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# Health Care Waste Management

## Training Manual *For* Medical Professionals



(May 2002)

**Prepared by:**

*Nepal Health Research Council*

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## **Preface**

Health-care waste is a unique form of solid and/or liquid waste generated in the diagnosis, treatment, prevention, or research of human and animal disease. Each year, thousands of kilograms of health care waste are produced by hospitals, clinics and other institutions in Nepal.

But health care waste presents occupational health risks to those who generate, package, store, transport, treat and dispose of it. It also presents environmental and public health risks through inappropriate treatment and/or disposal, and can contribute to the spread of infectious disease. The disorganized and chaotic management of health care wastes leads, rightly or wrongly, to the public belief that an institution is an unhealthy place and failing in its responsibilities. Every hospital or health care institution, no matter what size, is intended to be a place of healing. This is the fundamental purpose of a health care system. The ability of an institution to provide a good standard of health care is undermined if there is poor standard of hygiene and a high risk of avoidable infection to patients and medical workers. Achieving a good standard of cleanliness in health care institutions is an important component in controlling infection.

Training forms an important tool to improve the functioning of health care waste management. With this view in mind, training manual for Medical Professionals has been developed by NHRC with the financial and technical assistance from WHO-Nepal.

On behalf of NHRC, I wish to thank WHO, **Mr. Chandra Shekhar Yadav**, Team leader, **Mr. Sharad Aryal**, environmental health specialist and **Mr. Salil Devkota**, environment expert for their valuable support in preparation of this training manual.

Dr. Anil Kumar Mishra  
**Member- Secretary**  
**NHRC**

## **Acknowledgement**

With the intent of tackling waste management issues related to health care institutions, NHRC, through its Environmental Health Unit, has developed these "Health Care Waste Management Training Manual for Medical Professionals".

Sincerest gratitude is expressed to **Professor G. P. Acharya**, Chairman NHRC and **Dr. Anil Kumar Mishra**, Member-Secretary NHRC for their support and encouragement in the formulation of this document.

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Deep appreciation is also extended to all staffs at the NHRC.

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## Module 1

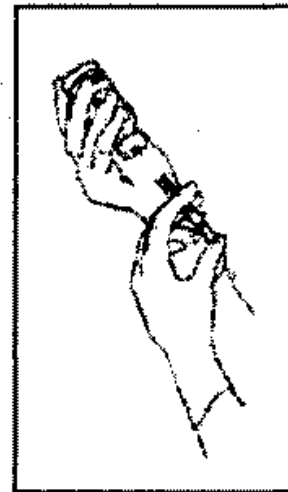
# WHAT IS HEALTH-CARE WASTE?

Health care waste includes all the waste generated by health-care establishments, research facilities, and laboratories. In addition it includes the waste originating from 'scattered' sources- such as that produced in the course of health care undertaken in the home (dialysis, insulin injections etc.).

Between 75% and 90% of the waste produced by health-care providers is 'non-hazardous' or general health-care waste comparable to domestic waste. The remaining 10-25% of health-care waste is regarded as 'hazardous' waste.

*According to WHO guidelines, health-care waste is categorized as:*

- *Infectious waste*
- *Pathological waste*
- *Sharps*
- *Pharmaceutical waste*
- *Genotoxic waste*
- *Chemical waste*
- *Wastes with high content of health metals*
- *Pressurized containers*
- *Radioactive waste*
- *General waste*



The "Waste Management Guidelines for Health-Care Institutions" as developed by Nepal Health Research Council (NHRC) has classified health-care waste only in three categories.

- *Non-hazardous Waste or General Waste*
- *Hazardous or Contaminated Waste*
- *Sharps (Whether Infected or Not)*

## ***Facilities That Produce Health-Care Waste:***

- Hospitals
- Health Clinics
- Dental Clinics
- Dispensaries
- Blood banks and blood collection services
- Medical and biomedical laboratories
- Biotechnology laboratories and institutions
- Medical research institutions
- Dialysis centers
- Military medical services
- Animal research and testing

## ***Health Care Waste Terms***

**Treatment:** Any method, technique or process (usually thermal or chemical) designed to change the biological character or composition of a hazardous waste to reduce or eliminate its potential for causing disease. The treatment may/not physically destroy the waste and render it unrecognizable.

