Applying Infection Prevention Techniques and Workplace

NTQF Level III

Learning guide #11

Unit of Competence:- Applying Infection Prevention Techniques and Workplace
Module Title: Applying Infection Prevention Techniques and Workplace
LG Code:-HLT MLT3 M02 LO6-LG11
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LO 6: Handle, package, label, store, transport and dispose of clinical and other waste

Instruction Sheet	Learning Guide #6

This learning guide is developed to provide you the necessary information regarding the following **content coverage and topics** –

Handle, package, label, store, transport and dispose of clinical and other waste

- wearing appropriate personal protective equipment when handling waste
- separating and disposing waste into color coded waste containers
- storage of Clinical or related waste into accessible area
- waste management to minimize potential risk
- safely waste disposal in accordance with policies

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you **will be able to** –

- worn aappropriate personal protective clothing and equipment in accordance with OHS policies and procedures when handling waste
- separate and identifie waste at the point where it has been generated and dispose of into waste containers that are color coded
- Clinical or related waste is stored in an area that is accessible only to authorized persons
- handle, package, labelle, store, transporte and disposed of appropriately waste to minimize potential for contact with the waste and to reduce the risk to the environment from accidental release
- dispose of waste safely in accordance with policies and procedures of the organization and legislative requirements

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 16.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” in page 8.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).

6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your trainer for further instructions or go back to Information sheet 1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.
8. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
9. Accomplish the “Self-check 2” in page 16.
10. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
11. Read the information written in the “Information Sheets 5”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 3” in page 19.
13. Ask your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-check 3).
14. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” in page 21; However, if your rating is unsatisfactory, see your trainer for further instructions or go back to Information sheet 3.
15. Read the “Operation Sheet 1 and try to understand the procedures discussed.
16. Do the “LAP test” in page 22 (if you are ready). Request your trainer to evaluate your performance and outputs. Your trainer will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your trainer shall advice you on additional work. But if satisfactory you can proceed to Learning Guide #2.

Information Sheet-1	wearing appropriate personal protective equipment when handling waste

1. Wearing appropriate personal protective equipment

1.1. Health care wastes

Health care waste is a byproduct of health care that includes potential risk and nonrisk wastes. It includes all the waste generated by health care establishments, research facilities, and laboratories. Health care waste can be classified as high-risk and low-risk wastes depending on the level of the risk they pose to the health provider, patient, and community.

Appropriate handling and disposal of potentially infectious waste helps to prevent the spread of infection, illness and disease

High-Risk Waste

High-risk waste includes the following:

- **Infectious waste:**
  - Blood, blood products, and other bodily fluids or items contaminated with similar fluids
  - Cultures and stocks of infectious agents from the laboratory and items contaminated with such agents
  - Isolation waste from highly infectious patients (including food residue)
  - Discarded live and attenuated vaccines
  - Waste, bedding, bandages, surgical dressings, and other contaminated material infected with human pathogens
- **Anatomical waste:**
  - Human tissues, body parts, and fetuses
  - Biopsies, carcasses, organs, and tissues infected with human pathogens
- **Sharps waste (used or unused):**
  - Syringes, needles, scalpel blades, suture needles, razors, and intravenous set needles
- **Chemical waste:**
  - Formaldehyde, photographic chemicals, solvents, organic and inorganic chemicals
- **Pharmaceutical waste:**
  - Outdated medications and residuals of drugs used in chemotherapy
  - Items contaminated by or containing pharmaceutical bottles/boxes
- **Radioactive waste:**
  - Contamination with radioactive isotopes
- **Genotoxic waste:**
  - Cytostatic drugs
  - Vomit, urine, or feces from patients treated with cytotoxic drugs, chemicals, and radioactive material

- **Pressurized containers:**
    - Explosion of cylinders containing gases or aerosols
- **Waste with high content of heavy metals:**
    - Batteries, broken thermometers, blood pressure gauges, etc.

