



Proceedings of the Training on Health Care Waste Management

CaLaBaRZon Region, Philippines



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Proceedings of the Training on Health Care Waste Management CaLaBaRZon Region, Philippines

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ABBREVIATIONS

3R	Reduce, Reuse and Recycle
CHD	Center for Health Development
DOH	Department of Health
GEF	Global Environment Facility
HCF	Health Care Facility
HCWM	Health Care Waste Management
HCWMC	Health Care Waste Management Committee
LGU	Local Government Unit
MOEJ	Ministry of the Environment of Japan
MRI	Mitsubishi Research Institute
PD	Presidential Decree
RA	Republic Act
RRC.AP	Regional Resource Centre for Asia and the Pacific
SMCS	Sound Material Cycle Society
TCI	Training Comfort Index
TWG	Thematic Working Group
UNDP	United Nations Development Programme

I. EXECUTIVE SUMMARY

Solid and Hazardous waste is increasingly becoming a major environmental burden of most urban and industrial areas. An alarming rate of solid and hazardous waste arising in Asia and the world has been witnessed parallel to urbanization, industrialization and economic development. Issues such as the increase in volume, variety of solid wastes, their qualitative diversification, and the trans-boundary movement of hazardous materials and soaring prices of resources now bound. The Thematic Working Group on Solid and Hazardous Waste (Waste TWG) of the Regional Forum on Environment and Health in Southeast and East Asian Countries was established in 2007 to address many of these problems. The goal of Waste TWG is to ensure environmentally sound management of solid and hazardous waste, particularly municipal and medical waste, and promote the 3R's.

Several meetings of the Waste TWG were held, the first meeting was held in Singapore (28-29 February 2008), the second meeting was held in Cambodia (2-3 December 2008). These meetings discussed the status-quo and issues on medical waste management or health care waste management (HCWM) in member countries as well as shared good practices and lessons learnt relative to the 3R principle. Based from the recommendation of the first phase of Waste TWG, the second phase (2010-2013) of waste TWG includes, among other objectives, to 1) hold workshops to promote activities relevant to the recommendation utilizing the status-quo reports compiled in the first phase; and 2) enhance capacity building of policy makers to identify and address waste and health problems by sharing knowledge including best practices in the region.

Moreover Waste TWG Secretariat conducted a survey on March 2011 to 14 member countries on the need for capacity-building of HCWM in relevant stakeholders in the region. The secretariat compiled the survey duly accomplished by the member countries, particularly the health sector tackling on HCWM. The results on capacity-building needs analysis showed that the strengthening of national/local level training workshops for health care managers, health care waste authorities/facility managers/workers or municipalities was a high priority and was selected.

Based on the above-mentioned developments, the Ministry of the Environment of Japan, through the Mitsubishi Research Institute (MRI), requested RRC.AP to support the waste TWG member countries to build capacity on HCWM. The Philippines was selected to conduct the HCWM training at the local level. Upon completion of the capacity building through HCWM training, the results will be disseminated to other areas within the country and to other TWG member countries.

RRC.AP worked in collaboration with the Citigate Travelplus Dasma and Department of Health (DOH) Region 4A (CaLaBaRZon¹), of which the latter agreed to be a collaborating centre for the implementation and conduct of the HCWM training. The training was aimed to train head or key staff/local persons involved in health care waste management from DOH, LGU, and selected private hospitals within the CaLaBaRZon Region. The CHD CaLaBaRZon hosted the training with the support of RRC.AP. Planning, preparations, and management of the training including the training modules, materials, resource speakers, listing and communication of invitations for prospective participants, venues and logistics were carried out by DOH 4A CaLaBaRZon, RRC.AP and Citigate TravelPlus.

The five day training on Health Care Waste Management was designed to address the management of health care waste of local health facilities. The training aimed to train head/Chief of Hospital or key staff/focal person involved in healthcare waste management from DOH, LGU and selected private hospitals within the CALABARZON.

The chosen venue for the HCWM training was the City State Tower Hotel located in Ermita, Manila, Philippines. On the day of the training thirty-two (32) individuals from twenty-three (23) different health facilities of CaLaBaRZon Region composed this batch of participants (Annex A).

¹ CaLaBaRZon region covers the mainland provinces and cities of Cavite, Laguna, Batangas, Rizal and Quezon

II. INTRODUCTION

The Center for Health Development No. 4A (CHD 4A) is the Department of Health Regional Field Office for CaLaBaRZon Region, covering the mainland provinces and cities of Cavite, Laguna, Batangas, Rizal and Quezon. CHD 4A is responsible for the field operations of the Department of Health in the CaLaBaRZon region and it is mandated to implement and monitor health and health-related laws, regulations, policies and programs; and to coordinate with regional offices of other departments, offices and national government agencies as well as local government units within the region.

In CALABARZON Region there are two hundred thirty-nine (239) health facilities, 29% (69) are government-owned hospitals and 71% (170) are privately-owned hospitals. The service capability/category of these health facilities are Level 1 to Level 4. The authorized bed capacity of Level 1 to Level 4 ranges from 10 to 260. For this project of Regional Resource Centre for Asia and the Pacific (RRC.AP) - Training on Health Care Waste Management, the recipients were from twenty-three (23) health facilities (10%). Thirty-two individuals from these twenty-three (23) different health facilities of CaLaBaRZon Region composed this batch of participants (Annex A). The training was held on March 5 – 9, 2012 at the City State Tower Hotel, Ermita, Manila

Table 1 shows the name of health facilities represented by the participants.

Table 1: Distribution of Participants According to Health Facilities

<i>Name of Health Facility</i>	<i>Number of Participants</i>
Apacible Memorial District Hospital	1
Batangas Regional Hospital	2
CarSiGMA District Hospital	1
Dela Salle University Medical Center	1
Don Juan Mayuga Memorial District Hospital	2
Don Manuel Lopez Memorial District Hospital	2
Dona Marta Memorial District Hospital	1
Dr. Jose P. Rizal Memorial District Hospital	1
Emilio Aguinaldo College Medical Center	1
Gen. Emilio Aguinaldo Memorial Hospital	1
Gen. J. Cailles Memorial District Hospital	1
Gumaca District Hospital	1
Laguna Provincial Hospital	2
Lipa Medix Medical Center	1

Luisiana District Hospital	1
Manila East Medical Center	1
Mary Mediatrix Medical Center	1
Ospital ng Binan	1
Panlalawigan Pagamutan ng Laguna	1
Santa Rosa Community Hospital	1
Quezon Medical Center	2
Tayabas Community Hospital	2
Unciano Medical Center	1
Center for Health Development IVA	3
Total	32

A total of thirty-five (35) participants were invited to attend in this training and thirty-two (32) (91.42%) actually participated.

Participants representing the government health facilities (Provincial and District Hospitals) operated by Local Government Units (LGU) level constituted the majority of the trainees (78.12%) of the course. Seven participants (21.88%) were from private hospitals.

Table II. Distribution of Participants According to Department and Their Designation

<i>Department of Health Levels</i>	<i>Designation</i>	<i>Number of Participants</i>	<i>Total Number of Participants (%)</i>
Regional	1. Medical Officer IV – Health Facility Enhancement Program Coordinator 2. Supervising Administrative Officer 3. Engineer III – Hospital Licensing Officer 4. Engineer III – Maintenance Engineer 5. Sanitary Inspector V – Hospital Licensing Officer	1 1 1 1 1	5 (15.63%)
Provincial	1. Provincial Sanitary Engineer 2. Pollution Control Officer 3. Administrative Officer 4. Engineer II 5. Asst. Chief Nurse	2 1 2 1 1	7 (21.88%)
District Hospital	1. Chief of Hospital 2. Administrative Officer 3. Nurse	4 5 2	11 (34.38%)

Municipal Hospital	1. Nurse	2	2 (6.25%)
Private Hospital	1. Environmental & Safety Requirement Officer/Pollution Control Officer (Designated) 2. Administrative Officer 3. Head, General Services Division 4. Chief Nurse 5. Infection Control Officer	2 1 2 1 1	7 (21.88%)

This Training on Health Care Waste Management was designed to address the management of health care waste of local health facilities. The demand for health services of the CaLaBaRZon growing population is increasing and there is need for continuous improvement and upgrading of health facilities. As a result, there is an increasing volume of health care wastes generated that, if not properly handled, carries risk for infection and injury. The health care facilities have the responsibility to prevent these through proper handling, collection, storage, treatment and disposal of health care waste. With the development of new technologies for health care wastes and promulgation of new laws and policies, there is an urgent need to train the health care providers. This will provide a more effective and efficient approach in the management of health care wastes that will eliminate potential risk to people's health and reduce health problems.

III. OBJECTIVE

By the end of the training workshop, the participants were able to:

1. Developed awareness of the health, safety and environmental issues relating to HCW in health care establishments;
2. Identify the health and environmental impacts of health care waste and appreciate the need to protect patients, health care staff, the community and environment by ensuring proper HCW management;
3. Discuss the concepts and importance of application of 3Rs and environmentally sound technologies; and
4. Identify the requirements and strategies necessary to institute and sustain a health care waste management program in their respective facilities.

IV. OPENING CEREMONY

The Opening Ceremony was graced by the newly appointed Director IV of Department of Health - Center for Health Development IVA – (CHD IVA) - Dr. Edgardo M. Gonzaga. Dr. Gonzaga acknowledged the participants one by one by calling all their names and the health facilities where they belong. He was grateful to the Ministry of Environment of Japan and the Regional Resource Center for Asia and the Pacific (RRC.AP) in collaborating with the DOH – CHD IVA in providing support in this training. He also welcomed the participation of the private hospitals being our partners in providing quality health care. He thanked the participants for believing in this kind of training. It is the mandate of the DOH to provide technical assistance but he emphasized that DOH cannot do it alone, that it needs partners in providing quality care and also being responsible for the management of health care wastes. Lastly, he solicited the comments of the participants if they had any problem with their License to Operate, and that if they have any concerns that need to be addressed. He inspired the participants and challenged them with the task ahead and he thanked them for attending the training.

V. CONTENT OF THE COURSE

1. Health and Environmental Impacts of Health Care Waste
2. Legislation, Laws and Policies Related to HCW Management
3. Health Care Waste Minimization (3Rs Application)
4. Segregation, Collection, Storage and Transport of Health Care Waste
5. Mercury in Health Care Facility
6. Hazardous Waste Storage Options: Mercury
7. Health and Safety Practices in HCW Programs
8. Health Care Wastewater Management
9. Waste Treatment and Disposal
10. Institutionalization and Sustainability of HCW Management
11. Case Studies on HCW Management
12. Case Studies on HCW Technologies and Energy Efficiency in HCF
13. Innovative Practice of Health Care Waste in Asia
14. Health Care Facility Visit
15. Health Care Waste Management Plan

A. Overview

The training overview was presented by Engr. Corazon Vidad. She briefly discussed the objective of the training, its content, and gave a brief orientation on the topics to be presented and schedule of activities. The mechanics for the following activity, which was the levelling of expectations, was presented by Engr. Vidad. The expectations are categorized into: 1) expectation from the training; 2) expectation from the resource persons/facilitators; 3) expectation from the co-participants; and 4) expectation from each trainee/participant. To gather the responses from the participants, they were divided into four groups and all of them transfer from one station to the next station, until they complete posting their responses on the four boards where the different expectation categories were posted. Engr. Vidad processed the activity by clarifying the responses written on the board. This levelling of expectation is an important activity to gauge the effectiveness/success of the training.

The participants were also asked to fill in a form to assess their personal Training Comfort Index (TCI), facilitated by Engr. Guilberto Borongan. The Index was calculated from the self-assessment of the trainees, who rated their capacity in the training categories of Data Gathering, Data Analysis, Solution Development, and Action Taking. The scoring for each category was placed on a chart where the TCI was illustrated by the area of a quadrilateral, resulting from the connection of the four scores. With only one exception, all participants assessed themselves with general high scores, which indicated a high level of confidence and expectations. Nevertheless, the two categories requiring more inventiveness and initiative, i.e. Solution Development and Action Taking, scored relatively low, indicating the need for the training to focus on the practical implementation of the topics. Participants were requested to take the test again at the end of the training. In this case the results indicated a significant improvement, especially regarding the confidence of the trainees in taking action and developing solutions. The shape of the resulting quadrilaterals was also more regular and closer to a square shape, indicating the achievement of a balance among the different categories of acquired knowledge.

B. Health and Environmental Impacts of Health Care Waste

Number of hours: 1 hour

Learning Objectives:

1. To define key terminology related to health care waste.
2. To identify the various types of health care waste.
3. To identify the various health and environmental risks from health care wastes

The Health and Environmental Impacts of Health Care Waste Management module was presented by Dr. Gilbert Par. He discussed that in pursuing the aims of the health care services in reducing health problems and eliminating potential risks to people's health, the process inevitably creates wastes that are hazardous to health. The waste produced by the health care facilities in the course of health care activities carries risk for infection and injury. Wherever it is generated, safe and reliable methods for its handling are, therefore, essential.

Inadequate and inappropriate handling of health care waste poses serious public health consequences and a significant impact on the environment. Thus, sound management of health care waste should be considered a crucial component of environmental health protection.

In both the short term and the long term, the actions involved in implementing effective health care waste management programs require multisectoral cooperation and interaction at all levels. Since the wastes that are inadequately managed may have a widespread impact, policies should be generated and coordinated globally, and the management practices implemented locally. Establishment of a legal framework vis-à-vis a national policy is of utmost importance.

Management of health care waste should thus be put into a systematic, multifaceted framework, and should become an integral feature of health care services. Improved awareness of the problem in the community is as well vital in ensuring public participation in generating and implementing policies and programs related to health care waste management.

C. Legislation, Laws and Policies Related to HCW Management

Number of hours: 1 hour

Learning Objectives:

1. Discuss laws, polices and guidelines related to health care waste management;
2. Identify the requirements and strategies on how to comply with the existing laws and regulations.

The module on “Legislation, Laws, and Policies related to HCW Management” was presented by Engr. Corazon Z. Vidad. The health care facilities (HCF), as generators of health care waste (HCW), are responsible for the collection, handling, segregation, transport, treatment and disposal of the HCW they produce. To do this, the HCF have to be cognizant on the existing international agreements, national laws, policies, guidelines and specific administrative requirement related to health care waste management (HCWM). Understanding these laws polices and guidelines will provide direction to HCF in developing HCWM program.

This presentation provided the participants with the knowledge of the existing international agreements and laws, policies, guidelines required by regulatory agencies such as Department of Health, Department of Environmental and Natural Resources, Environmental Management Bureau, Laguna Lake Development Authority and Department of Labor and Employment. The importance in complying with all these regulations to protect the health and the environment was emphasized.

D. Health Care Waste Minimization (3Rs Application)

Number of hours: 2 hours

Learning Objectives:

1. Identify challenges faced in Health Care Waste Management at the HCF;
2. Discuss about the concept and importance of 3Rs in Health Care Waste Management at the HCF;
3. Build awareness on 3R principles and its practices in HCF;
4. Identify the health care waste categories at the HCF from Asian countries;
5. Inform about existing regional frameworks on waste management system; and
6. Identify elements in carrying out recycling projects in HCF

The lecture on health care waste minimization was discussed by Engr. Guilberto Borongan. The high potential for waste minimization and the Reduce, Reuse and Recycle (3Rs) of wastes in developing country cities or provinces are beset with

problems and challenges that include the use of open dumps that create and spread health problems, contamination of underground water resources, decreasing capacity of sanitary landfills along with difficulties in establishing new dump-sites and rising costs of wastes disposal. Similarly, lack of initiatives and actions toward its segregation at source are evident – most medical/hospital wastes are disposed together with municipal wastes while others are openly burnt. Only a few local initiatives have been undertaken by non-government organizations.

The 3R approaches are necessary for the establishment of a Sound Material Cycle Society (SMCS). The key strategies for the promotion and implementation of 3Rs include; raise awareness, create partnerships between various health care stakeholders, share information, carry out technological research/development and provide incentives. Effective linkage between these diverse approaches will achieve synergistic effects, making effective promotion and implementation of the 3Rs possible.

Existing initiatives and regional framework in SEA and East Asia related to waste management and 3Rs as well as healthcare waste categories in some Asian countries, and the challenges faced in healthcare waste management at the HCF were discussed.

His discussion provided the participants with an overview of 3Rs and its application on Health Care Waste Management by building awareness on 3R principles and its practices in Health Care Facilities.

E. Segregation, Collection, Storage and Transport of Health Care Waste

Number of hours: 2 hours

Learning Objectives:

1. Identify proper methods of segregation, coding and labeling of health care waste;
2. Discuss guidelines on proper storage of health care waste;
3. Identify requirements for a central waste storage facility;
4. Discuss guidelines on proper collection and transport of health care waste; and
5. Identify requirements for packaging and vehicles for off-site collection of waste

The Segregation, Collection, Storage and Transport of Health Care Waste session conducted by Engr. Aida C. Barcelona discussed the important concepts involved in the management of health care wastes and the process of separating different types of

waste at the point of generation until its final disposal. The entire waste generated from the health care facility is separated according to the specific treatment and disposal requirements to reduce the amount of waste that must be handled and treated as hazardous waste, to help reduce the risks of hazardous health care waste to workers, to lower the cost of treatment and disposal of health care waste and to make possible the recycling of non-hazardous general waste. Segregation must be applied strictly at the point of generation during collection, transport, storage and at the treatment site prior to final disposal.

All untreated HCW inside plastic liners shall be collected using standard trolley and deposited in waste storage area until transported to a designated on-site/off-site treatment facility. The storage area must satisfy all the requirements for an appropriate storage. The waste in plastic liners or waste bins shall be stored in a separate area, room or building of a size appropriate to the quantities of waste produced and there shall be a schedule of collection depending on the waste generated. In cases where the HCF lacks the space, daily collection and treatment shall be imposed prior to disposal.

Health care waste collection and transport must be an efficient movement of waste from point of generation to storage or treatment while minimizing the risk to personnel. This may be on-site, following designated route, or off-site collection and transport.

Her discussion and group activity provided the participants with the knowledge on how to implement proper segregation, collection, storage and transport health care wastes.

F. Mercury in Health Care Facility

Number of hours: 2 hours

Learning Objectives:

1. Learn the importance of properly segregating mercury wastes from the rest of the health care facilities wastes;
2. Identify the responsibilities of each health care facility in the construction of temporary storage for mercury wastes;
3. Learn how to construct and maintain the temporary storage for mercury wastes;
4. Identify appropriate committee structure that will maintain the temporary storage site, and

5. Identify necessary budgetary requirements for the construction and maintenance of storage area

Ms. Faye Ferrer talked about the Mercury in Health Care Facility. Her discussion focused on the virtue of Department of Health Administrative Order 2008-0021 (DOH AO21) or the Gradual Phase-out of Mercury in all Philippine Health Care Facilities and Institutions; health care facilities (HCF) all over the country have replaced mercury-containing thermometers and sphygmomanometers with safe and appropriate alternatives. The phase-out in 2010 marked the Philippines as the first developing country to order a phase-out of mercury devices in all of its hospital.

With the phase-out enforced, health care facilities are faced with the important task of proper temporary storage of these phased-out devices and ensuring that they would not be re-introduced to the environment again. The United Nations Development Programme Global Environment Facility (UNDP-GEF) Global Health Care Waste Project has produced a guidance document for the temporary storage of phased-out mercury waste in health care facilities.

Her discussion provided information to the participants on how to safely store phased-out mercury devices and how to take precautions in securing them. The participants also learned how proper management of wastes – toxic or non-toxic – will help improve each health care facility's waste stream.

G. Hazardous Waste Storage Options: Mercury

Number of hours: 0.5 hours

Engr. Guilberto Borongan presented his experiences from observation tours and studies from developed countries on their storage protocols for mercury wastes. He underlined the importance of proper storage of collected mercury wastes. Germany has some of the most vast and modern facilities that can accommodate not only mercury but also other hazardous chemicals.

H. Health and Safety Practices in HCW Programs

Number of hours: 1 hour

Learning Objectives:

For the participants to be able to describe the health and safety practices in health care waste management based on its minimum elements.

Dr. Gilbert Par discussed the Health and Safety Practices in HCW Programs. The waste is produced in so many areas within the health care facility. In order to properly manage health care waste, having a team approach is essential. All members of the health facility play a critical role in the management of health care waste. Hence, all personnel should be made aware of their roles and responsibilities, as well as the procedures that apply to their work in order to manage health care waste safely and efficiently.

He presented the following items that comprise the “Minimum Program Elements of a Health Care Waste Management”, which health facilities should look into, in order to assure the health and safety, not only of their patients and clients, but of the health facility staff and the community itself:

1. Written plan
2. Clear responsibilities
3. Written, internal rules
4. Staff training
5. Protective clothing
6. Good hygiene practices
7. Vaccinated workers
8. Designated storage locations
9. Waste minimization
10. Waste segregation
11. Waste Treatment
12. Final disposal site
13. Periodic reviews

After his discussion, the participants were provided with knowledge on particular health and safety practices that needs to be observed in handling health care wastes.

I. Health Care Wastewater Management

Number of hours: 2 hours

Learning Objectives:

1. Characterize wastewater from health care facilities in terms of its composition and type;
2. Identify the different sources of wastewater in health care facilities;
3. Discuss the hazards/risks associated with wastewater from health care facilities;
4. Discuss the environmental and health impact of discharging untreated wastewater; and
5. Discuss the appropriate and specific technologies for the treatment and disposal of wastewater.

Professor Romeo Quizon presented the Management of Wastewater from Health Care Facilities. His discussion was focused on how the hazards posed by improper wastewater management have served as bases for the enactment of several National Legislations and Codes. The Sanitation Code of the Philippines (PD 856) and the Philippine Clean Water Act of 2004 (RA9275) have specific provisions for the proper collection, treatment and disposal of wastewater. However, the strict implementation of these legislations remains a challenge due to constraints in resources and many other concerns.

Wastewater from health care facilities poses greater risks to human health and the environment as compared to domestic wastewater. This is attributed to certain components of health care wastewater such as chemicals, pharmaceutical products, contagious biological agents and radioisotopes.

This module aims to present specific technologies for the treatment and proper disposal of wastewater. As an introduction, wastewater will be characterized according to its composition, type and sources. Environmental and health hazards associated with wastewater from health care facilities will be the take off point for the discussion on the management of wastewater. This will include appropriate technologies for the treatment and disposal of wastewater from health care facilities.

His presentation provided great interest to the participants on the importance of having their wastewater treated before discharging it in the environment. .

J. Waste Treatment and Disposal

Number of hours: 1 hour

Learning Objectives:

1. Identify the appropriate treatment technologies and processes for health care waste;
2. Discuss the appropriate standard disposal system for each category of waste.

Engr. Corazon Vidad identified the Treatment and Disposal requirement for each type or category of waste. She discussed that for each waste category there is corresponding treatment and disposal requirement. Non-hazardous wastes, Infectious, Pathological, Chemical, Pharmaceutical, Radioactive and Sharps – all these wastes have corresponding treatment: autoclave, microwave, pyrolysis, chemical disinfection; and disposal: landfilling, and safe burial.

K. Institutionalization and Sustainability of HCW Management

Number of hours: 2 hours

Learning Objectives:

1. Identify requirements and strategies on how to institute and sustain a HCWM Program in each HCF;
2. Identify the duties and responsibilities of the Office of the Administrator of the HCF;
3. Identify the required composition of HCWM Committee and the Corresponding duties and responsibilities of each member;
4. Discuss the purpose of planning health care waste management in the health care facility level;
5. Identify communication and training intervention needed; and
6. Discuss the budgetary requirements.

The session on Institutionalization and Sustainability of Health Care Waste Management was presented by Engr. Aida C. Barcelona. She emphasized that the success in the implementation of Health Care Waste Management (HCWM) Programs depends on the

political will of the head of the health care facility (HCF) and the motivation, dedication and commitment of all the health care facility workers. Planning, directing and implementing depend on the capability of designated members of the Health Care Waste Management Committee (HCWMC) to sustain the program.

Any HCF has to comply with certain administrative requirements such as developing a comprehensive plan and organizing a HCWMC. Planning, directing and implementing depend on the capability of the designated members of the HCWMC to sustain the program. Appropriate HCWM practices depend largely on good administration and financial support as well as the active participation by trained and informed staff.

This module provided the participants with the knowledge on how to institute a HCWM program including practical framework in establishing HCWM Committee and strategies on how to sustain the HCWM program.

L. Treatment and Disposal Technologies for Medical Wastes in Developing Countries

Number of hours: 0.5 hour

Learning Objectives:

To discuss the treatment and disposal technologies for medical wastes.

Dr. Mohd Nasir Hassan, Regional Adviser of the World Health Organization – Western Pacific Regional Office, made a special presentation to the participants by discussing the treatment and disposal technologies being used in developing countries. His presence in the training provided inspiration to the participants. He expressed full support in providing quality care for the patients and at the same time taking care of the environment by doing proper treatment and disposal of medical wastes.

M. Case studies on HCW Technologies and Energy Efficiency in HCF

Number of hours: 1 hour

Learning Objectives:

1. Identify alternative technologies for health care waste management;
2. Discuss the concept of environmental footprint and energy efficiency in the context of HCWM;

3. Discuss the benefits of energy efficiency in the health care waste management process and in the management of health care facilities;
4. Identify possible energy efficiency improvements in their working facilities.

The session on HCW Technologies and Energy Efficiency in HCF was presented by Arch. Marco Silvestri. Some of the technologies he discussed included incineration (including pyrolytic incineration and rotary kilns), chemical disinfection, wet and dry thermal treatment (including autoclaving), microwave irradiation, land disposal (including encapsulation), and inertization (mixing waste with cement or other substances). He presented reports showing a comparative analysis, performance issues, environmental impacts, and cost for different technologies used in HCF. Also he included in his discussion other thermal-based technologies such as dielectric heating, use of high velocity heated air treatment, dry heating, depolymerization, and advanced thermal oxidation.

Innovative Health Care Waste Management technologies seek to improve the treatment process, reduce air pollutants emissions, and facilitate disposal, but also target environmental sustainability through a holistic approach that includes the reduction of resource consumption. Health care organizations must demonstrate the commitment to environmental issues by considering and implementing strategies to achieve environmental sustainability beyond the waste management itself. Thus, energy efficiency in HCF becomes a crucial component of health care services and activities, including the waste management process.

This module provided the participants with the knowledge of some alternative and innovative technologies for health care waste management, some of which were used to introduce the concept of energy efficiency and its application in health care facilities.

N. Innovative Practice of Health Care Waste in Asia

Number of hours: 1 hour

Learning Objectives:

1. Identify existing innovative practices on Health Care Waste Management at the HCF;
2. Identify innovative practices on source separation of HCW at HCF;
3. Inform about innovative practices on Waste Management Systems at HCF; and

4. Discuss the role of stakeholders in Health Care Waste Management systems.

The session on Innovative Practice of Health Care Waste in Asia showed that health care waste increases parallel with industrialization. Strong efforts to achieve safe and sustainable management of health care waste include raising awareness of the risks that infectious and hazardous health care waste pose to human health and the environment, especially among policymakers and communities living in the vicinity of sites where health care waste is separated, stored, transported, treated and disposed.

Leadership, commitment and active participation of every individual in the health care facility (HCF) are of high importance for the HCWM to be successful. The innovative practices showcase an appropriate HCWM system in HCF in Asia that can be replicated in HCF in the Philippines.

The video presentation of Engr. Guilberto Borongan provided insights to the participants and created great interest and challenge to institute HCWM into their system. Everybody wanted to have copy of the video presentation about the Bir Hospital implemented by Health Care Foundation in Nepal.

O. Health Care Facility Visit

Number of hours: 7 hours

Learning Objectives:

1. Establish an initial reference point for assessing waste management practices and techniques in a health care facility;
2. Compare the various performance indicators with the existing national and/or global standards, as applicable;
3. Describe current good practices and techniques and identify potential gaps;
4. Help define goals and milestones in order to gauge progress of the activities in relation with the health care waste project.
5. Determine initial resource needs to support the health care waste initiative.

A hospital visit or a walk-through survey was held on March 8, 2012 at Sta. Ana Hospital located in New Panaderos Street, Sta. Ana, Manila. The walk-through survey provided the information on the status of the health care waste management in a health care facility. The survey results of this walk-through shall be used as an initial step towards a more comprehensive process that shall be conducted by the participants upon returning to their respective facilities.

Guidelines for the Visit:

1. The participants were divided into four (4) groups of 8-9 members each group with assigned facilitator.

2. The specific schedule of activities during the visit was as follows:

8:30 am: Departure of Participants from the training venue (City State Tower Hotel)

9:30 am: Courtesy call to the Hospital Director and Staff

10:00 am: Orientation session on the hospital facility by Sta. Ana Hospital Representative

1:00 pm: Guided walk-through survey

3:00 pm: Discussion/ Wrap-up

3:30 pm: Adjournment

General orientation of the facility was be conducted prior to ocular using the walk-through checklist. An assigned staff of the Sta. Ana Hospital acted as a resource person attending to the general data/information needs of the participants.

3. Four main areas of the hospital were visited (one area per group).

a. Laboratory/Diagnostic Areas and Administrative Office

b. Medicine/Pediatrics, and OB-gyne Wards

c. Out-patient Department and Emergency Room

d. Operating/Delivery Room and Dietary

4. After the group visit to their respective assigned areas all groups proceeded to the Central Waste Storage Area and Wastewater Treatment Facility

5. A walk-through survey (self-monitoring) form was used to guide the participants. For groups assigned in more than one area, another copy of the walk-through survey form was used.

All the four groups presented their output based on the given survey form. They rated the hospital based on the forms provided. Based on the assessment of all four groups, the hospital rating was high. The area that needs to be addressed promptly by Sta.Ana Hospital staff is the provision of soap and hand-drying equipment in all the hand-washing facilities. Insights were presented about the good points that are worth to be replicated in the participants' health facilities.

This activity provided good inputs to the participants. They learned how to do actual survey of the facility, looking into minute details that are necessary to improve the management of health care waste management, and making it compliant to the standards. This assessment tool will be very useful when they return to their respective health facilities. The output of their survey will be the basis in making their health care waste management plan.

P. Health Care Waste Management Plan

Number of hours: 1 hour

Learning Objectives:

1. Discuss the procedures in developing Health Care Waste Management Plan
2. Apply the procedures learned in developing Health Care Waste Management Plan

The last session was presented by Engr. Corazon Vidad. The presentation focused on having an initial assessment, which is the key to develop a comprehensive health care waste management plan (HCWMP). Each division/section in the organization must be involved in the development of the plan, for it to be understood and later to be followed. In developing the HCWM plan, there are three major concerns that must be addressed, namely: formulating the specific plan of actions involving health care facility (HCF) personnel and its clients; improvement of HCF facilities; and training and enhancement of skills necessary to have an effective handling of health care waste.

Her presentation provided guidance for the participants in the preparation of the HCWMP for their respective facilities. Preparation of this document is necessary to have effective management of health care waste and is also a requirement in the renewal of hospital license. The target for the implementation of the plan is within six (6) months. There will be a follow-through visit in the health facilities to see the changes made after the implementation of health care waste management program.

VI. TRAINING EVALUATION and CLOSING CEREMONY

The closing ceremony was facilitated by Group 4 and hosted by Ms. Gloria C. Africa. The group members gave their impressions about the different aspects of the training. The following are some of the highlights:

- Mr. Ramil Raoet of Manila East Medical Center, Rizal gave good impressions and praises about the training particularly on the topics, the speakers, the food, the room accommodations, the training venue, and the event organizer.
- Engr. Rene Chavez of Mary Mediatrix Medical Center Rizal commented on the relevant topics shared during the training and gave high regard to the resource persons along with their expertise.
- Ms. April Ann Del Rosario of Emilio Aguinaldo College Medical Center in Cavite said she enjoyed the training as she was able to find new friends and social contacts among the participants. As newly appointed Infection Control Nurse the training and information that she got will be of great value to her work.
- Ms. Salome Paycao of Quezon Medical Center Lucena City expressed her appreciation for the training and saw the great benefits from the things she learned. She also acknowledged her co-participants and quoted a passage in the Bible found in I Corinthians 12:12 which states that “...we are one body” and that we are part of God’s work.
- Dr. Bayani Terciano of Luisiana District Hospital recapped the expectations that were formulated during the first day of the training and gave the conclusion that all expectations written were met -with some exceptions on punctuality of some participants- but the overall training was excellent.

After the sharing of impressions Engr. Pablo del Mundo of the Laguna Provincial Hospital rendered a special song. He sang it without accompaniment and everybody appreciated and applauded his good voice. Afterwards Rev. Jonathan C. Mendieta CEO of Citigate TravelPlus Dasma, the Event Organizer of the training expressed his appreciation for the excellent rating and comments given by the participants and other partners in the preparations and service given by Citigate to the HCWM training. He also mentioned that it was a historical moment and opportunity for Citigate to be part of the campaign in protecting the environment and preserving it for the next generation.

Engr. Corazon Vidad of DOH CaLaBaRZon in behalf of Dr. Edgardo Gonzaga, Director IV of Department of Health - Center for Health Development IVA expressed her wholehearted gratitude to RRC.AP and to Japan Ministry of Environment for the opportunity given to the Philippines and in particular to CaLaBaRZon Region for funding the training. She also thanked the participants who have sacrificed their time and effort in attending the HCWM training. She appreciated the enthusiasm of the participants to learn and think on how they will put all the learning into practice.

Engr. Guilberto Borongan of RRC.AP thanked the DOH CaLaBaRZon for facilitating the Training on HCWM, the CITIGATE TravelPlus Dasma for the preparation and excellent service, good accommodation and choosing a very conducive venue for the training. He also acknowledged and thanked the financial support of the Government of Japan through Ministry of the Environment; and thanked the participants for attending the training, with the hope that they will apply what they have learned, especially the practice of the 3R's (Reduce, Reuse and Recycle) of which they are advocating and giving emphasis in the implementation.

Dr. Gilbert Par of DOH CaLaBaRZon on his closing remarks thanked and acknowledged everybody, especially their Head of Office - Dr. Edgardo Gonzaga for his support in this training. He cited the initiative of RRC.AP and Ministry of the Environment, Japan in providing financial support in the Training on HCWM. He cited the importance of the training and its application in the health facilities

Based on the impressions shared by the participants, they were very appreciative and happy that they attended this training. They were so inspired and wanted to catch the passion of the facilitators and resource persons in the implementation of HCWM in their respective areas.

At the final phase of the closing Ceremony Training Certificates were given to the participants who completed the five day course. The giving of certificates was hosted by Rev. Jonathan Mendieta of Citigate TravelPlus Dasma and certificates were awarded by Engr. Cogie Vidad, Dr. Gilbert Parr and Engr. Guilbert Borongan. Certificates of Appreciation were also given to the Resource Persons who gave their lectures throughout the training period.

Digital Copies of the whole training lectures, slides, photos, and videos were distributed to the participants by the Citigate Secretariat in exchange of their accomplished survey forms and before they left and check out of the venue.

VII. RECOMMENDATIONS

With the evident success of this training, the following are the recommendations to be considered so as to reinforce, sustain and widen the effects of its success not only to the participants of the HCWM training but also to the people within their areas of influence.

1. Monitor the implementation of HCWM.

This can be done through a random visit in the health facilities, possibly within two months after the training. Activities that can be done in this monitoring visit are to check the status of their implementation, encourage them to continue the good work they started, see areas that needs improvement, and help them apply what they have learned.

2. Capability building of other health facilities.

Considering the number of health facilities existing in CaLaBaRZon Region, there is a need to conduct similar trainings to other health facilities to create better impact and influence more the practice of sound management of health care wastes.

3. Practice and advocacy on waste minimization and proper management of health care wastes.

The CHD 4A should take the lead in practicing and advocating waste minimization and proper health care waste management, being the lead agency in health, and in accordance to existing legal mandates and policies. (Please see Annex J: Report to Director Edgardo M. Gonzaga)

4. Forming the HCWM Council

When the participants made significant progress in their implementation and found the worth and advantage of practicing HCWM, the recommendation is to form a HCWM council. By grouping them based on their location will create a support group that can provide help among each other. This council can conduct strategic consultations, possible sharing of resources, advocate sound management of health care wastes, and create environmental awareness to protect the environment.

This HCWM council can also become a hub to promote programs not only for HCWM but also other environmental concerns. This can also open opportunities for future projects. The formation of such a community will also reinforce and strengthen the participant's belief system that will lead to life forming habits. Such community may need some assistance and support from relevant local and

national government agencies in its start-up activities, but will be geared towards self-sustaining and self-propagating entity.

