



BEST PRACTICES

in Health Care Waste Management

Examples from Four Philippine Hospitals

DISPOSE OF
PROPERLY

INFECTIOUS
SUBSTANCE

Health Care Without Harm Asia
February 2007



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Metro Manila, Philippines



A B O U T

Health Care Without Harm (HCWH) is an international coalition of over 440 organizations in more than 50 countries, working to transform the health care industry so it is no longer a source of harm to people and the environment.

In the Philippines, HCWH Asia has laid the groundwork for promoting its three main issues on environmental responsibility in health care: best practices in health care waste management, mercury-free health care, and alternative technologies to incineration of medical wastes.

In the four years that HCWH Asia has been in the country, it has done high profile projects such as the documentation of the proper disposal of needles and syringes used in the DOH Philippine Measles Eradication Campaign in 2004 and the hosting of the first ever Southeast Asian Conference on Mercury in Health Care in early 2006.

HCWH Asia has been visibly promoting its causes through seminars, conferences, and training programs, and has made several contributions to various published material concerning its key environmental issues. Most notably, HCWH is cited as one of the contributors to the creation of the Philippine Department of Health's Health Care Waste Management Manual.



Notice

This report was written in adherence to an agreement HCWH made to not reveal the identities of the four hospitals. Recent developments, however, now allow us to reveal the identities of three of the four hospitals:

Recent developments however, now allow us to reveal the identities of three of the four hospitals.

Hospital A: Philippine Heart Center
Quezon City

Hospital C: Philippine Children's Medical Center
Quezon City

Hospital D: San Lazaro Hospital
City of Manila

Hospital B has opted to retain its anonymity.



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ABBREVIATIONS

ADB	Asian Development Bank
DOH	(Philippine) Department of Health
HWAP	Health Care Waste Assessment Project
HCWH	Health Care Without Harm
HCWM	Health Care Waste Management
UNEP	United Nations Environment Programme
US EPA	United States Environmental Protection Agency
WHO	World Health Organization
WMC	Waste Management Committee



Introduction

Over the past few years, public concern has been growing over the disposal of wastes produced by health care facilities in the Philippines. Several reports have cited large, albeit inconsistent, figures of the amount of infectious waste hospitals in Metro Manila produce daily, and little information is available on what is done with these wastes, especially after the banning of incineration in the country.

More recently, these concerns have been fueled by reports that some of these wastes end up in our open dumpsites and in some cases, in rivers, leading some sectors to call for the allowing of incineration once again.

Health Care Without Harm (HCWH) believes that health care waste can be managed properly without the use of incinerators that produce toxic air pollutants that pose threat to human health and environment. To begin with, not all of the wastes produced by hospitals are infectious or hazardous. With proper management and the use of well-known solid waste management tools such as segregation and recycling, the portion of a hospital's waste stream that poses risk to human and environmental health need not be cause of public fear.

This publication is the result of a study made by HCWH on the waste management practices of four tertiary hospitals in Metro Manila. A compilation of best practices, this report highlights how four hospitals in a developing country where an incineration ban is in place have been

able to manage, minimize and properly dispose of their waste. Through their example, other health care facilities can hopefully adopt measures and policies that will ensure that they truly do no harm.

The Problem with Health Care Wastes



According to the World Health Organization (WHO), in 2000, 21 million people all over the world were infected with the hepatitis B virus due to injections with contaminated syringes. Another 2 million people were infected with the hepatitis C virus due to the same cause, and about 260,000 were infected with HIV.

Ironically, all these people acquired diseases as a result of the practices of the very institutions that should be protecting their health. The sheer nature of providing health care, unfortunately, creates wastes that can pose serious environmental and health risks to health care workers, waste handlers, and even waste pickers.

This, however, is the case only if the wastes produced by health care facilities are not managed properly.

In 2002, though, a WHO assessment conducted in 22 developing countries showed that 18% to 64% of health care facilities do not use proper waste disposal methods. While most of the waste produced by health care facilities is not any more dangerous than regular household waste, some types do represent a higher risk to health. According to the WHO, these include infectious waste (15% to 25% of total health-care waste), among which are sharps waste (1%), body part waste (1%), chemical or pharmaceutical waste (3%), and

radioactive and cytotoxic waste or broken thermometers (less than 1%). Improperly managed and disposed, these wastes can expose health care workers and the public to risk of infections.

(Data from WHO Policy Paper on Health Care Waste)



Health Care Without Harm and the Promotion of Best Practices

HCWH believes that, in order to fulfill the medical ethic to “first do no harm”, the health care industry has a responsibility to manage waste in ways that protect both the public and the environment. Thus, HCWH works to eliminate the dangerous practice of incineration, as well as to minimize the amount and toxicity of all waste generated by the health care sector.

A key factor in achieving these goals is the promotion of best practices in health care waste management (HCWM), including by reducing the amount of waste produced through segregation, source reduction, and resource recovery and recycling. These practices do not only protect the environment and minimize the risk/prevent the spread of disease, they, in fact, make good business sense for health care facilities as they save substantial amounts of money that can be used to further improve the facilities’ waste management.

Over the past decade, there has been a significant increase in the popularity of these practices, as the health care industry worldwide moves towards reducing pollution in their respective backyards. The rapid growth of HCWH’s campaign and the many accomplishments it has made in a short time mean only one thing: environmental awareness among hospitals is growing (refer to Annex I: HCWH’s Major Achievements).

The market for cost-effective alternative technologies that are safer and cleaner than incineration and just as effective at rendering medical waste harmless is also increasing, consequently driving down prices and making them more affordable.

All these show that safe health care is not only a worthy goal, but a realistic one. Moreover, hospitals, as providers of health care, should take a leadership role in this issue because promoting best practices in health care waste management is, in essence, promoting health.



The Philippine Case

Until the Philippine Clean Air Act was passed in 1999, health care facilities in the Philippines relied heavily on incineration to dispose of their waste. Philippine hospitals are estimated to generate up to 10,290 tons of waste each year.

Available Figures on Hospital Waste Generated in Metro Manila*

Metro Manila Development Authority (MMDA) (2000)	9 tons infectious waste/day 60 tons total waste/day
Japan International Cooperation Agency (JICA) (2001)	17 tons infectious waste/day
Asian Development Bank (ADB) (2003)	27 tons infectious waste/day 47 tons total waste/day

The common practice in the past was to simply dump all forms of waste together, from reception-area trash to operating-room waste, and burn them in incinerators. While burning of wastes seems convenient, its downside is the production of highly toxic pollutants, such as dioxins and furans, both in the form of gas released during the burning process and as components of the ash that remains afterwards.

While no recent publicly available data exists on how hospitals today dispose of their infectious and hazardous wastes, some studies provide an indication of where these used to go. According to JICA, 47% of the 158 facilities they surveyed then disposed of their infectious wastes through incineration. The more recent ADB study estimates that only 5 tons of infectious wastes per day are disposed of through autoclave, microwave or incineration, and approximately 22 tons per day are either buried on-site or discarded along with the rest of the waste collected by the municipal waste collection service.

