

WASTE MANAGEMENT OF SELECTED HOSPITALS IN DAVAO CITY

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Abstract - Waste management of nine selected hospitals in Davao City was observed from April to August 2005. Four aspects of hospital waste management were considered, namely: (1) collection, (2) transport, (3) treatment, and (4) disposal of waste. It was noted that the quantity of hospital waste generated in Davao City varied depending on the hospital policies and practices in waste management. About 89% of waste generated by the selected hospitals was comparable to domestic waste, while the remaining 11% was special waste or waste which needed special handling and treatment before final disposal. It was observed that many hospitals in Davao City mixed the waste generated. These wastes were collected, transported, and finally disposed of collectively. As a result of this failure to establish and follow segregation protocols, the waste leaving hospitals, as a whole, was both potentially infectious and potentially hazardous. Most hospitals viewed the lack of appropriate technologies for treatment and disposal of hospital waste as their greatest problem in hospital waste management. It is recommended then that hospitals strictly implement waste segregation policies. Hospital workers should also be given proper education and training in safe and efficient waste management. With the help of the local government, hospitals could also invest in environmentally sound and cost effective medical waste treatment and disposal technologies.

INTRODUCTION

Hospitals are institutions devoted primarily to safeguard the health of the community. In the fulfillment of their mandate to take care of the health of the citizenry, however, waste is produced. Unfortunately, the waste produced by hospitals carries a higher potential for infection and injury than residential or commercial waste. Hence, if disposed improperly, hospital waste can pose a great threat not only to the hospital personnel but also to the community in general.

A varying proportion of hospital waste - sharps, pathological waste, pharmaceutical waste, biological waste, and hazardous chemical waste - requires special attention. An individual may get afflicted with a disease through a puncture, abrasion, or cut in the skin; through the mucous membranes; through inhalation and ingestion.

A lot of countries worldwide are having problems on the lack of systematic approaches to medical waste disposal. Some of the most prevalent problems regarding medical waste are separation of infectious waste from general waste; reuse of disposable syringes and other untreated equipment; lack of awareness and training for healthcare professionals; and inadequate storage facilities, transportation and disposal equipment (Yadav, 2001).

In the Philippines, the management of healthcare waste is driven by concerns for adverse health and environmental effects, uncertainty regarding regulations, and the negative perceptions of waste handlers (Health Care Waste Management Manual, 2004).

Competing with all of the other environmental problems, medical waste is often overlooked or simply viewed as a solid waste issue. Sound medical waste management,

however, is key to protecting public health and requires dedicated planning, training and tracking throughout the medical waste collection, storage, treatment, and disposal process. As a source of both hazardous and non-hazardous waste, all hospitals need to accept basic responsibility for proper waste management.

This study aimed to describe the waste management of selected hospitals in Davao City. Specifically, it aimed at identifying the different types of hospital waste and the common practices the hospitals employ in the collection, transportation, treatment and disposal of their waste.

Results of this study hopefully can provide inputs for decisions along policy implementation that hopefully can bring about sound hospital waste management in Davao City.

METHODOLOGY

This is a descriptive survey method of research which employed both quantitative and qualitative approaches in the investigation of the research problem. The quantitative aspect came from the information gathered from the answers of the respondents to the different questions in the questionnaires. The qualitative aspect was taken from the answers to the probe questions in the interview with the contact persons from the different hospitals and from actual observation. Actual observations were done either together with a hospital representative or through self observation.

The primary sources of data were from the questionnaires that were fielded and from the interviews with the administrative heads and other regular hospital employees like administrative staff, nurses and maintenance people. Secondary data were from records of hospitals and interviews with the Department of Health representatives and The City Environment and Natural Resources Office representative.

The questionnaire was divided into three parts namely: (1) general facility information, (2) practices in hospital waste management and (3) problems in management and handling of hospital waste. For the interview guide, it was divided into five parts namely, (1) healthcare

waste composition and quantity, (2) healthcare waste collection, (3) treatment and disposal on the facility premises, (4) healthcare waste management on the facility premises and (5) financial data.

Validity was checked through content validation by three experts in hospital waste management who did not come from the hospitals covered by the study.