VIII. PRESENTATION MATERIALS

Module Objectives

Health and Environmental Impacts of Health Care Waste

DR. GILBERT PAR
Department of Health
Center for Health Development- 4A(CALABARZON)



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By the end of the training, the participants will be able to:

1. to define key terminology related to healthcare waste; and
2. to identify the various types of healthcare waste; and
3. to identify the various health and environmental risks from healthcare wastes

Healthcare waste (HCW)

- a kind of waste generated mainly from hospitals, medical centers, healthcare establishments & research facilities in the diagnosis, treatment, immunization & associated research
 - WHO

Healthcare waste (HCW)

- 75-90%
 - **healthcare general waste (HCGW)**
 - similar to domestic waste
- 10-25%
 - **healthcare risk waste (HCRW)**
 - infectious/ hazardous waste
 - requires special treatment
 - poses risks both to human health & the environment



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Classification of HCW by WHO

- **1. Infectious Waste**
 - Waste suspected to contain pathogens
 - laboratory cultures
 - waste from isolation wards
 - tissues (swabs)
 - materials or equipment that have been in contact with infected patients
 - excreta
- **2. Pathological Waste**
 - Human tissues or fluids
 - body parts
 - blood and other body fluids
 - fetuses

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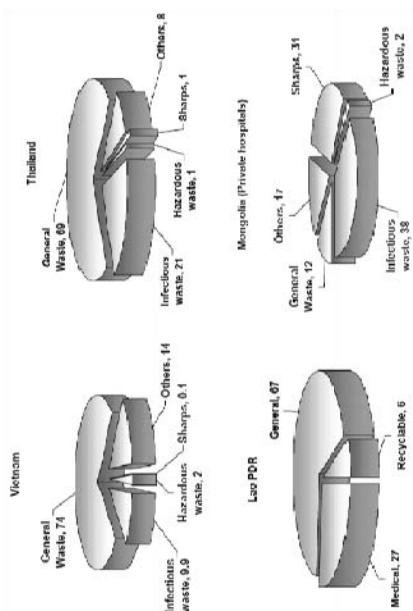


Classification of HCW by WHO

- **3. Hazardous Chemical Waste**
 - contains chemical substances
 - laboratory reagents
 - film developer
 - disinfectants that are expired or no longer needed
 - solvents
- **4. Pressurized Containers**
 - containers used to store gases under pressure
 - gas cylinders
 - gas cartridges
 - aerosol cans

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Classification of HCW by WHO

- **5. Hazardous Chemical Waste**
 - contains chemical substances
 - laboratory reagents
 - film developer
 - disinfectants that are expired or no longer needed
 - solvents
- **6. Genotoxic Waste**
 - contains substances which cause damage to DNA
 - waste containing cytostatic drugs (often used in cancer therapy)
 - genotoxic chemicals

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Classification of HCW by WHO

- **7. Radioactive Waste**
 - contains radioactive substances
 - unused liquids from radiotherapy or laboratory research
 - contaminated glassware
 - packages or absorbent paper
 - urine and excreta from patients treated or tested with unsealed radionuclide
- **9. Heavy Metal Waste**
 - contains high content of heavy metals such as mercury
 - batteries
 - broken thermometers
 - blood-pressure gauges

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Classification of HCW by WHO

- **9. Hazardous Pharmaceutical Waste**
 - contains pharmaceuticals
 - pharmaceuticals that are expired or no longer needed
 - items contaminated by or containing pharmaceuticals (bottles, boxes)
 - expired vaccines
- **10. Highly Infectious Waste**
 - microbial cultures
 - stocks of highly infectious agents from Medical Analysis Laboratories & body fluids of patients with highly infectious diseases

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Classification of HCW, DOH vs WHO

DOH	WHO
1. Infectious	1. Infectious
2. Sharps	2. Sharps
3. Pathological	3. Pathological
4. Pharmaceutical	4. Genotoxic
5. Chemical	5. Hazardous Chemical
6. Radioactive	6. Pressurized Containers
7. Non-hazardous or general	7. Radioactive
8. Heavy Metal	8. Heavy Metal
9. Hazardous Pharmaceutical	9. Hazardous Pharmaceutical
10. Highly Infectious	10. Highly Infectious

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1. Infectious Waste

Segregation (bin, plastic lining, labelling and signs)	Waste management	Storage, collection and transport	Treatment	Disposal
• Strong, leak-proof bin with cover with plastic lining	• Properly labelled and built storage area in healthcare facility	• Pyrolysis (not available in the Phil)	• Safe burial on site (treated)	
• Yellow plastic that can withstand autoclaving (thickness: 0.096mm)	• Properly collected and transported on site and off-site	• Microwave (high cost, not recommended for individual HCF)	• Landfill	
• Size varies depending on the volume of waste				
• Properly labelled "INFECTIONOUS WASTE"				
• Tag indicating source and weight of waste generated, date of collection				
• Biohazard symbol for bin but optional for plastic lining				



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2. Sharps

Waste management	Storage, collection and transport	Treatment	Disposal
Segregation (bin, plastic lining, labelling and signs)	• Puncture-proof container with wide mouth and cover • Plastic lining NOT applicable • Properly labelled "SHARPS" • Tag indicating source and weight of waste generated, date of collection • With biohazard symbol (optional)	• Properly labelled and built storage area in healthcare facility • Properly collected and transported on-site and off-site	• Pyrolysis (not available in the Philippines) • Autoclave • Encapsulation • Incineration



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3. Pathological and Anatomical

Waste management	Storage, collection and transport	Treatment	Disposal
Segregation (bin, plastic lining, labelling and signs)	• Thin plastic lining (labelling and signs) • Leak proof bin with cover with plastic lining • Yellow plastic that can withstand autoclaving (Thickness: 0.009mm) • Size varies depending on the volume of waste • Properly labelled "INHFC/TQOL/S WASTE" • Tag indicating source and weight of waste generated, date of collection • Biohazard symbol for bin but optional for plastic lining	• Properly labelled and built storage area in healthcare facility • Properly collected and transported on-site and off-site	• Pyrolysis (not available in the Philippines) • Landfill • Cremation • Transported on-site and off-site • Refrigeration



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4. Pharmaceutical

Waste management	Storage, collection and transport	Treatment	Disposal
Segregation (bin, plastic lining, labelling and signs)	• Strong, leak-proof container with cover and plastic lining • Yellow plastic that can withstand autoclaving (Thickness: 0.009mm) • Properly labelled "PHARMACEUTICAL WASTE" for expired drugs, and for containers "CYTOTOXIC WASTE" for cytotoxic, genotoxic, and mutagenic waste	• Properly labelled and built storage area in healthcare facility • Properly collected and transported on-site and off-site	• Pyrolysis (not available in the Philippines) • Autoclave • Encapsulation • Incineration • Chemical degradation for TSD • Landfill for encapsulated expired and spoiled drugs and chemicals, degraded TSD • Chemical waste • Recycling for treated empty vials/bottles



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5. Chemical

Waste management	Storage, collection and transport	Treatment	Disposal
Segregation (bin, plastic lining, labelling and signs)	• For liquid chemical waste: Disposal bottle that is made of amber-colored glass, with at least 4L capacity that is strong chemical-resistant and leak-proof • For solid chemical waste: Yellow plastic. Thickness: 0.009mm • Properly labelled "CHEMICAL WASTE"	• Properly labelled and built storage area in healthcare facility • Properly collected and transported on-site and off-site	• Pyrolysis EXCEPT MERCURY (not available in the Philippines) • Drain (non hazardous liquid waste) → waste water treatment plants • Encapsulation (for solid chemicals) • DENR accredited transporter of hazardous liquid waste • Incineration (for solid chemicals) • Land fill (after chemical waste degradation) • Chemical waste • Storage facility (for MERCURY)



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6. Radioactive

Segregation (bin, plastic lining, labelling and signs)	Storage, collection and transport	Treatment	Disposal
• Radiation proof repositories, leak proof and lead-lined container with plastic lining	• Properly labelled and built storage area in healthcare facility	• Pyrolysis (not available in the PNR)	• NOT applicable (collected by PNR)
• Orange plastic (Thickness: 0.009mm) sizes varies depending on the volume of radioactive waste	• Properly collected on-site and off-site as specified by PNR	• Pyrolysis (not available in the PNR)	• Pyrolysis (not available in the PNR)
• Properly labelled "RADIONUCLIDES" and "RADIOACTIVE"	• Stored in Lead containers (decay)	• Pyrolysis (not available in the PNR)	• Pyrolysis (not available in the PNR)
• Labelled with the name of radionuclide and date of deposition	• Collected off site by PNR		






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7. Non-hazardous or General

Waste management	Segregation (bin, plastic lining, labelling and signs)	Storage, collection and transport	Treatment	Disposal
• Leak-proof bin with cover and plastic lining	• Leak-proof bin with cover and plastic lining	• Properly labelled and built storage area in healthcare facility	• Not applicable	• Landfill (nonbiodegradable)
• Black or Colorless' (non-biodegradable) and green (biodegradable) (Thickness: 0.009mm)	• Black or Colorless' (non-biodegradable) and green (biodegradable) (Thickness: 0.009mm)	• Properly collected and transported on-site and off-site		• Composting
• Tag indicating source and weight of waste generated, date of collection	• Tag indicating source and weight of waste generated, date of collection			• Biodegradable
• Sizes varies depending on the volume of waste	• Sizes varies depending on the volume of waste			• Animal feeds (food waste)
• Recycle Symbol optional for recyclable non-hazardous wastes	• Recycle Symbol optional for recyclable non-hazardous wastes			• Recycling facilities (for recyclables)






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Poor management of healthcare waste



- WHO assessment in 22 developing countries, 2002
 - The proportion of health-care facilities that do not use proper waste disposal methods ranged from 18% to 64%.
- In 2000, the WHO estimated that Injections with contaminated syringes caused:
 - 21 million hepatitis B virus (HBV) infections
 - 32% of all new infections
 - 2M hepatitis C virus (HCV) infections
 - 40% of all new infections
 - 260,000 HIV infections
 - 5% of all new infections

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Health Risks of Healthcare Waste

1. injury
 - puncture, abrasion, laceration
2. disease transmission
3. chemical and toxic exposures
 - corrosion, burn, intoxication

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Persons at risk from poorly managed health care waste

- workers in support services allied to health-care establishments, such as laundries, waste handling, & transportation;
- workers in waste disposal facilities (such as landfills or incinerators), including scavengers



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Persons at risk from poorly managed health care waste

- medical doctors, nurses, health-care auxiliaries, and hospital maintenance personnel;
- patients in health-care establishments or receiving home care;
- visitors to health-care establishments;



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Infections caused by exposure to HCW, causative organisms, & transmission vehicles

Type of infection	Examples of causative organisms	Transmission vehicles
Gastroenteric infections	Enterobacteriæ, e.g. <i>Salmonella</i> , <i>Shigella</i> spp., <i>Vibrio cholerae</i> , <i>Helicobacter</i> , <i>Mycobacterium tuberculosis</i> , <i>Yersinia</i> spp., <i>Streptococcus pneumoniae</i>	Faeces and/or vomit, Inhaled secretions, saliva
Respiratory infections	<i>Mycobacterium tuberculosis</i> ; measles virus, <i>Streptococcus pneumoniae</i>	
Ocular infection	<i>Herpes simplex</i> virus, <i>Varicella zoster</i> virus	Eye secretions
Cutaneous infections	<i>Escherichia coli</i> spp., <i>Staphylococcus</i> spp.	Cutaneous ulcers
Skin infections	<i>Escherichia coli</i> spp.	Flea bites
Abrasions	<i>Neisseria gonorrhoeae</i> , <i>Neisseria meningitidis</i>	Skin secretions
Meningitis	<i>Neisseria meningitidis</i>	Cerebrospinal fluid
Acquired immunodeficiency syndrome (AIDS)	<i>Human immunodeficiency virus (HIV)</i>	Blood, sexual secretions
Haemorrhagic fevers	<i>Junin</i> , <i>Lassa</i> , <i>Ebola</i> , and <i>Marburg</i> viruses	All bodily products and secretions
Septicaemia	<i>Staphylococcus</i> spp.	Blood
Bacteremia	<i>Clostridium</i> spp., <i>Staphylococcus</i> spp.; <i>Staphylococcus aureus</i> ; <i>Enterococcus</i> , <i>Escherichia coli</i> , <i>Enterococcus faecalis</i> , and <i>Streptococcus</i> spp.	
Candidaemia	<i>Candida albicans</i>	
Viral Hepatitis A	<i>Hepatitis A virus</i>	Blood
Viral Hepatitis D and C	<i>Hepatitis D and C viruses</i>	Bile, blood and body fluids

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Health effects and potential hazards from clinical wastes

Potential hazards	Health effects
Infectious agents	Respiratory infections, genital infections, skin infections, AIDS, Viral Hepatitis A, B and C
Radioactive	Cancer, burn and skin irritation, headache, dizziness, and vomiting
Sharps	Double risk: injury and potential transmission routes for HIV and Hepatitis B and C from contaminated sharp
Pressurized containers	Injury from explosion
Hazardous chemicals	Intoxication, burns and skin irritation, pollution of groundwater, surface water and the air, possibility of fire, poisoning
Pharmaceuticals	Ineffective medical care from consumption of expired pharmaceuticals, pollution of groundwater, surface water and air
Genotoxic waste	Carcinogenic and mutagenic, skin or eyes irritation, nausea, headache, or dermatitis

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Environmental Risks of Healthcare Waste

- 3 R South Asia Expert Workshop, 30 August - 1 September, 2006 Kathmandu, Nepal.
- A. Prem Aranth, V. Prashanthini, C. Visyanathan. Healthcare waste management in Asia, 2009.
- Environmental Guidelines for Small-Scale Activities in Africa, 2nd Ed, 2009
 - <http://www.encafrica.org/egssa.htm>
- Healthcare Waste Management
 - <http://www.healthcarewaste.org>
- Healthcare waste management manual. 2011. Department of Health.
- contamination of soil
- contamination of water supply
- air pollution



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Module Objectives

LEGISLATION, LAWS AND POLICIES RELATED TO HEALTH CARE WASTE MANAGEMENT

Engr. Corazon Zuela-Viddad, SE, MEnvMan
Regional Sanitary Engineer
Department of Health- Center for Health Development IVA

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At the end of the session, the participant will be able to:

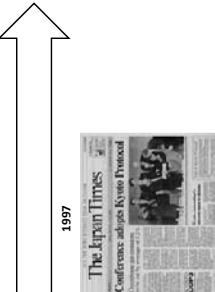
1. Identify pertinent multilateral and international environmental agreements with relevance to health care waste management; and
2. Discuss key national laws, rules and regulations governing health care waste management

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International Agreements



1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001



THE MONTREAL PROTOCOL ON SUBSTANCE THAT DEPLETE THE OZONE LAYER

- Adopted in Montreal, Canada on 16 Sept. 1987
 - Came into force on 1 January 1989
 - Final Objective: ELIMINATION OF OZONE DEPLETING SUBSTANCES



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<p>International Agreements</p> <p>THE MONTREAL PROTOCOL ON SUBSTANCE THAT DEPLETE THE OZONE LAYER</p> <p>London Amendment in 1990</p> <ul style="list-style-type: none"> strengthened the control measures under the Montreal Protocol added provisions related to technology transfer and extended the coverage to new substances <p>Copenhagen Amendment in 1992</p> <ul style="list-style-type: none"> speeded up the phase-out dates for many ODS added new substances to the list of controlled substances hydrochlorofluorocarbons (HCFCs), methyl bromide hydrobromofluorocarbons (HBFCs) <p></p> <p><small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small></p>	<p>International Agreements</p> <p>THE MONTREAL PROTOCOL ON SUBSTANCE THAT DEPLETE THE OZONE LAYER</p> <p>Montreal Amendment in 1997</p> <ul style="list-style-type: none"> tightened restrictions on several destructive chemicals and included a phase-out schedule for methyl bromide. set up a licensing system to help Governments track international trade in chlorofluorocarbons (CFCs) and other controlled substances <p>Beijing Amendment in 1999</p> <ul style="list-style-type: none"> hydrochlorofluorocarbons (HCFCs) are to be phased out in developed countries by 2030 and in developing countries by 2040 <p></p> <p><small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small></p>
<p>International Agreements</p> <p>THE BASEL CONVENTION</p> <p>THE BASEL CONVENTION</p> <p>4 Principles Highlighted in the Convention</p> <ol style="list-style-type: none"> POLLUTERS PAY PRINCIPLE <ul style="list-style-type: none"> All producers of waste are legally and financially responsible for the safe and environmentally sound disposal of waste they produce. PRECAUTIONARY PRINCIPLE <ul style="list-style-type: none"> When the magnitude of a particular risk is uncertain, it should be assumed that this risk is significant, and measures to protect health and safety should be designed accordingly. <p></p> <p><small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small></p>	<p>International Agreements</p> <p>THE BASEL CONVENTION</p> <p>THE BASEL CONVENTION</p> <p>4 Principles Highlighted in the Convention</p> <ol style="list-style-type: none"> POLLUTERS PAY PRINCIPLE <ul style="list-style-type: none"> All producers of waste are legally and financially responsible for the safe and environmentally sound disposal of waste they produce. PRECAUTIONARY PRINCIPLE <ul style="list-style-type: none"> When the magnitude of a particular risk is uncertain, it should be assumed that this risk is significant, and measures to protect health and safety should be designed accordingly. <p></p> <p><small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small></p>

International Agreements	 BASEL CONVENTION The Convention on the Control and Management of Transboundary Movements of Hazardous Wastes and their Disposal
THE BASEL CONVENTION	
<p>4 Principles Highlighted in the Convention</p> <p>3. DUTY OF CARE PRINCIPLE</p> <ul style="list-style-type: none"> • Any person handling or managing hazardous substances or related equipment is ethically responsible for using the utmost care in that task. <p>4. PROXIMITY PRINCIPLE</p> <ul style="list-style-type: none"> • The treatment and disposal of hazardous waste take place at the closest possible location to its source in order to minimize the risks involved in its transport. 	

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International Agreements	 United Nations Framework Convention on Climate Change
THE KYOTO PROTOCOL	
<p>International Agreements – THE KYOTO PROTOCOL</p> <ul style="list-style-type: none"> • A legally binding pledge that by year 2000 the major industrialized nations would voluntarily reduce their greenhouse gas emissions to 1990 levels. • Convention sets out the following responsibilities: <ul style="list-style-type: none"> ◦ prepare national inventories on greenhouse gas emissions and on actions taken to remove them; ◦ formulate and implement programmes for the control of climate change; ◦ take climate change into account in such matters as agriculture, energy, natural resources, and activities involving coastal areas; ◦ encouraged to develop and share environmentally sound technology 	

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5-9 March 2012, Citygate Tower Hotel, Ermita, Manila

International Agreements	 United Nations Framework Convention on Climate Change®
THE KJPP	
<ul style="list-style-type: none"> • Targets cover emissions of the six main greenhouse gases: <ol style="list-style-type: none"> 1. carbon dioxide (CO₂) 2. methane (CH₄) 3. nitrous oxide (N₂O) 4. hydrofluorocarbons (HFCs) 5. perfluorocarbons (PFCs) 6. sulfur hexafluoride (SF₆) • Sets binding targets for reducing (GHG) emissions • Major distinction between the Protocol and the Convention is that while the Convention encouraged industrialised countries to stabilize GHG emissions, the Protocol commits them to do so • Adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. • The detailed rules for the implementation of the Protocol were adopted at COP 7 in Marrakesh in 2001, and are called the "Marrakesh Accords." 	

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- Global treaty to protect human health and the environment from POPs
- POPs are chemicals with the following characteristics:
 - remain unchanged in the environment for long periods of time
 - accumulate in the fatty tissue of living organisms
 - Toxic to humans and wildlife
- Exposure to POPs can lead to serious health effects - cancer, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease and even diminished intelligence.

Laws, Policies and Guidelines		Training on Health Care Waste Management - CHID CALABARZON		
 Philippine Department of Health <i>(Registration No. 0000000000000000)</i>				
HOSPITAL LICENSURE ACT (R.A. 4226) – Registration & licensure of all hospitals	1905	CODE ON SANITATION OF THE PHILS. (P.D. 856)	1976	Republic Act # 9241 "The Philippine Health Insurance Corporation"
A.O.#70-A.s 2002 Planning & Design	2002	Chap.XVII – Sewage Collection, Excreta Disposal & Drainage	2008	A.O. #0023 National Policy on patient Safety
A.O.#2005-0029 Submission of Waste Management Plan	2005	Chap. XVII – Refuse Disposal Supplement to Chap. XVII – Septage Collection DOH Health Care Waste Management Manual 2004/2012	2008	A.O. #2008-0021 Gradual Phase out of H in all Healthcare Facilities & Institutions
A.O.#2007-0027 Written procedures for the proper disposal of waste and hazardous substances	2007	Written policy guidelines on bio-safety & bio-security	2008	5-9 March 2012, Cebuano Power Hotel, Ermita, Manila

 <p>Laws, Policies and Guidelines</p> <p>Republic of the Philippines Department of Health Environment Management</p>	<p>DOH Requirement :</p> <ul style="list-style-type: none"> 1. Registration/licensure of hospital 2. Submit plans and other requirement 3. Submit the approved Health Care Waste Management Plan prior to issuance or renewal of license (2002); 4. Submit plans of wastewater treatment facilities. 	<table border="0"> <tr> <td style="width: 50px; height: 50px;"></td><td>1. PD 856 "Sanitation Code of the Philippines"</td></tr> <tr> <td style="width: 50px; height: 50px;"></td><td>2. R.A. 4226 "HOSPITAL LICENSURE ACT"</td></tr> <tr> <td style="width: 50px; height: 50px;"></td><td>3. National Plumbing Code</td></tr> <tr> <td style="width: 50px; height: 50px;"></td><td>4. National Fire and Building Code</td></tr> <tr> <td style="width: 50px; height: 50px;"></td><td>5. Health Facilities Maintenance Manual</td></tr> <tr> <td style="width: 50px; height: 50px;"></td><td>6. Health Care Waste Management Manual</td></tr> </table>		1. PD 856 "Sanitation Code of the Philippines"		2. R.A. 4226 "HOSPITAL LICENSURE ACT"		3. National Plumbing Code		4. National Fire and Building Code		5. Health Facilities Maintenance Manual		6. Health Care Waste Management Manual
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graph TD
    A[DOH-DENR Joint  
Administrative Order  
No. 02 s. 2005] --> B["Policies and  
Guidelines on Effective  
& Proper Handling,  
Collection, Transport,  
Treatment, Storage  
and Disposal of HCW"]
    A --> C["Guidelines on the management  
of HCW on site - DOH"]
    A --> D["Guidelines on the management  
of HCW off site - DENR"]

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Laws, Policies and Guidelines

- Guidelines to generators, transporters and operators/owners of TSD Facilities
 - Regulation on the management of HCW on site - DOH
 - Regulation on the management of HCW off site - DENR

Department of Health
Responsible in regulating
Health care waste Management

Department of Environment and Natural Resources
Responsible in regulating
Health care waste Management

Training on Health Care Waste Management - CHDC ALABARZON

<p>Laws, Policies and Guidelines</p> <p>Republic of the Philippines Department of Health Waste Management Program</p> <ul style="list-style-type: none"> • Certificate of Product Registration (subject to annual renewal) • All HCW treatment equipment/devices should be validated through Performance Evaluation (testing waste samples collected after treatment) 	<p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<p>DOH Administrative Order No. 2007-0014 "Guidelines on the Issuance of CFR for Equipment or Devices Used for Treating Sharps, Pathological and Infectious Waste"</p>
<p>National Laws, Policies and Guidelines</p> <p>Republic of the Philippines Department of Health Waste Management Program</p>	<p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<p>General Provisions:</p> <ol style="list-style-type: none"> 1. All Hospitals shall immediately discontinue the distribution of mercury thermometer 2. All Hospitals shall follow the guidelines for the gradual phase-out of mercury in health care facilities 3. All new Health Care Facilities applying for a License to Operate shall submit an inventory of all mercury-containing devices that will be used in their facilities and a corresponding mercury elimination program <p>DOH Administrative Order No. 21 series of 2008: Gradual Phase-Out of Use in all Philippine Health Care Facilities and Institutions</p>
<p>Laws, Policies and Guidelines</p> <p>PhilHealth Benchbook ENERGY AND WASTE MANAGEMENT</p>	<p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<p>• Goal: The organization demonstrates its commitment to environmental issues by considering and implementing strategies to achieve environmental sustainability</p> <p>DOCUMENT REVIEW</p> <ol style="list-style-type: none"> 1. Issuances -memos, guidelines on waste disposal 2. Contracts with waste handlers or disposal contractors, (if applicable) 3. Hospital policy that conforms to the joint DOH-DENR circular on waste management for LGUs
<p>Laws, Policies and Guidelines</p> <p>PhilHealth Benchbook Quality Assurance Program</p>	<p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<p>Proof of implementation of policies, procedures and safety programs on:</p> <ol style="list-style-type: none"> 1. electrical safety 2. medical device safety 3. chemical safety 4. radiation safety 5. mechanical safety 6. water safety 7. combustible material safety 8. waste management 9. hospital safety program (fire, emergency, disaster) <p>DOCUMENT REVIEW</p> <ol style="list-style-type: none"> 1. Water safety -water analysis results for the past 6 months 2. Fire and emergency preparedness -check for exit plans, plans for earthquake and other disasters 3. Control of hazardous materials -MOA/Contract of outsourced services for waste management <p>1. Republic Act 875 (1995) 2. Republic 9241 (2004) on the Philippine Health Insurance Corporation PhilHealth Benchbook for Quality Assurance in Healthcare (2006)</p>

<p>Laws, Policies and Guidelines</p> <p>Department of Environmental and Natural Resources Environmental Management Bureau</p> 	<p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila</p> 
<p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila</p> 	<p>Republic Act No. 9275: The Clean Water Act Sec. 14- Discharge Permits</p> <ul style="list-style-type: none"> • Owners or operators of facilities that discharge regulated effluents pursuant to this Act to secure a permit to discharge. • Specify the quantity and quality of effluent that facilities are allowed to discharge • Encourage the adoption of waste minimization and waste treatment technologies • For industries without any discharge permit, they may be given a period of twelve (12) months after the effectivity of the IRR pursuant to this Act, to secure a discharge permit. 
<p>Laws, Policies and Guidelines</p> <p>Department of Environmental and Natural Resources Environmental Management Bureau</p> 	<p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila</p> 
<p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila</p> 	<p>RA 6969 Under DAO 2004-36, classifies healthcare waste under Miscellaneous Waste as follows:</p> <ul style="list-style-type: none"> M501 (pathogenic and infectious wastes) <ul style="list-style-type: none"> – includes pathological wastes i.e., tissues, organs, fetuses, bloods and body fluids, infectious wastes and sharps M503 (pharmaceuticals and drugs) <ul style="list-style-type: none"> – includes expired pharmaceuticals and drugs stocked at producers and retailers' facilities. 
<p>Laws, Policies and Guidelines</p> <p>Department of Environmental and Natural Resources Environmental Management Bureau</p> 	<p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila</p> 

<p>Laws, Policies and Guidelines</p>  <p>Department of Environment and Natural Resources Environmental Management Bureau</p>	<p>Hospitals are classified as Hazardous Waste Generators are required to :</p> <ul style="list-style-type: none"> – submit an accomplished registration form to the EMB Regional Office – DENR I.D. Number shall be issued upon registration <p>Other requirements</p> <ul style="list-style-type: none"> – designation of a Pollution Control Officer (PCO) – use of authorized transporters and treaters – confirmation of completion of treatment/disposal and emergency contingency plan. 	<p>Training on Health Care Waste Management - CHID CALABARZON</p> <p>5-9 March 2012, Cagayan Tower Hotel, Emma, Manila</p>    
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<p>Laws, Policies and Guidelines</p>  <p>Department of Environment and Natural Resources</p> <p>Environmental Management Bureau</p>	<p>8. Authority to construct for air pollution source installation such as boiler, generator set (prior to construction/installation)</p> <p>9. Permit to Operate for air pollution source installations such as boiler, generator set (prior to operation and renewed annually thereafter)</p>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>R.A. 8749 “The Philippine Clean Air Act of 1999”</p> </div>
		     <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Covanta Power Hold, Ermita, Manila</p>

<p>Laws, Policies and Guidelines</p>	<p>Department of Environmental and Natural Resources Environmental Management Bureau</p>	<p>6. Comprehensive Management Program for pollution prevention - Construction of Waste Water Treatment Facility/Sewage Treatment Plant</p>	<p>R.A. 9275 “The Philippine Clean Water Act”</p>	<p>R.A. 9003 “Ecological Solid Waste Management Act of 2000”</p>
<p>7. Segregation of solid wastes at the source using separate container for each type of waste from all sources</p>				<p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Emanuel, Manila</p>      

<p>Laws, Policies and Guidelines</p> <p>BUREAU OF WATER RESOURCES AND DEVELOPMENT</p> <p>Water for Life</p>	<p>1. LLDA Clearance (ECC is a pre-requisite)</p> <p>2. Discharge Permit</p> <p>3. Pollution Control Officer</p>	<p>1. PD. 813 (1975) 2. Executive Order No. 927 (1983)/ DENR</p> <p>3. Administrative Order No. 35 s. 1990 "Effluent Regulations</p>	<p>Training on Health Care Waste Management - CHD CALABARZON</p> <p>S-9 March 2012, Cincoante Tower Hotel, Manila, Manila</p>
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Laws, Policies and Guidelines	<p>Includes watershed of Rizal (13 towns) and Laguna (28 towns), chartered cities of Pasay, Caloocan, Quezon, Manila, Muntinlupa, Pasig, San Pablo, Tagaytay, Antipolo, Calamba and Tanauan; towns of Sto. Tomas and Malvar in Batangas; Silang, Carmona and GMA in Cavite; Lucban in Quezon; and Taguig and Pateros in Metro Manila.</p> <p>R.A. 4850 (1966) " Empowered to provide proprietary functions within Laguna de Bay"</p>	Training on Health Care Waste Management - CHID CALABARZON 5-9 March 2012, Crescendo Tower Hotel, Ermita, Manila
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Laws, Policies and Guidelines

- Department of Labor and Employment

Under the OSH standards.

- Duty of the employers to give complete job safety instructions to all his workers, hazards to which the workers are exposed to and steps taken in case of emergency;
- Comply with the requirements of this Standards; and
- Use only approved devices and equipment in his workplace



**RESIDENTIAL DECREE NO.
442, AS AMENDED**
 A DECREE INSTITUTING A
 LABOR CODE THEREBY
 REVISING AND
 CONSOLIDATING LABOR
 AND SOCIAL LAWS TO
 AFFORD PROTECTION TO
 LABOR, PROMOTE
 EMPLOYMENT AND
 HUMAN RESOURCES
 DEVELOPMENT AND
 INSURE INDUSTRIAL PEACE
 BASED ON SOCIAL JUSTICE

Approved by Executive Order No. 1
July 1, 1944

Healthcare Waste Minimization (3Rs Application)

Engr. Guillermo Borongan, ChE, MSJEM
Programme Officer
Regional Resource Center for Asia and the Pacific (RRC.AP)

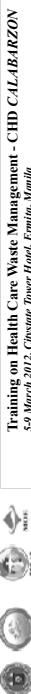


Training on Health Care Waste Management - CHB CALABARZON
5-9 March 2012, Citystate Tower Hotel, EDSA, Manila

Module Objectives

At the end of the session, the participant will be able to:

1. Identify challenges faced in Healthcare Waste Management at the HCF;
2. Discuss about the concept and importance of 3Rs in HCWM at the HCF;
3. Build awareness on 3R principles and its practices in HCF;
4. Identify the healthcare waste categories at the HCF;
5. Informed about existing regional framework on waste management;
6. Identify elements in carrying out recycling projects in HCF.



Training on Health Care Waste Management - CHB CALABARZON
5-9 March 2012, Citystate Tower Hotel, EDSA, Manila

Contents

- 1 Overview of Healthcare Waste
- 2 Existing Regional Framework in SEA and East Asia
- 3 The Reduce, Reuse and Recycle (3Rs)
- 4 Healthcare Waste Categories



RRC.AP Projects related to Waste and 3R

Regional Level

- 3R Knowledge Hub (3RKH) *Asia and the Pacific*
 - URL: www.3rkh.net

Sub Regional Level

- Thematic Working Group on Solid and Hazardous Waste (Waste TWG) of the Regional Forum on Environment and Health in 14 countries in Southeast and East Asian

National Level

- Advanced Waste Management in Asia and the Pacific (AMMAP) or "National 3R Strategy" *Cambodia, Malaysia, Thailand and the Philippines*

1. Overview of Healthcare Waste



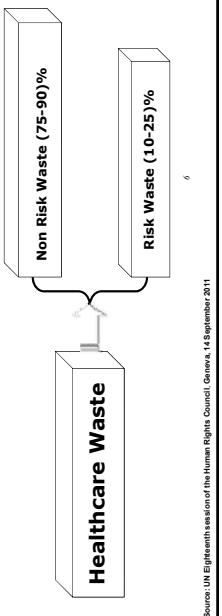
Overview of Healthcare Waste

Definition

"Medical waste" or **"health-care waste"** refers to all waste generated by health-care establishments.

- Approximately 75 to 90 % of the total waste generated by these establishments does not pose any particular risk to human health or the environment

Healthcare Waste Characterization



Overview of Healthcare Waste

- Remaining waste is regarded as hazardous and may create a variety of health risks if not managed and disposed of in an appropriate manner
- Hazardous health-care waste includes infectious waste, sharps, anatomical and pathological waste, obsolete or expired chemical products and pharmaceuticals, and radioactive materials



Source: UN Eighteenth session of the Human Rights Council, Geneva, 14 September 2011

7

Overview of Healthcare Waste

Challenges

- In many countries, including some developed countries, significant challenges persist with regard to the proper management and disposal of health-care waste
- Medical waste is often mixed with general household waste, and either disposed of in municipal waste facilities or dumped illegally
- Open burning and widespread deficiencies in the operation and management of small-scale medical waste incinerators result in incomplete waste destruction

Source: UN Eighteenth session of the Human Rights Council, Geneva, 14 September 2011

7

Overview of Healthcare Waste

Challenges

- Inappropriate ash disposal and dioxins emissions, which can be even 40,000 times higher than emission limits set forth in the Stockholm Convention
- All persons exposed to hazardous medical waste are potentially at risk of injuries and/or contamination through accidental exposure.

Source: UN Eighteenth session of the Human Rights Council Geneva, 14 September 2011

Healthcare Waste: Asian Perspective



- ✓ Wastes not segregated in many hospitals
- ✓ Disposed off together with municipal solid waste
- ✓ Openly burnt in some hospitals
- ✓ Few local initiatives taken by NGOs
- ✓ Healthcare waste scavenging
- ✓ Medical waste segregation, recycling and reused by waste pickers

Source: ITRH, 2009



Open burning

Regional Forum on Environment and Health

1. The First Ministerial Forum, August 2007 in Bangkok



- Charter of the Regional Forum on Environment and Health in Southeast and East Asian Countries < Framework for Cooperation>
- Bangkok Declaration on Environment and Health
- Workplans for Thematic Working Groups



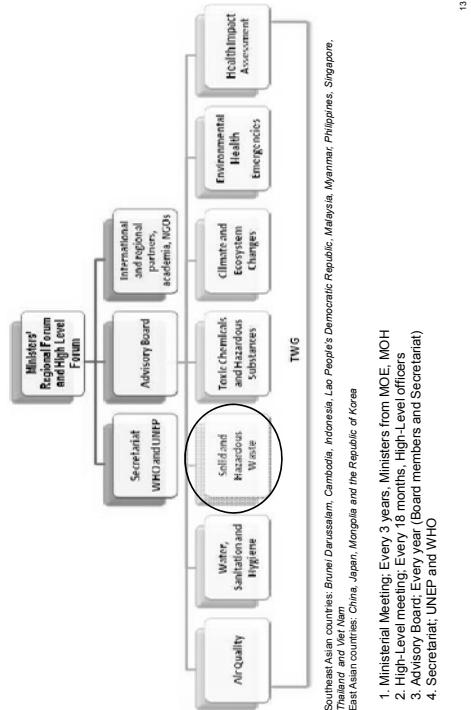
2. The Second Ministerial Regional Forum, July 2010 in Jeju, Republic of Korea

- Jeju Declaration
- Strengthening Regional Forum's role

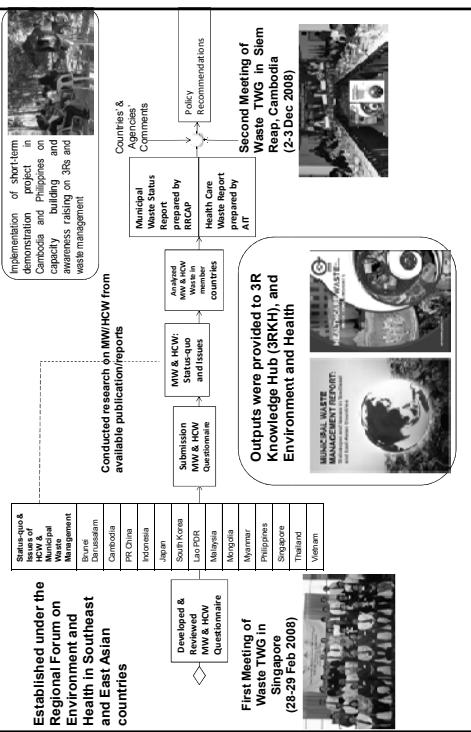
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Background: The Organization Diagram



Waste TWG



3. The Reduce, Reuse and Recycle (3Rs)



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Waste TWG

Established under the Regional Forum on Environment and Health in Southeast and East Asian countries¹

Objectives

- Ensure environmentally sound management of solid and hazardous waste, in particular municipal waste and medical waste, and **promote** the 3Rs
 - Prioritize issues by analyzing status-quo of municipal waste and medical waste management in the member countries
 - Provide useful information to raise policymakers' awareness

Chair: Ministry of the Environment, Japan

1 Brunei Darussalam, Cambodia, Peoples Republic of China, Indonesia, Japan, South Korea, Lao PDR, Malaysia, Mongolia, Myanmar, The Philippines, Singapore, Thailand and Vietnam

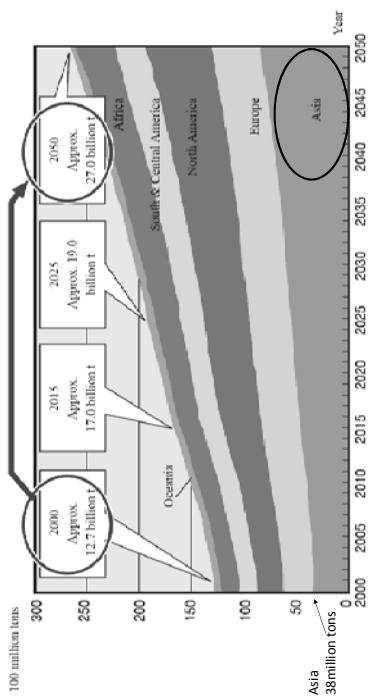


Concept and importance of 3R

- Reducing - choosing to use things with care to reduce the amount of waste generated
- Reusing - involves the repeated use of items or parts of items which still have usable aspects
- Recycling - the use of waste itself as resources

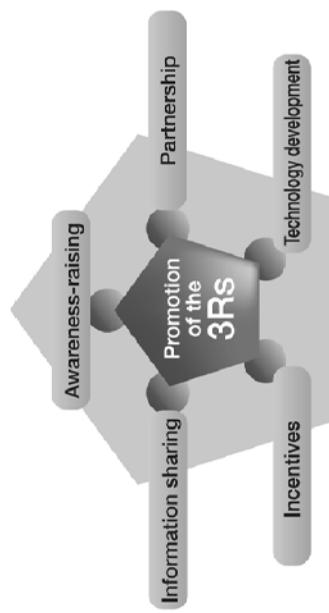
Source: ADB, 2006

Increase of Waste in World and Asia



Source: Toyozawa, Tatsuo, V. Sheldar, Okayama University, 2004, Ministry of the Environment, Japan, "A Sound Material Cycle Society: Through the Eyes of Toyozawa", July 7th, 2006

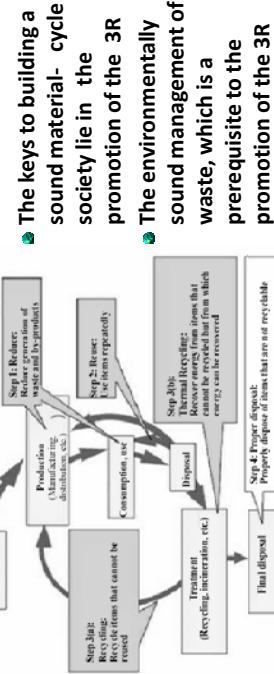
Keywords for SMCS



Source: MOEJ, 2005

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Concept and importance of 3R



Source: Ministry of the Environment, Japan and Institute of Global Environmental Strategies, Japan, "Issues Paper Asia 3R Conference", 19 October, 2006

3R Developments in Asia

3R Initiative

- Strengthening of domestic policies to implement the 3Rs
- Reduction of trade barriers
- Cooperation between developed and developing countries
- Cooperation among stakeholders
- Promotion of science and technology

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Development of 3R

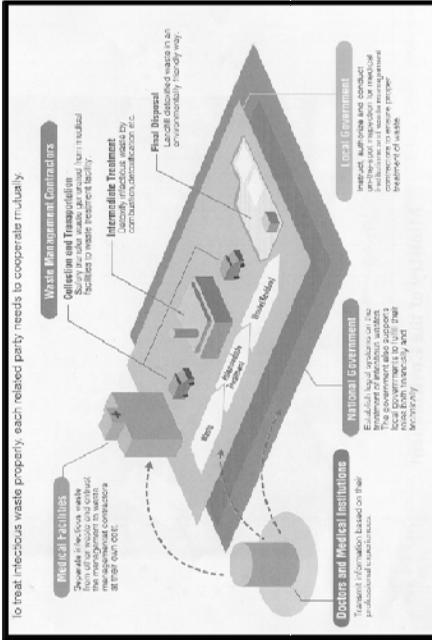
2004	G8 Sea Island Summit (U.S.)	3R Initiative was agreed upon
2005	Ministerial Meeting on the 3R Initiative (Tokyo)	Assistance to National 3R Strategy Development started (Indonesia, Philippines, Thailand, Viet Nam, Bangladesh, Cambodia)
2006	Senior Officials Meeting on the 3R Initiative (Tokyo)	Asia 3R Promotion Conference (Tokyo)
2007	2 nd Senior Officials Meeting on the 3R Initiative (Bonn, Germany)	2 nd Asia 3R Promotion Conference (Tokyo)
2008	G8 Environment Ministers Meeting (Kobe)	EAS Environment Ministers Meeting (Hanoi) Japan's Proposal of Regional 3R Forum was appreciated
2009	'Kobe 3R Action Plan' agreed upon G8 Summit (Hakodate/Tokyo) 'Kobe 3R Action Plan' was endorsed	Asia 3R High-Level Seminar (Tokyo)
	Preparatory Meeting of the Inauguration of the Regional 3R Forum in Asia (Tokyo)	Inaugural Regional 3R Forum in Asia, 2009
	"Tokyo 3R Statement" was endorsed	2 nd Regional 3R Forum in Kuala Lumpur, Malaysia
2010	3 rd Regional 3R Forum in Singapore	Source: Ministry of the Environment, Japan
2011		22

Scope for 3Rs in Healthcare Waste

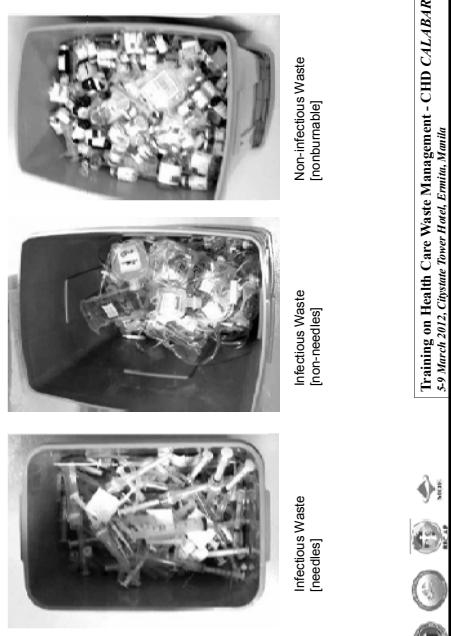
- Segregation and handling of generated waste
 - Segregation reduces the volume and toxicity of waste stream
- Proper procurement practices such as changing the products and materials can help to reduce the harm (mercury based thermometer can be substituted by electronic sensing devices)
- Increasing awareness of hospital staffs, employee training in hazardous materials management and waste minimization



Role of Stakeholders



Infectious Waste's Separation



Example: Awareness Raising

Delivering talk at Hospital's waiting lounge (quest to raise awareness on environment conservation and sources recovery amongst staff and the public)



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Use of Environmental Friendly Products

Cafeteria uses Ecopack, a biodegradable and environment friendly food container

1. Lack of cooperation from some of the staff

Solutions / Initiatives:

- Reinforcement and education through email and awareness campaigns and talks
- Organise trips to visit landfills

2. Insufficient knowledge about recyclables

Solutions / Initiatives:

- Provide pamphlets on recyclables
- Display posters about hospital recyclables in every ward and department
- Display the list of non-recyclables

Source: HOSPITAL LAM WAN EE, 2008

Detrimental elements in carrying out recycling project



Detrimental elements

3. Unaware about the importance of recycling

Solutions / Initiatives:

- Educate by giving talks on the importance of recycling
- Conduct awareness campaign by organising quiz, games, sing-a-long sessions, exhibitions

4. Some of the heads of departments also lack awareness about recycling

Solutions / Initiatives:

- Talks and emails to the heads of departments (including Matrons, Nursing Sisters & etc)
- Invite them to the gatherings

Source: HOSPITAL LAM WAH EE, 2008

Detrimental elements

5. The recyclables are not segregated properly

Solutions / Initiatives:

- Educate the staff
- Partition the recycling store room according to categories
- Conduct Best Management Competitions in wards and departments
- Identify recycling corner in every ward/department

6. The recyclables are not placed at designated area in the storeroom

Solutions / Initiatives:

- Label the plastic bags in the departments/wards when sending recyclables to the storeroom
- Send reminders through heads of department and identify the problematic departments/wards

Source: HOSPITAL LAM WAH EE, 2008

Detrimental elements

7. The recyclables and non-recyclables are mixed together

Solutions / Initiatives:

- Use transparent green plastic bags for recyclables and black plastic bags for general waste
- Appoint facilitator at every ward and department to facilitate the activities

8. Some of the Committee members are not committed

Solutions / Initiatives:

- Impose a penalty system, to fine a particular amount of money if one fails to serve his/her duty as per roster

Source: HOSPITAL LAM WAH EE, 2008

Detrimental elements

9. Staff do not want to attend the Recycling AGM due to fear of being elected as committee members

Solutions / Initiatives:

- Door gift, lucky draw and complimentary buffet lunch for participants
- Recycling store room treated as a dumping ground

10. Recycling bins treated as garbage bins

Solutions / Initiatives:

- Take photos of the messy condition and email to all departments / wards

11. Recycling bins treated as garbage bins

Solutions / Initiatives:

- Educate staff and take photos of the non-recyclables and email to all departments / wards

Source: HOSPITAL LAM WAH EE, 2008

Detrimental elements

12. Lukewarm response from staff as some think that recycling should be the responsibility of the government

Solutions / Initiatives:

- Conduct annual interdepartmental recycling competition to promote the activity
- Give 80% of the proceeds from the sale of house-hold recyclables back to the staff
- Hold a weekly educational talk to the staff about global warming/ climate change, etc.

