

# EVALUATION OF BIOMEDICAL WASTE MANAGEMENT – CASE STUDY OF A HOSPITAL IN IMPHAL CITY

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## ABSTRACT

Biomedical Waste Management (BWM) create an intensive range of fitness and protection hazards for each sufferers and healthcare workers. Its segregation, series and disposal is a difficulty no longer only for the scientific however general community additionally. Proper and effective control of BMW isn't handiest essential however also a public duty. The goals of this take a look at are (i) have a look at of the BMW control scenario together with segregation, series, transportation, storage, treatment and disposal methods in a non-public health center. (ii) look at of the various protection measures taken through the fitness care workers involved in BMW control. These records became collected by direct interview and remark. The examiner showed that 0.three kg of waste turned into generated consistent with mattress per day. The health center has been given separate color coded bins in all the wards for collection of waste and segregation takes location on the source. The diverse BMW practices inside the medical institution were quite up to the same old, it turned into specially because of the know-how of fitness hazards by using the fitness care employees. For that reason it's miles concluded that to face the existing standards of BMW management, authority ought to inspire, encourage.

**key words :** Biomedical waste management, Health

## INTRODUCTION

Biomedical Waste (BMW) are those waste which are produced in the process of diagnosis, immunization or treatment of man or animals, or in research work, or in biological testing and observation, and contaminated human fluids Das et al., (2001) 85% of hospital wastes are non – hazardous, 10% are infectious but non-hazardous, and 5% are hazardous as stated by the World health organization (WHO). In general, 15% to 35% of hospital waste produced are infectious waste and categorized as 'hazardous and toxic'. Based on the BMW (Management and Handling) Rules for adequate handling and management practices of the various HCEs, National guidelines on 'Hospital Waste Managements', Govt. of India (GoI), has notified the Bio-medical (handling and management) rules, 2003 under the Environmental Protection Act of 1986, Though the above rules exist, the ground reality is far from satisfactory.

Productive and effective management of BMW is not only essential but also a public responsibility. The absence of awareness about the health hazards of BMW, proper waste management, insufficient human and financial resources, and improper waste disposal are the most serious problems associated with health care waste (WHO, 2005). The segregation, collection, handling, transportation and disposal of waste should be appropriately managed so as to reduce the risks to the health and safety of healthcare, patients, the public and the safety of the environment (Hall, 2008). This could only be done if the process practiced is revised continuously from time to time, so that the current best practice is being followed (Baillie, 2008). In India, the

awareness level of BMW has been found to be unsatisfactory although global concerns is increased among health care workers about hazards and proper handling techniques (Pandit et al., 2005 and Kishore et al., 2000). So, the current study was done to assess the awareness level and attitude among health care workers in a private hospital in Imphal, India.

### **REVIEW OF LITERATURE**

The rapid growth of population has led to an increase in demand and production of goods and services across the world (Blanchard, 2009). By discharging more waste to the environment, these anthropogenic activities have always imposed threats to it (Ezebilo and Animasaun, 2011; Mary and Adelayo, 2014). The UNEP reports, (2009) state that daily global generation of waste in 2006 was reported as 2.02 billion tonnes. At the global level, 18% – 64% health care facilities have unsatisfactory BMW facilities, which include lack of awareness, inadequate resources and poor disposal mechanisms. In South-East Asian countries, 56% of medical facilities lack proper waste disposal and treatment (WHO, 2011). Similar situation existed in several other developing countries such as Senegal, Iran, Nigeria and Pakistan and the authors reported lack of infrastructure, state of collection, transportation, disposal, training, capacity building, PPEs and resource constraints in BMW (Abah and Ohimain, 2011; Ali et al., 2015; Askarian et al., 2004). Pollution has also increased, because the rapid increase of waste generation has exceeded the earth's carrying capacity by 30 percent (Odum and Odum, 2006). A major concern for many fast growing cities in developing countries is the lack of proper planning, inadequate governance, resource constraint and ineffective management, solid waste, especially inadequate collection and improper disposal of the same (Pek and Othman, 2010; Medina, 2010). The important steps identified are as follows: the institution of a sharp management system, avoidance of hazardous substances wherever possible, waste reduction, ensuring worker safety, providing appropriate methods of waste collection and transportation and installing safe treatment and disposal mechanisms (Abor and Bouer, 2008). It is estimated that some 5.2 million people (including 4 million children) die each year from waste-related diseases. Globally, the amount of hospital waste generated will be doubled by the year 2000 and quadruple in the year 2025 (Haque, 1994; Akter et al., 1999). A study in Bangladesh about BMW in different health care centres reported the absence of appropriate policy and laws, awareness and willingness responsible for the improper management of BMW (Hassan, 2008). A study of BMW in low level health facilities of Tanzania reported that the medical waste management is still very poor and awareness and training should be provided to the staffs of the health care settings (Manyele, 2010). A study in Nigeria reported that more than 90% of the hospital waste generated is directly disposed on land in an unhygienic and unsatisfactory manner (Vivan et al., 2011). The hospital needed proper program for solid waste management require having a good arrangement of waste bins with different colours and an appropriate site selection in the hospital for different types of wastes (Yousefi and Rostami, 2017).

