# Nursing level-III

**NTQF Level III**

# Learning Guide#6

**Unit of Competence: - Apply** Infection Prevention Techniques and Workplace OHS

**Module Title: - Applying Infection Prevention Techniques and Workplace OHS**

**LG Code: HLT NUR3 M02 LO1-LG-6**

**Code: HLT NUR3 M02 TTLM0919V2**

## **LO1.** Apply Infection Prevention Techniques

| Instruction Sheet 1 | Learning Guide #6 |
|---|---|

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

- Introduction to disease transmission
- Infection prevention techniques

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**:

- Introduction to disease transmission
- Infection prevention techniques

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information "Sheet 1, Sheet 2, Sheet 3, Sheet 4 and sheet 5"
4. Accomplish the "Self-check 1, and Self-check 2 " **13, and 41** respectively.
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1, -- Operation Sheet 5 " **in page 42-44.**
6. Do the "LAP test" **in page – 45** (if you are ready).

| Information Sheet-1 | Introduction to disease transmission |
|---|---|

### 1.1.1. Basic concepts in transmission of communicable disease

An enormous variety of organisms exist, including some which can survive and even develop in the body of people or animals. If the organism can cause infection, it is an infectious agent. Infectious agents which cause infection and illness are called pathogens. Diseases caused by pathogens, or the toxins they produce are communicable or infectious diseases.

The transmission cycle of disease to be able to persist or live on, pathogens must be able to leave an infected host, survive transmission in the environment, enter a susceptible person or animal, and develop or multiply in the newly infected host.

The transmission of pathogens from current to future host follows a repeating cycle. This cycle can be simple, with a direct transmission from current to future host, or complex, where transmission occurs through (multiple) intermediate hosts or vectors. this cycle is called the transmission cycle of disease.

**Stage of infection:-** At this stage the infectious agent has entered the host's body and has begun multiplying. The entry and multiplication of an infectious agent inside the host is known as the **stage of infection**. For instance, a person who has eaten food contaminated with *Salmonella typhii* (the bacteria that cause typhoid fever) is said to be *exposed*; if the bacteria enter the cells lining the intestines and start multiplying, the person is said to be *infected*.

At this stage there are no **clinical manifestations** of the disease, a term referring to the typical symptoms and signs of that illness. **Symptoms** are the complaints the patient can tell you about (e.g. headache, vomiting, dizziness). **Signs** are the features that would only be detected by a trained health worker (e.g. high temperature, fast pulse rate, enlargement of organs in the abdomen).

**Stage of infectious disease:** at this stage the clinical manifestations of the disease are present in the infected host. For example, a person infected with *Plasmodium falciparum*, who has fever, vomiting and headache, is in the **stage of infectious disease** – in this case, malaria. The time interval between the onset (start) of infection and the first appearance of clinical manifestations of a disease is called the **incubation period**. For malaria caused by

*Plasmodium falciparum* the incubation period ranges from 7 to 14 days. Remember that not all infected hosts may develop the disease, and among those who do, the severity of the illness may differ, depending on the level of immunity of the host and the type of infectious agent. Infected hosts who have clinical manifestations of the disease are called **active cases**. Individuals who are infected, but who do not have clinical manifestations, are called **carriers**. Carriers and active cases can both transmit the infection to others.

**2.2 The transmission cycle has different elements:-**

Infection spread by a chain of events and these events involves having the following parts:

**Pathogen (infectious agent) :** is the organism causing the infection.

**Host (Reservoir) :** is the infected person or animal 'carrying' the pathogen. „

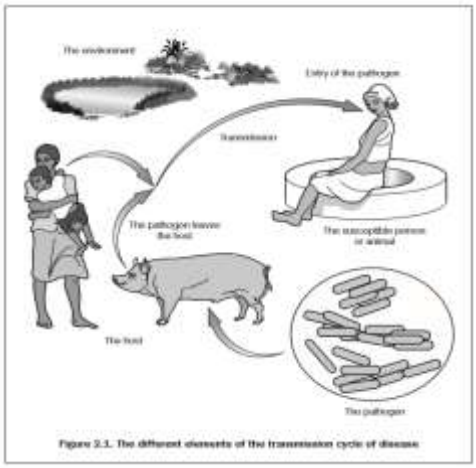
**Route of exit:** the method the pathogen uses to leave the body of the host.