**Destruction:** The process whereby wastes are rendered unrecognizable such as grinding or shredding. Destruction may be part of the treatment process or follow treatment.

**Disposal:** Final placement of health care waste or its residue following treatment to eliminate its original risk.

### **Questions**

- What do you mean by health-care waste?
- What type of institution produces hazardous waste?
- Do health care facility generate a large amount of hazardous waste?

### **Discussion**

Health-care waste

### **Demonstration**

Posters, Photos, Audio-visual

#### **What should be done?**

We must understand the difference between hazardous and non-hazardous waste.

## **Field Visit**

By visiting a health-care facility



**A hospital**



## Module 2

# HAZARDS OF HEALTH-CARE WASTE

Exposure to hazardous health-care waste can result in disease or injury. The hazardous nature of health-care waste may be due to one or more of the following characteristics:

- It contains infectious agents
- It is genotoxic
- It contains toxic or hazardous chemicals
- It is radioactive
- It contains sharps

## *Persons at Risk*

All individuals exposed to hazardous health-care waste are potentially at risk. The main groups at risk are the following:

- Medical doctors, nurses, health-care auxiliaries and hospital maintenance personnel
- Patients in health-care establishments
- Visitors to health-care establishments
- Workers in waste handling, transportation and waste disposal facilities
- Ragpickers

**Cost on maintenance of treatment and disposal is less than expenditure on treatment. Waste needs safe disposal.**

## *Questions*

- What are health hazards?
- Who is at risk of health-care waste?
- What is your opinion about rag pickers?

### ***Group Discussion***

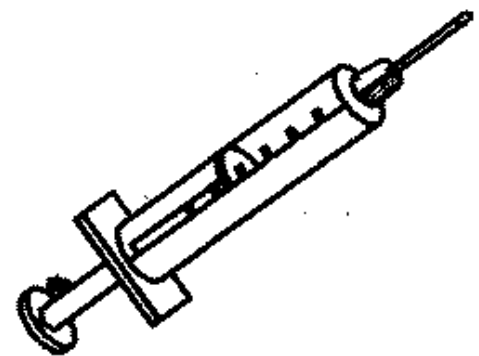
- Health hazards
- Persons at risk
- Ragpickers

### ***Demonstration***

Posters, Audio-visuals

### ***Field Visit***

Take around the health-care establishments to see the existing status of sanitation and waste management.



AIDS by Infected Syringe

## ***REASONS FOR UNSATISFACTORY STATUS***

### **Lack of**

- Priority and funds on this issue
- Training and managerial skill
- Appropriate technologies for treatment and disposal
- Awareness among medical personnel, patients, attendants and people in general
- Co-ordination between municipality, government institutions and health-care facilities
- Accountability



Unhygienic waste storage- a breeding site for pathogens

### **Questions**

- What are the reasons for unsatisfactory status?
- Can government alone solve this problem?
- How medical staffs and other personnel can improve the situation?

### **Group Discussion**

- **Reasons for unsatisfactory status**
- **How responsibilities can be shared by personnel in the health-care establishments?**

### **Demonstration**

Poster/Photo, Audio-visual

### **Field visit**

By visiting a health care facility

#### **What should be done.**

- **By education and motivation of patients and attendants waste can be minimize at source**
- **Minimum materials and belongings of the patients should be allowed in indoor wards.**
- **Ensure that needle and syringes should be kept in proper containers.**

# MANAGEMENT RESPONSIBILITY

The primary day to day responsibility for all health care waste management lies with each facility generating the waste and with the local government or government agencies for ensuring public health and environmental regulatory compliance. The starting point in each health-care facility is the preparation of a waste management plan.

There are three primary steps towards developing a health care waste management plan.

The relevant director should:

- Assess current duties, responsibilities and practices
- Assess current health care waste costs
- Decide on the health care waste management policy the hospital will follow

### First Steps to Effective Health Care Waste Management

- Identify present technical aspects, functions and personnel involved in the production, handling, and management of health care waste.
- Assess the costs associated with present waste management.
- Define management policies for waste management to be used in future
- Train employees in policy, health and safety procedures
- Analyze technical procedures, costs and policies annually to identify if additional better practices can be adopted.

## ***Step 1: Assessment of duties, responsibilities, practices***

The first step to an effective health care waste management plan is a comprehensive audit to determine the current status of personnel duties and responsibilities regarding health care waste and to define handling and reporting practices.

