



BIOMEDICAL WASTE MANAGEMENT & ITS LEGAL REINFORCEMENTS: AN INDIAN SCENARIO

Hospital Administration

Dr. Shubhankur Bhardwaj

Hospital Administrator, Government Institute of Medical Sciences, Greater Noida, UP.

Dr. Preeti Verma

Hospital Administrator, Government Institute of Medical Sciences, Greater Noida, UP.

ABSTRACT

The biomedical waste generated by the hospital is very dangerous and affects human health and the environment there too. Even though there are Bio-Medical Waste Management Rules implemented in India, it's not able to manage bio-medical waste management effectively. It has its loopholes to control the mishandling of Bio-Medical waste generated by private as well as government hospitals. Biomedical waste management follows the essential steps: Generation, Segregation, Collection and Storage, handling, transportation, treatment, and disposal. The hospital must give all the required effluent treatment to disinfect before disposing of the biomedical waste. This study mainly highlights the role of private and government hospitals while handling biomedical waste, existing law in India and its limitation as well as the socio-economic implementation of biomedical waste management rules in India and recommendations.

KEYWORDS

Bio-Medical Waste, Law, BMW Rules 2016, Health, Hospitals.

INTRODUCTION

There are few things certain in life – first is death, second is change and last is waste. No one can stop these things to take place in our lives. But with better management, we can prepare ourselves for them. Every healthcare worker's activity generates waste while delivering healthcare.¹ The World Health Organization states that 85% of hospital wastes are non-hazardous, whereas 10% are infectious and 5% are non-infectious but they are all included in hazardous wastes. About 15-35% of hospital waste is regulated as infectious waste. This range depends on the total amount of waste generated.²

The average quantity of biomedical waste generated per bed per day will vary depending upon the type of health problems, the type of care provided, and the hospital waste management practices. It varies from 1–2 kg/bed/day in developing countries to 4.5 kg/bed/day in developed countries such as the USA and has been attributed mainly to the increase in the use of disposables.^{3,4}

Effective management of biomedical waste is not only a legal necessity but also a social responsibility. Hence, there is a need for resource material to help administrators, doctors, nurses, and paramedical staff. The purpose of BMW is mainly to reduce waste generation, to ensure its efficient collection, handling, as well as safe disposal in such a way that it controls the infection and improves safety for employees working in the system. For this, a conscious, coordinated, and cooperative effort has to be made from doctors to housekeeping staff. Scientists, researchers, NGOs, and environmental protection activists understood that human behaviors and activities cause major damage to the environment, and they put forward their pressure on the government to make proper rules for bio-medical waste handling. As a result in India, the Bio-Medical Waste (Management and Handling) Rules of 1998 have been passed under the Environment (Protection) Act of 1986. The government made a proper evaluation of the working capacity of these rules and as a modification to the existing rule, the new rule was passed in 2016.

What is Biomedical Waste?

The waste generated from medical procedures within healthcare facilities. It includes human and animal anatomical wastes and treatment apparatus that are used and generated during diagnosis, treatment, or immunization in hospitals, nursing homes, and pathological laboratories (WHO, 2014).⁵

According to Bio-Medical Waste Management Rules, 2016, Bio-Medical Waste (BMW) means any solid, fluid, or liquid waste including its containers and any intermediate product which is generated during the diagnosis, treatment, or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological and includes four categories for same.⁵

Sources of Bio-Medical waste

The environment and health care system are closely related to each

other.⁵ The basic services are provided by the environment to the economy as well as to human beings.² The waste generated from healthcare institutions Government/ Private, PHCs, M, Veterinary Colleges, etc. & minor sources are clinics, medical camps laboratories, the material generated as a result of the diagnosis, treatment, or immunization of patients and associated biomedical research in these facilities.⁶ Such waste contributes to significant health risks to hospital employees, patients, and society.