Source: HOSPITAL LAM WAH EE, 2008

Detrimental elements

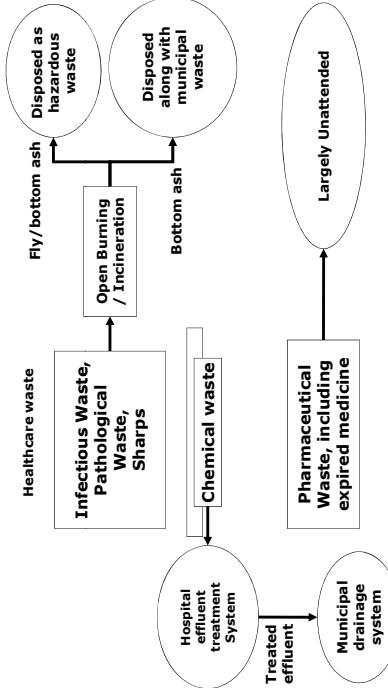
13. Recyclables are stolen from the store room or containers

Solutions / Initiatives:

- Provide authorisation letter to recycler or buyer to present to security check-point when leaving Hospital premises
- Install CCTV at Recycling store room

Source: HOSPITAL LAM WAH EE, 2008

4. Healthcare Waste Categories

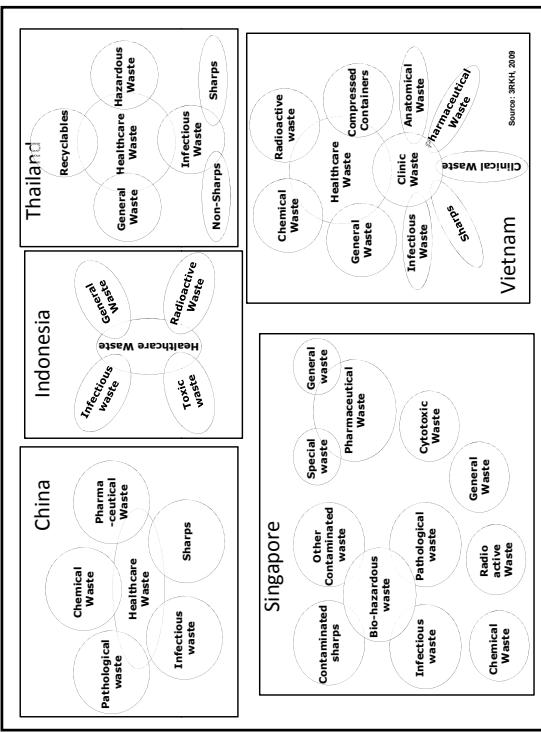
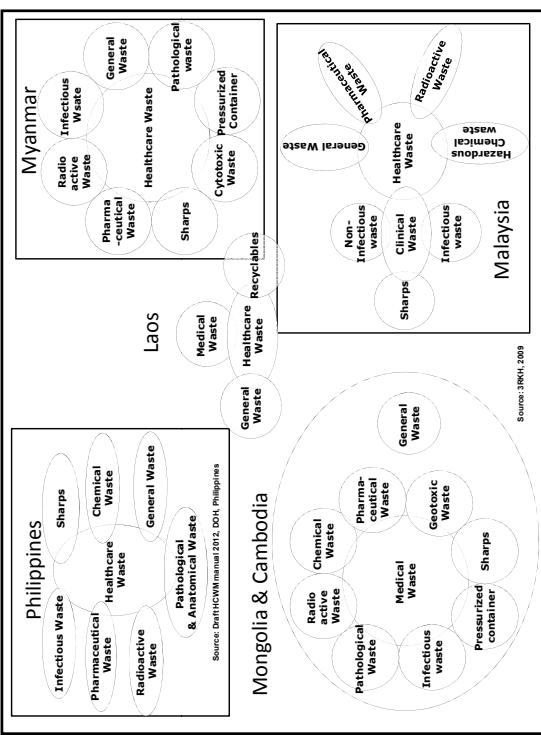


Source: HKH, 2009

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Challenges Faced

- **Waste generation:**
 - Insufficient data on waste generation
 - Non uniformity in units used by countries eg: tons, litres
 - Inconsistency in data
- **Composition and characteristics of waste:**
 - Lack of adequate data
- **Current HCWM practices:**
 - Absence of micro level, country specific information
 - Information available is on solid waste in general-not specific on HCW
 - Available information is region specific -not for the whole country

Source: APCH, 2009
40

Challenges Faced

- **Institutional Setup**
 - Not HCW specific
 - Lack of clear definition of roles and responsibility
 - Hence organizational flowchart is not complete
- **Policy and Legislation**
 - Very general, not HCW specific
 - Role of the policies in HCWM is not clearly defined
- **International and Regional Initiatives**
 - Limited information

Source: APCH, 2009
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Module Objectives

Segregation, Collection, Storage and Transport of Healthcare Waste

Engr. Aida Camacho- Barcelona, SE, MSE
Department of Health



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- At the end of the session, the participant will be able to:
1. Identify proper methods of segregation, coding and labeling of health care waste.
 2. Discuss guidelines on proper storage of health care waste
 3. Identify requirements for a central waste storage facility
 4. Discuss guidelines on proper collection and transport of health care waste.
 5. Identify requirements for packaging and vehicles for off-site collection of waste.

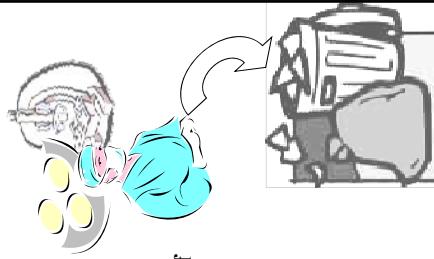
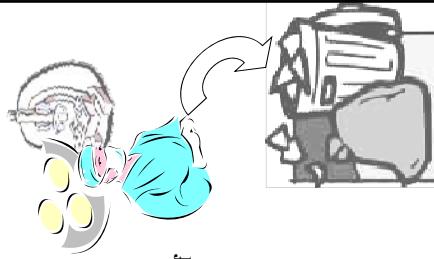


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Definition of Health Care Waste

Means waste generated as a result of...

- Diagnosis, treatment or immunization of human beings or animals;
- Research pertaining to the above activities;
- Production or testing of biological products; and
- Other activities of healthcare facilities



HEALTHCARE FACILITIES

Include among others...

1. Hospital and Medical Centers
2. Health Care Units/Clinics
 - * Physician's Offices
 - * Dental Clinics
 - * Alternative Medicine Clinics
3. Related Laboratories and Research Centers
4. Ambulances and Mobile Emergency Care

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SOURCES AND COMPOSITION OF WASTE

Major Sources	Composition
Medical Wards	<ul style="list-style-type: none"> >General waste (food wastes, paper, tetra packs) >Infectious waste <ul style="list-style-type: none"> * Blood- soaked dressings * Bandages Urine bag * Blood or Other body secretions >Sharps <ul style="list-style-type: none"> * Used hypodermic needle, Broken test tube >Pathological Waste <ul style="list-style-type: none"> * Body fluids
• Medicine	
• Pediatrics	
• OB-Gynecology	
• Surgery	

SOURCES AND COMPOSITION OF WASTE

Major Sources	Composition
Operating Rooms and Surgical Wards	<ul style="list-style-type: none"> >General waste >Pathological (placenta, tissues, organs) and Anatomical wastes (amputated body parts like legs and limbs) >Infectious Waste (contaminated gloves, packaging & disposable medical items in contact with blood)
Pharmacy	<ul style="list-style-type: none"> >General waste >Expired, unused & contaminated pharmaceutical products >Cytotoxic drugs



SOURCES AND COMPOSITION OF WASTE

Major Sources	Composition
Laboratories	<ul style="list-style-type: none"> >General waste >Pathological waste <ul style="list-style-type: none"> * Tissue samples * Microbiological cultures and stocks * Blood and body fluids >Infectious Waste <ul style="list-style-type: none"> * Contaminated gloves, tubing and Containers >Sharps (syringes) >Chemical waste (reagents, disinfectants)
Administrative Offices	<ul style="list-style-type: none"> Papers >Empty bottles >Tetra packs >Food wastes >Cardboards



SOURCES AND COMPOSITION OF WASTE

Major Sources	Composition
Emergency Room, Out-patient Department	<ul style="list-style-type: none"> >General waste >Infectious waste >Sharps
General Waste	<ul style="list-style-type: none"> Papers >Empty bottles >Tetra packs >Food wastes >Cardboards

SOURCES AND COMPOSITION OF WASTE

Major Sources	Composition
Operating Rooms and Surgical Wards	<ul style="list-style-type: none"> >General waste >Pathological (placenta, tissues, organs) and Anatomical wastes (amputated body parts like legs and limbs) >Infectious Waste (contaminated gloves, packaging & disposable medical items in contact with blood)

General Principles

1. Healthcare Wastes must be segregated, collected, stored and transported in a safe manner under consideration of the risk level, occupational safety rules and in accordance with existing laws, policies and guidelines;
2. The Healthcare Facility should have a Waste Management Officer (WMO) responsible for HCWM;
3. Hazardous and general waste must not be mixed up during collection, transport and storage;



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General Principles

1. be well-trained on the risk and safety procedures on handling waste;
2. Appropriate labeling, signage, route and segregation system must be established; and
3. Central Waste Storage Area must be provided



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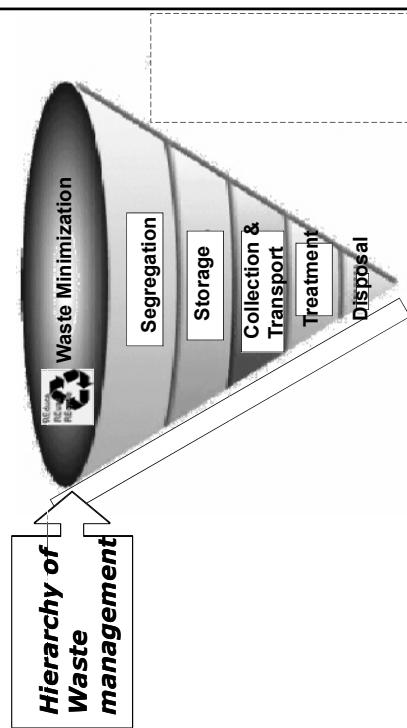
Importance of Waste Segregation

1. Public Health Significance
2. Facilitate waste recovery and recycling
3. Minimize waste that needs treatment
4. Increase productivity and Cost Saving



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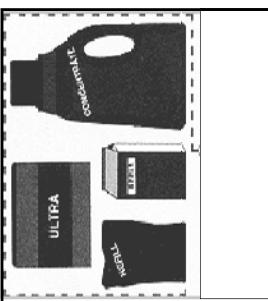
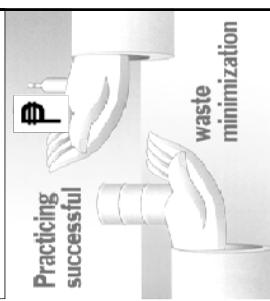
Solid Waste Management in Health Care Facilities



Strategies (Options) on HCW Minimization

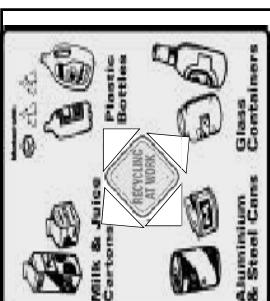
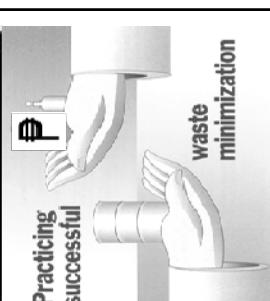
1. Reduction at source

- Improve housekeeping by reducing use of air fresheners and insecticides.
- Use non-biodegradable cleaner instead of hazardous chemical cleaner.
- Work with suppliers to reduce packing of materials(e.g. buy concentrated products, refill systems, and packages with recycled materials).
- Replace Mercury thermometers with digital equipment.

Strategies (Options) on HCW Minimization

2. Re-use

Waste Minimization Concepts/ Strategies

Stoping waste before it starts

Waste Minimization



Reduction at Source

Re-use

Recycling

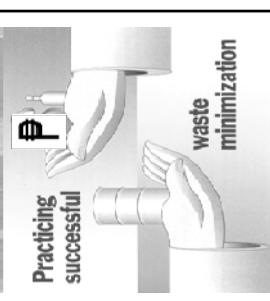




Strategies (Options) on HCW Minimization

2. Re-use

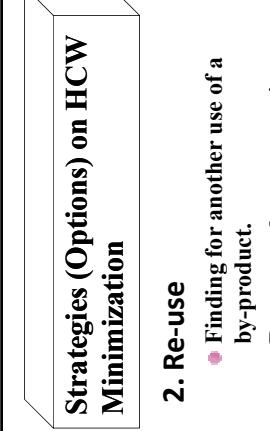
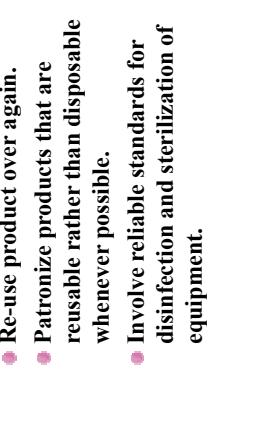
- Finding for another use of a by-product.
- Re-use product over again.
- Patronize products that are reusable rather than disposable whenever possible.
- Involve reliable standards for disinfection and sterilization of equipment.

Strategies (Options) on HCW Minimization

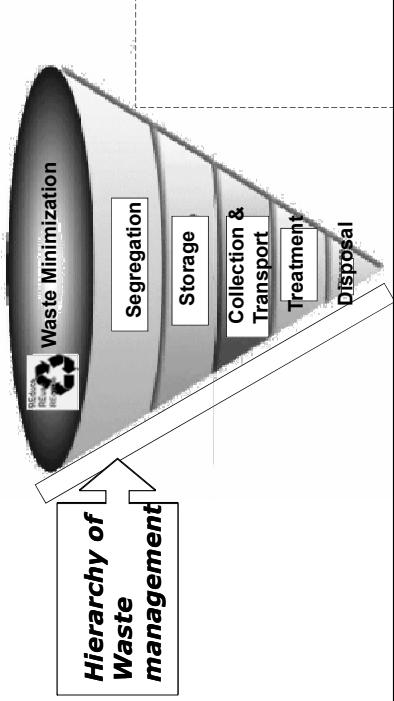
3. Recycling

- Segregating, selling and processing waste into something new for HCW that can be recycled:
 - Biodegradable materials
 - Plastics
 - Paper
 - Glass
 - Metals

<p>San Lazaro Hospital</p> <p>...Efforts towards waste minimization and Green Productivity on HCWM.</p>  <p>Recyclable wastes are being segregated at source by department</p>	<p>Public Health/ Epidemiology Unit</p>  <p>San Lazaro Hospital</p> <p>...Efforts towards waste minimization and Green Productivity on HCWM.</p> <p>Disposable concrete culvert/pipe was painted and re-use as waste receptacle/bin</p>
<p>San Lazaro Hospital</p> <p>...Efforts towards waste minimization and Green Productivity on HCWM.</p>  <p>Recyclable waste materials are being segregated at source by department</p>	<p>Administrative Department</p>  <p>San Lazaro Hospital</p> <p>...Efforts towards waste minimization and Green Productivity on HCWM.</p> <p>Recyclable papers are being re-use as filing folders and IEC materials</p>

Solid Waste Management in Health Care Facilities



Group Exercise



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Benefits of Implementing Waste Minimization Program

By Minimizing Waste....

- Appropriate resource recovery and recycling can be applied
- The amount of infected waste to be disinfected is minimize

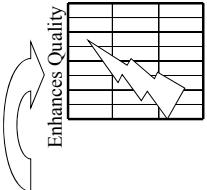
hence....

INCREASE PRODUCTIVITY
AND COST SAVINGS



Ensures profitability

P



Enhances Quality

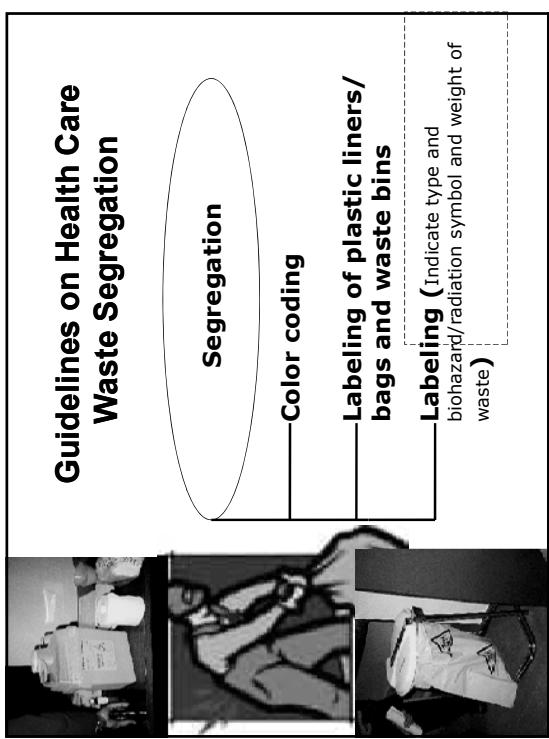
Categories of Health Care Waste

1. Infectious Waste
2. Sharps
3. Pathological and Anatomical Waste
4. Pharmaceutical Waste (including genotoxic, cytotoxic wastes)
5. Chemical Waste
6. Radioactive Waste
7. General Waste or Non-hazardous (dry/wet)



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Guidelines on Health Care Waste Segregation



Categories of Health Care Waste

1. Infectious Waste
2. Sharps
3. Pathological and Anatomical Waste
4. Pharmaceutical Waste (including genotoxic, cytotoxic wastes)
5. Chemical Waste
6. Radioactive Waste
7. General Waste or Non-hazardous (dry/wet)

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Color-Coding of Plastic Liner

COLOR	TYPE OF WASTE
BLACK/COLORLESS	General Waste (Non-Biodegradable)
GREEN	General Waste (Biodegradable)
YELLOW	Infectious Waste
YELLOW	Pathological & Anatomical Waste
	Chemical Waste

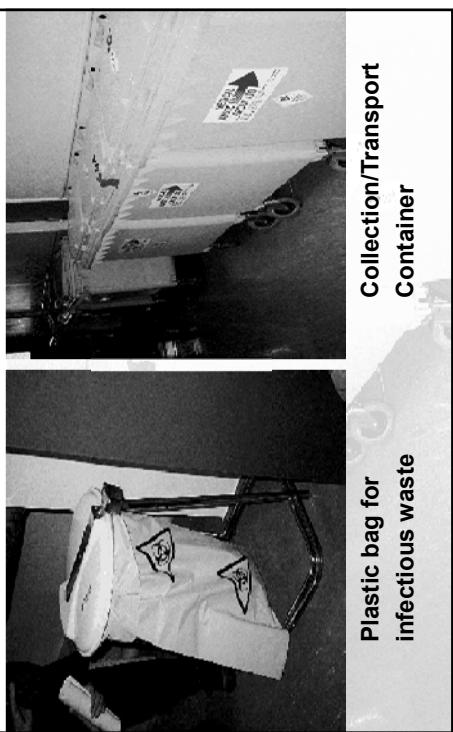
Color-Coding of Plastic Liners

COLOR OF BAG/CONTAINER	TYPE OF WASTE
NOT APPLICABLE	Sharps
ORANGE	Radioactive Waste
YELLOW	Pharmaceutical Waste
YELLOW	Chemical Waste

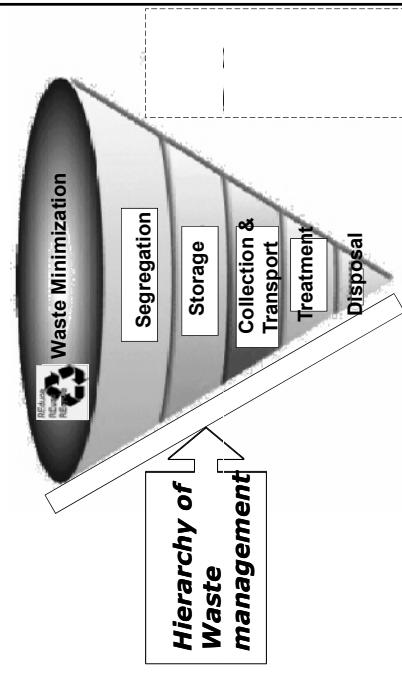
Labelling of HCW

TYPE OF WASTES	PLASTIC LINERS	BINS
INFECTIOUS	TAG WITH SOURCE AND WEIGHT, DATE COLLECT	"INFECTIOUS" and with Biohazard Symbol
PATHOLOGICAL and ANATOMICAL	TAG WITH SOURCE AND WEIGHT, DATE COLLECT	Biohazard Symbol
SHARPS	PLASTIC LINING NOT APPLICABLE	"SHARPS" and with Biohazard symbol, source and weight, date
PHARMACEUTICAL	TAG WITH SOURCE AND WEIGHT, DATE COLLECT	"PHARMACEUTICAL WASTE" for drugs "CYTOTOXIC WASTE" for genotoxic & antineoplastic
CHEMICAL	FOR SOLID-TAG WITH SOURCE AND WEIGHT, DATE COLLECT FOR LIQUID- 4L Capacity, amber-colored glass bottle	"CHEMICAL WASTE"
RADIOACTIVE	LEAD-LINED CONTAINER WITH PLASTIC	"RADIOACTIVE" Radiation Symbol

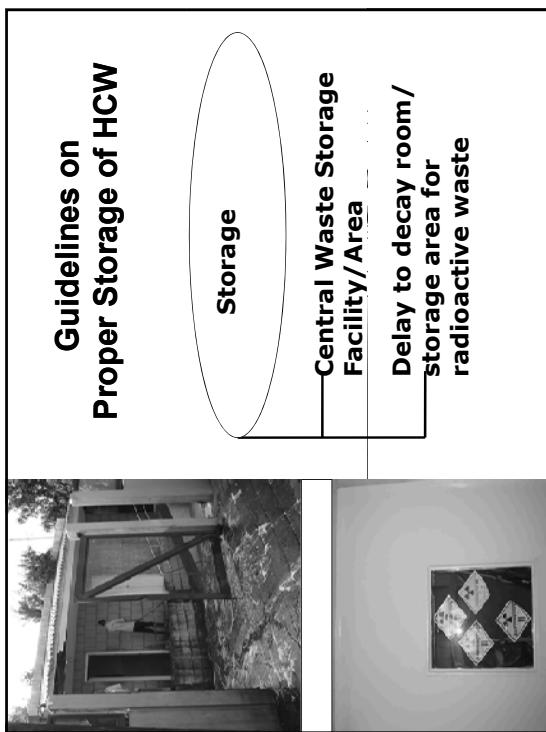
Waste Bags/Bins



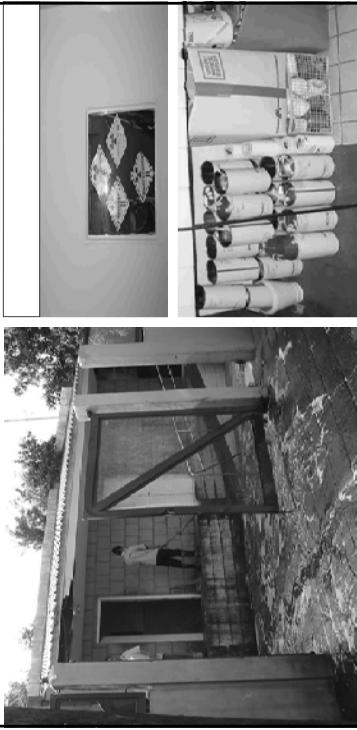
Solid Waste Management in Health Care Facilities



Guidelines on Proper Storage of HCW



Storage Facility/Area



Central Waste Storage Facility/Area

Delay to decay room for radioactive waste

Storage Facility/Area



Central Waste Storage Facility/Area

Four Areas:

1. Black-Non-biodegradable
2. Green-Biodegradable
3. Yellow-hazardous waste
4. Phased-out mercury

Guidelines/ Requirements for a Central Waste Storage Facility



Central waste storage facility:

PROPER LOCATION- separated, strategically located and accessible (away from dietary, laboratories, OR)

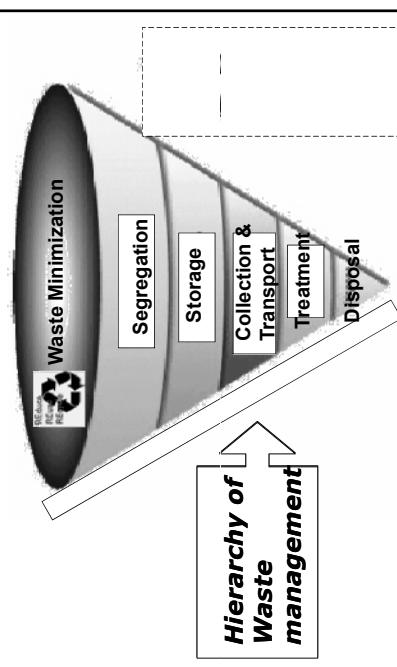
Shall have impermeable, elevated, hard-standing floor with good drainage and water supply

Shall have good lighting and adequate ventilation.

SECURITY AND PROTECTION- Marked with signage/ warning sign "CAUTION: HEALTHCARE WASTE STORAGE AREA-UNAUTHORIZED PERSONS KEEP OUT"

Well maintain/clean at all times.

Solid Waste Management in Health Care Facilities



Collection and Transport of HCW

Collection and transport

On-site collection and transport
(Within the health care facility)

Off-site collection and transport
(From the health care facility to treatment and to disposal facility)

Sharing



On-site Collection/Transport Vehicle



Easy to load and unload
Push cart

Wheeled trolley/ Rolling container



Guidelines on Proper On-Site Collection and Transport of HCW

Collection and transport

On-site collection and transport

- ❖ Done at least once a day (or if possible room-to-room basis shall be at least once every shift).
- ❖ Use of easy to load and unload wheeled trolleys or carts (has no sharp edges).

Guidelines on Proper On-Site Collection and Transport



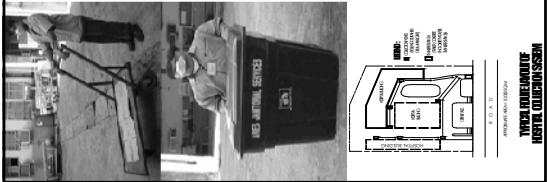
- GENERAL WASTE shall be collected on a room – to-room basis to the collection points, then to the designated collection storage or transfer stations using a packaged-type rolling container.
- PATHOLOGICAL and INFECTIOUS WASTES shall be collected using a separate air-tight container with inner plastic bag lining. It must not be mixed with other type of wastes unless it is treated.
- SHARPS shall be collected using a puncture-proof container which should be packed in a plastic bag properly labelled as "SHARPS"

Guidelines on Proper On-Site Collection and Transport



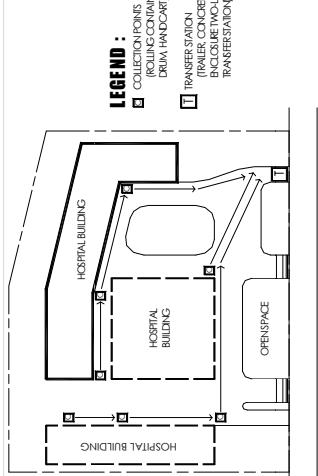
- RADIOACTIVE WASTE which are subject to delay-to-decay process under PNRI regulations and stored in a designated storage room.
- Collected off site by PNRI

Establishment of Strategic On-Site Collection Points



- Divide the hospital area along the collection route (Planning should avoid routing on congested area)
- Select suitable collection points
- Select collection storage/transfer station within the hospital compound (It must be accessible to municipal/private collection service and be located where there is minimum public objection)

Strategic On-Site Collection Points



TYPICAL ROUTE LAYOUT OF HOSPITAL COLLECTION SYSTEM

Guidelines on Proper Off-Site Transport of HCW



Collection and transport

- Off-site collection and transport
 - ❖ Done either by a DENR accredited transporter or city/municipal waste collector
 - ❖ Consignment note/manifest system

Consignment Note



The consignment note shall contain the following:

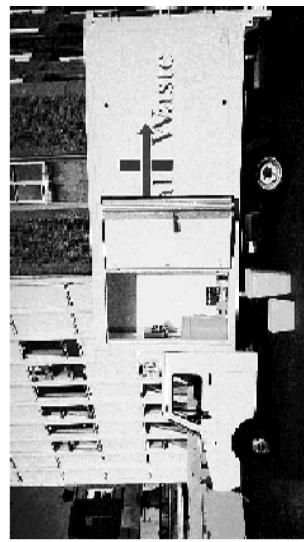
- Name, address and telephone number of the generator
- Type and quantity of waste transported
- Name, address, telephone number, accreditation number of the transporter
- Name, address and telephone number of an authorized representative of treatment/disposal facility

Guidelines on Proper Off-Site Collection and Transport

1. REQUIREMENTS FOR PACKAGING FOR OFF-SITE COLLECTION

- All bags or containers should be labeled with basic information written directly on bags/containers or on preprinted labels
 - Basic information on labeling
 - Type/category of HCW
 - Date of Collection
 - Volume/quantity
 - Precautionary measures
 - Emergency measures
 - Destination

Off- site Collection/Transport Vehicle



Properly marked transport vehicle

Guidelines on Proper Off-Site Collection and Transport

1. REQUIREMENTS FOR COLLECTION AND TRANSPORT VEHICLE

Collection vehicle used to transport hospital waste shall....

- ❖ Be suitable in size
- ❖ Have a totally enclosed car body with the driver seat separated
- ❖ Be well maintained and clean
- ❖ Be properly marked indicating name and address of the waste carrier and hazards signs.
- ❖ Have special kit in case of accident

Module Objectives	
<p>At the end of the session, the participant will be able to:</p> <ol style="list-style-type: none"> 1. Identify proper methods of segregation, coding and labeling of health care waste. 2. Discuss guidelines on proper storage of health care waste 3. Identify requirements for a central waste storage facility 4. Discuss guidelines on proper collection and transport of health care waste. 5. Identify requirements for packaging and vehicles for off-site collection of waste. 	 <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Chiyente River Hotel, Ermita, Manila</p>

Routing
<ul style="list-style-type: none"> ➤ Route Planning- waste shall be transported through the quickest and shorter possible route. ➤ Efficient and effective collection route system: <ul style="list-style-type: none"> ✓ Collection schedule by zone ✓ Assign personnel responsible by area ✓ Avoid passing along congested area

STORAGE FOR PHASED-OUT MERCURY WASTES IN HEALTH CARE FACILITIES



FAYE V. FERRER
Environmental Health Campaigner
Safer Chemicals Campaign
Health Care Without Harm
www.noaharm.org/seasia

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Mercury-use by Philippine Health Care Facilities

- Based on the PHA's 2009 list, there are 99,708 bed capacity provided by 1,851 hospitals in the country.
- Hospitals have a policy of giving out one mercury thermometer per patient admission or discharge kit.
- Most of the thermometers either break during their stay or are taken home never knowing their fate.
- Breakages are common occurrences that never gets reported inside or outside of the hospital.
- Disposal is done either through dumpsites, landfill or incinerators.



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Dangers of Mercury introduced in the Philippines

- In January 2006, HCWH conducted the First Southeast Asian Mercury in Health Care Conference.
- Former DOH Secretary Francisco Duque III announced an Administrative Order on the phase-out of mercury is to be drafted.
- Health Care Facilities have pledged to move for a phase-out of mercury in their facilities.

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Mercury Phase-out Timeline

- Memo on Mercury Spills Management was released to guide health care facilities on proper clean-up of small mercury spills.
- Rapid Mercury Assessment on several DOH controlled hospitals was conducted to test their mercury levels.
- First Quarter of 2008 - Committee to draft AO on mercury phase-out was formed.
- In July 2008, Secretary Duque signed DOH AO21.
- In September 2008, DOH AO21 took effect.



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DOH Administrative Order 2008-0021

Gradual Phase-out of Mercury in all Philippine Health Care Facilities and Institutions

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DOH Administrative Order 2008-0021

- A two-year phase-out on the use of mercury containing thermometers and sphygmomanometers.
- Hospitals are to form Mercury Management Team as part of the Health Care Waste Management Committee
- Inventory of existing mercury containing devices.
- Inform vendors of preference to use alternatives
- Patient, and patient companion education on the dangers of mercury.

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www.doharm.org.ph



www.doharm.org.ph



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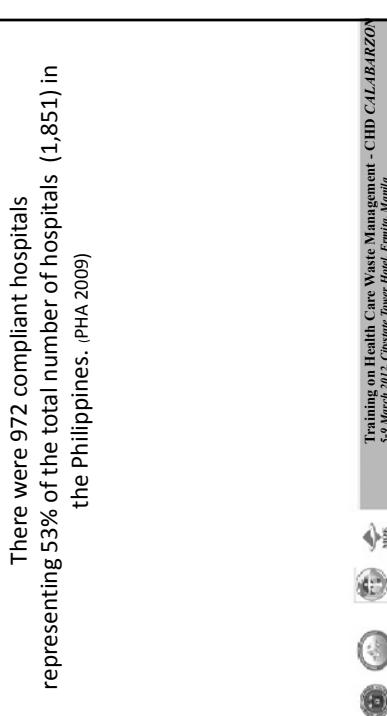
www.doharm.org.ph



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Status of Implementation of DOH AO 21

There were 972 compliant hospitals representing 53% of the total number of hospitals (1,851) in the Philippines. (PHA 2009)



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Breakdown of 972 per region

Regions	PHA List of Hospitals	Implemented AO 21	Percentage
Region 4B	63	56	89
Region 8	75	62	83
Region 12	106	80	75
Region 1	130	95	73
CAR	59	40	68
Region 4A	242	165	68
Region 10	111	69	62
Region 5	120	72	60
Region 3	206	101	49
Region 13	60	29	48
Region 2	83	39	47
ARM	28	12	43
Region 11	116	46	40
Region 7	106	33	31
NCR	183	51	28
Region 9	76	14	18
Region 6	87	8	9
Total	1,851	972	

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Challenges Encountered

STORAGE

- Proper storage are not implemented by some facilities, some do not know how to implement one.
- Concerns on the safety of maintaining on-site storage were raised
- Some facilities practiced recovery and placing all elemental mercury in one container.
- Others, before implementation of AO21 gave out all mercury containing devices to patients to avoid storage.

Practices in Storage



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Practices in Storage



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UNDP-GEF Guidance Document

www.gefmedwaste.org

UNITED NATIONS DEVELOPMENT PROGRAMME
GEF GLOBAL HEALTHCARE WASTE PROJECT

**GUIDANCE ON THE CLEANUP, TEMPORARY OR
INTERMEDIATE STORAGE, AND TRANSPORT OF
MERCURY WASTE FROM HEALTHCARE FACILITIES**

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INTRODUCTION

The UNDP-GEF project involves documenting best practices for the management of mercury waste and services to health facilities.

