Medical Libratory

NTQF Level III

Learning Guide # 6

Unit of Competence: Apply Infection Prevention Techniques and Workplace OHS

Module Title: Apply Infection Prevention Techniques and Workplace OHS
LG Code: HLT MLT3 M02 LO1-LG6
TTLM Code: HLT MLT3 TTLM 0919v1

LO 1: Follow infection control guidelines

Instruction Sheet	Learning guide #1

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

Follow infection control guidelines

- preventing spread of infection
- using additional precautions if there is no sufficient standard precautions to prevent transmission of infection
- minimizing Contamination of materials, equipment and instruments by aerosols and splatter

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 –

- Demonstrate the application of standard precautions to prevent the spread of infection in accordance with organization requirements
- The application of *additional precautions* is demonstrated when standard precautions alone may not be sufficient to prevent transmission of infection
- *minimized* contamination of materials, equipment and instruments by aerosols and splatter.

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 3”. 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	**Preventing spread of infection**

1. Preventing spread of infection

1.1. Introduction

1.1.1 Definition of terms

Asepsis and aseptic Technique: A combination of efforts made to prevent entry of microorganisms into any area of the body

- The goal of aseptic technique is to reduce or eliminate the number of microorganisms on both animate (living) surfaces (skin and mucous membranes) and inanimate objects (surgical instruments and other items) to an infection free

Antiseptic: A germicide that is used on skin or living tissue for the purpose of inhibiting or destroying microorganisms. Examples include alcohols, chlorhexidine, chlorine, hexachlorophene, and iodine

Antisepsis: a process of reducing the number of microorganisms on the skin, mucous membranes or other body tissue by applying an antimicrobial (antiseptic) agent

Antimicrobial agents: A general term for the drugs, chemicals, or other substances that either kill or slow the growth of microbes. Among the antimicrobial agents in use today are antibacterial drugs (which kill bacteria), antiviral agents (which kill viruses), antifungal agents (which kill fungi), and antiparasitic drugs (which kill parasites).

Cleaning: - a process that physically removes all visible dust, soil blood or other body fluids from inanimate object as well as removing sufficient number of microorganisms to reduce risks for those who touch the skin or handle the object.

- It consists of thorough washing with soap or detergent and water, rinsing with clean water and drying

One of the most basic measures for the maintenance of hygiene, and one that is particularly important in the hospital environment, is cleaning. The principal aim of cleaning is to remove visible dirt. It is essentially a mechanical process: the dirt is dissolved by water, diluted until it is no longer visible, and rinsed off. Soaps and detergents act as solubility promoting agents

Colonization: the presence of pathogenic (illness or disease causing) organisms in a person or animal in abundance (pathogens can be detected by cultures or other tests) usually without causing symptoms or clinical findings (they do not invade tissues, cause cellular changes or cause damages).

- It also defined as the presence or increased number of a particular invasive bacterial species in the resident micro flora.

Colonized person: can be a major source of transfer of pathogens to other persons.

- For instance
    - Neisseria meningitides colonizes nasal cavity and oropharynx with or without causing subsequent infections
    - Entamoeba histolytica can colonize the large bowel without any harm to the host but are often shade in the stool as infectious cysts which may cause dysentery

Contamination: The presence of an infectious agent on a body surface or on clothes, gowns, gloves, bedding, furniture, computer keyboards, or other inanimate objects that may be capable of producing disease or infection

Contact: An exposed individual who might have been infected through transmission from another host or the environment

Decontamination: a process that makes inanimate objects safer for the staff to handle them before cleaning (i.e. inactivates HBV, HCV and HIV and reduce, but does not eliminate, the number of other contaminating microorganisms)

- It is also defined as a process or treatment that renders a medical device, instrument, or environmental surface safe to handle because it is no longer capable of transmitting particles of infectious material.

Disinfectant: A chemical agent used on inanimate (non-living) objects to destroy virtually all recognized pathogenic microorganisms, but not necessarily all microbial forms (e.g., bacterial spores).

Disinfection: The destruction of pathogenic and other kinds of microorganisms by physical or chemical means. Disinfection is less lethal than sterilization, because it destroys most recognized pathogenic microorganisms, but not necessarily all microbial forms, such as bacterial spores.

Disease: any deviation from being healthy or interruption of the normal structure or function of any body part, organ, or system manifested by a characteristics set of symptoms and signs whose etiology, pathology, and prognosis may be known or unknown

Endogenous infection: Micro-organisms originating from the service user's own body which cause harm in another body site.

Exogenous infection: Micro-organisms originating from a source or reservoir which are transmitted by any mechanism to a person, i.e. contact or airborne routes.

High level disinfection (HLD): a process of eliminating all microorganisms except some bacterial endospores from inanimate objects by boiling, steaming or using chemical disinfectants

Infection: is an invasion and multiplication of microorganisms in body tissues which may clinically be apparent or result in local cellular injury due to competitive metabolism, toxins, intracellular replication or antigen antibody response.

