

REDEFINING BIO-MEDICAL WASTE MANAGEMENT: A PATH AHEAD IN INDIA

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Abstract

In any nation majority of hospitals, surgical centres, health facility providers, pathological laboratories, and blood banks are the foremost sources of bio-medical waste. Apart from these sources mortuary centres, human and animal medical research centres, nursing homes, and autopsy centres also significantly contribute to bio-medical waste generation. Typically, in developed countries 'per hospital per day' between 200 to 500 gm of harmful bio-medical waste is generated. In underdeveloped countries, this generated quantity is much higher with the existence of other key issues like non-separation of non-hazardous and hazardous bio-medical waste. In this paper, the researcher makes an attempt to discuss a few global factual questions confronted by existing BMWM systems and the current scenario in India.

Keywords: *Common Bio-medical Waste Treatment and Disposal Facility (CBWTF), Bio-medical Waste Management (BMWM)*

1. Introduction

Applause for the existence of life-saving healthcare systems is undoubtedly necessary but equal attention must be drawn to system-generated bio-medical waste. Generally, approximately 85% of total generated medical waste is non-hazardous in nature. But the remaining 15% of waste can be enormously harmful as it majorly consists of radioactive materials extracted from biochemical processes or life-threatening infectious material.

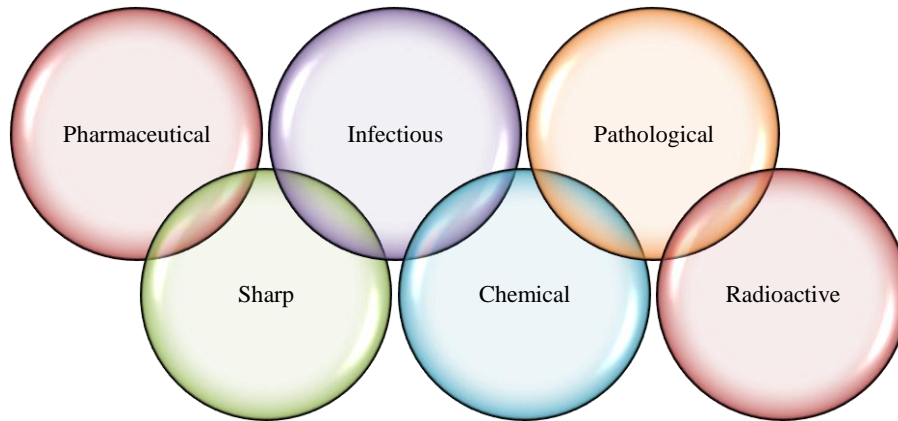
Let's start with a few factual questions confronted by BMWM systems:

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- ✓ Is every year all 16 billion worldwide used needles of injections systematically disposed of after usage?
- ✓ What are the corrective measures taken for a total of 15% of generated unsafe and hazardous bio-medical wastes?
- ✓ Are radioactive wastes, infection-transferrable wastes, and toxic wastes well-treated?
- ✓ Is the world concerned about generated furans and dioxins emissions after open burning practices in a few nations?
- ✓ Are modern medical waste management systems facilitating a well-designed system for accidentally generated microorganisms?
- ✓ Is environment protection waste management really present on agenda?
- ✓ Are we really committed to the health of patients, health workers, and general citizens?

2. Types of bio-medical by-products (waste) and their sources



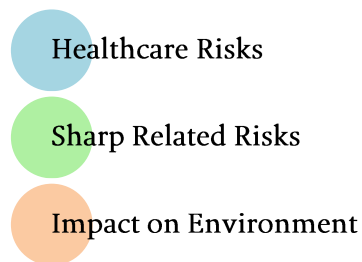
Bio-Medical Waste	Sources
Pharmaceutical	Expired or unused pharmaceutical drugs, cytotoxic drugs, vaccines, etc.
Infectious	Infected blood, body fluids, swabs, post-mortem, bandages, etc.
Pathological	Human/animal body parts, tissues, skeletons,

	fluids, etc.
Sharp	Surgical instruments, needles, blades, syringes, etc.
Chemical	Laboratories solvents, disinfectants, chemicals, reagents, etc.
Radioactive	Diagnosis or surgical materials used after radio therapy, radionuclides, etc.