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Siting

- > Secure restricted area (to prevent theft)
- > Readily accessible to mercury waste handlers
- > Separate from regular or infectious waste storage areas



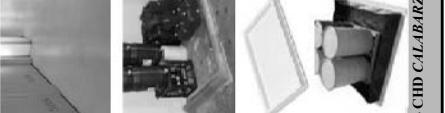
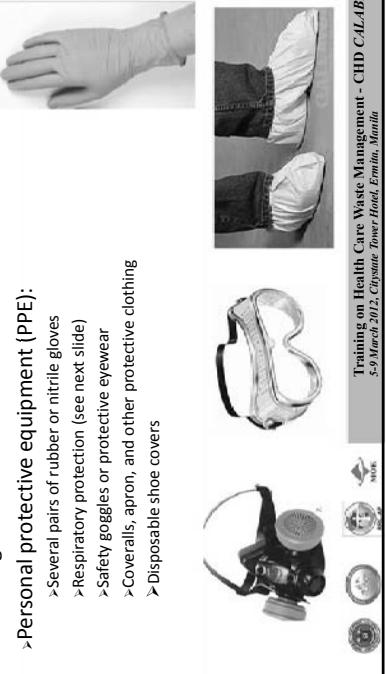
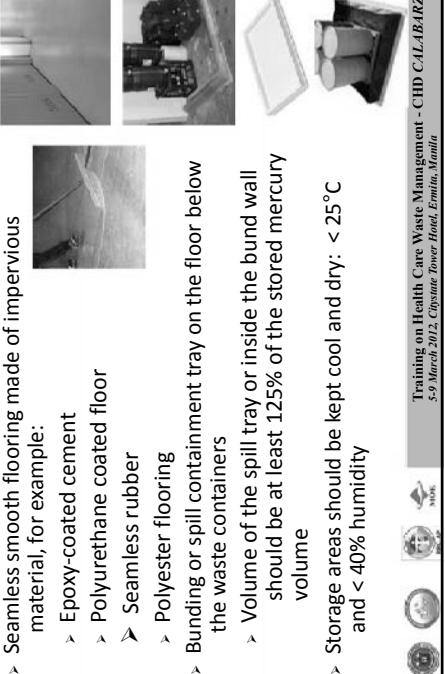
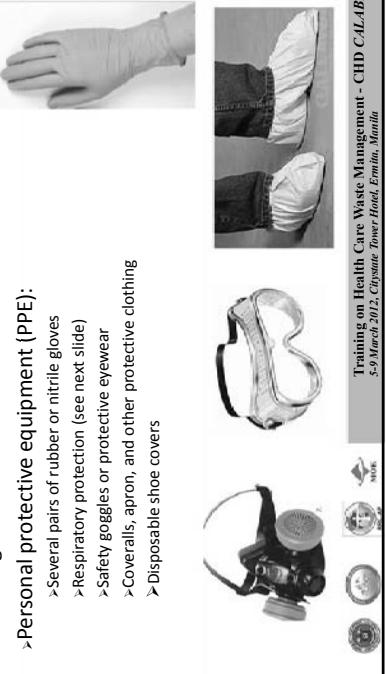
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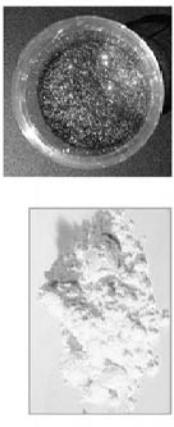
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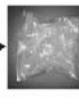
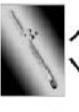
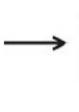
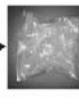
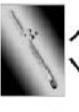
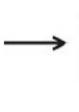
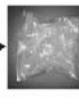
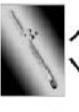
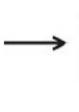
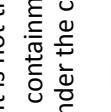
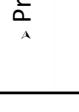
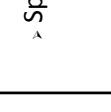
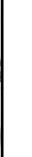
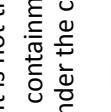
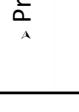
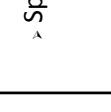
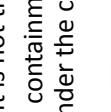
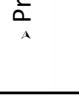
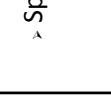
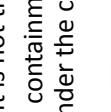
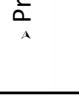
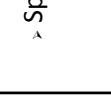
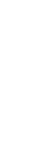
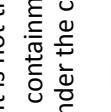
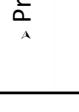
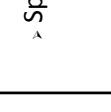
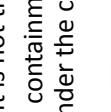
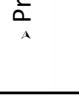
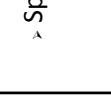
- > Enclosed area (roof and walls)
- > Locked door
- > Proper size (based on amount of waste to be stored plus space for materials movement)
- > Ventilation
 - > Exhaust vent leads to the outside
 - > Exhaust air is released away from people and crowded areas
 - > Exhaust vent is not near any air intake vents
 - > Ventilation control that can block air circulation back into the facility
 - > Exhaust fan capable of (600/Q) air changes per hour where Q is the room volume in cubic meters

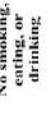


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<p>Design</p> <ul style="list-style-type: none"> > Seamless smooth flooring made of impervious material, for example: <ul style="list-style-type: none"> ➢ Epoxy-coated cement ➢ Polyurethane coated floor ➢ Seamless rubber ➢ Polyester flooring > Bunding or spill containment tray on the floor below the waste containers > Volume of the spill tray or inside the bund wall should be at least 125% of the stored mercury volume > Storage areas should be kept cool and dry: < 25°C and < 40% humidity 	 <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<p>Design</p> <ul style="list-style-type: none"> > Spill kit, PPE and wash area should be near (but not in) the storage area > Personal protective equipment (PPE): <ul style="list-style-type: none"> ➢ Several pairs of rubber or nitrile gloves ➢ Respiratory protection (see next slide) ➢ Safety goggles or protective eyewear ➢ Coveralls, apron, and other protective clothing ➢ Disposable shoe covers 	 <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>
<p>Design</p> <ul style="list-style-type: none"> > Personal protective equipment (PPE): <ul style="list-style-type: none"> ➢ Fit-tested full- or half-facepiece air-purifying respirator with mercury vapor cartridges, or ➢ Face mask with sulfur or iodide impregnated activated carbon, or face mask made of sandwiched activated charcoal-impregnated cloth (Note that face masks that do not seal tightly around the face could allow contaminated air to enter through the edges), or ➢ Other specialty mask or respirator designed particularly for mercury, or ➢ If no specialty masks are available: a face mask with a 0.3 micron HEPA filter to capture amalgam particles and mercury-laden dust (unfortunately regular masks will NOT protect against mercury vapor) 	 <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<p>Design</p> <ul style="list-style-type: none"> > Spill kit contents: > Step-by-step instructions > Containers: <ul style="list-style-type: none"> ➢ Air-tight, sealable plastic bags (small and large sizes, thickness: 2 to 6 mils, or 50 to 150 microns) ➢ Small, air-tight, rigid plastic container with some water or vapor suppression agent ➢ Air-tight, puncture-resistant, rigid plastic or steel jar or container with a wide opening ➢ Plastic tray ➢ Regular plastic waste bags (thickness: 2 to 6 mils, or 50 to 150 microns) 	 <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>

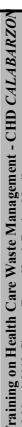
<h3>Design</h3> <ul style="list-style-type: none"> Spill kit contents: <ul style="list-style-type: none"> Tools for removing mercury Flashlight Plastic-coated playing cards or thin pieces of plastic Small plastic scoop or plastic dust pan Tweezers Eyedropper or syringe (without the needle) Duct tape or sticky tape Danger: Mercury Waste" labels to put on waste containers 	 <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<h3>Signage and Labeling</h3> <ul style="list-style-type: none"> Spill kit contents: <ul style="list-style-type: none"> Vapor suppression agents: Sulfur powder (available from pharmacies) Zinc or copper flakes (available from hardware stores) Commercial absorbent pads or vapor suppressants Brush to remove powder or flakes 	 <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>
<h3>Design</h3> <ul style="list-style-type: none"> Spill kit contents: 	 <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<h3>Design</h3> <ul style="list-style-type: none"> Spill kit contents: Materials for decontamination Vinegar, hydrogen peroxide, and cotton swabs for final cleaning when using sulfur powder Decontaminant solution or commercial decontaminant Piece of soap and paper towels <p>Decontamination solutions can be made of sodium thiosulfate solution (photographic fixer); or a mixture of sodium thiosulfate and EDTA.</p>	 <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>

<h3>Containers for Different Types of Mercury Waste</h3> <ul style="list-style-type: none"> > General approach <ul style="list-style-type: none"> > Primary container that prevents breakage > Secondary container that prevents release of mercury if the contents break > Label on the primary container and label on the secondary container if it is not transparent > Spill containment tray directly under the containers <p>  </p> <p><small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small></p>	<h3>Examples</h3> <table border="1"> <thead> <tr> <th>UNBROKEN mercury devices</th> <th>BROKEN mercury devices</th> <th>NON-SHARPS</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>  </p> <p><small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small></p>	UNBROKEN mercury devices	BROKEN mercury devices	NON-SHARPS										<h3>Practices</h3> <ul style="list-style-type: none"> > All personnel involved in collection, storage, transport, and supervision of mercury waste should receive special training on mercury waste management including spill cleanup. > Material Safety Data Sheets and International Chemical Safety Cards on mercury should be discussed with employees. > The most senior staff involved in a cleanup is responsible for ensuring replenishment of the contents. Spill kits should have a signed sheet indicating when they were used and replenishment. <p>  </p> <p><small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small></p>												
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<h3>Examples</h3> <table border="1"> <thead> <tr> <th>Analysed waste</th> <th>Elemental mercury waste</th> <th>Fluorescent lamps</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>  </p> <p><small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small></p>	Analysed waste	Elemental mercury waste	Fluorescent lamps										<h3>Examples</h3> <table border="1"> <thead> <tr> <th>Analysed waste</th> <th>Elemental mercury waste</th> <th>Fluorescent lamps</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>  </p> <p><small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small></p>	Analysed waste	Elemental mercury waste	Fluorescent lamps										<h3>Practices</h3> <ul style="list-style-type: none"> > All personnel involved in collection, storage, transport, and supervision of elemental mercury waste should receive special training on elemental mercury waste management including spill cleanup. > Material Safety Data Sheets and International Chemical Safety Cards on elemental mercury should be discussed with employees. > The most senior staff involved in a cleanup is responsible for ensuring replenishment of the contents. Spill kits should have a signed sheet indicating when they were used and replenishment. <p>  </p> <p><small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small></p>
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<h3>Practices</h3> <ul style="list-style-type: none"> ➢ The storage space should be inspected every month to check for leaks, corroded or broken containers, improper methods of storage, ventilation, the condition of the PPE and wash area, spill kit contents, and updated records. ➢ Inventory records should be kept of the types of mercury waste, descriptions, quantities in storage, and initial dates of storage. ➢ No smoking or eating in and around the storage space. <p style="text-align: right;">    No smoking, eating, or drinking. </p> <p style="text-align: right;">    </p> <p style="text-align: right; font-size: small;"> Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila </p>	<h3>Example Large Hospital</h3> <ul style="list-style-type: none"> ➢ 1000 unbroken thermometers <ul style="list-style-type: none"> ➢ Wrapped in plastic bag and taped to form compact volume ➢ Taped thermometers placed in 3L stainless steel can with plastic bubble wrap [primary container] ➢ Can is labeled ➢ Can is placed in a 4L, 75 micron transparent sealable plastic bag [secondary container] ➢ 20 unbroken sphygmomanometers <ul style="list-style-type: none"> ➢ Placed in their original cases with labels [primary container] ➢ Cases taped together in groups of four ➢ Taped cases placed in 100 micron colored garbage bag with label [secondary container] ➢ 500 broken thermometers <ul style="list-style-type: none"> ➢ Placed in a 3L stainless steel can with tight lid [primary container] ➢ Can placed in a 4L 75 micron transparent sealable plastic bag [secondary container] <p style="text-align: right;">    </p> <p style="text-align: right; font-size: small;"> Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila </p>
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Example Large Hospital

- > 1,280 T8 fluorescent lamps
 - > Placed in UN-approved, labeled drums
- > Storage room:
 - > 3 x 3 meter locked room in the basement
 - > Basement is off-limits to patients and visitors
 - > "Danger: Mercury Waste" and poison symbol on the door
 - > Exhaust fan on one wall capable of 22 ACH
 - > Air is blown out above the roof line facing an empty yard
 - > Mechanical damper plates in the AC vent
 - > Smooth floor with polyurethane paint and flexible plastic bunding strip around the area where the mercury waste is stored
 - > Cabinet with a spill kit, PPE, MSDSs, a copy of the inventory, and other records located outside the storage room

Example Small Hospital

- > Small quantities of old thermometers, 1 or 2 sphygmomanometers, some dental amalgam
 - > Packaged using primary and secondary containers as above
- > Storage :
 - > Refrigerator in a locked room
 - > "Danger: Mercury Waste" and poison symbol on refrigerator door
 - > Fan stored by the window facing an empty yard
 - > Plastic tray at the bottom shelf of the refrigerator
 - > Cabinet with a spill kit, PPE, MSDSs, a copy of the inventory, and other records located outside the room

Example: San Lazaro Hospital

- > Sphygmomanometer - 74pcs (intact & broken)
- > Thermometers - 36pcs (intact & broken)
- > PPE used in clean-up of Hg spill





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Mercury in Air Study

SURVEY OF MERCURY CONCENTRATIONS IN AMBIENT AIR INSIDE HEALTHCARE FACILITIES

INTRODUCTION AND OBJECTIVES

One of the goals of the UNDP GEF Project on Healthcare Waste is to protect public health and the global environment from the impacts of mercury releases by demonstrating and promoting proper management of mercury waste and the use of non-mercury alternatives.

The purpose of this survey is to gather data in order to: (1) assess potential mercury exposures of health workers and patients in different parts of healthcare facilities; (2) identify areas where ambient air mercury levels are higher than normal; (3) highlight incidents in healthcare facilities that have occurred due to mercury devices.

The compiled data from different project countries could be used to raise awareness among health professionals, particular departments or agencies concerned about a particular form for a monitoring programme, and may trigger discussions on actions that may require monitoring after a guidance.

United Nations Development Programme
GEF Global Healthcare Waste Project
WHO

DO NOT OPEN

DANGER HAZARDOUS MERCURY WASTE

SANTANDER HOSPITAL

DO NOT OPEN

DO NOT OPEN

DANGER HAZARDOUS MERCURY WASTE

SAN LAZARO HOSPITAL

DO NOT OPEN

DO NOT OPEN

DANGER HAZARDOUS MERCURY WASTE

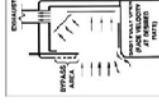
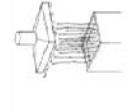
SANTANDER HOSPITAL

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<h3>Areas where to measure</h3> <ul style="list-style-type: none"> Dentistry department especially where amalgam is mixed Pediatric ward Male and female adult wards Nurses' stations Biomedical laboratory Emergency department Outpatient department Engineering and maintenance department where mercury sphygmomanometers may be repaired or calibrated Healthcare waste storage area Storage area for mercury device and fluorescent lamps Area around an operating healthcare waste incinerator Pharmacy Storage area for cleaning solutions and disinfectants <p> </p> <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<h3>Some Elements of Transport Guidelines</h3> <ul style="list-style-type: none"> Packaging requirements Special permit/license for transporter <ul style="list-style-type: none"> Certified training, proof of liability insurance, submitted emergency response plans, spill kits, PPE, etc. Registered vehicle <ul style="list-style-type: none"> Passed inspection Closed design, correct size for the intended load Bulkhead between driver cabin and body System to keep load secure during transport Spill kit, first-aid kit, fire extinguisher Placard Routing plan, contingency plan, emergency phone, etc. <p> </p> <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>
<h3>Jerome J405</h3> <ul style="list-style-type: none"> Ambient Air Sampling in Five (5) Private Hospitals Almost all readings registered 0.00 µg/m³ Small readings on previous storage areas for broken mercury. <p> </p> <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<h3>Siting of an Interim Storage Facility</h3> <ul style="list-style-type: none"> At least 150 meters away from schools, hospitals, homes, food processing, agricultural operations, rivers or lakes, fisheries Secure area Accessible to vehicles transporting mercury waste <p> </p> <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>

<p>Design of an Interim Storage Facility</p> <ul style="list-style-type: none"> ➢ Size should handle maximum anticipated volume of mercury waste, plus shelving space, aisles, etc. ➢ Measures to withstand floods, earthquakes, typhoons, and other natural disasters ➢ Closely controlled access with an intrusion detection and alarm system ➢ Air conditioning to control temperature and humidity ➢ Heat, smoke and fire detection and alarm system, plus a fire suppression system <div style="text-align: right; margin-top: -20px;">  <small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small> </div>	<p>Design of an Interim Storage Facility</p> <ul style="list-style-type: none"> ➢ Drains connected to a separate wastewater collection system ➢ Equipped with PPE, spill cleanup kits, first-aid medical supplies, and wash areas ➢ Receiving area <ul style="list-style-type: none"> ➢ Signs ➢ Presort table for incoming waste; a cart made of impervious material; spill kits; emergency containers for leaking containers; PPE; and a separate table or counter for documentation <div style="text-align: right; margin-top: -20px;">  <small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small> </div>
<p>Design of an Interim Storage Facility</p> <ul style="list-style-type: none"> ➢ At least four distinct and separate functional areas: ➢ Receiving area for receiving and presorting waste, re-labeling if necessary, and signing documents ➢ Inspection area for checking for leaks, repackaging, secondary containment, and re-labeling if necessary ➢ Storage area specific for mercury waste ➢ Administrative and record-keeping area <div style="text-align: right; margin-top: -20px;">      <small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small> </div>	<p>Design of an Interim Storage Facility</p> <ul style="list-style-type: none"> ➢ Inspection area ➢ Engineered spill-control features including containment dikes or bunding on the floor ➢ Mercury vapor detection monitor or detection tubes ➢ Local exhaust ventilation, such as a fume hood, connected to an activated carbon filter ➢ Spill control tray or containment device over which the waste should be inspected ➢ Emergency containers, packaging, labels, spill kits, and PPE <div style="text-align: right; margin-top: -20px;">        <small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small> </div>

<h3>Design of an Interim Storage Facility</h3> <ul style="list-style-type: none"> > Storage area <ul style="list-style-type: none"> > Warning signs on all doors > Continuous or periodic monitoring of mercury levels > Spill control features including floor sealant and containment dikes > Shelving and storage racks not above shoulder height > Lighting, aisle space, stacking, arrangements of containers, and labeling designed to facilitate inspection and future transport to terminal storage <p style="text-align: right;"> </p> <p style="text-align: center;">Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<h3>Design of an Interim Storage Facility</h3> <ul style="list-style-type: none"> > Storage area <ul style="list-style-type: none"> > Risk level 1 (highest risk): elemental mercury, unbroken sphygmomanometers, and medical devices containing large amounts of mercury (gastro-intestinal tubes, esophageal dilators, etc.) > Risk level 2: unbroken mercury thermometers, small mercury switches and small relays from electrical equipment > Risk Level 3: broken glassware contaminated with mercury, mercury cleanup waste > Risk Level 4: fluorescent lamps, compact fluorescent bulbs, dental amalgam > Shelving and storage racks for Risk Levels 1 and 2 fitted with plastic containment trays <p style="text-align: right;"> </p> <p style="text-align: center;">Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>
<h3>Other Procedures for Interim Central Storage</h3> <ul style="list-style-type: none"> > Manifest system > Licensing > Hazardous waste management plan including storage and labeling guidelines, and staff training > Periodic monitoring, weekly inspection, record-keeping, periodic reporting > Health surveillance, medical monitoring of workers <p style="text-align: right;"> </p> <p style="text-align: center;">Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	<h3>Summary Points</h3> <ul style="list-style-type: none"> > Remember: surface tension, mobility, volatility, toxicity of mercury > Redundancy: primary container to prevent leaks, secondary container in case the primary container breaks, bund or tray > Use proper PPE when handling mercury > Seek practical solutions consistent with the basic principles needed to protect health and environment <p style="text-align: right;"> </p> <p style="text-align: center;">Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>

Module Objectives

At the end of the session, the participant will be able to:

1. Discuss the concept about Mercury and other Hazardous Waste Storage options
2. Informed about existing underground permanent storage or disposal facility.

Engr. Guillermo Borongan
Programme Officer
RRC, AP

Citystate Tower Hotel, Ermita, Manila,
the Philippines
6 March 2012

1

Hazardous Waste Storage Options: Mercury

Training on Health Care Waste Management

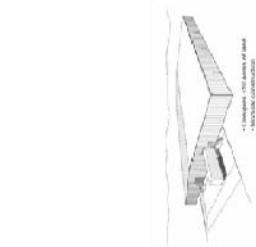
Contents

- 1 Mercury and Other Hazardous Waste Storage
- 2 Background: EU Storage Obligation for Metallic Mercury
- 3 Salt Rock: Concept of Complete Inclusion
- 4 Herfa-Neurode Underground Disposal Facility

Source: Thomas Bresser, GRS, Germany 2010
Training on Health Care Waste Management - CHD CALABARZON
5-9 March 2012, Citystate Tower Hotel, Ermita, Manila

Source: Thomas Bresser, GRS, Germany 2010
Training on Health Care Waste Management - CHD CALABARZON
5-9 March 2012, Citystate Tower Hotel, Ermita, Manila

Mercury and Other Hazardous Waste Storage: General Options



Underground Disposal

Deep Injection

Not considered: Surface Landfill
Additional Option: Stabilization

Source: Thomas Bresser, GRS, Germany 2010
Training on Health Care Waste Management - CHD CALABARZON
5-9 March 2012, Citystate Tower Hotel, Ermita, Manila

Source: Thomas Bresser, GRS, Germany 2010
Training on Health Care Waste Management - CHD CALABARZON
5-9 March 2012, Citystate Tower Hotel, Ermita, Manila

Mercury Storage: Warehousing - Features

- Investment app. 10 Mio US\$
- Waste still in biosphere
- Dry climate required
- Safety dependent on political & economic constraints
- US concept for app. 100 yrs.
- No permanent solution



Source: Thomas Brässer, GRS, Germany 2010

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Mercury Storage: Deep Injection - Features

- Investment costs unknown
- No control after injection
- Long-term safety assessment problematic
- Suitable geological situation needed
- Several applications worldwide (but no Hg) with different success



Source: Thomas Brässer, GRS, Germany 2010

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Mercury Storage: Underground Disposal - Features

Permanent storage in underground mines is generally regarded as a safe disposal concept for hazardous wastes.

- Investment costs strongly variable (e.g. new facility / abandoned mine)
- Long-term safety assessment (broad experience)
- Suitable geological situation needed (e.g. salt, hard rock - optionally combinations)
- Several facilities with positive experiences since decades (esp. in rock salt formations)
- Operational safety must be guaranteed
- Combination with other hazardous wastes recommended



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Background: EU Storage Obligation for Metallic Mercury

Regulation allows only few storage options, e.g.:

- **Temporary or Permanently in**
- Salt mines* or in
- Deep underground hard rock formations**

* adapted for the disposal of metallic mercury
** providing a level of safety and confinement equivalent to that of salt mines

Source: Thomas Brässer, GRS, Germany 2010

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Why Rock Salt?

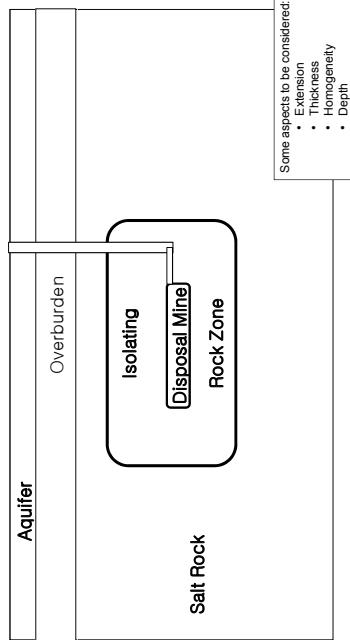


Large and stable
cavities

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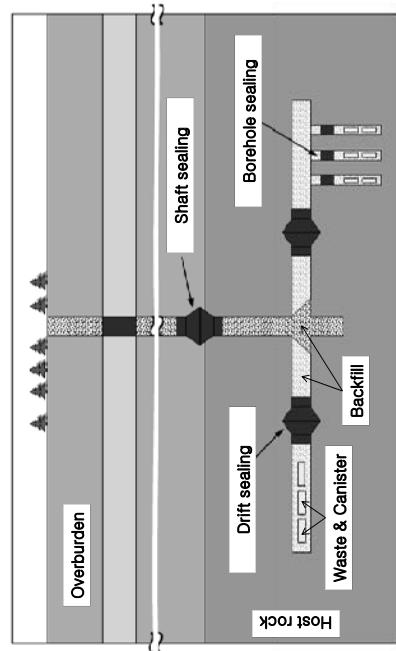
Salt Rock: Concept of Complete Inclusion



Source: Thomas Bräser, GRS, Germany 2010

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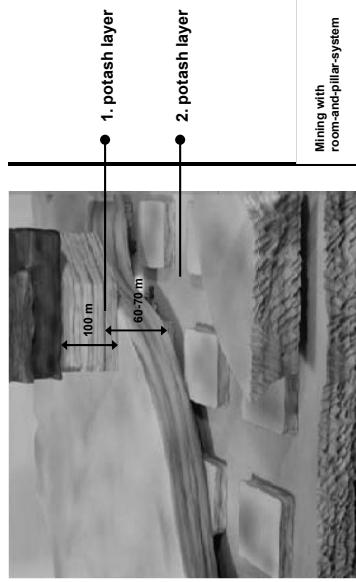
Waste Isolation Multibarrier System (2)



Source: Thomas Bräser, GRS, Germany 2010

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Potash mining



Mining with room-and-pillar-system

Source: Thomas Bräser, GRS, Germany 2010



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Herfa-Neurode | Storage Conditions

**Not acceptable for underground disposal
are wastes that are:**

- explosive
- self inflammable
- spontaneous combustible
- Infectious
- Radioactive
- releasing hazardous gases
- Liquid
- increasing their volume



Acceptance control

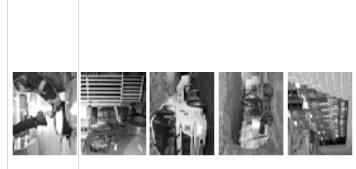
Source: Thomas Brässer, GRS, Germany 2010 13

Mode of operation in an underground disposal facility

Operational procedure of the State of the Art underground disposal facility

1. Generator / Owner of the waste must obtain the facility's approval
 - description and analysis of the composition of the waste to the regulations authorities
2. After a first check at the disposal site, the documents have to be sent to the relevant authorities for approval and acceptance of the waste.
3. Wastes may be transported to the underground waste disposal facility by means of trucks or rail.
 - Before the vehicles reach the entrance area, they have already passed a radioactivity control.

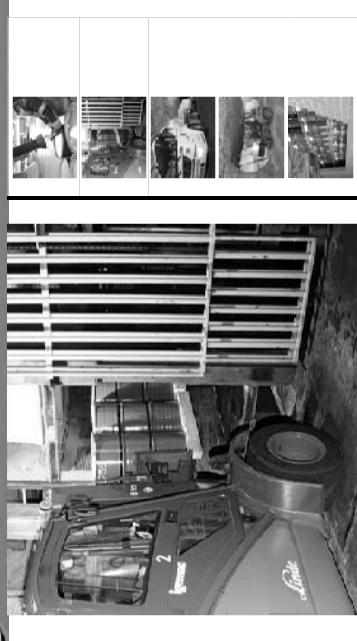
Source: Thomas Brässer, GRS, Germany 2010
5.9 March 2012, Chysina River Hotel, Ermita, Manila



Herfa-Neurode | Acceptance control

4. At reception, the waste documents, the delivered amounts and the packaging are checked and random samples of the waste are analysed (degassing, visual inspection, chemical composition). The waste is only unloaded if it is identified as indicated in the waste documents and fulfils specific waste acceptance criteria. Otherwise, the disposal of the waste is rejected.
5. After acceptance, control and determination of the conformity, the waste is cleared for storage. It is then unloaded from the delivery vehicle by, for example, forklifts, and is transported to its final destination. At the shaft entrance, the waste enters the underground transport system to the storage area.

Herfa-Neurode | Shaft transport



Source: Thomas Brässer, GRS, Germany 2010
5.9 March 2012, Chysina River Hotel, Ermita, Manila

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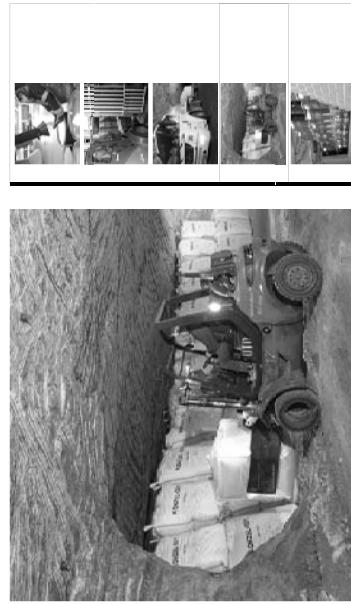
Herfa-Neurode | Underground Transport



Solid stabilized mercury (mercury sulphide) as well as mercury-containing wastes are waste types that are accepted at several underground waste disposal facilities in Europe. They may be stored in drums or big bags.

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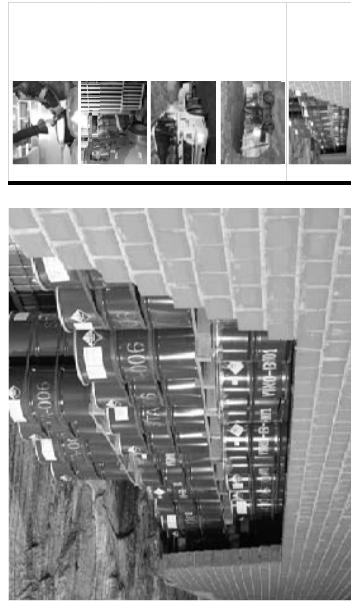
Herfa-Neurode | Storage Chambers



6. The waste is then stacked accordingly at its final place of storage, i.e., the respective chamber, drift or other part of the mine area.

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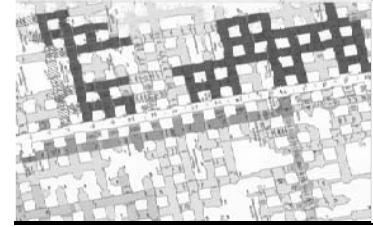
Herfa-Neurode | Sealing off by walls



7. At an operating German underground waste disposal site, salt dams or stonewalls are built in order to separate the storage cells and to facilitate the ventilation of the disposal site.

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Herfa-Neurode | Material groups

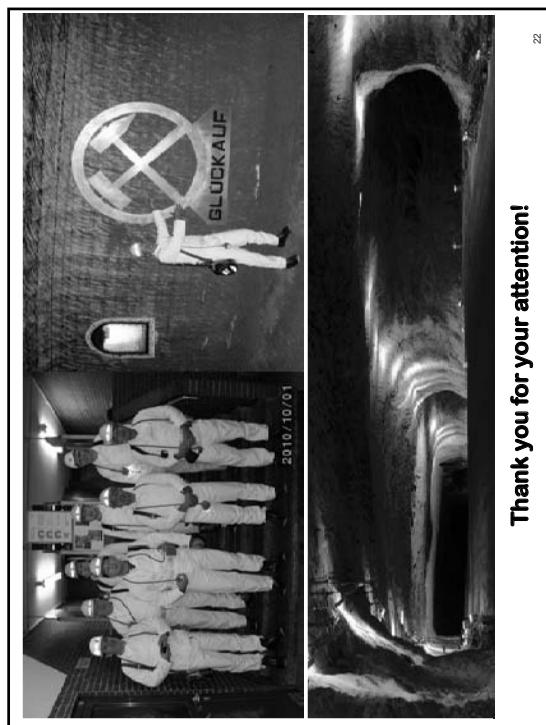


Wastes are separated by 17 material groups:

- Alkaline wastes
- Alkaline wastes, moisture sensitive
- Acid wastes
- Acid wastes, moisture sensitive
- Cyanides (acid / alkaline)
- Mercury (acid / alkaline)
- Organic wastes (acid / alkaline)
- Hydroxide sludges
- Capacitors
- Transformers (Cu / Fe)
- Parts of transformers (Cu / Fe)
- Other wastes

Source: Thomas Brässer, GRS, Germany 2010

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Thank you for your attention!

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Report: Options for the environmentally Sound management of surplus mercury in Asia and the Pacific

GRS
International
Gesellschaft
für
Rechts- und
Sozialberatung

Analysis of options for the environmentally sound management of surplus mercury in Asia and the Pacific:
Final Report

A. Hegeleman
F. Bannister
C. Chau
D. M. Miel
G. W. Brueggen

April 2011

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<h3>Module Objectives</h3>	<p>By the end of the training, the participants will be able to describe the health and safety practices in health care waste management based on its minimum elements.</p>
<p>Health and Safety Practices in Health Care Waste Management Program</p> <p>DR. GILBERT PAR Department of Health Center for Health Development- 4A(CALABARZON)</p>	 <p>Training on Health Care Waste Management - CHD CALABARZON 5.9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>
<p>1. Written waste management plan</p> <ul style="list-style-type: none"> • plan describes practices for handling, storing, treating, & disposing of hazardous & non-hazardous waste • drawn up after doing a comprehensive assessment of waste handling at the facility. • Indicates the types of worker training required <p>PLAN FIRST!</p>	<p>Objective: Describe the health and safety practices in HCWM based on its minimum elements</p> <ol style="list-style-type: none"> 1. Written plan 2. Clear responsibilities 3. Written, internal rules 4. Staff training 5. Protective clothing 6. Good hygiene practices 7. Vaccinated workers 8. Designated storage locations 9. Waste minimization 10. Waste segregation 11. Waste Treatment 12. Final disposal site 13. Periodic reviews

2. Clearly assigned staff responsibilities.

- Make responsibilities clear so that workers feel accountable for how well tasks are completed & so that no step in the process is overlooked.



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3. Written, internal rules

- Formalize desired practices, as written rules may be better maintained.

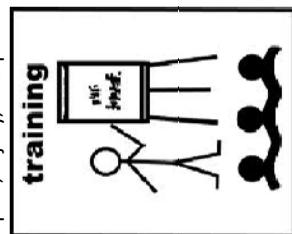


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4. Staff trained in safe handling, storage, treatment, & disposal.

- to ensure staff are aware of all hazards they might meet
- to ensure that they are practicing good hygiene, safe sharps handling, proper use of PPE, proper packaging & labeling of waste, & safe storage of waste
- to ensure correct response to spills, injury, & exposure



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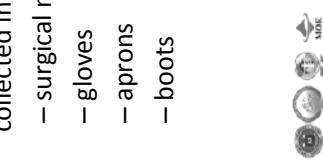


5. Protective clothing available.

- Workers need specific types of clothing to protect themselves when moving & treating various types of collected infectious waste:
 - surgical masks
 - gloves
 - aprons
 - boots



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6. Good hygiene practices.

- Even if protective clothing is worn, some organisms will get on workers' hands & faces.
- Thus, workers need to wash their hands & faces regularly with soap & water.



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How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

Duration of the entire procedure: 40-60 seconds

 World Health Organization
Patient Safety
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SAVE LIVES
Clean Your Hands

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http://www.who.int/gpsc/5may/How_To_HandWash_Poster.pdf

How to Handrhub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

Duration of the entire procedure: 20-30 seconds

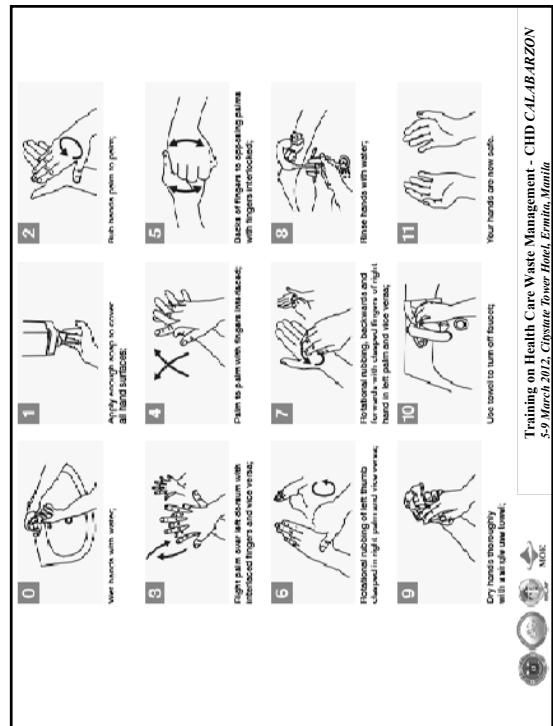
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http://www.who.int/gpsc/5may/How_To_HandRub_Poster.pdf

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Hand Hygiene Video from the New England Journal of Medicine, 2011

7. Vaccinated workers

Healthcare Personnel!

Are your vaccinations up-to-date?

You should be immune to:

- > INFLUENZA
- > HEPATITIS B
- > MEASLES/MUMPS/RUBELLA
- > TETANUS/DIPHTHERIA/PERTUSSIS
- > VARICELLA (CHICKENPOX)



Protect your patients.
Protect your family.
Protect yourself.

Get vaccinated!

www.cdc.gov/vaccines

- Workers should be vaccinated against:
 - hepatitis B
 - influenza
 - measles, mumps, & rubella
 - varicella
 - tetanus, diphtheria, & pertussis
 - meningococcal disease

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Healthcare Personnel Vaccination Recommendations

Vaccine	Recommendations in brief
Hepatitis B	Give 3-dose series dose #1 now, #2 in 1 month, #3 approximately 5 months after #2. Give IM. Obtain anti-HBs serologic testing 1-2 months after dose #3.
Influenza	Give 1 dose of influenza vaccine annually. Give inactivated influenza vaccine (LAIV) intranasally or live attenuated influenza vaccine (LAIV) intranasally.
MMR	For healthcare personnel born in 1957 or later without serologic evidence of immunity or prior vaccination, give 2 doses of MMR, 4 weeks apart. For HCP born prior to 1957, see below. Give SC.
Varicella (chickenpox)	For HCP who have no serologic proof of immunity, prior vaccination, or history of varicella disease, give 2 doses of varicella vaccine, 4 weeks apart. Give SC.
Tetanus, diphtheria, pertussis	Give a one-time dose of Tdap as soon as feasible to all HCP who have not received Tdap previously. Give TD booster every 10 years thereafter. Give IM.
Meningococcal	Give 1 dose to microbiologists who are routinely exposed to isolates of <i>N. meningitidis</i> . Give IM or SC.

Hepatitis A, typhoid, and polio vaccines are not routinely recommended for HCP who may have oral-fecal exposure to fecal material.

Immunization Action Coalition. Technical content reviewed by the Centers for Disease Control and Prevention, February 2012.

<http://www.cdc.gov/acip/recschedules/downloads/adult/adult-schedule.pdf>
5-9 March 2012, Cainta Tower Hotel, Ermita, Manila

8. Temporary storage containers in designated locations.

- Hazardous healthcare wastes
 - store only for short periods, <24 hrs
 - put in a labeled, covered container in a fixed location (specific corner of the room)
 - do not store near patients or food



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9. Minimization, reuse, & recycling procedures

- Unnecessary disposal of valuable chemicals & pharmaceuticals can be avoided through good inventory practices:
 - a) Use the oldest batch first.
 - b) Never open a new container before the last one is finished.
 - c) Prevent products from being thrown out during routine cleaning.
 - d) Check the delivery to make sure materials are not about to expire.

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9. Minimization, reuse, & recycling procedures

- Unnecessary disposal of valuable chemicals & pharmaceuticals can be avoided through good inventory practices:
 - e) Where possible & safe, use reusable syringes & needles:
 - generates approximately 0.5–2% of the waste of using disposables; &
 - costs 5 to 15 times less.
 - f) Minimize use of products containing PVC plastics.

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10. A Waste Segregation System

- Sorting & separating waste reduce the volume of waste by 75–90%.
- sharps
 - collected in separate puncture-proof containers
- Segregate categories:
 - hazardous liquids
 - chemicals & pharmaceuticals
 - PVC plastic
 - materials containing heavy metals

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11. Treatment methods for hazardous & highly hazardous waste.

- Treatment options available to small-scale facilities for hazardous
 - disinfection - most important function of treatment
 - incineration?
 - autoclaving of infectious waste
 - encapsulation of sharps
 - small facilities could look into piggy-backing w/ bigger facilities

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12. A final disposal site.

- Facilities must have a place to dispose of waste that cannot be treated, & the residues from treated waste.
 - pit lined with clay or a similarly impermeable material
 - to prevent contamination of ground water
- disposal in a public landfill may be the only option for some

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13. A schedule for periodic review of adherence to the plan & effectiveness of the plan

- A program schedule must be established for regular follow-up to ensure planned practices are:
 - in place;
 - being carried out correctly; &
 - actually minimizing risk, damage, & disease.

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References

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 - Environmental Guidelines for Small-Scale Activities in Africa, 2nd Ed, 2009
 - <http://www.encafrica.org/egsaa.htm>
- Healthcare Waste Management
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- Immunization Action Coalition. Technical content reviewed by the Centers for Disease Control and Prevention, February 2012.
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 - <http://www.cdc.gov/vaccines/recs/schedules/adult/adult-schedule.pdf>
- Your 5 Moments for Hygiene
 - http://www.who.int/bpsc/smyay/your_5_Moments_for_Hand_Hygiene_Poster.pdf
- Yves Longtin, M.D., Hugo Sax, M.D., Benedetta Allegranzi, M.D., Franck Schneider, and Didier Pittet, M.D. N Engl J Med 2011; 364:e24March 31, 2011
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HEALTHCARE WASTEWATER MANAGEMENT

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Learning Objectives

At the end of the session, the participants should be able to:

- characterize wastewater from healthcare facilities in terms of its composition and type;
- identify the different sources of wastewater in healthcare facilities;
- discuss the hazards/risks associated with wastewater from healthcare facilities;
- discuss the environmental and health impact of discharging untreated wastewater; and,
- discuss the appropriate and specific technologies for the treatment and disposal of wastewater.

Sanitation Code of the Philippines (PD 856)

- Requirements in the Operation of Industrial Establishments (RULE V)
 - Section E: Disposal of Industrial Wastes
 - All toxic and hazardous wastes including nuclear wastes incident to the operation of the industrial plant shall be collected, stored or disposed of in a manner that will prevent health hazards, nuisance and pollution in accordance with the guidelines set by DENR (RA 6969).
 - All industrial establishments discharging toxic wastes shall submit a copy of the method of treatment approved and certified by the EMB-DENR .

Philippine Clean Water Act (RA 9275)

- Ch. 2 Art 1 Sec 8 – Domestic Sewage Collection, Treatment and Disposal
 - That all establishments including industrial complex and similar establishments must be connected to a sewerage system.
- Sec. 12 – Categories of Industry Sector
 - The Department shall revise and publish a list of categories of industry sector for which effluent standards will be provided for each significant wastewater parameter.

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Philippine Clean Water Act (RA 9275)

- SEC. 14. **Discharge Permits.** The Department shall require owners or operators of facilities that discharge regulated effluents pursuant to this Act to secure a permit to discharge. The discharge permit shall be the legal authorization granted by the Department to discharge wastewater: *Provided*, That the discharge permit shall specify among others, the quantity and quality of effluent that said facilities are allowed to discharge into a particular water body, compliance schedule and monitoring requirement.

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WASTEWATER

- USED WATER
 - WASTE IN LIQUID FORM CONTAINING POLLUTANTS

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COMPOSITION OF WASTEWATER

99.99 % liquid



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Definition

Wastewater in health care facilities

- any water that has been adversely affected in quality by anthropogenic influence during the provision of healthcare services.

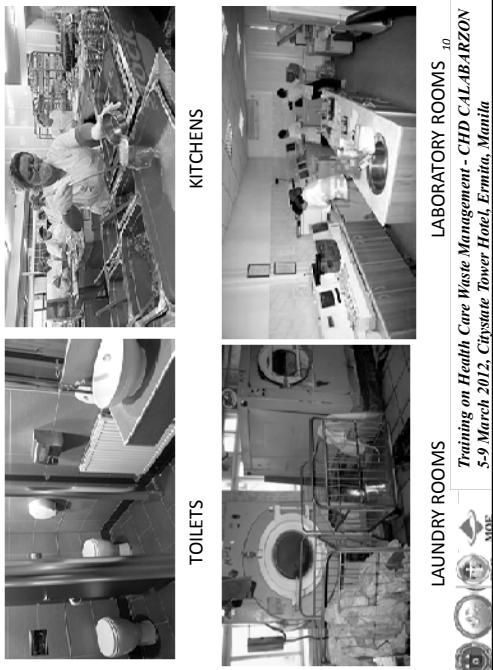
Source: DOH Manual 3rd Edition 2011 Update

Types

Black water	Grey water
• "Sewage"	• "Sullage"
• heavily polluted wastewater	• low polluted wastewater
• fecal matter, urine, significant food residues or toxic chemicals.	• residues from washing, bathing, laboratory processes, laundry, or technical processes (cooling water or rinsing of x-ray films).

