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A REVIEW ON BIO-MEDICAL WASTE AND MANAGEMENT: NEED OF TODAY

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Abstract
Medical Waste is broadly classified as any solid or liquid waste that is generated in the diagnosis, treatment of immunization of human being or animals and research pertaining there to, or in the production or testing of biological material. According to WHO estimates 85% of hospital waste is actually non-hazardous and around 10% is infectious while the remaining 5% is non-infectious but consist of hazardous chemicals. The main concern of infectious waste is transmission of HIV and Hepatitis B or C viruses .This needs immediate treatment and effective disposal. The waste string from the sterilization of syringes usually has infectious material and methanol. The waste stream from X-Ray unit has chemical contamination. It is estimated that annually about 0.33 million tones of hospital waste in India. and, the waste generation rate ranges from 0.5 to 2.0 kg per bed per day. So as preventive measure a legislative frame work for bio-medical waste management was established in country more than decade ago. Tough some studies have identified gaps at local levels; no systematic effort was done to collect data from different parts of country. 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. The present review article deals with the basic issues as definition, categories, problems relating to biomedical waste and procedure of handling and disposal method of Biomedical Waste Management. It also intends to create awareness amongst the personnel involved in health care unit.

Index Terms: - Bio-Medical Waste ,Treatment, Responsibility for BMW ,Segregation, Transportation ,Disposal.

1. Introduction

All human activities produce waste. Industrial waste, sewage and agricultural waste pollute water, soil and air. It can also be dangerous to human beings and environment. Similarly, hospitals and other health care facilities generate lots of waste which can transmit infections, particularly HIV, Hepatitis B & C and Tetanus, to the people who handle it or come in contact with it. Biomedical waste management has recently emerged as an issue of major concern not only to hospitals, nursing home authorities but also to the environment.The proper management of biomedical waste has become a worldwide humanitarian topic today. Hospital waste is a capacity health hazard to the health care workers, public and flora and fauna of the area. Biomedical waste may be solid or liquid. Ex. of infectious waste include discarded blood, sharps, unwanted microbiological cultures,virology research centers, pharmaceutical stores and stocks, identifiable body parts, other human or animal tissue, used bandages and dressings, cottns balls, discarded gloves, other medical and body fluids, and laboratory waste that reveal the characteristics described above. Waste sharps include potentially contaminated used needles, sometimes detachable blade, lancets and other devices capable of high-pitched skin

Health-care institutions have become issues of increasing trouble. Most countries of the world, especially the developing nations, are facing the grim situation arising out of environmental pollution due to pathological waste arising from increasing populations and the consequent rapid growth in the number of health care centre's. India is no exception to this and it is estimated that there are more than 15,015 small and private hospitals and nursing homes in the country. This is apart from clinics and pathological labs, which also generate sizeable waste.

The act was passed by the Ministry of Environment and Forests in 1986 and notified the Bio- Medical Waste (Management and Handling) Rules in July 1998.

supplies that may have been in contact with blood.

1.1**Sources of Bio Medical 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.

Major Sources

- Govt. hospitals.
- Private health centers.
- Medical colleges, research centers and Pharmaceutical Stores
- Animal research centers.
- Blood banks, Mortuaries, Funeral.
- Biotechnology institutions.
- Production units.

Minor Sources

Dentists' clinics.

- Animal Shelter.
- Blood donation camps.
- Vaccination Stores.
- Psychiatric clinics.
- Funeral services.
- Homes for Handicap Persons.

1.2.Classification of Bio Medical Waste

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

- General Waste.
- Pathological Waste.
- Radioactive Waste.
- Chemical Waste.
- Infectious to potentially infectious waste.
- Sharps Waste.
- Pharmaceuticals Waste.
- Pressurized containers Waste.

1.3.Treatment of Biomedical waste

There are mainly five technology options available for the treatment of Biomedical Waste or still under research can be grouped as:-

1. Chemical process
2. Thermal process
3. Mechanical process
4. Irradiation process
5. Biological process
6. Incineration process

1.4.Processing Process of the Waste

Incineration

- Incinerators should be suitably designed to achieve the emission limits.
- Wastes to be incinerated it shall not be chemically treated with any chlorinated disinfectants.
- Toxic metals in the incineration ash shall be limited within the regulatory quantities.
- Only low sulphur fuel like Diesel shall be used as fuel in the incinerator.

1.4 Autoclaving

The autoclave should be dedicated for the purpose of its disinfecting and treating biomedical waste. The sterilization and treatment of biomedical waste before it's dumped as garbage is an extremely important part of medical waste management industry. Without the proper treatment, waste is still dangerous either hazardous or infectious can end up in landfills. An autoclave is a sterilization machine that uses steam heated to 300 degrees. The size of an autoclave can vary from as small as the top of a desk to 7,62 meter long and 3.04 meter high. The different sizes are obviously to accommodate different amounts of medical waste. This medical waste sterilization machine is specially used for regulated medical waste. That waste is put into the machine on carts and the door is shut, and 300-degree steam is pumped in at regulated amount for approximately for 60 minutes. This process kills all the viruses and infectious material within that biomedical waste.

At this point, the waste is considered as non-infectious. Because it doesn't cause a bacterial or infectious for human health. It can be treated as solid trash on a non-hazardous transportation to a non-hazardous landfill.

