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"BIO – MEDICAL WASTE"

A Dissertation Submitted To The

Dr. BABASAHEB AMBEDKAR TECHNICAL EDUCATION,LONERE.

In Partial Fulfillment Of The Eight Semester Of

BACHELOR OF PHARMACY

Submitted By

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Under the guidance of

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(2022-2023)

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CERTIFICATE

This is to certify that, the work presented in this titled **"BIO – MEDICAL WASTE"** for the submission in the partial fulfillment of **"Bachelor Of Pharmacy"** affiliated to, Dr. Babasaheb Ambedkar Technical Education Lonere at the ***ADITYA INSTITUTE PHARMACEUTICAL BEED*** by **Mr. GOPHANE PRAVIN LAXMAN** PRN.NO.**1925551823053** to my satisfaction, this project is ready forsubmission.

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Date:

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Place: Beed

MR.GARAD R.S.

DECLARATION

I hereby declare that this project entitled **"BIO – MEDICAL WASTE"** submitted to Dr. Babasaheb Ambedkar Technical Education ,Lonere review work carried out by me at, ***ADITYA INSTITUTE OF PHARMACEUTICAL BEED*** under the guidance of **MR.GARAD R.S.**

Mr. GOPHANE PRAVIN LAXMAN

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Mr.GOPHANE PRAVIN LAXMAN

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INTRODUCTION

'Bio-medical waste' means any waste generated during diagnosis, treatment or immunization of human beings or animals. Management of healthcare waste is an integral part of infection control and hygiene programs in healthcare settings. These settings are a major contributor to community-acquired infection, as they produce large amounts of biomedical waste. Biomedical waste can be categorized based on the risk of causing injury and/or infection during handling and disposal. Wastes targeted for precautions during handling and disposal include sharps (needles or scalpel blades), pathological wastes (anatomical body parts, microbiology cultures and blood samples) and infectious wastes (items contaminated with body fluids and discharges such as dressing, catheters and I.V. lines). Other wastes generated in healthcare settings include radioactive wastes, mercury containing instruments and polyvinyl chloride (PVC) plastics.

These are among the most environmentally sensitive by-products of health care. WHO stated that 85% of hospital wastes are actually non-hazardous, around 10% are infectious and around 5% are non-infectious but hazardous wastes. In the USA, about 15% of hospital waste is regulated as infectious waste. In India this could range from15% to 35% depending on the total amount of waste generated the management of bio-medical waste is still in its infancy all over the world.

There is a lot of confusion with the problems among the generators, operators, decision-makers and the general community about the safe management of bio-medical waste. The reason may be a lack of awareness. Hence resource material on the environment for hospital administrators, surgeons, doctors, paramedical staff and waste retrievers.

DEFINITION:

Hospital waste: Refers to all waste, biological or non-biological that is discarded and not intended for further use.

Biomedical waste: Means any waste, 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 including categories mentioned in Schedule I.

Infectious waste: The wastes which contain pathogens in sufficient concentration or quantity that could cause diseases. It is hazardous e.g. culture and stocks of infectious agents from laboratories, waste from surgery, waste originating from infectious patients.

CLASSIFICATION OF BIOMEDICAL WASTE

COLOUR CODING	TYPE OF WASTE	EXAMPLES
Yellow	a. Human anatomical waste	Human tissues, organs, body parts, fetus
	b. Animal anatomical waste	Experimental animal carcasses
	c. Soiled waste	Cotton contaminated with blood and other body fluids, plaster casts
	d. Expired or discarded medicines	Discarded tablets and capsules
	e. Chemical waste	Used or discarded disinfectants, chemicals used in biologicals
	f. Chemical liquid waste	Laboratory reagents, X ray film developer, disinfectants, floor washings, formalin
	g. Discarded linen, mattresses, beddings contaminated with blood or body fluid	Bedsheets, blankets, mattresses contaminated with blood or body fluids
	h. Microbiology, biotechnology and other clinical laboratory waste	Culture plates, blood bags, vaccines
Red	i. Contaminated waste (recyclable)	Plastic tubings, urine bags, vacutainers, gloves, catheters, Ryle's tube
White	j. Waste sharps including metals	Hypodermic needles, auto-disabled syringes, syringes with fixed needles, scalpels, knives, blades, lumbar puncture needles and intravenous needles.[1]
Blue	k. Glassware	Used glass bottles
	l. Metallic body implants	Body implants, Plates and screws

TABLE NO 1: CLASSIFICATION OF BIOMEDICAL WASTE AS PER BMWM RULES 2016

The World Health Organization (WHO) has classified medical waste into six categories

1) General
2) Pathological
3) Radioactive

4) Chemicals
5) Infectious to potentially infectious waste Sharps
6) Pharmaceuticals

SOURCES OF BIOMEDICAL WASTE

Hospitals produce waste, which is increasing over the years in its amount and type. The hospital waste, in addition to the risk for patients and personnel who handle them also poses a threat to public health and environment.