Infectious Microorganisms: are microorganisms capable of producing disease in the appropriate hosts

Infection prevention: is a systematic effort or process of placing barriers between a susceptible host (person lacking effective natural or acquired protection) and the microorganisms

Microorganisms: are causative agents of infections such as bacteria, viruses, fungi and parasite

Nosocomial Infection: is a term used interchangeably with "healthcare facility acquired infection" or "healthcare associated infections (HAIs)" and is defined as a situation in which patients coming to health institutions seeking treatments acquire an

infection/s in healthcare facility afterwards other than disease/health problems they had

- It also defined as infections acquired while a patient is under hospital or any health facility care which are not present or incubating at time of admission
- It is a time related criterion which refers to infectious occurring more than 48 hours after admission

Nosocomial infections—known also as hospital-acquired infections, hospital-associated infections, and hospital infections—are infections that are not present in the patient at the time of admission to hospital but develop during the course of the stay in hospital. There are two forms:
• **Endogenous infection, self-infection, or auto-infection.** The causative agent of the infection is present in the patient at the time of admission to hospital but there are no signs of infection. The infection develops during the stay in hospital as a result of the patient's altered resistance.
• **Cross-contamination followed by cross-infection.** During the stay in hospital the patient comes into contact with new infective agents, becomes contaminated, and subsequently develops an infection.

Patient Safety: is an issue focusing at reduction or aversion of unsafe acts/circumstances within the healthcare system through the use of best practices leading to optimal patient outcomes

Protective Barriers: are physical, mechanical or chemical processes that help to prevent the spread of infectious microorganisms from person to person (patient, healthcare client or health workers) and /or equipment, instruments and environmental surface to people

Sterilization: a process of eliminating all microorganisms (bacteria, viruses, fungi and parasites) including bacterial endospores from inanimate object by high-pressure steam (autoclave), dry heat (oven), chemical sterilization or radiation

1.1.2 General principles of infection prevention

Good infection prevention and control are essential to ensure that people who use health and social care services receive safe and effective care. Effective prevention and control of infection must be part of everyday practice and be applied consistently by everyone

Adherence to good practice in relation to infection prevention and control has been shown to reduce the risk of infection to residents and care workers. Providers should have relevant polices in place as identified by local risk assessment, and having taken account of the Code of Practice. Staff training is important and will improve compliance with policies, which should be regularly audited, updated and clearly marked with a review date.

It is not always possible to identify people who may spread infection to others and precautions for the care and treatment of all residents are recommended to prevent this spread of infection. Basic infection prevention and control practices are designed to reduce the risk of cross infection from both recognized and unrecognized sources of infection and should be applied at all times by all care workers. All those who provide care should be trained in understanding the basic infection prevention and control practices.

Standard principles

Some of the general advice includes

Everyone involved in providing care should be:

- educated about the standard principles of infection prevention and control **and** trained in hand decontamination, the use of personal protective equipment, and the safe use and disposal of sharps.

Wherever care is delivered, healthcare workers must have available appropriate supplies of:

- materials for hand decontamination
- sharps containers
- personal protective equipment.

Educate patients and care givers about:

- the benefits of effective hand decontamination
- the correct techniques and timing of hand decontamination
- when it is appropriate to use liquid soap and water or hand rub
- the availability of hand decontamination facilities
- their role in maintaining standards of healthcare workers' hand decontamination.

Waste disposal

1.1.3 Risk of disease transmission in the health care facility

Healthcare personnel including the support staff (e.g. housekeeping, laundry staff and maintenance), who work in healthcare settings are at risk of exposure to serious potentially life threatening infectious such as HIV, HBV, HCV. Direct contact with blood and other body fluids is the most common or frequent risk healthcare workers encounter while caring of patients. Studies in the United States have shown that the risk of acquiring HBV after being stuck with a needle from an HBV+ client ranges 27 to 37%. In addition, the risk of acquiring HCV and HIV after being stuck with a needle from an infected person is 3 to 10% and 0.2% to 0.4% respectively (Gerberding, 1990; Gershon et al., 1995 & Landpher, 1994). Among these, the efficiency for transmission of hepatitis B is high. For example, an accidental splash in the eye of as little as 10^{-8ml} (0.00000001m) of infected blood can transmit HBV to a susceptible host (Bond et al., 1982).

Each year, In United States, 800,000 sharp injuries are reported by healthcare workers (Rogers, 1997). However, it is anticipated that most healthcare workers do not report needle stick or other sharps injuries as often as they should. Hence, the number of needle stick injuries is under reported in most cases

Similarly, a survey conducted in the year 2003 and 2004 on about 40 health facilities in Ethiopia, reported that 32% of the healthcare workers in these institution sustained needle stick injuries in 12-months' time.