Another study on waste management practices of hospitals in Metro Manila conducted by Victorio Molina for the Department of Health (DOH) revealed that although most of the hospitals perform waste segregation, less than 50% of the 144 hospitals studied did not have the proper mechanisms for proper waste handling and segregation. Incineration and landfill were used for final disposal of wastes. Only two out of five hospitals had an existing waste management committee and a separate budget allocation for waste management program

As such, while the Philippine Clean Air Act was heralded as a landmark legislation, the question of what is now being done with the voluminous infectious wastes generated begs to be asked.



Addressing the Problem

The issue of properly managing infectious and hazardous health care waste is indeed a pressing one that needs to be addressed to ensure that health care facilities do not bring harm to the communities in which they operate. The situation is even more pressing in the country where not all hospitals have access to alternative technologies that can be used to safely and effectively dispose harmful wastes.

In 2001, the Department of Health (DOH), through its collaboration with different organizations and agencies, revised its *Health Care Waste Management Manual* to follow the policies stipulated under the Philippine Clean Air Act and the Ecological Solid Waste Management Act of 2000. The manual provides health care facilities with practical guidelines in establishing Health Care Waste Management Programs, and promotes the use of alternative technologies for the disposal of health care wastes.

To demonstrate how medical waste can be disposed of safely in the country without incineration, in February 2004, HCWH, in coordination with the DOH, documented the safe handling and disposal of 19.5 million syringes used to vaccinate children nationwide under the Philippine Follow-Up Measles Elimination Campaign. The used syringes were collected in 5-liter safety boxes, and treated and disposed of using autoclave facility, microwave, septic vault encapsulation, or septic burial.



If the proper disposal of these infectious wastes can be done in such a massive scale in the Philippines (in rural areas, no less), then proper waste management and disposal is possible for hospitals.

A sample of a labeled burial pit used during the PMEC Campaign



Best Practices in the Philippines

In the wake of all these developments, in February of 2005, HCWH Asia launched a project entitled *Health Care Waste Assessment of Four Tertiary Hospitals in Metro Manila*.

Beginning with a thorough four-step health care waste assessment, the study sought to document the good practices of four tertiary hospitals in Metro Manila in managing their health care waste in order to serve as a model or guide to other hospitals.

The advantage of piloting the study in the Philippines is two-fold:

- (1) It is an opportunity to show that best practices in healthcare waste management can flourish even in a developing country; and
- (2) In a country where incineration is banned, hospitals are able to successfully employ alternative methods and techniques to effectively minimize, manage and dispose of their waste.

The results and recommendations from the study will hopefully serve as guide for other hospitals in the Philippines so that they can adopt the necessary systems and procedures for their own health care waste management programs.



Health Care Waste Assessment of Four Tertiary Hospitals in Metro Manila

The primary goal of HCWH's study is to draw up baseline data on good health care waste management practices from four tertiary care hospitals with different cases and specialties in Metro Manila, described briefly below:

Hospital A

A DOH-retained 302-bed specialty hospital with an average of 370 admissions per day, it has over 1,800 personnel, mainly composed of professional staff (medical doctors, surgeons, nurses, pharmacists, etc.), management, and technical staff.

Hospital B

A small government hospital managed by a non-stock, non-partisan, non-profit foundation located in the southern part of Metro Manila, this hospital has 149 beds with a 29.9-average bed occupancy per day and 6,685 admissions in 2004.

Hospital C

A 200-bed government hospital specializing in pediatric care, this hospital had an average yearly admission of 9,369 patients from 2000-2004. Patient consultations in the outpatient department and emergency room average 45,246 per year.

Hospital D

A government hospital mandated by the DOH as the referral center for infectious diseases, this hospital has a 900-bed capacity, with an average admission of 316 patients per day in 2004. The institution was regarded as the "National

reference Laboratory for different types of infectious diseases such as sexually transmitted infections (STIs), Hepatitis and HIV/ AIDS.”

To achieve the study’s objectives, the project was implemented through a four-step health care waste assessment. This process can give valuable insights into how health care wastes are produced, handled, and disposed of.

The project was done in four stages:

1. Document Review

Reviewing documents related to the hospital’s waste management system and policies helped to gauge how rigorous the hospitals’ systems are and showed how best to proceed with the project.

2. Key Informant Interview

People in charge of managing the hospital waste system, such as key members of the administration and waste management committees, were interviewed to learn more about actual waste management practices.

3. Focus Group Discussions

Through discussions with select groups of hospital staff from different departments (nursing, housekeeping, janitorial, etc.), the information gathered from the first two steps is validated and the level of awareness hospital staff have on waste management issues and policies is revealed.

4. Walk-through Assessment

An observation tour of the waste flow in the hospital, the walk-through allowed the documentation of actual practices performed by the different departments of the hospital.

This four-step process enabled the team to document the existing practices of the four hospitals, analyze their effectiveness, recommend ways to improve them, and, finally, determine the factors that contribute to the success of a waste management system.



Best Practices of the Four Hospitals

The proper management of health care waste need not be too complicated nor unaffordable exercise. As the following sections will show, the four tertiary hospitals studied employed simple tools, enhanced by their innovativeness, to come up with “best practices” that contributed to reducing the volume of waste they produce and safely disposing of infectious and hazardous wastes.

Basic waste management principles apply. First, an assessment of the volume, type, and source of waste should be conducted. Then, at the administrative level, rules and policies should be set clearly to guide and encourage the staff to handle waste properly. Waste minimization strategies can then be employed to reduce the quantity of health care wastes, so that the ultimate goal of safely and properly disposing infectious and hazardous wastes can be achieved even without incineration.

In fact, according to the ADB study, if waste minimization strategies are implemented, the estimated volume of health care waste by 2010 of 55 tons per day can be reduced to a more manageable 18.5 tons per day.

The following pages will describe the “best practices” in hospital waste management and how four tertiary hospitals as documented by HCWH’s Health Care Waste Assessment Project (HWAP) have successfully been able to adopt them.

Health care waste includes all wastes generated or produced as a result of diagnosis, treatment or immunization of both human beings and animals; research or production of biologicals and waste originating from minor or scattered sources. Health care facilities such as hospitals, research laboratories, medical and dental clinics, nursing homes, ambulance, mortuary and autopsy centers, etc. produce varying levels of health care wastes.

Health care wastes are categorized into: general, infectious, pathological, sharps, pharmaceutical, genotoxic, chemical, radioactive, and wastes which contain high amounts of heavy metals. While general wastes do not require special handling, the improper handling of others, collectively referred to as hazardous and infectious wastes, may cause potential harm to health personnel, patients in health care establishments and even the general public.



Best Practices in the Administrative and Policy Making Level

Appropriate health care waste management practices depend largely on the administration and organization and require adequate legislative and financial report as well as the active participation by trained and informed staff. (DOH Manual)

A. Formation of a Health Care Waste Management Committee (HCWMC)

A prerequisite to a successful waste management system is the establishment of a dedicated Waste Management Committee.

