EVALUATION OF BIO-MEDICAL WASTE MANAGEMENT PRACTICES

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ABSTRACT

Bio medical waste (BMW) collection and proper disposal has become a significant concern for both the medical and the general community. The scientific “Hospital Waste Management” is of vital importance as its improper management poses risks to the health care workers, waste handlers, patients, community in general and largely the environment.

The project is titled “Evaluation Of Bio-Medical Waste Management Practices”. An attempt has been made to evaluate waste management practices in G.J.Multiclave (India) Pvt. Ltd., 7-1-47/1/A, D.K.Road, Ameerpet, Hyderabad, Telangana, India and was studied during the period of November 2015 to March 2015.

The objective of this study is (i) to summarize the rules for management and handling of biomedical wastes, (ii) to give the definition, categories of biomedical wastes, suggested storage containers including colour-coding and treatment options, (iii) mainly to highlight the effects of bio-medical waste in the environment such as air, land, radioactive pollution and (iv) disposal of wastes, regulation and recommendations.

BMW generated by 571 hospitals, nursing homes, research laboratories containing 10983 beds in various districts of Telangana i.e., Hyderabad, Rangareddy, Nalgonda, is around 5000-6000Kg/day which is segregated, collected, transported, treated and finally disposed. The waste generation rate ranges between 0.5-2.0 kg/ bed/day. The solid waste from the hospitals consists of bandages, body parts and other infectious waste (45-50%), plastics (50-55%), disposable syringes (4-5%), drugs (1-2%).

The disposal methods involved in treatment practices include incineration(Nos.2), autoclave(Nos.1), shredder(Nos.1), Effluent treatment plant (Nos.1).

The information and data regarding Bio-medical waste management practices and safety information collected was verified by personal observations made and tabulated at Survey No. 179 & 181, Edulapally Village, Kothur Mandal, Mahabubnagar District. The work is being done in association with training manager of G.J.Multiclave.

1.1. Introduction

Medical care is vital for our life, health and well being. But the waste generated from medical activities can be hazardous, toxic and even lethal because of their high potential for diseases transmission. The hazardous and toxic parts of waste from health care establishments comprising infectious, bio-medical and radio-active material as well as sharps (hypodermic needles, knives, scalpels etc.) constitute a grave risk, if these are not properly treated/disposed or is allowed to get mixed with other municipal waste. Its propensity to encourage growth of various pathogen and vectors and its ability to contaminate other nonhazardous/ non-toxic municipal waste, the efforts undertaken for overall municipal waste management. The rag pickers and waste workers are often
worst affected, because unknowingly they rummage through all kinds of poisonous material while trying to salvage items which they can sell for reuse. At the same time, this kind of illegal and unethical reuse can be extremely dangerous and even fatal. Diseases like cholera, plague, tuberculosis, hepatitis (especially HBV), AIDS (HIV), diphtheria etc. in either epidemic or even endemic form, pose grave public health risks.

With a judicious planning and management, however, the risk can be considerably reduced. Studies have shown that about three fourth of the total waste generated in health care establishments is non-hazardous and non-toxic. Some estimates put the infectious waste at 15% and other hazardous waste at 5%. Therefore with a rigorous regime of segregation at source, the problem can be reduced proportionately. Similarly, with better planning and management, not only the waste generation is reduced, but overall expenditure on waste management can be controlled. Institutional/Organizational set up, training and motivation are given great importance these days. Proper training of health care establishment personnel at all levels coupled with sustained motivation can improve the situation considerably.

The rules framed by the Ministry of Environment and Forests, Govt. of India, known as ‘Bio-medical Waste (Management and Handling) Rules, 1998,’ notified on 20th July 1998, provides uniform guidelines and code of practice for the whole nation. It is clearly mentioned in this rule that the ‘occupier’ (a person who has control over the concerned institution / premises) of an institution generating biomedical waste shall be responsible for taking necessary steps to ensure that such waste is handled without any adverse effect to human health and the environment.

### 1.2 Bio-medical waste

Biomedical waste, also known as infectious waste or medical waste is defined as waste generated during the diagnosis, testing, treatment, research activities or immunization of human beings or animals.