Low-Risk Waste

Noninfectious waste:

Commercial waste is non-contaminated waste and poses no infectious risk to persons who handle it. Examples include paper, trash, boxes, bottles, plastic containers, leftover foods, and food products

Not all health care waste is risky; most waste (80 to 85 percent) generated from health care facilities is believed to be noninfectious and non-risky (FMOH, *Infection Prevention and Patient Safety Reference Manual for Service Providers and Managers in Health Care Facilities of Ethiopia*, February 2011).

The proportion of waste generated from health care is as follows:

- Noninfectious waste: 80 percent
- Pathological waste and infectious waste: 15 percent
- Sharps waste: 1 percent
- Chemical or pharmaceutical waste: 3 percent
- Pressurized cylinders, thermometers: less than 1 percent

Risks of Health Care Waste

Inadequate and inappropriate handling of health care waste may have serious public health consequences and a significant impact on the environment. Injuries, transmission of infections, environmental pollution, fire hazards, and public nuisance (offensive smells, unsightly debris, etc.) are the major risks and hazards of poorly managed health care waste.

Improper health care waste management can expose health workers, patients, and the community to the risk of being exposed and potentially infected by blood-borne pathogens. Studies revealed that 33 percent of HBV and 42 percent of HCV infections occur due to direct or indirect exposure to infectious waste (WHO 2005a). Improper health care waste management can also expose people to gastro enteric and respiratory infections.

In addition to health risks from direct contact, health care waste can impact human health by contaminating bodies of water and polluting the air. Emission of persistent organic pollutants/toxic gases like dioxins, furans, and polychlorinated biphenyls is dangerous to human health.

1.2. personal protective clothing and equipment during waste handling

Personal protective clothing and equipment during waste handling includes

- **Disposable plastic aprons and Gowns**
    - Aprons should be put on at the beginning of the activity
- **Full-body gowns**
    - Use where there is a risk of extensive splashing of blood, bodily fluids, secretions or excretions on to the skin or clothing of a HCW
- **Gloves including rubber gloves**
- **Face masks/respirators**
    - The mucous membrane of the mouth, nose and eyes are portals of entry for infectious agents as other skin surfaces if not intact.

- **Eye protect ion/face visors/protective spectacles**
    - Goggles, visors or protective spectacles must be worn to protect the eye
- **Forearm protection**
    - Forearm protection should be available for use in areas that there is a risk of injury. It should be used in conjunction with a detailed plan of care to minimize injuries from scratches and bites
- **Foot protection**
    - To protect feet and legs from falling objects, moving machinery, sharp objects, hot materials, chemicals, or slippery surfaces, employees should wear closed-toed shoes, boots, foot guards, leggings, or safety shoes as appropria

Self-Check 1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. High-risk waste includes the following
   A. Anatomical waste
   B. Pharmaceutical waste
   C. Radioactive waste
   D. ALL

2. Waste that are arising from Cytostatic drugs are
   a. Drug waste
   b. Genotoxic waste
   c. Pharmacological waste
   d. Low risk waste

3. Batteries, broken thermometers, blood pressure gauges are
   a. Medical equipment waste
   b. Genotoxic waste
   c. Pharmacological waste
   d. Waste with high content of heavy metals

4. Most waste (80 to 85 percent) generated from health care facilities is believed to be
   a. Infectious
   b. Risky
   c. Noninfectious and non-risky
   d. Blood borne

Note: **Satisfactory rating - 16 points** **Unsatisfactory - below 16 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Answer

No	
1	D
2	B
3	D
4	C

Information Sheet 2	waste separation

2. waste separation

Contaminated and non-contaminated wastes should be separated at origin, to reduce the volume of contaminated waste and minimize the cost to the institution for more expensive procedures required for managing and disposing of contaminated waste properly.

- When possible, use separate containers for combustible and non-combustible waste.
- Never sort through contaminated wastes (e.g., do not try to separate non-contaminated waste from contaminated wastes, or combustible from non-combustible, after they have been combined).