The facility director should conduct this audit, gathering all relevant information from every floor, department and service throughout the facility. The audit should contain detailed information about all personnel time spent in the performance of a health care waste generating, handling or processing.

## ***Step 2: Assessment of health care waste management costs***

The second step in the development of an effective waste management plan is an assessment of how much it costs.

### Costs to Consider When Auditing

- Health care waste containers, sacks and labels
- Disinfectants and antiseptics
- Personal protective equipment such as gowns and gloves, and their frequency of use must be included
- Disposable bed covering, bowls, tubing and many other similar items
- Vehicle, fuel and driver if the waste is shipped off site by hospital personnel either before or after treatment
- Contractor costs

## ***Step 3: Development of health care waste management policy***

The final step in the development of a health care waste management plan is to develop a management policy based on the assessments of current practices and costs. A health-care waste management policy is the compilation of all practices and procedures regularly carried out in regard to health care waste, from generation to ultimate disposal.

A health care waste management policy should be in a written form and describe all levels of responsibility, from the highest administrative authority to manual staff. It should be officially approved by the organization's governing body, endorsed with the director's signature and be explained to all employees in all departments.

Finally a health care waste management policy should be reviewed and updated annually.

**Health Care Waste  
Management Policy**

*Waste minimization*

*Separation*

*Identification*

*Collection*

*Storage*

*Transport*

*Measurement*

*Treatment*

*Disposal*

*Worker Training*

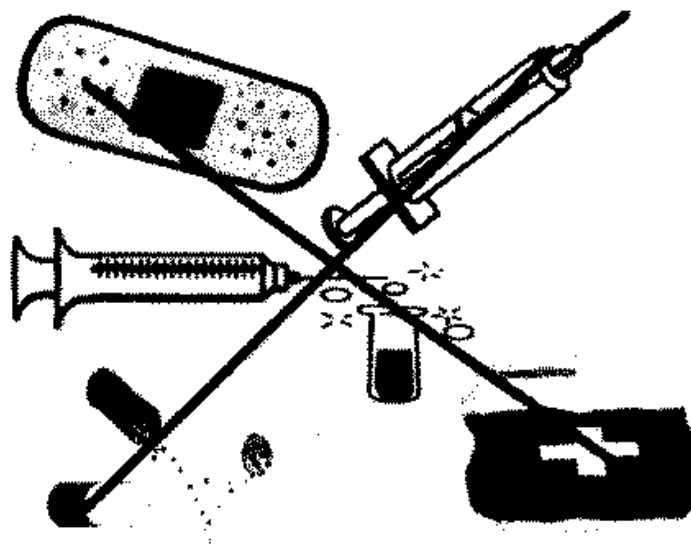
*Worker Health and Safety*

# WASTE MANAGEMENT

Good management of health care waste means the effective segregation of waste and the separate handling and disposal of each segregated waste category. This can not be achieved without the commitment of senior directors and the motivation of medical and support staff. Health care waste should be managed through a pathway composed of different elements, each of which must be addressed in terms of personnel and material costs, and occupation and safety risks. The main elements are-

- Identification and Segregation
- Handling (collection, measurement, storage and transport)
- Treatment
- Disposal

Minimization is the first best way to reduce health care waste quantities and costs, and to reduce environmental impacts. Effective minimization requires that all purchases of materials and supplies be made with waste reduction in mind.