Biomedical waste is distinct from normal trash or general waste, and differs from other types of hazardous waste, such as chemical, radioactive, universal or industrial waste. Medical facilities generate waste hazardous chemicals and radioactive materials. While such wastes are normally not infectious, they require proper disposal.

### 1.3 Bio Medical waste consists of

- Human anatomical waste like tissues, blood, organs and body parts.
- Animal wastes generated during research from veterinary hospitals.
- Waste sharps like sharp needles, syringes, and broken glass.
- Discarded medicines and cytotoxic drugs.
- Solid waste such as dressings, used bandages, plaster casts, discarded gloves, material contaminated with blood, tubes.
1.4. Sources of bio medical waste

Biomedical waste is generated from biological and medical sources and activities. Medical waste is a subset of hospital waste. Waste generated primarily from health care establishments, including hospitals, nursing homes, veterinary hospitals, clinics and general practitioners, dispensaries, blood banks, animal houses and research institutes, health care teaching institutes, clinics, laboratories, animal houses and veterinary institutes.

Hospital waste refers to all waste, biologic or non biologic that is discarded and not intended for further use.

The sources of bio-medical waste can be categorized as major or minor according to the quantities produces. While minor and scattered sources may produce some health care waste in categories similar to hospital waste, their composition is different.

Common generators (or producers) of biomedical waste include

1.4.1. Major sources

- Govt. hospitals/private hospitals/nursing homes/ dispensaries.
- Primary health centers.
- Medical colleges and research centers.
- Biotechnology institutions.
- Forensic Laboratories.
- Medical colleges and research centers.
- Animal research centers.
- Blood banks/mortuaries.

1.4.2. Minor sources

- Physicians/ dentists’ clinics.
- Animal houses/slaughter houses.
- Blood donation camps.
- Vaccination centers.
- Acupuncturists/psychiatric clinics/cosmetic.
- Funeral services.

1.5. Need/Health hazards associated with Bio-medical waste

Biomedical waste poses hazard due to two principal reasons – the first is infectivity and other toxicity.

- It is often found that biomedical waste is put into the ocean, aquatic life are consuming the infected waste and eventually, these infections can be transported to humans through eating of the meat.
- Risks of infections outside hospital for waste handlers, scavengers and (eventually) the general public.
- Injuries from sharps cause health hazards to employees.
- Improper practices such as dumping of bio-medical waste in municipal
dustbins, open spaces, water bodies etc., leads to the spread of diseases through flies, insects, dogs etc.

- Emissions from incinerators and open burning also lead to exposure to harmful gases which can cause cancer and respiratory diseases.

- Plastic waste can choke animals, which scavenge on open dumps.

- “Disposable” being repacked and sold by unscrupulous elements without even being washed.

- Drugs which have been disposed of, being repacked and sold off to unsuspecting buyers.

(Fig.1.2). Need/Health Hazards Associated With BMW

- As per survey, the quantity of biomedical waste collected, treated and disposed obtained from 571 HCFs in GJ is estimated to be about 5000-6000kg/day.

- Of which animal, human, microbiological waste is about 45-50% which is burnt in incinerator and produced ash is sent to ramky enviro engineers pvt ltd where the ash is disposed in sanitary landfill.

- Used gloves, drained urine bags, emptied saline bottles, plastic material is about 50-55% which is disinfected in autoclave, made pieces in shredder and produced plastic is sent for recycling.
Waste sharps i.e., syringe needles are about 10kgs/day. These are disinfected by sodium hypochlorite solution and are disposed in concrete encapsulated bunkers.

Therefore the total waste is reduced to about 20% and plastic is used for recycling.

1.6. Conclusion

The present study was done to evaluate the practices of biomedical waste management and has provided detailed policy guidelines for the efficient management of biomedical wastes on the basis of a review of the current trends and best practices in the G.J.Multiclave.

The quantity of hospital waste and proportion of infection waste is definitely higher than one would expect in India due to extensive use of medical and non-medical disposals. The quantity of BMW obtained from medium to large sized hospitals is higher when compared to that of clinics and mini hospitals.