In the hospitals studied, the following factors have been observed to contribute to the overall effectiveness of the committees:

- (1) *Recognition of the committee as an integral part of the hospital organization*
- (2) *Presence of active members representing key departments of the hospital*
- (3) *Visible and tangible support from the administration, such as through funding, policy support, resource availability, and event participation.*
- (4) *Regularity of meetings*
- (5) *A dedicated waste management officer or waste management committee member*

The study consistently learned through interviews and focus group discussions of how the cooperation of hospital staff in the waste management programs is largely due to the visibility of and vigilance of the committee, as well as the support they receive from the administration. In Hospital C, a hospital issuance backing an innovative incentive program - a sign of strong administration support - is partly credited for its success.

B. Developing and Updating the Facility's Waste Management Plan

A primary function of a HCWMC: Establish baseline data and develop the facility's health care waste management plan which should include a minimization plan, training, and written guidelines on waste management. (DOH Manual)

Once a committee is formed, an efficient waste management system based on a solid waste management plan is created.

The DOH HCWM is an excellent guide in creating this, and other management principles and strategies can also be applied. Hospital A, for example, uses the 5S system, which refers to five Japanese words that describe standardized cleanup often translated as "Sort, Straighten, Shine, Systemise and Sustain." A sixth S for "safety" is often added.

C. Sample Policies and Programs

Waste minimization programs, or in the case of Hospital A, a Zero Waste Program, are integral parts of the four hospitals' waste management systems as they reduce the overall risk of exposure health workers deal with. Documented waste minimization activities of the four hospitals are discussed in more detail in the succeeding sections.

Being responsible for the overall safety of the people involved in implementing the waste management system of the hospital, the waste management committees set policies that ensure occupational safety and overall health of these workers.

In some of the studied hospitals, a policy that all waste handlers should have Hepatitis B and Anti-Tetanus vaccinations exists. When personnel are accidentally pricked by misplaced needles, they are immediately sent to the infirmary where they are usually given anti-tetanus shots.

D. Communications and Training

The level of awareness of the hospital staff on the committees programs and policies greatly contribute to the success of the waste management system.

The four hospitals employ several methods in communicating the importance of proper waste management to their staff. These are summarized into three basic activities:

- (1) **ORIENTATION** of staff through training programs, workshops, lectures, and seminars;
- (2) **Printed INFORMATION MATERIALS**, such as posters, brochures and leaflets. One hospital (Hospital D) even has a dedicated bulletin board for this; and
- (3) **EVENTS** that promote waste management issues and activities. Hospital A holds an annual Waste management and infection control week and monthly clean-up days for each department.

E. Monitoring

The four hospitals' waste management committees use several activities to monitor the following areas:

- (1) Compliance to the waste processing procedures
- (2) Amount, types and sources of waste generated
- (3) Disposal costs and savings
- (4) Success of waste minimization activities
- (5) Awareness and compliance
- (6) Incidents/accidents related to waste handling

CASE STUDY

Hospital A: Leadership Counts

In a DOH-retained 302-bed specialty hospital, most, if not all, of the 1,800 people that collectively make up their staff are actively involved in implementing waste management programs.

For example, once every two months, the staff of each of the nursing departments comes together to sort out items earmarked for disposal and identify those that can be reused. The holiday season then sees nurses bringing out their creative sides in producing Christmas decorations from recycled materials.

The key to all this is strong leadership of a very visible waste management committee, and the strong support it receives from the hospital administration.

A regular orientation on the hospital's waste segregation and waste management policies is given to patients and new staff. They also hold monthly meetings to discuss and address issues related to waste management, with updates on waste management disseminated through the supervisors/managers of each department and discussed to their members. Once every year, a Waste Management Week and an Infection Control Week is held.

The committee keeps itself up-to-date with the trends in waste management and environmental health awareness, and the roles hospitals can play in promoting it. Armed with all this knowledge, they have developed a system that integrates different techniques taken not only from traditional waste management styles, but also from other popular management styles. The committee is also

excellent at developing out-of-the-box solutions for common problems.

It conducts random hospital rounds to monitor the proper waste disposal, including segregation and recycling practices, of every department, with particular attention paid to the top five infectious waste generators in the hospital.

If there are violations of the waste disposal policy, incident reports are prepared and submitted to them. A verbal reprimand is given on the first instance, and a written warning that is attached to personnel records follows if repeated.

The dedication and visibility of the committee ensures that hospital personnel are not only aware of the issue, they understand the importance of and wisdom behind making sure that waste is safely and properly disposed of.



This sign posted at the hospital's pathology department says it right: *Proper Hospital Waste Disposal is Everyone's Concern*



II. Best Practices in Health Care Waste Minimization: Waste Reduction Activities

A. Reduction at Source

Source reduction involves measures that either completely eliminate the use of a material to generate less waste. (DOH Manual)

Source reduction, in its simplest explanation, involves not creating waste in the first place. However, it involves sophisticated risk management, liaison with manufacturers, and consultations with staff. A careful re-evaluation of a hospital's purchasing practices, product choices, and operating procedures can reveal several opportunities for waste reduction.

Kaiser Permanente, one of the largest health care providers in the US, sets a good example: in their efforts to minimize their waste, Kaiser Permanente purchasing staff in Oregon collaborated with manufacturers to reduce excess packaging in a variety of products. For instance, they requested manufacturers to shift to recyclable packaging such as corrugated cardboard, thus reducing the size of the package and requiring less packaging. Purchasing supplies in bulk further reduced packaging and handling costs.

By not allowing the entry of unnecessary materials in their facilities in the first place, they were able to reduce their potential waste stream.

Purchasing policies such as these that create opportunities for waste reduction, and showing a clear preference for suppliers that share the same concern is a good start for hospitals that want to have a waste minimization program.

Locally, one of the participant hospitals in HCWH’s study heavily discourages the use and entry of polystyrene foam products (more commonly known by the trademark name Styrofoam) in its facility. Styrofoam products, as a solid waste material, are particularly problematic because of their being non-biodegradable and the lack of options available in the country for reusing or recycling it.

Hospitals personnel, patients and visitors are asked to use reusable or more environment-friendly disposable items whenever applicable. From the main entry point of the hospital, for example, visitors are already advised to not bring in food contained in Styrofoam packaging.

B. Re-use

Re-use is not only finding another use for a product but, more importantly, reusing the product over and over again for a given function as intended. Promoting re-use entails the selection of reusable rather than disposable products whenever possible. Re-use will also entail setting reliable standards for disinfection and sterilization of equipment and materials for use. (DOH Manual)

Before the advent of disposables, hospitals used various reusable products in their facilities. It is only in the past two decades that we have seen a sharp rise in the use of disposables in health care facilities.

Hospitals adopting “re-use” as a waste reduction strategy make a return to the use of some reusable materials, which is a sensible option

especially with new technologies for disinfection and sterilization readily available. However, careful procedures and safety standards should be established.

In the U.S. and in other parts of the world, the demand for reusable supplies and supplies that have refillable packaging has seen a significant increase. This is not surprising because apart from environmental benefits, the use of these types of products can produce enormous financial benefits.