A. Major Sources

1) Govt. hospitals/private hospitals/nursing homes/ dispensaries.
2) Primary health centers.
3) Medical colleges and research centers/ paramedic services.
4) Veterinary colleges and animal research centers.
5) Blood banks/mortuaries/autopsy centers.
6) Biotechnology institutions.

B. Minor Sources:

1) Physicians/ dentists' clinics
2) Animal houses/slaughter houses.
3) Blood donation camps.
4) Vaccination centers.
5) Acupuncturists/psychiatric clinics/cosmetic piercing.
6) Funeral services.

PROBLEM RELATING TO BIOMEDICAL WASTE

A major issue related to current Bio-Medical waste management in many hospitals is that the implementation of Bio-Waste regulation is unsatisfactory as some hospitals are disposing of waste in a haphazard, improper and indiscriminate manner. Lack of segregation practices, results in mixing of hospital wastes with general waste making the whole waste stream hazardous. Inappropriate segregation ultimately results in an incorrect method of waste disposal.

Inadequate Bio-Medical waste management thus 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 through injuries from syringes and needles contaminated with human.

Various communicable diseases, which spread through water, sweat, blood, body

fluids and contaminated organs, are important to be prevented. The Bio Medical Waste scattered in and around the hospitals invites flies, insects, rodents, cats and dogs that are responsible for the spread of communication disease like plague and rabies. Rag pickers in the hospital, sorting out the garbage are at a risk of getting tetanus and HIV infections. The recycling of disposable syringes, needles, IV sets and other article like glass bottles without proper sterilization are responsible for Hepatitis, HIV, and other viral diseases. It becomes

primary responsibility of Health administrators to manage hospital waste in most safe and eco- friendly manner.

The problem of bio-medical waste disposal in the hospitals and other healthcare establishments has become an issue of increasing concern, prompting hospital administration to seek new ways of scientific, safe and cost effective management of the waste, and keeping their personnel informed about the advances in this area. The need of proper hospital waste management system is of prime importance and is an essential component of quality assurance in hospital

NEED OF BIOMEDICAL WASTE MANAGEMENT

The reasons due to which there is great need of management of hospitals waste such as:

1) Injuries from sharps leading to infection to all categories of hospital personnel and waste handler.
2) Nosocomial infections in patients from poor infection control practices and poor waste management.
3) Risk of infection outside hospital for waste handlers and scavengers and at time general public living in the vicinity of hospitals.
4) Risk associated with hazardous chemicals, drugs to persons handling wastes at all levels.
5) “Disposable” being repacked and sold by unscrupulous elements without even being washed.
6) Drugs which have been disposed of, being repacked and sold off to unsuspecting buyers.
7) Risk of air, water and soil pollution directly due to waste, or due to defective incineration emissions and ash.

There is a big network of Health Care Institutions in India. The hospital waste like body parts, organs, tissues, blood and body fluids along with soiled linen, cotton, bandage and plaster casts from infected and contaminated areas are very essential to be properly collected, segregated, stored, transported, treated and disposed of in safe manner to prevent nosocomial or hospital acquired infection.

1) Waste collection
2) Segregation
3) Transportation and storage
4) Treatment & Disposal
5) Transport to final disposal site

BIOMEDICAL WASTE TREATMENT AND DISPOSAL

Health care waste is a heterogeneous mixture, which is very difficult to manage as such. But the problem can be simplified and its dimension reduced considerably if a proper management system is planned.

1) Incineration Technology

This is a high temperature thermal process employing combustion of the waste under controlled condition for converting them into inert material and gases. Incinerators can be oil fired or electrically powered or a combination thereof. Broadly, three types of incinerators are used for hospital waste: multiple hearth type, rotary kiln and controlled air types. All the types can have primary and secondary combustion chambers to ensure optimal combustion. These are refractory lined.

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. Facilities should make certain that the technology could meet state criteria for disinfection.