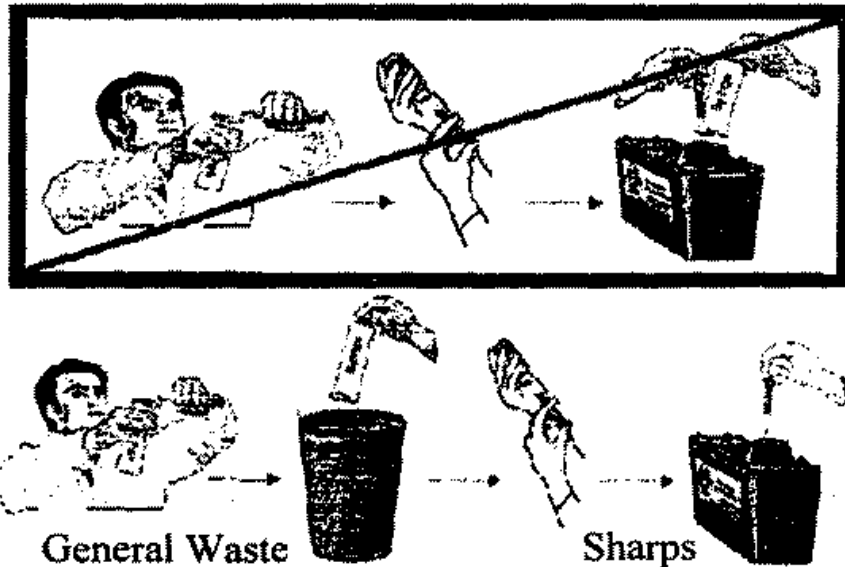
In medical department where all health care waste is mixed together and perhaps also stored and removed in a haphazard and unsatisfactory way, an obvious potential for injury and infection exists. Poor standards of hygiene can be reduced significantly by adopting some straightforward steps to segregate the main types of waste, collect and store them properly, and remove them regularly from medical areas.



## **IDENTIFICATION & SEGREGATION**

Proper identification and separation are the key to minimization and effective health care waste management. Segregation of waste will reduce the risks of health hazards and also reduce the cost of handling and disposal.

For example after use, a syringe becomes a potentially infectious waste, but its original package does not. If separated properly from the syringe before use, the packaging can be placed into a general waste bin, otherwise, if it has been included in hazardous waste bin, it cannot be separated later because of potential contamination from body fluids or blood.



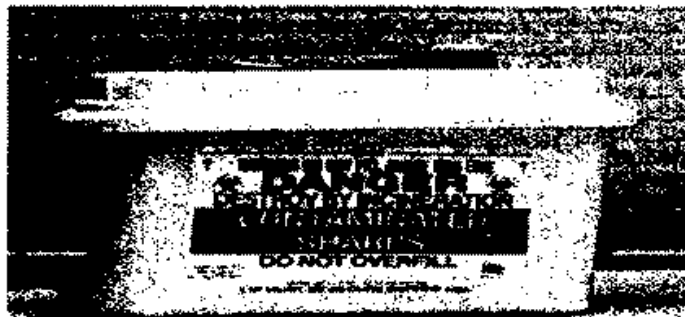
As a minimum, waste identification should be through a color-coded system (e.g. yellow for hazardous waste and black for non-hazardous waste). To separate and identify health care hazardous waste, a health care waste management policy should:

- Include a list of items and materials that will always be considered as hazardous wastes (such as needles and syringes)
- Designate containers using defined color-coding such as:
  1. Yellow for hazardous wastes and sharps
  2. Black for non-hazardous waste
- Designate Sharps containers as such and provide appropriate labeling including the international biohazard symbol.

- Ensure Sharps containers are placed at all locations where contaminated sharps are generated.
- Ensure puncture-proof and sealable containers are purchased and used for safe waste transport.
- Place information at each waste generation point to reinforce the policy and to illustrate quickly separation procedures.

***Examples of typical items placed in separate waste containers:***

<b>Potentially Hazardous Waste Bag</b>		<b>General Waste Bag</b>
<b>Contaminated or Hazardous Waste Materials</b>	<b>Used Sharp Containers</b>	<b>Waste Materials not Contaminated</b>
Gloves, gowns, masks Gauze, dressings, swabs Spatulas Urine, blood bags Sump tubes Suction canisters Disposable bowls and containers used for medical purposes Haemodialysis tubing Intravenous lines, bags Foley catheters Sanitary napkins Incontinence pads Nappies, diapers Human and animal tissue, placentae Body parts	Needles Needle and syringe assemblies Lancets Scalpels, blades Scissors, sutures Specimen tables Broken glass, ampoules Intravenous catheter Glass slides, cover slips	Packages, boxes, wrappings Newspapers, magazines Disposable plates, cups, utensils Food, food packaging, drinks containers Tissues, paper towels Flowers Intravenous bottles, packs



An example of sharps container

## **Questions**

- What do you mean by segregation of waste?
- How segregation helps in health-care waste management?

