Short Communication

GENERATION OF HOSPITAL WASTE: AN AWARENESS IMPACT ON HEALTH AND ENVIRONMENTAL PROTECTION

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ABSTRACT

World is generating more and more waste as the population of people in the world & Hospitals are increasing day by day. Health care activities are a means of protecting health, curing patients and saving lives. Waste generating from hospitals, health centers and medicals are no exceptions. Medical waste contains toxic chemicals, can be infectious and pose contamination risks both to public health and environment. But they also generate waste, out of which 25 percent entail risks, either of infection, of trauma or radiation exposure. In addition the inappropriate treatment or disposal of the waste can lead to environmental contamination or pollution. Seventy five percent of the hospital waste is similar to household waste and do not entail any particular hazard. In general, PVC plastic waste represents the large amount in hospital waste. In this paper we are addressing the issue of incineration of medical waste and to control the surface water mercurial pollution, their impacts on health, environment and their remediation.

Keywords: Environmental pollution, Health centers, Medical waste, Municipal waste

INTRODUCTION

The term "Medical waste" is generally covers all wastes produced in health-care or diagnostic activities. Hospitals with 200 beds will produce an average of 1.5 to 3.0 Kg of waste per patient per day [LLRM, Subharti Meerut]. The quantity of waste produced in any country depends upon the national income and type of facility concerned within hospital. A university hospital in a high income place can produce 10 Kg of waste per bed per day. Seventy five percent of hospital wastes are similar to household waste or Municipal waste, only twenty five percent wastes which entails hazard. This type of particular hazard waste entails health risk and processing of this waste causes the environmental pollution. Health care activities / hospital activities purposes for protecting health's, curing patients and saving lives. But they also generate waste of which entail risks either of infection, of trauma or of chemical or of radiation exposure. It deals with the wastes that are created in the course of surgical, medical, laboratory and radiological activities or nuclear medicine. As regards viral infections such as AIDS and Hepatitis are at most risks of infection. Sharps and pathogenic cultures are regarded as the most hazardous medical waste[1]. Poor waste management can jeopardize care staff, employees who handle medical waste, patients and their families, and the neighboring population. In addition the inappropriate treatment or disposal of that waste can lead to environmental contamination. Mercury is found mainly in thermometers, manometers, dental alloys, certain types of battery. Mercury is a heavy metal in a liquid form at room temperature and pressure. It is very dense and it evaporates and can remain for up to a year in the atmosphere. It accumulates in sediments, where it is converted into Methyl-mercury, a more toxic organic derivative. Health care facilities are one of the main sources of mercury in the atmosphere due to incineration of medical waste. These facilities are also responsible for mercurial pollution of surface water.

HOSPITAL WASTE & THEIR RISKS

Hazardous hospital wastes such as Sharps-waste entailing risk of injury, while waste contains blood, secretions or excreta entailing a risk of contamination. Anatomic waste contains body parts, tissues entailing a risk of contamination. Waste contains large quantity of materials, substances or cultures entailing the risk of propagating infectious agents. Spilled unused medicines as well as expired drugs and used medication receptacles, expired or left over cytotoxic drugs equipment contaminated with cytotoxic substances. Waste containing heavy metals like mercury, batteries, compact fluorescent light tubes entailing the risk to environment. Waste containing chemical substances-leftover laboratory solvents, disinfectants, photographic developers and fixers, waste containing radio substances- like radio nuclides used in laboratories, urine or excreta of patients treated entailing to risk. Persons who are in contact with hazardous waste are potentially exposed to various risks it entails – inside the hospital as well as outside the hospital offsite transport personal [1,2].

