

3.14 Workshop 4

Treatment and disposal options

A) For participants from national or local authorities

Evaluate the treatment and disposal options that would be suitable for health-care waste in your country and prepare a policy. Differentiate the policy for large hospitals and for smaller, remote health-care establishments. Take into account the aspects listed below.

B) For participants from health-care establishments

Evaluate the treatment and disposal options that would be suitable for health-care waste in your health-care establishment and propose a strategy. Formulate a strategy for larger hospitals and smaller, remote health-care establishments. Take into account the following aspects:

- C Public health and safety, including worker's safety
 - C Existing options in the country/ region
 - C Different health-care waste categories
 - C Availability of qualified personnel
 - C Technologies available on the market
 - C Environmental aspects
 - C Approximate investment and operational costs
 - C Required training to operate the technologies
 - C Maintenance requirements
 - C On-site versus off-site options
 - C Acceptability by the general public
- etc.

3.15 Lecture 10

Wastewater management

Overheads

Overhead 10.1 Wastewater from health-care establishments

Overhead 10.2 Wastewater discharge to municipal sewer

Overhead 10.3 On-site treatment of wastewater

Overhead 10.4 On-site sludge treatment

Overhead 10.5 On-site minimal safety requirements

Overhead 10.6 Sanitation in health-care establishments

Teacher-s notes

Handouts

Reduced overheads

Wastewater from health-care establishments

May contain

- **Microbiological pathogens**
 - Bacteria
 - Viruses
 - Helminths
- **Hazardous chemicals**
- **Pharmaceuticals**
- **Radioactive isotopes**



Wastewater discharge to municipal sewer

Hospitals may use a sewer providing:

- The sewer is connected to a plant removing 95% of bacteria
- Sludge is anaerobically digested to a standard of <one helminth egg per litre
- High standards of HCW management and low discharge of hazardous chemicals
- Waste from patients treated with cytotoxic drugs is collected separately



On-site treatment of wastewater

- **Primary treatment**
- **Secondary biological purification**
 - 90% to 95% of bacteria removed
 - Most helminths removed
- **Tertiary treatment**
 - Lagooning or sand filter
 - <10 mg/l suspended organic matter
- **Chlorine disinfection**
 - Especially important if effluent discharged in a coastal area



On-site sludge treatment

Options

- Anaerobic digestion
- Natural drying in beds, and incineration

Guidelines for safe land spreading without disinfection

- <one helminth egg per kilogram
- <1000 faecal coliform per 100 grammes



On-site minimal safety requirements

Lagooning

- Two lagoons (minimum) followed by soil filtration

If no sewage treatment:

- Isolate enteric patients and disinfect excreta
- No discharge of chemicals and pharmaceuticals to the sewer
- Deshydrate sludges from hospital cesspools and disinfect chemically
- NEVER use hospital sewage for agriculture
- Don't discharge to natural waters
- Small rural establishments: infiltrate through porous soil



Sanitation in health-care establishments

*Hospital sanitation is of
primary importance
to avoid the continuous recirculation of
diseases in the community*



Overhead 10.1

Sewage from health-care establishments is of a quality similar to urban sewage, but may in addition include various potentially hazardous components, listed on the overhead.

Of main concern are wastewaters with a high content of enteric pathogens easily transmitted through the water cycle; these are produced by wards treating patients with enteric diseases (mainly contained in patient's excreta), in particular during outbreaks of diarrhoeal disease.

Possible links between unsafe wastewater disposal of health-care establishments have been strongly suspected in relation to major outbreak spreads (e.g. cholera outbreaks).

Sewer networks of the health-care establishments are not always connected to an efficiently operated sewage treatment plant, and sometimes municipal sewer networks may not even exist.

Overhead 10.2

Discharge to the municipal sewer is possible if the health-care waste management system of the establishment reaches high standards, ensuring the absence of significant quantities of toxic chemicals, pharmaceuticals and radionuclides, and cytotoxic drugs and antibiotics in the discharged sewage; also, in oncological wards, excreta from patients under treatment with cytotoxic drugs should be collected separately and adequately treated as the other cytotoxic waste. Chemical pollutants contained in hospital wastewater may have toxic effects on the active bacteria of the municipal sewage purification processes which may cause a problems regarding the good functioning of the sewage treatment plant.