## **Group Discussions**

- Importance of segregation
- Relation between segregation and health-care waste management
- Establishment of three-bin system

## **Demonstration**

Posters, Photos, Audio-visual

<p><b>What should be done.</b> We must segregate the waste on-site.</p>
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## **Field Visit**

Different units of a health care facility

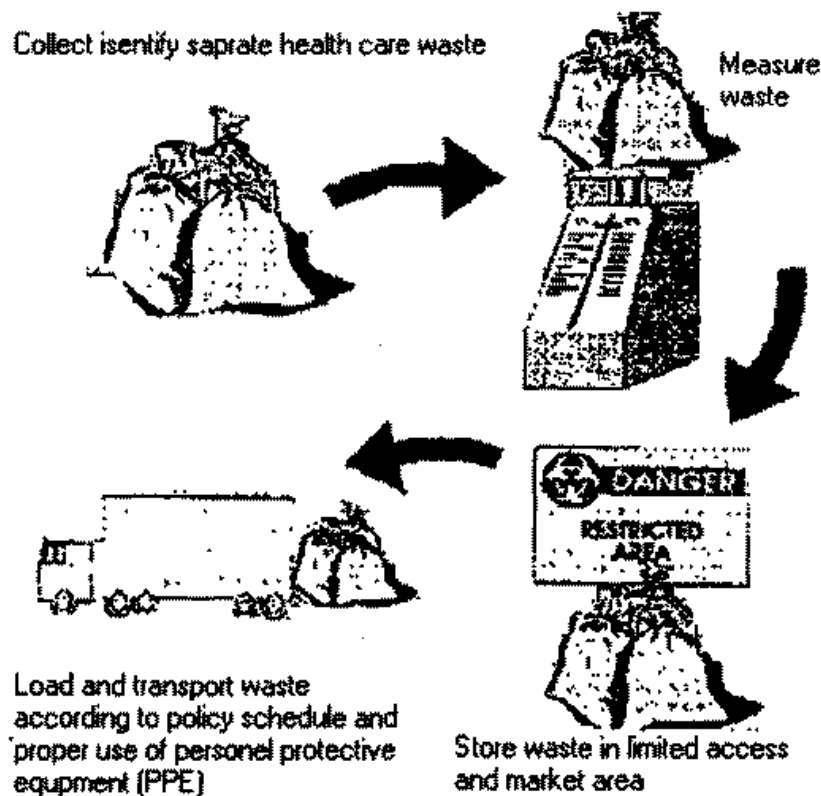
## Module 5

# HANDLING

All health care facilities should evaluate their existing health care hazardous waste collection, internal transport and storage practices to ensure they are safe, efficient, cost-effective and comply with government regulations.

After health care waste is collected and separated, it should be identified and measured by type, location of origin in the facility and weight. If there are no scales to measure weight, waste should minimally be measured by counting the number of bags.

Each facility should have a limited access waste storage area to contain hazardous waste awaiting on-site treatment or transport to an off-site facility. This area should be posted with warning signs and locked.



The health care hazardous waste collection portion of the management policy should include:

- A list of persons responsible for collection
- Collection schedule

- Internal transport routes
- Use of personal protective equipment
- Decontamination and cleaning procedures for waste collection carts and storage areas
- Use, maintenance and security of the storage area

The policy also should include limitations on how long waste can be stored and this should be posted.

## COLLECTION OF WASTE

There should be a fixed schedule for the collection of waste bags and containers from each medical department. This is to ensure the regular removal of waste from each location and to avoid misunderstandings between medical staff and cleaning or housekeeping staff. The minimum frequency of waste removal should be once a day. There should be separate schedules and separate collection times for general waste bags and hazardous waste bags / sharp containers.

### ***Bins / Bags***

*Plastic bins*

*Plastic bags (colored)*

*Black - General or Non-hazardous waste*

*Yellow- Hazardous waste*

*Yellow - Sharps*

No bags or sharps container should be more than three-quarters full when it is replaced. It should preferably be replaced when it reached two thirds full. The reason for this is to reduce the risk of plastic bags splitting open and of an injury from a protruding sharp item in sharps containers.

All bags and containers leaving a medical area should be sealed and labelled. The label should show, as a minimum, the name of the responsible medical person from the medical area, the date and the department name. This labelling is to enable managers and other personnel to trace any waste bag to its source if a problem is found (e.g. used sharps are contained in bags). It also allows medical managers to gather data on the amount of waste produced in each medical department and so ensure that the typical quantities of each waste type do not suddenly change.