The Medical Center Hospital of Vermont, for example, has benefited financially from waste reduction through reuse. The hospital invested in reusable resuscitation bags and ventilator circuit tubings which led to annual savings of about \$40,000 (about P2 million).

Another hospital in the US reported annual savings of \$70,000 (P3.5 million) in disposal costs and a reduction of 22,000 pounds (11 tons) of waste just by switching to reusable underpads.

Although reusable items initially cost more than disposables, the long term benefits are clear. Not only do hospitals and patients get savings from the costs of disposable items, less health care waste produced also means savings from disposal costs.

In the case of our four hospitals, they adopted this concept mainly through finding uses for various materials that would otherwise be considered as waste. A tour of the study's four participant hospitals revealed how this strategy is applied by different departments in their facilities.

Offices and Clinics

In hospital offices and clinics, the simple reuse of the back of used bond papers for memos, laboratory print outs, running bills or monthly reports significantly reduces the need for fresh stocks of bond paper. Used folders and envelopes are reused for filing patient's records and as file dividers.

Printer ink cartridges are collected and are either sold to recyclers or taken to refilling stations. In each office, a point person is assigned to monitor and ensure the proper collection of used ink cartridges and the collection of empty cartridges upon the release of new cartridges.

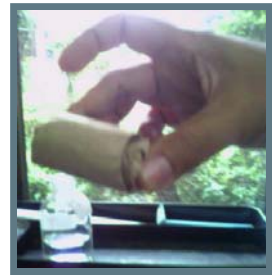
In other cases, used paper also find its way into central supply rooms to serve as wrapping paper for items to be autoclaved.

Central Supply and Pharmacy

The packaging materials hospitals get from medical and pharmaceutical supply deliveries are reused in a variety of ways. Thick cartons and boxes are cut into strips to resemble splints, (see image left) wrapped in paper, and then sterilized. Boxes that are about just the right size are crafted into improvised trays for medicines. During rainy days, sheets of carton are used as mats. Some are re-used as receptacles for used syringes and vials.



Re-usable materials and equipments are sterilized using the hospital's autoclave. In laboratories, glassware and vials are cleaned, sterilized, and reused as specimen collection bottles for laboratory examinations. (see image right)



Unused medical supplies or those with expired sterilization are re-sterilized and re-packed for future use.

Slightly used latex gloves from treatment rooms are washed, sterilized, and packaged for one-time re-use. Other gloves are sterilized and re-used as hot or cold water compress.

Intravenous fluid (IVF) bottles are re-used as drainage bottles and as containers for distilled or sterile water and dietary supplements. They are also sometimes used as urine collectors.



Pictures of some of the hospitals' autoclaves.

In one innovative hospital, some medical items have even found their way to the housekeeping department, where expired and unused tubings are used as clothes lines.

Dietary / Cafeterias

The cafeterias and dietary departments of the four hospitals use mostly reusable dishware and utensils.

Used cooking oil aluminum containers are used as additional trash cans.

Plastic bottles of mineral water are re-used as improvised containers for used syringes, while glass soda bottles are re-used as suction collecting bottles.

Housekeeping

Old or stained linens are recycled into flat sheets, mortuary sheets, and cleaning rugs, and old curtains are turned into telephone and cabinet linings. Old blankets and towels are recycled into doormats, table rugs, and hand towels.

Used and properly washed disinfectant containers are re-used as water storage containers for the hospital's comfort rooms.

Broken trash bins are re-used as plant receptacles in the hospital's garden.

C. Recycling

Recycling is collecting waste and processing it into something new. Many items in the hospital can be recycled. Items such as organics, plastic, paper, glass and metal can be recycled easily. (DOH Manual)

In Hanoi, Vietnam, most hospitals practice some form of waste segregation to recover recyclable materials. Paper and cardboard are recycled, plastic wastes, such as transfusion bottles and syringes, are sold to junkshops and recyclers, and old x-ray films are sold to jewelers for electrolytic extraction of silver.

In Bogotá, Colombia, three hospitals were able to generate a total revenue of Colombian \$10,600,000 (US\$ 4,735.62 or Php 229,149.03)) out of recycled materials from hospital waste.

In Manila, the efficiency of the study's participant hospitals in collecting recyclable items from the waste they produce and the sale of these generate significant amounts of profit. In 2004, the highest income generated among the four amounted to P379,971.58 (US\$ 7,852.55) - enough to cover the annual the salaries of two additional waste management personnel. On the other hand, the lowest income generated still totaled P152,788.20 (US\$ 3,157.54), enough to cover the annual wage of an employee or purchase at least 65 mercury-free infrared ear thermometers (each can cost about US\$ 45.46 or Php 2,200.00).

Wherever effective waste segregation systems and monitoring of proper waste disposal are carried out by hospital waste management committees, there is increasing income from the sale of recyclable materials. Profits from the sale of recyclables go to any of the three documented beneficiaries:

(1) Housekeeping Department: profits are used for purchasing cleaning agents, additional trash bins, trash liners, doormats, etc. The generated income from recycling covers some of the housekeeping department’s expenses, and is sometimes used for emergency purchases of housekeeping materials.

(2) Hospital General Fund: profits are added to the hospital’s total profit.

(3) Employees: Profits become part of the employee’s benefits.

The recyclable items often collected and sold by the participant hospitals include the following:

Offices and Clinics

Boxes and Cartons

Papers - Old Newspapers and

Magazines, Used Papers, Shredded papers, Old Phone

Directories

Ink Cartridges

Central Supply and Pharmacy

Boxes and Cartons

IVF Bottles

Assorted Plastics

Glass Bottles

Dietary / Cafeteria

Boxes and Cartons

Used Kitchen Oil

Empty cans of cooking oil

Dietary Slops

Assorted Plastics

Plastic Bottles Glass Bottles

Housekeeping

Boxes and Cartons

Plastic Bottles

Engineering

Boxes and Cartons

Car batteries

Assorted Metals

Assorted Tin Cans

Scrap Wood

Other items that cannot be sold to recyclers are used in crafts and other livelihood projects. For example, hospital personnel and staff are highly encouraged to participate in contests



held by some of the hospitals, usually during the holidays, where the best Christmas decorations fashioned out of recycled materials are rewarded. Hospital D even has a dedicated a bulletin board for decorations and projects made from recycled items.

Other examples of recycling activities include empty juice containers/ tetra packs turned into bags that are displayed or sold during fairs, and parts of the old cribs and beds transformed into fences and trolleys used for waste transport and aluminum oil cans transformed into dust pans.



Although the burden of collecting recycling materials commonly falls on the waste handlers and janitors, hospitals can employ other strategies to make their recycling program more effective. Hospital D, for example, strategically locates dedicated recyclable waste receptacles along the hallways. These are labeled accordingly and encourage people to throw the listed items in these bins.