3) Autoclaving

A. The autoclave operates on the principle of the standard pressure cooker.
B. The process involves using steam at high temperatures.
C. The steam generated at high temperature penetrates waste material and kills all the micro organism
D. These are also of three types: Gravity type, Pre-vacuum type and Retort type.

Operates with temperature of 121 deg. C. and steam pressure of15 psi. for 60-90 minutes. Vacuum pumps are used to evacuate air from the Pre vacuum autoclave system so that the

time cycle is reduced to 30-60 minutes. It operates at about 132 deg. C. Retort type autoclaves are designed much higher steam temperature and pressure. Autoclave treatment has been recommended for microbiology and biotechnology waste, waste sharps, soiled and solid

wastes. This technology renders certain categories (mentioned in the rules) of bio-medical waste innocuous and unrecognizable so that the treated residue can be land filled.

4) Microwave Irradiation

The microwave is based on the principle of In the first type (Gravity type), air is evacuated with the help of gravity alone. The system generation of high frequency waves. These waves cause the particles within the waste material to vibrate, generating heat. This heat generated from within kills all pathogens.

5) Chemical Methods

1 % hypochlorite solution can be used for chemical disinfection.

6) Plasma Pyrolysis

Plasma pyrolysis is a state-of-the-art technology for safe disposal of medical waste. It is an environment-friendly technology, which converts organic waste into commercially useful byproducts. The intense heat generated by the plasma enables it to dispose all types of waste including municipal solid waste, biomedical waste and hazardous waste in a safe and reliable manner. Medical waste is pyrolysis into CO, H2, and hydrocarbons when it comes in contact with the plasma-arc. These gases are burned and produce a high temperature (around 1200^{o}C).

BIOMEDICAL WASTE MANGEMENT RULE

Safe disposal of biomedical waste is now a legal requirement in India. The Biomedical Waste Management & Handling) Rules, 1998 came into force on 1998. In accordance with these rules, it is the duty of every “occupier” i.e. a person who has the control over the institution or its premises, to take all steps to ensure that waste generated is handled without any adverse effect to human health and environment. It consists of six schedules.

1) Schedule I
2) Schedule II
3) Schedule III
4) Schedule IV
5) Schedule V
6) Schedule VI

CATEGORIES OF BIOMEDICAL WASTE MANGEMENT

Category	Source of waste	Treatment and Disposal
1	Human Anatomical Waste (human tissues, organs, body parts)	Incineration /deep burial
2	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
3	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 industrial laboratories, wastes from production of biological, toxins, dishes and devices used for transfer of cultures)	Local autoclaving /microwaving incineration
4	Waste Sharps (needles, syringes, scalpels, blades, glass, etc.	Disinfection(chemical treatment/autoclaving/microwavi and mutilation/shredding”

5	Discarded Medicines & Cytotoxic drugs (wastes comprising of outdated, contaminated and discarded medicines)	Incineration /destruction and drugs disposal in secured
6	Soiled Waste (items contaminated with blood and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood	Incineration autoclaving/microwaving
7	Solid Waste (wastes generated from disposable items other than waste sharpsSuch as tabbing, catheters, intravenous sets etc.)	Disinfection by chemicaltreatment autoclaving/microwaving and mutilation/
8	Liquid Waste(waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities)	Disinfection by chemicaltreatment and discharge into

TABLE NO - 2 CATEGORIES OF BIOMEDICAL WASTE

EFFECTS OF BIOMEDICAL WASTE

The improper management in bio-medical waste causes stern environmental problems that causes to air, water and land pollution. The pollutants that cause damage can be classified into biological, chemical and radioactive. There are several legislations and guidelines in India concerning environmental problems, which can be addressed. The classification of radioactive waste generated as part of bio-medical waste is covered. Some of the effects of pollution on air, radio activities, land, health and hazards are discussed.

