

ABSTRACT

Clinical waste management and disposal methods are quite unique due to their infectious and harmful nature. Unlike municipal waste, clinical waste is pathogenic which jeopardizes the biotic community including human beings, if not quelled of its pathogenic effect.. However, shortcomings or drawbacks are still possible in areas of source separation, inappropriate containment and labeling. Improper incineration may also lead to incomplete combustion ultimately leading to air pollution. Though existing system of clinical waste disposal and management in Malaysia seem adequate, still efficient and cost effective mechanisms are needed.

The focus of this research is to survey and study the administrative activities and management of clinical wastes in the Northern States of Malaysia, Sabah and Sarawak by Faber Mediserve, one of the three privatised clinical waste management companies in Malaysia. To supplement the objective, two case studies were carried out. One case study involves Teluk Intan District Hospital and another is the incinerator plant at Kamunting.

Out of the 142 Ministry of Health (MOH) Government hospitals in Malaysia, the Northern States (Perlis, Kedah, Pulau Pinang and Perak), Sabah and Sarawak alone contain a total of 72 hospitals spread all over the region catering for more than 50% of the area where medical care facility is provided in the country. Of the total bed capacity in the country, the above States contribute almost 52.3%. As for the total clinical waste volume generated, more than 42.3% is from the above States. In terms of bed occupancy rate, the national average ranges from 54% to 59% and the variation mostly depends on the population of the area. Generally all general hospitals rank high in occupancy rate (71%) followed by district hospitals (52%). The bed occupancy rate in the Northern States, Sabah and Sarawak averages at 55.6% which is close to the national average. However data from 1997 - 98 and thereafter indicate that almost no radical increase or decrease in clinical care facility has been effected.

But the increase in the clinical waste volume is predicted as it has been steadily increasing over the years since 1997.

The first case study was to investigate the clinical waste management in Teluk Intan District Hospital. The hospital is almost fifty years old and is located within the town limits of Teluk Intan in Hilir Perak district of Perak State. It is well-organized with many medical facilities. The hospital is found to be an ideal example to represent the whole Malaysian clinical waste management scenario since it is a pioneer district hospital with many modern facilities and numerous wards for various disciplines.

Waste audit was done on three different days of the week for three weeks. The hospital has 548 beds in 24 wards altogether with arrangements to accommodate more beds on makeshift facilities. The bed occupancy rate of the hospital usually ranged from 51 to 58 % as against the State rate of 42.1%. The volume of waste on Monday (being the first working of the week) indicated a higher volume of waste generated (170.8 kg) whereas it fell sharply in the following days (150.6 kg). However, the lowest recorded volume of waste is on Sundays (109.5 kg) due to the closure of some of the non-emergency facilities on the day. When the ward-wise volume of waste was analysed, labour wards seemed to be generating more than any other care facilities. However, occasionally it is outweighed by other wards like dental surgery or accidents and emergency depending on the surgical activities carried out in these wards on certain days. The administrative procedures in handling and disposing clinical wastes in Teluk Intan hospital are quite in line with the Department of Environment (DOE) and MOH Malaysia guidelines. More than forty thousand people of different socio-economic background in and around Teluk Intan avail use of the normal and specialized medical care facilities in this hospital.

The second case study was at Kamunting Incinerator Plant owned by Faber Medi Serve Sdn. Bhd. The incinerator plant is one of their larger ones located in the industrial area of Kamunting, close to Taiping. The capacity of incineration is 350 kg per hour. It is equipped with an advanced technique of automation by a

microprocessor-linked personal computer with self-communication facility to remote centres in case of emergency or undue incident.

In the two analyses, namely, the residue ash analysis and stack emission analysis carried out, the components are well within the DOE specifications. The residue ash analysis indicated presence of inorganic contents like Cadmium, Lead, Arsenic, Chromium, Selenium, Mercury, Copper, Manganese and Nickel at less than 40% of the emission standards and operating conditions set forth by DOE.

In the stack emission analysis, there are almost 26 Dioxin and Furan components and these are carcinogenic compounds. However Dioxin and Furan compounds were 55.6% less than the DOE limit. Total particulate content in the stack emission remained 82 as against 200 (in Ringlemann scale limit) specified by DOE. Presence of heavy metals was also recorded at less than 1% of DOE limits while Hydrogen chloride was at 9.1% but still within limits.

Disposal procedures and associated activities [like external transportation, bulk weighing, on-site storage, inerting, encapsulating, documentation and further transportation in scavenger boxes to the secure landfill site at Bukit Nanas] were also studied.