Overhead 10.3

Many hospitals have their own sewage treatment plant, in particular when the hospital is not connected to any municipal treatment plants. Efficient treatment of sewage from health-care establishments should include the operations outlined on the overhead.

Secondary treatment will usually remove a significant part of helminths, bacteria and viruses.

Tertiary treatment should reduce the suspended organic matter to far less than 10 mg/l. For reaching pathogen concentrations comparable to those found in natural waters, chlorine disinfection should be made.

Overhead 10.4

The sludge resulting from hospital sewage treatment will contain high concentrations of helminths and other pathogens.

Reuse of wastewater and sludges in agriculture and aquaculture:

According to the relevant WHO guidelines, the treated wastewater should not contain more than one helminth egg per litre and no more than 1000 faecal coliforms per 100 millilitres for unrestricted irrigation. It is essential that the treated sludge does not contain more than one helminth egg per kilogram and no more than 1000 faecal coliforms per 100 grams. Furthermore, the sludge should be applied to the fields in trenches and covered with soil.

Overhead 10.5

There is no safe solution for the disposal of sewage from hospitals which are not connected to a sewer, are unable to afford a compact sewage treatment plant, and have no space available to build a lagooning system.

Establishments which cannot afford sewage treatment plants should use a lagooning system. The lagooning system should comprise two successive lagoons to achieve an acceptable level of purification of their hospital sewage. This lagooning system may eventually be followed by land infiltration of the effluent to benefit from the soil filtering capacity.

Minimal safety requirements should be taken by establishments with minimal programmes, unable to afford any sewage treatment to minimize health risks (see overhead).

Small-scale rural health-care establishments applying minimal waste management programmes may discharge their wastewater to the environment. An acceptable solution would be to practice natural filtration of their sewage through infiltration on adequate porous soils, located outside the catchment area of aquifers used to produce drinking water or to supply water to the hospital.

Overhead 10.6

In many of the health-care establishments of developing countries, patients have no access to sanitation. This means that excreta, are usually spread out to the environment, creating a high risk of infection to people who come in direct or indirect contact with it. Human excreta are the principal vehicle for the transmission and spread of a wide range of communicable diseases. It is, therefore, of primary importance to provide access to adequate sanitation in every health-care establishment. The faecal-oral cycle (and other routes of transmission like penetration through the skin) has to be interrupted to avoid the diseases being continuously recirculated through the population.

The health-care establishment should, if possible, be connected to a sewage system. There also exist technically sound on-site sanitation systems according to the standard technologies in sanitary engineering, which are readily accessible in guidebooks. In addition, convenient washing facilities should be available to all patients personnel and visitors.


Reduced overheads - Lecture 10

Overhead 10.1

Wastewater from health-care establishments

May contain

- **Microbiological pathogens**
 - Bacteria
 - Viruses
 - Helminths
- **Hazardous chemicals**
- **Pharmaceuticals**
- **Radioactive isotopes**

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Overhead 10.2

Wastewater discharge to municipal sewer

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Overhead 10.3

On-site treatment of wastewater

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 - Especially important if effluent discharged in a coastal area

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Overhead 10.4


On-site sludge treatment

Options

- Anaerobic digestion
- Natural drying in beds, and incineration

Guidelines for safe land spreading without disinfection

- <one helminth egg per kilogram
- <1000 faecal coliform per 100 grammes

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Overhead 10.5


On-site minimal safety requirements

Lagooning

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If no sewage treatment:

- Isolate enteric patients and disinfect excreta
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- Deshydrate sludges from hospital cesspools and disinfect chemically
- NEVER use hospital sewage for agriculture
- Don't discharge to natural waters
- Small rural establishments: infiltrate through porous soil


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Overhead 10.6

Sanitation in health-care establishments

Hospital sanitation is of primary importance to avoid the continuous recirculation of diseases in the community

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3.16 Lecture 11

Workers= health and safety and emergencies

Overheads

Overhead 11.1	Workers=health and safety - principles
Overhead 11.2	Personal hygiene
Overhead 11.3	Protective clothing
Overhead 11.4	Safe management practices
Overhead 11.5	Programme for response to injuries
Overhead 11.6	Cytotoxic safety
Overhead 11.7	Emergency response - principles
Overhead 11.8	Procedure for spillage cleaning
Overhead 11.9	Reporting incidents