Biomedical waste & Health

The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling healthcare waste may have serious health consequences and a significant impact on the environment as well. However, lack of awareness has led to the hospitals becoming a hub for spreading diseases rather than working toward eradicating them. The data available from developed countries' studies indicate that approximately 1-5 kg of waste is generated per bed per day, with substantial inter-country and inter-specialty differences. In India, it is estimated to be 2.0 kg per bed per day.⁷ WHO (2005) in a study on the safe management of biomedical sharps in India found that 25% of HIV and 40% of hepatitis B and C viruses are transmitted through exposure to injection needles among healthcare workers.⁸

Biomedical waste collection and proper disposal have become significant concerns for both the medical and general community.⁶ Among all health problems, there is a particular concern with HIV/AIDS, Hepatitis B, and C, for which there is strong evidence of transmission through healthcare waste.

Various communicable diseases, which spread through water, sweat, blood, body fluids, and contaminated organs, are important to be prevented. The biomedical waste scattered in and around the hospitals invites flies, insects, rodents, cats, and dogs that are responsible for the spread of communicable diseases like plague and rabies. Rag pickers in the hospitals, sorting out the garbage are at risk of getting tetanus and HIV infections. The recycling of disposable syringes, needles, IV sets, and other articles like glass bottles without proper sterilization is responsible for Hepatitis, HIV, and other viral diseases.

Role of Private and Govt. Hospitals in Handling Waste:

Hospital is frequented by people from every walk of life in society. India is one of the most populous nations in the world. The unbounded growth of urban areas has led to degradation in infrastructural services one of which is waste management. The burgeoning population has resulted in massive pressure on healthcare services, leading to huge amounts of hospital waste generation. Over the years there have been tremendous advancements in the healthcare system. The last century witnessed the rapid mushrooming of hospitals in the public and private sectors, dictated by the needs of expanding population. The advent and acceptance of "disposable items" have made the generation of hospital waste a significant factor in the current scenario.

As per data retrieved from the Government of India sites, the country generates about 484 TPD (tonnes per day) from 1,68,869 HCFs. Out of these only 447 TPD is treated leaving out the 37 TPD untreated. The count of CBMWTFs is 198 which are in operation and 28 remain under construction. While 1,31,837 HCFs are currently using CBMWTFs, and approximately 21,870 HCFs have their treatment facilities on-site.¹³

Both the private and the government sector have their responsibilities and roles in handling the waste generated. Though it is impossible to stop the generation of such waste as medical assistance is part of our lives, extra efforts can be taken on our part to reduce the harmful impacts of this waste on human life and the environment. The hospitals need to follow the rules diligently. They should have properly trained and skilled employees to handle this task. In addition to that, they should regularly impart training and awareness sessions for those who are involved in this function.

Legal framework related to BMW in India^{12,13,14,15}

Various central legislations related to General & biomedical waste management in India are as follows:

1. The water (prevention and control of pollution) Act, 1974
2. The Air (prevention and control of pollution) Act, 1981
3. The Environment (Protection) Act, 1986
4. The hazardous waste (management and handling) rules, 1998
5. The Biomedical waste (management and handling) rules, 1998
6. Municipal Solid waste (management and handling) rules, 2000
7. The Biomedical waste (management and handling) rules, 2016

Globally, three major conventions address and identify the cause of BMW concerning environmental protection, sustainable development, and putting together policies for effective handling and management. These are the Basel Convention on Hazardous Waste⁹, Stockholm Convention on Persistent Organic Pollutants (POPs)¹⁰, and Minamata Convention on Mercury.¹¹

The Basel Convention on Hazardous Waste⁹

It is the most comprehensive globally inclusive environmental treaty, which has about 170 countries as its members and aims to protect the environment and human health from the detrimental impact of management, and disposal of hazardous wastes rising due to improper generation of clinical wastes from health care centers, and clinics.

Stockholm Convention on Persistent Organic Pollutants (POPs)¹⁰

This one too is a global treaty to protect human health and the environment from POPs which are dioxins and furans. These are the chemically toxic elements formed by medical waste incinerators using other combustion methods, and later get accumulated in the living organism's fatty tissue and cause damage. This convention addresses source reduction, segregation, resource recovery and recycling, training, proper collection, transport, and other best environmental practices which were released in 2006.

