

CHAPTER ONE: INTRODUCTION

1.1 GENERAL WASTE

Clinical waste volume in Malaysia has increased by 15% in 1998 as against an annual prediction of increase by 4.25% in the preceding years. Global waste generation has also generally increased over the years but with some variations depending on the economic status of countries. Global waste management experts and scientists have to take on a concerted effort to find a system that would contain or reduce the amount of waste quantity generated. While an integrated system of waste management is progressive, reduction at source or waste minimization, regardless of any section is tantamount to winning half the war.

1.2 CLINICAL WASTE

Ministry of Health (MOH) Malaysia (1992) defines clinical waste as follows:

“Any waste which consists wholly or partly of human or animal tissues, blood or other body fluids, excretions, drugs or other pharmaceutical products, swabs or dressings, syringes, needles or other sharp instruments being waste which unless rendered safe, may prove hazardous to any person coming into contact with it”

“Clinical waste is any other waste coming from Medical, Nursing, Dental, Veterinary, Pharmaceutical, Animal house, Morque and other scientific investigations, treatment, health care establishments, teaching or research or collection and testing of blood for transfusion, which may cause infections when in contact” (Agamuthu, 1997).

1.3 CLINICAL WASTE CLASSIFICATION

Clinical waste can be broadly classified into the following categories:

1. Hospital waste
2. Infectious waste

1.3.1 HOSPITAL WASTE

Hospital waste is any waste arising from a hospital premises including kitchen and canteen wastes. Such waste elements are generated in all sections of a hospital administration including where medical, paramedical and non-medical activities are carried out.

1.3.2 INFECTIOUS WASTE

Infectious waste is waste comprising elements that can cause harm to human beings when in contact, especially before such waste was treated and declared inert. Wastes of this category are generated mostly in wards and surgical halls where patients are directly treated for various diseases.

1.4 CLINICAL WASTE HIERARCHY

Clinical waste is considered a scheduled waste but is quite distinct in respect of other (general) wastes since its characteristics require special handling and precautions. Figure 1.1 shows the components of waste classifications.

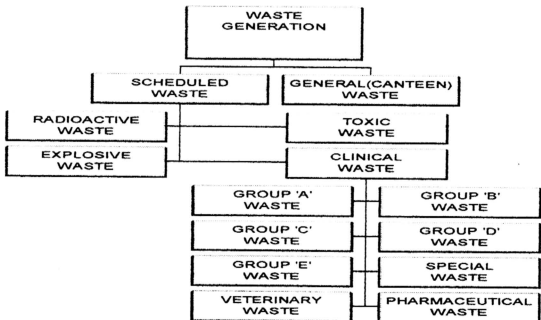


Fig: 1.1 Flowchart showing clinical waste hierarchy

1.5 CLINICAL WASTE GENERATION - MALAYSIAN SCENARIO

Table 1.1 shows the clinical waste generation per bed per day in the States of Malaysia in the year 1997. However, the data are for Ministry of Health Malaysia controlled hospitals such as General hospitals, District hospitals and Nucleus hospitals with or without specialist care facilities but do not include private hospitals and clinics. General hospitals in Kuala Lumpur and Johor generate the highest amount of clinical waste. The sharp difference in waste generating between Kuala Lumpur and Perlis is due to the fact that Kuala Lumpur has the largest general hospital and higher bed occupancy rate.

Table 1.1 Clinical waste generation volume in the States of Malaysia in 1997

States	Waste in kg/day
Perlis	84
Kedah	476
Pulau Pinang	538
Perak	641
Selangor	695
Kuala Lumpur	1340
Negeri Sembilan	571
Malakka	343
Johor	1247
Pahang	522
Terengganu	347
Kelantan	438
Sarawak	564
Sabah	546

Source: Ministry of Health Malaysia, (1997)

1.6 CLINICAL WASTE - INTERNATIONAL SCENARIO

Table 1.2 below indicates the hospital waste generated including non-hazardous wastes in some of the industrialized countries. The quantum generated is much higher (2 to 9 times) then those produced in Malaysia.

