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A STUDY ON THEORETICAL FRAME WORK FOR DISPOSAL OF BIOLOGICAL MEDICAL WASTE AND ITS MANAGEMENT

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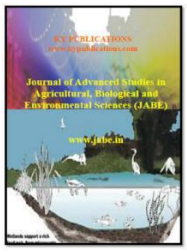

ABSTRACT

The Bio-medical waste generated from various sources has become a problem and much attention is being given worldwide to find out solution of this problem. The main concern lies with the hospital waste generated from large hospitals/nursing homes as it may pose deleterious effects due to its hazardous nature. Bio-medical wastes, if not handled in a proper way, is a potent source of diseases, like AIDS, Tuberculosis, Hepatitis and other bacterial diseases causing serious threats to human health. This review mainly Owing to the discussed potential threats this waste needs prime attention for its safe and proper disposal.

Keywords: Biomedical waste, Disposal, Hospital

INTRODUCTION

Medical science most of the hospitals/nursing homes are now equipped with latest instruments for diagnosis and treatment of various diseases. One of the most important aspect associated with hospitals is the safe management of the wastes.

The Bio-medical waste generated from various sources has become a problem and much attention is being given worldwide to find out solution of this problem. The main concern lies with the hospital waste generated from large hospitals/nursing homes as it may pose deleterious effects due to its hazardous nature. Owing to the discussed potential threats this waste needs prime attention for its safe and proper disposal.

The following are the objectives of the study.

- To deal with the generation/handling/treatment/disposal of Bio Medical Waste.
- To observe the Bio-Medical Waste (Management and Handling) Rules, 1998.
- To study the standards for treatment and disposal of bio-medical waste.
- To segregate waste at source for safe and proper disposal.
- To suggest the suitable steps in managing the bio0 medical waste at hospitals.

Significance the study

- General Waste and Infectious as well as hazardous waste generated from different activities of the hospital should be properly separated. Even if a small amount of infectious waste gets mixed with general waste, it can contaminate the entire waste collected. Segregation at source means separation of the waste materials from each other at the place of its generation. For example, the quantity of the infectious waste generated in OTs, ICUs is proportionately greater than the non-infectious waste. If the waste is segregated there itself, then the risk of infection can be greatly reduced.

Hospital industry profile

- Medicine and surgery date back to the beginning of civilization because diseases preceded humans on earth. Early medical treatment was always identified with religious services and ceremonies. Priests were also physicians or medicine men, ministering to spirits, mind and body,

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Priests/doctors were part of the ruling class with great political influences and the temple/hospital was also a meeting place.

Bio-Medical waste

Bio-Medical waste is an extremely hazardous type of waste and if not managed properly, it can lead to serious health and environment problems. "Bio-medical waste is any type of waste generated during the **diagnosis, treatment** or **immunization of human** beings or **animals** or in research activities pertaining to the production of drugs in **pharmaceutical** companies, **animal waste** generated in the veterinary hospitals and also in the slaughter houses, etc."

Bio-medical waste is also generated at the domestic level in the form of sanitary pads, diapers, cotton swabs and gauges, disposable razors, etc. In many cases, the patient is given treatment in his or her own house when the hospitalization is not possible due to some or the other reason. Domestic Bio-Medical waste has not been given any consideration so far. Although, Bio-Medical waste includes the waste produced by the living organisms because of human activities, more attention and emphasis is being given on the management of the Bio-Medical waste generated in the healthcare centers or hospitals.. The quantum of waste thus generated varies according to the site and the nature of treatment. Bio-Medical waste is also generated in the clinics and dispensaries belonging to the general practitioners and the dentists.

At present with advancement of medical science most of the hospitals are now equipped with latest instruments for diagnosis and treatment of various diseases. One of the most important aspect associated with hospitals is the safe management of the wastes; generated from these establishments,

This contains;
Human anatomical wastes
Blood,
Body fluid,
Disposable syringe,
Used bandages,
Surgical gloves,
Blood bags intravenous tubes etc.

The Bio-medical waste generated from various sources has become a problem and much attention is being given worldwide to find out solution of this problem. The main concern lies with the hospital waste generated from large hospitals as it may pose deleterious effects due to its hazardous nature. Bio-medical wastes, if not handled in a proper way, is a potent source of diseases, like AIDS, Tuberculosis, Hepatitis and other Bacterial diseases causing serious threats to human health. Owing to the discussed potential threats this waste needs prime attention for its safe and proper disposal.