Three primary, three secondary and three tertiary hospitals were included in this study. Primary hospital refers to any hospital that is equipped with the service capabilities needed to support licensed physicians rendering services in Medicine, Pediatrics, Obstetrics and Minor Surgery. Secondary Hospital refers to any hospital that is equipped with the service capabilities needed to support licensed physicians rendering services in the field of Medicine, Pediatrics, Obstetrics and Gynecology, General Surgery and other Ancillary Services. Tertiary Hospital refers to any hospital that is fully departmentalized and equipped with the service capabilities needed to support certified Medical Specialists and other licensed physicians rendering services in the field of Medicine, Pediatrics, Obstetrics and Gynecology, Surgery, their subspecialties and ancillary services. For the purpose of anonymity, primary hospitals were designated as Hospital A, Hospital B and Hospital C; secondary hospitals as Hospital D, Hospital E and Hospital F; and tertiary hospitals as Hospital G, Hospital H and Hospital I. The criteria used for the choices were accessibility and the willingness of the heads of hospitals to cooperate.

RESULTS AND DISCUSSION

Hospital Waste Volume and Composition

Hospital waste accounted only for about 0.4% of the total waste stream in the city. The remaining 96.6% came from residential, commercial, and market (Figure 1).

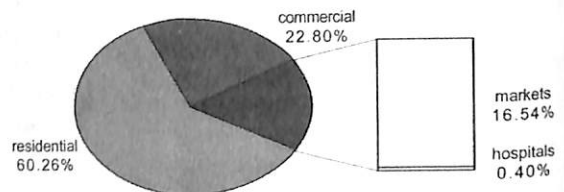


Figure 1. Major sources of waste in Davao City.

Table 1. Type of Waste Generated by the Different Hospitals.

Type of Waste	Primary Hospitals			Secondary Hospitals			Tertiary Hospitals		
	A	B	C	D	E	F	G	H	I
Non-infectious	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pressurized containers	✓	✓	✓	✓	✓	✓	✓	✓	✓
Infectious	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chemical	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sharps	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pharmaceutical	✓	✓	✓	✓	✓	✓	✓	✓	✓
Radioactive	✗	✗	✗	✗	✗	✓	✓	✓	✓
Pathological	✗	✓	✓	✓	✓	✓	✓	✓	✓

Legend: ✓ - present ✗ - absent

The types of waste generated by the hospitals include non-infectious waste, pressurized containers, infectious waste, chemicals, sharps, pharmaceutical, radioactive and pathological waste (Table 1).

In 2004, the City Environment and Natural Resources Office (CENRO) collected an average of about 3.6 cu m of hospital waste everyday. About 89% of this waste was categorized as general waste while the remaining 11% was special waste or waste oftentimes described as hazardous or infectious (Figure 2). General waste coming from hospitals mainly comprised of plastics, organic waste, papers, bottles, cans and Styrofoam (Figure 3).

Table 2 shows the different units in the selected hospitals that generate wastes.

Hospital Waste Management System

The three primary hospitals visited were small hospitals with an average bed capacity of 20. Being small hospitals, intricate equipment nor facilities were not used in their waste collection and disposal. The equipment/materials they used in waste collection were plastic bags, trash bins, "sharps" containers,

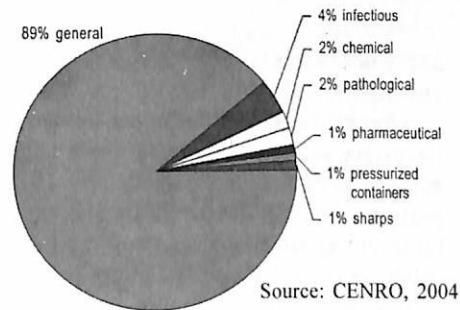


Figure 2. Volume and composition of hospital waste.

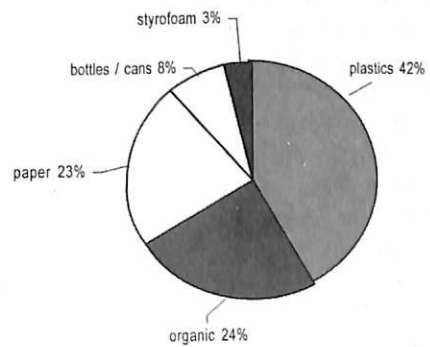


Figure 3. Volume and composition of hospital general waste.

Table 2. Different Units in the Selected Hospitals that Generate Waste.