Table 1.2 Waste generation data in some industrialized countries (kg/bed/day)

Type of Hospital	Norway	Spain	UK	France	USA	Netherlands
University Hospital	3.9	4.4	3.3	3.35	5.24	4.2 to 6.5
General Hospital				2.5	4.5	2.7
Maternity		3.4	3.0			
Mental hospital		1.6	0.5			1.3
Geriatric Hospital		1.2	9.25			1.7

Source: WHO/Europe Publications ERS 97

Clinical wastes generated in Latin American countries are given in Table 1.3. Once again the rate of generation is much higher than the Malaysia average of 0.52 kg bed/day. However, data collected in 1997 shows a drastic decrease to 0.80 kg/bed/day (Table 1.4)

Table 1.3 Clinical waste generation in Latin American countries (kg/bed/day)

Country	Year of study	Minimum	Median	Maximum
Chile	19731	0.97		1.21
Venezuela	1976	2.56	3.10	3.71
Brazil	1978	1.20	2.63	3.80
Argentina	1982	0.82		4.20
Peru	1987	3.00	3.80	4.50
Paraguay	1989	3.00	3.80	4.50
Argentina	1988	1.85		3.65

Source: Report of a Consultancy on Medical Waste Management in Developing Countries, WHO, Geneva, September 1982.

Comparatively, the clinical waste in North America was at 2.5 kg/occupied bed/day (Table 1.4). Meanwhile, Japan, Middle East and Eastern European countries record lower range of 0.5 to 1.8 kg/per occupied bed/day and this may be due to improved waste management. A factor that remains contributive to this volume is considered to be the economic trends of the countries in some developed countries. (Graham, 1997).

Table 1.4 Clinical waste generation in some developed nations

Countries	Waste generated (kg per occupied bed/day)
1 North America	2.50
2 United Kingdom	2.40
3 Western Europe	1.80
4 Japan	1.20
5 Middle East	0.90
6 Latin America	0.80
7 Eastern Europe	0.50

Source: Graham from World Health Organization Report, (1997)

1.7 LEGAL FRAMEWORK

In Malaysia, disposal of clinical wastes must comply with the Environmental Quality Act 1974 (Act 127) and the following subsidiary legislations made under it (MOH Malaysia, 1994):

- i. Environmental Quality (Scheduled Waste) Regulations, 1989,
- ii. Environmental Quality (Prescribed Premises) Scheduled Waste Treatment and Disposal Facilities Regulations, 1989, and
- iii. Environmental Quality (Clean air) Regulations, 1978.

In addition, Control of Infectious Diseases Act (1988) prescribes guidelines in handling and disposing clinical wastes.

1.8 GROUPING OF HOSPITAL WASTES

Hospital wastes should not be mixed with general wastes and if mixed, will be treated as Clinical waste as a whole. All hospitals and health care establishments in Malaysia are to adopt the following standard colour coding for waste storage and handling.

Table 1.5 shows a summary of colour coding for the bags and containers commonly used in hospitals as a norm that is universally practised. Basically the colours are aimed at identifying the wastes from general wastes and are indicative of subsequent care on handling and disposal.

Table: 1.5 Colour codes of bags/containers used in clinical waste handling

Colour code of containers/bags	Type of waste
Black	General Waste
Yellow	Clinical waste for incineration only
Light blue	Waste for autoclaving or equivalent treatment before disposal

(Source: Ministry of Health Manual on Hospital Waste Management, 1994)

According to London Waste Regulations Authority (1994) Clinical waste has been grouped as shown in Table 1.6. As shown in the table, Clinical Waste comprises a wide variety where Cytotoxic waste, Veterinary Practices waste, Pharmaceutical waste etc have their own paths of generation and routes of disposal. Nonetheless, basic handling and disposal systems remain the same. However, the focus in this

dissertation is Clinical Waste Management in MOH hospitals, which is one of the predominant waste types among Scheduled wastes.

