Bio-medical waste- threat to environment: Management, disposal, ethical aspects and legal implications

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Article history	Abstract			
Received: March 28, 2016 Received in revised form: June 01, 2016 Accepted: July 5, 2016 Available online: July 25, 2016	The world health organization [WHO] in 1983 discussed bio-medical waste issue. The seriousness of improper biomedical waste management was brought to the limelight during the "beach wash-ups" during summer 1998: which was investigated by the			
Corresponding author	Environment Protection Agency (EPA) of the USA: and			
Qaiser Rasool Panzoo, Post Graduate Student – III year, Department of Forensic Medicine, Teerthanker Mahaveer Medical College & Research Centre, Morabadad Phone: +918397952319 Email: drpardeepsingh@yahoo.com	it resulted in the passing of Medical waste tracking Act (MWTA) in November 1998. This made USA the pioneer as far as waste management is concerned (1). Most important regarding the bio-medical waste is health hazards to patient and relatives, microbiological and chemical contamination of soil and ground water (2). Every human being should live in a clean environment is one of the Fundamental Rights, and is the innovative judicial interpretations of article 21 of Constitution of India. Article 48-A and 51 of the Constitution provide to protect and improve the natural environment including forests lakes, rivers and wild life. There are number of statutes like The Water Act, The Air Act, The Environment Protection Act, Hazardous Waste (management and Handling) Rules 1980. Forests Act, the Wild Life Acts and Provision of Indian Penal court, Criminal Procedure Code and Factories Act are meant for providing pollution free environment to mankind. There are many categories of institutions which pollute the environment but recently the ignored field which produce the pollution by way of Bio-Medical waste have attracted the attention of the environmentalists are the Hospitals, Dispensaries, Medical Shops, Medical clinics of doctors and other paramedical staff (2)			
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Introduction

Waste material produced, during treatment, diagnosis immunization of human being or in research activities pertaining to or in the production or testing or biological" and including categories mentioned in Scheduled 1. The government of India (notification 1998) specifies that Hospital Waste Management is a part of hospital hygiene and maintenance activities, known as bio-medical waste. This involves management of range of activities, which are mainly engineering functions, such as collection, transportation, operation or treatment of processing systems, and disposal of wastes. A WHO study has shown that, of the total biomedical waste, about 85 percent is non-infectious, 10 percent is infectious but non-hazardous and rest 5 percent is both infectious as well as hazardous in nature (CPCB, 2000). Bio-medical waste is not only hazardous and pollute the environment but dangerous of human beings, animals and plants by other ways also. Every day the country's numerous hospitals and other medical institutions churn out millions of tons of waste. The total quantity of biomedical waste for U.P is estimated at 20.7 MT per day. District wise biomedical waste generation potential is estimated based on the number of hospital beds. An alarming percentage of the waste lies on open space creating environmental problems. These can damage the environment, even at low concentration. Hence it is necessary to take precautionary measures, so that hazardous components in the waste are rendered harmless through proper treatment and safe disposal methods. 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. The major sources of biomedical waste production are Medical colleges and research centers, government hospitals, private hospitals, nursing homes, veterinary colleges and animal research centers, blood banks and autopsy centers. The minor sources are physicians clinics, animal houses, slaughter houses, blood donation camps and vaccination centers (4).

Observation

Bio-medical waste is very broad and wide problem especially of cities. The problem of bio-medical waste has acquired gigantic. About one and half kg of waste is produced per head/per day of the total hospital waste. If we take an example of a patient lying in the hospital for treatment and a normal man lives in the society, a patient in the hospital needs more and more hygienic and pollution free environment. He needs fresh oxygen. But the environment of the Hospitals especially of government hospitals is so polluted by the medical wastes that in becomes very difficult even for a normal man to go in the hospital to attend the patient. Recycling of the hospital waste is a big threat to the society. Workers in the hospitals regularly collect syringes drips and bottles, which they sell in the market. They also sell used and contaminated cotton and cotton like material to make mattresses etc.

Various items like blood, urine, sperms, stool, used cotton, disordered medicine chemicals, body

organs like placenta, empty bottles, polythene bags of urine and blood, pipes, syringes waste of fruits etc. contribute to the pollution of environment: bio-medical waste shall be treated and disposed of in accordance with Schedule I and in compliance with the standards prescribed in Schedule V.

Every occupier, where required, shall set up in accordance with the time-schedule in Schedule VI, requisite bio-medical waste treatment facilities like incinerator, autoclave, microwave system for the treatment of waste, or, ensure requisite treatment of waste at a common waste treatment facility of any other waste treatment facility (5).

- Throwing it in the sewerage
- Throwing in a small trench, in case of body organs
- Burning, in very few cases
- Throwing on own or municipal corporation land, marked for the purpose
- Incineration (once or twice in six months in one government hospital
- Do not dispose, only dogs, cats and pigs carry all the wastes

About the use of incinerators, authorities always show their inability due to the costly process, lack of training, that all the private hospitals cannot afford incinerators, etc. It is true that no training is given to the operating staff about the disposal of bio-medical waste regarding incinerator. Sometimes incinerators do not give required temperature to burn the waste.

It is observed that the use of incinerator to dispose the medical waste is compulsory, but it is in the access of very few government hospitals due to its cost. In these days the trend of general public is to prefer private hospital than the government. So problem regarding the disposal of bio-medical waste is more with private hospitals than government hospitals but they do not have access to incinerator installed by the government (5).