The Disease Transmission Cycle

Microorganisms live everywhere in our environment. Human normally carry them on their skin, upper respiratory, intestinal and genital tracts. Generally, microorganisms live in animals, plants, soil, air and water. Not all, but some among these microorganism are pathogenic (likely to cause disease) in varied degrees. When they get favorable conditions, most of these microorganisms may cause infections if transmitted to immune compromised people such as patients with AIDS (Burke, 1977)

Microorganisms can be classified as bacteria, viruses, fungi, and protozoa. Bacteria can be further divided into three categories: vegetative (e.g., Staphylococcus), mycobacteria (e.g., tuberculosis [TB]), and endospores (e.g., tetanus). Of all the common infectious agents, endospores are the most difficult to kill due to their protective coating

All humans are susceptible to bacterial infections and also to most viral agents. The number (dose) of organisms necessary to produce infection in a susceptible host varies with the location.

The essential factor for the transmission of disease-causing microorganisms from person to person comprises the following six components:

The disease transmission cycle, shown in Figure 1.1, describes how infections are transmitted from one person to another.

1. **Agent:** The microorganism that can cause infection or disease. The infectious agent can include bacteria, viruses, fungi, and parasites.
2. **Host or reservoir**: The reservoir of an agent is the habitat in which an infectious agent normally lives, grows, and/or multiplies. Reservoirs include humans, animals, and the environment (plants, soil, air, water, etc.). Solutions, instruments, and other items used in clinical procedures can also serve as reservoirs for potentially infectious microorganisms.
3. **Portal of exit**: The gateway through which the agent leaves the host or reservoir. The infectious agent can leave the reservoir through the bloodstream, broken skin (e.g., puncture, cut, surgical site, rash), mucous membranes (e.g., eyes, nose, mouth), respiratory tract (e.g., upper respiratory), genitourinary tract (e.g., vagina, penis), gastrointestinal tract (e.g., mouth, anus), or placenta by means of blood, excretions, secretions, or droplets that come from these places. However, the agent must have the right environment in which to survive until it infects another person. For example, the bacteria that cause TB can survive in sputum for weeks but will be killed by sunlight within a few hours.
4. **Method of transmission**: After an agent exits its natural reservoir, it may be transmitted to a susceptible host in numerous ways. These modes of transmission are classified as: -
    a. **Direct transmission**: An immediate transfer of the agent from a reservoir to a susceptible host by direct contact or droplet spread.

i. **Direct contact**: This occurs through kissing, skin-to-skin contact, and sexual intercourse. Direct contact refers also to contact with soil or vegetation harboring infectious organisms. Thus, infectious mononucleosis ("kissing disease") and gonorrhea are spread from person to person by direct contact. Hookworm is spread by direct contact with contaminated soil.

ii. **Droplet spread**: This refers to spray with relatively large, short-range aerosols produced by sneezing, coughing, or even talking. Droplet spread is classified as direct because transmission is by direct spray over a few feet, before the droplets fall to the ground (e.g., influenza, TB).