Teacher-s notes

Handouts

Reduced overheads

Workers' health and safety principles

Good occupational health and safety measures include the following points:

- Proper training
- Personal protective clothing and equipment
- Effective occupational health programme
 - immunization
 - post-exposure prophylaxis
 - medical surveillance
- Personal Hygiene



Personal hygiene

- Convenient washing facilities (with warm water and soap) should be available for personnel handling hazardous HCW
- Personnel should be trained on personal hygiene issues that reduce the risk from handling hazardous HCW



Protective clothing

- Helmets
- Respiratory face masks
- Eye protectors
- Overalls
- Industrial aprons
- Leg protectors
- Industrial boots
- Disposable gloves (medical staff) or
- Heavy duty gloves (waste workers)



Safe management practices

- Waste segregation
- Appropriate packaging of waste
- Waste identification
- Proper storage of waste
- Adequate transportation



Programme for response to injuries

- Immediate first aid measures
- Immediate reporting
- Identify source of injury
- Obtain additional medical care
- Maintain medical surveillance
- Blood tests if required
- Record the incident in full
- Investigate the causes and report
- Implement prevention measures for similar incidents



Cytotoxic safety

Special measures should be taken when using cytotoxic drugs:

- A specially assigned safety officer should supervise the safe management of these products and wastes
- Set up written procedures for handling products and waste
- Training of the staff about hazards, and handling and decontamination procedures
- Develop emergency programme for spills and accidents



Emergency response - principles

- **Follow the waste management plan**
- **Clean contaminated areas and disinfect if necessary**
- **Limit exposure of workers**
- **Limit impact on:**
 - ▶ Patients
 - ▶ Personnel
 - ▶ Environment



Procedure for spillage cleaning

- Evacuate the area
- Decontaminate eyes and skin
- Inform designated person
- Determine nature of spill
- Provide first aid
- Secure area
- Protective clothing
- Limit the spill
- Neutralize or disinfect
- Collect the spill
- Decontaminate the area
- Rinse the area
- Seek medical care where necessary



Reporting incidents

All incidents including near misses must be notified as follows:

- Description of incident
- Where and when it occurred
- Which staff were involved
- Other relevant circumstances

A report should be made and records should be kept



Overhead 11.1

Health and safety training should ensure that workers know and understand the potential risks associated with health-care waste, the value of immunization, and the importance of using the personal protective equipment and personal hygiene.

Groups of workers at risk include health-care providers, hospital cleaners, maintenance workers, operators of treatment facilities, health-care waste handlers and health-care waste disposal operators in and outside health-care establishments.

Overhead 11.2

Personal hygiene, in particular hand washing, may prevent further spread of pathogens (e.g. ingestion) with which the worker may have come into contact.

Overhead 11.3

The protective clothing listed on the overhead should be used by workers handling health-care waste (only the disposable gloves are for use by medical staff). The overall, aprons, leg protectors or industrial boots and gloves are obligatory, while the use of the other items should depend upon the operations carried out by the worker.

Protective clothing is essential to protect against personal injury.

Overhead 11.4

Many of the practices outlined in the previous lectures of this course contribute to workers' safety and health protection. The main points are listed on the overhead.

Segregation and waste identification shows the hazards of the content.

Adequate packaging and transportation prevents exposure of workers to the content.

Adequate storage limits the access to unauthorized persons and the access of rodents.

Overhead 11.5

A programme should be established for the response to injuries of personnel. This programme should be known to all staff. It should include the elements listed on the overhead.

Identifying the source of injury may provide information on possible infections.

Assessing the detailed circumstances of the injury and its causes may suggest measures for the prevention of such accidents in the future.

Overhead 11.6

Due to the special hazards related to exposure to cytotoxic products, special precautions should be taken.

Rural or urban district hospitals of middle and lower income countries do not typically use cytotoxic products.

Overhead 11.7

One person should be designated to be responsible for handling emergencies. This person has to design a deputy in case of absence.

In health-care establishments the most common emergencies are probably related to the spill of infectious and hazardous substances and wastes. The response to emergencies is based on the principles listed on the overhead.