Medical waste shall not be considered properly treated unless the time, temperature and pressure indicate specify limits. If there is any reason, these were not reached, the entire load of medical waste must be autoclaved again until the proper temperature, pressure and residence time were achieved.

1.5 Waste minimization:

Waste minimization is an first important step in managing wastes safety, responsibility and in a cost of effective manner. This management step makes use of 3R method i.e. reusing, recycling and recovery principles. There are many possible routes to minimize the amount of both general waste and biomedical wastes within the health care or related facility. Alternative technologies for biomedical waste minimization (e.g., microwave treatment) have been investigated and are not considered to be practical. Some of the principles of waste minimization are listed below and will be developed further in the long-term strategy.

Fig. 1

1.Health hazards

The improper management of bio-medical waste causes serious environmental problems in terms of air, water and land pollution. According to the WHO, the global life expectation is increasing year after year. However, deaths due to infectious disease are also increasing. A study conducted by the WHO reveals that more than 50,000 people die every day from infectious diseases. One of the causes for the increase in infectious diseases is improper waste management. Blood, body fluids and This passes via a number of human contacts, all of whom are potential 'recipients' of the infection. Human Immunodeficiency Virus (HIV) and hepatitis viruses B or C spearhead an extensive list of infections and diseases documented to have spread through bio-medical waste. Tuberculosis, pneumonia, diarrhea diseases, tetanus, whooping cough etc., there are other common diseases are spread due to improper waste management.

1. **Color Coding for BMW**
   Different color coding has to be assigned to various waste for effective segregation, as
2. **Black : Risk waste with Sharps .**
3. **Red: Plastic Waste**
4. **Blue: All types of glass bottles, Discarded Medicines**
5. **Yellow: Infectious waste.**

Table.1

COLOR CODING FOR SEGGREGATION OF BMW

COLOR	WASTE	TREATMENT
Yellow	Human & Animal anatomical waste / Micro-biology waste and soiled cotton/dressings/linen/bedding s etc.	Incineration / Deep burial
Red	Tubing, Catheters, IV sets.	Autoclaving / Microwaving / Chemical treatment
Blue / White	Waste sharps (Needles, Syringes, Scalpels, blades etc.)	Autoclaving / Microwaving / Chemical treatment & Destruction / Shredding
Black	Discarded medicines/cytotoxic drugs, Incineration ash, Chemical	Disposal in secured landfill

6. Occupational health hazards

The health hazards due to improper waste management can affect

- The occupants in the institutions and spread in the vicinity of the institutions. People happened to be in contact with the institution like laundry workers, nurses, emergency medical personnel, and refuse workers. Risks of infections outside hospital for waste handlers, scavengers and (eventually) the general public and sanitary workers. Risks are specially associated with hazardous chemicals, drugs, being handled by persons handling wastes at all levels.
- Injuries from sharps and exposure to harmful chemical waste and radioactive waste also cause health hazards to employees and sanitary workers

Hazards to the general public. The general public's health not only affect the inhabitant (occupant) in institutions, but also spread in the vicinity of the institutions. Occupational health concerns exist for removing garbage and laundry workers, nurses.

Emergency medical personnel, and refuse workers. Due to liberation of toxic chemicals and radioactive wastes may lead to health causes to the employees in the biomedical waste generating sites

9. Hazards to the general public

The biomedical wastes can affect the human beings as well as the environment. Malpractices like dumping of bio-medical waste in public dustbins, open space areas, aquatic areas etc., can spread the spread several diseases. Liberations from incinerators and combustion of waste also cause to exposure of harmful gases which then causes cancer and various respiratory diseases. Addition of radioactive waste elements in the waste stream may lead to several health diseases. An often-ignored area is the increase of home healthcare activities also generates bio-medical waste which can lead serious health hazards.

Bio-medical waste can cause health hazards to animals and birds . Plastic waste can choke animals which scavenge on openly dumped waste. Injuries from sharps are a common feature affecting animals . Chemicals such as dioxins and furans can cause health hazards to flora and fauna. Heavy metals waste can affect the reproductive health also. The problem of bio-medical waste disposal in the healthcare establishments has become a major concern to the hospital administration to find new ways of scientific, safe and cost effective management of the waste. The improper management of biomedical waste has become a worldwide topic today. Although hazards of poor management of biomedical waste have raised the concern world over human health and environment as well.

People other than health care workers who are in recycling business are at risk of acquiring diseases.

Fig.2

10.Recommendations

• Hospital should have special colour coded dustbins for bio-medical waste.

• Bio-medical waste should not be added to other wastes of Municipal Corporation.

• Bio-medical waste Management Board must be present at

can also be adversely affected by bio-medical waste. The health hazards due to the improper waste management can

12.Conclusion

The bio medical waste must be taken proper care in order to avoid the below mentioned affects in fig 1. and it should be transported by a specific airtight vehicle so that it should not harm environment and also must not affect or cause human beings.

But as per our survey it was not happening on a typical site in fig 2.

If the proper waste management is done as per the government act. Then it may lead to some beneficiary benefits as per mentioned below :-

i. Healthier & Clean Environment.
ii. Reduction in number of diseases caused by this waste.
iii. Decrease in pollution emission.
iv. Increase in hygienic healthcares.

Fig. 3

Fig. 4

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