1) Air Pollution

Air pollution can be caused in both indoors and outdoors atmosphere. Biomedical waste that Generated by air pollution are been classified in three types namely-Biological, Chemical and radioactive)

2) In-door air pollution

Pathogens present in the waste can enter and remain in the air for a long period in the form of Spores or as pathogens Segregation of waste, pre-treatment at source etc., can also reduce this problem to a great extent. Sterilizing the rooms will also help in checking the indoor air pollution due to biological. The indoor air pollution caused due to the above chemicals from poor ventilation can cause diseases like Sick Building Syndrome (SBS). Proper Building design and well-maintained air conditioners can reduce the SBS. Chemicals should be utilized as per prescribed norms. Over use of chemicals should be avoided

3) Out-door air pollution

Outdoor air pollution can be caused by pathogens. The biomedical waste without pre-treatment if transported outside the institution, or if it is dumped in open areas, pathogens can enter into the Atmosphere. Chemical pollutants that cause outdoor air pollution have two major sources-open Burning and incinerators. Open burning of bio-medical waste is the most harmful practice. When Inhaled can cause respiratory diseases. Certain organic gases such as dioxins and furans are Carcinogenic the design parameters and maintenance of such treatment and disposal technology should be as per the prescribed standards (Bdour 2004).

4) Radioactive emissions

Research and radio-immunoassay activities may generate small quantities of radioactive gas. Gaseous radioactive material should be evacuated directly to the outside. The use of such device requires maintenance of the trap and monitoring of the off-gas .

5) Water Pollution

The liquid waste generated when let into sewers can also lead to water pollution if not treated properly Water pollution can alter parameters such as pH, BOD, DO, COD, *etc*. There are instances where dioxins are reported from water bodies near incinerator plants.

6) Radioactive effluent

Radioactive waste in liquid form can come from chemical or biological research, from body organ imaging, from decontamination of radioactive spills, from patient's urine and from scintillation liquids used in radioimmunoassay. Under normal circumstances, urine and faces can be handled as no radioactive waste so long as the patient's room is routinely monitored for radioactive contamination

7) Land Pollution

Soil pollution from bio-medical waste is caused due to infectious waste, discarded medicines, chemicals used metals such as cadmium, lead, mercury etc., which are present in the waste will get absorbed by plants and can then enter the food chain. Nitrates and phosphates present in leachates from landfills are also pollutants. Excessive amounts of trace nutrient elements and other elements including heavy metals in soil are harmful to crops and are also harmful to animals and human beings the permissible limits of some elements in soil for plants are presented in the Table 2. Minimizing the waste and proper treatment before disposal on land are the only ways of reducing this kind of pollution.

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LIFE CYCLE APPROACH IN BIOMEDICAL WASTE MANAGEMENT

Bio-medical waste management should be approached in a lifecycle manner. The management of waste starts form waste minimization, Segregation at source till its final treatment and disposal options. The important component that should be kept in mind throughout the life cycle approach is that of Worker safety, Patient safety and Environment safety. Health care waste management hierarchy depicts the application of waste minimization technique.

Medical care is vital for our life and health, but the waste generated from medical activities represents a real problem of living nature and human world. Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and on the environment Every day, relatively large amount of potentially infectious and hazardous waste are generated in the health care hospitals and facilities around the world. Indiscriminate disposal of BMW or hospital waste and exposure to such waste possess serious threat to environment and to human health that requires specific treatment and management prior to its final disposal

Waste minimization can be done at two points in HCFs

1. Firstly, at Procurement stage referred to as Step Zero (step 0) by adopting purchasing environmentally friendly products.
2. Secondly, during the process of segregation by applying the 4 R principle

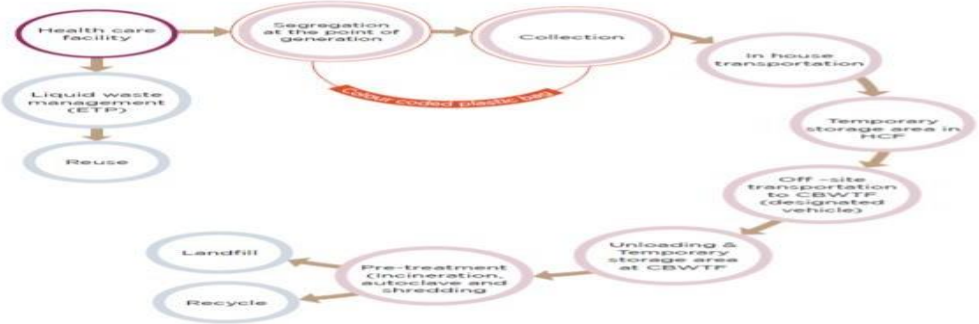

Fig No. 1 LIFE CYCLE APPROACH IN BIOMEDICAL WASTE MANAGEMENT

4 'R's help in environmentally sound and safe management of medical waste by minimizing

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and managing the waste and waste streams effectively.