D. Segregation

Segregation is the process of separating different types of waste at the point of generation and keeping them isolated from each other. Appropriate resource recovery and recycling technique can be applied to each separate waste stream. Moreover the amount of hazardous waste that needs to be treated will be minimized or reduced subsequently prolonging the operational life of the disposal facility and may gain benefit in terms of conservation of resources. (DOH Manual)

As an example: Mt. Sinai Medical Center located in New York City, USA, provides one of the best examples of the economic benefits of a waste reduction activity. The hospital was able to develop a waste segregation program that generated savings of more than US\$ 1 million per year. This was achieved by training nurses and housekeepers to distinguish the red bag (red bags in the US are for infectious waste) items from municipal solid waste (MSW), and by withdrawing red-bag containers to centralized locations such as: medication rooms, examination/ treatment and soiled utility rooms.

Proper segregation of their waste also revealed that 80% of the waste produced in the operating room (OR) is from packaging, and is usually generated before the patient's arrival in the room, thus reducing the amount of waste to be classified as "infectious".

In the case of the four participant hospitals, proper segregation has been a key factor in the success of their waste management and minimization programs. Waste segregation benefited our participant hospitals in two ways:

(1) Proper segregation significantly reduced the amount of infectious waste and thereby directly reduced the cost of waste disposal. Key practices that contributed to this include:

- (a) Placement of yellow trash cans only in areas where infectious waste is generated

CASE STUDY

Hospital B: Small Steps Go a Long Way

Despite being the smallest of the four hospitals in terms of both size and number of patient admissions, Hospital B did not use these as an excuse to not have a good waste management system.

A government hospital managed by a non-stock, non-partisan, non-profit foundation located in the southern part of Metro Manila, Hospital B established a Waste Management Committee in 2001.

Faced with limited financial resources, the hospital decided to augment its waste management budget with income generated from the sale of its recyclable materials, such as newspapers, ink cartridges, aluminum cans, and plastic bottles. The housekeeping department regularly reports the monthly income generated from the recyclables to the accounting division.

The income helps the hospital cover the expenses incurred by the housekeeping department. The money is kept by the housekeeping department for emergency purchases of housekeeping materials, such as cleaning agents, additional trash bins, trash liners, doormats, etc.

In addition, because of the efficiency of the hospital's waste segregation system, their infectious waste showed a decreasing trend both in the actual weight and the cost of waste treatment. In January 2004, the hospital spent P17,600 (US\$ 363.72) to treat about 490 kilograms of infectious waste. By December of the same year, it paid its waste treater a mere P3,400 (US\$ 70.26) for about 95 kilograms of infectious waste.

Chart showing the decrease in Hospital B's infectiouswaste stream

Php 20,000



Jan 2004

April 2005

- (b) Placement of puncture proof sharps containers in nurses stations and treatment rooms
- (c) Proper labeling of the yellow trash cans and other hazardous waste containers.

(2) Efficient waste segregation as the foundation of for other waste minimization activities such as recycling and composting.

Segregated recyclable waste has made some of our hospitals significant profits as discussed in the previous section. Other documented effective practices include:

Color-coded and properly labeled trash bins are readily available and strategically placed in most of the areas of the hospital encouraging proper segregation at source.

Green and black trash cans are placed in general areas and in offices (Hospital A)



What Not to Sell

Fluorescent Lamps

Not all waste items should be sold. Fluorescent lamps, in particular, should not be sold to unaccredited “lamp recyclers” because they contain some amount of mercury and the mishandling of these can lead to serious health risks and environmental pollution. A joint administrative order signed by the DOH and Department of Environment and Natural Resources clearly states that wastes containing any amount of mercury should be handled only by accredited waste transporters and treaters.

Research by HCWH, however, has revealed that there are no proper mercury waste recyclers in the country. Anyone claiming to be a mercury waste recycler should be duly accredited first before dealing with hospitals.

Hospitals are therefore advised to properly store spent fluorescent bulbs in individual boxes (preferably in the packaging they came in) to prevent breakage and in store them in an area dedicated to the storage of mercury-containing waste, until they can be collected or transferred by an accredited hazardous waste transporter.

Another option is to talk to the supplier and inquire about them taking back used fluorescent bulbs.

Vials

Selling vials to the wrong person can promote the proliferation of fake drugs. This is especially true for empty vials of expensive 3rd or 4th generation drugs. One hospital crushes these vials to ensure that they cannot be refilled with fake medicine.



Left: Three colored trash bins are available in most patient areas at Hospital C.; Right: Hospital A places a box to collect recyclable items (like IVF Bottles) beside the standard three trash cans in wards. They use foot operated trash bins for its ease of use.

Posters on proper waste segregation and disposal are placed above trash bins.



Left: Clear labels for the containers of used needles and syringes at Hospital B; Right: Sign at Hospital D placed on above infectious waste trash bins.

Dedication of ample storage space for collected recyclables. Recyclables are easier to sell when sold in bulk.



Left: Spacious storage facility for recyclables at Hospital D; Right: Storage for recyclables at Hospital B, photo shows collected cartons ready for selling.

Recyclables such as plastic bottles and cups, aluminum cans and other plastics are washed prior to transport to the storage area

The success of the hospitals' segregation programs as waste minimization activities were found to rely heavily on the following:

- (1) Cooperation of the waste producers and handlers
- (2) The dedication and leadership of the hospital administration
- (3) Information materials of the hospital on proper waste segregation
- (4) System of segregation
- (5) Incentive system

CASE STUDY

Hospital C: Getting Everyone Involved

In this government hospital, staff members, which are often overloaded with taking care of over 9,000 admitted patients every year, are all mindful of how they dispose of their wastes. Some even go as far as washing their used cups, soda cans and bottles, plastics, and other recyclable wastes before neatly placing them in the trash cans.

This level of cooperation and involvement is the result, not of the usual awareness campaigns and information materials, but of the incentive program the hospital has put in place.

A profit-sharing scheme for the sale of hospital domestic wastes was employed, wherein people were rewarded for their waste segregation efforts. Staff directly involved in waste segregation received incentives from the sale of the food wastes. Free annual checkups (Tetanus and Hepatitis B immunization) were also provided to prevent staff from contracting diseases.

Coming from a situation where housekeeping staff displayed high resistance to segregating domestic wastes from non-domestic wastes, and where pilferage of food and non-food wastes was frequent, the effect of the new incentive program in 2003, backed by a hospital issuance, was remarkable. (source: “Earn Extra Income from Waste” available at www.csc.gov.ph)

Because the hospital staff now knows where the money from the sale of recyclables goes to, waste minimization has become a hospital-wide community affair. Thus, in

2003, hospital earned P346, 698.07 (US\$ 7,164.91) from the sale of recyclable non-biodegradable wastes, In 2004, they earned P368,537.70 (US\$ 7,616.25) from the same, and an additional P11,433.88 (US\$ 236.29) from the sale of dietary slops.