Staff should be trained for emergency procedures. Written procedures should be established for the different types of emergencies. The necessary tools and materials should be easily accessible at all times.

Overhead 11.8

Usually, spills only require cleaning of the contaminated area. For spills of infectious agents, it may be necessary to evacuate the area, depending on the infectious agents involved. On the overhead is listed an example of procedure to follow after a spill. The actions should follow the order provided on the overhead.

It is essential that contaminated eyes or skin are decontaminated immediately, in general with abundant amounts of water.

Overhead 11.9

The incidents should be reported to the responsible officer who should investigate them. This officer should consider the implementation of preventive measures.


Reduced overheads - Lecture 11

Overhead 11.1

Workers' health and safety principles

Good occupational health and safety measures include the following points:


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- Personal protective clothing and equipment
- Effective occupational health programme
 - immunization
 - post-exposure prophylaxis
 - medical surveillance
- Personal Hygiene

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Overhead 11.2

Personal hygiene


- Convenient washing facilities (with warm water and soap) should be available for personnel handling hazardous HCW
- Personnel should be trained on personal hygiene issues that reduce the risk from handling hazardous HCW

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Overhead 11.3

Protective clothing

- Helmets
- Respiratory face masks
- Eye protectors
- Overalls
- Industrial aprons
- Leg protectors
- Industrial boots
- Disposable gloves (medical staff) or
- Heavy duty gloves (waste workers)

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Overhead 11.4

Safe management practices


- Waste segregation
- Appropriate packaging of waste
- Waste identification
- Proper storage of waste
- Adequate transportation

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Overhead 11.5

Programme for response to injuries

- Immediate first aid measures
- Immediate reporting
- Identify source of injury
- Obtain additional medical care
- Maintain medical surveillance
- Blood tests if required
- Record the incident in full
- Investigate the causes and report
- Implement prevention measures for similar incidents


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Overhead 11.6

Cytotoxic safety

Special measures should be taken when using cytotoxic drugs:

- A specially assigned safety officer should supervise the safe management of these products and wastes
- Set up written procedures for handling products and waste
- Training of the staff about hazards, and handling and decontamination procedures
- Develop emergency programme for spills and accidents


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Reduced overheads - Lecture 11

Overhead 11.7

Emergency response - principles

- Follow the waste management plan
- Clean contaminated areas and disinfect if necessary
- Limit exposure of workers
- Limit impact on:
 - Patients
 - Personnel
 - Environment


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Overhead 11.8

Procedure for spillage cleaning

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- Inform designated person
- Determine nature of spill
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- Secure area
- Protective clothing
- Limit the spill
- Neutralize or disinfect
- Collect the spill
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- Rinse the area
- Seek medical care where necessary

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Overhead 11.9

Reporting incidents

All incidents including near misses must be notified as follows:

- Description of incident
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- Other relevant circumstances

A report should be made and records should be kept

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3.17 Lecture 12

Waste management related costs

Overheads

Overhead 12.1	Principles of costing
Overhead 12.2	Internal and external costs
Overhead 12.3	Total costs of a waste management system
Overhead 12.4	Methods of financing
Overhead 12.5	Use of private services
Overhead 12.6	Contractual arrangements
Overhead 12.7	Cost reduction check list

Teacher-s notes

Lecture Handout

Handout 12.1	Costs of construction and operation of a health-care waste incineration plant
Reduced overheads	

Principles of costing

Polluter Pays Principle

- Health-care establishment pays for the safe disposal of the waste it generates

Minimization, segregation and recycling of waste

Appropriate sizing of the waste management system

Anticipate future trends



Internal and external costs

Internal Costs

Segregation, packaging, on-site handling and treatment: costs of supplies and labour.

External Costs

Off-site transport and treatment, final disposal: paid to contractors who provide the service.