Hospital Waste:

Hospital is a place, where an individual is examined by the doctors, diagnosis is made and an appropriate treatment plan is worked out. Depending upon the extent or the intensity of illness, the patients are either treated in out patient department (OPD) or are admitted in the hospital for treatment and follow up. In both the cases, greater amount of waste is generated during this procedure. The quantum of waste thus generated varies according to the site and the nature of treatment. For example, in the minor operation theatres (OT), the amount of waste would be less than that of the major OT. Similarly, the amount of infectious waste is more in the maternity hospitals than in a general hospital. In orthopedic specialties, this amount is much less. Thus, the amount of waste will vary depending upon the nature of treatment. At individual ward level also, waste is generated. However, this is generally non-infectious, domestic type. Apart

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from the hospitals, BMW is also generated in the clinics and dispensaries belonging to the general practitioners and the dentists.

Hospital waste is different from domestic waste and must be segregated, collected and disposed off using scientific technology. If segregation is not done properly at source, it can get mixed with municipal solid waste resulting in possible exposure of the entire community to the microorganisms, which are responsible for highly infectious and dreadful diseases like HIV, hepatitis A, B and C, tuberculosis, and other skin and respiratory ailments. In many hospitals, unscientific technologies, like burning of the waste are used for disposal of the hospital waste. This can lead to dangerous levels of emission of gases like dioxins and furans in the environment, which contain cancer causing agents. Residual ash, if not disposed off in secured landfills, can also pollute the underground water and contaminate the soil. The waste generated in the hospitals in particular can be categorized as follows:

General Waste: This makes about 80-85% of the total waste generated in a hospital. This is non-infectious and can be easily managed if it is segregated at source properly. General waste includes items like paper, cardboard boxes, plastic packaging, metal boxes, etc. which is non biodegradable Another category of general waste includes kitchen waste which consists of left over food, vegetable and fruit peels, meat, fish, tea bags or used tea powder, coconut shells, flowers or bouquets brought in by patient's visitors, etc. which is biodegradable.

Infectious Waste: This accounts for only a small fraction comprising about 10-15% of the total volume of waste generated in a hospital. However, this small fraction is of the biggest concern as it poses direct threat to the health and hygiene of the human beings by transmitting viral, bacterial fungal or parasitic diseases.

This type of waste includes:

a) **Pathological Waste:** Human anatomical wastes, like organs, body parts, tumours, glands, etc. that are removed during surgery or biopsy or any other medical procedure, amputated parts and also tissues, placentas, aborted foetuses, blood and other body fluids, etc., animal carcasses and tissues from laboratories, dressings, cotton swabs soaked in blood/body fluids, hospital gowns, aprons and other similar materials which have been in contact with a patient's body,

b) Infectious Plastic: Disposable items like syringes, IV sets, blood bags, catheters, gloves, endotracheal tubes, canulas, dialysis sets, etc.

c) Sharps: These are the most dangerous contents of the hospital waste especially for the healthcare staff handling these. Sharps include broken glass articles or metal articles such as needles, blades, scalpels, saws, nails, etc.

Non-Infectious, but Hazardous Waste: This type of waste does not contain any infectious, i.e. disease causing component and comprise about 5-10% of the total volume of waste generated in a hospital. However, it can cause serious health hazards like burns, corrosions, genotoxicity, chromosomal aberrations, toxicity, carcinogenic effects, etc. These include:

a) **Chemical Waste**: Chemicals like disinfectants, fumigants, other solid, liquid or gaseous substances, etc. These can be hazardous, if these possess corrosive, inflammable or reactive genotoxic properties, or these can be non-hazardous, if these do not possess these properties. These include inorganic salts, buffer chemicals, sugars, amino acids, etc.

b) **Radioactive Waste**: Solids, liquids and gases from in vitro analysis of tissues and body fluids, X-rays, chemical dyes and isotopes of various radioactive elements frequently used in diagnosis and /or treatment of diseases, etc.

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c) **Cytotoxic Waste**: This type of waste is generated form diagnosis and treatment of diseases like cancer. This type of waste can be found in small quantities in human excreta, I.V. solutions and containers from laboratories.

d) **Waste with multiple categories**: At times, the waste generated in hospitals falls into more than one category like radioactive sharps, plastic I.V. tubes contaminated with cytotoxic drugs, etc.