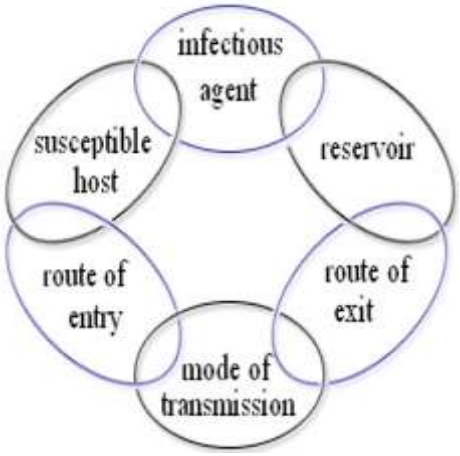
**Transmission:** how the pathogen is transferred from host to susceptible person or animal, which can include developmental stages in the environment, in intermediate hosts, or in vectors.

**Route of entry:** the method the pathogen uses to enter the body of the susceptible person or animal .

**The susceptible person or animal:** the potential future host who is receptive to the pathogen.

In order to understand why infections occur in a particular situation, and to know how to prevent them, the transmission cycles of these infections must be understood.






**2.2.1 The pathogen (Infectious agent)**:- the pathogen is the organism that causes the infection, Specific pathogens cause specific infections. an example Cholera is caused by the bacterium Vibrio cholerae, and Leishmaniasis is caused by different species of the protozoa Leishmaniasis.

Different categories of pathogens can infect humans. Infectious agents can have varying sizes. Some, such as *Plasmodium falciparum* and all bacteria and viruses, are tiny and are called

**micro-organisms**, because they can only be seen with the aid of microscopes. Others, such as the Ascaris worm (*Ascaris lumbricoides*), can be easily seen with the naked eye. The pathogens causing the diseases are

- Viruses
- Bacteria
- Fungi
- Protozoa and Helminthes (worms).

**Helminthes** are worms made up of many cells; for example, *Ascaris lumbricoides*.

**Protozoa** are micro-organisms made up of one cell; for example, *Plasmodium falciparum*.

**Bacteria** are also micro-organisms made up of one cell, but they are much smaller than protozoa and have a different structure; for example *Vibrio cholerae*, which causes cholera.

**Viruses** are infectious agents that do not have the structure of a cell. They are more like tiny boxes or particles and are much smaller than bacteria; for example, **HIV** (the Human Immunodeficiency Virus), which can lead to AIDS.

Though not as common as causes of communicable disease in humans, other types of infectious agents include *fungi* (e.g. ringworm is caused by a fungus infection), and *mites* (similar to insects), which cause scabies.

All pathogens go through a lifecycle, which takes the organism from reproducing adult to reproducing adult. This cycle includes

- ✓ phases of growth
- ✓ consolidation
- ✓ change of structure
- ✓ multiplication/reproduction, spread, and infection of a new host

The combination of these phases is called the **development of the pathogen**. pathogen must develop in the environment or intermediate host before a susceptible person or animal can be infected. During the latent period the pathogen is not infectious. A non-latent pathogen does not need to go through a development, and can cause infection directly after being excreted.

also a persistent pathogen remains viable for a long period outside the host (perhaps months), while a non-persistent pathogen remains viable for only a limited period (6) (days, or weeks).

It is important to realize that not all infections will result in disease. While a pathogen may cause illness in one person, it may be killed or cause asymptomatic infection in another.