### **MATERIALS AND METHODS**

The study was carried out in a 200 bedded Private hospital, Shija Hospital and Research Institute, Imphal. The hospital based study was conducted during October 2022. Different areas of the hospital were surveyed for studying the various processes of segregation, collection, storage, transportation and disposal of Bio-medical waste. Field observation and personal interview with the BMW manager of the hospital was conducted to collect available information for analysis of the system. On alternate days for the time period of one month, observations of BMW management practices were done in all wards of the hospital. Parallel to the interviews with the health workers, the average quantity of the BMW was also determined. The waste from the storage area Yellow bags, Red bags, Blue bags and Black bags were collected and weighed.

### **RESULTS AND DISCUSSION**

Segregation, collection and transportation, the waste is segregated according to their characteristics into the following categories

- Infectious waste, microbiological waste (yellow bag)

- Sharps, glass (blue bag)
- Plastic waste, gloves mask (red bag)
- Domestic waste (black bag)

The hospital provides colour coded plastic bags and strong plastic containers for infectious waste as well as non infectious waste and are kept outside all the wards. The wastes are collected daily and transported to temporary storage site and finally to the designated central storage site. Transportation of waste within the establishment utilizes wheeled trolleys that are dedicated solely for the purpose.

#### Quantity of waste generated in the hospital

The waste quantities are estimated by assuming 100% bed occupancy in the hospital. The survey results show that the average amount of waste generated in the hospital for one month is 1,763.4 kg. Yellow bag 316 kg, Blue bag 97.6 kg, Red bag 550kg and Black bag contains 800 kg, Waste produced / bed /day = Mean waste generated/day/ no. of beds, Waste produced per day = 0.3 kgs /bed/ day and is lower than the average quantity surveyed at national level (India) (Shah et al., 2000). It is observed that the BMWs were segregated at the starting place and that the hospital had knowledge of the handling and safety procedures.

#### Treatment and Disposal

The infectious waste is treated via the incinerator.

**Table 1. Facilities available in the hospital.**

S. No.	Department
1	Plastic Surgery
2	General Surgery
3	Nephrology
4	Urology
5	Neurosurgery
6	Anesthesiology
7	Obstetrics and Gynaecology
8	Ophthalmology
9	ENT
10	Dietetics and Nutrition
11	General Medicine
12	Orthopaedics
13	Pediatrics
14	Dental
15	Pathology
16	Gastroenterology
17	Radiology and Imaging Sciences
18	Cardio Thoracic and Imaging Sciences
19	Clinical Psychology
20	Audiology and Speech Pathology

**Table 2. Total Amount of waste generated according to colour coding.**

S. No.	Category of waste	Amount of waste (kg)
1	Yellow	317
2	Blue	97.6
3	Red	550
4	Black	800

	Total	1763.60
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**Table 3. Total amount of waste as hazardous and nonhazardous in hospital**

S. No.	Category of waste	Amount of waste (kg)
1	Hazardous	963.60
2	Non- Hazardous	800

After the incineration, the final waste is deposited in a site at the hospital premises. However, non infectious domestic wastes are taken by the municipality for dumping outside the city. Shredder for shredding the plastic waste ,Autoclave for plastic and Laboratory waste and Sharp pits for disposal of sharps such as Needles, blades, glass and scalpels are also practiced.