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SOURCES OF WASTEWATER



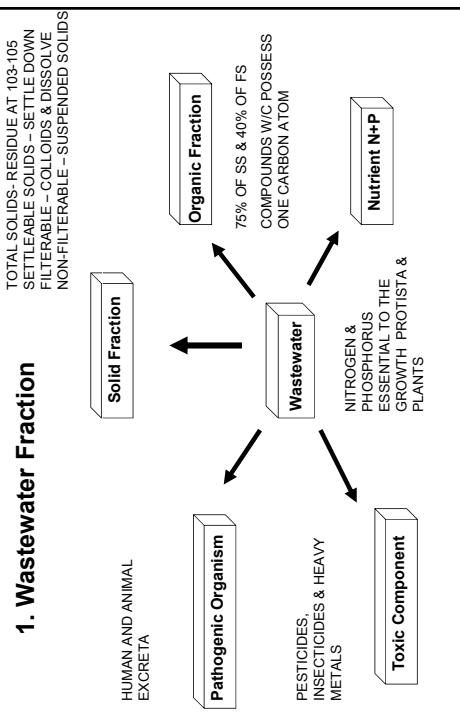
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SOURCES OF WASTEWATER

- Administrative office
- Wards
- Operating room
- ICU
- Radiology
- Renal Department
- Dental Department
- Central Sterilization room

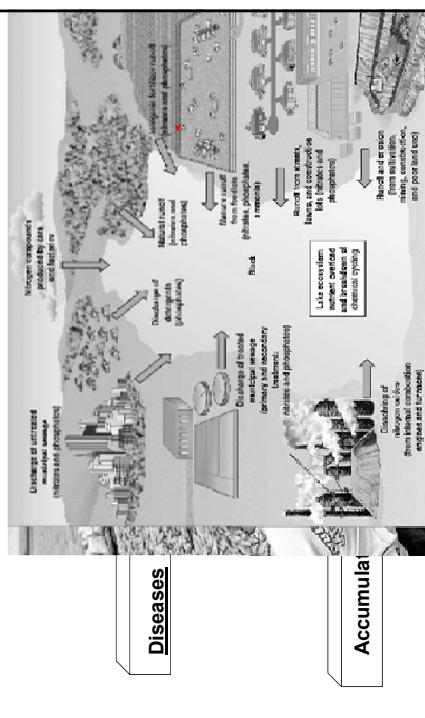
WATER POLLUTANTS

1. Wastewater Fraction



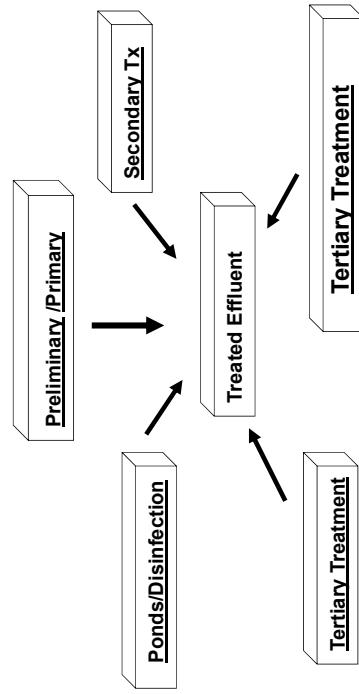
WATER POLLUTANTS

2. Environmental and Health Impact



WATER POLLUTANTS

3. Treatment Option

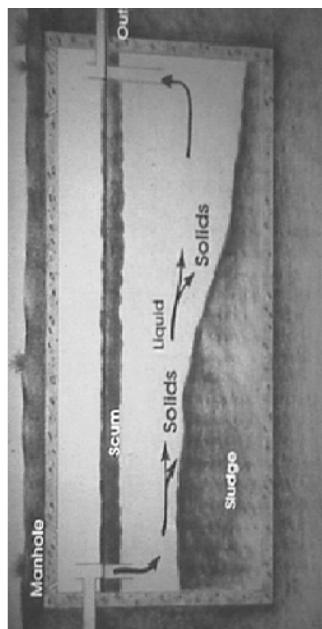


PRELIMINARY TREATMENT

- Chemical wastes are not allowed to be discharged into the sewer/WTP
- Infectious wastes must be first disinfected
 - Screening
 - Grease removal
 - Amalgam removal

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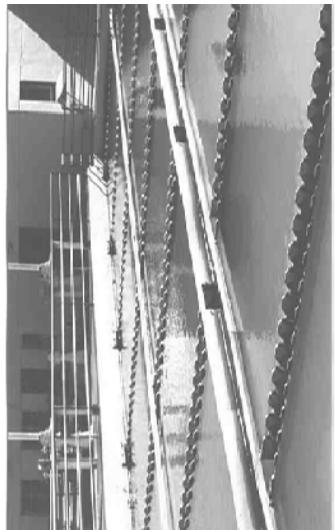
PRIMARY TREATMENT



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SEDIMENTATION TANKS

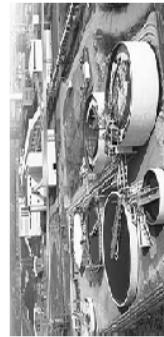


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SECONDARY TREATMENT

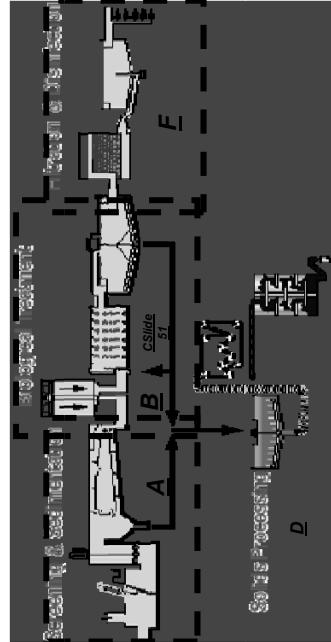


ACTIVATED SLUDGE



TRICKLING FILTER

WASTEWATER TREATMENT



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SEDIMENTATION TANKS



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TRICKLING FILTERS

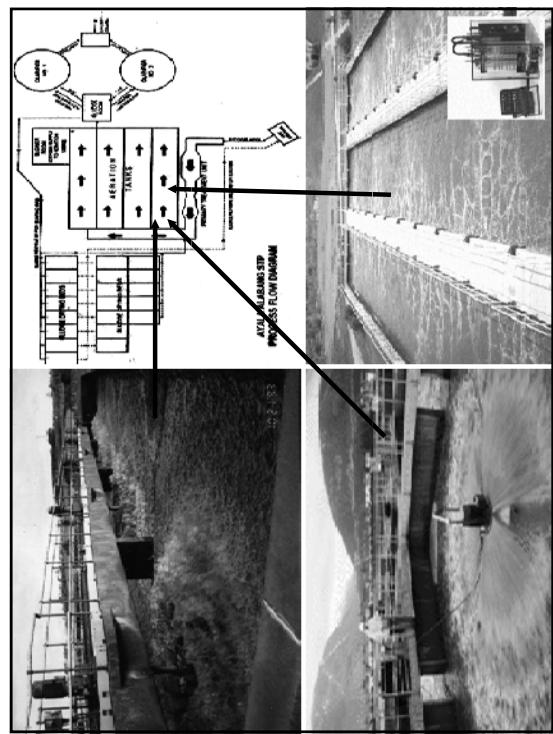


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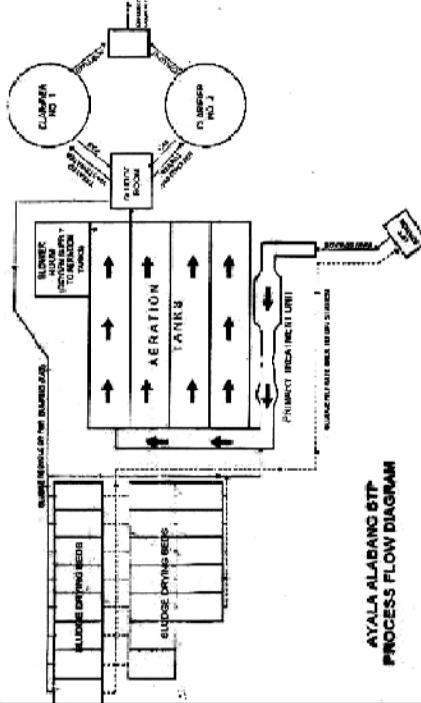
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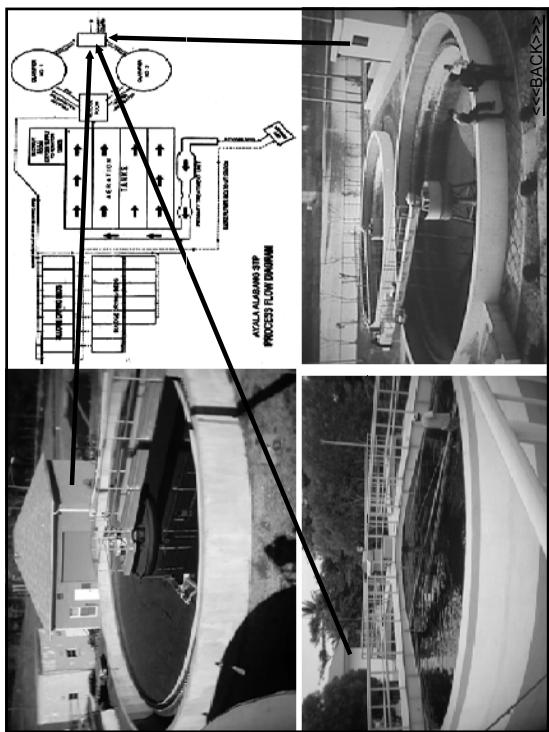
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CONVENTIONAL ACTIVATED SLUDGE TREATMENT PROCESS

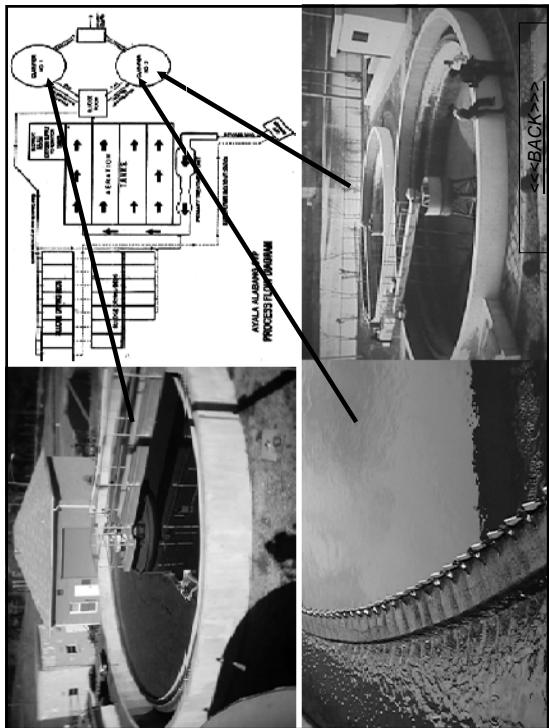


AYALA ALABANG STP
PROCESS FLOW DIAGRAM



TERTIARY TREATMENT

- Dissolved inorganic
 - Reverse osmosis
 - Distillation
 - Oxidation of NH_4^+ to NO_3^- and denitrification of NO_3^- to N_2 , both by biological processes



SLUDGE DEWATERING



TERTIARY TREATMENT

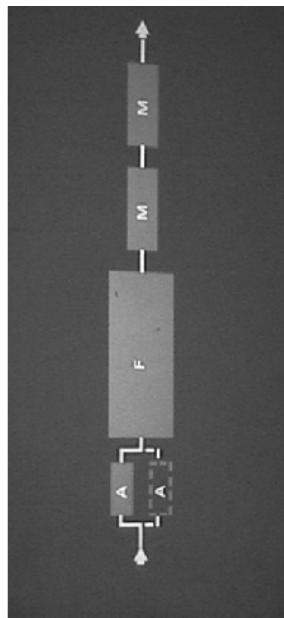
- Heavy Metals
 - Reverse osmosis
 - Distillation
 - Adsorption

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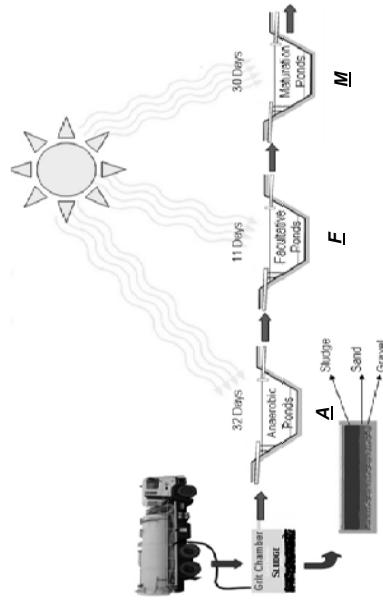
WASTE STABILIZATION PONDS



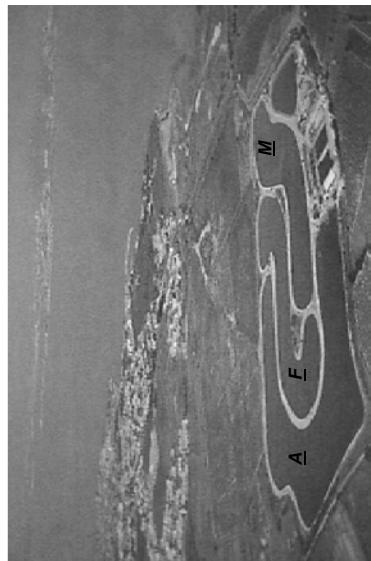
WASTE STABILIZATION PONDS



WASTE STABILIZATION PONDS



WASTE STABILIZATION PONDS



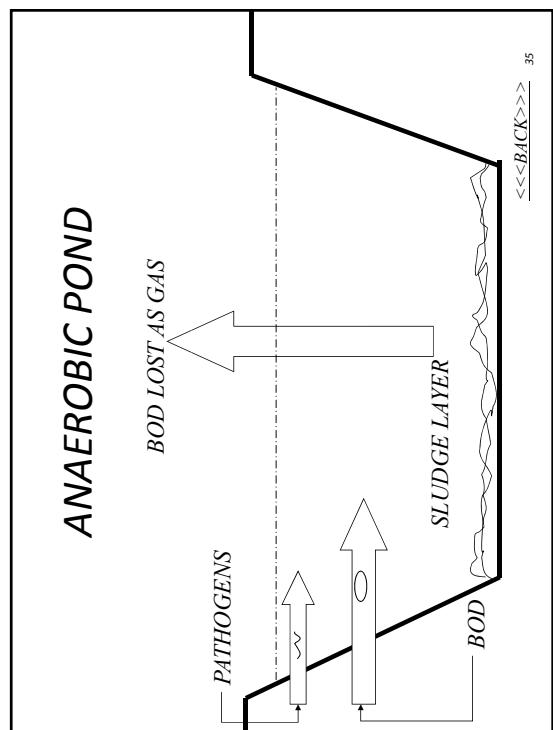
ANAEROBIC POND



ANAEROBIC POND

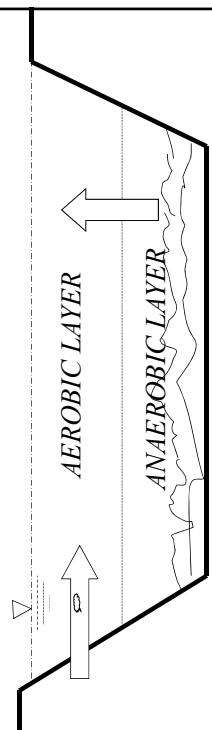


FACULTATIVE POND



FACULTATIVE POND

BOD LOST AS GAS

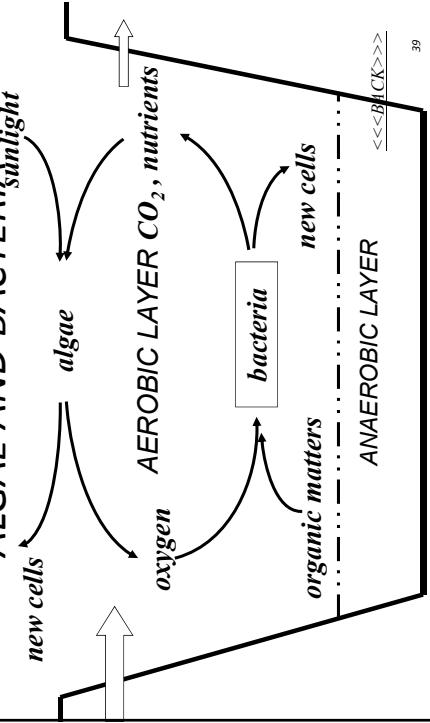


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MATURATION POND

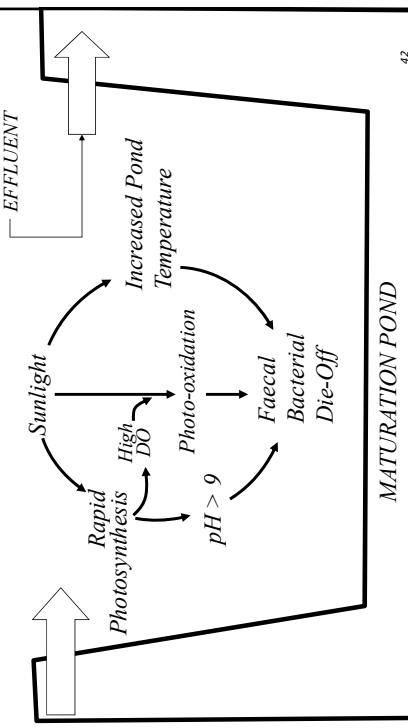


SYMBIOTIC RELATIONSHIP OF ALGAE AND BACTERIA



39

MECHANISMS FOR FAECAL COLIFORM DIE-OFF IN WSP



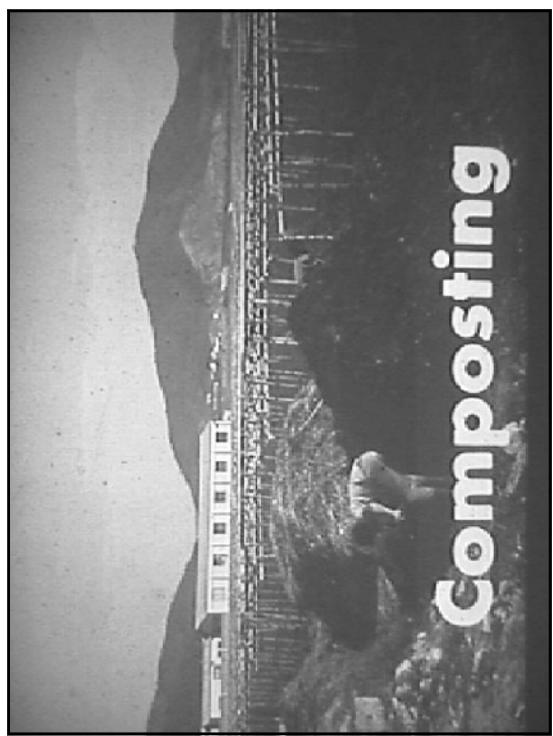
42

EFFLUENT STANDARDS: Conventional and Other Pollutants in Protected Waters Category I and II and in Inland Waters Class C DENR DAO 35 SERIES of 1990

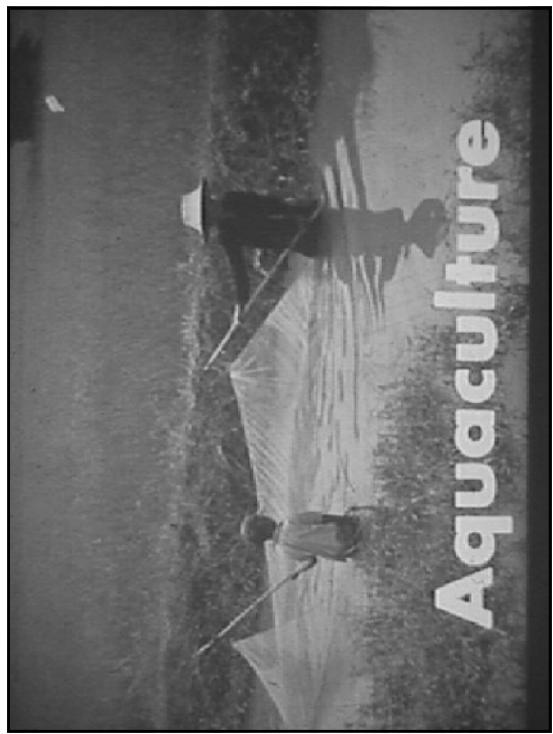
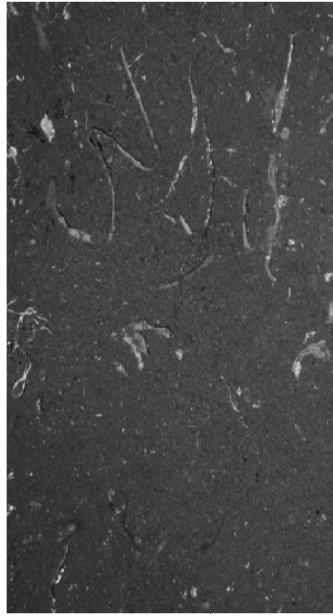
Parameter	Unit	Protected Waters		Category II		Category III		Inland Waters	
		Category I	Category II	Category I	Category II	Category III	Category IV	Category V	Category VI
Color	P.U.	—	—	—	—	—	—	—	—
Temperature (max rise in 15g Celsius in NW)	°C (site)	6	6	3	3	3	3	3	3
pH (10g/l)	—	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
TDS	mg/L	40	30	100	90	150	150	150	150
Soluble Solids (1 hour)	mg/L	40	30	0.3	0.3	0.5	0.5	0.5	0.5
5 Day 20°C BOD	mg/L	—	—	50	30	80	50	50	50
Total Suspended Solids	mg/L	—	—	70	50	90	70	70	70
Total Dissolved Solids	mg/L	—	—	1200	1100	—	—	—	—
Surfactants (LAS)	mg/L	—	—	5.0	2.0	7.0	5.0	5.0	5.0
Chlorine (Residual Ether Extract)	mg/L	—	—	5.0	5.0	10.0	5.0	5.0	5.0
Phytic Substances as Periods	mg/L	—	—	0.1	0.05	0.05	0.05	0.05	0.05
Total Coliforms	MEN/100mL	—	—	5000	3000	10,000	10,000	10,000	10,000

EFFLUENT





Composting



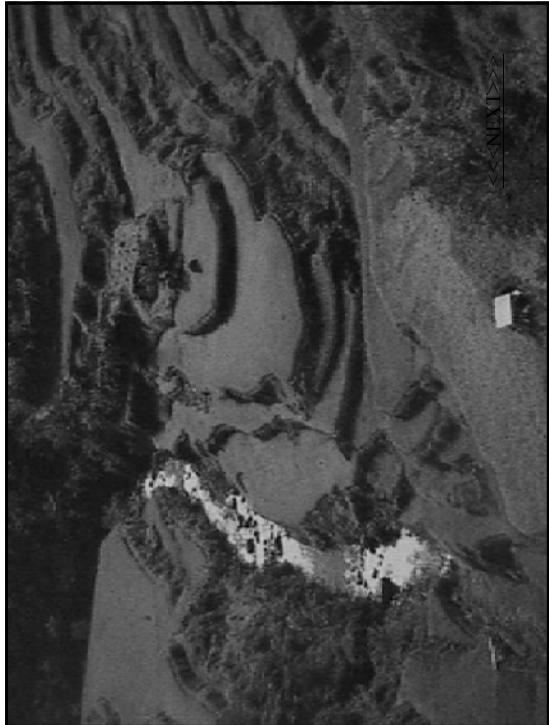
Aquaculture



THE NEED FOR WASTEWATER TREATMENT

- PROTECT RECEIVING WATERS FROM FAECAL CONTAMINATION
- PROTECT RECEIVING WATERS FROM OXYGEN DEPLETION AND ECOLOGICAL DAMAGE
- PRODUCE MICROBIOLOGICALLY SAFE EFFLUENTS FOR AGRICULTURAL AND AQUACULTURAL REUSE

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<<<NEXT>>>

Factors to be Considered in the Establishment of an On-Site WTP

- Regulatory requirements
 - Environmental Compliance Certificate
 - Accredited Pollution Control Officer
 - Working Plan signed by Professional ME
 - Engineering Report
 - Submission of Quarterly Self-Monitoring Report



Factors to be Considered in the Establishment of an On-Site WTP

- Reuse of treated wastewater
- Sludge and septage disposal
- Training requirement for operation
- Investment and operating cost

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Factors to be Considered in the Establishment of an On-Site WTP

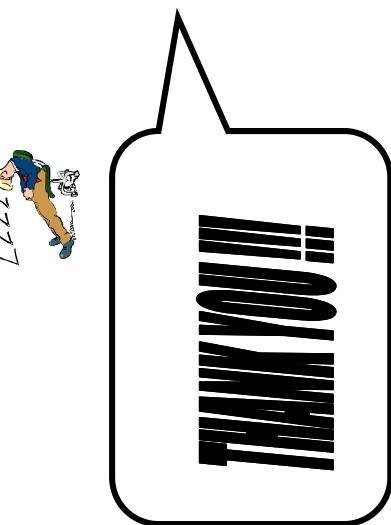
- Operation and Maintenance
 - Awareness among management and staff on wastewater problems
 - Physical Asset Management
 - Preventive Maintenance Program
 - Basic tools to carry out regular maintenance
 - PPE and safety equipment/measures
 - Trained operators and workers
 - Budget for operational and maintenance costs

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WATER-RELATED DISEASES

- WATER BORNE
- WATER WASHED
- WATER BASED
- WATER INSECT RELATED

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WASTE TREATMENT & DISPOSAL



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HEALTHCARE WASTE MANAGEMENT SYSTEM

Non Hazardous Waste
Infectious Waste
Sharps

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- About **75-90 %** of the waste produced by healthcare providers is non-hazardous or general waste.
- Uncontrolled dumping and improper waste handling causes a variety of problems (e.g. water contamination, breeding site of insects and rodents, flooding, etc.)



Non-Hazardous or General Waste



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SPECIFIC OBJECTIVES

1. Identify the appropriate treatment technologies and processes for healthcare waste;
2. Discuss the appropriate standard disposal system for each category of waste.

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Non-Hazardous or General Waste



1. Biodegradable Waste
2. Non-Biodegradable/
Recyclable Waste
3. Non-Biodegradable/Non-
Recyclable Waste

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Biodegradable Waste



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Recyclable Waste



 Source: A Tertiary Government Hospital

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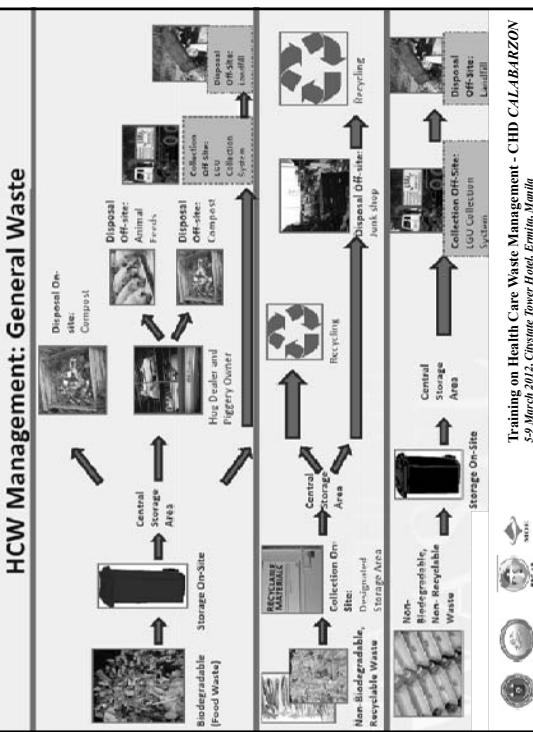
Non-recyclable/Non-Biodegradable Waste



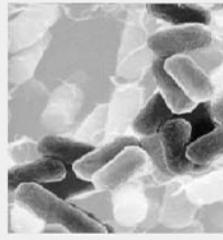
Source: DOH HCW Manual, 2011

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Infectious Waste



- **Infectious Agent - A** microbial organism with the ability to cause disease. Infectious agents are bacteria, viruses, fungi, and parasites.

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Infectious Waste

These are wastes that are most likely to contain pathogens (bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause diseases in susceptible hosts, which includes:



- cultures and stocks of infectious agents from laboratory work;
- waste from surgeries and autopsies on patients with infectious diseases.

Source: DOH HCWM Manual, 2011
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Infectious Waste (con't)

- waste from infected patients in isolation wards (e.g. excreta, dressings from infected wounds).

- waste that has been in contact with infected patients undergoing hemodialysis (e.g. dialysis equipment such as tubing and filters, disposable towels).

Source: DOH HCWM Manual, 2011

Source: DOH HCWM Manual, 2011
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Infectious Waste (con't)

- infected animals from research laboratories.
- any other instruments or materials that have been in contact with infected persons or animals.



Source: DOH HCWM Manual, 2011
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Source: DOH HCWM Manual, 2011
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How much Infectious Waste do we generate?

HCW Generation in NCR, Region 3 & 4 (DOH and Other Hospitals)			DOH Hospitals		
	All Hospitals (including DOH)	No of Hosp	No of HCW (kg/day)	No of Hosp	No of HCW (kg/day)
Philippines	2,068	94,000	36,660	71	25,855
NCR	200	29,330	11,439	20	9,445
Region 3	214	7,451	2,906	4	1,050
Region 4	321	10,685	4,167	4	3,000
Generation Rate: 0.39 kg/bed/day (ADB-JICA Study 2003)					

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Hazards from Infectious Waste

- Infectious waste may contain variety of pathogenic organisms.
- These organisms may be present in blood and other tissues.
- Pathogens in infectious waste may enter the human body through (a) puncture, abrasion, or cut in the skin; (b) through the mucous membrane; (c) by inhalation; and (d) by ingestion.

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Labeling, Markings, and Color-Coding of Waste Bins and Plastic Liners

- The purpose of color coding is to facilitate waste segregation, storage, collection, transport, treatment and disposal.

TYPE OF WASTE	PLASTIC LINERS	MARKINGS AND LABELLING OF PLASTIC LINER	TYPE AND COLOR OF PLASTIC LINERS	MARKINGS AND LABELLING OF BIN	BIN
Infectious waste	Properly labeled "INFECTIOUS WASTE" Source and weight of waste generated, date of collection optional	Yellow plastic that can withstand autoclaving Thickness: 0.005mm Sample sizes: XL size, 39cm x 39cm x 45cm; size varies depending on the volume of wastes	Properly labeled "INFECTOUS" and biohazard symbol	Properly labeled "INFECTOUS" and biohazard symbol	Strong, leak-proof bin with cover

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**In the implementation of a color coding system,
the following practices shall be imposed in the
HCF:**

TYPE OF WASTE	PLASTIC LINERS	MARKINGS AND LABELLING OF PLASTIC LINER	TYPE AND COLOR OF PLASTIC LINERS	BIN	MARKINGS AND LABELLING OF BIN	TYPE OF BIN
Pathological and Anatomical waste	Properly labeled "PATHOLOGICAL WASTE" tag indicating source and weight of waste generated, date of collection Biohazard symbol optional	Yellow plastic, Thickness: 0.005mm Sample sizes: XL size: 36cm x 36cm x 95cm (transfer space), size varies depending on the volume of wastes	Properly labeled "PATHOLOGICAL / ANATOMICAL WASTE" with biohazard symbol	Leak-proof bin with cover Size varies depending on the volume of wastes generated		

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- Highly infectious waste must be disinfected at source.
- Anatomical waste including recognizable body parts, placenta waste and fetus are disposed through safe burial or cremation.
- Pathological waste must be refrigerated if not collected/treated within 24 hours.
- Due to the current state of many landfills, it is advisable to shred or crush treated sharps waste before transport to landfill.

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Specifications of Waste Bins and Plastic Liners

- Bins for general waste shall be placed away from hazardous waste to prevent cross contamination.
- Aerosol containers can be collected together with the general waste.

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- Should be made of sturdy and leak-proof material.
- Bins shall have well-fitting lids.
- Both the bins and the plastic liners shall be preferably of the same color for the type of waste intended to be placed.
- Plastic liners shall withstand autoclaving at 121° C - 130° C.
- Recommended thickness of plastic liners is 0.009mm. Only bins for general wastes shall be placed in public area.

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Waste Transport

- Consignment Note
- All HCW should be transported only by a DENR-accredited transporter (except non-hazardous HCW)
- The authorized transporter shall maintain a completed consignment note of all HCW for treatment or disposal and updated transport permit.

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The consignment note shall include, but is not limited to the following information:

- The name, address, telephone number, and accreditation number of the transporter, (unless the transporter is the generator)
 - The type and quantity of HCW transported
 - The name, address, and telephone number of the generator

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Waste Treatment

- The purpose of treating HCW is to change the biological and chemical character of the waste to minimize its potential to cause harm.
- The name, address, telephone number, permit number, and the signature of an authorized representative of the approved facility receiving the HCW
- The date that the HCW is collected or removed from the generator's facility, and the date that the HCW is received by the treatment facility.

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- **Sterilization** is defined as a $6\log_{10}$ survival probability of the most resistant microorganism of concern in a given process.
- **Disinfection** is defined as low, intermediate or high depending on the survival probability of specific microbial groups.

Selection Criteria of Healthcare Waste Treatment Technology

- Treatment efficiency
- Occupational health, safety and environmental considerations
- Volume and mass reduction
- Types and quantity of wastes for treatment and disposal/capacity of the system

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- Infrastructure and space requirements (investment and operational cost)
- Locally available treatment options for final disposal
- Training requirements for operation of the method
- Cost of operation and maintenance considerations
- Location/surrounding of the treatment site and disposal facility
- Regulatory requirements
- Social and political acceptability

HCW TREATMENT TECHNOLOGY / METHODS	DESCRIPTION	APPLICABILITY	REMARKS
Pyrolysis	Thermal decomposition of HCW in the absence of supplied molecular oxygen in the destruction chamber in HCW is converted into gaseous, liquid, or solid form.	All types of waste except mercury waste	Costly, Not yet available in the country
Autoclave	Uses steam sterilization to render waste harmless and is an efficient wet thermal disinfection process. <i>(For autoclaves that do not shred waste during clean disinfection, color-changing indicator strips may be inserted inside the yellow bag in the middle of each load and that strip shall be checked to ensure that steam penetration has occurred).</i>	All types of waste except anatomical/ pathological, expired pharmaceutical drugs, cytotoxic, chemical, radioactive waste, and mercury waste	Relatively low investment and operating costs. And has no significant environmental adverse impact!

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HCW TREATMENT TECHNOLOGY/ METHODS	DESCRIPTION	APPLICABILITY	REMARKS
Microwave	Waste is exposed to microwaves that raises the temperature to 100°C (237.6°F) for at least 30 minutes. (<i>Heteroorganisms are destroyed by moist heat which irreversibly coagulates and denatures enzymes and structural proteins. Shredding of wastes is done before disinfection.</i>)	The process is inappropriate for the treatment of anatomical waste and animal carcasses, and will not efficiently treat chemical or pharmaceutical waste	The system has a relatively high investment and operating costs. (<i>Not recommended for individual/HCF</i>)
Disinfection	Chemicals like sodium hypochlorite, hydrogen peroxide, among others are added to HCW to kill or inactivate pathogens present.	Chemical disinfection is most suitable in treating blood, urine, stools and sewage.	Application of this method shall only be done when there is no available treatment facility in the area.

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HCW TREATMENT TECHNOLOGY/ METHODS	DESCRIPTION	APPLICABILITY	REMARKS
Autoclave	Waste is exposed to steam under pressure at 121°C (250°F) for 15-30 minutes.	Applicable only to treated infectious waste, pathological and anatomical waste, encapsulated/ inertized pharmaceutical wastes, and encapsulated/ inertized solid chemical wastes.	The process is appropriate for the treatment of anatomical waste and animal carcasses, and will not efficiently treat chemical or pharmaceutical waste

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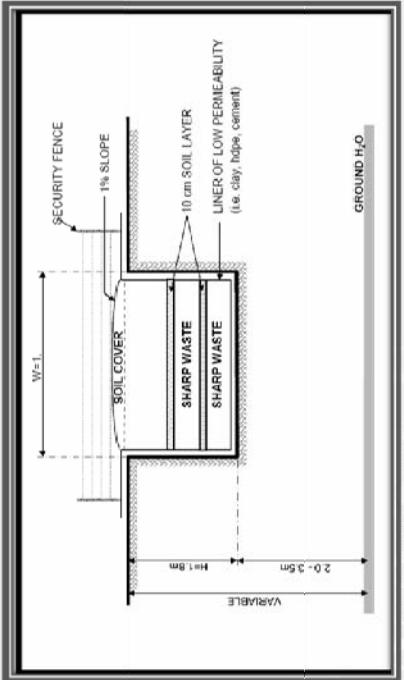
Safe Burial at HCF Located in Remote Areas	<ul style="list-style-type: none"> Safe burial as a disposal method is applicable only to treated infectious waste, pathological and anatomical waste, encapsulated/ inertized pharmaceutical wastes, and encapsulated/ inertized solid chemical wastes.

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Autoclave (Image taken from the UP-NIH)	

Safe Burial Pit (Volume of 1 x 1 x 1.8 m)



Source: DOH HCWM Manual, 2011

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Situations where safe burial of HCW is allowed are the following:

- HCF is located in a remote and far-flung area.
- HCF does not have access to TSD facilities.
- HCF belongs to an LGU with an income classification of 5th or 6th Class.
- Only viable option at the specific period of time (Temporary solution).



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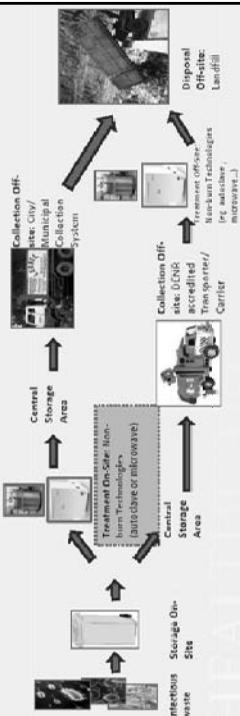
The Safe Burial Site shall:

- Have an accessibility limited to authorized personnel.
- Be lined with a material of low permeability, such as clay or HDPE, to prevent pollution of any shallow groundwater that may subsequently reach nearby wells.
- Only allow hazardous HCW to be buried. (burying general waste fill-up available space quickly).
- Each layer of waste covered with soil to prevent odor and proliferation of rodents and insects.
- Not located in flood prone areas.
- Be secured (e.g. fenced with warning signs).
- Downhill or down-gradient from any nearby wells and about 50 meters away from bodies of water.
- Have the bottom of the pit at least 1.5 meters above the ground water table.



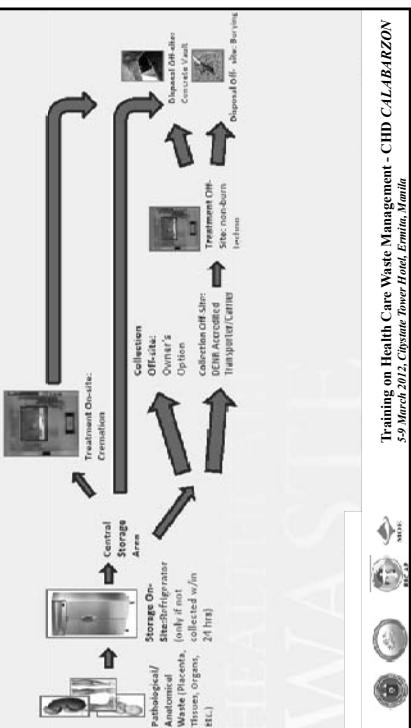
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HCW Management: Infectious Waste



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HCW Management: Pathological/ Anatomical Waste



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Sharps



- As a biohazard material, injuries from sharps waste can pose significant occupational and public health concern.
- By penetrating the skin it is possible for this waste to spread blood-borne pathogens.
- The general public can also be directly or indirectly at risk to injuries from sharps waste.

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- For healthcare workers the fraction of infections due to percutaneous occupational exposure to HBV, HCV and HIV are 37%, 39% and 4% respectively.
- More than 2 million healthcare workers are exposed to percutaneous injuries with infected sharps every year,(WHO, 2009).

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- High risk of exposure to infections such as HIV/AIDS and Hepatitis B and C among healthcare workers.
- In 2000, sharps injuries in healthcare workers were estimated to cause about 66,000 HBV, 16,000 HCV and 200-5000 HIV infections among health-care workers (Prüss-Ustun et al. 2005).

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Labeling, Markings and Color-Coding of Plastic Liners and Bin

TYPE of WASTE	PLASTIC LINERS	MARKINGS AND LABELLING OF PLASTIC LINER	MARKINGS AND LABELLING OF BIN	TYPE of BIN
Sharps	Not applicable	Not applicable	Properly labelled "SHARPS" Source and weight of waste generated, date of collection With biohazard symbol (optional)	Puncture-proof container with wide mouth and cover.

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Definition

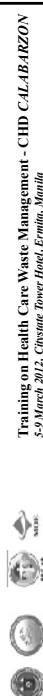
- Sharps include needles, syringes, scalpels, saws, blades, broken glass, infusion sets, knives, nails and any other items that can cause a cut or puncture wounds.
- Whether or not they are infected, these items are usually considered as highly hazardous HCW.

TREATMENT TECHNOLOGY	DESCRIPTION
Encapsulation	<ul style="list-style-type: none"> • Encapsulation involves the filling up of containers with waste, adding and immobilizing material, and sealing the containers. • The process uses either cubic boxes made of high-density polyethylene or metallic drums, that are three quarters filled with sharps or chemical or pharmaceutical residues. • The containers or boxes are then filled up with a medium such as plastic foam, bituminous sand and cement mortar. • After the medium has dried, the containers are sealed and disposed of in landfill.



