Overview of Solid Waste Management of Healthcare and Related Organisations

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INTRODUCTION

Medical solid waste is any solid waste which is generated in the diagnosis, treatment (provision of medical services), or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biological. Medical waste (MW) is classified by the World Health Organization (WHO) as "waste that is generated in the diagnosis, treatment or immunization of human beings or animals". As defined by WHO (2014), the term health-care waste includes all the waste generated within healthcare facilities, research centres and laboratories related to medical procedures. It also includes waste produced in the course of health care undertaken in the home. Management of medical (healthcare) waste is an integral part of infection control and hygiene programs in healthcare settings. These settings are a major contributor to community acquired infection, as they produce large amounts of biomedical waste. Biomedical waste can be categorized based on the risk of causing injury and/or infection during handling and disposal. Wastes targeted for precautions during handling and disposal include sharps (needles or scalpel blades), pathological wastes (anatomical body parts, microbiology cultures and blood samples) and infectious wastes (items contaminated with body fluids and discharges such as dressing, catheters and IV. lines). Other wastes generated in healthcare settings include radioactive wastes, mercury containing instruments and polyvinyl chloride (PVC) plastics. These are among the most environmentally sensitive by-products of healthcare (Remy, 2001). World Health Organization (WHO) stated that 85% of hospital wastes are actually non-hazardous, around 10% are infectious and around 5% are non-infectious but hazardous wastes. In the USA, about 15% of hospital waste is regulated as infectious waste. In India this could range from 15% to 35% depending on the total amount of waste generated (Glenn and Garwal, 1999; Soliman and Ahmed, 2007).

Healthcare waste products should be considered as a reservoir of pathogenic microorganisms, which can cause contamination and give rise to infection. If waste is inadequately managed, these microorganisms can be transmitted by direct contact, in the air or by a variety of vectors, and can pose a serious threat to human health and to the environment. The inefficient handling of biomedical waste is more

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likely to cause problems such as blood borne pathogens to the groups at highest risk, namely; healthcare staff, scavengers, and municipal workers (from needle sticks for example, if the biomedical wastes are handled and disposed together with domestic wastes). In many countries, cities are with inadequate segregation of hazardous and non-hazardous biomedical wastes, as well as a lack of suitable waste treatment facilities and methods. These cities also have either unregulated or non-existent legislation, with regard to waste processing and treatment, in addition to inefficient training of personnel and lack of personal protective measures (Askarian *et al.,* 2004; Marinkovic *et al.,* 2005; Rasheed *et al.,* 2005; Soliman and Ahmed, 2007).

Medical solid wastes management is an important factor in environmental hygiene and needs to be integrated with total environmental planning (Oke, 2008). Elements of waste management include characterisation, storage, collection, transportation, treatment and final disposal. Although, the World Health Organization (WHO, 2004), US Environmental Protection Agency (EPA, 1991), US Centres for Disease Control and Prevention, Italy (Liberti *et al.*, 1994, 1996), Finland, Japan and Germany (Miyazaki *et al.,* 2007; Miyazaki and Une, 2005; Tsakona *et al.,* 2007) have already established strict guidelines for the management of infectious waste materials, solid waste management is a major problem in most developing countries of the world due to its ever growing and endless generation coupled with poor management (Longe and Williams, 2006, Meghdad *et al., 2016*).

BACKGROUND

In some countries, solid and medical wastes disposal is governed by laws of the Ministry of Environmental Affairs in collaboration with the Ministry of Health and Population. Regulations classify the waste from healthcare settings to be hazardous, and state that certain precautions should be considered during collection, handling and final disposal (Soliman and Ahmed, 2007, Meghdad *et al., 2016*). One of the most important and initial steps in the development of a plan or in the performance of risk or cost analyses in the field of solid waste management involves a thorough understanding of the quantities and properties of the material that needs to be evaluated or treated (Diaz *et al.,* 2008). In this particular case, the material under consideration is healthcare waste. Unfortunately, there is a limited quantity of reliable information in the open literature on the quantities and characteristics of the various types of wastes that are generated in healthcare facilities (Diaz *et al.,* 2008). Furthermore, most of the reports dealing with analyses and evaluations conducted on the performance of a particular type of treatment method either in industrialized or in developing countries do not clearly specify or characterize the quality of the waste undergoing the treatment. Article provides basic information on the quantities, characteristics; collection, transportation and disposal of the solid wastes generated in various types of healthcare facilities located in industrialized and in developing countries are rare (Diaz *et al.,* 2008). This therefore calls for documentations on such important waste with a particular attention to prevention spreading of infectious diseases and to aid environmental engineer in the design of disposal facilities. The main objective of this study is to presents documentations on health care solid wastes with a particular attention to prevention spreading of infectious diseases and to aid environmental engineer in the design of disposal facilities.

Medical Wastes Treatment and Disposal Practices

Treatment of toxic and infectious waste has been defined as any method, technique or process designed to change the biological character or composition of waste to render it non-toxic or non-infectious. There