Total costs of a waste management system

- **Initial capital investments**
purchase of equipment
- **Amortization of plant and equipment**
over life time of equipment
- **Operating costs**
costs of labour and consumables
- **Contractual costs**
for external services, e.g. transportation, final disposal



Methods of financing

Public funding of investments

Compulsory use of public facilities

Private funding of investments

Choice of private facilities and services

Funding of investments by the health-care establishment

Use of on-site treatment facility

Funding of investments by several health-care establishments

Cooperation between establishments to use common facility



Use of private services

Advantages:

- Inability of health-care establishments to raise needed capital
- Expected greater efficiency than public facilities
- Transfer of risk for operation

Disadvantages:

- Potential loss of control by the public agency
- May result in minimum level of services provided
- Regular inspection and regulatory control required



Contractual arrangements

Any agreement with private companies should include the following points:

- Prescribe minimal levels of service
(reliability, safety, public health risks, expansion)
- Method of dealing with cost increases
(inflation etc.)
- Environmental concerns
- Transfer of ownership
- Quality and regulatory control



Cost reduction check list

- **On-site waste management practices**
 - Waste segregation, minimization and recycling
- **Purchasing policy and stock management**
- **Comprehensive planning**
 - Develop and implement waste management strategy
 - Consider regional cooperation
- **Cost accounting and control**
- **Choose adequate methods and technologies**
- **Training of personnel for efficient and safe implementation**



Overhead 12.1

According to the 'Polluter pays' principle, each health-care establishment should pay for the safe treatment and disposal of the waste it generates.

Before planning a waste management system it should always ensure that the waste is segregated, which will significantly reduce the quantities of hazardous waste requiring special handling, treatment and disposal.

Adequate sizing of all elements of the system will prevent from subsequent costly modifications; Future trends in waste production, and the legislation becoming more stringent, should be anticipated.

Overhead 12.2

The construction, operation and maintenance costs of health-care waste management systems can represent a significant part of the global budget of a health-care establishment. It is essential to consider these costs when planning an establishment.

The internal and external costs of waste management have to be considered by the health-care establishment.

Overhead 12.3

A list of elements that contribute to the costs related to health-care waste management is summarized on Handout 12.1, for the example of an incinerator. It can be adapted for other technologies. This list may not be exhaustive.

Overhead 12.4

For public health-care establishments, general revenues may be used for waste management. The treatment and disposal facilities/sites may be constructed and operated from public or private funding. The national authority may require, by regulations, implementation of on-site treatment, compulsorily use public facilities or allow the choice to use private waste facilities (e.g. in the USA). These regulations may restrict certain disposal options or specify the required treatment technology and standards of operation.

Under arrangements with a private company, a private entity finances, builds, owns and operates for instance the treatment facility and sells the services to health-care establishments for collection and disposal fees. The use of private services should be encouraged, in particular for alternative treatment methods other than incineration.

Overhead 12.5

On the overhead are listed possible advantages and disadvantages that may result from the use of private waste management services including treatment and disposal. The main advantage is usually the increased efficiency resulting from competition among service providers on the market. The reduced level of services refers specifically to reliability, safety, public health risks and environmental aspects.

Also, the private company may increase the service costs due to factors that could not be foreseen (e.g. change of legislation) and which will represent unexpected expenses for the health-care establishment.

Overhead 12.7

Cost reduction measures can be taken at different levels of waste management.

As repeatedly mentioned, the most efficient ways to minimize hazardous health-care waste production are segregation, minimization, in certain cases recycling of wastes, purchase policies and stock management.

Documentation of costs will allow to identify priorities for cost reduction and monitor progress in the achievements of objectives.

Handout 12.1: Costs of construction and operation of a health-care waste incineration plant

Site

Cost of land
Rights of way
Site preparation and infrastructure
Provision of utilities to site

Consultancy fees

Environmental/waste management consultant
Engineering
Architectural
Legal fees

Construction costs

Incinerator building
Waste storage room
Offices

Incinerator

Cost of incinerator
Freight and storage charges

Waste transport costs

Waste collection trucks
Bins/containers for transporting waste from hospitals to incinerator site

Equipment costs

Trolleys for collecting waste bags from wards
Bag holders to be located at all sources of waste arisings in hospitals
Weighing machines for weighing waste bags
Refrigerators for storage of waste if necessary

Financing charges

Interest
Taxes
Accounting and audit fees

Direct operating costs

Manpower requirements (manager, operators, drivers,...)
Yellow bags with tags for infectious wastes
Black bags for non-risk waste
Sharps containers
Transportation costs
Utilities (fuel, water, electricity)
Chemicals (for flue-gas cleaning)