Infectious Plastic, Disposable items like syringes

Infectious Plastic: IV sets, blood bags, catheters

BIOHAZARD SYMBOL
जैविक परिसंकट चिन्ह

BIOHAZARD
जैविक परिसंकट

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- Published by Govt. of India, under Section 6 & 25 of Environmental Protection Act 1986 on 20/7/98 and appeared in official gazette of India on 27/7/98.
- Deals with the generation/handling/treatment/disposal of Bio Medical Waste.
- These rules apply to all persons who generate, collect, receive, store, transport, treat, dispose or handle bio-medical waste in any form.
- Rule 4 specify duty of occupier (generator) to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.
- Rule 5 and 6 specifies waste management procedures.
- These rules apply to all persons who generate, collect, receive, store, transport, treat, dispose or handle bio-medical Waste in any form. Every occupier of an institution generating, collecting, receiving, storing, transporting, treating disposal and for handling Bio-medical waste in any other manner, except such occupier of clinics, dispensaries, pathological laboratories, blood banks providing treatment/service to less Than 1000 patients per month and also the operators of Biomedical waste facility are covered under these rules.
- As per these rules, this shall be the duty of every occupier {as defined in rule 3(8)} of an institution generating bio-medical waste which includes a hospital, nursing home, clinic dispensary, veterinary institution, animal house, pathological laboratory blood bank by what ever name called to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.
- The prescribed authority to generate, collect, receive, store, transport, treat, dispose and/or handle bio-medical waste in accordance with these rules and any guidelines issued by the Central Government.
- The diagnosis, treatment or immunisation of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals, and including categories mentioned in Schedule I.
- Any preparation made from organisms or micro-organisms or product of metabolism and biochemical reactions intended for use in the diagnosis, immunisation or the treatment of human beings or animals or in research activities pertaining.

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- Any facility wherein treatment. disposal of bio-medical waste or processes incidental to such treatment or disposal is carried out.
- Any institution generating bio-medical waste, which includes a hospital, nursing home, clinic dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called, means a person who has control over that institution and/or its premises.
- A person who owns or controls or operates a facility for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste.

BIO-MEDICAL WASTE: How to Manage?

It is essential to manage the hospital waste in a proper way. The following hints may be useful:

- Use a 'mantra' of three R's, i.e., *Reduce, Reuse and Recycle!*
- Segregate at source for safe and proper disposal.

Segregation of waste at source for safe and proper disposal :Basic and the most important step in managing the hospital waste.

General Waste and Infectious as well as hazardous waste generated from different activities of the hospital should be properly separated. Even if a small amount of infectious waste gets mixed with general waste, it can contaminate the entire waste collected. Segregation at source means separation of the waste materials from each other at the place of its generation. For example, the quantity of the infectious waste generated in OTs, ICUs is proportionately greater than the non-infectious waste. If the waste is segregated there itself, then the risk of infection can be greatly reduced.

Segregation in a hospital results in:

- Waste minimisation
- Effective waste management
- Decrease in expenses incurred in managing waste
- Reduce the risk of infection ensuring better healthcare
- Prevent infection to communities living in the vicinity of the hospital that may be exposed to the infectious hospital waste.

Segregation should be done as per specific treatment and disposal requirements. Segregated waste must be stored in coloured containers as per the colour coding system prescribed by the Ministry of Environment and Forests, Govt. of India, under Bio-Medical Waste (Management and Handling), 1998 rules

The ideal system would be to use different coloured garbage bags or liners in waste storage bins. There are four major colour codes as per the notification:

Black Bag: Used for collecting general waste i.e., paper, non-infectious plastics, cardboard boxes, and other dry waste generated in hospital office or in the wards. For kitchen waste, a separate, preferably a green coloured container is highly recommended.

What is the current practice and why it is harmful?

The current practice is to collect and throw the entire waste in common municipal refuse collector. This ultimately results in the creation of large volume of garbage ultimately causing overburdening of the landfills.

Where should this waste go?

However, when segregated in this way, the 'dry', non-infectious waste can be reused after recycling it at a recycling facility. The 'wet', non-infectious and bio-degradable waste from the hospital kitchens can be used for making good quality compost within the hospital premises only and can be effectively used for a healthy garden of the hospitals.