Perhaps to that active immunity is the resistance the person or animal develops against the pathogen after overcoming infection or through immunization (vaccination), Depending on

the pathogen, the effectiveness of active immunity often decreases over time. Usually immunity only develops against the specific pathogen that caused the infection. If there are different types (serotypes or strains) of the same pathogen (e.g. in dengue fever and scrub typhus), immunity will often only develop against the particular type which caused the infection. The person or animal can still develop the illness when infected with another serotype or strain of the pathogen.

**2.2.2 The host (Reservoir)**: - the host is the person or animal infected by the pathogen. the importance of the host in the transmission cycle, roles as both reservoir and source of pathogens.

**There are two types of host**: definitive and intermediate host.

- ✓ The **definitive host** is the person or animal infected with the adult, or sexual, form of the pathogen. In the infections covered here, people are usually the definitive host. To keep things simple the definitive host is called just 'the host'.
- ✓ The **intermediate host** is an animal or person infected by a larval, or asexual, form of the pathogen. Helminthes have both definitive and intermediate hosts. All other pathogens only have definitive hosts, although vectors function technically as intermediate hosts for protozoa.

**Zoonosis:** transmission from animal to person some pathogens are specific to humans, others to animals. Many pathogens are less specific and can infect both people and animals. Infections that can naturally be transmitted from animal to person are called zoonosis.

Zoonosis is very common many of these infections normally occur in an animal cycle, with people being infected by chance. The problem with zoonosis is that a continuous reservoir of pathogens exists outside humans. Even if all human infections were cured and transmission to people stopped, the presence of an animal reservoir would remain a continuous risk to people.

**Carriers**: hosts without obvious illness a person or animal who develops an illness is an obvious example of a host. It is very common, however, for infections to occur without the disease developing. The person or animal infected can potentially spread the pathogen, but does not show clear symptoms and the symptoms may be mild, or may be completely absent these hosts are called carriers.

The host can be infectious for a short period in **transient carriers**, or over a prolonged period in a **chronic carrier**, **Incubating carriers** have been infected and can spread the pathogen, but do not yet show the symptoms of the illness. **Convalescent carriers** continue to spread the pathogen even though they have recovered from illness.

In many infections carriers play an important role in transmitting the pathogen. It is usually not possible to identify asymptomatic carriers, and unless the family and other close contacts of the sick person or even the whole population can be treated, carriers will remain a threat to the health of those surrounding them.

**2.2.3 Transmission of disease: -** To survive as a species, pathogens must infect new people or animals. They must leave the body of the host, find their way to a new susceptible person or animal, and enter the body of that person or animal. As the exit, transmission, and entry of the pathogens are closely associated.

Water and environmental sanitation interventions improve the health of a population usually try to reduce the risk of transmission of infection.

Some terms relating to the transmission or classification of infections are defined here:

**Direct transmission** refers to the transfer of an infectious agent from an infected host to a new host, without the need for intermediates such as air, food, water or other animals. Direct modes of transmission can occur in two main ways:

- **Person to person**: The infectious agent is spread by direct contact between people through touching, biting, kissing, sexual intercourse or direct projection of respiratory droplets into another person's nose or mouth during coughing, sneezing or talking. A familiar example is the transmission of HIV from an infected person to others through sexual intercourse.
- **Trans placental transmission**: This refers to the transmission of an infectious agent from a pregnant woman to her fetus through the placenta. An example is mother-to-child transmission (MTCT) of HIV.

❖ **Indirect transmission: -** is when infectious agents are transmitted to new hosts through intermediates such as air, food, water, objects or substances in the environment, or other animals. Indirect transmission has three subtypes:

A. **Airborne transmission**: The infectious agent may be transmitted in dried secretions from the respiratory tract, which can remain suspended in the air for some time e.g. Dusts & droplets. For example, the infectious agent causing tuberculosis can enter a new host through airborne transmission.

B. **Vehicle- borne transmission** – Indirect contact through contaminated in animate objects like hand kerchiefs, soiled clothes, surgical instrument, contaminated food & water biological products like blood, serum, IV fluids which then transmits it to a new host.