### **Questions**

- Name the color which is to be used for particular type of waste
  - General waste
  - Hazardous waste
- What should be the quality of the dustbin?

## **Group Discussion**

Color coding

Type of dustbin

Bag/Container filling

## **Demonstration**

Posters, Photos, Audio-visual

## Module 6

# TRANSPORT OF WASTE

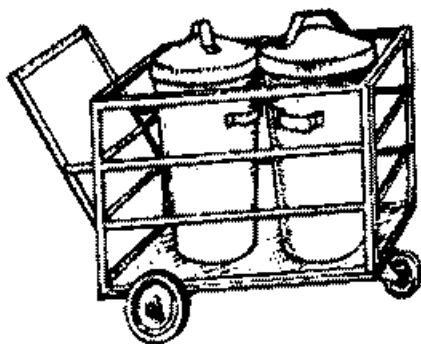
Health-care waste should be transported within the hospital or other facility by means of wheeled trolleys, containers or carts that are not used for any other purpose and meet the following specifications:

- Easy to load and unload
- No sharp edges that could damage waste bags or containers during loading and unloading
- Easy to clean

All the garbage vehicle should be properly covered so that no littering of the waste take place. Waste bags should not be hand-carried around a health care facility since this increases the risk of injury to legs, arms and torso from incorrectly disposed of sharps or other items.

### Transfer Vehicles

- Trolley
- Wheel Barrow
- Trailer and Tractor
- Use proper label on the transport vehicle
- Vehicle should be covered



Waste vehicle



On site transportation of health-care waste



### **Question**

- What type of transfer vehicle is available in your facility?
- How vehicles are maintained properly?

### **Discussion**

Type of transport vehicle  
Maintenance of vehicle

### **Demonstration**

Poster/Photos/Video film

### **Field Visit**

Visiting a waste loading station

## Module 7

# TREATMENT AND DISINFECTANTS

The main objective of the treatment of waste are:

- To make waste free from pathogen and infectious microorganisms
- To reduce the weight and volume
- To make syringes and needle non-reusable.

### Methods

- Incineration
- Sterilization
- Autoclave
- Microwave irradiation
- Chemical disinfection
- Encapsulation

All of these treatment technologies have positive as well as negative sides. There is no one, treatment technology for hazardous waste for all situations. Facilities should select a treatment method considering investment costs, maintenance and service costs, treatment effectiveness, destructive capability, hazardousness of post-treatment residues and environmental pollution.



A single chamber incinerator

## ***Disinfectants***

Any chemical substances used for disinfection

### ***Commonly used disinfectants are***

- Formaldehyde
- Ethylene oxide
- Glutaraldehyde
- Sodium hypochlorite
- Phenolic compounds
- Hydrogen peroxide
- Chlorine Dioxide
- Alcohols

Instruments and equipment that come in contact with contaminated floor, surface like trolley tops, table tops, try, clothes, beddings, beds, utensils and other articles like bed pan, milk bottles etc. should be regularly disinfected

### **Questions**

- What do you mean by treatment?
- What are the various methods of treatment?
- What do you mean by disinfection?
- How disinfection helps in health-care waste management?
- Suggest some disinfection methods for
- Thermometer
- Needles and syringes
- Surface
- Why disinfection is necessary?
- What are different methods?

### **Group Discussion**

Disposal of general waste.  
Disposal of hazardous waste.

### **Demonstration**

Posters, Photos, Video-film

#### **What should be done?**

All hazardous waste must be treated before final disposal.