3. Why still a failure in the implementation of BMWM?

- Less importance is given to the issues generated along with BWM.
- Lack of financial provision and insufficient funds for BMW treatment.
- Inadequate manpower and lack of accurate training for health workers.
- Absence of appropriate rules and regulations regarding BMW disposal.
- Unwillingness of countries in enforcing disposal.
- Non-existence of suitable BMW treatment and disposal.
- Unawareness related to acute health issues after ignorance of BMWM.

4. Key Risks Related to BMW



4.1 Health Risks

There is always a threat of spreading the microorganisms like harmful viruses or bacteria etc. if BMW is not handled and disposed of as per the prescribed rules. The major threat of spread can be among the health workers or patients admitted to the hospitals. There are chances that

mishandled microorganisms can be easily spread among the general public. These microorganisms can be normal, harmful, drug-resistance, or may be new to the world. There are chances of air pollution, radiation burns, thermal injuries, toxic exposures, etc.

4.2 Sharp Related Risks

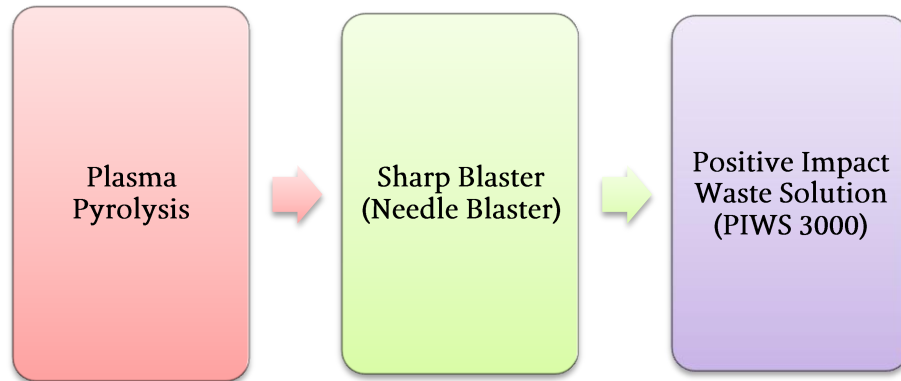
Worldwide there is a yearly usage of over 16 billion injections and the fact is not all are properly disposed of. There is an unbelievable threat like the reuse of infected needles which was the cause of innocent people getting infections like HIV, Hepatitis B, and Hepatitis C. These cases can be found particularly in underdeveloped countries. Lack of specialized and dedicated tools for sorting, handling, and disposing along with the practices of manual handling of the sharp related materials are commonly found in low to middle-income nations. Such practices increase sharp related risks.

4.3 Impact on the Environment

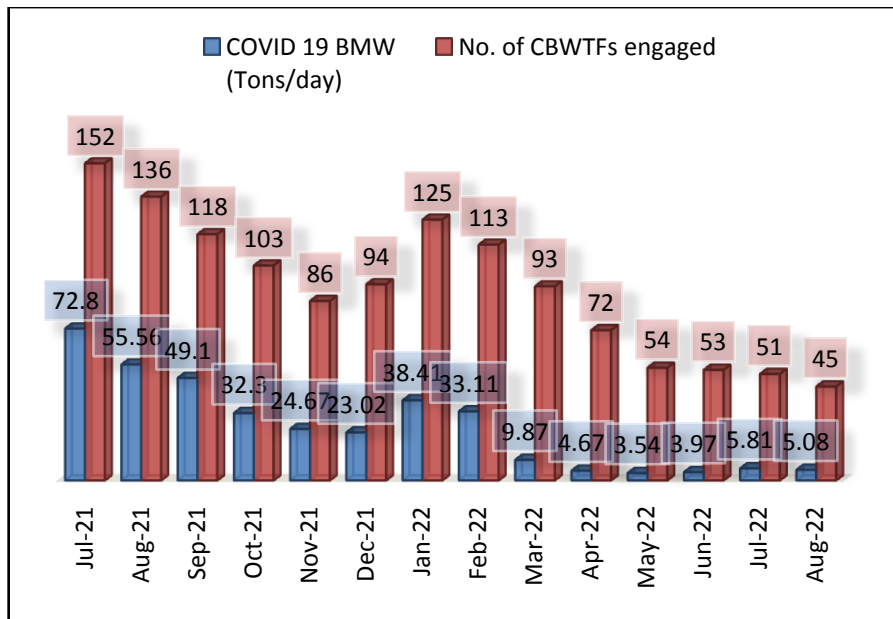
Unsafe ways of disposing of BMW in landfills surely can affect the environment. Cases of polluting drinking water and groundwater, etc. can be easily found. There can be various ways how BMW can have an indirect but adverse impact on the surrounding environment. Poisonous and toxic impurities may be produced as by-products and chemical disinfectants. These can be generated after BMW disposal treatments and can be spread in the air and water. Air pollution cases are found after ash residue pollutes the surrounding air. These incidents are happening because of increasing incineration practices practiced on improper materials like heavy metals.