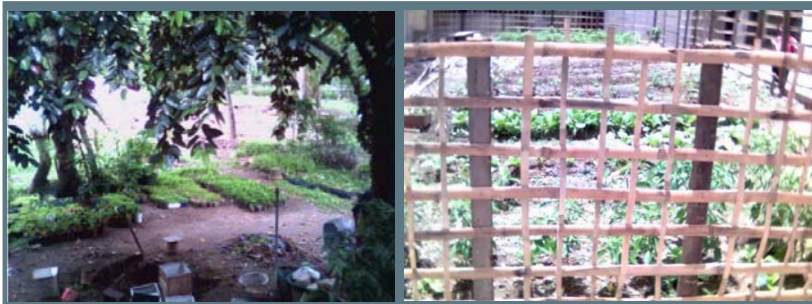
Photos from the hospital's storage area for recyclables and unservicable equipment. From top: different types of waste paper are stored in different boxes; unservicable equipment like old cribs, tables, etc.; plastic bottles are grouped according to type and size

E. Composting

Composting is another important strategy to minimize waste such as food discards, kitchen waste, cardboard and yard waste. Some hospitals in other countries have also successfully composted placenta waste. Sufficient land space for on-site composting far enough from patient care and public access area would be needed. Food scraps can provide most of the nitrogen while bulking agents commonly found in hospitals such as cardboard and wooden chips could provide carbon. Composting techniques ranges from simple un-aerated static piles to aerated windrows to vermin-composting. The resulting rich compost can be sold or donated to local farmers and gardeners or used for plants around the health care facility grounds. (DOH Manual)

Two of the study's participant hospitals employ this strategy in different ways. One hospital composts yard wastes for the hospital's backyard garden, where they grow plants that they use to landscape the hospital. The other one uses food scraps and other kitchen wastes.

Using a makeshift compost pit out of large rubber pots, the second hospital produces compost material that is used as fertilizer for their vegetable garden. This compost activity and vegetable garden is the brainchild and project of a hospital employee, a graduate of the hospital's waste management training program.



Hospital C and Hospital D's compost gardens.

All of the four hospitals sell all, or at least some portion, of their food discards to piggery owners, with Hospital C reportedly earning PHP 11,433.88 (US\$ 236.29) in 2004 from the sale of dietary slops alone.

F. Policies

Although the success of any type of waste management and minimization program is largely dependent on the cooperation of the actual waste producers (in this case, the patients, visitors and hospital staff) and the waste handlers, the contribution of waste reduction strategies made at the policy making level has a huge impact on the success or failure of the entire waste management system.

In purchasing departments of the participant hospitals, for example, a “take-back policy” is usually stipulated in contracts with private medical/pharmaceutical suppliers. The return policy provides the hospital with the option to return products near their expiration dates. This practice alone has contributed heavily to the sharp decline of the volume of pharmaceutical wastes of the hospitals.

Well-organized and effective inventory systems for central supply offices have proven extremely helpful in avoiding the creation of unnecessary waste like expired products.

Monitoring the rate of consumption of different types of medical supplies by the different departments to reveal important insights as to how purchasing schedules can be improved. Implementing a strict “first in, first out” (FIFO) policy for both medical supplies and pharmaceutical products and regular monitoring of expiration dates of stock supplies/materials are good examples of an effective waste minimization policies practiced by the four hospitals.



III. Best Practices in Health Care Waste Processing

All individuals exposed to hazardous health care waste are potentially at risk, including those within the health care establishments that generate hazardous waste, and those outside these sources who either handle such waste or are exposed to it as a consequence of careless management. (DOH Manual)

Along with implementation of waste minimization practices, hospitals should exert effort to ensure the safety of people who handle or encounter the waste materials. Within the facility, hospital staff, patients, visitors, and waste handlers and transporters are at risk of acquiring infections from improperly kept needles or poorly segregated infectious wastes, for example. Outside the hospital, waste pickers who scour through mounds of unsorted trash, as well as the public in general, are also at risk.

Waste Segregation and Storage

To prevent unwanted infections from health care waste, a number of practices have shown to be effective. Proper segregation at source by the waste producer is foremost among these. Segregation should take place as close as possible to where the waste is generated and should be maintained in storage areas during transport.

The most appropriate way of identifying categories of health care waste is by sorting the waste into color-coded plastic bags or containers. Recommended color-coding scheme for health care waste follows:

A Color Coding Scheme for Health Care Waste

Color	Type of Waste
Black	Non-infectious dry waste
Green	Non infectious wet waste (kitchen, dietary, etc.)
Yellow	Infectious and Pathological Waste
Yellow with black band	Chemical waste including those w/ heavy metals
Orange	Radioactive waste
Red	Sharps and pressurized containers

All departments of the four hospitals practice waste segregation following the color coding scheme prescribed by the DOH HCWM Manual. The use of color-coded trash cans and trash liners is observed to keep the waste segregated during waste collection until final disposal.

Waste handlers follow regularly-spaced collection schedules from hospital rooms and departments. Trolleys are used for this, along with other waste collection gear as shown below:



Pictures of waste collectors of Hospital A and Hospital C.

All of the hospitals provide personal protective equipment/gears such as latex gloves, tongs/ forceps and masks to their waste handlers/ collectors during actual waste collection and transport.

Collection involves taking the filled bags and replacing the trash bins with new ones. The collected bags are placed in corresponding color coded receptacles (or in some cases larger trash bags) on the waste collector’s trolleys.

Other good practices observed are:

Appropriate containers for sharps are also used by the hospitals.



One hospital has

a needle de-
stroyer/ burner in every ward, thus, possibility of needle stick injury is minimized. Reduction of sharps from the total infectious waste was facilitated by this instrument.

The storage areas have designated areas for different types of waste, ensuring that waste is segregated until final disposal. Well-designed storage areas are spacious, easy to clean, located far from patient areas and secured by gates and locks. For some hospitals, the storage areas are opened only in accordance to the collection schedules.



Photos show the waste storage area of Hospital D for general and infectious waste and the storage area of Hospital A for infectious waste.

For some hospitals, waste collectors follow waste flow diagrams designed by the hospitals' waste management committees. These diagrams show how waste is to be moved from the points of generation to the storage areas, making sure that the waste is kept away from public areas and routes.

For hazardous wastes like nuclear wastes from the nuclear medicine department, these are placed in a "delay to decay lead insulated cabinet". After complete nuclear decay, the wastes are temporarily stored in garbage holding area to be scheduled for on-site treatment.

CASE STUDY

Hospital D: Effective Systems in Place

The largest of the four hospitals studied, this facility's waste management system stands out as an example of how large-scale waste management is possible. Composed of several buildings situated on a large, expansive compound, the hospital's ability to create and implement effective systems given its sheer size is remarkable.

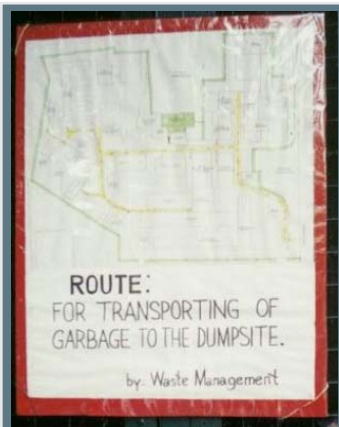
For a hospital of this size, a key factor in the success of its waste management system was having effective systems in place.

To begin with, its Waste Management Committee drafted its own healthcare waste management manual, based on the standards set by the DOH. Then it developed a "Health Care Waste Management and Ecological Awareness Program" with three subprograms, namely: 3Rs (reduce, re-use, and recycle) and Livelihood program, Compliance and Monitoring program, and Health Education program. Each subprogram has its own team with its own work and financial plans approved by the chairperson of the committee and/ or the Medical Center Chief II.