C. **Vector-borne transmission**: A **vector** is an organism, usually an *arthropod*, which transmits an infectious agent to a new host. Arthropods which act as vectors include houseflies, mosquitoes, lice and ticks.

D. **Mechanical transmission**- The insect transport the agent by soiling its feet or proboscis in which case multiplication of the agent in the vector does not occur. e.g. House fly

E. **Biological transmission**- This is when the agent multiplies in the arthropod before it is transmitted such as the transmission of malaria by mosquito.

**Food-borne infections:** infections which can be transmitted through eating food containing the pathogen.

**Vector-borne infections:** infections transmitted through vectors. We use vector borne infections only for infections with a biological vector, that is a vector in which the pathogen goes through a development before further transmission is possible (e.g. mosquitoes, tsetse fly, body louse). We do not classify as vector borne those infections which are transmitted by **mechanical vectors** that are the animal is only a vehicle for transporting the pathogen (e.g. domestic flies, cockroaches).

**Water-borne infections:** infections which can be transmitted through drinkingwater which contains the pathogen.

**Water-washed infections:** infections caused by pathogens whose transmission can be prevented by improving personal hygiene.

Infections can have either **direct** or **indirect** transmission routes.

- Infections with direct transmission:- a pathogen with a direct transmission route can infect a susceptible person or animal **immediately** after leaving the host. The

pathogen does not need to develop in the **environment, in an intermediate host, or in a vector**.

Examples of infections with direct transmission are feco-oral infections, these pathogens leave the host through faeces, and enter the susceptible person or animal through ingestion. Transmission occurs mainly through **direct contact** with contaminated **fingers,** contaminated **food** directly with **feaces,** contaminated hands, domestic **flies,** soil, or water; contaminated drinking-water; or contaminated soil generally the **5 "S''**

- **Fingers**
- **Flies**
- **Food**
- **Feaces and Floods**

Faecal-oral infections are **food-borne, water-borne, and water-washed**. as faecal-oral infections are transmitted directly, any route that will take matter polluted with faeces directly or indirectly to somebody's mouth could potentially transmit the pathogen.

Some of these infections have mainly **animal hosts**, while others are limited to **humans.**

Example of Feco-oral infections includes diarrheal diseases such as cholera and bacillary dysentery, typhoid, and poliomyelitis.

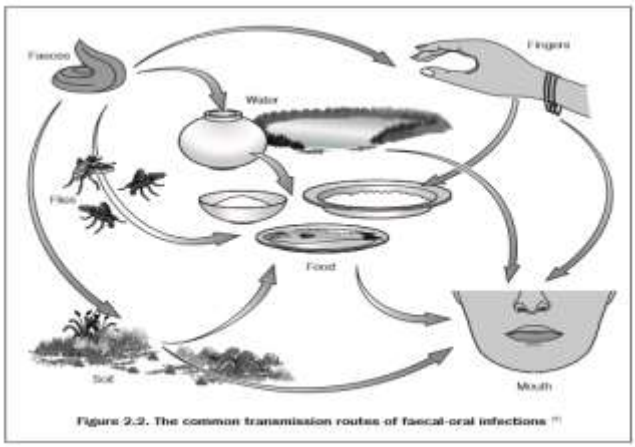


Figure 2.2. The common transmission routes of faecal-oral infections [1]

Figure 2.2 shows some common transmission routes of faecal-oral infections.

### 2.2.4 Route of entry

Successful transmission of the infectious agent requires it to enter the host through a specific part of the body before it can cause disease. The site through which an infectious agent enters the host is called the route of entry. The routes of entry are

- **The respiratory tract:** some infectious agents enter the body in air breathed into the lungs. Example: *Mycobacterium tuberculosis*.
- **The gastrointestinal tract:** some infectious agents enter through the mouth. Example: the infectious agents causing diarrheal diseases enter through the mouth in contaminated food, water or on unclean hands.
- **The skin:** the skin provides a natural barrier against entry of many infectious agents, but some can enter through breaks in the skin. Example: malaria parasites (*Plasmodium* species) get into the body when an infected mosquito bites through the skin to suck blood.