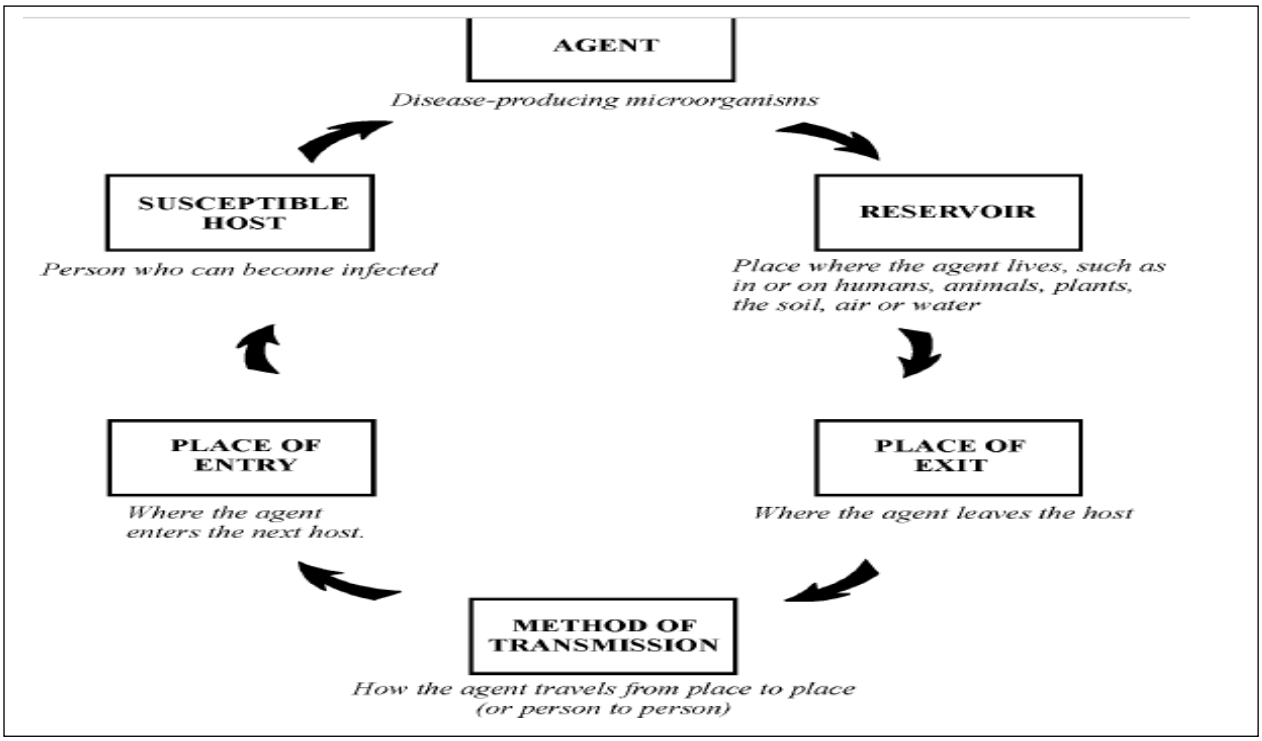

Fig1.1. disease transmission cycle

b. **Indirect transmission**: In indirect transmission, an agent is carried from a reservoir to a susceptible host by suspended air particles (airborne) or by animate (vector) or inanimate (vehicle-borne) intermediaries.

i. **Airborne**: The infectious agent can be carried by air currents (e.g., measles, TB).

ii. **Vehicle-borne:** The infectious agent can be transmitted indirectly from the reservoir to a susceptible host by material that maintains the life of the infectious agent. Such vehicles include food (e.g., Salmonella), blood (e.g., HBV, HIV), water (e.g., cholera, Shigella), or instruments and other items.

iii. **Vector-borne:**

1. **Biological**: The infectious agent can be transmitted to a susceptible host through insects and other invertebrate animals (e.g., mosquitoes can transmit malaria and yellow fever; fleas can transmit plague).
2. **Mechanical**: The infectious agent is carried by certain animals without having any biological change (flies can carry and transmit Vibrio cholera).

Infection prevention in a health care setting primarily deals with preventing the spread of infectious diseases through the air, blood or body fluids, and contact, including droplet, fecaloral, and food-borne routes.

5. **Portal of entry**: The gateway through which an infectious agent enters into the susceptible host. These portals of entry could be mouth, nose, skin, or other (including the respiratory system, vascular system, genitourinary system, and placenta).
6. **Susceptible host**: An organism that catches the infectious agent/pathogen. People are exposed to disease-causing agents every day but do not always get sick. For the purpose of this training, susceptible hosts include clients, service providers, support staff, and members of the community.

Preventing Infectious Diseases

To prevent the transmission of infections, the disease transmission cycle needs to be broken at some point. Hence, understanding the disease transmission cycle is important if health care workers are to:

- Prevent transmission of microorganisms from patient to patient, from patient to provider or from provider to patient during medical and surgical procedures as well as from health facilities to the general community.
- Teach others the factors required for transmission to occur.
- Most importantly, teach others how to break the disease transmission cycle.

In a health care facility, this can be accomplished by following proper Infection Prevention and patient safety (IPPS) practice, such as the following:

- Reducing the number of microorganisms present (e.g., hand washing, cleaning of instruments)
- Killing, inhibiting, or inactivating microorganisms (e.g., hand washing with a waterless alcohol preparation, decontamination, sterilization, or high-level disinfection [HLD])
- Creating barriers to prevent infectious agents from spreading (e.g., wearing gloves or personal protective equipment [PPE])
- Reducing or eliminating risky practices (e.g., by using hands-free technique in the operation room, using disposable gloves and syringes, etc.)
- Making sure that people, especially health care workers, are immune or vaccinated
- Reducing adverse events (e.g., by improving data collection, epidemiological surveys of adverse events, training on prevention of adverse events

Spaulding Categories of Potential Infection Risk

In 1968, Spaulding proposed three categories of potential infection risk to serve as the basis for selecting the prevention practice or process to use (e.g., sterilization or medical instruments, gloves, and other items) when caring for patients

This classification has stood the test of time and still serves as a good basis for setting priorities for any infection prevention program. The Spaulding categories are summarized below:

- **Critical**: These items and practices affect normally sterile tissues or the blood system and represent the highest level of infection risk. Failure to provide management of sterile or, where appropriate, high-level disinfected items is most likely to result in infections that are most serious.
  - ✓ Critical items confer a high risk for infection if they are contaminated with any microorganism as they are entering sterile tissue or the vascular system so they must be sterile because any microbial contamination could be a source to transmit diseases. That class includes medical devices e.g. Implants, invasive catheters , Implants and any device that touch sterile body cavities. Utmost of the articles in this class should be purchased as sterile or be sterilized before usage.
- **Semi-critical:** These items and practices are second in importance and affect mucous membranes and small areas of non-intact skin. Management needs are considerable and require knowledge and skills in handling many invasive devices (e.g., gastrointestinal endoscopes and vaginal specula), performing decontamination, cleaning and high-level disinfection, and gloving for personnel who touch mucous membranes and non-intact skin.
  - ✓ This class includes metabolic process medical care and physiological state instrumentality, some endoscopes, medical instrument blades, passageway manometry probes, cystoscopes, body part
- **Noncritical:** Management of items and practices that involve intact skin and represent the lowest level of risk.
  - ✓ Poor management of noncritical items such as overuse of examination gloves often consumes a major share of resources while providing only limited benefits. (Spaulding 1968).
  - ✓ Noncritical things, which contact with intact skin, however, not secretion membranes. Intact skin acts as an honest barrier to most microorganisms; therefore, the sterility of things returning in touch with intact skin is “not essential.”
  - ✓ Objects That contact Intact skin but not Mucous membranes, and Require low level disinfection

