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A STUDY ON EFFECT OF HAZARDOUS HEALTH CARE WASTE GENERATION IN REWA, MADHYA PRADESH

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ABSTRACT

Health care waste is defined as the total waste stream from a health care facility that includes both potential infectious waste and non-infectious waste materials. Infectious wastes include infectious sharps and infectious non-sharp materials. Infectious Sharps consist of syringe or other needles, blades, infusion sets, broken glass or other items that can cause direct injury. Infectious non-sharps include materials that have been in contact with human blood, or its derivatives, bandages, swabs or items soaked with blood, isolation wastes from highly infectious patients (including food residues), used and obsolete vaccine vials, bedding and other contaminated materials infected with human pathogens. Non-infectious wastes may include materials that have not been in contact with patients such as paper and plastic packaging, metal, glass or other wastes which are similar to household wastes.

KEYWORDS: Health care wastes, Bio-medical wastes, hazardous and non-hazardous wastes, etc.

INTRODUCTION

Health-care waste management, as well as posing technical problems, is strongly influenced by cultural, social, and economic circumstances. A well designed waste policy, a legislative framework, and plans for achieving local implementation are essential. Change will be gradual and should be technically and financially sustainable in the long term. In pursuing their aims of reducing health problems and eliminating potential risks to people's health, health-care services inevitably create waste that may itself be hazardous to health. The waste produced in the course of health-care activities carries a higher potential for infection and injury than any other type of waste. Wherever it is generated, safe and reliable methods for its

handling are therefore essential. Inadequate and inappropriate handling of health-care waste may have serious public health consequences and a significant impact on the environment. Sound management of health-care waste is thus a crucial component of environ-mental health protection.[1,2,3]

Health-care waste includes all the waste generated by health-care establishments, research facilities, and laboratories. In addition, it includes the waste originating from "minor" or "scattered" sources such as that produced in the course of health care undertaken in the home (dialysis, insulin injections, etc.). Hospitals and other health-care establishments have a "duty of care" for the environment and for public health and have particular responsibilities in relation to the waste they produce. Between 75% and 90% of the waste produced by health-care providers is non-risk or "general" health-care waste, comparable to domestic waste. It comes mostly from the administrative and housekeeping functions of health-care establishments and may also include waste generated during maintenance of health-care premises. The remaining 10 to 25% of health-care waste is regarded as hazardous and may create a variety of health risks.[4,5, 6, 7]

Several surveys have provided an indication of typical health-care waste generation. Waste generation depends on numerous factors such as established waste management methods, type of health-care establishment, hospital specializations, pro-portion of reusable items employed in health care and proportion of patients treated on a day-care basis. It is therefore suggested that these data are viewed only as examples and not used as a basis for waste management within an individual health-care establishment. Even a limited survey will probably provide more reliable data on local waste generation than any estimate based on data from other countries or types of establishment.[8,9,10]

Healthcare workers, patients, waste handlers, waste pickers and the general public are exposed to health risks from infectious waste (particularly sharps), chemicals and other special health care waste. Improper disposal of special health care waste, including open dumping and uncontrolled burning, increases the risk of spreading infections and of exposure to toxic emissions from incomplete combustion. For these reasons, occupational health and safety should be a component of health care waste management plans.[11,12,13]

Transmission of disease generally occurs through injuries from contaminated sharps. Infections of particular concern are Hepatitis B (HBV), Hepatitis C (HCV) and the human

immunodeficiency virus (HIV). HBV, for example, can remain infectious for a week, even dried at room temperature and the probability that a single needle stick will result in sero-conversion is approximately 30 percent.[14,15,16]

MATERIALS AND METHODS

Here is a list of Bio-medical wastes generated by Health Care Centers in Rewa, city.

Table 1- Categories of Bio-medical wastes by Health Care Units.

Category	Types of wastes	Treatment and disposal
1	**Human anatomical waste** Human tissues, organs, body parts	Incineration/ deep burial
2	**Animal waste** Animal tissues, organs, body parts, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals/colleges, discharges from hospitals, animal houses etc.	Incineration/ deep burial
3	**Microbiology and Biotechnology wastes** Wastes from laboratory cultures, stocks or specimens of microorganisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratory, wastes from production of biological toxins, dishes and devices used for transfer of cultures	Autoclaving/ microwaving/ incineration
4	**Waste sharps** Needles, syringes, scalpels, blades, glass etc (including both used and unused)	Disinfections(chemical treatment)/autoclaving/microwaving
5	**Discarded medicines and cytotoxic drugs**	
6	**Infectious wastes** Waste suspected to contain pathogens e.g. laboratory cultures; waste from isolation wards; tissues (swabs), materials, or equipment that have been in contact with infected patients; excreta	Disinfections(chemical treatment)/autoclaving/microwaving
7	**Pathological waste** Human tissues or fluids	Disinfections(chemical treatment)/autoclaving/microwaving
8	**Pharmaceutical waste** Waste containing pharmaceuticals e.g. pharmaceuticals that are expired or no longer needed; items contaminated by or containing pharmaceuticals (bottles, boxes)	Disinfections(chemical treatment)/autoclaving/microwaving
9	**Genotoxic waste** Waste containing substances with genotoxic properties e.g. waste containing cytostatic drugs (often used in cancer therapy); genotoxic chemicals	Disinfections(chemical treatment)/autoclaving/microwaving
10	**Chemical waste** Waste containing chemical substances e.g. laboratory reagents; film developer; disinfectants that are expired or no longer needed; solvents	Disinfections(chemical treatment)/autoclaving/microwaving
11	**Wastes with high content of heavy metals**	Disinfections(chemical