Type of Waste	Primary Hospitals			Secondary Hospitals			Tertiary Hospitals		
	A	B	C	D	E	F	G	H	I
Medical wards	✓	✓	✓	✓	✓	✓	✓	✓	✓
Private rooms	✓	✓	✓	✓	✓	✓	✓	✓	✓
Surgical wards	✓	✓	✓	✓	✓	✓	✓	✓	✓
Laboratories	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pharmacies	✓	✓	✓	✓	✓	✓	✓	✓	✓
Physician's Clinics	✗	✗	✓	✓	✓	✓	✓	✓	✓
Administrative Service Offices	✓	✓	✓	✓	✓	✓	✓	✓	✓
Canteens	✗	✓	✗	✓	✓	✓	✓	✓	✓

Legend: ✓ - present ✗ - absent

and whenever available, disposable gloves and masks.

Except for one, all secondary and tertiary hospitals used trolleys and pushcarts in addition to all the other facilities used by the primary hospitals. In addition to all these, two tertiary hospitals had designated one elevator solely for the collection and transportation of wastes and used linens within the hospital. These two hospitals are at least five stories high and have bed capacities above 200 which explain the need for the elevators to safely and conveniently transport waste in a big facility

For smaller hospitals, hospital waste management was often dealt with by all members of the staff. In secondary and tertiary hospitals, hospital waste management was the responsibility of the administration staff, nurses and janitors.

In every hospital, janitors played a vital role in waste management since they collected, transported and disposed of hospital waste. The head of administration or lead persons from agencies were accountable for the performance of the janitors.

Practices in Hospital Waste Management

The practices of the selected hospitals in Davao City with regard to segregation, collection and transportation of waste are shown in Table 3 while the waste flow is shown Figure 4.

All the selected hospitals did not treat their general waste, pressurized containers, and pharmaceutical waste. Infectious wastes, sharps and pathological wastes were treated through chemical disinfection either using Lysol, Clorox, hypochlorite or creolina solutions.

All hospitals disposed of their pressurized containers, usually aerosol cans, and containers of liquid waste together with the general waste through the city collection system. Collection of waste was usually done daily for major hospitals and once or twice a week, for the smaller hospitals in the city. The waste was disposed of in the City's open dumpsite in Carmen, Baguio District.

Infectious wastes were either buried or disposed of through the city collection system together with the non-infectious waste. Sharps were usually burned, buried or placed in septic

Table 3. Segregation, Collection and Transportation of Waste in the Selected Hospitals.

Method Generally Used	Primary Hospitals			Secondary Hospitals			Tertiary Hospitals	
	Y	N	U	Y	N	U	Y	N
Waste is segregated at source.	1	2	0	3	0	0	3	0
Waste is collected in prescribed color-coded bins and duly labeled.	1	2	0	3	0	0	3	0
BLACK (general-non-infectious-dry)	1	2	0	3	0	0	3	0
GREEN (general-non-infectious-wet)	1	2	0	3	0	0	3	0
YELLOW (infectious-pathological)	1	2	0	3	0	0	3	0
YELLOW/BLACK (chemical waste)	0	3	0	0	3	0	0	3
ORANGE (radioactive)	0	3	0	0	3	0	2	1
RED (sharps and pressurized containers)	0	3	0	0	3	0	2	1
	0	3	0	0	3	0	3	0
	0	3	0	0	3	0	3	0
Dustbin or container is light and can be carried by a person.	3	0	0	3	0	0	3	0
Dustbin or container is covered.	3	0	0	3	0	0	3	0
Colored bags/dustbins are placed in different parts of the hospital.	0	3	0	3	0	0	3	0
Special waste is collected not beyond a period of 48 hours.	3	0	0	3	0	0	3	0
Protective clothing and equipment appropriate to the risks associated with the handling, storage, and disposal of wastes are provided to and used by personnel.	2	1	0	3	0	0	3	0
Special vehicles are designated for the transportation of waste.	1	2	0	2	1	0	3	0
Transportation of waste does not clash with peak working hours, visiting hours and meal distribution timing.	1	1	1	3	0	0	3	0
The timing of transportation of infectious and non-infectious waste is different.	0	3	0	0	2	1	1	2