1.1.4 Common health facility-acquired infections (HCFs)

These infections earlier called **‘nosocomial infections’ (NI)** or simply **‘hospital infections’** are infections occurring during a stay in hospital that were neither present

nor incubating at the time of hospital admission. Mostly, nosocomial infections only appear in patients hospitalized for 48 hours or longer

Healthcare-associated infections:

- are a consistent issue for both hospital patients and healthcare providers
- occur in both adult and pediatric patients. Bloodstream infections, followed by pneumonia and urinary tract infections are the most infections in children, urinary tract infections are the most common healthcare – associated infections in adults.

Infections in HCFs have become a major health problem especially in the health institutions located in developing countries. Therefore, identification of these infections, their source and some factors responsible for their acquisition is very important.

There are many microbes responsible for various forms of infection in health care facilities. For simplicity the most common infections and their etiologies are discussed in the following categories

I. Bacterial infections

Bacteria are the major cause of infections in HCFs. The Gram-negative bacteria are most commonly isolated pathogens from all sites of infection. This is mainly because of the abundant anti-microbial that affects gram-negative bacteria for which the bacteria develop resistance.

The following are the most important bacterial infections that deserve every health professional's awareness in HCFs:

1. Urinary tract infections

Urinary tract infections include infections of the urethra, bladder, the ureters and the kidneys. Most cases of UTI are caused by gram-negative bacteria especially E. coli. Escherichia coli is a normal flora in the gastro-intestinal system of humans but under certain conditions it might result in infections like urinary tract infection.

Most patients within health care facilities acquired UTIs after catheterization, instrumentation and/or operation in the lower urinary tract. Host factors also contribute for the risk of developing UTI in health care facilities.

2. Wound infection and abscess

Wounds can be broadly classified as traumatic (accidental) wounds and surgical wounds. In developing countries such as Ethiopia where sporadic disputes and poverty prevail traumatic wounds are the more common ones. These traumatic wounds are most of the time infected (dirty) wounds. Dirty wounds are more prone to multiple micro-organism contamination.

Commonly isolated bacteria include:

- **Gram positive (both aerobic and anaerobic)**
  - Staphylococcus species
  - Streptococcus especially in deep abscesses
  - Clostridium species (Clostridium tetani, Clostridium perfringens)

- **Gram negative**
    - Escherichia coli
    - Pseudomonas aeroginosa

Special attention should be given to unclean burn wounds where microorganisms like clostridium species and pseudomonas are mostly isolated.

3. **Air-borne infections**

These are infections transmitted by inhalation of pathogenic (disease causing) micro-organisms. Pneumonia, which literally means acute infection of the lung, is one the leading causes of death, especially in children, in the developing world.

Though Streptococcus pneumoniae is a common cause at the community level, Staphylococcus aureus is known for its aggressiveness in health care facilities.

Tuberculosis is another common bacterial infection of the lung in health care facilities. This chronic infection of the lung is caused by Mycobacterium tuberculosis. With the advent of HIV, multi-drug resistance tuberculosis is becoming a problem that needs attention by all health workers in health care facilities.

4. Relapsing fever

This is a common acute febrile illness in situations where hygiene is poor (e.g. refugee camps) and is caused by spirochete called Borrelia recurrentis. Relapsing fever, if not identified early, can result in death. It needs joint management by all health worker teams in health care facilities.

II. Non-Bacterial causes of infections

Previously it was mentioned that bacteria play a major role in nosocomial infections. Though not as common as bacteria other micro-organisms like viruses, fungi, protozoas, helminthes and rickettsias also play a major role in causing infection in health care facilities.

The most common ones include:

1. HIV/AIDS

Acquired immunodeficiency syndrome (AIDS) is a systemic viral disease caused by a virus called HIV (Human Immuno Deficiency Virus). Though it is a chronic illness with long periods of latency (3-12yrs), initial acquisition of the virus can occur in health care facilities due to negligence and accidents in handling contaminated specimens and equipment.

2. Hepatitis

Viral Hepatitis is inflammation (infection) of the liver caused by viruses. The most common causes are viral hepatitis - hepatitis A, B, C, D, E, and G. Feco-Oral route is the commonest way of transmission in cases of hepatitis A and E infection therefore they pose major problems in HCFs where sanitary conditions are very poor. On the other hand, contact with contaminated blood and blood products is a major way of

transmission of hepatitis B, C, D, and G in HCF so they pose major problems in facilities where universal precaution is not properly followed.