### 2.2.5 Susceptible hosts and risk factors

After an infectious agent gets inside the body it has to multiply in order to cause the disease. In some hosts, infection leads to the disease developing, but in others it does not. Individuals who are likely to develop a communicable disease after exposure to the infectious agents are called **susceptible hosts**. Different individuals are not equally susceptible to infection, for a variety of reasons.

Factors that increase the susceptibility of a host to the development of a communicable disease are called **risk factors**. Some risk factors arise from outside the individual – for example, poor personal hygiene, or poor control of reservoirs of infection in the environment. Factors such as these increase the *exposure* of susceptible hosts to infectious agents, which makes the disease more likely to develop.

Additionally, some people in a community are more likely to develop the disease than others, even though they all have the *same* exposure to infectious agents. This is due to a low level of immunity within the more susceptible individuals. **Immunity** refers to the resistance of an individual to communicable diseases, because their *white blood cells* and *antibodies* (defensive proteins) are able to fight the infectious agents successfully.

Low levels of immunity could be due to:

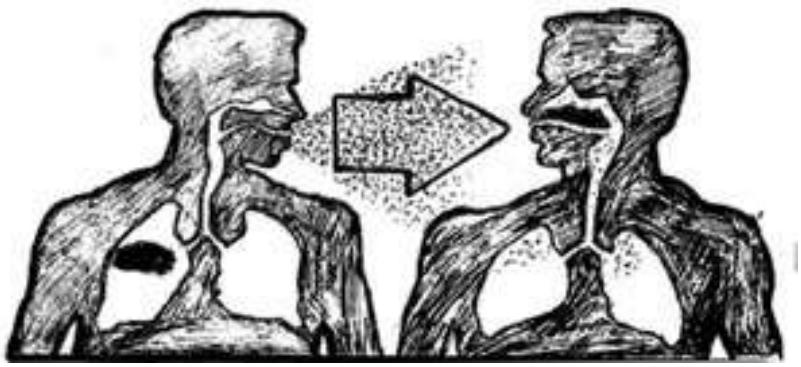
- diseases like HIV/AIDS which suppress immunity
- poorly developed or immature immunity, as in very young children

- not being vaccinated
- poor nutritional status (e.g. malnourished children) and Pregnancy.

### 2.2.6 Route of exit

Before an infectious agent can be transmitted to other people, it must first get out of the infected host. The site on the infected host through which the infectious agent gets out is called the route of exit. Some common examples are

**Respiratory tract:** the routes of exit from the respiratory tract are the nose and the mouth. Some infectious agents get out of the infected host in droplets expelled during coughing, sneezing, spitting or talking, and then get transmitted to others. For example people with tuberculosis in their lungs usually have a persistent cough; *Mycobacterium tuberculosis* uses this as its route of exit.



**Gastrointestinal tract**: the anus is the route of exit from the gastrointestinal tract (or gut). Some infectious agents leave the human body in the stool or faeces, the infectious agents of shigellosis, a disease which can cause bloody diarrhoea, use this route of exit.

**Skin:** Some types of infectious agents can exit the body through breaks in the skin continuity. For example, this route of exit is used by *Plasmodium* protozoa, which are present in the blood and get out of the human body when a mosquito bites through the skin to suck blood.

| Self-Check -1 | Written Test |
|---|---|

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

1. Identify the main types of infectious agents.
2. Describe the chain of transmission of diseases.
3. Mention the pathogens that can cause disease.
4. Mention types of indirect mode of transmission.

***Note:*** **Satisfactory rating – 8> points** **Unsatisfactory - below 8 points**

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Question**

# Answer sheet

**1.** _____

_____

_____

**2.** _____

_____

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**3.** _____

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| Information Sheet-2 | Infection prevention techniques |
|---|---|

**Introduction to infection prevention: -**Infection prevention is a scientific and practical approach designed to prevent harm caused by infections to the patients and health works. No country, no health care facility, even with the most developed health care systems can claim to be free from problems associated with infections. The health problems due to communicable diseases can be tackled by the application of relatively easy measures at different levels of the health system.