Minamata Convention on Mercury¹¹

Likewise, as mentioned above, this convention also has similar objectives and aims to protect the environment and human health, but as the name suggests it attempts to prevent the adverse effects of mercury. This treaty suggests methods of phasing out certain medical equipment in healthcare services, including mercury-containing medical items such as thermometers and blood pressure devices.

The Indian scenario

The first-ever BMW rules were notified in India in July of 1998 by the then Ministry of Environment, Forest and Climate Change. The issue was aggravated by the fact that the scavengers used to pick on the exposed, vulnerable to infect and diseased waste, generated without any gloves, masks, or shoes for recycling, and reusing the unsterilized syringes and other medical equipment. Then in the timespan of 2002-2004, the existing BMW measures, framework, and practices were explored by the International Clinical Epidemiology Network. It was found that about 82% of the primary, 60% in the secondary, and 54% of the tertiary health care facility (HCF) in India across 20 states, had no reliable BMW system and lacked credibility.

This was then supported by evidence when in 2009, around 240 people in Gujarat, India contracted hepatitis B following the reuse of unsterilized syringes. This, along with many other incidents that followed, reflected the urgent need for the country to take immediate action to strengthen the prevalent system by increasing its funding and commitment to protecting the environment. Later in the following

years of 2000, 2003, and 2011, the BMW 1998 Rules were amended. However, the 2011 Draft Rules could not be notified because of the failure of reaching a consensus on categorization and standards.

However, in March of 2016, the BMW rules were amended again by the Ministry of Environment, Forest and Climate Change which expanded its scope, and coverage and made the categorization 4 categories as compared to 10 categories of biomedical waste listed in the previous rule (BMW Rule, 2011)¹² and authorization easier, and improved the provision of segregation, transportation, and disposal methods by way of 4 schedules, 5 forms, and 18 rules.^{12,13,14}

Brief of Biomedical Waste Management Rules, 2016¹³

- There has been a wide expansion of the scope of the rules which now includes the various health camps (like vaccination camps/blood donation camps).
- There has been a revision of the duties of the HCFs occupier, that is, one who has administrative control over the healthcare facility which generates the waste.

These include:-

1. Having mandatory pre-treatment of the labs, microbiological waste, and blood bags before disposal using the prescribed sterilization methods by the National AIDS Control Organization (NACO) or WHO.
2. Slowly phasing out the practice of using chlorinated plastic/blood bags and gloves within two years from the notification date.
3. Imparting proper training to the workers at healthcare facilities and ensuring their protection by immunizing them from infectious diseases like hepatitis B and tetanus, while handling biomedical waste.
4. Separating the liquid waste before mixing it with other liquid waste, at its source by pre-treatment. (S-A-S)
5. To incorporate a system of barcodes for sending the biomedical waste out of the premises for its treatment and disposal.
6. The ambit of the major accidents includes accidents caused by fire hazards, blasts, during handling of BMW, and reporting of the remedial action taken by the prescribed authority.
7. Updating/modifying the prevalent incinerator to keep up with the new standard within two years from the notification date.
8. There has to be regular monthly updating and daily maintenance of the BMW disposal register on the website.
9. There has been an increase in the duties of the common BMW treatment and disposal facility (CBMWTF)'s operator.
10. The categorization of biomedical waste as per color-coded containers is majorly revised for improving the segregation & treatment options of biomedical waste.¹²
11. If a common biomedical waste treatment facility is located at a distance of 75 kilometers, then the HCFs will not be allowed to establish their on-site BMW disposal facility. In case there isn't a CBWTF located within the mentioned distance, then the HCFs can take prior permission from the prescribed authority and set up the required on-site facility such as an incinerator, autoclave or microwave, or shredder. Once the treatment is confirmed of the glassware and the plastics using the processes of autoclaving/microwaving/mutilation/shredding, the respective authorized recyclers should be given the recyclables.
12. The permissible limit as per the standards for emission from incinerators has been altered to SPM-50 mg/nm³, two seconds for the residence time in the secondary chamber of an incinerator, 0.1 ng TEQ/Nm³ for the standard for dioxin and furans.

