



Global Journal of Medicine and Public Health

www.gjmedph.org

Bio Medical Waste Management- 'An Emerging Problem'

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ABSTRACT

As per Bio-Medical Waste (Management and Handling) Rules, 1998 and amendments, any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining there to or in the production of testing of biological and including categories mentioned in schedule 1 of the Rule, is the bio-medical waste. The private sector accounts for more than 80% of total healthcare spending in India. Unless there is a decline in the combined federal and state government deficit, which currently stands at roughly 9%, the opportunity for significantly higher public health spending will be limited. The growth of this sector has not only increased the quality of patient care but also put a tremendous strain on the environment due to generation of huge amounts of Bio-Medical waste. It is estimated that quantity of waste generated from hospitals in our country ranges from 0.5-2 kg/bed/day and annually 0.33 million tons of waste is generated in India ^[2]. The waste generated in the hospitals and institutions essentially consists of solids and liquid, which may be hazardous, infectious and non-infectious. According to a WHO report, around 85% of the hospital wastes are actually non-hazardous, 10% are infectious and 5% are non-infectious but hazardous.

Keywords: Biomedical Waste Management

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Funding: None

Conflict of interest: None Declared

Definition

As per Bio-Medical Waste (Management and Handling) Rules, 1998 and amendments, any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining there to or in the production of testing of biological and including categories mentioned in schedule 1 of the Rule, is the bio-medical waste ^[1].

As per *WHO norms* the health-care waste includes all the waste generated by healthcare 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.). In Schedule I of the Bio-medical Waste (Management and Handling) Rules, 1998 (Annexure II), therefore, the waste originating from different kinds of such establishments, has been categorized into 10 different categories and their treatment and disposal options have been indicated.

Schedule I: Categories of Bio-Medical Waste

Waste Category	Waste Category Type	Treatment and Disposal Option
Category No. 1	Human Anatomical Waste (body parts, organs, human tissues etc.).	Incineration / deep burial
Category No. 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
Category No. 3	Microbiology & Biotechnology Waste (Wastes from laboratory cultures, stocks or micro-organisms live or vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures).	Local autoclaving / micro waving / incineration
Category No. 4	Waste Sharps (needles, syringes, scalpels, blade, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps).	Disinfection (chemical treatment / autoclaving / micro waving and mutilation / shredding
Category No. 5	Discarded Medicines and Cytotoxic drugs (Waste comprising of outdated, contaminated and discarded medicines).	Incineration / destruction and drugs disposal in secured landfills
Category No. 6	Soiled Waste (items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, bedding, other material	Local autoclaving / micro waving / incineration

	contaminated with blood).	
Category No. 7	Solid Waste (Waste generated from disposal items other than the sharps such as tubings, catheters, intravenous sets etc.).	Disinfection by chemical treatment autoclaving / micro waving and mutilation/ shredding
Category No. 8	Liquid Waste (Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities).	Disinfection by chemical treatment and discharge into drains
Category No. 9	Incineration Ash (Ash from incineration of any Bio-medical waste).	Disposal in municipal landfill
Category No. 10	Chemical Waste (Chemicals used in production of biologicals, chemicals used in disinfection, as Insecticides, etc.).	Disinfection by chemical treatment and discharge into drains for liquids and secured land fill for solids

Current Scenario

Healthcare is one of India's largest sectors, in terms of revenue and employment, and the sector is expanding rapidly. During the 1990s, Indian healthcare grew at a compound annual rate of 16%. Today the total value of the sector is more than \$34 billion. This translates to \$34 per capita, or roughly 6% of GDP. By 2012, India's healthcare sector is projected to grow to nearly \$40 billion.

The private sector accounts for more than 80% of total healthcare spending in India. Unless there is a decline in the combined federal and state government deficit, which currently stands at roughly 9%, the opportunity for significantly higher public health spending will be limited.

The growth of this sector has not only increased the quality of patient care but also put a tremendous strain

on the environment due to generation of huge amounts of Bio-Medical waste. It is estimated that quantity of waste generated from hospitals in our country ranges from 0.5-2 kg/bed/day and annually 0.33 million tons of waste is generated in India ^[2].

The waste generated in the hospitals and institutions essentially consists of solids and liquid, which may be hazardous, infectious and non-infectious. According to a WHO report, around 85% of the hospital wastes are actually non-hazardous, 10% are infectious and 5% are non-infectious but hazardous.

Health Hazards Associated With Poor Management Of Bio-Medical Waste:

Poor Bio-Medical waste management exposes the workers of health care facility, waste handlers and community as a whole to infection, toxic effect and

injuries. The waste disposed off with general municipal waste can cause serious injuries to the scavengers and children finding access to these items. Some of the important blood borne disease that are at high risk of transmission from contaminated sharps, scalpels, catheters etc are Hepatitis B & C, Tuberculosis, G E infections etc.

- I. Injury from sharps to staff and waste handlers associated with the health care establishment.
- II. Hospital Acquired Infection (HAI) (Nosocomial) of patients due to spread of infection.
- III. Risk of infection outside the hospital for waste handlers/scavengers and eventually general public. Occupational risk associated with hazardous chemicals, drugs etc.
- IV. Unauthorized repackaging and sale of disposable items and unused / date expired drugs.

WHO has estimated that, in 2000, injections with contaminated syringes caused;

- 21 million hepatitis B virus (HBV) infections (32% of all new infections);

- Two million hepatitis C virus (HCV) infections (40% of all new infections);
- 260 000 HIV infections (5% of all new infections).