IMPACT ON HEALTH & ENVIRONMENT

Health care resources are potentially dangerous micro-organisms that can infect hospital patients, personnel and general public. Risks of trauma and infections are many different exposure ways through injury, cut, and prick, through contact with the skin or mucous membrane, through inhalation or through ingestion. We are discussing some of the infections that can be caused by hazardous medical waste. Gastrointestinal infection that can be due to infective agent enterobacteria and transmission agent is faeces, vomit etc. Respiratory infections occur due to infective agent like mycobacterium tuberculosis, SARS (Severe Acute Respiratory Syndrome) Virus and the transmission agent of this infection is inhaled secretions, salvia etc. Eye infections are due to herpes virus and in this case transmission agent is eye secretions. Eye infections are due to infection agent streptococcus and the transmission agent is pus. AIDS are due to Humanimmuno Deficiency Virus and the transmission agents are Blood, sexual secretions, and other body fluids. Hemorrhagic fever is due to presence of Marburg and Junin virus is blood and secretions. Viral hepatitis A, B and C occurs due to Hepatitis A, B and C viruses and the transmission agents in this case can be faeces, blood and other biological fluids. As regards viral infections the nursing staffs are most at risk of infection through contaminated needles. According to world health organizations in 2000 that world level accidents happened due to sharps are very large 66,000 cases of infections with the Hepatitis B virus. While 16,000 cases of infections for Hepatitis C virus. Survival of the Pathogenic micro organism depends on the environmental conditions (temperature, humidity, organic solvents, presence of disinfectants etc). Bacteria are less resistant than viruses. Hepatitis B virus survival depends on the conditions such as several weeks on a surface in dry air and minimum of one week at normal temperature, while several weeks on dried blood. HIV remains 3-7 days in ambient air and 21 days in 2µl of blood at ambient temperature and this virus becomes inactivated at 56^{o}C. In general however the survival time of microorganism present in medical waste is short probably because the waste contains the disinfectants. The role played by carriers such as rats and insects must also be taken into account in the evaluation of survival of microorganism time. They are passive carriers of pathogens and measures must be taken to control their proliferation.

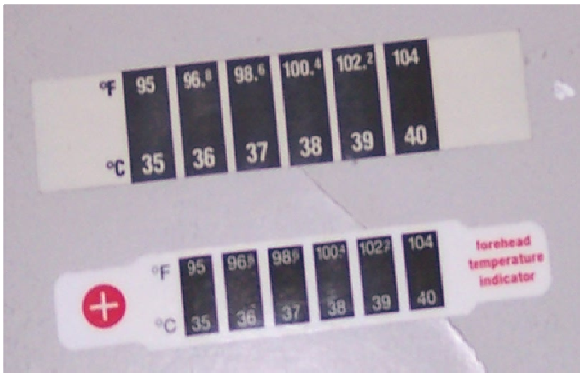
Since exposure conditions are same for employees dealing the house hold refuse and those dealing with medical waste. High income countries have shown the following impacts compared to the general population, in the case of persons employed in the processing of house hold waste. The risk of infection is 6 times higher and the risk of contracting an allergic pulmonary disease is 2.5% higher as well as the risk of contracting hepatitis is 1.2 times higher[4]. Pulmonary diseases and bronchitis diseases are caused by the exposure to the bio-aerosols contained in the air at the sites where refuse is dumped, stored or processed. Other impact on health care activities may be arises due to many chemicals and pharmaceutical products are used in health care facilities. Most chemicals have the nature of toxic, carcinogenic, mutagenic, irritant, explosive, flammable, corrosive etc. Various exposure routes for contact with these substances: inhalation of gas, vapour or droplets contact with skin. Some substances (chlorine and acids) are incompatible and can generate toxic gases when mixed. In general cleaning products and, in particular, disinfectants are examples of dangerous chemicals which are used in large quantities in hospitals and some disinfectants (such as formaldehyde) can be sensitizing or

toxic. This malpractice places the public in danger of being exposed to epidemic disease[3].