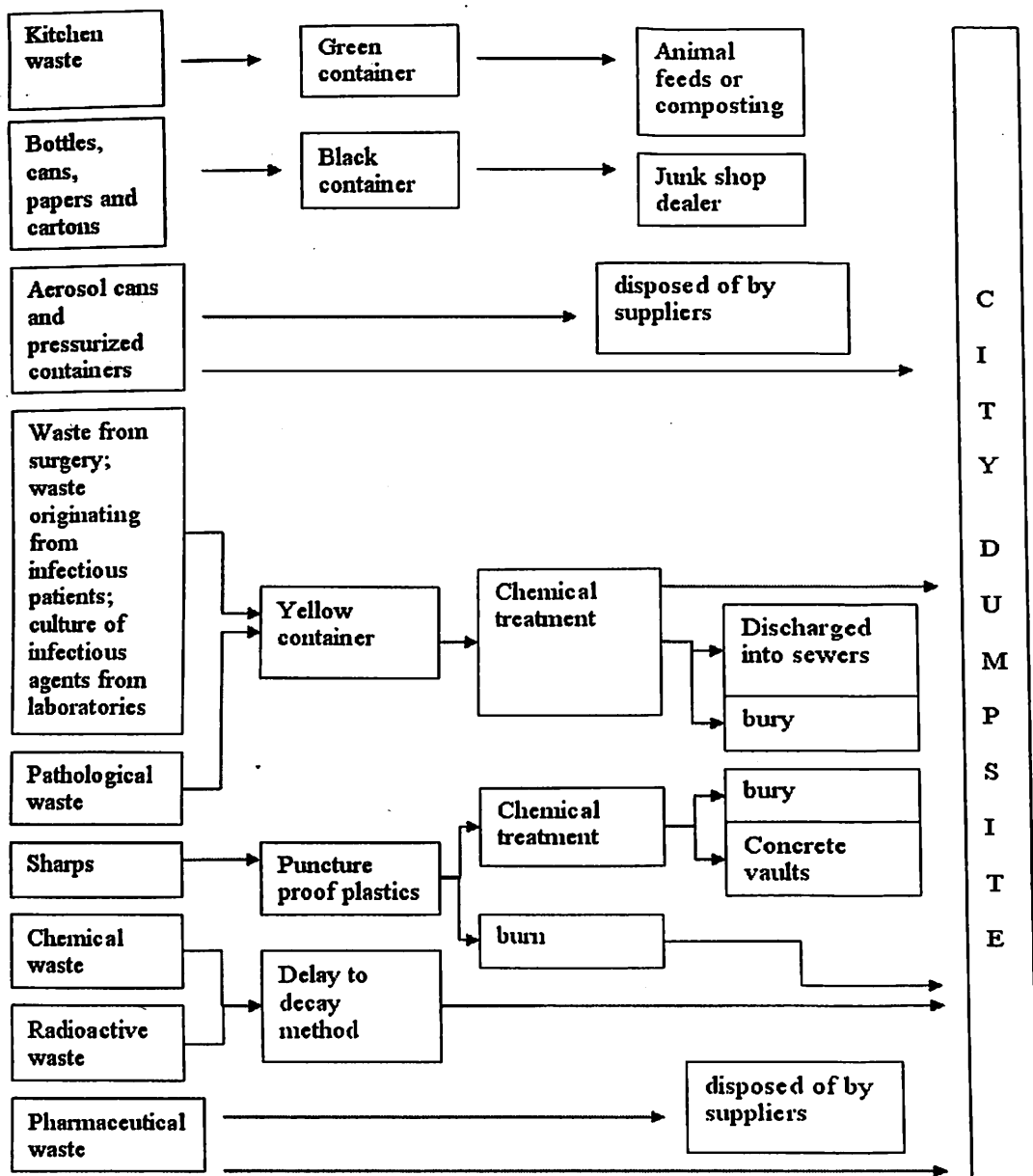


Figure 4. Hospital Waste Flow.

vaults while expired or adulterated drugs and medicines were returned to the supplier.

The liquid waste contaminated with radioactive materials was discharged into the sewers. The radioactive linens were placed in barrels outside the hospital building and allowed to decay. With regard to radioactive containers, the hospitals returned these to the suppliers.

The common problems in waste management of the selected hospitals in Davao City are shown in Table 4.

Hospital waste falls into two broad categories: general waste and special waste. General waste does not pose special handling problems or hazards to human health or to the environment. Its composition is similar to residential waste. It is collected and disposed

Table 4. Major Problems in Waste Management in the Selected Hospitals.

Problems in Management and Handling of Hospital Waste	Rank		
	Primary	Secondary	Tertiary
Lack of priority in policy on Hospital Waste Management and funds on the issue.	2	4	6
Lack of managerial skill and training in Hospital Waste Management.	3	3	4
Lack of appropriate technologies for treatment and disposal of Hospital Waste.	1	1	1
Lack of strict implementation of infection control measures like sterilization and disinfectant techniques.	4	5	5
Lack of awareness among medical personnel, patients, attendants and people at large.	5	6	2
Lack of accountability of persons involved in the management of Bio-Medical Waste	6	2	3

by CENRO to the city dumpsite. In Davao City, about 89 percent of hospital waste is considered as general waste while the remaining 11 percent is special waste. Special waste includes infectious and potentially infectious materials such as blood-contaminated items, human tissue, used syringes, needles or other sharp instruments, and pharmaceutical products. The hospital is held responsible for the treatment and disposal of its special waste.