STEPS OF WASTE MANAGEMENT

- Segregation
- Collection
- Transportation
- Disposal

Self-Check 2	Written Test

***Instructions**:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page:

:

1. Contaminated and non-contaminated wastes should be separated at
   A. At Origin
   B. At the final site
   C. At the site of disposal
   D. None of the above

Note: **Satisfactory rating - 16 points** **Unsatisfactory - below 16 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Answer

No	
1	A
2	
3	

Information Sheet 3	storage of Clinical or related waste into accessible area

Self-Check 3	Written Test

***Instructions**:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page.

1. What is OHS represents for (2 point)
2. What is OSH represents for? (1 point)
3. What does WHS represent for? (1 point)
4. What are the goals of OHS? (2 points)
5. List at least two examples of OHS requirements in your work areas. (10 points)
6. List at least four workplace hazards? (4 points)

Note: **Satisfactory rating - 12 points** **Unsatisfactory – below 12 points**

You can ask your trainer for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

_____

2. _____

_____

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_____

3. _____

_____

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4. _____

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5. _____

_____

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Waste Minimization/Containment

Waste minimization is the first and best way to reduce health care waste quantities and costs, environmental impact, and exposure to health care workers, patients, and communities. Effective waste minimization practices require that the purchases of all materials and supplies be made with waste reduction in mind.

Segregation

Waste segregation is separating waste by type at the place where it is generated. Waste should immediately be separated by the person generating the waste, according to its type, and placed

in a bin with an appropriate colored bin liner or into a sharps container. Waste handlers should never sort through waste after it has been placed in the bin. The color-coding system aims at ensuring immediate and nonequivocal identification and segregation of the hazards associated with the type of health care waste that is handled or treated. It is very important that both providers and waste handlers understand the color-coding system and handle waste accordingly. The following table shows the recommended color coding for categories of health care waste.

Category	Example	Color of Bin Liner
Noninfectious	Paper, packing materials, plastic bottles, food, cartons	Black
Infectious	Gloves, dressings, blood, body fluids, used specimen containers	Yellow with biohazard symbol
Highly infectious	Anatomical waste, pathological waste	Red with biohazard symbol
Chemical	Formaldehyde, pathological chemicals, solvents, organic and inorganic chemicals	Brown
Radioactive	Any solid, liquid, or pathological waste contaminated with radioactive isotopes of any kind	Yellow with radioactive label
Sharps	Needles, needles from intravenous sets, scalpels, blades, lancets, broken glass, syringes, and needles	Yellow box marked "SHARPS" with biohazard symbol

storage or disposal area. It also includes quantifying waste by volume, labeling as to its source, and recording.

Waste storing is the process of placing waste in a secure place until it can be disposed of. The ideal storage area should be designated (for waste only), secure (only authorized persons should have access), and kept clean, dry, and pest free. The designated central storage facility should be located within the premises of the health facility, close to the treatment unit but away from food storage or food preparation areas. Health care waste should be stored for no longer than two to three days, depending on weather conditions. However, in the case of safety boxes, the filled box can be stored in a locked room for up to one week at lower- level health care facilities where there is no incinerator. Organic waste should be disposed of daily. Segregation must be maintained throughout until final disposal.

Waste Transportation

Waste transportation is movement of waste from one place to another. Waste transportation can be either on-site or off-site and should also maintain waste segregation.

- **On-site:** Moving waste from one point to another within the health care facility
- **Off-site:** Transporting waste outside the health facility

Treatment and Disposal

Health care waste is treated to render it nonhazardous. Noninfectious waste does not need to be treated. Disposal is a process of eliminating health care waste without posing any risk to health facility workers or the general public.