Limitations On Implications Of Rules

Even though we have updated new rules to manage biomedical waste in India, it is a failure to give a total successful result due to several reasons. The rule has given complete power to the local self-government as well as to the state and central pollution control board. The pollution control board has to inspect the hospitals from time to time without prior notice and if any hospital found guilty of non-commencement of the bio-medical rules in their hospital, there is strict action should be taken against the such hospital which may result in the closing down of the hospital without any hesitation. Even though rules have mentioned different types of treatment for bio-medical waste, it's difficult to follow the disposal methods in the city hospitals, which may affect the neighboring residential areas and people. To dispose of the BMW generated in the hospital, the hospital needs to depend on a private contractor to carry the waste and dispose of it, which becomes more expensive for the small clinics. The illegal disposal of bio-

medical waste becomes quite common in a nation. The law may not be able to monitor the rules followers completely. It is not easy to identify the illegal disposer because they mix the bio-medical waste with general waste and through to the local dustbins. This is one of the major issues which cannot be solved so easily by the authorities. Apart from that the influence and bribe also cause to protect the defaulters.

Socio-Economic Implementation of Rules: Awareness is lacking among people concerning bio-medical waste and its impact on health and the environment. The concerned authorities must take the step forward to bring social awareness about the impact of illegal disposal of waste on human health and the environment. The BMUM Rules strictly provided the procedure for incineration, landfilling, and effluent chemical treatment for biomedical waste. But, this procedure is more expensive in nature as well as the private contractors of biomedical waste management are also imposing huge charges, which becomes economically little difficult for the small clinics. So, to avoid the charges clinics and some hospitals go for illegal disposal of biomedical waste. Another major problem is the delay in payment to the private contractor especially by the government hospital creates major issues like a non-collection of waste for days together and overflow storages etc... which is dangerous to the surrounding environment.

Recommendations

Waste generation is inevitable in a hospital, BMWM policies aim for a combination of necessary human resources, material tools, equipment, workspace, and apparatus brought together in systemic and effective coordination for the management of biomedical waste in the hospital. The following recommendations were made from the research and the rest from the administrative duty experience and review of literature by the author to ensure proper biomedical waste management and implementation of BMWM Rules 2016 and its amendments:

1. In-service training programs should be conducted for all the healthcare personnel of the Govt. & Pvt. Hospitals to fill the deficiency of their knowledge and in practice w.r.t. BMWM.
2. Longitudinal in-service training programs (LTP) for biomedical waste management should be made compulsory for all healthcare personnel and facility.
3. A separate Training program for Group D staff should be organized for easy adoption of BMW.
4. BMW Squad will be constituted for Quality assessment and onsite inspection & training of bio-medical waste management for should inspect, observe and train the entire staff in the hospital at the level of district & state if needed.
5. Information regarding the various risks involved in healthcare waste management practices has to be disseminated, to the public or the general community by organizing seminars, workshops, practical demonstrations, group discussions, lectures, etc in bilingual.
6. There should be an appointment of an Infection Control Nurse for continuous monitoring of BMW practices in Hospitals.
7. The foot-operated and covered waste collection bins should be made available and innovations in form of sensor-generated bins can be implemented.
8. Standard operating procedures should be made for BMWM in hospitals and compliance reports should be monitored by higher authority.
9. Reward and penalty systems should be framed if found incorrect segregation in inspections.
10. Visitor policy should be framed so that overcrowding in the IPD/OPD is reduced and therefore the risk of waste mixing is reduced.
11. Availability and utilization of the Spill management Kit should be ensured.
12. HCPS' practical skills in the collection, handling, and disposal of waste need to be strengthened for improving the overall performance of all concerned including patients and visitors to the hospital.
13. For transportation of filled liners, tags should be provided so that spillage or liquid discharge could be avoided
14. The logbook for waste collection data records should be maintained and signed by the staff concerned
15. Intramural routes for waste transportation should be made different than that of patient or visitor circulation routes.
16. Reduce, reuse, and recycle (3R) should be promoted.