Table 1.6 Hospital Waste Classification

Group	Type of wastes
A(a)	All human tissue including blood (whether infected or not), animal carcasses and tissue from veterinary centres, hospitals or laboratories and all related swabs or dressings
A(b)	Waste materials where the assessment indicates a risk to staff handling them, for example from infectious disease cases.
A(c)	Soiled surgical dressings, swabs and all other soiled wastes from treatment areas.
B	Discarded syringe needles, cartridges, broken glass and any other contaminated disposable sharp instruments or items
C	Microbiological cultures and potentially infected waste from pathology departments (laboratory and ort-mortem rooms) and other clinical and research laboratories
D	Certain pharmaceutical and chemical wastes
E	Items used to dispose of urine, faeces and other bodily secretions or excretions assessed as not falling within Group A. This included used disposable bed pans or bed pan liners incontinence pads, stoma bags, and urine containers. It will be apparent that Group E contains items, which will usually present a low level of risk. However, as the actual risk cannot be readily demonstrated, items within this Group should be treated as clinical waste taking into account local circumstances. It should be recognized that while the risk from Group E items may be low they will often be of an offensive nature and adequate steps should be taken in line with the general duties under Health and Safety at work etc Act for proper handling and disposal arrangements.

(Source: Saw, 1997)

1.9 SCOPE AND OBJECTIVE OF THE PRESENT STUDY

Data from the Ministry of Health Malaysia (1995) reveals that the daily generation of clinical waste in Malaysia is 293 tonnes and at the current rate of growth of 4.25%, it would lead to a generation of 0.531 million tonnes a year in the year 2000. Contrary to the prediction in 1995, the clinical waste generation increased 6-fold and reached 3.02 million tonnes in 1997. The greater the waste volume increase, the larger the facilities required for waste management. More in depth research and analysis are required to contain the effects of the waste generation. Casualties arising due to increase of volume of clinical wastes should not be criteria, on the contrary, successful management remains with the inverse proportion of casualties with the growing volume of wastes.

In Malaysia, Clinical Waste Management still remains an area where more innovations are needed to bring it par with international or developed nations. However, being a country of tropical geography, the criteria pertaining to climatic conditions are of concern. Humidity and moisture are factors, which can cause additional concern in disposing the waste to desired perfection within a short time.

Certain areas in waste handling still require greater attention in order to achieve the desired results. These areas can be identified as:

- i. Lack of resources,
- ii. Lack of awareness by public, patients and personnel,
- iii. Lack of proper training for waste handlers,
- iv. Absence of clear policies to regulate other health care establishments,
- v. Medical and non-medical public personnel involvement in handling activities,
- vi. Possibility of cross infection due to negligence in disposal,
- vii. Lack of professional skill to manage spillage and
- viii. High cost of disposal of Clinical wastes.

This study is aimed at exploring the actual system of Hospital waste management in the Northern States of peninsular Malaysia (Perlis, Kedah, Pulau Pinang and Perak), Sabah and Sarawak. Two case studies, the first part relevant to waste generation and handling in Teluk Intan District Hospital and second part pertinent to waste incineration and disposal at Kamunting Clinical Waste Incinerator Plant, the second largest in Malaysia and owned by Faber Medi-Serve Consortium will be studied. These two case studies could be similar to the system employed in other parts of the country since Ministry of Health Malaysia also controls these areas.

The main focus of this study involves the physical observation and hands-on exposure with the day to day clinical waste management activities in the Northern States Perlis, Kedah, Pulau Pinang and Perak of peninsular Malaysia, Sabah and Sarawak.

The objectives could be summarised as follows: -

- i. To characterize the clinical wastes generated in the northern states of Peninsular Malaysia, Sabah and Sarawak by hospitals under the Ministry of Health Malaysia. The hospital types include General Hospitals, District Hospitals, Nucleus hospitals with and without specialist care facilities,
- ii. To quantify the clinical wastes generated by these hospitals,
- iii. To study the methods of handling and transportation of clinical waste in the northern states of Peninsular Malaysia, Sabah and Sarawak by Faber Medi-Serve Sdn. Bhd. including the systems involved in the storage and disposal of Clinical wastes at Clinical Waste Incinerator Plant situated at Kamunting, Taiping, and
- iv. To observe and study the clinical waste management activities carried out in Teluk Intan District Hospital on a hands-on basis, including daily waste generation quantity and quality.