BIOMEDICAL WASTE IN INDIAN CONTEXT

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Abstract

Hospitals generate waste which is chemically hazardous, infectious and often radioactive. Such waste because of inappropriate disposal/treatment strategies contributes to serious health hazards in the community. The main concern of infectious hospital waste is the transmission of HIV and infectious hepatitis viruses. As regulatory measures, the Bureau of Indian Standards, New Delhi has issued guidelines for the management of Solid Wastes-Hospitals 1989. The Ministry of Environment and Forests has also issued rules on the categorization of biomedical waste in 1997-98. The implementation of the above could mitigate the ill effects of the exponentially increasing problem of biomedical waste in India.

1. Introduction

Medical waste is broadly defined as any solid or liquid waste that is generated in the diagnosis, treatment of immunization of human beings or animals in research pertaining thereto, or in the production or testing of biological material. According to World Health Organisation (WHO) estimates 85% of hospital waste is actually non-hazardous and around 10% is infectious while the remaining 5% is non-infectious but consists of hazardous chemicals like methylchloride and formaldehyde. Here., the main concern of infectious hospital waste is the transmission of HIV and Hepatitis B or C viruses. In this context, syringes and needles have the highest disease transmission potential.

Hospital waste, till recently was not being managed but it was simply ‘disposed off’. The disposal of hospital waste can be very hazardous particularly when it gets mixed with municipal solid waste and is dumped in uncontrolled or illegal landfills such as vacant lots in neighboring residential areas and slums. This can lead to a higher degree of environmental pollution, apart from posing serious public health risks such as AIDS, Hepatitis, plague, cholera, etc.

In the total amount of municipal waste a city generates, only 1 to 1.5% is hospital waste, of which 10-15% is considered infectious. It is estimated, a city like New Delhi with about 40,000 beds generates about 60 metric tons of hospital waste per day. But whatever the amount of hospital waste there be, it proves to be harmful to the community. This needs immediate treatment and effective disposal. Discarded blood and blood products serve as significant foci of hazardous diseases. The waste stream from X-ray units has chemical contamination of silver bromide (Fixon), glutaraldehyde, hydroquinone and potassium hydroxide. The waste stream from the sterilization of syringes usually has infectious materials and methanol. The usual infective waste consists of bandages, gauzes, cotton waste, amputated human parts, placenta and used dialysis kits containing plastic and

aluminum. The sterilization of dialysis units, operation theatres and private wards contributes formaldehyde. The waste from laboratory contains infectious materials as well as reagents and solvents used for analytical purposes.

Table 1.1: PERCENTAGE CONSTITUTION OF HOSPITAL WASTE

CONSTITUENTS	APPROX. %
Pathological waste	5
Infectious material	10
General Non-Infectious	50
Kitchen waste	30
Recyclable materials (paper, plastic, metal)	4.5

Further, unhygienic conditions in general ward toilets, coupled with frequent strikes by Class IV staff create what are virtually secondary foci of infectious diseases within the hospital premises. Such areas are often stockpiles of heterogeneous infectious material and contribute greatly to the incidence of nosocomial infections. For example, according to a WHO report the excreted loads of some selected enteric diseases are as follows:

Table 1.2: EXCRETED LOADS OF INFECTIOUS AGENTS

INFECTIOUS AGENT	AVERAGE NO. PER GRAM FECES
Shigella spp.	10^7
Salmonella typhi	10^8
Escherichia coli (pathological)	10^8
Hepatitis A virus	10^6

The persistence of these organisms in the environment at 20-30ºC is shown to vary from 2 weeks to a month. This aggravates health hazards when associated with the biomedical wastes generated in the hospitals.