Personal Protective Clothing from table 5 it can be observed that the housekeeping staffs are well aware of the safety practices while handling the biomedical waste.

### Training

Regarding sensitization of biomedical waste management practices 70% of the housekeeping staffs were trained for waste management. There were no reports of any injury or accidents in the past six months according to Table 6.

In this study, the hospital generated BMW is about 58.78 kg/day, which is about 0.3 kg/day/bed. A study in M.L.B Medical College also shows waste generation of 0.52 kg/day/bed and maximum waste generated in wards. Segregation is the most important step in the entire process of biomedical waste management. Segregation not only reduces the risks associated with the biomedical waste but also the cost of handling, treatment and disposal. As per the findings of this study, the hospital uses four colour coded bags to segregate the waste and segregating was done at the source. From a study in Srinagar and Lucknow, it was reported that there was no mechanism for waste segregation of infectious and non-infectious waste (Pandit et al., 2007 and Gupta et al., 2000). In Davangere city of Karnataka it was found that all hospitals in the city disposed of their BMW by burring in pits and covering with clay and lime at specific landfill sites or burial site of the city (Thirumala, 2013).

**Table 4. Transport Facilities and Storage Provisions of BMW**

Any different ways for transportation of BMW	No
BMW and general waste separately transported to avoid mixing	No
Transportation of BMW separately different trolley used	No
After collection separate room for storing waste	Yes
Supply of water impermeable in storage area	No
To prevent entry of unauthorized person storage room locked	No
Presence of weighing machine in storage area	Yes
BMW is not kept more than 2 days	Yes

**Table 5. Clothing used for personal protection by Waste handlers/Sweepers (n=50)**

Clothing used for personal protection	No. in Percentage
Apron	49 (98)
Boots	10 (20)
Mask	45 (90)
Gloves	46 (92)

**Table 6. Practices and other training of waste handlers (n=50)**

Practices and other Training	No. in Percentage
Any training in BMW handling	35(70)
Any workshop/training on BMW in the past 1 year	0(0)
Knowledge of danger/ risk in handling BMW	35(70)
Any injury /infection in past 6 months	0(0)
Report of accidents to higher authority	0(0)

In Agra the commonly used method for final disposal of waste was dumping of waste inside and outside the place followed by open burning and throwing the waste into drains and municipal dumpers (Sharma et al., 2008). Our study revealed that the hospital incinerates the contents of the yellow bag which contained anatomical wastes, microbiological waste, and soiled waste and disposed off sharps, needles, blades and glass into the sharp pits. A study carried out in a district of Gujarat and Kathmandu valley also noted that there were no effective waste segregation, collection, and transportation and disposal system in the majority of the health care institutions. (Pandit et al., 2005 and Rijal et al., 2007). In this study, the safety measures adopted by the housekeeping staffs were excellent. They were conscious of the risk and health effect of handling biomedical waste. 14% of hospital staffs received training on safety measures and had knowledge of the risks of BMW management in a study carried out by Shalini et al., 2012. Also at Sarojini Naidu Medical College, Agra, 37.04% of housekeeping staffs had knowledge of the risk involved in BMW handling, although no one received any training in this area.

#### CONCLUSION

The study concluded that though, Imphal is a small city situated in northeast India, the knowledge regarding biomedical waste management was quite satisfactory among the workers of Shija hospital. The Biomedical waste management department provides orientation training to entire health care personnel of the hospital. However workers regularly engaged in the process of biomedical waste management and handling, need to be trained on a regular basis on the various issues such as protection of the patients, visitors, nearby community, environment and finally self protection. The hospital is also providing facility to other hospitals of Imphal and other nearby areas for incineration of their biomedical waste on payment basis to make Imphal a place free of biomedical waste.

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