Fig No.2 4 'R's

1) REDUCE

Reducing the waste is a simple and primary step in minimizing the waste generation. This can be achieved by

1. Environmentally preferable purchasing
   a) Products or services whose environmental impacts have been assessed and found to be not harmful to human health and environment
   b) Also called "green purchasing"
   c) Includes everything from recycled paper at the simplest level to medical equipment at higher levels
   d) Employs a 'life-cycle' approach to reduce overall environmental impact

2. Inventory control in pharmacy and store room

3. Employing reusable and recyclable products.

2) REUSE

Re-use is reusing the product over and over again for a given function intended as well as finding another use for a product.

1. Reuse as a principle of waste management demands selection of such materials that can be reused rather than those that have to be disposed after single use. This principle can be applied whenever possible.

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2. Standards for disinfection and sterilization have to be strictly followed if equipment's and materials have to be reused.

3. a combination of or all sterilization processes as autoclaving, disinfection, cleaning, reconditioning and decontamination methods should be used for the devices such that they are safe for reuse.

4. Items not directly used for healthcare can be used for reuse - paper, cardboard, glass, metal containers, plastic wrappings etc.

5. Devices such as syringes and hypodermic needles that are meant for single use must not be reused as the risk of cross infection is high.

3) RECOVER

Resource recovery can be achieved by selective extraction of disposed materials from waste stream for a specific next use by diverting it to resource recovery stream.

1. Solvent recovery in the hospital laboratory

2. Silver recovery in Radiology Department

3. Mercury recovery.

4) RECYCLE

Recycling is reprocessing of a used item into a new raw material. Often reduce and reuse terminologies often used synonymously. While Reuse refers to use of the product or item in the original form either for same purpose or for different purpose, recycling refers to when the product will lose its original form and shape and may be used for different purpose. Recycling office paper, newspapers, aluminum cans, glass bottles, construction debris, etc.

BIO – MEDICAL WASTE

RISK INVOLVE IN BMW MANAGEMENT:

1) Risk of air, water and soil pollution directly due to waste, or due to defective incineration emissions and ash.
2) Drugs which have been disposed of, being repacked and sold off to unsuspecting buyers.
3) Nosocomial infections in patients from poor infection control practices and poor waste management.
4) Risk of infection outside hospital for waste handlers and scavengers.

TRANSPORTATION AND STORAGE

The waste may be temporarily stored at the central storage area of the hospital and from there it may be sent in bulk to the site of final disposal once or twice a day depending upon the quantum of waste.

During transportation following care should be taken:

1) Ensure that waste bags/containers are properly sealed and labeled.
2) Bags should not be filled completely, so that bags can be picked up by the neck again for further handling. Hand should not be put under the bag. At a time only one bag should be lifted.
3) Manual handling of waste bags should be minimized to reduce the risk of needle prick injury and infection.
4) BMW should be kept only in a specified storage area.
5) After removal of the bag, clean the container including the lid with an appropriate disinfectant.
6) Waste bags and containers should be removed daily from wards / OPDs or even more frequently if needed (as in Operation Theatres, ICUs, labor rooms). Waste bags should be transported in a covered wheeled containers or large bins in covered trolleys.

Fig No. 3 OFF-SITE TRANSPORTATION

BIO – MEDICAL WASTE

SAFETY MEASURE

All the generators of biomedical waste should adopt universal precautions and appropriate safety measures while handling the bio- medical waste.

It should be ensured that:

1) Drivers, collectors and other handlers are aware of the nature and risk of the waste.
2) Written instructions provided regarding the procedures to be adopted in the event of spillage/ accidents.
3) Protective gears provided and instructions regarding their uses are given.

Waste types not to be incinerated are:

1) Pressurized gas containers.
2) Large amount of reactive chemical wastes.
3) Silver salts and photographic or radiographic wastes.
4) Halogenated plastics such as PVC.
5) Waste with high mercury or cadmium content such as broken thermometers, used batteries.
6) Sealed ampoules or ampoules containing heavy metals.

MANAGEMENT OF CHEMICAL SPILL:

Accidental spillage of chemicals / chemical waste within the health care facility has to be given the due importance and dealt by trained personnel. Only the area contaminated with spillage needs clean up.

Step 1: Put a caution board and cordon off the area.

Step 2: Decontaminate the eyes and skin of exposed personnel immediately.

Step3: Inform the designated person (usually the Safety Officer or the Waste Management Officer), who should coordinate the required necessary actions.