1. Classification of Bio-Medical Waste

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

i. General Waste
ii. Pathological
iii. Radioactive
iv. Chemical
v. Infectious to potentially infectious waste
vi. Sharps
vii. Pharmaceuticals
viii. Pressurized containers

Table 1.3: HOSPITAL WASTE RELATED NOSOCOMIAL INFECTIONS

ORGANISM	DISEASE CAUSED	RELATED WASTE ITEM
VIRUSES • HIV • Hepatitis B • Hepatitis A,C • Arboviruses • Enteroviruses	• AIDS • Infectious Hepatitis • Infectious Hepatitis • Dengue, Japanese encephalitis, tick-borne fevers, etc. • Dysentery	• Infected needles, body fluids • Infected needles, body fluids • Human excreta, soiled linen • Blood, body fluids • Human excreta, soiled linen.
BACTERIA • Shigella spp. • Salmonella typhi • Vibrio cholerae • Clostridium tetani • Staphylococcus spp. • Pseudomonas • Streptococcus • Borrelia spp.	• Shigellosis • Typhoid • Cholera • Tetanus • Wound infections, septicemia, rheumatic fever, endocarditis, skin and soft tissue infections. • Louse and tick borne fevers.	• Human excreta and body fluid in landfills and hospital wards • Sharps such as needles, surgical blades in hospital waste. • Rodent infestations of poorly managed landfills and dumping grounds.
PARASITES • Giardia lamblia • Wucheraria bancrofti • Plasmodium	Giardiasis Cutaneous leishmaniasis, Kala Azar Malaria	Human excreta, blood and body fluids in poorly managed sewage system of hospitals.

WHO has recommended that hospitals in developing countries use a simplified classification for practical purposes:

a) General non-hazardous waste
b) Non-infectious waste
c) Chemical and Pharmaceutical waste
d) Infectious waste
e) Other hazardous medical waste.

1. The Indian Context

Until recent times, hospital waste in India was not segregated before disposal to the dump or incinerator. Traditionally, recycling in India is conducted from the dumping grounds of

immense waste where freelance workers or rag pickers scour the waste manually and sort for recyclable material. These workers then contact relevant industries, which acquire the waste from them. Since most of these rag pickers are women and children from the lowest socio-economic strata, awareness of health risks in general is poor. As a result many of them contract diseases from syringes and needles and other biomedical waste and become carriers of great health risk to the general populace. Since their traditional rejection from mainstream society (as 'untouchables') and their re-emergence as a political front in recent times, it is germane to call for further legislation to ensure education, awareness and health care facilities for their special status, in the context of health hazards in the recycling industry.

The Government of India in a recent Gazette notification of 20th July 1998 has classified biomedical waste under Schedule I, into ten categories. Under this notification, rules have been framed for the management and disposal of biomedical wastes. These are:

i. Human anatomical wastes, blood and body fluids.
ii. Animal and slaughter house waste.
iii. Microbiology and biotechnology waste.
iv. Waste sharps.
v. Discarded medicines
vi. Solid waste.

Hospitals should not exclusively depend on incinerators for disposal of biomedical wastes. There is no single technology available for the treatment of hospital waste. Hospitals should segregate the waste and decide about the technological option appropriate for the management of waste disposal. For example, contaminated plastics need to be disinfected and shredded while pathological waste may be incinerated. In India, most of the medical administrations have focused on installing disposal technologies while not implementing 'waste management practices' within the hospital premises. New emerging technologies are being developed in order to have more effective control, with proclivity on complete recycling of wastes such as:

A. Plasma Torch Technology
B. Detoxification Technology
C. Advanced Wet Oxidation Technology
D. Thermal Dry Heat Technology
E. Irradiation
F. Gas sterilization

4. Conclusion

Biomedical waste management requires:

- Segregation of the hospital wastes according to the available disposal technology.
- Employment of cost-effective and available relevant technology.
- Possibilities of recycling to be explored in a scientific and hygienic manner for permissible items.

- ❖ Setting up of common medical waste treatment facilities for/by different hospitals such as transportation of the hazardous waste to the common disposal system to reduce expenditure.
- ❖ Safety of medical staff/rag-pickers, by the use of gloves and masks and housekeeping aspects (drinking water, sewage system of the hospitals).
- ❖ Implementation of recycling etiquette by medical and paramedical personnel.
- ❖ Training of Municipality workers by medical personnel in handling of medical waste to avoid risks and health hazards.
- ❖ Implementations of legislations pertaining to hygiene of freelance workers such as rag pickers in the recycling industry.

The management of biomedical wastes poses a great challenge to the policy planners, city administrators, medical personnel and workers in the recycling industry. There is a need for adopting a cost-effective system for providing better medical waste treatment facilities and reduce the amount of waste generation by awareness and education of all concerned.

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