Indirect operating costs

Training
Incinerator maintenance and parts replacement
Vehicle maintenance
Uniforms and safety equipment
Ash disposal cost
Compliance monitoring of flue gas emissions
Project management and administrative costs for the organization responsible for the execution and long-term operation of the project

Total

Estimation of Costs

Reduced overheads - Lecture 12

Overhead 12.1

Principles of costing


Polluter Pays Principle

- Health-care establishment pays for the safe disposal of the waste it generates

Minimization, segregation and recycling of waste

Appropriate sizing of the waste management system

Anticipate future trends

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Overhead 12.2


Internal and external costs

Internal Costs

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External Costs


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Overhead 12.3

Total costs of a waste management system

- **Initial capital investments**
purchase of equipment
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over life time of equipment
- **Operating costs**
costs of labour and consumables
- **Contractual costs**
for external services, e.g. transportation, final disposal

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Overhead 12.4


Methods of financing

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Overhead 12.5


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Disadvantages:

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Overhead 12.6

Contractual arrangements

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Reduced overheads - Lecture 12

Overhead 12.7

Cost reduction check list

- **On-site waste management practices**
 - Waste segregation, minimization and recycling
- **Purchasing policy and stock management**
- **Comprehensive planning**
 - Develop and implement waste management strategy
 - Consider regional cooperation
- **Cost accounting and control**
- **Choose adequate methods and technologies**
- **Training of personnel for efficient and safe implementation**

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WHO

3.18 Lecture 13

Training on HCW management

Overheads

Overhead 13.1	Aims of education and training
Overhead 13.2	Target groups for training
Overhead 13.3	Training programme content
Overhead 13.4	Training for waste management operators
Overhead 13.5	Training for waste transporters
Overhead 13.6	Training for operators of waste treatment facilities
Overhead 13.7	Training for landfill operators

Teacher-s notes

Handouts

Reduced overheads

Aims of education and training

- To make the waste management strategy effective
- To create a competent workforce
- Highlight employees' responsibilities
- To protect employees health and safety



Target groups for training (health-care establishments)

- Hospital managers and waste managers
- Medical doctors
- Nursing staff
- Hospital cleaners, porters and auxiliary staff



Training programme content

Training should be competence based with hands-on training in simulated real life situations, on the following subjects:

- Health-care waste policy with full justification
- Instructions on individual responsibilities
- Detailed technical instructions on procedures to be followed

Periodical repetition courses will refreshen and update the knowledge



Training for waste management operators

- Information on risks, and health and safety advice
- Competence based training on all handling procedures, including the management of incidents
- Wearing of protective clothing
- Use of safety equipment
- Documentation and record keeping



Training for waste transporters

- Risks related to the transported waste
- Handling, loading and unloading procedures
- Procedures for dealing with spillages
- Wearing of protective clothing
- Equipment of the vehicle
- Documentation and record-keeping procedures
(e.g. consignment note system)



Training for operators of waste treatment facilities

- Outline of the operation of the facility
- Health and safety related to the operations
- Emergency procedures
- Technical procedures
- Maintenance and record keeping
- Emission control
- Surveillance of residue quality



Training for landfill operators

- Information on health and safety
- Control of scavenging
- Protective clothing and personal hygiene
- Safe procedures for landfilling HCW
- Emergency response measures



Teacher-s notes - Lecture 13

Overhead 13.1

Personnel of health-care establishments and waste workers have a right to be informed about the potential hazards of the waste they are handling. Training of personnel and workers are the basis for an effective implementation of the waste management strategy. Raising their awareness is a way forward towards gaining their cooperation. The overall aim of the training is to develop awareness in the participants of the health, safety and environmental protection issues relating to healthcare waste, and how these can affect them in their daily work.

Overhead 13.2

All personnel should be trained on the management strategy of the establishment. Actions need to be taken at management level, of those producing the waste, and those handling the waste. Separate courses should be designed for the categories listed on the overhead, specifically adapted to their tasks, responsibilities and level of education.

Overhead 13.3

The Infection Control Officer would usually be a suitable person to be responsible for training. For smaller health-care establishments, a central training function could be established by the regional authority. Training packages could also be developed by national government agencies. A training package should include numerous illustrations, such as drawings, figure and photographs of local applications. The ideal number of participants is 20 to 30.