Step 4: Determine the nature of the spilled material.

Step 5: Exposed individuals to be provided with first aid and medical care.

Step 6: Wear PPE – Gown, Cap, Mask, Goggles and gloves in that order.

Step 7: Limit the spread of spill and neutralize (Neutralize acids with soda ash or sodium bicarbonate. Bases can be neutralized with citric acid or ascorbic acid) and leave

it for 30 minutes.

Step 8: Decontaminate or disinfect the area: wipe the area dry using a wipe. Only one side of the cloth has to be used for wiping as turning over of the cloth may spread the contamination.

Step 9: Collect all spilled and contaminated material (sharps should be picked up by brushes and pans or other suitable tools). Spilled material and the material used for cleaning should be disposed in yellow bin.

Step 10: Wipe the area and dry with absorbent cloth.

Step 11: Remove PPE (heavy duty gloves and gum boots can be washed and dried and replaced into the spill kit; other PPE to be disposed in yellow bin)

Fig No. 4 MANAGEMENT OF A SPILL

CHARACTERICTICS WASTE SUITABLE FOR INCINERTION ARE:

1) Low heating volume above 2000 Kcal/Kg for single chamber incinerators and Above 3500 Kcal/Kg for pyro lytic double chamber incinerators.
2) Content of combustible matter above 60%.
3) Content of noncombustible matter below 50%.
4) Content of non-combustible fines below 20%.
5) Moisture content below 30%.

DISPOSAL METHODS

Different methods are used for the disposal of bio medical waste as follows:

1) Incineration:

It is a controlled combustion process where waste is completely oxidized and harmful microorganisms present in it are destroyed /denatured under high temperature. An article regarding plasma pyrolysis of medical waste was reported by Neema and The authors stated that the operating cost of the system would be Indian Rupees 13 per kilograms (kg), and the energy recovered would cost Indi hospital waste generated are in Table 5. Incineration is popular in countries such as Japan where land is a scarce resource, as they do not consume as

much area as a landfill. Sweden has been a leader in using the energy generated from incineration over the past 20 years.

Denmark also extensively uses waste-to-energy incineration in localized combined heat and power facilities supporting district heating schemes and Rupees 8 per kg; thus the net cost would be Rs. 7 per kg.

Machinery requirements for Common Waste Treatment Facility

1) Incinerators
2) Auto Claves
3) Microwave equipment
4) Shredders
5) Chimney
6) Effluent Treatment
7) Vehicle Washing Equipment's
8) Water pumps, Storage, Air Compressors

2) Autoclaving

Autoclaving is a low-heat thermal process where steam is brought into direct contact with waste in a controlled manner and for sufficient duration to disinfect the wastes.

For ease and safety in operation, the system should be horizontal type and exclusively designed for the treatment *of* bio-medical waste. For optimum results, pre-vacuum based system be preferred against the gravity type system. It shall have tamper-proof control panel with efficient display and recording devices for critical parameters such as time, temperature, pressure, date and batch number etc.

3) Microwaving

Microbial inactivation occurs as a result of the thermal effect of electromagnetic Radiation spectrum lying between the frequencies 300 and 300,000 MHz Microwave heating is anointer-molecular heating process. The heating occurs inside the waste material in the presence of steam.

4) Hydroclaving

Similar to that of autoclaving except that the waste is subjected to indirect heating by applying steam in the outer jacket. The waste is continuously tumbled in the chamber during the process.

PROBLEMS ASSOCIATED WITH BMW:

Organism	Diseased caused	Related waste item
Viruses HIV, Hepatitis B, Hepatitis A,C, Arboviruses , Enteroviruses	HIV, Hepatitis B, Hepatitis A,C,Arboviruses, Enteroviruses	Infected needles, body Fluids, Human excreta, soiled linen, Blood, body fluids.
BACTERIA Salmonella typhi, Vibrio cholera , Clostridium Titani, Pseudomonas, Streptococcus	Typhoid, Cholera, Tetanus Wound infections, septicemia, rheumatic fever, endocarditis , skin and soft tissue infection.	Human excreta and body fluid in landfills and hospital wards, Sharps such as needles, surgical blades in hospital
PARASITES Wucherari Bancrofti, Plasmodium	Cutaneous leishmaniasis , Kala Azar, Malaria	Human excreta, blood and body fluids in poorly managed sewage system of Hospitals.