The following are health care waste treatment and disposal options at the health care facility level:

Sharps waste:

- Incineration using properly built and maintained medium- or high-temperature incinerator on-site
- Transport to off-site incinerators, if there is centralized treatment service
- On-site burial in a protected pit

Infectious waste:

- On-site burial in a protected pit
- On-site incineration in a medium- or high-temperature incinerator provided that the incinerator is standard and capable of destroying such wastes
- Transport to off-site treatment/disposal site, if the service is available

Non-risk waste:

- Collection by municipal truck or other private trash collection firm for landfill disposal

Self-Check 4	Written Test

***Instructions**:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page:

2. According to the color coding system, infectious wastes such as gloves, dressing, blood, body fluids and used specimen containers are put in
   A. Yellow color container
   B. Red color container
   C. Blue color container

D. Dark color container

3. According to the color coding system, Highly infectious wastes such as anatomical and pathological waste are put in
   A. Yellow color container
   B. Red color container
   C. Blue color container
   D. Dark color container
4. Process of placing waste in a secure place until it can be disposed of is
   A. Waste storing
   B. Waste handling
   C. Waste collection
   D. None of the above
5. Moving waste from one point to another within the health care facility is
   A. On site
   B. Off site
   C. Far site
   D. Near site

Note: **Satisfactory rating - 12 points** **Unsatisfactory – below 12 points**

You can ask your trainer for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   __

_____

_____

Health care wastes disposal methods

Recommended Disposal Methods of Health Care Waste

1. Burial in a protected pit:

- Waste is placed into a pit (1 to 2 meters wide, 2 to 5 meters deep, and at least 1.5 meters above the water table) and covered with soil.
- Protected burial pits are an acceptable, and perhaps the most appropriate, disposal option for infectious wastes in rural health care facilities.
- Pits should be at least 50 meters away from any waster source, be fenced to restrict unauthorized access, and be located away from public areas.
- Keep waste covered with a 10- to 30-cm layer of soil every time waste is added to the pit.
- Only contaminated and hazardous waste needs to be buried.
- Expired vaccines and drugs should be encapsulated and buried. Place the expired drugs and vaccines in a hard container such as a metal drum. When the container is mostly full (3/4) add

a mixture of 1 part cement, 1 part lime, 4 parts sand, and 1/3 to 1/2 part water. Lime works as a disinfectant, and it also helps the cement flow into empty spaces to completely surround the waste. Seal the container and bury it in a pit. Expired vaccines and drugs should not be burned unless there is appropriate incineration technology.

- When the level of waste reaches to within 30 to 50 cm to the surface of the ground, completely fill the pit in with soil and dig another pit.

Advantages: Simple and inexpensive

Disadvantages: Can handle only a small volume of waste in areas where there is shortage of space and presents a danger to the community if not buried or covered properly

2. Burn

- Waste is placed into a pit and burned on a regular basis (at least once a week, according to volume of waste and size of pit). Waste must be burned thoroughly, and ashes must be covered with soil.
- Pits should be dug 1 to 2 meters wide and to a depth of 2 to 5 meters, but also at least 1.5 meters above water table
- The pit should be fenced off to restrict unauthorized access. The burn pit must be located away from public areas, and smoke from burning waste must not affect the surrounding area.
- Open burning (outside of a pit, on the ground) should not be practiced.
- Medical waste may not burn easily, especially if it is wet. Add kerosene to make the fire hot enough to burn all wastes.

3. Medium- or high-temperature incineration:

- Incineration is medium- or high-temperature burning. It reduces the volume of the waste and, if high enough temperatures are reached, eliminates pathogens.
- Proper incineration produces fewer pollutants than open-air burning and is preferred if a good-quality incinerator is available with a well-trained operator. Proper incineration includes: - Clear operation procedures
    - ✓ Trained operator
    - ✓ Reliable segregation system
    - ✓ Reliable transport system
    - ✓ Ash pit
    - ✓ Maintenance performed on schedule
    - ✓ Adequate supply of fuel
    - ✓ Secured incinerator

When using incinerator:

- Keep incinerator clean. Remove ash from ash chamber and grate and dispose the ash into ash pit. Do not store waste in incinerator.

