 with respect to: salient features, schedules, colour coding and type of container for disposal of BMW, label for BMW containers/bags, label for transport of BMW containers/bags and standards for treatment and disposal of BMW is considered.

**Definition of Biomedical waste:**
Biomedical waste (BMW) refers to all waste, biological or non-biological, that is discarded and not intended for further use (CDC, 2003; Odumosu, 2015). It is also referred to as hospital waste (Chandrappa and Das, 2012), or medical waste (Aymen and Bajari, 2018) or health-care waste (HCW) (Ansari et al., 2019).

BMW comprises of human anatomical waste, animal waste, microbiology and biotechnology wastes, waste sharps, discarded medicines and cytotoxic drugs, soiled waste, solid waste (wastes generated from disposable items other than the waste sharps), liquid waste, incineration ash and chemical waste (Chandrappa and Das, 2012).

**Goal of the present review paper:**
The present paper provides an overview on the major issues and debate, gaps in knowledge and way to bridge the gap related to Biomedical Waste Management (BMWM) Rules, 2016.

**Biomedical waste Management Rules:**
On 20th July 1998, Ministry of Environment and Forest (MoEF), Govt. of India have framed the 'Biomedical waste (Management and Handling) Rules' for safe disposal of BMW. It was amended on 6th March 2000 (1st Amendment), 17th September 2003 (2nd Amendment) and 28th March 2016 (3rd Amendment) which replaced the earlier Rules (1988). The BMW Rule 2016 was further amended in 2018 and 2019 (Mathur et al, 2012; BMW Rule, 2016; Datta et al., 2018).

**Salient Features of BMW Management Rule 2016:**
(Source: Bhatia and Paul, 2017; Datta et al., 2018)

- Provides uniform guidelines and code of practice for BMW management.
- Applied to all persons who generate, collect, receive, store, transport, treat, dispose or handle BMW in any form.
- All institutions generating BMW must take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.
- Applicable to health camps such as vaccination camps, blood donation camps, and surgical camps.
**Schedules of BMW Management Rule 2016 (Source: Datta et al., 2018)**

Table 1: Schedules of BMW Rule, 2016

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Waste category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule I</td>
<td>Categories of BMW</td>
</tr>
<tr>
<td>Schedule II</td>
<td>Colour Coding and Type of Container for Disposal of BMW</td>
</tr>
<tr>
<td>Schedule III</td>
<td>Label for BMW Containers/Bags</td>
</tr>
<tr>
<td>Schedule IV</td>
<td>Label for Transport of BMW Containers/Bags</td>
</tr>
<tr>
<td>Schedule V</td>
<td>Standards for Treatment and Disposal of BMW Standards for Incinerators</td>
</tr>
<tr>
<td>Schedule VI</td>
<td>Schedule for Waste Treatment Facilities</td>
</tr>
</tbody>
</table>

**Schedule II: Colour Coding and Type of Container for disposal of BMW:**

Table 2: Colour Coding and Type of Container for collection and disposal of BMW (Source: Aymen and Bajari, 2018)

<table>
<thead>
<tr>
<th>Colour Code</th>
<th>Type of Container</th>
<th>Category of BMW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>A solid, leak proof plastic bags Disinfected</td>
<td>Category: 1,2,3 and 6</td>
</tr>
<tr>
<td>Red</td>
<td>Disinfected Container/Plastic bag</td>
<td>Category: 3, 6 and 7</td>
</tr>
<tr>
<td>Blue/White</td>
<td>Translucent (Plastic bag/puncture proof container)</td>
<td>Category: 4 and 7</td>
</tr>
<tr>
<td>Black</td>
<td>Plastic bags</td>
<td>Category: 5, 9 and 10</td>
</tr>
</tbody>
</table>

**Schedule III: Label for BMW Containers/Bags:**

![Various labels for BMW containers/bags]
Fig. 1: Label for BMW Containers/Bags (Source: CCDC et al, 2020) (Note: Label shall be non-washable and prominently visible).

Schedule IV: Label for Transport of BMW Containers/Bags:

Containers/Bags
Day: .......... Month: .......... Year: ...........
Date of generation: .........................
Waste category No: ..........
Waste class:

Fig. 2: Label for Transport of BMW.

Schedule V: Standards for Treatment and Disposal of BMW:

Table 3: Disposal standard for biomedical waste

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Permissible limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.5 - 9.0</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>100 mg/l</td>
</tr>
<tr>
<td>Oil and grease</td>
<td>10 mg/l</td>
</tr>
<tr>
<td>Biochemical Oxygen Demand (BOD)</td>
<td>30 mg/l</td>
</tr>
<tr>
<td>Chemical Oxygen Demand (COD)</td>
<td>250 mg/l</td>
</tr>
</tbody>
</table>
**Conclusion**

Effective implementation of 'Biomedical waste (Management and Handling) Rules 2016' will maintain the hospital hygiene and management of medical waste. This study recommends to scientific community for development of new eco-friendly techniques and equipments for sustainable management of biomedical waste to assure cleaner and greener environment. The BMWM Rules 2016 should be strictly practiced by all health-care facilities along with hospital staff and should be financially supported by government for dedicated equipments and development of separate infrastructure.

**Acknowledgements**

Encouragement and support provided by Dr. Ganesh A. Thakur, Principal, Mahatma Phule Arts, Science and Commerce College, Panvel, Raigad, Navi Mumbai, India is gratefully acknowledged. Author is thankful to faculty members, Department of Zoology for healthy cooperation and fruitful discussion on the present study. Their comments and suggestions have been critical in understanding the issue.

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