TABLE NO – 3 PROBLEMS ASSOCIETED WITH BMW

ENIVIRONMENT LEGISLATION

1) The Environment (Protection) Act, 1986
2) The Biomedical Waste (Management & Handling) Rules, 1998
3) The Municipal Solid Waste (Management & Handling) Rules, 2000
4) The Hazardous Waste (Management & Handling) Rules, 1989
5) The National Environmental Tribunal Act, 1995
6) The Air (Prevention and Control of Pollution) Act, 1981

CLASSIFICATION OF HEALTH CARE BIOMEDICAL WASTE

1) Infectious waste

a) Waste from isolation wards

b) Lab cultures

c) Tissues(swabs)

d) Materials/equipment's of infected patients

Fig No. 5 INFECTIOUS WASTE

2) Pathological waste

a) Human tissues/fluids

b) Body parts

c) Blood

d) or body fluids

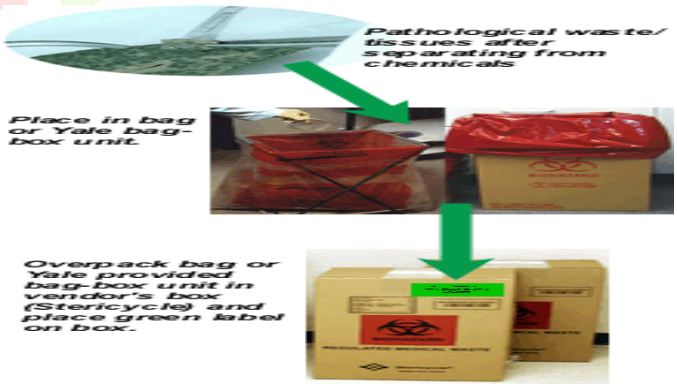

Fig No. 6 PATHOLOGICAL WASTE

3) Sharp waste

a) Scalpels

b) Knives Blades

c) Broken Glass

Fig No. 7 SHARPE WASTE

4) Pharmaceutical waste

a) Expired Pharmaceuticals

b) Contaminated Pharmaceuticals

c) Banned Pharmaceuticals

Fig No. 8 PHARMACEUTICAL WASTE

5) Genotoxic waste

a) Waste Containing Cytotoxic Drugs(often Used In Cancer Theraphy)

b) Genotoxic Chemical

Fig No. 9 GENOTOXIC WASTE

6) Chemical waste

a) Lab reagents

b) Film develop

c) Expired disinfectants

Fig No. 10 CHEMICAL WASTE

7) Pressurized containers

a) Gas cylinders

b) Gas cartridges

c) Aerosol cans

Fig No. 11 PRESSURIED CONATIONER

SOURCES OF HEALTH CARE WASTE

A) Government/private hospitals

1) Nursing homes
2) Physician/dentist office or clinic
3) Dispensaries
4) Primary health care centers
5) Medical research and training centers
6) animal/slaughter houses
7) labs/research organizations
8) Vaccinating centers
9) Bio tech institutions/production

TRANSPORT TO FINAL DISPOSAL SITE

Transportation from health care establishment to the site of final disposal in a closed motor vehicle (truck, tractor- trolley etc.) is desirable as it prevents spillage of waste on the way. Vehicles used for transport of BMW must have the **"Bio- Hazard" symbol** and used these vehicles should not be for any other purpose.

CONCLUSION:

Proper management of Bio medical waste is a concern that has been recognized by both government agencies and the Non-government organizations. Several hazards and toxic material containing should be disposed of with proper take and care. Inadequate and inefficient segregation and transportation system may cause severe problem to the society hence implementing of protective measures, written policies all of these factors contribute to increased risk of exposure of staff, patients and the community to biomedical hazards.

In order to accelerate the rate at which proper processing and management methods are designed, timely regulatory and legislative policies and procedures are needed. To properly separate, process and isolation of wastes, they must be well-characterized, Qwhich is challenging. Safe and effective management of bio medical waste is not only a legal necessity but also a social responsibility. Lack of concern in persons working in that area, less motivation, awareness and cost factor are some of the problems faced in the proper hospital waste

management. Proper surveys of waste management procedures in various practices are needed. Clearly there is a need for education as to the hazards associated with improper waste disposal.

An effective communication strategy is imperative keeping in view the low awareness level among different category of staff in the health care establishments regarding biomedical waste management. One important direction for future research would be to project the flows of bio medical waste worldwide and quantitatively and qualitatively assess.

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