5. Current Scenario: BMW generated versus Number of treatment and disposal facilities

In India there are approvals for adoption of the following techniques and technologies for treatment of BMW disposal.



The below-shown graph indicates the total tons per day (TPD) BMW generated in India considering total States and UTs. The number of BMW collection, disposal and treatment facility centres is also shown in the graph. In the month of July 2021, there were 152 centres for a total of 72.8 TPD generated BMW while these figures were drastically reduced to a total of 5.08 TPD generated BMW and there was a total of 45 treatment centres in August 2022.



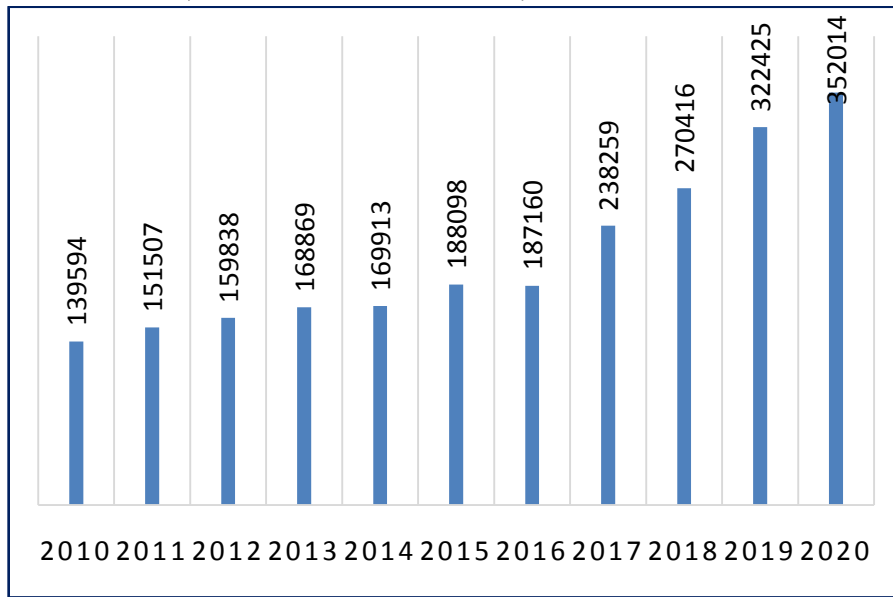
Graph: BMW TPD Vs No. of CBWTFs Centres (Source: CPCB, Delhi, Annual Reports)

5.1 BMW Generation & Treatment TPD (Tons Per Day)

BMW Generated	BMW Treated	Gap
656 TPD (by total 3,52,014 healthcare centres)	590 TPD (by total 17,206 treatment facilities and 208 CBWTFs centres)	66 TPD

5.2 Healthcare Facility Centres (HFCs)

In India, over the last decade, there has been a continuous increase in HFCs. The following graph is clearly showing the growth in HFCs from 1,39,594 in the year 2010 to 3,52,014 in the year 2020.



Graph: Number of healthcare facility centres from 2010 to 2020 (Source: CPCB, Delhi, Annual Reports 2019-20)

6. A path ahead

On the COVID-19 pandemic background worldwide healthcare associations must be more attentive toward BMW implementation. Failure in the disposal of various BMWs and toxic elements can easily spread infectious agents.

- Adopting the techniques for minimization of BMW generation.
- Encouraging the practices of appropriate BMW segregation.
- Formulating the strategies for BMW disposal as per national/international standards.
- Constructing a framework that encourages improvements in the process by allocation of responsibilities to healthcare workers.
- Arranging extensive training and providing guidance to healthcare workers about the adoption of safe BMW handling and disposal practices. Evaluating training effectiveness as a part of controlling feedback loop.
- Selecting easy, effective yet harmless processes and actions while collecting, sorting, handling, transporting, and disposing of BMW.
- Avoiding incineration process and encouraging environment-friendly BMW disposal processes like microwaving or chemical or steam treatment etc.
- Ensuring commitment from local/state/national Government to support a long-term and universally accepted action plan for BMWM.

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