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Red Bag: To be used for segregated plastics collected from OTs, ICUs and from the wards. You have to be very careful and strict about proper segregation of this waste component.

What is the current practice and why it is harmful?

The current practice is to mix this waste with general waste after improper disinfection or even in some places, disinfection is not carried at all. This thus enters a common municipal refuse collection bins. The rag pickers segregate these and sell these for a small price. These plastics are then repackaged imitating the original and resold thus causing serious health problems to the concerned people.

Where should this waste go?

This waste should be disinfected by applying an authorised, scientific methodology. The best way to disinfect is to autoclave this waste. After autoclaving, all the plastic should be shredded or mutilated to avoid unauthorised use. Such plastic can be then recycled and reused for good cause for the community.

Yellow Bag: Used for highly infectious items like pathological waste, human anatomical waste such as body parts, amputated parts/ organs, tumours, placentas, aborted or otherwise abnormal or dead foetuses, etc. In addition to this, it also includes blood soaked cotton bandages, animal tissues, organs, carcasses and other wastes.

What is the current practice and why it is harmful?

The current practice is to mix this waste with general waste and thus throw this in a common municipal garbage collection. The hazards of such mixing are already discussed **earlier**. In many hospitals, most of the human anatomical wastes are buried in the soil. However, this practice is dangerous and causes serious social and environmental problems.

Where should this waste go?

As per the Central Pollution Control Board regulation, deep burial of this type of waste is not acceptable for towns or cities above a population of 5 lakhs.

The best solution that is available these days is to incinerate this type of waste. In this technology, the contents of the yellow bag are burned in an incinerator at extremely high temperature (800 0 C-1100 0 C). The contents of the yellow bag are thus turned completely into residual ash, which can be safely buried in the soil. The alternative technologies that are available include use of microwaves, hydroclaves, plasma pyrolysis, etc.

Blue or White, Opaque Bag: This bag is used for collecting the segregated metal and /or glass sharps such as needles, blades, saws, scalpels and all such similar type of waste.

These bags must be puncture proof as the sharp metal or broken glass wastes are to be collected in these.It is, however strongly recommend to the hospital staff that even metal sharps and broken glass articles are to be segregated. Ideally, a metal box should be used for collecting the metal sharps and glass sharps should be collected in blue/ white bags.

Lead Containers: These are to be used, if necessary, for radioactive wastes which are to be disposed as per the guidelines provided by Bhabha Atomic Research Centre (BARC), Mumbai. Radioactive wastes, especially cobalt needles used for Brachy treatment must be returned to BARC. Cytotoxic waste can be stored in sturdy cardboard boxes, which can be incinerated later.

Disinfection : It is a process of destruction or removal of pathogen which gives rise of infection. Hospital Medical Waste in category of “Infectious Waste” should be disinfected before final disposal as it contains pathological microorganisms responsible for diseases.

Disinfection should be used even if sterilisation facilities are available. Infectious waste should be disinfected before it is disposed off. Instruments and equipments that come in contact with contaminated

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floor, surfaces like trolley tops, table tops, clothes, bedding, beds, utensils and other articles like bed pan etc. should be regularly disinfected.

Disinfectant : Any chemical substance used for disinfection.

Methods of Disinfection:

- Thermal
- Chemical (Formaldehyde, Ethylene Oxide, etc.)
- Irradiation and ultraviolet
- Microwave
- Filtration

Managing Chemical waste:

a. Chemotherapy and antineoplastc chemicals : Reducing the volume to be used. Optimising the size of the drug container while purchasing Returning the outdated drugs to the manufacturerCentralising chemotherapy compounding location Providing spill clean ups Segregating the wastes.
b. Formaldehyde: Minimise the strength of formaldehyde solutions. Minimise the waste from cleaning dialysis machines and RO units. Use reverse osmosis water treatment to reduce dialysis-cleaning demand. Capture waste formaldehyde Investigate the possibility of reuse in pathology, autopsy labs, etc.
c. Photographic chemicals: Return of spec developer to the manufacturer. Cover developer and fixes cans to reduce evaporation. Recover silver efficiency. Recycle waste film and paper. Segregate and label properly the radioactive wastes and store short-lived wastes in isolation until decay permits disposal in trash.Substitute less hazardous cleaning agents, methods for solvent cleaners, etc.
d. Solvents: Reduce the volume requirement. Use premixed kits for tests involving solvent fixation. Use calibrated solvent dispensers for routine tests.Segregate solvent wastes. Recover used solvents through distillation.
e. Mercury: Substitute electronic sensing devices for mercury containing devices. Make provisions for mercury spill clean up kits and proper training to the concerned personnel. Recycle uncontaminated mercury waste using proper safety controls.
f. Waste Anesthetic gases: Purchase low leakage equipments and maintain these properly,
g. Toxic corrosives and Miscellaneous chemicals: Inspect and maintain ethylene oxide sterilisers. Use less toxic compounds, cleaning agents, etc.Return the containers for reuse and make use of recyclable containers.Neutralise the acidic waste by mixing with basic wastes. Avoid spills; make use of mechanical handling aids. Use automated system for laundry equipments. As far as possible, use physical cleaning methods.

Common Bio-Medical Waste Treatment and Disposal Facility (CBMWTDF) run by Enviro-Vigil, a Thane based NGO: An Ideal project, set by NGO.

Enviro-Vigil is a NGO working hard to tackle various environmental issues in and around Thane city, for the past six years. As a NGO, it has set up a common facility for collection, transportation, treatment and disposal of BMW generated in the healthcare facilities since past three and a half years. This facility has been set up for Thane Municipal Corporation. All the private and government hospitals in the jurisdiction of TMC have joined this facility. In addition, private and govt. hospitals from Vasai, Nalasopara, Bhayander, Mira Road, Virar, etc. have joined this facility. Waste is also collected from the pathology labs, diagnostic centres, etc. Enviro-vigil provides on site training to the hospital staff, in which the details regarding handling and management of BMW are explained. The nurses and class four employees are made aware about the colour coding system and significance of segregation at source. About 500 to 600 kg waste is received per day at the

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facility, out of which, almost 400 kg is "incinerable" waste. The plastic waste is disinfected by autoclaving, shredded and sent for recycling. The volume of metal sharps and disposable glass articles is comparatively less. These are also disinfected at the facility, and then sent out for recycling. The residual ash is disposed of as per the norms provided in the rules.

Enviro-vigil has a pyrolytic incinerator with a burning capacity of 50 kg of incinerable waste per hour. It is manufactured by Thermax (India) Pvt. ltd., Pune, Mharashtra. It is a dual chambered incinerator with Venturi scrubber. Enviro-Vigil has also set up an effluent treatment plant (ETP) as per the requirement. It has obtained all the necessary authorisations and permits from MPCB. Transportation is carried out in its own vehicles, which have been designed as per the specifications provided by the MPCB and are totally dedicated for this cause only. Enviro-Vigil has its own staff that are committed and dedicated to run this facility for a social cause. This facility is located in the campus of Thane Municipal Corporation's Chhatrapati Shivaji Maharaj Hospital (CHM Hospital) and Rajeev Gandhi Medical College, at Thane-Belapur road, Kalwa, Thane. As this facility is being run by a NGO, it is receiving good response and appreciation from various sectors of the society. Barring a few shortfalls, even the authorities at higher levels in CPCB and MPCB have identified this facility as a role model, which is unique of its kind. A mass campaign has been initiated by Enviro-Vigil now to involve general practitioners, dentists, etc. to join this facility. It has also started collecting waste from the research laboratories, pharmaceutical companies, etc. A campaign is being worked out to involve the common people for managing their domestic BMW. So far no emphasis is being given on the issue of BMW generated at the slaughterhouses. However, in near future, Enviro-Vigil plans to consider managing the animal waste form the slaughter houses also

The NGO is aiming towards *'Zero Bio-Medical Waste'* in the city. As a proud moment for us at Enviro-Vigil, this bio-medical waste treatment facility has been awarded *ISO 9001-2000 Certificate from DNV of Netherlands* in December, 2005. Following are the highlights of this facility. All the employees mentioned above are coming from lower middle class of the society. Some of these have been the rag pickers. The work they are doing is very good in large perspective. But, while working such type of work, they have to take care of themselves e.g. cleanliness, wearing PPEs (personal protective equipments), etc. We have provided all the necessary facilities to these workers to maintain health and hygiene. They have been provided the necessary vaccination and they have to undergo routine medical check up once in three months under normal conditions. These workers have also been covered under Medi-Claim Insurance policy.