Overhead 13.4

The overhead contains a number of issues to be addressed for the training of waste management operators. These are the minimal training requirements.

Overhead 13.5

These are the main areas which should be addressed in the training course. The waste may be transported by the health-care establishment, or it may contract an **A**uthorized@waste transporter.

Overhead 13.6

These are the main areas which should be addressed in the training course. The competence of the trainee should be assessed by carrying out actual or simulated activities that have been taught in the training session to ensure that the individuals can carry out the required tasks correctly.

Overhead 13.7


Safe burying of hazardous health-care waste will continue to be practiced in many locations, until sufficient capacity for adequate treatment will be available. The training of landfill operators is important for limiting the subsequent risks, mainly related to scavenging and the quality of surface and groundwater. The competence of the trainee should be assessed.

Reduced overheads - Lecture 13

Overhead 13.1

Aims of education and training

- To make the waste management strategy effective
- To create a competent workforce
- Highlight employees' responsibilities
- To protect employees health and safety


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Overhead 13.2

Target groups for training (health-care establishments)

- Hospital managers and waste managers
- Medical doctors
- Nursing staff
- Hospital cleaners, porters and auxiliary staff

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Overhead 13.3

Training programme content

Training should be competence based with hands-on training in simulated real life situations, on the following subjects:

- Health-care waste policy with full justification
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- Detailed technical instructions on procedures to be followed

Periodical repetition courses will refreshen and update the knowledge


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Overhead 13.4

Training for waste management operators

- Information on risks, and health and safety advice
- Competence based training on all handling procedures, including the management of incidents
- Wearing of protective clothing
- Use of safety equipment
- Documentation and record keeping


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Overhead 13.5

Training for waste transporters

- Risks related to the transported waste
- Handling, loading and unloading procedures
- Procedures for dealing with spillages
- Wearing of protective clothing
- Equipment of the vehicle
- Documentation and record-keeping procedures
(e.g. consignment note system)

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Overhead 13.6

Training for operators of waste treatment facilities

- Outline of the operation of the facility
- Health and safety related to the operations
- Emergency procedures
- Technical procedures
- Maintenance and record keeping
- Emission control
- Surveillance of residue quality

 World Health Organization


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Reduced overheads - Lecture 13

Overhead 13.7

Training for landfill operators

- Information on health and safety
- Control of scavenging
- Protective clothing and personal hygiene
- Safe procedures for landfilling HCW
- Emergency response measures

 World Health Organization

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3.19 Workshop 5

Regulatory package/ Waste management plan - design

Two groups should be established for this workshop. Participants from authorities may mainly join the group A, and participants from health-care establishments group B. It may however be enriching if group A also contains participants from group B and vice versa.

A) Draft an outline of a regulatory package for national legislation on health-care waste management

Draft the structure of the national regulatory package (e.g. policy, law, guidelines); draft the main elements to be included in the regulatory documents.

B) Design a comprehensive waste management plan for a large hospital, and one for a smaller, remote establishment, taking into account the following aspects:

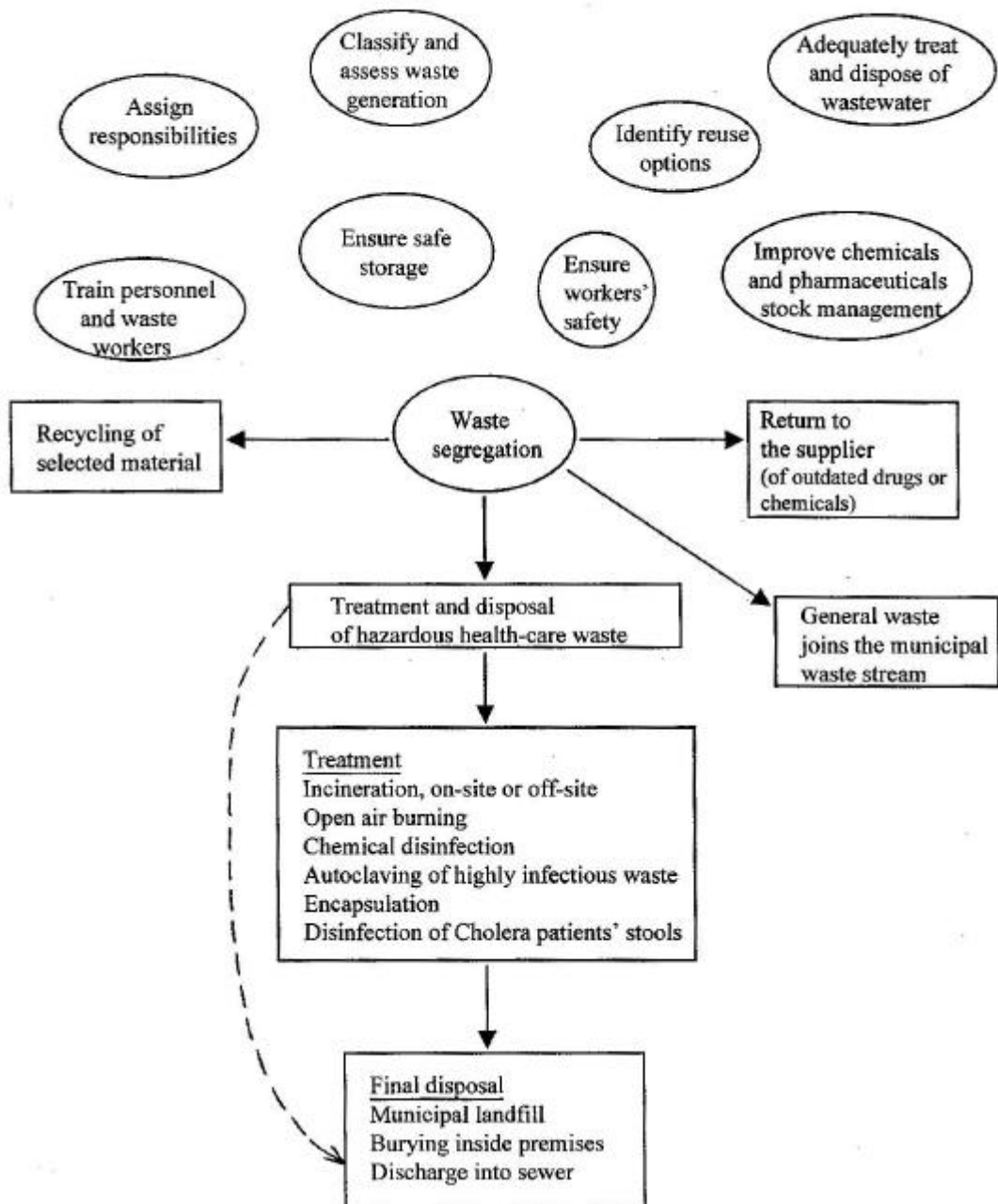
- C Organization and responsibilities
- C On-site waste management
- C Waste treatment and disposal
- C Wastewater management
- C Workers=health and safety
- C Training

You may use the elements already elaborated during the previous workshops. An overview for an establishment practising a minimal programme for waste management, e.g. a smaller remote establishments, is provided in the Handout for Workshop 5 and may assist you in your work.

The main results of the workshops should be written on transparencies or a blackboard and reported to the entire group after about 1 hour. The results, and the compatibility between the material elaborated by the two groups, should be discussed in plenary.

Handout for Workshop 5

Basic steps in healthcare waste management in minimal programmes



3.20 Sources of handouts

Christen J/SKAT. Dar es Salaam Urban Health Project. Health care waste management in district health facilities. Situational Analysis and system development. Swiss Centre for Development Cooperation in Technology and Management St Gallen, Switzerland, 1996.

Dunsmore DJ. *Safety measures for use in outbreaks of communicable disease*. Geneva, Switzerland, World Health Organization, 1986.

WHO. *Action Plan for the development of national programme for sound management of hospital wastes. An outcome of the Regional Consultation on Sound Management of Hospital Waste, Chiang Mai, Thailand, 28-29 November 1996*. New Delhi, India, World Health Organization, Regional Office for South-East Asia, 1997.

WHO. *Regional Guidelines for Health Care Waste Management in Developing Countries (draft)*, Working document used at the WHO Regional Workshop on Clinical Waste Management. 28 November - 2 December 1994. Kuala Lumpur, Malaysia, World Health Organization, Western Pacific Regional Environmental Health Centre (EHC), 1994.