- Some incinerators need to be preheated by burning general or nonmedical waste (e.g., paper) until the incinerator reaches the recommended temperature for incinerating health care waste (800°C in the burning chamber).
    - Polyvinyl chloride plastics (like blood bags and intravenous lines), large amounts of reactive chemical waste, silver salts and photographic or radiographic waste (x-ray materials), waste with high mercury (such as broken mercury thermometers) or cadmium content, batteries, aerosol cans or pressurized gas containers, and glass vials must never be incinerated. **N.B. Syringes are not made of polyvinyl chloride plastic and are therefore safe to burn.**

Advantages: Treats and greatly reduces waste volume

Disadvantages: Overfilling the combustion chamber and wastes with high moisture content can produce smoke, and also may produce emission and hazardous ash that contain dioxins and metals. It may require pollution control equipment to meet local environmental regulation.

In general, medical wastes require careful disposal and containment before collection and consolidation for treatment. These measures are designed to protect the workers who generate medical wastes and who manage the wastes from point of generation to disposal.

- A single, leak-resistant biohazard bag is usually adequate for containment of regulated medical wastes, provided the bag is sturdy and the waste can be discarded without contaminating the bag's exterior.
- All bags should be securely closed for disposal.
- Puncture-resistant containers located at the point of use (e.g., sharps containers) are used as containment for discarded slides or tubes with small amounts of blood, scalpel blades, needles and syringes, and unused sterile sharps.
- To prevent needle stick injuries, needles and other contaminated sharps should not be recapped, purposefully bent, or broken by hand.
- Infected materials should be put in impermeable bags or hard plastic containers. These bags and containers need to be clearly labelled as highly infectious waste. Considerations on waste management:
    - ✓ Solid non-sharp waste should be placed in impermeable, clearly labelled bags to be discarded following applicable environmental regulations for the disposal and inactivation of infectious medical waste. Temporary disposal sites should be located as close as possible to the patient care area.
    - ✓ Sharp, pointed objects (e.g. open vials, needles) should be placed in hard plastic containers and labelled clearly.
    - ✓ Liquid waste (e.g. vomit, urine and diarrheal fluids) may only be disposed in the sanitary sewer if the pathogen in question would allow such procedure. Alternatively all bodily fluids need to be collected in tissues/diapers and then been disposed with other waste.

Self-Check 4	Written Test

***Instructions**:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page:

1. the most appropriate, disposal option for infectious wastes in rural health care facilitie is
   A. Burial in a protected pit
   B. Burn
   C. Medium- or high-temperature incineration
   D. ALL
2. Which of the following **<u>is True</u>** about incinerator
   A. Keep incinerator clean
   B. Remove ash from ash chamber
   C. Do not store waste in incinerator
   D. ALL

Note: **Satisfactory rating - 09 points** **Unsatisfactory - below 09 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

_____

_____

_____

Operation Sheet 3	**Prepare tools and equipment for identification and measuring Muda.**

1. Discuss and plan to prepare tools and equipment for Muda identification.
2. Prepare tools and equipment for Muda identification.

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, workshop, tools and materials you are required to perform the following tasks.

Task 1: Identify and prepare tools and equipment for measuring and identification of Muda.

List of Reference Materials

1. Federal Ministry of Health Ethiopia, April 2012, Infection Prevention and Patient Safety, Addis Ababa, Ethiopia: Federal Ministry of Health
2. Federal Ministry of Health, Ethiopia. 2004. *Infection Prevention Guidelines for Health Care Facilities in Ethiopia*. Addis Ababa, Ethiopia: Federal Ministry of Health.
3. Linda,Tietjen,Débora, BossemeyerNoel McIntosh JHPIEGO, USIAD 2003 Guidelines for Healthcare Facilities with Limited Resources, , Johns Hopkins University,
4. WHO, , 2004, Practical Guidelines for Infection Control in Health Care FacilitiesWorld Health OrganizationRegional Office for Western Pacific, Manila Regional Office for South-East Asia, New Delhi
5. Helen Lemass ,Niamh McDonnell ,Dr. Nuala O'Connor ,Dr. Sheila Rochford HCAI/AMR 2013, "INFECTION PREVENTION AND CONTROL FOR PRIMARY CARE IN IRELAND" ,
6. AG, Australian Guidelines for the Prevention and Control of Infection in Healthcare (2010)

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