The number of health care units that are attached to our facility is as follows:

No. Of Employees		**No. Of Vehicles**		**Approx. Waste Collection per day (in Kg)**	
Transport	11	Thane City	3	Incinerable	400
Shop floor	7	Western Sub.	2	Recyclable plastic	150
Office	12			Recyclable glass, metal sharps etc.	50
Total	**30**	**Total**	**5**	**Total**	**600**

The Number of Health Care Units that are Attached to our Facility is as follows:

Area ?	**Thane**	**Meera Bhayander**	**Vasai**	**Nallsopara**	**Virar**
Type of HCU ?	-	-	-	-	-
Hospitals	219	81	45	28	28
Laboratories	65	26	18	13	12

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Blood Banks	3	-	-	-	-
Dentists	1	1	7	1	2
General Practitioners	91	49	13	70	45
Eye clinics	11	-	-	-	2
ENT clinics	5	-	1	-	1
Companies	18	-	-	-	-

CHEDULE I; CATEGORIES OF BIO-MEDICAL WASTE

Option	Waste Category	Treatment & Disposal
Category No. I	**Human Anatomical Waste**	Human tissues, organs
Category No. 2	**Animal Waste**	Body Parts Animal tissues, organs, body parts carcasses, bleeding parts blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animalhouses)
Category No 3	**Microbiology,Biotechnology Waste**	wastes from laboratory cultures, stocks or specimens of micro- local autoclaving/micro-organisms live or attenuated vaccines, human and animal cell culture biologicals, toxins
Category No 4	**Waste sharps**	needles, syringes, scalpels, blades, glass, etc. that may cause disinfection (chemical treat-puncture and cuts. This includes both used and unused sharps)
Category No 5	**Discarded Medicines and Cytotoxic drugs**	wastes comprising of outdated, contaminated and discarded medicines
Category No 6	**Solid Waste**	Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, contaminated with blood, autoclaving/microwaving
Category No. 7	**Solid Waste**	wastes generated from disposable items other than the waste sharps disinfection by chemical such as tubing's, catheters, intravenous sets
Category No. 8	**Liquid Waste**	waste generated from laboratory and washing, cleaning, house-disinfection by chemical
Category No. 9	**Incineration Ash**	Ash from incineration of any bio-medical waste
Category No. 10	**Chemical Waste**	Disinfection, as insecticides

SCHEDULE II COLOUR CODING AND TYPE OF CONTAINER FOR DISPOSAL OF BIO-MEDICAL WASTES

Colour Conding	**Type of Container**-I Waste Category	**Treatment options as per Schedule I**
Yellow	Plastic bag Cat. 1, Cat. 2, and Cat. 3, Cat. 6.	Incineration/deep burial
Red	Disinfectedcontainer/plastic bag Cat. 3, Cat. 6, Cat.7.	Autoclaving/Microwaving/ Chemical Treatment

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Blue/White Translucent	Plastic bag/puncture proof Cat. 4, Cat. 7. Container	Autoclaving/Microwaving/ Chemical Treatment and destruction/shredding
Black	Plastic bag Cat. 5 and Cat. 9 and Cat. 10. (solid)	Disposal in secured landfill

1. Colour coding of waste categories with multiple treatment options as defined in Schedule I, shall be selected depending on treatment option chosen, which shall be as specified in Schedule I.
2. Waste collection bags for waste types needing incineration shall not be made of chlorinated plastics.
3. Categories 8 and 10 (liquid) do not require containers/bags.
4. Category 3 if disinfected locally need not be put in containers/bags.

Plastic bag/puncture proof Cat. 4, Cat. 7. Container

Yellow Plastic bag Cat. 1, Cat. 2, and Cat. 3, Cat. 6. Black Plastic bag Cat. 5 and Cat. 9 and Cat. 10. (solid)

1. For the use of incinerator Training should be given to some number of persons from staff.
2. Specific fund should be allocated for the use of incinerator.
3. Every hospital should have special boxes to use as dustbin for bio-medical waste.
4. Bio-medical waste should not be mixed with other waste of Municipal Corporation.
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. Special vehicle i.e. bio-medical waste vehicle should be started to collect waste from private hospitals and private medical clinics and carry it up to the main incinerator.