The proper hospital waste management system can help the control diseases can reduce community exposure to resistant bacteria, and could reduce HIV/AIDS and Hepatitis transmission from dirty needles and other improperly cleaned or disposed medical items. Regarding the environmental issues, a correct and sustainable management system of hospital waste will avoid the negative long term health effects, from the environmental release of toxic substances such as dioxin, mercury and others. From both volume and toxicity perspectives, the use of plastics in society is a focus of waste management concern. In the past, medical waste was often mixed with household waste and disposed of in municipal solid waste landfills. In recent years, increased public concerns over the improper disposal of hospital waste have led to a movement to regulate the waste more systematically and stringently by the Indian Government.

The challenge before us, therefore, is to scientifically manage growing quantities of biomedical waste that go beyond past practices. If we want to protect our environment and health of community we must sensitize ourselves to this important issue not only in the interest of health managers but also in the interest of community.

1.7. Scope For Future Studies

1. Viewing the effects, it leaves a scope for further study in the treatment and recycling process of the BMW. Healthcare waste management should be supported through appropriate education, training and the commitment of the healthcare staff, management and healthcare managers.

2. There is hope that the initial successful experience with privately built, owned, and operated CWTFs in Telangana and other states in India will form the foundation for common practice for urban areas of India.

3. Changes in culture regarding hygiene and HCW management practices have occurred at many healthcare facilities, and many facilities now accept the need to pay for off-site treatment and disposal of BMWs.
4. CBWTF being a highly specialized and specific job, involvement of specialized agencies would be necessary.

5. Private entrepreneurs with adequate background and capability may be encouraged to take up and organize such ventures.

6. The health care establishments may find it much more workable to hand over the day to day O&M to a private concern rather than doing it on their own. In this case, proper contract agreement must be made with the party with necessary terms and conditions and safeguards.

7. To predict the performance of digester under field conditions, a pilot plant study may be carried out.

8. Advanced digester design, operating techniques may be studied.

9. Methane bacteria are highly active in the mesophilic and thermophilic ranges. Study may be carried out by maintaining temperatures for different organic loading rates.

10. In a sponsored project from DRDO (Delhi), FCIPT explored the possibility of energy recovery during pyrolysis of plastic and cotton waste and understood its effect on the economics of the pyrolysis technology in the study and observed that the results from the initial set of experiments are highly promising and an intensive study is underway to understand and optimize the process and to increase the energy recovery close to the theoretical value. The CBWTF and WTE could work as a life saver in developing areas like Arunachal Pradesh, therefore, intensive study on these systems of treatment and energy recovery can be carried out to understand and optimize the CBWTF and in the State.

**Recommendations**

1. Effective implementation of rules by surprise visits and inspection by appropriate authorities and fixing accountability of each and every person involved in management of Bio-Medical waste.

2. Transportation should be done in closed trolleys and by separate route.

3. Sensitization of waste generators ad health care providers should be done more frequently, and separate sensitization programs should be organized for sweepers and fourth class health workers, in local language emphasizing the importance of using personal protective measures and immunization for Hepatitis B.

4. For the use of incinerator Training should be given to some number of persons from staff.

5. Private hospitals should also be allowed to use incinerator, which is installed, in govt. hospital. For this purpose a specific fee can be charged from private hospitals.

6. Bio-medical waste Management Board can be established in each District.

7. Either judicial powers should be given to the management board or special court should be established in the matters of environment pollution for imposing fines and awarding damages etc.

8. Housekeeping staff wear protective devices such as gloves, face masks, gowned, while handling the waste.
9. There is biomedical waste label on waste carry bags and waste carry trolley and also poster has put on the wall adjacent to the bins (waste) giving details about the type of waste that has to dispose in the baggage as per biomedical waste management rule.

10. Carry bags also have the biohazard symbol on them.

11. The entire waste management practices should be a part of total hygiene practice of the society rather than confining to hospital and health facility.

12. Intensive training programs at regular time interval for all the staff with special importance to the new comers.

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