Epidemiological studies indicate that a person who experiences one needle-stick injury from a needle used on an infected source patient has risks of 30%, 1.8%, and 0.3% respectively to become infected with HBV, HCV and HIV. In 2002, the results of a WHO assessment conducted in 22 developing countries showed that the proportion of healthcare facilities that do not use proper waste disposal methods ranges from 18% to 64%. (Source: AIDE-MEMOIRE by World Health Organization (WHO) Courtesy: Dept. of Protection of the Human Environment Water, Sanitation and Health)

In many parts of our country bio-medical waste is not segregated properly, segregation of biomedical waste is an important part of management of biomedical in any establishment. Most importantly there is no mechanism to ensure that all waste collected and segregated, reaches its final destination without any pilferage. Additional hazard includes recycling of disposables without even being washed [3]. The schedule II contains the color coding and types of containers for disposal of different Bio Medical waste categories.

Schedule II: Color Coding and Type of Container for disposal of Bio-Medical Waste

Colour Coding	Type of Containers	Waste Category	Treatment options as per schedule I
Yellow	Plastic bag	1,2,3,6	Incineration/deep burial
Red	Disinfected Container/ Plastic bag	3,6,7	Autoclaving/Micro waving/ Chemical Treatment
Blue/ White Translucent	Plastic bag/ puncture proof container	4,7	Autoclaving/Micro waving/ chemical treatment and destruction/shredding

Black	Plastic bag	5,9,10 (Solid)	Disposal in secured landfill
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Disposal: As per the guidelines no untreated Bio-Medical waste is to be kept stored beyond a period of 48 hours. Every health care facility that generates Bio-medical waste needs to set up requisite Bio-medical waste treatment facilities to ensure proper segregation and treatment of waste.

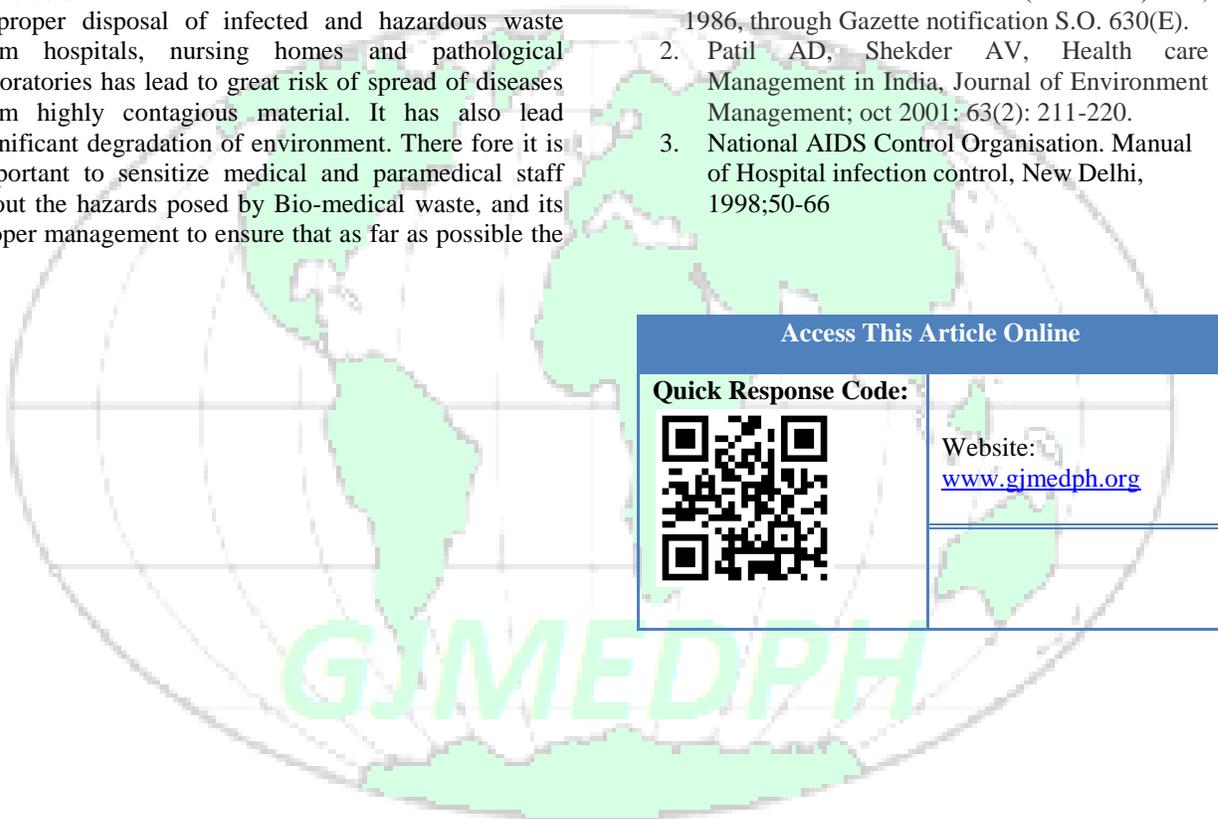
Conclusion

Improper disposal of infected and hazardous waste from hospitals, nursing homes and pathological laboratories has lead to great risk of spread of diseases from highly contagious material. It has also lead significant degradation of environment. There fore it is important to sensitize medical and paramedical staff about the hazards posed by Bio-medical waste, and its proper management to ensure that as far as possible the

staff adheres to the governmental guidelines related to Bio-Medical waste management.

References

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