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Review Article

AWARENESS TOWARDS BIOMEDICAL WASTE MANAGEMENT: A REVIEW

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Abstract

Proper handling, treatment and disposal of the biomedical waste material are most important issue for the health of the human beings. It is the responsibility of medical staff of medical treatment as well as the proper management of biomedical waste, which is still in its primary stages in many hospitals. The biomedical waste is hazardous, toxic and lethal. The inadequate knowledge about the proper handling of biomedical waste can be dangerous to the health of common man as well as of health care personnel. This review discusses about various types of waste, its hazards and management.

Keywords: Health, Biomedical waste, Disposal.

INTRODUCTION:

Management of the biomedical waste requires knowledge, specific regulations and should be dealt seriously. It must be appropriately managed to avoid the harmful effects on the specifically healthcare, general public and sanitation workers who are continuously exposed to biomedical waste as an occupation.[1,2]

Hospital waste defined as all waste, biologic or non-biologic that is discarded and not intended for further use. Medical waste is a subset of hospital waste; it refers to the material generated as a result of diagnosis, treatment or immunization of patients and associated biomedical research. Biomedical waste (BMW) is generated in hospitals, research institutions, health care teaching institutes, clinics, laboratories, blood banks, animal houses and veterinary institutes.[3-5]

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The health care management programs also includes as an essential elements, the proper handling, treatment and disposal of wastes. Today the term waste management covers collecting, sorting, processing, recycling and reusing materials; that otherwise considered as useless.[1,2]

Waste generated by health care activities includes a broad range of materials, including used needles and syringes, medical devices, diagnostic samples, soiled dressings, body parts, blood, chemicals, pharmaceuticals and radioactive materials.[6]

The biomedical waste carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling of healthcare waste may have significant impact on the environment and serious health consequences.[6]

SOURCES:

The sources of biomedical waste can be categorized as primary and secondary sources according to the quantities produced.[7]

Primary sources[7-9]:

- Govt. / private hospitals
- Nursing homes
- Dispensaries
- Maternity homes
- Dialysis centers
- Research labs
- Medical colleges
- Immunization centers
- Animal research centers
- Blood banks
- Production industries

Secondary sources[7-9]:

- Private clinics (including dental clinics)
- Ambulance services
- Home treatment
- Educational institutes
- Funeral services
- Health camps

Effects of biomedical waste[8]:

- Air pollution
- Water pollution
- Land pollution
- Radioactive emissions

HEALTH HAZARDS:

Bio-Medical waste if not managed properly will cause environmental pollution, unpleasant smell, growth and multiplication of vectors like insects, rodents and worms and may lead to the transmission of diseases like typhoid, cholera, hepatitis and AIDS. Various communicable diseases can spread through water, sweat, blood, body fluids and contaminated organs.[8-10]

Transmission of infections can also occur through needle-stick injuries, blood splashes and body fluid spills, mercury poisoning and other chemical exposures. There may also be

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increased risk of nosocomial infections. Inappropriate waste management may lead to change in microbial ecology and spread of antibiotic resistance.[5,11]

The doctors, nurses, technicians, hospital visitors, patients, sweepers, rag pickers and their relatives are exposed routinely to Bio-Medical Waste and are at more risk. Due to improper management, this infectious waste gets mixed with solid waste and ground water.[7]

CLASSIFICATION:

The World Health Organization (WHO) has classified medical waste into eight categories as[5,9]:

1. General Waste
2. Pathological
3. Radioactive
4. Chemical
5. Infectious to potentially infectious waste
6. Sharps
7. Pharmaceuticals
8. Pressurized containers

Whereas, In India, Ministry of Environment and Forest, Government of India (1998) has notified Bio-medical Waste (Management & Handling) Rules -1998, which describes ten categories.(Table 1 and 2)[5,12]

Biomedical wastes can also be classified as[2,5,10]:

Non-hazardous waste:

- The wastes generated by health care centers.
- Comprise about 85%.
- It constitutes food remnants, paper cartons, packaging material, fruit peels, wash water etc.

Hazardous waste

I. Potentially infectious waste:

- Includes infective medical waste, hazardous, red bag and contaminated, regulated and non-regulated medical waste.
- It adds up to 10% of the total waste which includes:

✓ Dressings and swabs infected with blood, pus and body fluids.
✓ Laboratory waste including laboratory culture stocks of infectious agents
✓ Potentially infected material: Excised tumors and organs, placenta.
✓ Potentially infected animals used in diagnostic and research studies.
✓ Sharps, which include needle, syringes, blades etc.
✓ Blood and blood products.

II. Potentially toxic waste:

- Radioactive waste: Wastes generated from in vitro analysis of body fluids and tissue.
- Chemical waste: Includes disinfectants, X-ray processing solutions, monomers and associated reagents, base metal debris (dental amalgam in extracted teeth).
- Pharmaceutical waste: Includes anesthetics, sedatives, antibiotics, analgesics etc.

Problems for biomedical waste management[3]:

- Inadequate space
- Lack of funds

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- Lack of awareness
- Inadequate waste management system
- Lack of monitoring facilities
- Lack of responsibility
- Non-availability of equipment's.