	Batteries; broken thermometers; blood-pressure gauges; etc.	treatment)/autoclaving/microwaving
12	**Radioactive waste** Waste containing radioactive substances e.g. unused liquids from radiotherapy or laboratory research; contaminated glassware, packages, or absorbent paper; urine and excreta from patients treated or tested with unsealed radionuclides; sealed sources	Disinfections(chemical treatment)/autoclaving/microwaving

The healthcare waste can be subdivided into hazardous and non-hazardous categories. Since, it would not be possible for each and every health care establishment to have its own full treatment and disposal system for biomedical waste, there would be need for common treatment and disposal facilities under the coordination of medical head coordination and under the supervision and guidance of the civic authority. An assessment of the biomedical waste situation obtained within Rewa district or city hospitals as a whole is necessary before making any attempts for improvement. It means that there must be taken into account the essential steps:

A) Biomedical waste generation.

B) Biomedical waste segregation, collection and storage.

C) Biomedical waste handling and transportation.

D) Biomedical waste treatment and disposal.

RESULTS AND DISCUSSIONS

Table- 2 Hazardous components generated by health care centers in Rewa city.

S. No.	Category of wastes
1	Clinical wastes from medical care in hospitals, medical centers and clinics
2	Waste pharmaceuticals drugs and medicines
3	Wastes from production and preparation of pharmaceuticals products
4	Waste from the manufacture, formulation and use of food preserving chemicals
5	Waste from heat treatment and tempering operations
6	Waste substances and articles containing or contaminated with polychlorinated biphenyls (PCBs) and/or polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)
7	Waste chemical substances arising from research and development or teaching activities which are not identified and/or are new and whose effects on man
8	Wastes from production, formulation and use of photographic chemicals and processing materials

Hazards of health-care waste

Health-care waste includes a large component of general waste and a smaller proportion of hazardous waste. This chapter addresses the potential hazards of exposure to hazardous (or risk) health-care waste.

Types of hazards

Exposure to hazardous health-care waste can result in disease or injury. The hazardous nature of health-care waste may be due to one or more of the following characteristics:

- It contains infectious agents;
- It is genotoxic;
- It contains toxic or hazardous chemicals or pharmaceuticals;
- It is radioactive;
- It contains sharps.

Hazards from infectious waste and sharps

Infectious waste may contain any of a great variety of pathogenic micro-organisms. Pathogens in infectious waste may enter the human body by a number of routes: through a puncture, abrasion, or cut in the skin;

- through the mucous membranes.
- by inhalation.
- by ingestion.

There is particular concern about infection with human immunodeficiency virus (HIV) and hepatitis viruses B and C, for which there is strong evidence of transmission via health-care waste. These viruses are generally transmitted through injuries from syringe needles contaminated by human blood.

The existence in health-care establishments of bacteria resistant to antibiotics and chemical disinfectants may also contribute to the hazards created by poorly managed health-care waste. It has been demonstrated, for example, that plasmids from laboratory strains contained in health-care waste were transferred to indigenous bacteria via the waste disposal system. Moreover, antibiotic-resistant *Escherichia coli* have been shown to survive in an activated sludge plant, although there does not seem to be significant transfer of this organism under normal conditions of waste-water disposal and treatment.

Hazards from chemical and pharmaceutical waste

Many of the chemicals and pharmaceuticals used in health-care establishments are hazardous (e.g. toxic, genotoxic, corrosive, flammable, reactive, explosive, shock-sensitive). These substances are commonly present in small quantities in health-care waste; larger quantities may be found when unwanted or outdated chemicals and pharmaceuticals are disposed of.

They may cause intoxication, either by acute or by chronic exposure and injuries, including burns. Intoxication can result from absorption of a chemical or pharmaceutical through the skin or the mucous membranes, or from inhalation or ingestion. Injuries to the skin, the eyes, or the mucous membranes of the airways can be caused by contact with flammable, corrosive, or reactive chemicals (e.g. formaldehyde and other volatile substances). The most common injuries are burns.

Hazards from radioactive waste

The type of disease caused by radioactive waste is determined by the type and extent of exposure. It can range from headache, dizziness and vomiting to much more serious problems. Because radioactive waste, like certain pharmaceutical waste, is genotoxic, it may also affect genetic material. Handling of highly active sources, e.g. certain sealed sources from diagnostic instruments, may cause much more severe injuries (such as destruction of tissue, necessitating amputation of body parts) and should therefore be undertaken with the utmost care.

CONCLUSION

Biomedical waste means any solid and/or liquid waste including its container and any intermediate product, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research pertaining thereto or in the production or testing thereof". The physic-chemical and biological nature of these components, their toxicity and potential hazard are different, necessitating different methods and options for their treatment and/or disposal. Each Clinic Head identifies and lists for the department that coordinates all operations performed and then determining the corresponding products using a form list of activities, products and waste from the clinic. This list is reviewed by the Environmental Officer. Heads of clinics develop input-output analysis to identify environmental issues as a form.

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