3. Malaria

Malaria is an acute febrile illness most commonly found in the lowlands of Ethiopia. It is caused by the plasmodium species. Plasmodium falciparum and plasmodium vivax are the two most common etiologic agents in our country.

Because of the high prevalence of malaria in our country identification and management of cases, as well as the setting up of preventive measures, are important issues to be performed by members of the health care team. Health care facilities, which are located in malaria endemic areas, should follow general preventive measures (like window iron mesh, bed nets, draining of marshy areas in the vicinity of the HCF...) to control malaria infection in the HCF.

4. Fungal infections

Dermatophytes (tinea), Candida and aspergillus species are the most frequently encountered fungal pathogens in health care facilities. “Ringworm” infections of the skin caused by tinea species are common in poor hygienic set ups in health care facilities.

Candida albicans is the candida species most commonly identified in health care facilities. It is the normal flora of the skin and gastro intestinal tract.

Unsupervised or prolonged use of medication, which perhaps is due to a lack of awareness by health professionals, can result in the colonization of this pathogen in all body areas.

Aspergillus species are also common in the environment. Air is the principal route of transmission of aspergillus. Acquisition of this fungal species might result in chronic respiratory infections.

5. Helmenthic infection

Poor handling of stool specimens especially in the laboratory set-up might result in the common helmenthic infection. These common helmentic infections include ascariasis, taeniasis, and hookworm infections. Infection due to entrobius vermicuclaris, which is highly contagious, is also possible in health care facilities where hygienic care is poor.

6. Ricketsial disease

One important cause of acute febrile illness in health care facilities which arises due to poor sanitary conditions is typhus (caused by ricketsia typhi). The health care worker has to give due attention to hygienic control of the disease (like proper washing and ironing of bed sheets, pajamas, fumigation of wards...).

Self-Check 1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:(2 **point each**)

1. A procedure made to prevent entry of microorganisms into any area of the body
   A. Asepsis
   B. Hand washing
   C. Sterilization
   D. Prevention
2. A germicide that is used on skin or living tissue for the purpose of inhibiting or destroying microorganisms.

A. Treatment
B. Standard precaution
C. Infection prevention
D. Antiseptic

3. A process that physically removes all visible dust, soil, blood or other body fluids from inanimate object as well as removing sufficient number of microorganisms
   A. Cleaning
   B. Colonization
   C. Contamination
   D. Boiling

4. The most common or frequent risk that health care personnel exposed is from
   A. Tuberculosis
   B. Direct contact with blood and other body fluids
   C. Multidrug resistance microorganisms
   D. None of the above

5. An agent is carried from a reservoir to a susceptible host by suspended air particles or by animate or inanimate intermediaries. This type of disease transmission is said to be
   A. Direct transmission
   B. Blood born disease
   C. Indirect transmission
   D. Direct contact

Note: **Satisfactory rating - 5 points & Above Unsatisfactory - below 5 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = ____5___
Rating: __10_____

Name: _____ Date: _____

Short Answer Questions

No	
1	A
2	D

3	A
4	B
5	C

Information Sheet 2	standard precautions to prevent transmission of infection

2. Standard precautions to prevent transmission of infection

2.1. Standard precaution

The use of standard precautions is the primary strategy for minimizing the transmission of healthcare-associated infections.

Because most people with blood borne viral infections such as HIV and HBV do not have symptoms, nor can they easily be recognized as such, Standard precautions are designed for the care of all person-patient, clients and staff regardless of whether or not they are actually infected.

Standard precautions combined the major features of Universal Precautions (UP) and body substances Isolation (BSI) and are based on the principle that all blood, body fluids, secretions, excretions except sweat, non-intact skin, and mucous membrane may contain transmissible infectious agents.

- Regarding precautions two-tier approach is currently employed. This includes

- ✓ **STANDARD PRECAUTIONS** (which applies to all patients) and
- ✓ **TRANSMISSION-BASED PRECAUTIONS** (which apply to patients with documented or suspected infection or colonization with certain micro-organisms).

The application of Standard Precautions during patient care is determined by the nature of the healthcare worker-patient interaction and the extent of anticipated blood, body fluid, or pathogen exposure.

For some interactions: for example:

- For performing vein puncture, only gloves may be needed
- For intubations use of gloves, gown, and face shield or mask and googles is necessary

Standard Precautions

- are formerly known as universal precautions underpin routine safe practice, protecting both staff and clients from infection.
- are designed to reduce the risk of transmission of micro-organisms from both recognized and unrecognized sources of infection in the hospital.
- applies to all patients regardless of their diagnosis.
- shall be implemented when contact with any of the following are anticipated
  - ✓ Blood · All body fluids, secretions and excretions, with the exception of sweat regardless of whether or not they contain visible blood.
  - ✓ Non-intact skin (this includes rashes)
  - ✓ Mucous membranes

By applying standard precautions at all times and to all patients, best practice becomes second nature and the risks of infection are minimized. They include:

1. achieving optimum hand hygiene
2. using personal protective equipment
3. safe handling and disposal of sharps
4. safe handling and disposal of clinical waste
5. managing blood and bodily fluids
6. decontaminating equipment
7. achieving and maintaining a clean clinical environment
8. appropriate use of indwelling devices
9. managing accidents
10. good communication – with other health care workers, patients and visitors
11. training/education.