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7. As provided by bio-medical waste rules, the whole of the waste should be fragmented into colours due to their hazardous nature.
8. Bio-medical waste Management Board can be established in each District.
9. 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.
10. Housekeeping staff wear protective devices such as gloves, face masks, gowned, while handling the waste.
11. 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. Carry bags also have the biohazard symbol on them.

Medical wastes should be classified according to their source, typology and risk factors associated with their handling, storage and ultimate disposal. The segregation of waste at source is the key step and reduction, reuse and recycling should be considered in proper perspectives. We need to consider innovative and radical measures to clean up the distressing picture of lack of civic concern on the part of hospitals and slackness in government implementation of bare minimum of rules, as waste generation particularly biomedical waste imposes increasing direct and indirect costs on society. 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.

Findings

- Only half of the total bio-medical waste generated in the country is treated according to rules while the rest is dumped with municipal solid waste, posing a risk to environment and human health, Presently 50 per cent - 55 per cent of bio-medical wastes is collected, segregated and treated as per Bio-medical Waste Management Rules. Rest is dumped with municipal solid wastes.
- Out of 84,809 hospitals, only 48,183 are either using common bio-medical waste treatment facilities (which are 170 in number) or have engaged private agencies.
- The Biomedical Waste Management Act, 1998, mandates hospitals to handle their wastes in an environmentally and scientifically not followed.
- The supervision of Central Pollution Control Board (CPCB) is not sufficient to avoid the biological medical waste at hospitals.
- The incineration of infectious medical wastes is mandatory for hospitals in the country, but many hospitals either do not have this facility or the machines are lying idle.
- Stressing that new technologies have to be promoted for destruction of toxic bio-medical wastes, it says the government is developing plasma technology for incinerating 50 tonnes per hour of biomedical waste.

Suggestions

- Formation of biological medical waste management inspection and monitoring task force in every city.
- Investigation and Inventorization of waste generation in all major cities.
- Identification of sites for common disposal of waste for less than 50 bed capacity.
- Implementation of Rules in all major (more than 50 bed capacity) health centres including installation of incinerators.

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- Need to start the inspection of hospitals, veterinary hospitals, dispensaries, pathological laboratories, nursing homes and blood banks to determine whether bio-medical waste generated is scientifically disposed off or not.
- Creation of awareness among all including sweepers in all health centres.
- Immediate notification of Authority for granting of consent to the generators and provide technical input to the generators in respect of proper management and handling of waste.
- Conduct fresh inspections to check whether bio-medical waste generated by medical institutes is disposed off as required under Bio-Medical Waste (Management & Handling) Rules and, shut down hospitals or clinics that did not co-operate.
- It is need to issue directions to district authorities to take necessary action against who does not co-operate.
- Publish the information in news papers, electronic media and at office about the action it had taken against defaulting parties and also distribute the hand booklets against Biological Medical Waste and action taken against defaulting parties.
- Declare the awards for best implementation of Bio-Medical Waste (Management & Handling) Rules, 1998.
- Declare the tax reduction or tax holiday facilities on purchases of technology and maintenance expenditure.
- Conduct orientation and refresher training facilities and seminars on biological medical waste disposal and management.
- The existing financial incentives in terms of custom duty exemption, depreciation allowance in the income-tax etc. may be extended for the provisions of the facilities, treatment and disposal facilities for bio-medical wastes management.
- Public Liability Insurance Act provides insurance cover in case of accident/emergency arising out of handling of hazardous chemicals, However, the accidents/emergencies involved due to the bio-medical wastes should also be incorporated in the Public Liability Insurance.
- A consensus emerged during the workshop that it is preferable to go for lesser number of facilities with bigger capacities for treatment, storage and disposal of hazardous wastes in an environmentally sound manner.
- Considering the scientific and technical inputs required for implementation of regulations concerning bio-medical waste management in the country, appropriate strengthening of SPCBs/PPCs may be considered by the State Government/Central Government on priority. State Board may formulate action plans for bio-medical wastes management in the State/UT for its systematic implementation over a period of time with the support of Central and State Government.

Conclusion

The study has shown a definite a broad awareness aspect of the system in the field of medical practice statutory public health awareness for Biomedical waste management and close monitoring of its compliance alone cause not achieve the ultimate goal

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