Management:

Proper management of the biomedical wastes includes following essential steps[9]:

1. Waste survey and collection
2. Segregation
3. Transportation and storage
4. Treatment
5. Transport to final disposal site
6. Final disposal

Proper labels should be used for the biomedical waste bags and carriers. (Fig.1 and 2)[9]

BIOMEDICAL WASTE TREATMENT AND DISPOSAL:

As health care waste is a heterogeneous mixture, it is difficult to manage. It can be simplified by proper management.[9,11]

1. Incineration Technology:

A high temperature thermal process includes combustion of the waste under controlled condition for converting them into inert material and gases.[9,11]

2. Non-Incineration Technology:

Non-incineration treatment includes four basic processes: thermal, chemical, irradiative, and biological. The majority of non-incineration technologies employ the thermal and chemical processes. The main purpose of the treatment technology is to decontaminate waste by destroying pathogens.[9,11]

It includes:

- Autoclaving
- Microwave irradiation
- Chemical methods
- Plasma pyrolysis

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Table 1:[12]

Category no.	Waste Content	Components	Method of Treatment & Disposal
	Human anatomical waste	Human tissues, organs, body parts	Incineration/ deep burial
	Animal Waste	Animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal, Houses	Incineration /deep burial
	Microbiology & Biotechnology Waste	Wastes from laboratory cultures, stocks or specimens of micro- organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents and industrial laboratories, wastes from production of biologicals, from research toxins, dishes and devices used for transfer of cultures	Local autoclaving/ micro waving/ incineration
	Waste sharps	Needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps	Disinfections chemical treatment /autoclaving/micro waving and mutilation shredding
	Discarded Medicines and Cytotoxic drugs	Wastes comprising of outdated, contaminated and discarded medicines	Incineration / destruction & drugs disposal in secured landfills
	Solid Waste	Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood	Incineration , autoclaving/ micro waving
	Solid Waste	Wastes generated from disposable items other than the waste sharps such as tubing's, catheters, intravenous sets etc	Disinfections chemical treatment /autoclaving/micro waving and mutilation shredding
	Liquid Waste	Waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities	Disinfections by chemical treatment and discharge into drains
	Incineration Ash	Ash from incineration of any bio-medical waste	Disposal in municipal landfill
	Chemical Waste	Chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc	Chemical treatment and discharges into drains

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Table 2:[12]

Color Coding	Type of Container	Waste Category
Yellow	Plastic bag	Category 1, 2, 3, 6 (human anatomical waste, animal waste, microbiology & biotechnology waste, solid waste)
Red	Disinfected container / Plastic bag	Category 3,6,7 (microbiology & biotechnology waste, solid waste)
Blue/White translucent	Plastic bag/puncture proof container	Category 4,7 (waste sharps, solid waste)
Black	Plastic bag	Category 5, 9, 10 (discarded medicine and cytotoxic drugs, incineration ash, chemicals)

Fig. 1 and 2: Labels for biomedical waste containers/ bags:

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CONCLUSION:

Awareness of biomedical waste management is very important to avoid hazardous effects of its inappropriate disposal. Proper management of biomedical waste is social responsibility as well as legal necessity. Effective education and communication strategy is important to implement the biomedical waste managements.

REFERENCES:

1. Arshad N, Nayyar S, Amin F, Mahmood KT. Hospital Waste Disposal: A Review Article. J Pharm Sci Res 2011;3(8):1412-1419.
2. Singh H, Rehman R, Bumb SS. Management of biomedical waste: a review. Int J Dent Med Res 2014;1(1):14-20.
3. Dalal P. Management of Infectious Bio-medical Waste of Ujjain City. International Journal of Advanced Research 2013;1(2):52-58.
4. Gautam V, Thapar R, Sharma M. Biomedical waste management: Incineration vs. environmental safety. Ind J Med Microbiol 2010;28(3):191-2.
5. Hegde V, Kulkarni RD, Ajantha GS. Biomedical waste management. J Oral Maxillofac Pathol 2007;11(1):5-10.
6. Archisman M, Gupta MK, Siddharudha S, Mishra CP, Mohapatra SC. Biomedical waste management practices of doctors: an online snapshot. National J Community Med 2012;3(2):227-31.
7. Tiwari AV, Kadu PA. Biomedical Waste Management Practices in India-A Review. International Journal of Current Engineering and Technology 2013;3(5):2030-4.
8. Babu BR, Parande AK, Rajalakshmi R, Sunykala P, Volga M. Management of Biomedical Waste in India and Other Countries: A Review. J. Int. Environmental Application & Science 2009;4(1):65-78.
9. Mathur P, Patan S, Shobhawat AS. Need of Biomedical Waste Management System in Hospitals - An Emerging issue - A Review. Current World Environment 2012;7(1):117-24.
10. Chakraborty S, Veeregowda B, Gowda L, Sannegowda SN, Tiwari R, Dhama K, Singh SV (2014). Biomedical waste management. Adv Anim Vet Sci 2014;2(2):67–72.
11. Kumar S, Manjunatha M, Vijetha B, Pradeep PR. Biomedical Waste Management: A Review. J oral Health and Community Dentistry 2012;6(3):141-5.
12. Notification by the Ministry of Environment and Forests, Govt. of India, New Delhi, 20th July, 1998. Available from: http://www.envfor.nic.in/legis/hsm/biomed.html.