Sharps Container

(Images taken from San Juan De Dios Hospital)

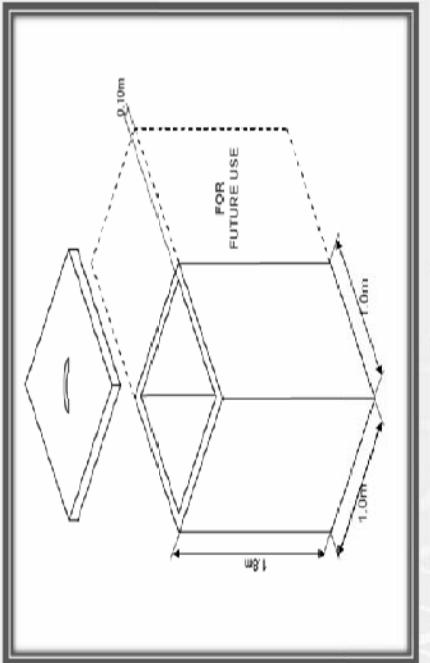
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Safe Burial at HCF Located in Remote Areas

- Safe burial as a disposal method is applicable only to treated infectious waste, pathological and anatomical waste, encapsulated/inertized pharmaceutical wastes, and encapsulated/inertized solid chemical wastes.

Concrete Vault	
This method is especially suitable for the disposal of used sharps and syringes.	The following steps shall be observed:
 Select a site that is isolated and at least 150 meters away from the water supply sources and dwelling units	<ul style="list-style-type: none"> ➤ Dig a pit (minimum size of 1 m x 1 m x 1.8 m depth), enough to accommodate sharps and syringes for an estimated period of time without reaching the groundwater level.

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Concrete Vault

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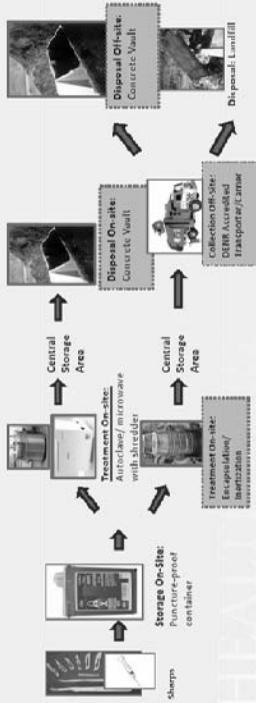
Concrete Vault

- Construct concrete walls and slabs of the pit.
- Provide slab with opening or manhole for easy deposition of collected sharps and syringes.
- The manhole shall be extended a few centimeters above the soil surface to overcome infiltration of surface water.
- Deposit the collected safety boxes filled with used sharps and needles inside the concrete vault.
- Install a security fence around the site with signage.

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HCW Management: Sharps



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Module Objectives

Institutionalization and Sustainability of Health Care Waste Management

Engr. Aida Camacho- Barcelona, SE, MSE
Department of Health



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At the end of the session, the participant will be able to:

1. Identify requirements and strategies on how to institute and sustain a HCWVM program in each HCF;
2. Identify the duties and responsibilities of the Office of the Administrator of the HCF;
3. Identify the required composition of HCWM Committee and the corresponding duties and responsibilities of each member;
4. Discuss the purpose of planning healthcare waste management in the health care facility level;
5. Identify communication and training intervention needed; and
6. Discuss the budgetary requirements.



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Administrative Requirements and Strategies

1. Organization of a Healthcare Waste Management Committee (HCWMC)
2. An up-dated healthcare waste management plan (HCWMP) that incorporates monitoring procedures;
3. Allocation of sufficient financial and personnel resources to ensure effective and efficient implementation of the HCWMP
4. Adequate training for key members and designate the staff responsible for coordinating and implementing training courses for HCF staff; and
5. Development of information, education, and communication (IEC) program/materials



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Administrator and/or Head of the HCF

Shall ensure the following:

- Organization of a Healthcare Waste Management Committee (HCWMC)
 - should be fully represented by all medical, nursing, and administrative services in the HCF
- Designation of a Waste Management Officer (WMO) or its equivalent/ Pollution Control Officer (PCO)
 - to supervise and coordinate the HCWM program planning and its subsequent implementation

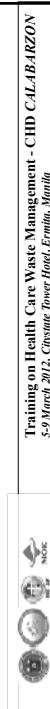


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Administrator and/or Head of the HCF

Shall ensure the following:

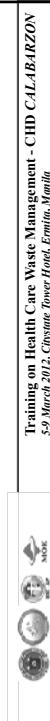
- An up-dated healthcare waste management plan (HCWMP) that incorporates monitoring procedures
- Allocation of sufficient financial and personnel resources to ensure effective and efficient implementation of the HCWMP



Administrator and/or Head of the HCF

Shall ensure the following:

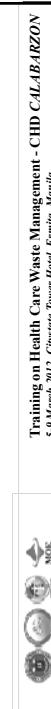
- Appointment/designation of alternate member in the event of personnel leaving key positions in the HCWMC or temporarily assign responsibility to another staff member until another one can be formally appointed/designated



Administrator and/or Head of the HCF

Shall ensure the following:

- Adequate training for key members and designate the staff responsible for coordinating and implementing training courses
- Speedy resolution of complaints and other related legal matters



Administrator and/or Head of the HCF

Shall ensure the following:

- Good working relationship with other related agencies by proper referral, consultation and cooperation concerning HCWM
- The effective management of healthcare waste depends on good administration and organization of HCWMC



Healthcare Waste Management Committee (HCWMC)



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HCWM Committee: Responsibilities

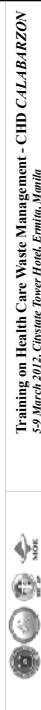
- Implement the HCWM plan;
- Ensure adequate financial and human resources for implementation of the HCWM plan;
- Conduct regular committee meetings and submit minutes of meetings;



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HCWM Committee: Responsibilities

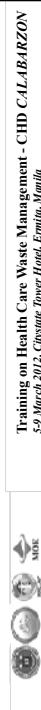
- Formulate a policy formalizing the commitment of the HCF to proper management of its waste with the goal of protecting health and the environment;
- Establish baseline data and develop the HCF's HCWVM plan which shall include a minimization plan, training, and written guidelines on waste management;



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HCWM Committee: Responsibilities

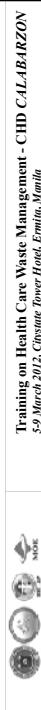
- Regularly monitor and evaluate the efficiency and effectiveness of the HCWMP;
- Ensure strict compliance to existing laws, policies and guidelines;
- Review and update the policy, plans, and guidelines on an annual basis.



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HCWM Committee: Responsibilities

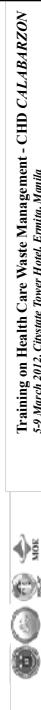
- Formulate a policy formalizing the commitment of the HCF to proper management of its waste with the goal of protecting health and the environment;
- Establish baseline data and develop the HCF's HCWVM plan which shall include a minimization plan, training, and written guidelines on waste management;



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HCWM Committee: Responsibilities

- Regularly monitor and evaluate the efficiency and effectiveness of the HCWMP;
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- Review and update the policy, plans, and guidelines on an annual basis.



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Healthcare Waste Management Committee

- Shall Have a Core Team to be composed of at least a minimum of five (5) members.
- Head/ Administrator of the HCF - shall be the Chairperson.
 -



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HCWMC Core Team

1. Administrator of the HCF as Chairperson
2. Designated Waste Management Officer as Co-Chair
3. Designated Infection Control Officer
4. Designated Pollution Control Officer
5. Head of Finance/ Budget Officer

Core Team shall be supported by key personnel in HCF



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Healthcare Waste Management Committee

Core team - shall have the following duties and responsibilities:

- Organize and establish the HCWM sub-committees or group who will directly implement the HCVWM policies and guidelines within specific units of the HCF
- Prepare the budgetary planning for the logistic requirements to implement the HCWM program within the HCF
- Provide assistance to all units relative to the proper orientation of all staff;



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Healthcare Waste Management Committee

Core Team - shall have the following duties and responsibilities:

- Formulate policies and guidelines in the implementation of the different programs including granting of incentives for noted best practices
 - Approve request for unit activities and programs which will include training
 - Document and prepare report on regular basis



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Group Work

Current HCWM Org. Structure and Experiences	Issues/Concerns	Recommendations

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Healthcare Waste Management Committee

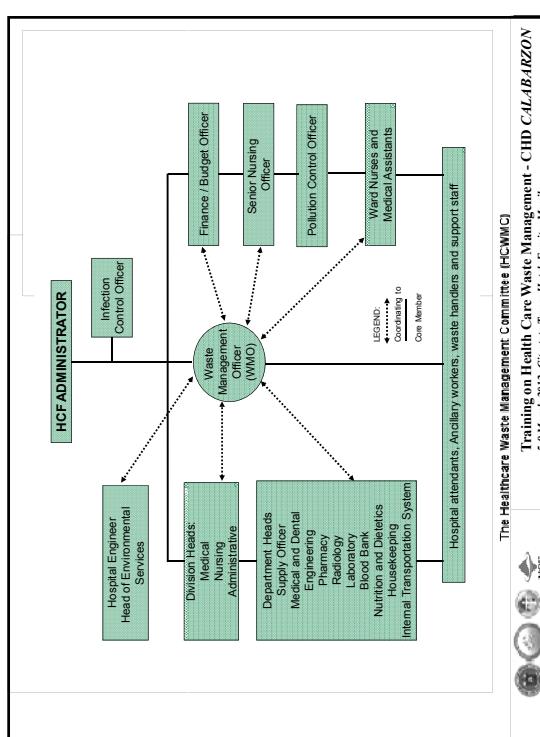
- Administrator of the HCF designated as Chairperson of the HCWM Committee shall –
 - be responsible in ensuring that the HCV shall be managed in accordance with the national policies and guidelines;
 - formally appoints/designates dedicate personnel as Waste Management Officer and Pollution Officer and other core members of the HCWMC indicating the specific duties and responsibilities, including their accountability S

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Administrator of the HCF as Chairperson



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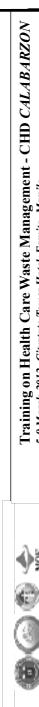


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Healthcare Waste Management Committee
<ul style="list-style-type: none"> • directs and controls the implementation of the different programs and activities of the HCWMC • conducts regular review of the policies subject for revision and assessment



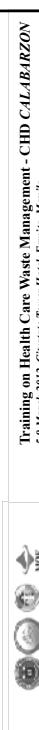
Healthcare Waste Management Committee
<p>2. Waste Management Officer (WMO) designated as Co-Chair of the HCWMC shall-</p> <ul style="list-style-type: none"> • be responsible for the day to day operation and monitoring of the waste management system in the hospital; • directly responsible to the Head/Administrator of the HCF;



Waste Management Officer (WMO)
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Healthcare Waste Management Committee
<p>Waste Management Officer -</p> <ul style="list-style-type: none"> • establish linkage with the Infection Control Officer, the Chief Pharmacist, and the Radiation Officer in order to become familiar with the correct procedures for handling and disposing of pathological, pharmaceutical, chemical and radioactive waste.



<h3>Healthcare Waste Management Committee</h3> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; padding: 5px; vertical-align: top;"> Waste Management Officer - </td><td style="width: 85%; padding: 5px;"> <ul style="list-style-type: none"> ○ Ensures that the internal regular collection of waste , proper waste segregation, collection and transport are properly observed; ○ Observes and directs the provisions of continuous availability of waste bins, plastic liners, personal protective equipment, and collection bins/carts, and direct supervision of collection crews; </td></tr> </table> <p style="text-align: right; margin-top: -10px;">     <small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small> </p>	Waste Management Officer -	<ul style="list-style-type: none"> ○ Ensures that the internal regular collection of waste , proper waste segregation, collection and transport are properly observed; ○ Observes and directs the provisions of continuous availability of waste bins, plastic liners, personal protective equipment, and collection bins/carts, and direct supervision of collection crews; 	<h3>Healthcare Waste Management Committee</h3> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; padding: 5px; vertical-align: top;"> Waste Management Officer - </td><td style="width: 85%; padding: 5px;"> <ul style="list-style-type: none"> ○ Checks and directs correct use of central storage facility, which shall be kept locked but is accessible to authorized staff at all times; ○ Coordinates and monitors waste treatment, disposal operations, waste transport for both on-site and off-site; </td></tr> </table> <p style="text-align: right; margin-top: -10px;">     <small>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</small> </p>	Waste Management Officer -	<ul style="list-style-type: none"> ○ Checks and directs correct use of central storage facility, which shall be kept locked but is accessible to authorized staff at all times; ○ Coordinates and monitors waste treatment, disposal operations, waste transport for both on-site and off-site;
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Healthcare Waste Management Committee

3. Infection Control Officer (ICO)/ Safety Officer (SO) -
Shall have the following duties and responsibilities:

- Maintains linkage with the WMO on a continuous basis and provide advice concerning the control of infection and the standards of the waste disposal system;
- Identifies training requirements according to staff grade and occupation;



Healthcare Waste Management Committee

Infection Control Officer (ICO)/ Safety Officer (SO)

- Handles the overall responsibility for chemical disinfection, sound management of chemical stores, and chemical waste minimization; and,
- Ensures that all chemicals used in the HCF have Material Safety Data sheet (MSDS)



Infection Control Officer (ICO)/ Safety Officer (SO)



Healthcare Waste Management Committee

Infection Control Officer (ICO)/ Safety Officer (SO)

- Organizes and supervises staff training courses on safe waste management;
- Liaises with the department heads and Senior Nursing Officer regarding training of staff;



Healthcare Waste Management Committee

4. Pollution Control Officer (PCO) -

Shall be responsible for the HCF compliance on the requirements mandated by EMB, DENR and other regulatory agencies. He/she shall have the following duties and responsibilities:

- Attends to the requirements of the HCF prior to the construction or installation of pollution control facilities including the application and securing of necessary pollution permits and renewal;



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Pollution Control Officer (PCO)



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Healthcare Waste Management Committee

Pollution Control Officer (PCO) -

- Monitors activities pertaining to the installation or construction of pollution source and control facilities thereby ensuring their compliance with air, noise and water quality standards; the PCO and the head of the HCF shall be held responsible for any violations of PD 984 and its implementing rules and regulations committed by the establishment where the officer is employed;



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Healthcare Waste Management Committee
<p>Pollution Control Officer (PCO) -</p> <ul style="list-style-type: none"> Supervises the proper operation and maintenance of pollution control facilities of the establishment or agency; Reports within reasonable time to the EMB-DENR the breakdown of any pollution control facility, and the estimated and the actual date of completion/repair and operation;

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Healthcare Waste Management Committee
<p>Pollution Control Officer (PCO) -</p> <ul style="list-style-type: none"> Promptly submits validated/certified as correct by the General Manager periodic reports as stipulated in section 7 hereof or as required by the EMB-DENR; Acts as liaison officer and maintain linkage with the DOH, DENR, EMB and other designated PCO of other agencies including the local government unit PCO;

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Healthcare Waste Management Committee
<p>Pollution Control Officer (PCO) -</p> <ul style="list-style-type: none"> Keeps himself abreast with the requirements of the Department and the latest available technology on the prevention, control and abatement of pollution; and Attends the meetings for PCO's which may from time to time be called by the monitoring agency.

Head of Finance/Budget Officer

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Healthcare Waste Management Committee
5. Head Finance/ Budget Officer

shall be responsible in assuring the provision of continuous logistics and inclusion in the annual development plan for maintaining and sustaining the programs and activities being implemented by the HCWM Committee.

		
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Division Heads, Department Heads and Other Key Personnel


		
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Healthcare Waste Management Committee
Division Heads of the Medical, Nursing and Administrative Services shall:

- Ensure strict compliance of their respective staff in the policies and guidelines being implemented by the HCWMC;
- Disseminate policies and guidelines down the line including all the support staff in the HCF;
- Conduct regular orientation and reorientation among their HCF workers;
- Maintain linkage with the designated WMO;

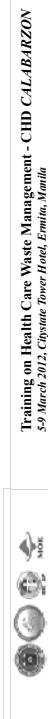
Division Heads of the Medical, Nursing and Administrative Services


		
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<h3>Healthcare Waste Management Committee</h3> <p>Department Heads shall be responsible within their respective areas of concern in ensuring that all members of their department are aware of the HCWP as to segregation and storage procedures and that strict compliance has been observed</p>	<p>Department Heads</p> <ul style="list-style-type: none"> • Ensure that all doctors, nurses, and clinical and non-clinical professional staff in their departments are aware of the segregation and storage procedures and that all personnel comply with the highest standards in HCWM; • Liaise with the WMO to monitor working practices against failures or mistakes;  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermita, Manila</p>
<h3>Healthcare Waste Management Committee</h3> <p>Department Heads</p> <ul style="list-style-type: none"> • Ensure that key staff members in their departments are given training in waste segregation and disposal procedures; and • Encourage medical and nursing staff to be vigilant so as to ensure that hospital attendants and ancillary staff follow correct procedures at all times.  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermita, Manila</p>	<p>Healthcare Waste Management Committee</p> <p>The Senior Nursing Officer is responsible for the training of nursing staff, medical assistants, hospital attendants, and ancillary staff in the correct procedures for segregation, storage, transport, and disposal of waste.</p> <p>He/ she shall therefore:</p> <ul style="list-style-type: none"> • Liaise with the WMO and the advisers (Infection Control Officer, Chief Pharmacist, and Radiation Officer) to maintain the highest standards in healthcare waste management;  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermita, Manila</p>
<h3>Healthcare Waste Management Committee</h3> <p>Department Heads</p> <ul style="list-style-type: none"> • Ensure that key staff members in their departments are given training in waste segregation and disposal procedures; and • Encourage medical and nursing staff to be vigilant so as to ensure that hospital attendants and ancillary staff follow correct procedures at all times.  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermita, Manila</p>	<p>Healthcare Waste Management Committee</p> <p>The Senior Nursing Officer is responsible for the training of nursing staff, medical assistants, hospital attendants, and ancillary staff in the correct procedures for segregation, storage, transport, and disposal of waste.</p> <p>He/ she shall therefore:</p> <ul style="list-style-type: none"> • Liaise with the WMO and the advisers (Infection Control Officer, Chief Pharmacist, and Radiation Officer) to maintain the highest standards in healthcare waste management;  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermita, Manila</p>

<h3>Healthcare Waste Management Committee</h3> <p>The Senior Nursing Officer</p> <ul style="list-style-type: none"> Coordinate with the Department Heads on training activities, and on other waste management issues specific to particular departments. <div style="text-align: right; margin-top: -20px;">  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermita, Manila</p> </div>	<h3>Healthcare Waste Management Committee</h3> <p>The Chief Pharmacist</p> <ul style="list-style-type: none"> ensure that personnel involved in pharmaceutical waste handling and disposal receive adequate training; and ensure safe utilization of genotoxic products and the safe management of genotoxic waste. <div style="text-align: right; margin-top: -20px;">  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermita, Manila</p> </div>	<h3>Healthcare Waste Management Committee</h3> <p>The Radiation Officer</p> <ul style="list-style-type: none"> ensure that involved personnel receive radioactive adequate training <div style="text-align: right; margin-top: -20px;">  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermita, Manila</p> </div>	<h3>Healthcare Waste Management Committee</h3> <p>The Chief Pharmacist</p> <ul style="list-style-type: none"> coordinate continuous monitoring of compliance with procedures for the storage and disposal of pharmaceutical waste; liaise with the Department Heads, the WMO, the Senior Nursing Officer and give advice on the appropriate procedures for radioactive waste disposal including its continuous monitoring <div style="text-align: right; margin-top: -20px;">  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermita, Manila</p> </div>
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<h3>Healthcare Waste Management Committee</h3> <p>The Head of the General Services including the unit heads of housekeeping and janitorial services shall:</p> <ul style="list-style-type: none"> • assist in the preparation of the HCWMP • maintain cleanliness and orderliness of the HCF premises for aesthetic reasons • initiate a sanitary manner of implementing the pre-treatment processes, appropriate collection system/procedures and disposal of waste either by TSD or municipal system <div style="text-align: right; margin-top: -20px;"> <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermata, Manila</p> </div>	<h3>Healthcare Waste Management Committee</h3> <p>Head of the General Services</p> <ul style="list-style-type: none"> • Establish baseline data, ensure generation of data for regular reporting and monitoring, and maintain proper filing system and update program records • Maintain constant good working relationship with all HCF personnel for their support and full participation in implementing the program <div style="text-align: right; margin-top: -20px;"> <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermata, Manila</p> </div>	<h3>Healthcare Waste Management Committee</h3> <p>Maintenance and Ground Services shall:</p> <ul style="list-style-type: none"> • assist in the proper collection, pre-treatment and disposal of HCW • carry out directly the activities related to the operation and maintenance of pre-treatment, collection and disposal system as soon as possible with importance to the drainage system and plumbing facilities of the establishment • attend immediately to problems arising from the repair/installation of waste equipment <div style="text-align: right; margin-top: -20px;"> <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermata, Manila</p> </div>
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<p>Healthcare Waste Management Committee</p> <p>The Motor Pool and Ground Services shall:</p> <ul style="list-style-type: none"> assist in the provision of vehicle for transporting healthcare waste to transfer station or disposal sites prepare and plan the collection system routes and frequency of collection of HCW <div style="text-align: right; margin-top: -20px;">  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermida, Manila</p> </div>	<p>Healthcare Waste Management Committee</p> <p>The Motor Pool and Ground Services shall:</p> <ul style="list-style-type: none"> Inspect and schedule maintenance work on vehicles use for transporting HCW; Observe proper infection control measures in the maintenance of vehicles used for the transportation of HCW. <div style="text-align: right; margin-top: -20px;">  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermida, Manila</p> </div>	<p>Healthcare Waste Management Committee</p> <p>The HCF Engineer or the designated in-charge of engineering services shall:</p> <ul style="list-style-type: none"> be responsible for installing and maintaining waste storage facilities and handling equipment that comply with the specifications of the national guidelines be accountable for the adequate operation and maintenance of any on-site waste treatment equipment <div style="text-align: right; margin-top: -20px;">  <p>Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Caysati Tower Hotel, Ermida, Manila</p> </div>
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Health Care Waste Management Plan

- A comprehensive HCWM plan is the key ingredient to a successful waste management within a HCF.
- It is important that the plan shall be clearly understood to be of great value to the institution.

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Communication and Training

- All HCF, the Department of Health, and EMB-DENR have the responsibility and a "duty of care" for the environment and public health, particularly in the institutionalization of awareness among HCW and the general public.

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Communication and Training

- Every member of the HCF and the community has the right to be informed about the potential health hazards associated to HCW.
- Inadequate handling of HCW may have serious public health consequences and impact on environment health protection.

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Communication and Training

- Public awareness through formal or informal education plays an important role in HCWM.
- Development of information, education and communication (IEC) programs and materials shall be given due course.

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Objectives of Communication and Training

- To foster responsibility among hospital patients and visitors to HCF regarding hygiene and HCWM
- To prevent exposure to HCW and related health hazards

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Objectives of Communication and Training

(con't)

- To increase awareness of the impact of HCW on environment and ecology
- To influence behavior of patients, watchers, healthcare facilities workers to implement proper HCWM



Considerations in Developing IEC Tools

- Specific targeted participants, including their level of understanding and involvement in the implementation of the HCWM plan;
- Availability of funds and logistics to sustain the program;
- Support of the HCF management to the program



Communication and Training

- Use of Tri media - announcement or commercial ads featured in radios, movies, television, newspaper, magazines and the internet
- Conduct series of orientation/re-orientation seminars, trainings and workshop among HCW, community and health teachings among hospital patients, watchers and other clients using the IEC materials and didactic exercises.



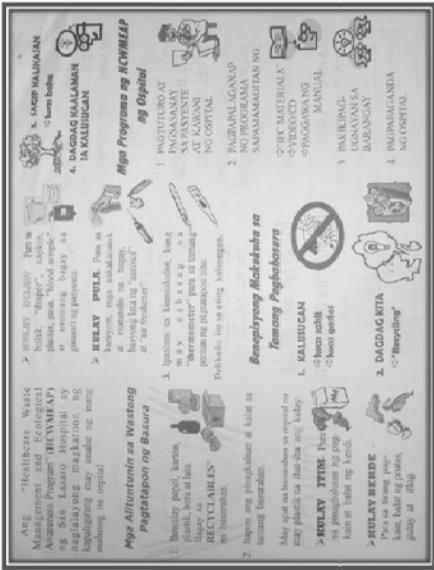
Communication and Training

- Issuances of written HCF policies to disseminate the information and awareness among HCW.
- There shall be corresponding sanctions to be implemented for non compliance of the issued policies to ensure strict compliance.



Training: Target Personnel

- HCF managers and administrative staff responsible for implementing regulations on HCWM
- **KULAY** PUL. Puso ni kuryente, mula sa elektrisidad, na makakawalaan, at nasaan pa ba? tulad ng bayanan, lupa at gubat, at sa medisina?
- 3. Ito ay or bawat kahulugan, tulad ng thermometer, para sa tamang pagtalon ng pulas, at sa titingling ng mga halaman.
- 4. DILAGAN MALAMAN SA KALIBIGAN
- **KULAY** PUL. Puso ni kuryente, mula sa elektrisidad, na makakawalaan, at nasaan pa ba? tulad ng bayanan, lupa at gubat, at sa medisina?
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- 4. DILAGAN MALAMAN SA KALIBIGAN



IEC Material: Leaflet given to patient upon admission to hospital.

(courtesy of San Lazaro Hospital)

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Training of Healthcare Personnel

- All personnel must receive initial and annual training.
- A trained individual must be available during training sessions.

Basic training program for healthcare staff

- Information on and justification for all aspects of the HCW policy
- Information on the role and responsibilities of each healthcare staff member in implementing the policy
- Technical instructions, relevant for the target group, on the application of waste management practices

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Suggested Training Package for Each Target Group

For Healthcare Personnel

- The training course shall provide an overview of the waste management policy and underlying rationale and information on practices relevant to the trainees' responsibilities.
- Waste segregation is a key element for this training in waste management.



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Recommended Training Package

For Healthcare Personnel

- All staff who produce healthcare waste shall be responsible for its segregation, and shall therefore receive training in the basic principles and practical applications of segregation.



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Recommended Training Package

For Healthcare Personnel

- Training shall make the staff aware of the potentially serious implications of the mismanagement of waste for the health of waste handlers and patients, provide them with an overview of the fate of waste after collection and removal from ward, and teach them the importance of proper segregation of waste.



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Recommended Training Package

For Waste Handlers

- Topics covered may include the waste management policy, health hazards, on-site transportation, storage, safety practices, and emergency response.



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Recommended Training Package

For Waste Handlers

- Topics covered may include the waste management policy, health hazards, on-site transportation, storage, safety practices, and emergency response.



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Recommended Training Package

For Waste Handlers

- Among staff who routinely handle healthcare waste, awareness of the need for safety may decrease with time, which will increase the risk of injury.
- Periodic refresher course is therefore recommended.

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Recommended Training Package

For Healthcare Waste Management Operators

The training course shall include:

- Information on the risks associated with the handling of HCW;
- Procedures for dealing with spillage and other accidents;
- Correct use of protective clothing.

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Recommended Training Package

For Staff who Transport the Waste

the drivers and waste handlers shall be aware of the nature and risk of the transported waste, and shall be able to carry out all procedures for -

- handling, loading and unloading of waste bags and bins
- dealing with spillage or accidents

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Recommended Training Package

For Staff who Transport the Waste

- Use of PPE
- Documentation and recording of HCW

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Recommended Training Package

For Treatment Plant Operators

- General operation of the treatment facility
- Health, safety, and environmental implications of treatment operations
- Technical procedures for plant operation

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Recommended Training Package

For Treatment Plant Operators

- Emergency response, in case of equipment failures and alarms
- Maintenance of the plant and record keeping
- Surveillance of the quality of emissions and discharges, according to the specifications

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Orientation Module for Patients

- HCF shall provide patients and watchers an orientation of the healthcare waste management policies and system of the hospital as part of the admission procedure.

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Orientation Module for Patients

Shall include, at the minimum:

- Policies on HCWM relevant to patients and watchers such as the ban on styrofoam and non-reusable plastic food containers, proper segregation of waste
- Impact of improper segregation and Styrofoam/non-reusable plastic food containers on health, safety and environment

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Budgetary Requirements

Investment and Operations Costs

- The "polluter pays" principle mandates each HCF to be financially liable for the safe management of its HCW.
- The costs of separate collection, appropriate packaging, and on-site handling are internal to the establishment while the costs of off-site transport, treatment, and final disposal are external and paid to the contractors who provide the service.

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Budgetary Requirements

The costs that will be incurred by HCF include:

1. Waste Segregation and On-Site Handling
 - Proper segregation and on-site handling of wastes includes the costs for the following materials, goods and services:
 - Waste bins, color-coded plastic liners that shall be placed in appropriate places in the hospital, transport trolleys ad collection bins.

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Budgetary Requirements

The costs that will be incurred by HCF in managing HCW include:

1. Waste Segregation and On-Site Handling
 - Proper labels for the waste bins, tags for the plastic liners, and signage /posters.
 - Training of personnel to place wastes in the appropriate container and to handle them in a safe manner
 - IEC materials

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Budgetary Requirements

- Storage spaces for HCW within the HCF, spill kits and measures to secure and protect the wastes when needed.
- PPE needed to safely and properly handle wastes
- Occupational health and safety measures such as immunization

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Budgetary Requirements

- 1. Waste Segregation and On-Site Handling
 - Sealers for plastic liners and packaging the wastes for transport if the treatment facility is sited a distance from the establishment
 - Transportation borne by the HCF
 - Operating and maintenance costs including salaries and wages

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Budgetary Requirements

- Segregation of wastes effectively reduces the amount of wastes needed for transport to (if located off-site), treatment, and disposal at the treatment facility.
- Investments in training and equipment may not be offset by lower treatment costs.

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Budgetary Requirements

- 2. Waste Treatment
 - Establishing and operating an on-site waste treatment facility include the investment and operating costs*
 - Non-burn waste treatment technology and its accessories and related processes (e.g., shredder) and additional processes such as encapsulation and inertization in cases where the waste treatment system do not deactivate chemical and toxic agents)

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Budgetary Requirements

- Microbiological testing equipment and supplies
- Installation and facility costs: installation labor, facility modifications - cement pad(s), curb cuts, sewers, electricity, space, security, etc.

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Budgetary Requirements

- Costs of pollution control equipment if required to control emissions and effluents from the facility (e.g., wastewater treatment plant)
- Construction of temporary storage and hauling areas for treated wastes

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Budgetary Requirements

- Direct labor costs: number of employees needed to operate the treatment and disposal equipment
- "Down time" costs: including repair (parts and labor), and alternative treatment
- Operating costs if the facility uses special chemicals and catalysts

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Budgetary Requirements

- Utility Costs
- Permitting and compliance fees: water and air quality monitoring fees, Environmental Clearance Certificate (ECC) and registration with DENR as waste generator, treater and/or transporter
- Fines: depending upon permitting requirements, National and Local regulations, violations of permits or emissions may result in fines

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Budgetary Requirements

- All transportation, processing and tipping fees
- Supply costs – Personal protective equipment, spill supplies, special bags (for example, some autoclaving systems require particular bags), collection containers (boxes or reusable containers)

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Budgetary Requirements

- All transportation, processing and tipping fees
- Community approval costs if a public hearing is required
- Sterilization equipment

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Budgetary Requirements

Waste Treatment

- In cases where the HCF enters into a contract with a DENR-accredited TSD, the costs that will be incurred by the HCF will be the charges of the waste treater and the associated transportation costs.
- Investment in on-site treatment facilities may be costly but allows the HCF to control the manner by which the waste is treated and the costs associated with treatment.

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Budgetary Requirements

2. Waste Treatment

- Off-site treatment facilities, when available, may be more costly in the long run but allows the HCF to concentrate on its basic operational function and not on operations it is not built to do, which is the treatment of wastes.

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Budgetary Requirements

3. Disposal

- Disposal to a sanitary landfill is considerably more costly than disposal in open dumpsites.
- Sanitary landfills may charge a higher fee for wastes coming from medical establishments.

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Budgetary Requirements

3. Disposal

- In evaluating treatment options, costs with relation to final disposal shall be inputted since some treatment systems can almost eliminate wastes altogether (pyrolysis) but some even increase the weight of wastes (steam systems without dryers).
- Care shall also be taken to render the wastes unrecognizable.

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Budgetary Requirements

Disposal (con't)

- Some costs for disposal of treated waste that shall be considered when an on-site facility is used include the following:
- Construction of temporary storage and hauling areas for treated wastes
 - Costs related to wastes not handled by the hauler
 - Cost of encapsulation, inertization, septic vault

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Budgetary Requirements

Disposal (con't)

- Labor costs for hauling, labelling, waste documentation, security, and maintenance of temporary storage areas.
- Hauling costs
- Transport containers
- Landfill tipping fees

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Measures to Reduce Costs

1. Comprehensive planning
 - Development and implementation of a comprehensive HCWM plan, which includes the recommendations listed below on on-site management.
 - Designing all elements of the system to be of adequate capacity in order to obviate the need for subsequent costly modifications.



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Measures to Reduce Costs

Comprehensive planning (*con't*)

- Possible cooperative use of regional waste treatment facilities, including private sector facilities where appropriate.
- Establishment of a wastewater disposal plan.



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Measures to Reduce Costs

Comprehensive planning (*con't*)

- Anticipating future trends in waste production and the likelihood of legislation becoming more stringent
- Planning collection and transport in such a way that all operations are safe and cost-efficient.



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Measures to Reduce Costs

2. On-site management: source reduction, recycling and re-use

- Comprehensive management of chemicals and pharmaceuticals stores, which includes centralized purchase and use of chemicals and pharmaceuticals and centralized monitoring of chemical flows within the HCF.
- Improved waste identification to simplify segregation, treatment, and recycling.



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Measures to Reduce Costs

2. On-site management: source reduction, recycling and re-use

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Measures to Reduce Costs

2. On-site management: source reduction, recycling and re-use

- Reduction of the amount of material used to accomplish tasks. Examples are the use of email instead of paper and the use of smaller amounts of disinfectant to clean rooms.

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Measures to Reduce Costs

3. Adequate treatment and disposal method

- Selection of a treatment and disposal option that is appropriate for waste type and local circumstances.
- Use of treatment equipment of appropriate type and capacity.
- Possible cooperation between local HCF.

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Measures to Reduce Costs

4. Measures at personnel level

- Establishment of training programmes for workers to improve the quality and quantity of work.
- Protection of workers against occupational risks.

Measures to Reduce Costs

5. Documentation

- Documentation of waste management and assessment of the true costs makes it easier to identify priorities for cost reduction and to monitor progress in the achievement of objectives

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Options for Financing

- HCWM may be financed through:
 - in-house funds of the HCF
 - revenues from recyclable waste
 - loans from credit facilities
 - through sub-contracting, partnership or joint venture with other institutions providing TSD services (sharing WTP, waste treatment, mercury storage)



Options for Financing

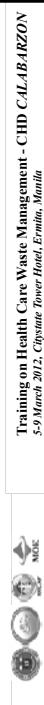
- Government-owned or private HCF may use internal revenues to pay the cost of the HCWM system
 - The costs of managing HCW shall be covered by a separate budget line item in the hospital budget



Module Objectives

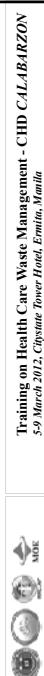
At the end of the session, the participant will be able to:

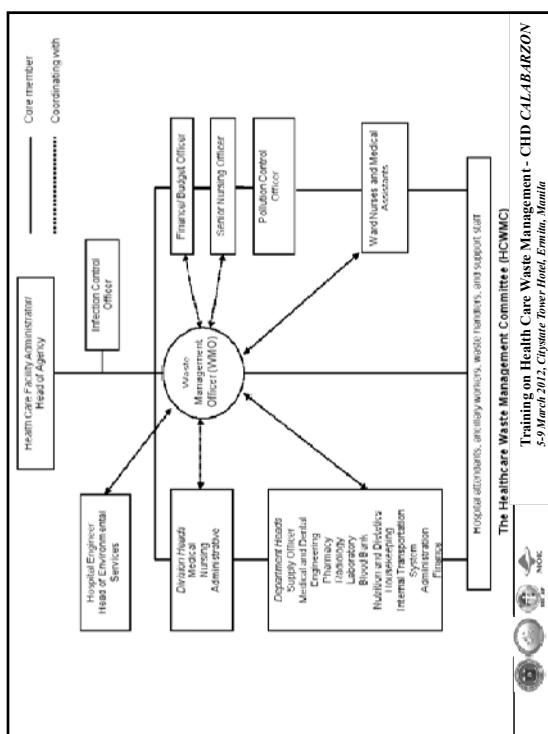
1. Identify requirements and strategies on how to institute and sustain a HCWM program in each HCF;
2. Identify the duties and responsibilities of the Office of the Administrator of the HCF;
3. Identify the required composition of HCWM Committee and the corresponding duties and responsibilities of each member;
4. Discuss the purpose of planning healthcare waste management in the health care facility level;
5. Identify communication and training intervention needed; and
6. Discuss the budgetary requirements.



Summary

Sustainable HCWM implementations depends on adequate organization and administration, and requires adequate financing and active participation by trained and informed staff





Treatment and Disposal Technologies for Medical Wastes in Developing Countries

Mohd Nasir Hassan, PhD

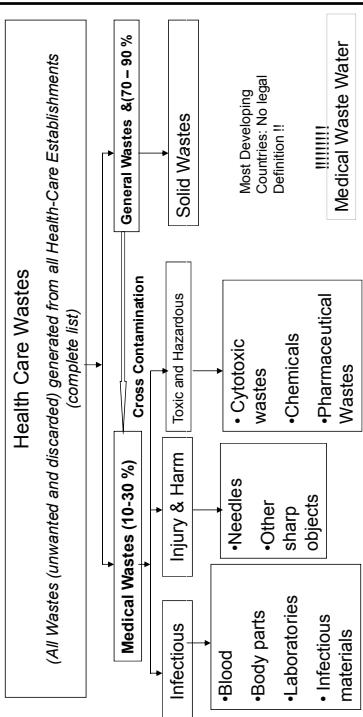
REGIONAL ADVISER

WORLD HEALTH ORGANIZATION (WHO)
WESTERN PACIFIC REGION



Where do We Start ?

Definition>>>Legal Implications>>What are medical wastes and what are not ???



- Medical wastes: How Much Produced ?
•1.0-1.5 kg/bed/day in a large hospital,
•0.3 kg/bed/day in a small hospital.



Used Blood Samples



Pathological Wastes: Body Parts



Blood



Laboratory Cultures

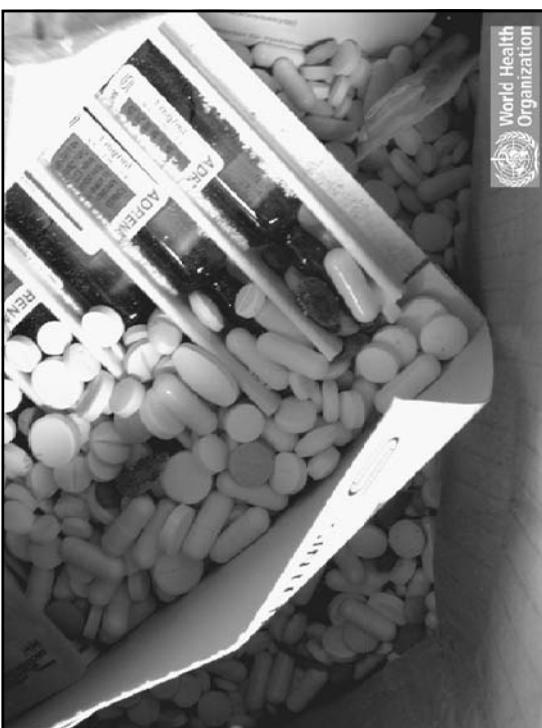




Sharps

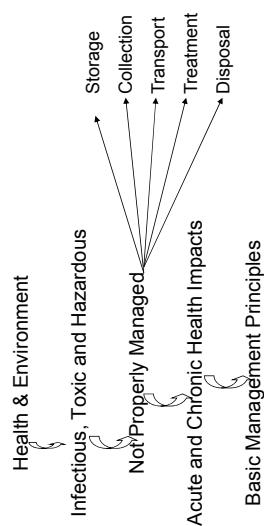


Used Chemicals



Medical Wastes in Developing Countries

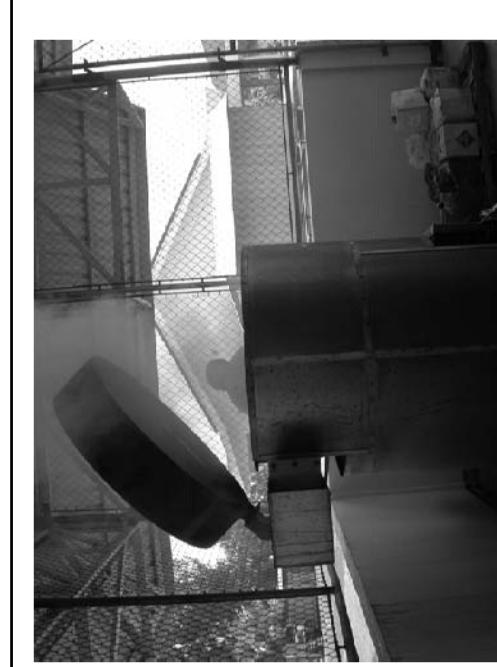
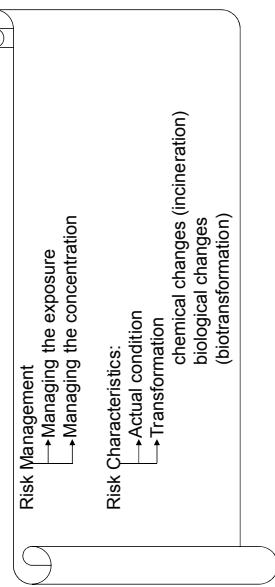
Challenge No 1: Failed to Understand the Risk (Health and Environment)



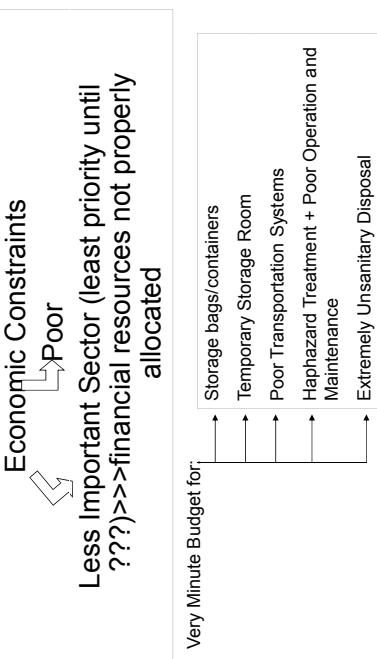
Challenge No 2: A Technology May Not Work Every Place

Appropriate Technology

Failed to understand the principles of medical waste management



Challenge No 3:



Developing Countries:

In 2002 of 22 developing countries:
**18 to 64 % of health care facilities with
poor health-care waste management**

Challenge No 4: Policies, Strategies and Plan of Action	No Policy, Guidelines on Medical Waste Management + Cross-cutting responsibilities
--	---

Advanced Systems:	Intermediate Systems:
<ul style="list-style-type: none">•Regulations•Guidelines•Technology can be improved•Adequate resources	<ul style="list-style-type: none">•Regulations•Guidelines•Technology can be improved•Adequate resources

Poor Systems:	Very Poor Systems:
<ul style="list-style-type: none">•Regulations•Guidelines•Not implemented	<ul style="list-style-type: none">•No Regulations•No Guidelines•Not implemented

Pathological Wastes: Body Parts Or ??