The source of waste often characterizes the composition of waste. The sources of special wastes are the medical wards, surgical wards, laboratories, pharmacies and physician's clinics. The support units and offices generate only general waste.

Not all hospitals in Davao City have written policies or guidelines regarding waste management. Some hospitals, however, may have prepared their own guidelines or policies regarding waste management but do not strictly implement them.

Majority of the hospitals visited did not present their annual budget. All hospitals claimed, however, that budget for waste

management is not a problem. Their funds, according to the interviewees, are enough with regard to the needs of their hospital in waste collection, treatment and disposal. All hospitals interviewed opined also that they have adequate manpower and facilities to manage the type and volume of waste generated.

In terms of hospital waste collection, most hospitals use colored plastic containers for different types of waste as recommended by DOH. However, these containers carry basically the same types of waste: papers, plastics, unfinished food, some potentially infectious waste and hazardous waste. Other hospitals do not even segregate at all.

The usual choice of treatment method for sharps, infectious and pathological wastes is chemical disinfection. Chemical disinfection, however, cannot treat all types of hospital waste. Some hospitals do not even treat the waste before final disposal.

Waste which is not disposed through the city's disposal system is usually buried, placed in septic vaults, disposed through septic tanks, discharged into sewers, burned or disposed of by supplier.

The most prevalent problem encountered by the different sample hospitals in Davao City with regard to hospital waste management was the lack of appropriate technologies for treatment and disposal of hospital waste.

The Manual on Health Care Waste Management of the Department of Health (2004) seems very idealistic when compared with the existing conditions among the hospitals here in Davao City.

Human and financial resources are often limited and an extensive waste management plan is not implemented.

In most cases, hospitals do not produce a sufficient amount of hospital waste to justify the purchase of a relatively sophisticated waste treatment unit. The typical scenario is for hospitals to adopt a simple and cheap, but less satisfactory treatment option such as the use of chemical disinfectants.

Technical devices used for the management of waste can be found at the level of containerization, handling, treatment and disposal.

Most of the hospitals do not have sound waste management because all types of wastes are mixed as they are generated, collected, transported and finally disposed of. Other hospitals have segregators but segregation is not strictly implemented. As a result, the waste leaving hospitals, as a whole, is both potentially infectious and potentially hazardous.

RECOMMENDATIONS

In view of the above findings, the following recommendations are given: (1) That hospital managers have a clear idea of their hospital waste stream. This will give the hospital managers a clearer idea of the type of waste that is seen to be a problem and its sources in order to come up with a sound solution. Hospital managers must address first the smaller percentage of infectious or hazardous waste and treat it separately since not all wastes generated by the hospitals are the same; (2) That hospitals strictly implement waste segregation. It is critical that wastes are segregated, preferably at the point of generation, prior to treatment and disposal.

Imposing segregation practices within hospitals to separate biological and chemical hazardous wastes will result in a clean solid waste stream which can be easily, safely and cost-effectively managed; (3) That hospital workers be given proper education, training and proper personal protective equipment to ensure their safety in managing waste. (4) That hospitals be required to develop clear waste management plans and policies as a condition for operating; (5) That hospitals invest in environmentally sound and cost effective medical waste treatment and disposal technologies; (6) That the local government be involved in proper hospital waste management. The city government should provide resources that will ensure proper disposal of hospital wastes. These resources must be made accessible to hospitals and other health-care facilities. An on-site treatment facility in each hospital or health-care facility may be helpful. However, if too costly, a regional or cooperative waste treatment facility supplemented by individual facilities of nearby hospitals may be considered instead.

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REFERENCES

Dela Cruz, Arcel. (personal interview) City Environment and Natural Resources Office. (Aug 2005).

Health Care Waste Management Manual. Department of Health. 2004. <http://www.doh.gov.ph/hcwm/hcwm.pdf> (Sept 2004).

Yadav, Mukesh. 2001. Hospital Waste a Major Problem. Vol.8, No.4 October-December. <http://medind.nic.in/jab/t01/i4/jabt01i4p276.pdf> (August 2004).