For hospital staff, a five-day waste management training program is held every quarter. Aside from the usual lectures on proper waste handling, the training program includes ecological tours in landfills and facilities of known waste treaters. Evaluations are also conducted before and after the program to assess the level of awareness and knowledge hospital staff have on waste management. Select participants who successfully complete the training course are further trained to become trainers or facilitators in future trainings.

Patient education sessions are also regularly conducted to inform and educate patients, as well as visiting students, on proper waste disposal.

Monitoring of compliance is conducted through random inspections by committee members. Reports from this activity are collated a monthly basis and reported to the chairperson of the program. The committee also meets regularly to assess the existing programs and further systematize health care waste management in the hospital.



Waste flow diagrams are also posted strategically throughout the compound to guide the waste handlers accordingly.

IV. Best Practices in Health Care Waste Disposal

After waste minimization strategies have been carried out to reduce the volume of waste produced, the final step in waste management is proper end-disposal of the remaining wastes.

While general wastes are collected by the hospitals' respective city governments, each of the four hospitals has had to contract the service of a private waste treater that uses a non-burn technology (for two hospitals, their treater uses specifically Microwave Disinfection), in the treatment of infectious wastes. Microwave disinfection is essentially a steam-based process, where disinfection occurs through the action of moist heat and steam generated by microwave energy.

Infectious wastes are collected by the waste treaters from the hospitals regularly (twice per week on average), and the resulting treated wastes are placed in controlled dumpsites.



Photos from actual collection process of infectious wastes by a private alternative technology provider from Hospital C. The green bins

in the second picture are being weighed in the presence of a waste management committee representative. The weight of each bin, which contains segregated infectious wastes, are recorded by the hospital guard, the WMC representative and the collector.

A list of waste treaters in the Philippines that use alternative non-burn technologies in treating and disposing of hospital waste found at the end of this report. (Annex III)



Conclusion

In the issue of waste management, hospitals, as providers of health care, are given the opportunity to take proactive measures towards protecting public health. These actions are not unreasonably difficult; in fact, they are manageable, as the four hospitals featured in this report have proven. They, along with their documented best practices, are a testament to the old adage: if there's a will, there's a way.

Because of their commitment to environmental responsibility and safe health care, the hospitals were able to rise up to the different challenges they faced to become examples of facilities with best practices in health care waste management

For Hospital A, all it took was the enthusiasm and dedication of strong leaders to create a hospital-wide culture for proper waste management. Hospital B showed that no matter how preliminary, good practices are important to laying the groundwork for proper waste management. They also showed that the size of the health care facility or the volume of waste produced is no excuse to not taking action. Hospital C, on the other hand, has shown that a single innovative policy can make all the difference. And Hospital D showed how proper waste management on a large scale is not impossible with proper systems in place.

Perhaps, more importantly, these four hospitals showed that there is no one waste management system, guide or specific set of practices, that are applicable to all.

Each facility has to determine and develop a waste management plan, adopt practices that are suited to their facility, and create corresponding programs and policies that works for them.

The goal of this report is not to serve as a manual; rather, by sharing the commitment and practices of these hospitals, it aims to inspire other to join the campaign for proper waste management, and to find practices best suited to their own facilities. By taking part in the study, these hospitals did not only take steps to better their own facilities and share what they knew, they also showed how hospitals should be at the forefront of promoting these issues.

HCWH would like to end this report with an invitation for other hospitals to take the first step towards improving their waste management systems through conducting health care waste assessments in their facilities.

The next page gives a brief introduction to health care waste assessments and more resource files on the topic are included in the CD that comes with this report. We hope you will find them useful in your own campaign for environmentally responsible health care.

An assessment is the first step

In developing a waste minimization program or improving an existing waste management system, a health care waste assessment is the first step. There is a lot of sense in knowing what the actual situation is before any major changes to an existing system. What is important is to understand first how things are done and why things are done the way they are.

Knowing what is being generated, who is generating it and who has the responsibility for collection and disposal, how it is being collected and disposed, and why the management decisions creating the system was made.

Knowing WHAT is being generated can lead to a specific recycling and waste reduction strategies

Knowing WHERE wastes are generated determines the collection procedure, especially those that need special handling

Knowing WHO or what section of the hospital generates particular kinds of wastes can assist management in identifying and tapping necessary resource people in designing the waste management system.

It also allows management to explore waste reduction techniques and alternative materials that may fit better into the system.

Knowing HOW involves the current waste management systems and procedures of the hospital, and how this can be better improved.

Annex I

Health Care Without Harm

Major Achievements

Health Care Without Harm (HCWH) was founded in 1996 to solve a disturbing pollution problem in the health care industry: the US Environmental Protection Agency (US EPA) had identified medical waste incinerators as the single largest source of dioxin, a potent carcinogen. In response, 28 organizations formed HCWH on the premise that the health care industry has a duty to fulfill its creed to “first, do no harm.” Today, HCWH has 443 member organizations in 52 countries working to reduce pollution in the health care industry, with offices in North America, Europe, Asia, and Latin America. Here’s a look back at major achievements of the past decade:

* More than 5,000 medical waste incinerators have closed in the US, and hundreds have closed across Europe, as hospitals have switched to safer, non-burn waste treatment technologies. Today, there are less than 100 medical waste incinerators remaining in the US.

* The market for mercury thermometers has been virtually eliminated in the US as most hospitals and all major pharmacies have switched to safer non-mercury devices. Fourteen states and 20 cities in the US have passed laws to ban or limit the sale of mercury-containing medical devices, and the European Union has taken the first step toward banning the export of mercury-containing products.

* 5,548 facilities in the US have joined Hospitals for a Healthy Environment, a joint program of US EPA,

American Hospital Association, American Nurses Association and HCWH. These hospitals are eliminating mercury entirely, and have agreed to reduce waste by 50% and reduce use of toxic, persistent chemicals.

* The first health-based green building system for hospitals, the Green Guide for Health Care, has 84 pilot projects representing more than 20 million square feet of construction. These hospitals are being built with less-toxic materials and healing design elements.

* Major hospital systems are phasing out PVC medical devices due to concerns about the health impact of toxic additives. The world's leading medical device manufacturers have pledged to develop PVC-free product lines.

* The top group purchasing organizations in the US – representing more than 70% of buying power for the nation's health care industry — have committed to take mercury products off contracts, list DEHP-free/ PVC-free medical devices in catalogues, identify products that contain brominated flame retardants, and educate their customers about environmentally preferable purchasing.

* More than 50 cities, states, and medical societies in the US have passed resolutions to reduce PVC, dioxin, mercury, or medical waste incineration.

* HCWH has organized nurses to be leading advocates for environmental responsibility in the health care industry. Read about nurses who are driving change in their facilities at www.theluminaryproject.org

* Under a newly developed food program, hospitals are advocating for antibiotic-free meat and pesticide-free foods. They are serving organic, locally grown food, and are planting gardens on site. Kaiser Permanente now has 25 farmer's markets serving locally grown organic food at their medical facilities across the US.