Black Bags are Meant for General Wastes



Food Wastes + Sharps !!!!



Over-used Sharp Containers



80-85% is general, non-hazardous waste, but often not segregated – need to deal with them as hazardous

CAN YOU READ THIS ???

DANGER
RADIATION SOURCE
DO NOT WORK IN IT IN DO
NOT FEE OF THIS
INSALLATION
NOTIFY MEDICAL
SUPERINTENDANT IF THE
INSALLATION IS DAMAGED

WILL YOU APPROVE THIS ???



Is this APPROPRIATE



Medical Wastes are Stored
in Open Containers

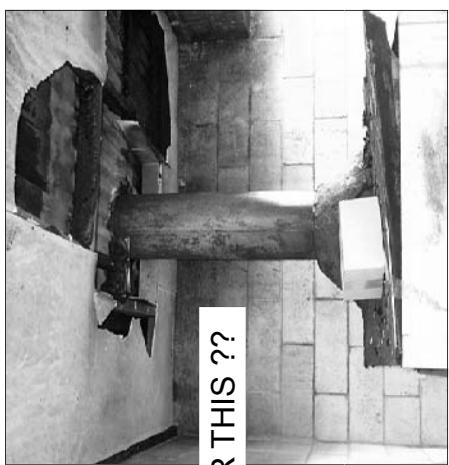


OR THIS ??



THEN
THESE

OR THIS ??



OR THIS ??

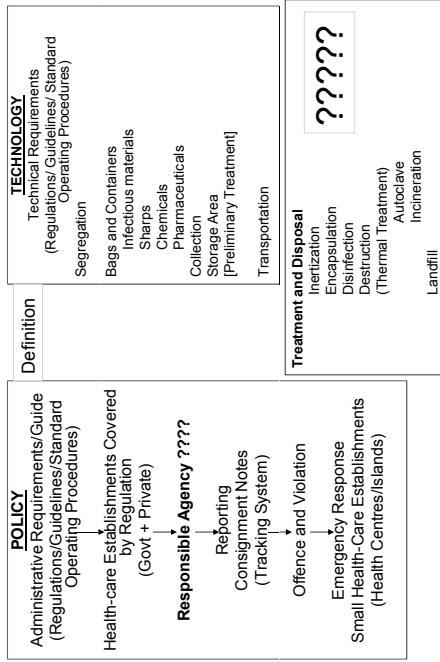


THEN
THESE



THEN
THESE

The Way Forward



Guiding Principles

Organizational Guidelines:

- a. Dedicated waste management team.
- b. Clear and practical organization.
- c. Underpinning legislation or guidelines or regulations.
- d. Affordable.
- e. Full participation

Guiding Principles

Technical Guidelines:

- a. Elimination or reduction of risk.
- b. Toxicity reduction.
- c. Volume reduction.
- d. Waste producers responsibilities.
- e. Cradle to grave management
- f. Training



Type of Wastes	Colour of Container and Markings	Type of Container
Infectious wastes pathological wastes	Yellow, marked "INFECTIOUS"	Strong, leak-proof plastic bag, or container capable of being autoclaved
Sharps	Yellow, marked "SHARPS"	Puncture-proof container
Chemical and pharmaceutical wastes	Brown, marked "HAZARDOUS"	Plastic bag or container
Wastes with High Content of Heavy Metals	Brown, marked with the specific heavy metal content and "HAZARDOUS"	Puncture and corrosive proof container, separate containers for different heavy metal contents.
Radioactive and Genotoxic wastes	Red, marked with "RADIOACTIVE SYMBOL"	Lead box, labelled with radioactive symbol
Pressurised containers	Black	Plastic bag; could mix with the general wastes
General Waste	Black	Plastic bag



Substance	Daily Average (mg/Nm ³)	Hourly Average (mg/Nm ³)	4 hours Average (mg/Nm ³)
Total dust	5	10	-
Total organic carbon	5	10	-
Chlorine compounds	5	10	-
Fluorine compounds	1	2	-
Sulphur oxides as SO ₂	25	50	-
Nitrogen oxides as NO ₂	100	200	-
Carbon monoxide	50	100	-
Mercury	-	-	0.05
Cadmium and thallium	-	-	0.05
Lead, chromium, copper, and Manganese	-	-	0.5
Nickel and arsenic	-	-	0.5
Antimony, cobalt, vanadium and tin	-	-	0.5
Dioxins and furans	-	-	0.1
Oxygen content			At least 6 % at any moment

Incineration: Most Countries Resort to Burning of Wastes

- | | |
|-----------------------|--|
| Advantages: | <ul style="list-style-type: none"> Score: Extremely Risky Verdict: Unless specifications/regulations are met (environment + health requirements) <ul style="list-style-type: none"> - NOT ENCOURAGED Strict requirements: <ul style="list-style-type: none"> - Temperature - Double combustion - Emission treatment - Auto-shut down So What is the Appropriate Technology <ul style="list-style-type: none"> - Simple high temperature systems - Sophisticated high tech system - Combination |
| Disadvantages: | <p>Costly</p> <p>Environmentally sensitive:</p> <ul style="list-style-type: none"> Emissions Ashes <p>Maintenance – sophisticated</p> <p>Limited effective life-time</p> |

DIOXINS, FURANS, CO-PLANNER PCB'S

- Polychlorinated dibenzo-para-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs).
 - Persistence, bioaccumulate.
 - Related to combustion at low temperature, plastics (esp. PVC).
 - Lower than 800°C
 - Especially in the range of 250-450°C
 - Temperature not uniform.
 - Presence in bottom ash, fly ash, emissions.

Safe Levels of Dioxins

- WHO:
 - Provisional Tolerable Monthly Intake (PTMI)
 - 70 picograms/kg body-weight (10^{-12} g).
 - Emission Limits:
 - Europe 0.1 ngTEQ/m³ (Toxicity Equivalent)

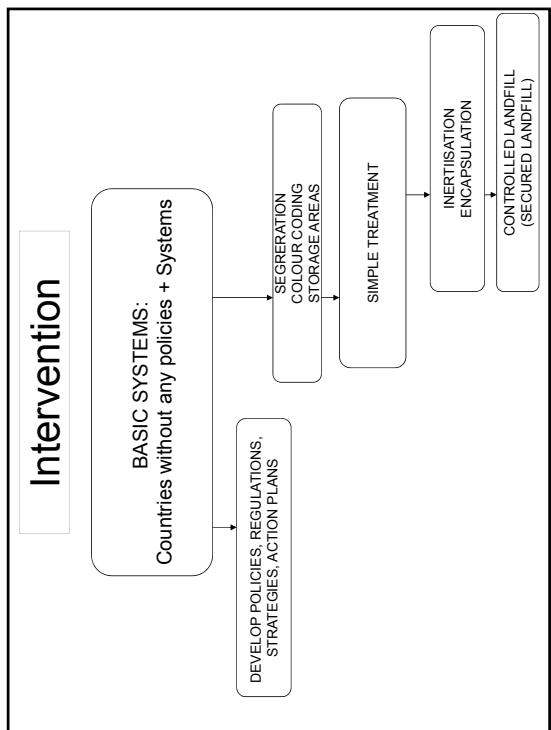
Criteria for Selection:

- Environment:
 - Emissions.
 - Residues.
- Technical:
 - Efficiency
 - Parts, components and maintenance.
- Technological: proven (commercialised); experimental (pilot).
- Costs:
 - Capital
 - Operating

Incinerators

- | | Before YES |
|---|---|
| <u>Technology Management</u> | Good Practices in Incineration Design, Construction and Operation (eg. pre-heating, not overloading, temperature above 800°C), maintenance, lowest emissions. |
| <u>Waste Reduction and Waste Segregation.</u> | Waste segregation and waste minimisation. |
| <u>Site of incinerators.</u> | Good practice tools (dimensional construction plans, operational guidelines). |
| <u>Detailed Engineering Design :</u> | Operator Training and Management Support. |
| <u>- Residence Time, Temperature, treatment of emissions.</u> | Avoid materials containing Chlorine (some blood bags, IV bags, IV tubes), heavy metals (mercury). |
| <u>Operation & Maintenance.</u> | Good construction plans, operational guidelines. |
| <u>Disposal of Ash.</u> | Operator Training and Management Support. |
| <u>Training</u> | Avoid materials containing Chlorine (some blood bags, IV bags, IV tubes), heavy metals (mercury). |
| <u>(Problems due inadequate training, waste segregation and poor maintenance)</u> | |

Intervention



High (COUNTRIES WITH REGULATION + SYSTEMS)

Research and Development:

- Technology
- 3 Rs
- Systems: Public Vs Private
- Systems to reduce the amount of waste produced
- Systems to reduce toxic contents so that we can promote reuse
- Systems that eliminate risks to allow recycling

Medium (COUNTRIES HAVE REGULATIONS BUT TECHNICALLY AND FINANCIALLY INCAPABLE)

- FINANCIAL ASSISTANCE
- DEVELOP PILOT HOSPITALS, HEALTH CENTRES
- NATION-WIDE SYSTEM

Summary

- Proper health-care waste management must start with proper definition.
- Three challenges:
 - Fail to understand the risks posed by wastes.
 - Inappropriate technology
 - Lack of financial resources.
- Waste management:
 - Managerial responsibilities
 - Technical guidelines/specifications

Cont.

- Essential elements:
 - Segregation.
 - Colour schemes + additional specifications for containers.
 - Collection.
 - Treatment and disposal.

Cont.

- Incineration:
 - Only system that destruct wastes.
 - Problems
 - Poor operation and maintenance.
 - Poor training.
- Technical requirements:
 - Temperature (preferably $>1000^{\circ}\text{C}$)
 - Residence time (2 seconds)
 - Emission treatment
 - Ash disposal

3 levels of interventions

- Basic
 - National policies/strategies/plan + costs
 - Source segregation
 - Colour coding + appropriate containers + labels
 - Basic and easy treatment systems.
 - Capacity building

Module Outline

**Case Studies of
Health Care Waste Management Technologies
and Energy Efficiency in Health Care Facilities**

Arch. Marco Silvestri,
Regional Resource Centre for Asia and the Pacific (RRC.AP)

Training on Health Care Waste Management - CHD CALABARZON
5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila

Module Objectives

At the end of the session, the participant will be able to:

1. identify alternative technologies for health care waste management;
2. Discuss the concept of environmental footprint and energy efficiency in the context of HCW/M;
3. Discuss the benefits of energy efficiency in the health care waste management process and in the management of health care facilities;
4. identify possible energy efficiency improvements in their working facilities.

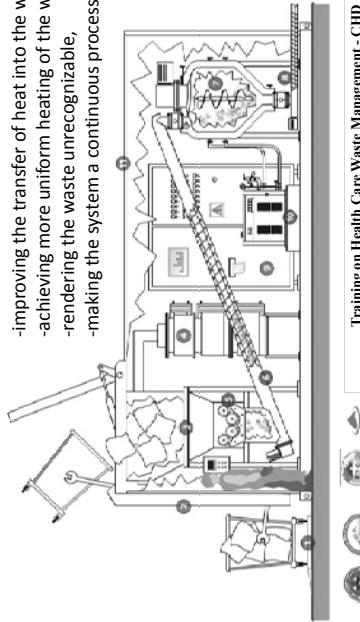
Overview of WHO treatment classification

Incineration (including pyrolytic incineration and rotary kilns)	 	Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila
Chemical disinfection	 	Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila
Wet and dry thermal treatment (including autoclaving)	 	Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila
Microwave irradiation	 	Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila
Land disposal (including encapsulation)	 	Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila
Inertization (mixing waste with cement or other substances)	 	Training on Health Care Waste Management - CHD CALABARZON 5-9 March 2012, Cagayan Tower Hotel, Ermita, Manila

Advanced Autoclaving

These systems function as autoclaves but combine steam treatment with pre-vacuuming and various kinds of mechanical processing.

- improving the transfer of heat into the waste,
- achieving more uniform heating of the waste,
- rendering the waste unrecognizable,
- making the system a continuous process.



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Microwave

Source: Treatment Alternatives for Medical Waste Disposal, USAID/WATH 2005

Microwave Description of Technology ¹	Performance Issues	Environmental Impact	Cost (US\$) Where Used
The microwave process uses radiant energy to heat medical waste. It can be used in a batch or continuous mode. Microwaves heat kill infectious agents through heat and pressure, and do not require water or chemicals. This technology is often used for hospital waste management. Water is heated to reduce volume. Waste is heated between 50°C – 100°C and maintained for a designated period of time.	Sterilization efficiency must be monitored; it will be visible if exposed. If liquid is added, it should be added at a slow rate. Microwave units kill effectively. To verify sterilization efficiency, it is recommended to use a specific test. Temperature often fluctuates. Equipment must be cleaned and sterilized after each use. Water quality impacts from effluents. Low energy consumption and low cost of equipment to initial investment.	No volatile organic compounds (VOCs) are released. There is little water waste. There is no need for water treatment. There is no need for disposal of hazardous wastes. There is no need for special equipment and environmental controls required.	Limited capacity to the US. \$500,000

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Other Thermal-based Technologies

In dielectric heating, compacted waste is exposed to high voltage electric fields, but the process raises security issues.

For high velocity heated air treatment, shredded waste is gathered in an air tight chamber where it is exposed to high-velocity heated (over 170 °C) that mixes and excoriates it.

Dry heating is used only for small amounts sharps and soft patient care waste.

In depolymerization waste is exposed to high-energy microwaves in a nitrogen atmosphere to break down the organic material at temperatures high enough to cause chemical changes and chemical decomposition on the molecular level.

Advanced thermal oxidation is a dual-chamber incineration where waste is burned using an oxygen-rich fast-burn process (unlike pyrolysis). Combustion gases are rapidly quenched using liquid mist injectors.

Chemical-based Technologies

Source: Treatment Alternatives for Medical Waste Disposal, USAID/WATH 2005

Chemical Treatment Description of Technology ¹	Performance Issues	Environmental Impact	Cost (US\$) Where Used
Chemical (caustic, acidic, ammonia, chlorine, etc.) treatment is used to remove infectious agents from medical waste. This treatment has a wide range of applications. The effectiveness of each technique depends on the type of waste being treated. Biodegradable wastes are performed best with caustic agents, while acidic and ammonia agents are best suited for non-biodegradable wastes. Acidic agents, such as sulfuric acid, and ammonia agents, such as ammonium hydroxide, are best suited for non-biodegradable wastes. A number of dangerous vapors, including chlorine, ammonia, and sulfur dioxide, are produced during the chemical treatment process. These vapors are highly toxic and may pose a threat to public health and the environment. Strong treatment processes should be used to minimize these risks. In addition, there is a risk of chlorine gas release, which must be managed regularly. The process must be managed. Among chemical treatments include chemical oxidation, chemical reduction, and thermal destruction. Solid wastes are usually treated by incineration.	Specialized equipment must be purchased, as well as safety equipment. Treatment times are often very long. Biodegradable wastes are performed best with caustic agents, while acidic and ammonia agents are best suited for non-biodegradable wastes. Acidic agents, such as sulfuric acid, and ammonia agents, such as ammonium hydroxide, are best suited for non-biodegradable wastes. A number of dangerous vapors, including chlorine, ammonia, and sulfur dioxide, are produced during the chemical treatment process. These vapors are highly toxic and may pose a threat to public health and the environment. Strong treatment processes should be used to minimize these risks. In addition, there is a risk of chlorine gas release, which must be managed regularly. The process must be managed. Among chemical treatments include chemical oxidation, chemical reduction, and thermal destruction. Solid wastes are usually treated by incineration.	No water treatment systems are available. There is potential for soil contamination if untreated wastes are released. Strong treatment processes should be used to minimize these risks. In addition, there is a risk of chlorine gas release, which must be managed regularly. The process must be managed. Among chemical treatments include chemical oxidation, chemical reduction, and thermal destruction. Solid wastes are usually treated by incineration.	Used in US, Canada, and Israel. No domestic treatment facility exists in developing world cities operating.

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Mechanical Processes

Source: Treatment Alternatives for Medical Waste Disposal, USAID/PATH 2005

Mechanical Processes

Source: Treatment Alternatives for Medical Waste Disposal, USAID/PATH 2005

Shredding (during after treatment), Compacting, and Landfill		Performance > Times		Environmental Impact		Costs (US\$)		Where Treated	
Shredding	Mechanical nature of shredder can create instantaneous problems, such as present in medical facilities, produce debris that can become a hazard during handling and storage, and cause a sterilization cycle. Failure of a sharp tool can result in product damage.	Trashed waste must still be disposed of in a sanitary disposal system. This is typically done in a compacting drum.	US: Europe: India: \$15,000-\$25,000	Some countries encourage disposal of sharp waste.	May indirectly lead to use of inappropriate and unsafe compacted or filled and treated in a compacted state.	Costs are low, does not disperse, and waste will remain infectious.			
Compacting	Open devices are more common, and much of the cost is in design, options, and maintenance.	Some countries encourage disposal of sharp waste.	May indirectly lead to use of inappropriate and unsafe compacted or filled and treated in a compacted state.	Compacting device does not disperse, and waste will remain infectious.					Disposal, offsite incineration.

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Shredding (during after treatment), Compacting, and Landfill		Performance > Times		Environmental Impact		Costs (US\$)		Where Treated	
Description of Technology	Performance > Times	Environmental Impact	Costs (US\$)	Where Treated	Description of Technology	Performance > Times	Environmental Impact	Costs (US\$)	Where Treated
Landfill	There three methods of landfill disposal are open, covered, and controlled.	There are three methods of landfill disposal in developing countries. These are open, covered, and controlled landfills.	US: Europe: India: \$15,000-\$25,000	Open devices are more common, and much of the cost is in design, options, and maintenance.	There are three methods of landfill disposal in developed countries. These are open, covered, and controlled landfills.	There are three methods of landfill disposal in developed countries. These are open, covered, and controlled landfills.	Environmental impact of landfills should not be underestimated. One half of a cubic meter of solid waste is converted to leachate. Methane gas decomposes over 25 times faster degrading to one cubic meter of solid waste.	Environmental impact of landfills should not be underestimated. One half of a cubic meter of solid waste is converted to leachate. Methane gas decomposes over 25 times faster degrading to one cubic meter of solid waste.	Disposal, offsite incineration.
Incineration	There are three methods of incineration: thermal, chemical, and biological.	There are three methods of incineration: thermal, chemical, and biological.	US: Europe: India: \$15,000-\$25,000	Open devices are more common, and much of the cost is in design, options, and maintenance.	There are three methods of incineration: thermal, chemical, and biological.	There are three methods of incineration: thermal, chemical, and biological.	Environmental impact of incinerators is high due to the amount of energy required to run them. They also produce large amounts of ash.	Environmental impact of incinerators is high due to the amount of energy required to run them. They also produce large amounts of ash.	Disposal, offsite incineration.

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Costs and Recommendation Case Studies

Summary of World Bank MAP country report recommendations for medical waste disposal alternatives.									
System	Capital Costs	Operating Costs	Available Spare Parts	Environmental Impact	Cape Town	Cape Town	Manila	Manila	Malawi
Autoclave	Partly High	Average	Very Qualified	Low	Not recommended				
Microwave	Very High	Average	Very Qualified	Low	Not recommended				
Mobile Incinerator	Low	Average	Limited	Possible	Medium	Recommended	Recommended	Recommended	Recommended
Small-scale Bio-composting	Low	Limited	Yes	High	Recommended	Recommended	Recommended	Recommended	Recommended
Chemical Disinfection (chlorine)	Low	Qualified	Yes	High	Not recommended				
Autoclave	Low	Qualified	Yes	High	Not recommended				
Incineration	Low	Limited	Yes	High	To be tested				
Open Biomass	Low	Limited	Yes	High	To be tested				

Costs and Choice of Treatment Technology

Items to be considered for the calculation of cost-effectiveness:

- capital investment
- operating costs (including requirement of skilled operators)
- maintenance costs (including availability of spare parts)
- safety risks and insurance costs
- kind of waste that can be treated by the devices
- disposal costs of resulting waste
- upgrading costs (including operators' trainings)
- life span of devices
- environmental impact (costs on the environment)

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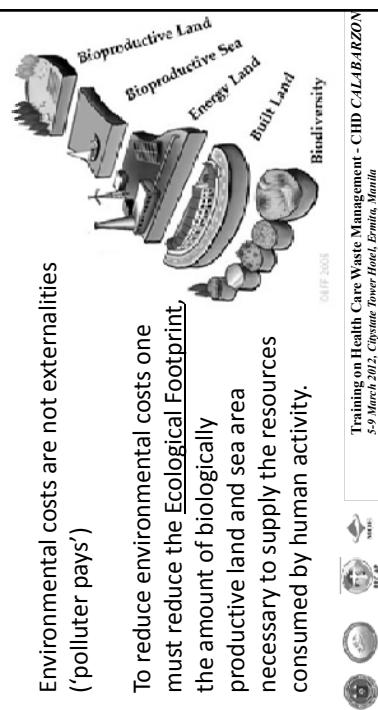
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Environmental Costs: the Ecological Footprint

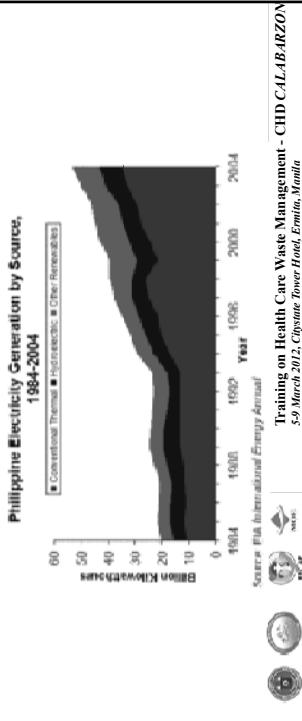
Environmental pollution causes costs (damaged crops, human health, etc.)

Environmental costs are not externalities ('polluter pays')



Energy in the Philippines

Energy consumption can implicate high levels of air pollution
The Philippines have high levels of grid dispersion and conventional thermal energy is the main source of electricity.
Energy efficiency can contribute to reduce air pollution.



Energy Efficiency in Health Care Facilities

Standard operating procedures for most hospitals require significant energy use (heating water, indoor temperature and humidity control, lighting, ventilation and clinical processes) with associated significant greenhouse gas emissions.

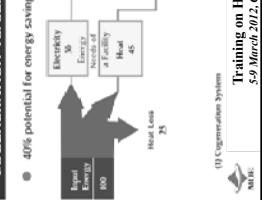
Hospitals can implement many measures to improve energy efficiency while satisfying the energy requirements of these important energy-consuming end-uses.

Energy efficiency measures are the easiest and most important first step that hospitals can take to cut costs, reduce emissions, and improve human and environmental health.



Energy Efficiency Improvements

- Supply side energy efficiency (plants can produce more electricity with less resources).
- End-side device energy efficiency (devices can perform equally or better with less electricity).
- Cogeneration or CHP (Combined Heat and Power), uses the heat that is generally a by-product of the electrical generating process.



Energy Efficiency in Health Care Facilities

Using cogeneration, or combined heat and power (CHP) technology facilities can generate onsite electricity and capture waste heat from its treatment process as thermal energy.

This can double energy efficiency by eliminating losses associated with the grid delivery of electricity.

In addition, CHP technology increases reliability as power can continue uninterrupted when the grid fails.

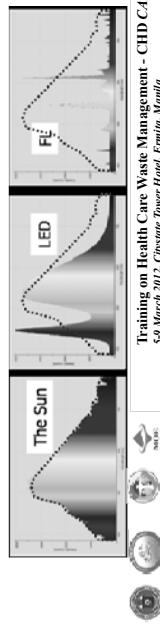
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Energy Efficiency in Health Care Facilities

Lighting:
-fenestration design to improve use of daylight
-switching to light-emitting diode (LED) bulbs

LED additional advantages include:

- reduced waste (over 10 times longer life-span)
- no heat produced
- better intensity and light quality
- shadow correction

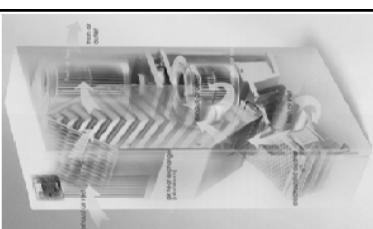


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Energy Efficiency in Health Care Facilities

Cooling and Ventilation:
-turning air conditioners a few degrees up
-use energy efficient cooling systems
-use heat exchangers for ventilation

Heat exchangers use the cold exhaust air that is pumped outdoors, to cool down the warmer fresh air that is pumped indoors.



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Energy Efficiency in Health Care Facilities

Green design and retrofitting to reduce energy waste.
-Automated occupancy sensors
-Insulation
-External shadings
-Double-glazed windows
-Green roof
-Window area
-Natural ventilation
-Orientation
-Equipment labeling



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Innovative Practice in Healthcare Waste in Asia

Engr. Guilberto Borongan, ChE, MSJEM
Regional Resource Center for Asia and the Pacific (RRC.AP)

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Contents

- 1 Health Care Waste Management in Japan
- 2 Innovative Practice on HCWM in HOSPITAL LAMWAH EE
Penang, Malaysia
- 3 Innovative Practice on Infectious Waste Management
in Nonthaburi, Thailand
- 4 Innovative Practice on Waste Management System
in Bir Hospital, Kathmandu, Nepal
- 5 Points to Ponder



Module Objectives

At the end of the session, the participant will be able to:

1. Identify existing innovative practices on HCWM at the HCF;
2. Identify innovative practices on source separation of HCW at HCF;
3. Informed about good practices on Waste Management System at HCF;
4. Discuss the role of stakeholders in HCWM system.

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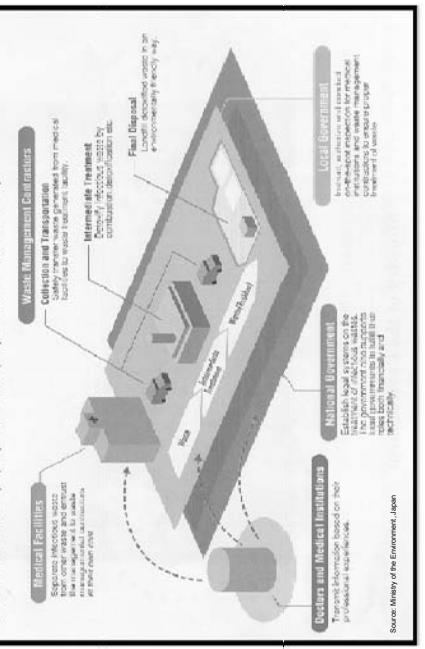
1. Healthcare Waste Management in Japan

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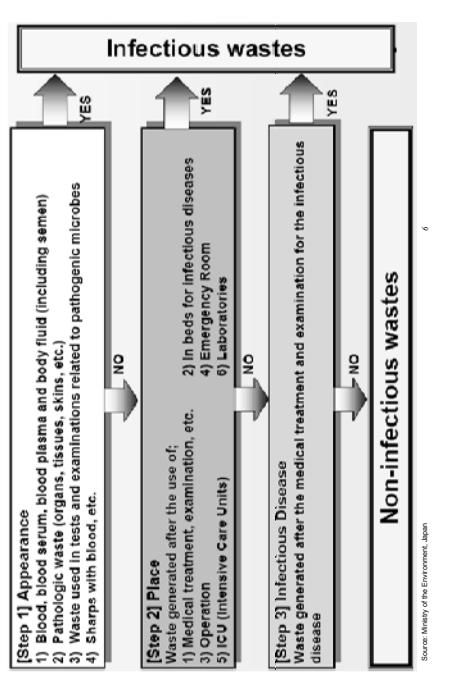


Role of Stakeholders

To treat infectious waste properly, each related party needs to cooperate mutually.



Judgement



Infectious Waste's Separation



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Infectious Waste's Separation



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Training on Health Care Waste Management - CHD CALABARZON
5-9 March 2012, Ospina Tower Hotel, Emma, Manila

Special Containers for infectious Waste



- For Sharps such as injection needles and surgical knives
 - Rigid and leak-resistant container made by steel or plastics
- For solid waste
 - Rigid, double-walled plastic bags or robust containers
- For liquid and sledge
 - leak-resistant containers

Bio-hazard Marking



Each Container is identified with bio-hazard marking. Bio-hazard marking has three different colors based on the nature of the containments

- Red : for bloods or sludge infectious waste
- Orange : for solid waste
- Yellow : for sharps

Source: Ministry of the Environment, Japan

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Recycling at Hospital Lam Wah EE

HOSPITAL LAM WAH EE
Penang, Malaysia

- 523 Beds
- 1300 staff

Source: HOSPITAL LAM WAH EE 2006
5-9 March 2012, Citystate Tower Hotel, Manila, Philippines
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2. Innovative Practice on HCWM in HOSPITAL LAM WAH EE Penang, Malaysia

Types of wastes



Clinical waste



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General waste



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Source: HOSPITAL LAM WAN EE, 2008

The Duties/Responsibilities of Recycling Project Committee

- ⦿ Bimonthly meetings
- ⦿ Each Committee Member is in charge of an activity
- ⦿ All Committee members take turns to do sorting and verifying
- ⦿ Sorting - Sort out the recyclable items according to their categories one day before the sale
- ⦿ Verifying - Verify the weight of recyclable items
- ⦿ Promote recycling activities including Reduce & Reuse

Source: HOSPITAL LAM WAN EE, 2008

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The following recyclable items are collected:

- 1) Old Newspapers
- 2) Books / Magazines / Loose Papers
- 3) Cardboards
- 4) Clear Plastics
- 5) Coloured Plastics
- 6) Drip Bottles
- 7) Glass Bottles
- 8) Tins/Cans /Cooking Oil Bottles
- 9) Aluminium Cans
- 10) Plastic Bags
- 11) Wearable Old Clothes
- 12) Old Car Batteries

Source: HOSPITAL LAM WAN EE, 2008

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Waste Segregation

Sorting hospital recyclables (Every Tuesday)



Source: HOSPITAL LAM WAN EE, 2008

Verifying hospital recyclables (Every Wednesday)

- ⦿ RM 30 penalty will be imposed upon any member who fails to serve On the day rostered for his/her duty. But if the member is able to find a replacement to fulfill this duty, the RM 30 penalty is waived!

“Garbage turns into GOLD”

Date	Total Weight	Sales
Jul-Dec 2002	21,017.90 kg	RM 3,653.19
Jan-Dec 2003	56,929.20 kg	RM13,503.18
Jan-Dec 2004	82,583.90 kg	RM19,133.12
Jan-Dec 2005	84,184.16 kg	RM22,155.70
Jan-Dec 2006	94,106.55 kg	RM24,647.74
Jan-Dec 2007	92,887.31 kg	RM23,974.51
Jan-Sep 2008	79,785.70 kg	RM122,480.60
Total	510,491.01 kg	RM130,158.62

Source: HOSPITAL LAM WAN EE, 2008

*about US\$ 7,000/yr

- As of 30 Sep 2008, the hospital recovered 510,491.01 kg of resources from going to landfills
- As of 30 Sep 2008, the hospital have turned garbage into gold, RM130,158.62

Source: HOSPITAL LAM WAN EE, 2008

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Use of Environmentally Products



Source: HOSPITAL LAM WAN EE, 2008

Cafeteria uses Ecopack, a biodegradable and environment friendly food container



Source: HOSPITAL LAM WAN EE, 2008

Mercury Elimination

Phased out the use of clinical thermometer which contains mercury



They are now using digital ear thermometer

Source: HOSPITAL LAM WAN EE, 2008

Awareness Raising

Motivated others through presentations at conventions and workshops including talks on recycling to schools, colleges, NGOs, factories, hotels, hospitals and the local governments



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Awareness Raising

Delivering talk at Hospital's waiting lounge (to raise awareness on environment conservation and sources recovery amongst staff and the public)



Source: HOSPITAL LAM WAH EE, 2008
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HLWE Recycling Project has been listed as one of the Good Practitioners on Solid Waste Management in Malaysia in June 2008 by the Ministry of Housing and Local Government

Good Practices
HOSPITAL LAM WAH EE



Source: HOSPITAL LAM WAH EE, 2008

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Recycling Facilities



Recycling notice board
Source: HOSPITAL LAM WAH EE, 2008
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3. Innovative Practice on Infectious Waste Management in Nonthaburi, Thailand

Infectious Waste Management in Nonthaburi, Thailand

Started in February 2004



Collection fee :

≤ 2 kgs or ≤ 13 liters : 10 USD / month
 ≥ 2 kgs or ≥ 13 liters or every 2 kgs or every
 13 liters : 7 USD / month

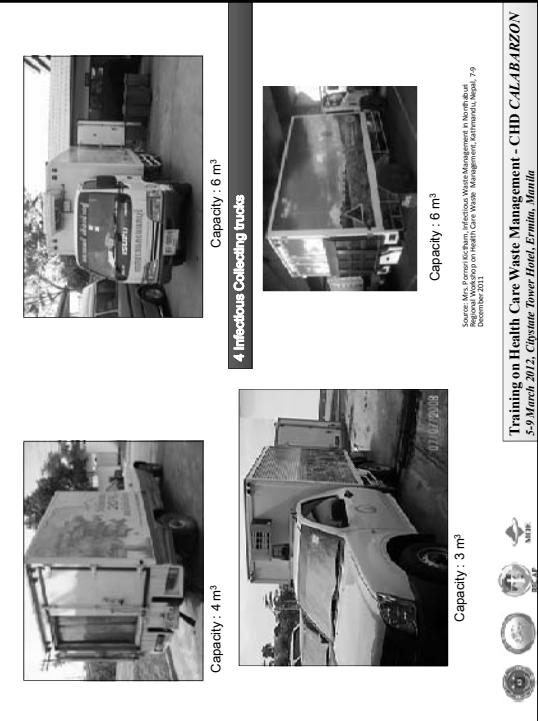
covering 33 health facilities with 1 collecting truck

Source: Ms. Porntip Kotham, Infectious Waste Management in Nonthaburi, Thailand, Report on Health Care Waste Management, December 2011

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Source: Ms. Porntip Kotham, Infectious Waste Management in Nonthaburi, Thailand, Report on Health Care Waste Management, December 2011

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Collection fee :

≤ 2 kgs or ≤ 13 liters : 10 USD / month
 ≥ 2 kgs or ≥ 13 liters or every 2 kgs or every
 13 liters : 7 USD / month

covering 33 health facilities with 1 collecting truck

Source: Ms. Porntip Kotham, Infectious Waste Management in Nonthaburi, Thailand, Report on Health Care Waste Management, December 2011

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Collection Activities

- Health care centers
- Medical, dental and veterinary clinics

Monday, Wednesday and Friday

Hospital and institutes –

Everyday

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Collection Activities

- Health care centers
- Medical, dental and veterinary clinics

Source: Ms. Porntip Kotham, Infectious Waste Management in Nonthaburi, Thailand, Report on Health Care Waste Management, December 2011

Monday, Wednesday and Friday

Hospital and institutes –

Everyday

Quantity of Infectious Waste with corresponding fees

Year	Healthcare facilities	Weight (kg)	Fee (USD)
			Collection
			Disposal
2004	33	44,148	10,843
2005	63	151,348	41,914
2006	66	261,578	78,473
2007	68	287,904	68,627
2008	85	373,346	74,078
2009	93	400,400	112,490
2010	98	405,510	104,013
2011	114	499,835	114,537
			67,931

Source: Mr. Pawan Acharya, Infectious Waste Management in Hospitals
Regional Workshop on Health Care Waste Management, Kathmandu, Nepal, 7-9
February 2011

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4. Innovative Practice on Waste Management System in Bir Hospital, Kathmandu, Nepal

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Healthcare Waste Management at Bir Hospital

Bir Hospital in Kathmandu, Nepal is the nation's oldest medical institute. Established in 1889, it has since developed into the National Academy of Medical Sciences (NAMS).

The HCWM at Bir works with three large components that support each year :

- ④ Waste management
- ④ Injection safety and
- ④ Mercury elimination

Source: Health Care Foundation Nepal, 2011

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Segregation waste at source

- ④ Identified central point in the ward where four buckets of different colors are kept.
- ④ Colors code for the segregation of bottles and cans, paper, plastic and biodegradables are in place.

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Segregation waste at source

Each ward is equipped with a waste segregation trolley, which is used by nurse and other medical personnel to separate risk waste from non-risk waste.



The trolley also contains a needle destroyer and receptacles for the proper disposal of needles and syringes after use.

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Waste treatment and storage center



The waste treatment and storage center is separated into two distinct areas for risk and non-risk waste.

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Waste treatment: Steam based technology



- ❖ Syringes are packaged in drums.
- ❖ After packaging, all infectious waste is treated prior to final disposal via one of three processes:
 - ❖ Steam based technology that is
 - ❖ Autoclaving
 - ❖ Chemical treatment
 - ❖ Biological treatment



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59 March 2012, Chhatrapati Shivaji International Airport, Mumbai, India

Recyclables Storage



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Recyclables Storage



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Biological Treatment



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- Chemical treatment**
- Genotoxic wastes from cancer patients are stored separately and treated chemically.
 - This waste includes equipment, such as saline bottles, vials, IV lines and syringes used in chemotherapy. 5% sodium hypochlorite is used to denature genotoxic cancer drugs.
 - After chemical treatment, it is processed and sent for recycling.



Biogas Production Area



Food waste are feed to the on site Biogas digester for biogas production use for sterilization along with organic fertilizer as by product - use for composting



Mercury Storage Area



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As a result...

❖ Approximate waste collection costs were USD 6,000 per year at Bir Hospital. It is likely that this can soon be reduced to half, or USD 3,000 per year.

❖ Currently, Bir is sending 34% of the waste for recycling and 30% for biogas digestion.

❖ Bir Hospital is earning almost USD 6,000/year.

❖ This innovative practices can be replicated to hospitals or healthcare facilities in the Asian region.

[Video Presentation of the Innovative Practice at Bir Hospital](#)

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Module Objectives

HEALTH CARE WASTE MANAGEMENT PLAN

Engr. CORAZON Z. VIDAD, SE, MEnvMan
Department of Health – Center for Health Development IVA

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HEALTH CARE WASTE MANAGEMENT PLAN

- Three major concerns:
1. Specific plan of actions which shall include the involvement of all HCF personnel and its client;
 2. Improvement of HCF facilities; and
 3. Training and enhancement of skills necessary to have an effective handling of HCW.

At the end of the session, the participant will be able to:

1. Discuss the procedures in developing Health Care Waste Management Plan
2. Apply the procedures learned in developing Health Care Waste Management Plan

Procedures for Developing the Health Care Waste Management Plan

Step 1: Assessment of waste generation and waste disposal.
The assessment shall include:

- Average daily volume of waste generated per category within a given period of time;
- Site and location of the HCF vis a vis the existence of accredited TSD within the locality;
- Assessment of any future changes in the facility, departmental growth or the establishment of new departments.

Note: Data from the waste generation survey shall be a basis of the waste management plan.