It is essential that standard precautions are applied at all times. This is because:

- people may be placed at risk of infection from others who carry infectious agents

- people may be infectious before signs or symptoms of disease are recognized or detected, or before laboratory tests are confirmed in time to contribute to care;
- people may be at risk from infectious agents present in the surrounding environment including environmental surfaces or from equipment
- there may be an increased risk of transmission associated with specific procedures and practices.

The three new areas of practices that have been added in Standard precautions are

1. respiratory hygiene and cough etiquette
2. safe injection practice and
3. use of masks for insertion of catheters or injection of material into spinal or epidural spaces via lumbar puncture procedures

Components of Standard Precautions:

- Hand hygiene, before and after every episode of patient contact
  - ✓ After touching blood, body fluids, secretions, excretions and contaminated items
  - ✓ Immediately after removing gloves
  - ✓ Between patient contacts
- the use of personal protective equipment
  - ✓ Appropriate use of gown/apron, mask, goggles and face shield
    - Use gloves for contact with blood, body fluids, secretions/excretions or contaminated items
    - Use gloves for contact with mucus membranes and non-intact skin
    - Use gown/apron to protect skin from blood or body fluid contact
    - Use gown/apron to prevent soiling of clothing during procedures that may involve contact with blood or any body fluids (secretions/excretions)
    - Use mask to protect mucous membranes of eyes, nose and mouth when contact with blood and body fluids is likely or possible
  - ✓ *During aerosol-generating processes in patients with suspected or confirmed infections transmitted by respiratory aerosols (e.g SARS), a fit-tested N95 or higher respiratory should be worn in addition to gloves, gown and face/eye protection*
- the safe use of needles and disposal of sharps
  - ✓ avoid recapping, bending, breaking, or hand manipulate used needles; if recapping is required, use a one-handed scoop technique only
  - ✓ Avoid removing used needles from disposable syringes
  - ✓ Place used sharps in puncture-resistant container at point of use

- Patient resuscitation
  - ✓ Use mouthpiece, resuscitation bags or other ventilation devices to avoid mouth-to-mouth resuscitation
- Patient placement
  - ✓ Place patients who contaminate the environment or cannot maintain appropriate hygiene in private rooms
  - ✓ Place patients on airborne, droplet, contact precautions in appropriate rooms
- soiled patient-care equipment
  - ✓ handle soiled equipment in a manner to prevent contact with skin or mucus membranes and to prevent contamination of clothing or the environment
  - ✓ Clean reusable equipment prior to reuse
- routine environmental cleaning
  - ✓ Develop procedures for routine care, cleaning and disinfection of equipment and environmental surfaces, especially frequently touched surfaces in patient care area
- waste management
- Textile and laundry
  - ✓ Handel in a manner that prevents transfer of microorganisms to others and to the environment
- appropriate handling of linen.
  - ✓ Handle soiled linen to prevent touching of skin or mucous membranes
  - ✓ Do not pre rinse soiled linens in patient care areas
- Respiratory hygiene/cough etiquette
  - ✓ Instruct symptomatic persons to cover mouth/nose when sneezing /coughing or use tissue papers and dispose in no-touch receptacle
  - ✓ Observe hand hygiene after soiling of hands with respiratory secretions
  - ✓ Wear separation,>3feet if possible

Standard precautions should be used in the handling of: blood (including dried blood); all other body substances, secretions and excretions (excluding sweat), regardless of whether they contain visible blood; non-intact skin; and mucous membranes.

2.2. Transmission based precautions

Any infection prevention and control strategy should be based on the use of standard precautions as a minimum level of control. Transmission-based precautions are recommended as extra work practices in situations where standard precautions alone may be insufficient to prevent transmission. Transmission-based precautions are also used in the event of an outbreak (e.g. gastroenteritis); to assist in containing the outbreak and preventing further infection.

- Transmission-based precautions are used in addition to standard precautions, where the suspected or confirmed presence of infectious agents represents an increased risk of transmission.
- The application of transmission-based precautions is particularly important in containing multi-resistant organisms (MROs) and in outbreak management.
- Medical and dental procedures increase the risk of transmission of infectious agents. Effective work practices to minimize risk of transmission of infection related to procedures require consideration of the specific situation, as well as appropriate use of standard and transmission-based precautions.

Transmission-based precautions should be tailored to the particular infectious agent involved and its mode of transmission. This may involve a combination of practices

Strategies for implementing transmission-based precautions

Transmission-based precautions may include one or any combination of the following:

- Aallocating a single room with closing door to patient with a suspected or confirmed infection (isolation)
- Wearing specific personal protective equipment
- providing patient-dedicated equipment
- using a TGA-registered disinfectant with label claims specifying its effectiveness against specific infectious organisms
- Using specific air handling techniques
- Restricting movement both of patients and healthcare workers.