For Higher Authorities:

1. There should be a heavy penalty to be imposed on hospitals or

clinics that failed to follow the rules.

2. The special squad should be appointed by the central government to monitor the implementation of bio-medical waste management rules in India.
3. The government should attempt to educate the people in the general public about the consequence of mishandling bio-medical waste.
4. environmental science should be a compulsory subject in all the courses with chapters on biomedical waste and its impact.
5. The government should build its unit for the disposal of bio biomedical than private contractors.
6. For the disposal and use of incinerators, Training should be given to some number of persons from staff by the government.

CONCLUSION

The proper biomedical waste management system will lead to a better environment and the control of the spread of disease in the environment. Keeping these valuable factors in mind, hospitals have to follow the legal aspects. In the coming year, we need to adapt to the prospective changes to handle bio-medically waste more efficiently by making use of new technologies. The government needs to make time-to-time dynamic rules to handle bio-medical waste more systematically.

REFERENCES

1. Rakesh A., Meena Chaudhry, 'Waste Management Initiative in India for Human Wellbeing', European Scientific Journal, June 2015 Special/edition ISSN: 1857-7881
2. Gupta, G. (2001), 'Environment, Ecology, and Economy, Environmental Economics – An Indian Perspective, Chapter - 1, Oxford University Press, ISBN-13: 978-0-19-566198-9, pp. 13-45.
3. National AIDS Control Organization Manual of Hospital infection control. New Delhi. 1998:50-66.
4. Kishor J, Joshi TK. International Development Centre and Centre for occupational & environmental health. Lok Nayak Hospital; New Delhi-1: 7-8 Mar 2000. Concept of Biomedical Waste Management: National Workshop on Hosp Waste Management Souvenir.
5. Subhadarsini, S. (2015), 'Valuation of Environment: A Study on Willingness to Pay for Improved Solid Waste Management in Paradip Town, Odisha Economic', International Journal of Humanities and Social Science Invention, ISSN: 2319 – 7714, Vol. 4(1), pp. 92-101.
6. Varsha H Tambe, Fareedi Mukram Ali, Kishor Patil, Prasant MC, "awareness towards biomedical waste management: a review", critical review in pharmaceutical sciences, ISSN 2319-1082.
7. Parag Dalal, "Management of Infectious Bio-medical Waste of Ujjain City, International Journal of Advanced Research (2013), Volume 1, Issue 2, 52-58.
8. World Health Organisation (2005). Safe management of biomedical sharps in India.
9. Technical Guidelines on Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing or Contaminated with Mercury 31 October 2011. Geneva: Basel Convention and United Nations Environment Programme; 2011. Secretariat of the Basel Convention.
10. Revised Draft Guidelines on Best Available Techniques and Provisional Guidance on Best Environmental Practices of the Stockholm Convention on Persistent Organic Pollutants. Geneva: Secretariat of the Stockholm Convention; 2006. Secretariat of the Stockholm Convention.
11. David Lennett, Richard Gutierrez. In: Minamata Convention on Mercury. Geneva: United Nations Environment Programme; 2014.
12. Bio-Medical Waste (Management and Handling) Rules, Ministry of Environment and Forests. 2011.
13. Bio-Medical Waste Management Rules. 2016 Published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-Section (i), Government of India Ministry of Environment, Forest and Climate Change. Notification; New Delhi, the 28th March, 2016
14. Bio-Medical Waste (Management and Handling) Rules, Ministry of Environment and Forests. 1998.
15. Certificate in Health Care Waste Management (CHCWM) Study Material, IGNOU.