Discussion

Bio-medical waste is a huge problem to overcome. Ministry of Environment and Forests has framed the Bio-medical waste (Management and Handling) Rules 1995, the waste is categorized into 10 types as shown in table 1.

In March 1996, the Supreme Court had ordered all hospitals to install incinerators or alternative technologies to disinfect medical wastes. In implementing the orders, hospitals used the single technology of incineration for all hospital wastes, which release dangerous substances such as

dioxins

and

furans.

Table1: Showing different types of wastes					
Category	Waste	Category	Waste		
1.	Human anatomical waste, blood and body fluids	6.	Solid wastes		
2.	Animal and slaughter house waste	7.	Disposables		
3.	Microbiology and biotechnology waste	8.	Liquid wastes		
4.	Waste sharps	9.	Incinerator ash		
5.	Discarded medicines	10.	Chemical waste		

The new rules focus on engineering issues, appropriate to the requirement of waste. They call for simplified "four-colour" scheme for segregation of waste and specification of how various kind of waste should be dealt with. These four colors are Yellow colour, Red colour, Blue colour/White translucent and Black colour.

 Table 2: Treatment options for different types of wastes

Colour coding	Type of contain ers	Wast e Cate gory	Treatment Options as per Schedule I
Yellow	Plastic bag	1,2,3, 6	Incineration/deep burial
Red	Disinfec ted Contain er Plastic bag	3,6,7	Autoclaving/Microwa ving/ Chemical treatment
Blue/ White translu cent	Plastic bag/pun cture proof contain er	4,7	Autoclaving/Microwa ving/Chemical treatment and destruction/shreddin g
Black	Plastic bag	5,9,1 0 (Solid)	Disposal in secured landfill

Transport and Disposal of Waste

General waste – can join the municipal waste stream

For others, methods may be employed:

- 1. Incineration
- 2. Deep burial
- 3. Autoclave or microwave
- 4. Chemical disinfection
- 5. Shredding/mutilation/cutting

All biomedical waste except chlorinated plastics and radioactive waste may be subjected to

and the occupier or operator of a common biomedical waste treatment facility shall not dispose of such plastics by incineration. BIOHAZARD SYMBOL

incineration (6). Use of chlorinated plastic bags for

handing of bio-medical waste shall be prohibited



BIOHAZARD Fig. 1: Label for bio-medical waste containers/bags

CYTOTOXIC HAZARD SYMB(कोषिकाविष परिसंकट चिन्ह



Fig. 2: Label for cytotoxic waste containers/bags

In the event of breakage of mercury containing medical instruments, necessary precautions shall be taken by the occupier to segregate such waste to the extent possible and also for its proper collection, storage and disposal as per rules and the guidelines issued by the Central Government or as the case may be, the Central Pollution Control Board in order to avoid of minimize mercury releases into the environment (7).

Ethical aspects

Ethical aspect related to social responsibilities. The health professionals have, as a result of their status, knowledge and skills and an obligation to alert those who are at risk. This is reflected by compulsory notification of infectious and notifiable diseases as a measure of public welfare.

There are many examples and ample evidences that indiscriminate management of bio-medical waste could cause serious hazards to health and environment as follows:

There are many harmful agents in the bio-medical waste. The most important are biological agents, which pollute water and food and cause alimentary infections like Cholera, Typhoid, dysentery, infective hepatitis, polio and ascariasis and hookworm diseases, etc.

Legal implications

As per law, it is mandatory for all types of medical service providers to ensure proper implementation of Bio-medical waste (Management and Handling) Rules, 1998. Installation of incinerator is mandatory for hospitals with more than 50 beds. It may be kept in mind that any person can report any alleged negligence in management and handling of bio-medical waste to the appropriate authority. The state pollution control board/committees have been asked to take action against the defaulting hospitals or nursing homes under Section 15 (1) of the Environment (protection) Act, 1996, which reads as "Whoever fails to comply with or contravenes any of this act, or the rules made or orders or directions issued hereunder, shall, in respect of each such failure or contravention, be punishable with imprisonment for a term, which may extend to 5 years or with fine which may extend to one lakh rupees or which both, and in case of failure or contravention continues, with additional fine, which can extend

- Colors due to their hazardous nature.
- Bio-medical waste management Board can be established in each District.
- Either judicial power 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.

to five thousand rupees for every day during which such failure or contravention continues after the conviction for the first such failure or contravention.

Any person aggrieved by an order made by the prescribed authority under these rules may, within a period of thirty days from the date on which the order is communicated to him, prefer an appeal in Form VI to the Secretary (Environment) of the State Government or Union territory administration (8).

Suggestions:

- For the use of incinerator, training should be given to concerned persons from medical staff.
- Bio-medical waste management is needed due to health, environment, legal & aesthetic reasons in additions to ethical reasons.
- Specific funds should be allocated for the use of incinerator
- Every hospital should have special boxes to use as dustbin for bio-medical waste
- Bio-medical waste should not be mixed with other waste of Municipal Corporation
- Private hospitals should also be allowed to use incinerator, which is installed, in government hospital. For this purpose specific fee can be charged from private hospitals.
- 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.
- As provided by bio-medical waste rules, the whole of the waste should be fragmented into
- NGOs should actively come forward to curb the problem
- Regular courses on waste management for nurses should be introduced.
- Minimize the generation of bio-medical waste (7).

Conclusion

It is concluded that bio-medical waste management is the need of hour, if it is not given

priority, then the upcoming generations will see its effects leading to ill health of living beings. Therefore bio-medical waste management is essential to save environment, plantations, human and animal life.

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