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Procedures for Developing the Health Care Waste Management Plan	
Step 2: Review of existing HCWM policies and procedures being implemented.	To have a clear overview of this concern, the following activities have to be included in the plan, namely: a. Understanding of existing policies, laws and regulations related to HCWM; b. Review of the present waste management system to include where the waste is generated, what types of waste are being generated, how and where it is stored and the cost effectiveness of the current handling processes; and
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Procedures for Developing the Health Care Waste Management Plan (HCWMP)	
Step 3: Formulation and drafting of HCWMP	a. Short description of the plan and the HCF Background of the HCF including its mandates, type of clients being served, demographic profile and geographic location of the HCF a. Objective and rationale of the plan Briefly discuss the purpose of the plan, targets, its coverage, scope and limitations. c. Composition of HCWMC Its structure, duties and responsibilities, roles and responsibilities of other staff.
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Procedures for Developing the Health Care Waste Management Plan (HCWMP)	
Step 3: Formulation and drafting of HCWMP	d. HCW/M plan Content: <ul style="list-style-type: none">From point of generation up to its final disposal including flow chart, route plans and schedulesDifferent activities and persons responsible for handling the specific activitiesMilestones or strategies to move the current HCW/M system into the system envisioned in the plan<ul style="list-style-type: none">Waste minimization planProcurement planEducation, training, information and communication activities
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Procedures for Developing the Health Care Waste Management Plan (HCWMP)	
Step 3: Formulation and drafting of HCWMP	d. HCW/M plan Content: <ul style="list-style-type: none">Every HCF worker must be aware of:<ul style="list-style-type: none">Policies, rules and regulationsSignificant health and environmental impacts of their work activitiesTheir roles and responsibilitiesProcedures that apply to their work and the importance of conforming with the requirements as well as the consequences of not following the requirements.
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<p>Procedures for Developing the Health Care Waste Management Plan (HCWMP)</p> <p>Step 3: Formulation and drafting of HCWMP</p> <p>d. HCWM plan</p> <p>Content:</p> <ul style="list-style-type: none"> • Timetable and the responsible persons for the development of training materials • Orientation for patients and watchers • HCF worker protection and safety <ul style="list-style-type: none"> • Plans for HCF worker's occupational health and safety program • Emergency management for possible related risks or accidents during the process. • Infection Control policies and procedures to be observed in handling HCW specifically infectious and mercury waste 	<p>Procedures for Developing the Health Care Waste Management Plan (HCWMP)</p> <p>Step 4: Prepare Financial Requirement</p> <ul style="list-style-type: none"> ▪ Indicate in the annual work and financial plan for health care waste management the following: <ol style="list-style-type: none"> 1. Cost for the operation and maintenance for waste treatment facilities 2. Supplies and materials used for collection, transport, treatment and disposal 3. Training and orientation of personnel and clients 4. Cost for other activities related to the implementation of health care waste management program. 	<p>Procedures for Developing the Health Care Waste Management Plan (HCWMP)</p> <p>Step 5: Monitoring and evaluation –</p> <p>Action plan for the conduct of regular monitoring of the implementation and submission of required reports.</p> <ul style="list-style-type: none"> • Self-monitoring tools • Assessment of findings • Submission of recommendations • Follow-up of status. 	
              	<p>Training on Health Care Waste Management - CHD CALABARZON</p> <p>5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>	              	<p>Training on Health Care Waste Management - CHD CALABARZON</p> <p>5-9 March 2012, Citystate Tower Hotel, Ermita, Manila</p>

IX. ANNEXES



TRAINING ON HEALTH CARE WASTE MANAGEMENT (CHD-CALABARZON)

Citystate Tower Hotel
Mabini corner P.Faura Street, Ermita, Manila
March 5-9, 2012

PARTICIPANT'S DIRECTORY

	NAME	DESIGNATION	OFFICE/HOSPITAL
	Ms. Aida M. Odon	Administrative Officer IV	Apacible Memorial District Hospital, Nasugbu, Batangas
	Ms. Gloria C. Africa	Supervising AO	Batangas Regional Hospital, Batangas City
	Engr. Cornelio G. Maranan	Engineer III, Head Maintenance Section	Batangas Regional Hospital, Batangas City
	Mr. Mark Glenn H. Casaljay	Nurse I	Carsigma District Hospital, General Mariano Alvares (GMA), Cavite
	Engr. Lowell D. Lee	Environmental and Safety Management Officer/Pollution Control Officer	De La Salle University Medical Center, Dasmariñas City, Cavite
	Dr. Danilo L. Aguilera	Chief of Hospital	Don Juan Mayuga Memorial Hospital, Lemery, Batangas
	Ms. Joy V. Gutierrez	Administrative Officer V	Don Juan Mayuga Memorial Hospital, Lemery, Batangas

	Dr. Antonio C. Hernandez	Chief of Hospital	Don Manuel Lopez Memorial District Hospital, Balayan, Batangas
	Ms. Ruth I. Delos Reyes	Administrative Officer II	Don Manuel Lopez Memorial District Hospital, Balayan, Batangas
	Dr. Arnulfo O. Imperial	Chief of Hospital I	Doña Marta Memorial District Hospital, Atimonan, Quezon
	Ms. Adelina A. Lopez	Administrative Officer IV	Dr. Jose P. Rizal Memorial District Hospital, Calamba City, Laguna
	Ms. April Ann B. del Rosario	Infection Control Nurse	Emilio Aguinaldo College Medical Center Cavite, Dasmarinas City, Cavite
	Engr. Arnulfo A. Alcain	Engineer III	General Emilio Aguinaldo Memorial Hospital, Trece Martires City, Cavite
	Ms. Teresita B. Cruz	Administrative Officer IV	Gen. J. Cailles Memorial District Hospital, Pakil, Laguna
	Ms. Susan L. Geronimo	Nurse I	Gumaca District Hospital, Gumaca, Quezon

	Engr. Pablo V. Del Mundo, Jr.	Pollution Control Officer	Laguna Provincial Hospital, Sta. Cruz, Laguna
	Engr. Virginia L. Fabros	Engineer III	Laguna Provincial Health Office, Sta. Cruz, Laguna
	Mr. Crispin M. Coliat	Head Maintenance Department	Lipa Medix Medical Center, Lipa City, Batangas
	Dr. Bayani H. Terciano	Chief of Hospital	Luisiana District Hospital, Luisiana, Laguna
	Mr. Ramil B. Raoet	Supervisor General Services	Manila East Medical Center, Taytay, Rizal
	Engr. Rene P. Chavez	Environment, Health, Safety Officer	Mary Mediatrix Medical Center, Lipa City, Batangas
	Mr. Gat-Joriz N. Alatiit	Infection Control Nurse	Ospital ng Biñan, Biñan City, Laguna
	Ms. Lita A. Calingasan	Administrative Officer V	Panlalawigang Pagamutan ng Laguna, San Pablo City, Laguna
	Mr. Dennis D. Guico	Infection Control Nurse/Pollution Control Officer	Santa Rosa Community Hospital, Sta. Rosa, Laguna

	Engr. Susan S. Evangelista	Engineer II	Quezon Medical Center, Lucena City, Quezon
	Ms. Salome N. Paycao	Assistant Chief Nurse	Quezon Medical Center, Lucena City, Quezon
	Ms. Dulce A. Daleon	Administrative Officer	Tayabas Community Hospital, Inc., Tayabas, Quezon
	Ms. Estrella E. Peñones	Chief Nurse	Tayabas Community Hospital, Tayabas, Quezon
	Mr. Ricardo P. Corado	Infection Prevention and Control Nurse	Unciano Medical Center Antipolo, Antipolo City, Rizal
	Dr. Susana C. Castillo	Medical Officer III	Center for Health Development IV-A, Quezon City
	Engr. Peter T. Herrera	Engineer III	Center for Health Development IV-A, Quezon City
	Engr. Jojo G. Franco	SIV/Regional Health Physicist	Center for Health Development IV-A, Quezon City

TRAINING ON HEALTH CARE WASTE MANAGEMENT
Center for Health Development-CALABARZON

5-9 March 2012

Citystate Tower Hotel, Ermita, Manila



Date/Time	Activities	Responsible Person
Day 1: March 5, 2012		
11:00 – 13:00	Registration/Billeting Activities/Lunch	
13:00 – 13:30	Opening Program	Engr. Corazon Vidad
	Prayer and National Anthem	
	Opening Address	Engr. Guilberto Borongan
	Welcome Address	Dr. Edgardo M. Gonzaga
	Introduction of Participants	
	Pre-Test	
13:30 – 14:30	Leveling of Expectations	Engr. Corazon Vidad
	Orientation of the Training Course	
14:30 – 15:30	Health and Environment Impacts of Health Care Waste (HCW)	Dr. Gilbert Par
15:30 – 16:00	Coffee Break/Group Photo Session	
16:00 – 16:45	Health and Environment Impacts of Health Care Waste (con't.)	Dr. Gilbert Par
16:45 – 18:00	Legislation, Laws and Policies related to HCW Management	Engr. Corazon Vidad
Day 2: March 6, 2012		
08:30-09:00	RECAPITULATION	
09:00-10:30	Healthcare Waste Minimization (3Rs Application)	Engr. Guilberto Borongan
10:30-10:45	Coffee Break	
10:45-12:00	Segregation, Collection, Storage, and Transport of HCW	Engr. Aida Barcelona
12:00-13:00	LUNCH	
13:00-15:15	Segregation, Collection, Storage, and Transport of HCW (cont.)	Engr. Aida Barcelona
15:15-15:30	Coffee Break	
15:30-16:00	Mercury in Health Care Facility	Ms. Faye Ferrer
16:00-16:30	Hazardous Waste Storage Options: Mercury	Engr. Guilberto Borongan
16:30-17:30	Health and Safety Practices in HCW Programs	Dr. Gilbert Par
18:00-21:00	Social Function	
Day 3: March 7, 2012		
08:30-09:00	RECAPITULATION	
09:00-10:00	Healthcare Wastewater Management	Prof. Romeo Quizon
10:00-10:15	Coffee Break	
10:15-11:15	Healthcare Wastewater Management (Cont.)	Prof. Romeo Quizon
11:15-12:00	Waste Treatment and Disposal	Engr. Corazon Vidad
12:00-13:00	LUNCH	
13:00-15:00	Institutionalization and Sustainability of HCW Management	Engr. Aida Barcelona
15:00-15:15	Coffee Break	
15:15-16:15	Case Studies on Healthcare Waste Management	Dr. Mohd Nasir Hassan
16:15-17:00	Case studies on HCW Technologies and Energy Efficiency in HCF	Arch. Marco Silvestri
17:00-18:00	Innovative Practice in Healthcare Waste in Asia/ Video Presentation	Engr. Guilberto Borongan
Day 4: March 8, 2012		
08:30	Departure to Sta. Ana Hospital, Sta. Ana, Manila	
09:30 - 15:30	Healthcare Facility Visit: Sta. Ana Hospital	
16:30	Arrival at the hotel	
15:45 – 18:00	Preparation of Report on Healthcare Facility: Sta. Ana Hospital	
Day 5: March 9, 2012		
08:30 – 10:00	Sharing of Insights/ Discussion of Healthcare Facility Visit	Participants
10:30 – 10:45	Coffee Break	
10:45 – 11:30	Health Care Waste Management Plan	Engr. Corazon Vidad
11:30 – 12:00	Evaluation of the Training and Post Test	
12:00 – 12:15	Check-out Time	
12:15 – 13:00	Closing Ceremony	
13:00	LUNCH	

PARTICIPANTS EXPECTATIONS

Station 1: Expectations from the Training	Station 2: Expectations from Resource Persons
<ul style="list-style-type: none"> 1. Knowledge on key terminologies in Health Care Waste Management 2. Updates on laws and regulations in Health Care Waste Management 3. Formulate Health Care Waste Management Plan 4. Applicable training design 	<ul style="list-style-type: none"> 1. Acquire updates on Health Care Waste Management 2. Enhance knowledge on Health Care Waste Management 3. Lively 4. Mastery of subject matter 5. Practical answers to queries 6. With sense of humor 7. Patient and accommodating
Station 3: Expectations from Myself	Station 4:Expectations from Co-participants
<ul style="list-style-type: none"> 1. To know something about waste management. 2. To learn new technologies on Health Care Waste Treatment. 3. Active participation 4. Punctual 5. Assertive about environmental condition 6. To be able to apply the knowledge learned from the training. 7. To learn and be able to impart knowledge to co-workers. 	<ul style="list-style-type: none"> 1. Cooperation from the group – insights and constructive criticisms 2. Sharing of best practices from their respective institutions 3. Friendly 4. To know proper segregation 5. Information dissemination to health care facilities 6. Observe punctuality

Group Output: Healthcare Wastewater Management

Group Discussion on Environmental/Health Impacts of Wastewater coming from Different Sources

Group 1: Kitchen

Wastewater Components	Environmental/Health Impacts
1. Grease and Oil 2. Detergent 3. Animal blood 4. Left over soup 5. Hand dirts (result of handwashing)	1. Clogging of drainage system 2. Hazardous effect on environment 3. Possible transmission of diseases from contaminated animals 4. Result to overflow of water 5. Microorganism colonization

Group 2: Toilet

Wastewater Components	Environmental/Health Impacts
1. Urine, feces, saliva, blood, secretions 2. Cleaning agents (Chlorine, muriatic acid, cleanser, bath soap and shampoo) 3. Extracted dirts from the floor, walls, and bowls of the toilet 4. Dirt from the body; scrubs from wounds, dry skin; falling hair	1. Bacterial contamination, transmission of disease, water pollutant 2. Contaminate ground water, affects marine life, and result to respiratory problems 3. Contamination and pollution 4. Contamination and pollution

Group 3: Laundry

Wastewater Components	Environmental/Health Impacts
1. Blood 2. Urine/Feces 3. Body fluids 4. Chemicals 5. Oil and grease 6. Detergents/Reagents 7. Dirt	1,2,3. Water pollution, land or soil pollution, destruction of aquatic life, and infection or disease. 4,5,6. Water pollution, land or soil pollution, destruction of aquatic life, infection or disease, and poisoning. 7. Water pollution, land or soil pollution, and destruction of aquatic life.

Group 4: Laboratory

Wastewater Components	Environmental Impacts	Health Impacts
1. Urine 2. Blood 3. Fecal matter 4. Body fluids 5. Sputum 6. Soaking solutions 7. Disinfectants	Air pollution Water pollution Soil pollution	Water borne diseases Poisoning Intoxication Skin disease

Group Output: Institutionalization and Sustainability of HCW Management

1. Cavite and Rizal Group

Current HCWM Organizational Structure & Experiences	Issues/Concerns	Recommendations
1. Organization	No regular meetings	<p>Conduct regular meeting quarterly.</p> <p>Management committee will issued memorandum having appropriate sanction for those who do not attend.</p>
2. Fast transition of staffs	Knowledge deficit of new staffs	Early training for the replacing staff
3. Infection control	PPE's are not well budgeted	Allocate enough budget
4. Collection of waste	<p>Delayed collection on infectious waste.</p> <p>Waste segregation at source is not followed.</p>	<p>Mandatory Regular collection of HCW as per DENR guidelines</p> <p>Dedicated monitoring of section heads and clear policy on waste segregation and imposing sanctions.</p>
5. Management Support	No support from management	Full support and complete involvement of the management.

2. Quezon Group

Current HCWM Organizational Structure & Experiences	Issues/Concerns	Recommendations
1. Members of HCWM committee has been identified	Formation of HCWM committee; waiting for issuance of Official Personnel Order	For the HCWM committee to be formalized; for budget allocation by the PHO
2. Hospitals have PCO designate and HCWM plan, in compliance to regulatory policies	No formal training for PCO and health staff on HCWM; inadequate training of utility personnel	Provide training for PCO
	Plan not fully implemented due to inadequate funding	Allocate budget for HCWM plan in 2013
	No piggy-backing by birthing homes, RHUs, health centers in HCWM	For the DOH to regulate HCWM not only of hospitals but all health care facilities (RHUs, birthing homes, dental clinics, clinical laboratories)
		Centralize the transport and treatment of HCW at the provincial level
	Inadequate awareness among hospital staff and patients on waste segregation	Conduct regular health promotion activities on HCWM and in patient education; disseminate HCWM policies
		Network with various stakeholders in the dissemination of HCWM policies/practices
3. Existing policies on waste minimization (local ordinances on ban of plastic in hospital premises, restriction in bringing in food, placing of food in reusable containers);		Some hospitals to follow-suit

monitoring system in place in some hospitals		
4. Income-generating programs on recycling of plastics are in place in QMC (Material recovery facility)		Some hospitals to follow-suit

3. Laguna Group

Current HCWM Organizational Structure & Experiences	Issues/Concerns	Recommendations
1. No organized HCWMC or Inactive HCWMC in some hospitals	Inadequate manpower compliment. Budgetary constraint.	Organize HCWM organizational structure Budget allocation
2. HCWM plan/policy guidelines	Multitasking of personnel	Re-activate hiring of personnel per designation
3. Budgetary requirements	Not strictly implemented	Strengthen the policy/plan implementation
	Not included/limited budget	Additional funds specifically for HCWM program/plan
	Rapid turnover of health personnel	Re-echo or feedback
	Inadequate training on HCWM	More/regular training
4. Implementation	Lack of IEC Non prioritization	Prioritization of HCWMP
5. M&E	Irregular monitoring Inavailability of checklist	Regular internal and external monitoring utilizing the established checklist

4. Batangas Group

Current HCWM Organizational Structure & Experiences	Issues/Concerns	Recommendations
1. Lack of personnel	Waste not collected	Assign personnel responsible for garbage collection
2. Chevalier failed to collect for two weeks	Chevalier got problems with DENR; temporarily suspended	Training
3. No existing organization	No budget or lacks manpower	Organize committee
4. With organize committee plans/manual	No funds, no training No appropriate PPE No support from top management	DOH-CO to allocate fund DBM creates position for WM Provisions of training for WMC
5. No Pollution Control Officer	No designated Pollution Control Officer Doctors became hindrance regarding program implementation No regular meeting	Designate PCO and train him/her Orientation/training provision Administer sanctions/penalties for erring members To set a regular meeting (in memo)

Module Description

A hospital visit or a walk-through survey will be held on March 8, 2012 at Sta. Ana Hospital located in New Panaderos Street, Sta. Ana, and Manila. The walk-through survey will provide the information on the status of the healthcare waste management in a healthcare facility. The survey results of this walk-through shall be used as an initial step towards a more comprehensive process that shall be conducted by the participants upon returning to their respective facilities

Objectives

At the end of the hospital visit/survey, the participant will be able to:

1. Establish an initial reference point for assessing waste management practices and techniques in a healthcare facility;
2. Compare the various performance indicators with the existing national and/ or global standards, as applicable;
3. Describe current good practices and techniques and identify potential gaps;
4. Help define goals and milestones in order to gauge progress of the activities in relation with the healthcare waste project.
5. Determine initial resource needs to support the healthcare waste initiative.

Guidelines for the Visit

1. The participants will be divided into four (4) groups of 8-9 members each group with assign facilitator.
2. The specific schedule of activities during the visit is as follows:

8:30 am- Departure of Participants from the training venue (Citystate Tower Hotel)
9:30 am- Courtesy call to the Hospital Director and Staff
10:00 am- Orientation session on the hospital facility by Sta. Ana Hospital Representative
1:00 pm- Guided walk-through survey
3:00 pm - Discussion/ Wrap-up
3:30 pm - Adjournment

2. General orientation of the facility will be conducted prior to ocular using the walk-through checklist. An assigned staff of the Sta. Ana Hospital will act as a resource person to attend to the general data/information needs of the participants.

3. Four main areas of the hospital shall be visited (one area per group).
 - a. Laboratory/diagnostic areas and Administrative Office
 - b. Medical, Surgical, OB-gyne wards
 - c. Out-patient department, Dietary Department
 - d. Operating/Delivery rooms and Emergency Room
4. After the group visit to their respective assigned areas all groups will proceed to the Central Waste Storage Area and Wastewater Treatment Facility
5. A walk-through survey (self-monitoring) form shall be used to guide the participants. (See Annex A.) For groups assigned in more than one area, another copy of the walk-through survey form shall be used.



TRAINING ON HEALTH CARE WASTE MANAGEMENT (CHD-CALABARZON)

*Citystate Tower Hotel
Mabini corner P.Faura Street, Ermita, Manila
March 5-9, 2012*

TRAINING EVALUATION FORM

In an effort to evaluate the effectiveness of this Training and improve future trainings, we request your assistance in providing us with the necessary feedback. Your comments will be greatly appreciated.

DIRECTIONS: Please encircle the appropriate response to the following items using the code:

SA	= strongly agree
A	= agree
D	= disagree
SD	= strongly disagree

- | | |
|---|---------------------------|
| 1. The training objectives were clear and relevant to my work situation | SA A D SD |
| 2. The training stimulated my interest in the subject matter | SA A D SD |
| 3. My previous knowledge/experiences prepared me adequately for the training | SA A D SD |
| 4. The handouts/audio-visual aids facilitated my understanding of the subject matter | SA A D SD |
| 5. The lectures were effective in facilitating my understanding of the subject matter | SA A D SD |
| 6. I had ample opportunity to ask questions and participate in the discussions | SA A D SD |
| 7. The facilitators provided valuable information and directions. | SA A D SD |
| 8. The activities were effective for the training objectives | SA A D SD |
| 9. The content of the workshops was appropriate for my needs | SA A D SD |
| 10. The venue is conducive to training | SA A D SD |

- | | |
|---|--------------------|
| 11. The meals were adequate | SA A D SD |
| 12. I am fully satisfied with the output of this training | SA A D SD |

COMMENTS:

13. What is your general reaction to the training program?

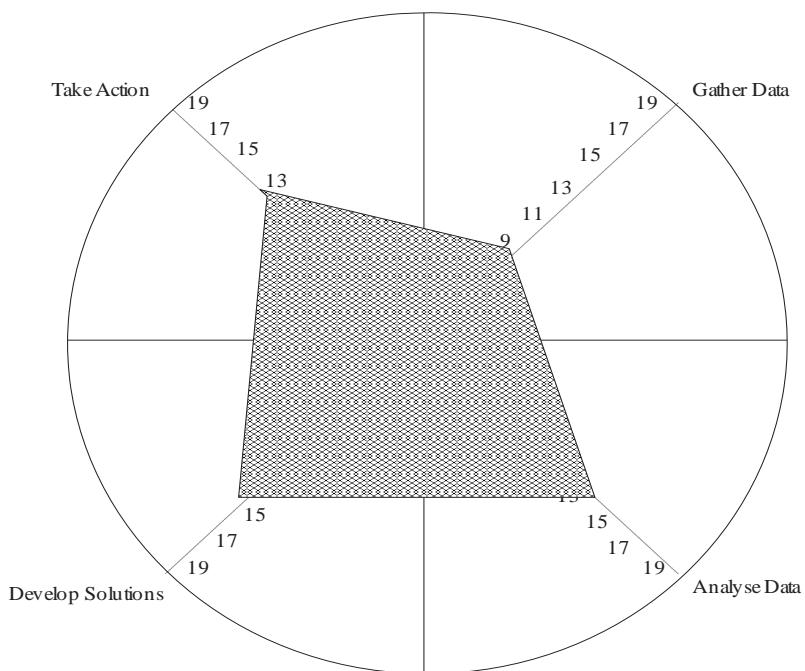
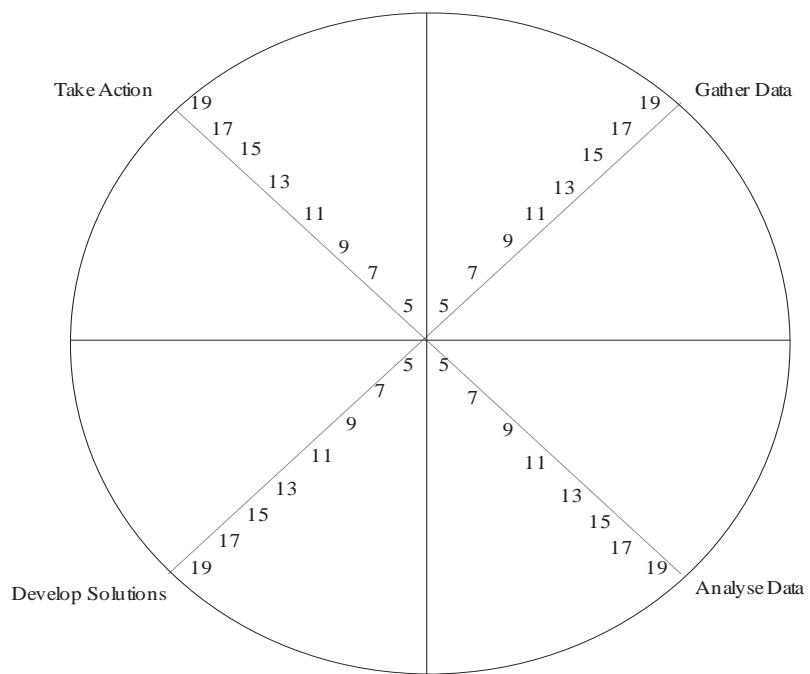
11. What did you like best about the training?

12. What did you like least about the training?

13. What changes would you recommend to improve future trainings?

14. Other Comments

TRAINING COMFORT INDEX



An example of a person's TRI

Gathering data	Analyzing data	Developing solutions	Taking actions
<ul style="list-style-type: none"> ➤ interview ➤ read ➤ survey ➤ learn ➤ observe 	<ul style="list-style-type: none"> ➤ analyze ➤ define objectives ➤ prioritize ➤ identify goals ➤ proceduralize 	<ul style="list-style-type: none"> ➤ storyboard ➤ produce media ➤ write workbooks ➤ prepare tests ➤ visualize 	<ul style="list-style-type: none"> ➤ teach ➤ administer ➤ lecture ➤ conduct workshops ➤ facilitate learning

Republic of the Philippines
Department of Health Center for Health Development 4A
Quirino Memorial Medical Center Compound, Project 4, Quezon City
Tel. No. 437-5585; 913-4526

Date: **9 March 2012**

For: **EDGARDO M. GONZAGA, MD, MSc, CESO III**
Director IV

Through: **HERMINIA L. PALAMING, MD, MPH**
Chief, RLED

NOEL G. PASION, MD, MPH
Chief, HOS/LHAD

Subject: **Output During the Health Care Waste Management Training last March 5 to 9, 2012**

The following are the recommendations by the undersigned after attending the pilot “Health Care Waste Management Training” last March 5 to 9, 2012, at the CityState Tower Hotel, Ermita, Manila:

1. The DOH CHD 4A should take the lead in practicing and advocating proper waste minimization and health care waste management, being the lead agency in health, and in accordance to existing legal mandates and policies (R.A. 9003, PD 856, DOH Healthcare Waste Management Manual of 2011, etc.).
2. The DOH CHD 4A should convene the Region 4A Waste Management Committee to:
 - a) review existing waste management policies and procedures;
 - b) assess the existing waste management system;
 - c) lobby with the subcontracted Utility Service to implement the proper waste management system;
 - d) formulate a Waste Management and Minimization Plan, for incorporation in the 2013 annual Work and Financial Plan;
 - e) conduct orientations and capability building activities for personnel on healthcare waste management; and
 - f) procure necessary waste management logistics (colored trash bins, assorted colored plastic containers, collateral materials, etc.).
3. The DOH CHD 4A should mainstream and advocate healthcare waste management among local government units and other healthcare facilities, both public and private.
4. The DOH CHD 4A should coordinate with the DENR, LLDA, and other stakeholders, in order to streamline procedures and policies related to healthcare waste management.

Prepared by:

Engr. Corazon Z. Vidad

Dr. Susana C. Castillo

Engr. Jojo G. Franco

Dr. Gilbert G. Par

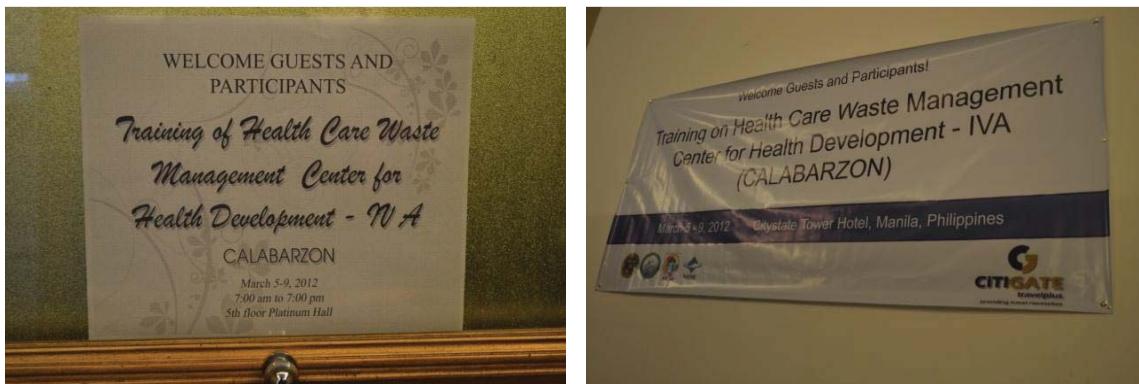
Engr. Peter T. Herrera

X. PHOTO DOCUMENTATION

THE TRAINING VENUE



5th Floor Platinum Hall, Citystate Tower Hotel, Ermita, Manila



Lobby Posting and streamer/banner for the said training.



Free materials courtesy of RRC.AP on display at the Display Corner/Marketplace.

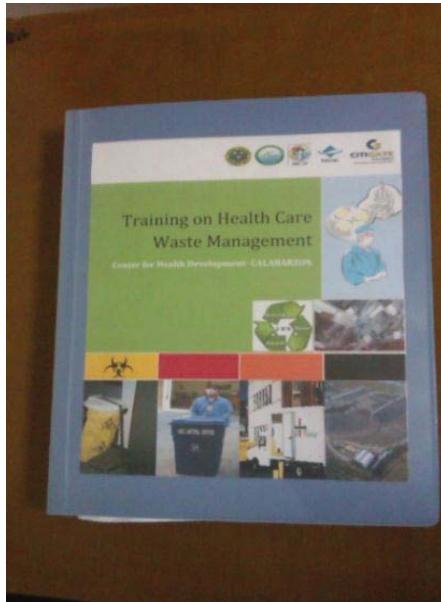


TRAINING ON HEALTH CARE WASTE MANAGEMENT

CENTER FOR HEALTH DEVELOPMENT IV A-CALABARZON

5-9 March 2012

TRAINING MATERIALS/ PARAPHERNALIA



Training manual containing printed training presentation materials for each module.



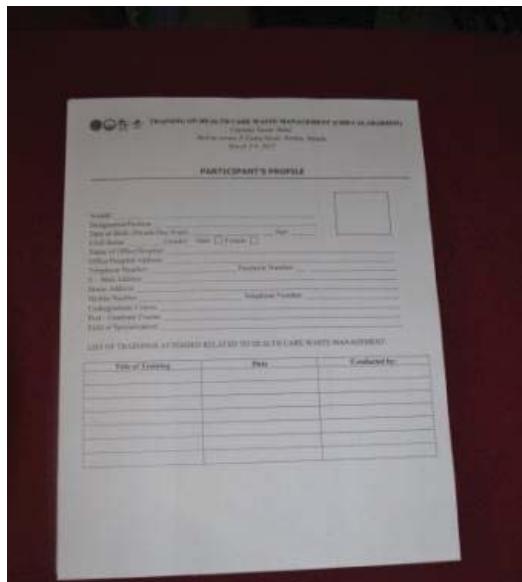
Training bag in which the participants put their things needed for the training.



CDs containing presentations materials for each training module, pictures and video presentation given to each participant.

5-9 March 2012

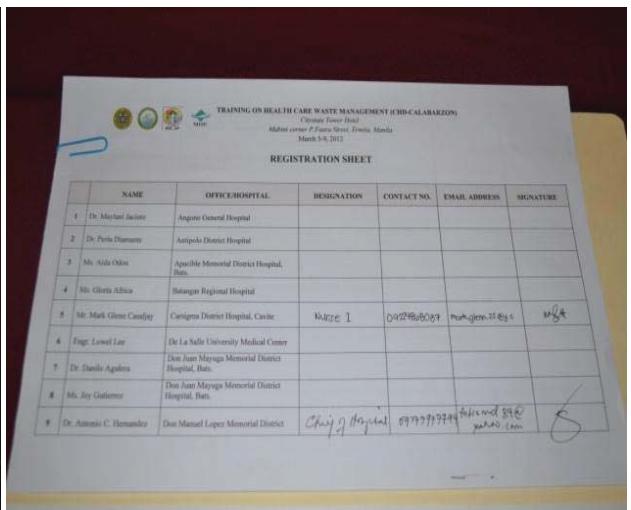
REGISTRATION MATERIALS



Participant's Profile Sheet used to gather detailed information of participant.



Participants' Nameplates/IDs



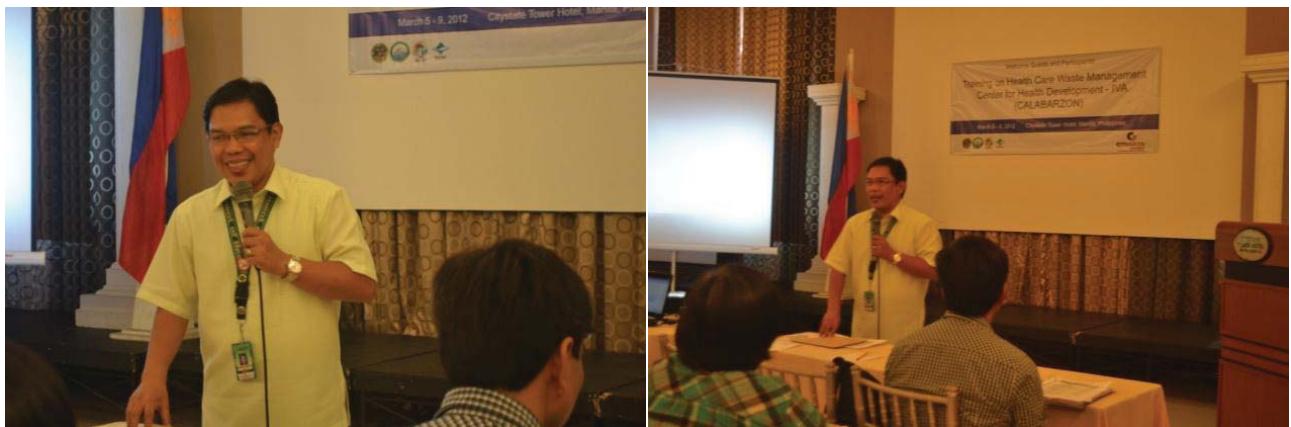
Registration Sheet where the participants signed their name that signifies their presence during the training.

5 MARCH 2012 (Day 1)

OPENING CEREMONY



The program was started with a Prayer led by Rev. Jonathan Mendieta and was followed by the singing of the Philippine National Anthem.



Dr. Edgardo M. Gonzaga, Director IV of Center for Health Development IV-A (CALABARZON) delivered the Opening Remarks. He emphasized the importance of conducting training on Health Care Waste Management. He also acknowledged the presence of the participants.

GROUP PHOTO



(Seated from the left) Rev. Jonathan C. Mendieta, Dr. Gilbert Par, Engr. Corazon Z. Vidad, Dr. Edgardo M. Gonzaga, Director IV of Center for Health IV-CALABARZON, Engr. Guilberto Borongan and Arch. Marco Silvestri with the participants who arrived early.

Day 1: LEVELING OF EXPECTATIONS



The participants were group into four and requested to write their expectations from the training, resource persons, themselves, and to their co-participants.

The participants write their expectations on the paper provided per station.



Participants' expectations were posted as reminder during the training.



Dr. Gilbert Par discussed “Health and Environment Impacts of Health Care Waste”.



Engr. Corazon Z. Vidad discussed “Legislation, Laws and Policies related to Health Care Waste Management”.

MARCH 6 (Day 2)



Unfreezing Exercise led by Mr. Ricardo Corado.



Engr. Guilberto Borongan discussed “Healthcare Waste Minimization (3Rs Application)”.



(Left) Engr. Aida C. Barcelona discussed “Segregation, Collection, Storage, and Transport of Health Care Waste”.

(Middle) Group Exercise: Participants were divided into four groups to work on classifying different types of wastes.

(Below) Participants post their group output on the board. Then each was processed by Engr. Barcelona who determined which group got the highest correct answers.





(Left) Ms. Faye V. Ferrer, Healthcare Without Harm-Southeast Asia, discussed Mercury in Health Care Facility.

(Right) Ms. Faye V. Ferrer received her Certificate of Appreciation.



Engr. Guilberto Borongan
discussed “Hazardous Waste
Storage Options: Mercury”.

Dr. Gilbert Par discussed
“Health and Safety Practices
in HCW Programs”.





TRAINING ON HEALTH CARE WASTE MANAGEMENT

CENTER FOR HEALTH DEVELOPMENT IV A-CALABARZON

5-9 March 2012

SOCIALIZATION



The “Healthcare Waste Management Dance Group” led by Engr. Virginia L. Fabros in their special dance number.



Engr. Guilberto Borongan and Dr. Gilbert Par paired up for the game “Pinoy Henyo”, a guessing game to identify the name of waste written in piece of paper.



Everyone enjoyed and had a wonderful night.

MARCH 7 (Day 3)



Prof. Romeo Quizon discussed “Healthcare Wastewater Management”. Participants were requested to discuss the components of wastewater and their environmental/health impacts by group and presented their output afterwards.





Engr. Corazon Vidad discussed “Waste Treatment and Disposal”.





(Left) Engr. Aida C. Barcelona discussed “Institutionalization and Sustainability of Health Care Waste Management”.

(Below) Group Exercise: Participants were divided into four groups to work on their current HCWM organizational structure and experiences, issues/concerns and their recommendations which were followed by reporting per group.



Dr. Bayani H. Terciano, Chief of Hospital of Luisiana District Hospital presented the output of Laguna Group.



TRAINING ON HEALTH CARE WASTE MANAGEMENT CENTER FOR HEALTH DEVELOPMENT IV A-CALABARZON

5-9 March 2012



Engr. Rene P. Chavez, Environment, Health and Safety Officer of Mary Mediatrix Medical Center presented output of Batangas Group.



Dr. Gilbert Par of Center for Health Development IVA-CALABARZON presented output of Quezon Group.



Mr. Ricardo P. Corado, Infection, Prevention and Control Nurse of Unciano Medical Center presented output of Cavite & Rizal Group.



Dr. Mohd Nasir Hassan of WHO/WPRO discussed “Case Studies on Healthcare Waste Management”.



Dr. Mohd Nasir Hassan received his Certificate of Appreciation.



(From left to right) Engr. Aida C. Barcelona, Engr. Corazon Z. Vidad, Arch. Marco Silvestri, Dr. Mohd Nasir Hassan, and Engr. Guilberto Borongan.



Arch. Marco Silvestri discussed Case studies on HCW Technologies and Energy Efficiency in HCF.



Engr. Guilberto Borongan discussed Innovative Practice in Healthcare Waste in Asia followed by a Video Presentation about Health Care Waste Management in Bir Hospital in Nepal.





TRAINING ON HEALTH CARE WASTE MANAGEMENT
CENTER FOR HEALTH DEVELOPMENT IV A-CALABARZON

5-9 March 2012

MARCH 8 (Day 4)

FIELD VISIT



The bus.



The participants waiting for the departure.



The Sta. Ana Hospital



Ms. Margaret Cabral discussed the Health Care Waste Management Plan of the Sta. Ana Hospital.



The garbage can with proper signages.



A group picture with Ms. Margaret Cabral of Sta. Ana Hospital.



MARCH 9 (Day 5)



Engr. Rene Chavez, participant sharing “Insights/ Discussion of Healthcare Facility Visit” with Engr. Corazon Vidad.



Engr. Corazon Vidad discussed Health Care Waste Management Plan.



TRAINING ON HEALTH CARE WASTE MANAGEMENT
CENTER FOR HEALTH DEVELOPMENT IV A-CALABARZON

5-9 March 2012



Ms. Gloria Africa hosted the Closing Ceremony.

Engr. Pablo del Mundo rendered a special song number.



From left to right. Mr. Ramil Raoet, Engr. Rene Chavez, Dr. BayaniTerciano, Ms. April del Rosario, and Ms. Salome Paycao shared their impressions on the training which are all positive remarks.



TRAINING ON HEALTH CARE WASTE MANAGEMENT
CENTER FOR HEALTH DEVELOPMENT IV A-CALABARZON

5-9 March 2012



Rev. Jonathan Mendieta and Engr. Corazon Vidad delivered their messages to the participants.



AWARDING OF CERTIFICATES



From left to right. Mr. Marco Silvestri, Engr. Guilberto Borongan, Dr. Gilbert Par, and Engr. Corazon Vidad with their respective Certificate of Appreciation.



TRAINING ON HEALTH CARE WASTE MANAGEMENT

CENTER FOR HEALTH DEVELOPMENT IV A-CALABARZON

5-9 March 2012



Engr. Guilberto Borongan shared an
Inspirational Message.

Dr. Gilbert Par on his Closing Remarks.



Picture with some of the participants during the last day.



Thematic Working Group on Solid and Hazardous Waste
Webpage: <http://www.environment-health.asia/twg.cfm?themeid=3>

Secretariat:

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Thailand