Contact precautions are used when there is known or suspected risk of direct or indirect contact transmission of infectious agents that are not effectively contained by standard precautions alone.

Droplet precautions are used for patients known or suspected to be infected with agents transmitted over short distances by large respiratory droplets.

Airborne precautions are used for patients known or suspected to be infected with agents transmitted person-to-person by the airborne route.

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. The primary strategy for minimizing the transmission of healthcare-associated infections is the use of
   A. Advanced treatment
   B. Secondary prevention
   C. Hand washing
   D. Standard precautions
2. According to transmission based precaution , which one of the following is/are are used when there is known or suspected risk of direct or indirect contact transmission of infectious agents that are not effectively contained by standard precautions alone.
   A. Droplet precautions
   B. Contact precautions
   C. Airborne precaution
   D. All of the above

Note: **Satisfactory rating – 2.5 points points**

Unsatisfactory – below 2

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Answer

N0	
1	
2	
3	
4	

1. **Minimizing contamination of materials, equipment and instruments**

The recommended infection prevention practices for minimizing microbial contamination of specific areas in healthcare facilities are

Procedure Area

- Limit traffic to authorized staff and patients at all times.

Information Sheet 3	Minimizing Contamination of materials, equipment and instruments

- Permit **only** the patient and staff performing and assisting with procedures in the procedure room (family members should be limited with obstetrical procedures).
- Patients can wear their own clean clothing.
- Staff should wear attire and personal protective equipment (PPE) according to procedures performed.
- Have a covered container filled with a 0.5% chlorine solution for immediate decontamination of instruments and other items once they are no longer needed.

- Have a leak proof, covered waste container for disposal of contaminated waste items (cotton, gauze, dressings) at point of use.
- Have a puncture-resistant container for safe disposal of sharps (e.g., used suture needles, hypodermic needles and syringes, and disposable scalpel blades) at point of use.
- Have storage space in procedure rooms for clean, high-level disinfected and sterile supplies. (Storage shelves should be enclosed to minimize dust and debris collecting on stored items.)

Surgical Unit

The surgical unit is often divided into four designated areas, which are defined by the activities performed in each—unrestricted area, transition zone, semi restricted area and restricted area. Environmental controls and use of surgical attire increase as one moves from unrestricted to restricted areas. Moreover, staff with respiratory or skin infections and uncovered open sores should not be allowed in the surgical unit

Unrestricted Area

This area is the entrance from the main corridor and is isolated from other areas of the surgical unit. This is the point through which staff, patients and materials enter the surgical unit.

Transition Zone

This area consists primarily of dressing rooms and lockers. It is where staff put on surgical attire that allows them to move from unrestricted to semi restricted or restricted areas in the surgical unit. Only authorized staff should enter this area.

Semi restricted Area

This is the peripheral support area of the surgical unit and includes preoperative and recovery rooms, storage space for sterile and high-level disinfected items, and corridors leading to the restricted area. Support activities (e.g., instrument processing and storage) for the operating room
occur here.

- Limit traffic to authorized staff and patients at all times.
- Have a work area for processing of clean instruments.
- Have storage space for clean and sterile or high-level disinfected supplies with enclosed shelves to minimize dust and debris collecting on stored items.
- Have doors limiting access to the restricted area of the surgical unit.
- Staff who work in this area should wear surgical attire and a cap.
- Staff should wear clean, closed shoes that will protect their feet from fluids and dropped items

Restricted Area

This area consists of the operating room(s) and scrub sink areas.

- Limit traffic to authorized staff and patients at all times.

- Keep the door closed at all times, except during movement of staff, patients, supplies and equipment.
- Scrubbed staff must wear full surgical attire and cover head and facial hair with a cap and mask.
- Staff should wear clean, closed shoes that will protect their feet from fluids and dropped items.
- Masks are required when sterile supplies are open and scrubbed staff are operating.
- Patients entering the surgical unit should wear clean gowns or be covered with clean linen, and have their hair covered.
- Patients do not need to wear masks during transport (unless they require airborne precautions).

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. Procedure area limit traffic to authorized staff and patients at all times True False(2 point each)
2. The surgical unit is often divided into four designated areas, which are defined by the activities performed in each True False(2 point each)
3. Unrestricted area is the entrance from the main corridor and is isolated from other areas of the surgical unit. True False(2 point each)
4. Semi restricted area is the peripheral support area of the surgical unit and includes preoperative and recovery True False(2 point each)

5. Restricted area consists of the operating room(s) and scrub sink areas. True False(2 point each)
6.

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: _____

Answer

No	
1	True
2	True
3	True
4	True
5	True

Operation Sheet 2	Standard precautions

1. Discuss and apply standard precautions at all times and to all patients, best practice becomes second nature and the risks of infection are minimized. They include:

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 standard precautions to prevent transmission of infection

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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