INCINERATION OF MEDICAL WASTE & REMEDIATION

A proper waste management system should be required to dispose hazardous medical waste and incineration should be the best available technology to reduce the volume of this hazardous waste. The incineration process destroys pathogens and reduces the waste volume and weight, but leaves the solid material called biomedical waste incineration such as ash as residues which increases the level of heavy metals, inorganic and organic compounds in the environment[5]. Disposal of biomedical waste ash in landfill without proper treatment may cause contamination of groundwater. Incineration usually involves the combustion of mingled solid wastes with the presence of air or sufficiently oxygen. Typically the temperature in the incinerator is more than 850 ^{0}C and the waste is converted into Carbon dioxide and some other gases as well as unwanted pollutants such as Polychlorinated Dibenzo-p-Dioxins (PCDD) and Di-benzo furans (PCDF) derived from the chlorinated phenols[6]. Metals are not destroyed during incineration. There is need to give more attention to the separation of medical waste from municipal waste. Increasing number of patients (cancer) can be correlated to the improper medical waste burning process practiced for quite long time. So, it is necessary that biomedical wastes should be disposed in a manner which is least harmful to human being. The use of bottom ash and fly ash from incineration process can be utilized in cement and concrete system. Slag obtained from biomedical waste in incinerator process utilized in road and another utilization of ashes in Portland cement mortar. One of the vital issues is for consideration of heavy metals in the medical waste, especially for mercury metal it is very dense and it evaporates and can remain for up to a year in the atmosphere to sort out this problem basically from thermometers that are used by medicine surgeon and dentist, to avoid the incident of broken thermometers in the mouth of a child and in wastes, we should replace glass thermometers by a forehead temperature indicator as shown in figure as below.

It is possible to avoid the incident of breakdown of glass thermometers and it will reduce the accumulation in sediments. It will also reduce the mercurial pollution of surface water as well as health and environmental contamination problem.



BIOMEDICAL WASTE MANAGEMENT SYSTEM

Waste generated from biomedical activities represents a real problem for nature and human being world. At present 170 common biomedical waste treatment facilities are available and 140 incinerators throughout the India. The present generation of hazardous waste is 4.16 lakhs metric ton per annum (MTA), but the incinerators have the capacity of 3.28 lakhs metric ton per annum (MTA). According to an estimate only 6.67% of waste is incinerated while the rest of the waste is going to landfill and recycled. Environmentally sound management involves taking all practical steps to protect all human health from hazardous hospital waste, ideally this would mean reducing the hazardous waste equal to zero. Properly waste management means separates the mingled waste such as proper packing of different components, storage, transportation and disposal of the waste. Rules and regulations applying at the time of collection of the waste from the hospitals, illegal dumping of the waste is another serious problem that should be avoided. Labeling of the particular component of waste is necessary before incineration [1, 6]. Properly incineration management at particular temperature is also possible to reduce the emission of the gases. Dumping of healthcare waste in uncontrolled areas can have a direct environmental effect on soil and underground water contamination. Proper filtration management of flue gases during incineration process is required, otherwise air will be polluted. In practical term for management of sound environment, climate

conditions are also responsible, the frequency with which the waste collection points must be serviced timely in order to limit negative environmental consequences. If the facilities face any problem in conducting waste management, any external funds should to support waste management practices in health facilities, any delay also impact negative in sustainable environment.

CONCLUSION

All hospital / medical facilities should be provided with standard operating procedures for example color code for particular waste collection and special containers for hazardous waste. Some of the suggestions are - all disposal sites should be established far from the human settlements and should be fenced. Healthcare waste handlers need to be adequately trained and provided with enough personal protective equipment like masks, apron, gloves, long boot, and eye shield, should be provided to take care from infectious waste. They should not handle the waste by hands without gloves. Burying sharp waste, needles or infectious waste should be monitor or evaluation process is further required to stop the environmental pollution and chance of epidemic due to burning infectious waste in open. It will be a good revolution in medical society in the world if they replace glass thermometers to forehead temperature indicators, it will control the surface water problem and mercurial pollution from the waste.

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