إدارة المخلفات الصلبة بالمستشفيات الخاصة بدولة الكويت

رسالة مقدمة من الطالبة

جنان محسن حسن رمضان

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لاستكمال متطلبات الحصول علي درجة دكتوراه فلسفة

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قسم العلوم الهندسية البيئية

معهد الدراسات والبحوث البيئية

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صفحة الموافقة على الرسالة

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ختم الإجازة:

أجيزت الرسالة بتاريخ / / 2014

موافقة مجلس المعهد / / 2014 موافقة مجلس الجامعة / / 2014

2014

SOILD WASTES MANAGEMENT IN PRIVATE HOSPITALS IN KUWAIT

Submitted By

Jenan Mohsen Hassan Ramadan

B.Sc. of (Chemical Engineering), Faculty of Engineering and Petroleum, Kuwait University, 1996

Master of (Chemical Engineering), Faculty of Engineering and Petroleum, Kuwait University, 2000

A thesis submitted in Partial Fulfillment
Of
The Requirement for the Doctor of Philosophy Degree
In
Environmental Science

Department of Environmental Engineering Science
Institute of Environmental Studies and Research
Ain Shams University

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APPROVAL SHEET

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Acknowledgment

I wish to express my sincerest gratitude to my thesis advisor, **Dr./ Hamdy Ibrahim Ali**. His guidance inspiration and valuable suggestions provided an invaluable contribution to the thesis. I have also greatly benefited from the suggestions of **Dr./ Jasem Al-humoud, Dr./ Mostafa Ragab and Dr./ Ahmed Shafik Al-Gendy,** who served on my committee. I gratefully acknowledge their assistance.

I am grateful to my mother, brothers, sister, husband and daughters for their dedication sacrifices they have made that enabled me to successfully complete my studies.

Last but not least I would like to convey my deepest appreciation to my colleague and life **Thekra** for her continuous support.

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Abstract

Hospitals generate and reject material regularly, and improper management of these wastes leads to public health hazards, environmental pollution, and aesthetic appearance. The study and the results presented in this article were as a work carried out in two major private hospitals, namely, the Al-Hadi Hospital and Al-Salam Hospital. The results indicated that the waste generation rate is 1.306 kg/bed/day, which includes 0.251 kg/bed/day of toilette waste (19%), 0.468 kg/bed/day of office waste (36%),0.570 kg/bed/day of infection waste (44%) and 0.017 kg/bed/day (1%) of sharp waste. Note that all the calculations were based on occupied beds in the hospitals.

A statistical analysis software (SAS) was used to produce the best fitting equation for the total hazardous and nonhazardous waste per occupied bed per day. The equation predicts a response (dependent) variable from a function of regression (explanatory) variables and parameters, adjusting the parameters such that a measure of fit is optimized. The stepwise regression with maximum R2 improvement option was evaluated for the hazardous and nonhazardous waste generation mathematical relationship. The choice of explanatory variables for the hazardous wastes mathematical relationship development included sharp waste (SHWS), infectious wastes (INWS), and number of occupied beds (NMBD). However, for the nonhazardous wastes, the explanatory variables of the relationship included: toilet wastes (TOWS), office wastes (OFWS), and number of occupied beds (NMBD).

Questionnaires were carried out on a sample of workers in these private hospitals to measure their knowledge and awareness.

According to this study an efficient database obtained and hospital solid waste management system improved for private hospitals in Kuwait.

Chapter 1: Introduction

1. Background

Over the years, the world has witnessed the rapid population growth in different patterns and extraordinary waste generation. In many developed and developing countries, collection, transportation, treatment and disposal of waste are the major challenges for government, organizations and other institutions. Different types of solid wastes depending on the generation resource can be classified into household waste or municipal waste, industrial waste as hazardous waste and biomedical waste (**Tabasi and Marthandan 2013**).

Clinical waste is generated during the diagnosis, treatment or immunization of human beings or animals as well as in research activities in these fields, or in the production or testing of biological samples. It may include wastes like sharps, soiled waste, disposables, anatomical waste, cultures, discarded medicines, chemical wastes, etc. These are in the form of disposable syringes, swabs, bandages, body fluids, human excreta, etc. This waste is highly infectious and can be a serious threat to human health if not managed in a scientific and discriminate manner.

Bio-medical waste' means any waste generated during diagnosis, treatment or immunization of human beings or animals. Management of 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