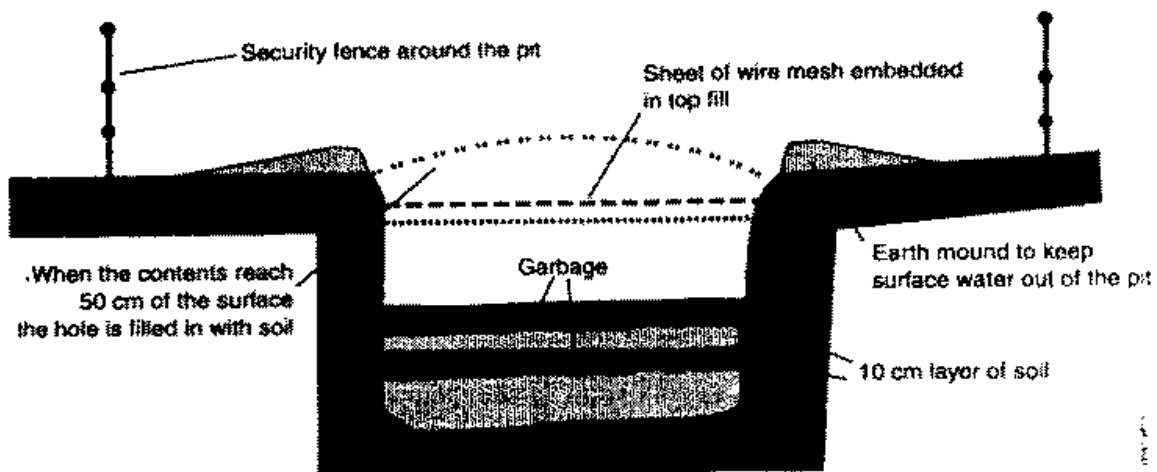
Use of disinfection must be done in right proportion with all precautions.

## Module 8

# DISPOSAL

Following treatment, health care hazardous waste can be disposed in several ways.

- General waste by Municipal corporation for landfilling.
- Hazardous waste by Incineration or Hazardous waste landfill site or other method of disposal approved by government of Nepal.
- Radioactive waste-special methods approved by the government of Nepal.
- Liquid waste by sanitary sewer and must conform to the national environmental guidelines



A small burial pit for health-care waste

### Question

What do you mean by disposal of waste?

Should hazardous waste be disposed in the sanitary landfill site designated for general waste?

### Group Discussion

Disposal of general waste.

Disposal of hazardous waste.

### Demonstration

Posters, Photos, Video-film

### Field Visit

A landfill site

**What should be done?**

All hazardous must be treated before final disposal

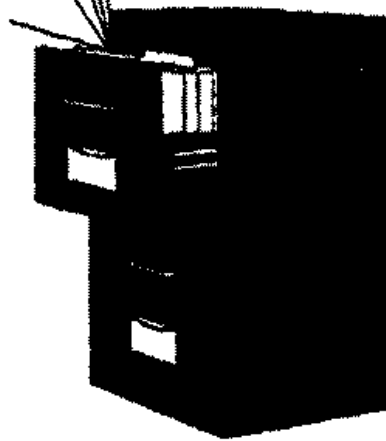
## Module 9

# RECORD KEEPING & TRAINING

Effective health care waste management requires accurate record keeping to assess waste quantities, annual expenditures and success of waste minimization efforts. The health care waste management policy should identify those persons who are responsible for record keeping.

### Keep Records About

- Amounts of waste generated in each department
- Amounts of waste generated for entire facility
- Direct costs for supplies and materials used for collection, transport, storage, treatment, disposal, decontamination and cleaning.
- Costs for labor and materials for training
- Cost for labor and materials for occupation health activities such as immunizations, needlesticks and other injuries.
- Costs to repair and maintenance of treatment technologies
- Costs for contractor services.



Also, a health care waste management policy is only effective if it is used daily, consistently and accurately. Training employees in implementing the policy is critical to a successful health care waste management program. Training will provide orientation for new employees and for existing employees with new responsibilities. Training should focus on all principles of health care waste management as discussed in this document. It also should highlight employees' responsibilities and where they fit into the entire management program.

## WORKER'S HEALTH AND SAFETY

A health care waste management policy should include continual monitoring of workers' health and safety to ensure that proper handling, treatment, storage and disposal are being implemented and that proper preventive measures are being carried out. Good health and safety measures include:

- Proper training
- Issuance of personal protective equipment (PPE)
- Establishment of an effective occupational health and safety program that includes immunization and medical surveillance.

Employees or Waste collectors should wear approved PPE which includes-

- Long boot with thick sole
- Apron
- Face mask
- Gloves
- Eye glasses



### Questions

How will you prevent accident in the hospital?

What are the special precautions in dealing with AIDS cases?

How can you improve safety measures in your hospital?

### Group Discussion

Safety Measures

Situations where accidents are likely to happen

### Demonstration

Posters, Photos, First-Aid Box, Protective wear

**What should be done?**  
Personal protective equipment should be used by waste handlers and other staffs.

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