* With support of health care professionals and institutions across Europe, the European Union passed a major reform of chemicals policy, which will provide health and safety data for thousands of chemicals and help move the market toward safer alternatives.

* In collaboration with the United Nations Development Program and the WHO, HCWH is implementing a global project to demonstrate sustainable health care waste management in Argentina, Latvia, Lebanon, India, the Philippines, Senegal, and Vietnam.

* In 2004, the WHO modified its health care waste management policy to include health risks associated with incineration. Strategies include selecting PVC-free medical devices and promoting non-incineration waste disposal technologies. In 2005, the WHO developed a non-mercury policy for the health care sector.

* To make safe, low-cost waste treatment options available worldwide, HCWH launched an international contest to find innovative non-burn waste treatment technologies. Winning designs are posted at: www.medwastecontest.org

* HCWH's flagship event, CleanMed, has become the world's largest health care conference on environmentally preferable medical products and green building. Register today for CleanMed US or CleanMed Europe: www.cleanmed.org

Annex II

Types of Health Care Wastes

(From the DOH HCWM Manual, with color coding scheme)

General Waste (Black and Green)	Comparable to domestic waste, this type of waste does not pose special handling problem or hazard to human health or the environment- Comes mostly from administrative and housekeeping functions
Infectious Waste (Yellow)	Waste that contains pathogens, (bacteria, viruses, parasites or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. This includes: <ul style="list-style-type: none">• Cultures and stocks of infectious agents from laboratory work• Waste from surgery and autopsies on patients with infectious diseases• Waste from infected patients in isolation wards• Waste that has been in contact with infected patients undergoing haemodialysis• Infected animals from laboratories; and Any other instruments or materials that have been in contact with infected persons or animals
Pathological Waste (Yellow)	Consists of tissues, organs, body parts, human fetus and animal carcasses, blood and body fluids; Should be considered a subcategory of infectious waste, even though it may also include healthy body parts

<p>Sharps (Red)</p>	<p>Includes needles, syringes, scalpels, saws, blades, broken glass, infusion sets, knives, nails and any other items that can cause a cut or puncture wounds. Whether or not they are infected, such items are usually considered as highly hazardous health care waste.</p>
<p>Pharmaceutical Waste (Yellow with black band?)</p>	<p>Includes expired, unused, spilt, and contaminated pharmaceutical products, drugs, vaccines and sera that are no longer required and need to be disposed of appropriately. This category also includes discarded items used in handling of pharmaceuticals such as bottles with residues, gloves, masks, connecting tubing and drug vials.</p>
<p>Genotoxic Waste (Orange?)</p>	<p>Genotoxic waste may include certain cytostatic drugs, vomit, urine or feces from patients treated with cytostatic drugs, chemicals and radioactive materials. This type of waste is highly hazardous and may have mutagenic, teratogenic or carcinogenic properties.</p> <p>Cytotoxic wastes are generated from several sources including contaminated materials from drug preparation and administration, such as syringes, needles, gauges, vials, packaging; outdated drugs, excess (left over) solutions and drugs returned from wards.</p>
<p>Chemical Waste (Yellow with black band)</p>	<p>Chemical waste consists of discarded solid, liquid, and gaseous chemicals, for example from diagnostic and experimental work and from cleaning, housekeeping and disinfecting procedures.</p>

<p>Chemical Waste-continued (Yellow with black band)</p>	<p>Chemical waste is considered hazardous if it has at least one of the following properties:</p> <ul style="list-style-type: none"> • Toxic • Corrosive (e.g. acids of pH < 2 and bases of pH > 12) • Flammable • Reactive (explosive, water-reactive, shock sensitive) • Genotoxic (e.g. cytostatic drugs)
<p>Waste w/ high content of heavy metals (Yellow with black band)</p>	<p>Represents a sub-category of hazardous chemical waste and are usually highly toxic. (e.g. mercury from thermometers, cadmium from discarded batteries, and lead)</p>
<p>Pressurized Containers (Red)</p>	<p>Many types of gases are used in health care and are often stored in pressurized cylinders, cartridges, and aerosol cans. Many of these once empty or of no further use (although they may still contain residues) are reusable, but certain types notably aerosol cans, must be disposed of. Whether inert or potentially harmful, gases in pressurized containers should always be handled with care; containers may explode if incinerated or accidentally punctured.</p>
<p>Radioactive Waste (Orange)</p>	<p>Includes disused sealed radiation sources, liquid and gaseous materials contaminated with radioactivity, excreta of patients who underwent radionuclide diagnostic and therapeutic applications, paper cups, straws, needles and syringes, test tubes, and tap water washings of such paraphernalia.</p>

Annex III

Service Providers of Alternative Technologies

Chevalier Enviro Services (CESI)

Autoclave/steam sterilizer

Address	Km 17 West Service Road Cervantes St., Bormaheco Compound, South Super Highway, Sucat, Paranaque City
PHONE	+632-823-3659 +632-823-4245
FAX	+632-823-3599 +632-776-7042
EMAIL	cheva@pacific.net.ph
WEB	www.chevalier.com/business/cel.htm

Cleanway Technology Corporation

Autoclave/steam sterilizer

(Office Address)	Herma Building, 94 Scout Rallos Street, Quezon City, Philippines
(Plant)	Cleanway Cavite Plant, Blk 4, Lot 2, 4-8, Meridian Industrial Park II, Maguyam Road, Silang, Cavite, Philippines
PHONE	+632 922-3421
FAX	+632 929-5306

PAE Environmental Incorporated

Autoclave/steam sterilizer

(Office Address)	908 ALPAP II Building Trade St. corner Investment Drive Madrigal Business Park, Alabang, Muntinlupa
(Plant)	General Emilio Aguinaldo Memorial Hospital Compound Trece Martires, Cavite


PHONE +632-842-7087
+632-842-7177
FAX +632-842-7154

Pollution Abatement Systems Specialists, Inc.
Autoclave/steam sterilizer, shredder/grinder

Address 2nd Level, Waterfront Hotel, Kahug
Salinas Drive, Cebu City, Philippines
PHONE +632 32 2342519
+632 32 2342517
+632 32 2342515
FAX +632 32 2342523

SafeWaste Inc.
Autoclave/steam sterilizer

Address 3 Pallosapis St., Greenville, City of
San Fernando, Pampanga 2000,
Philippines
PHONE +63 45 - 963 22 19
FAX +63 45 - 963 22 19
EMAIL safe_waste@yahoo.com
WEB www.safewasteasia.com

 *HCWH does not endorse any particular company or
waste treater. For more information on alternative
technologies, a report is available at www.noharm.org*



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<http://www.wpro.who.int>

<http://www.mb.com.ph>

<http://faspo.denr.gov.ph>



Health Care Without Harm Asia is interested in finding more best practices in health care waste management. If you think your facility has best practices and would like to share them, please contact us, we will more than happy to hear your story.

Email faye@hcwh.org
Tel +632 928 7572
Fax +632 926 2649
Address Unit 330 Eagle Court Condominium
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