Here, we will use some procedures at the individual and community levels, which are relevant to the community. Some measures can be applied before the occurrence of the disease to protect a community from getting it, and to reduce the number of cases locally in the future. These are called prevention measures. For example,

- Hand washing procedure,
- Use of personal protective equipment's,
- Safe handling of sharp items and
- Instrument processing

Vaccination of children with the measles vaccine is a prevention measure, because the vaccine will protect children from getting measles. Vaccination refers to administration of vaccines to increase resistance of a person against infectious diseases. Once disease occurs and is identified in an individual, measures can be applied to reduce the severity of the disease in that person, and to prevent transmission of the infectious agent to other members of the community are called control measures.

For example, once a child becomes infected with measles, treatment helps reduce the severity of the disease, and possibly prevents the child's death, but at the same time it decreases the risk of transmission to other children in the community. In this context, treatment of measles is considered a **control measure.**

- ❖ In the health care setting infection can easily spread from person to person, this transmission of infection is called **cross infection** a client may be infected while

receiving care, or health worker may be infected while carrying out their duties. People who work or interact with clients in a health care setting may be infected.

- ❖ It is essential to understand the way infection is controlled in any health care setting including hospitals, residential aged care, community services, dental practices, mortuaries or alternative health care services.

### 2.1.1. Hand washing

**Introduction to hand hygiene**

Hands are the most common ways in which microorganisms such as bacteria can be transported and subsequently causes infections, especially to those susceptible to infections. In order to prevent spread of microorganisms hand hygiene must be performed adequately to reduce the transmission of infectious agent. The transmission of microbes from one to another mostly takes place via our hands, or hands to contaminated object.

Hand hygiene is one of the simplest and most effective procedures to prevent the spread of disease. It's essential that everyone takes responsibility to ensure that the care provided is carried out in safe manner. Wash hands by soap and water or use an antiseptic hand rub/Waterless hand washing

In order to facilitate compliance in public services in infection prevention and control following procedures should be introduced

- Providing hand rubs at the entrance to service use areas for visitors if not contraindicated.
- Notices and hand hygiene poster should be displayed to attract attention of visitors and service users
- Hand hygiene leaflets should be distributed during outbreaks or mass media should be used.

**Types of hand washing**

- **Water based hand washing (liquid soap and water):** is using soap with water and it suspends transient microorganisms allowing them to be rinsed off effectively (mechanical removal) of dirty. Soap and water hand washing is effective as hand washing preparations containing anti-microbial agents (antiseptic solutions) for decontaminating hands and removing and removing transient microorganism.

- **Waterless hand washing (Alcohol based hand washing):** is using hand alcohol rub sanitizers as hand washing agent. Preparations contain an emollient which aid in reducing damage to the hands, these preparations should only be used when there is no visible soiling of the hands, if there is visible soiling, soap and water hand washing should be used.

Alcohol hand rub provide an acceptable alternative to soap and water in moist situations when hands are physically clean, this hand rubs are less effective if used immediately after the application of a hand lotions. However hands will need to wash with soap and water after several applications in order to prevent a buildup of an emollient on the skin.

**Levels of hand hygiene:** hand washing is probably the most important method of protecting the service user. The technique is more important than the solutions used. There are two main levels of hand hygiene.

- ✓ **Routine hand washing:** it is removing dirt, organic matter and most transient organism acquired through direct contact with person, and from the environment. Liquid soap and water is adequate for this procedure. A fifteen to thirty seconds hand wash using liquid soap is **acceptable**.

- ✓ **Aseptic hand washing:** it is disinfecting hands by removing transient microorganism and reducing resident organism. Level of hand hygiene should be done prior invasive procedures. Aseptic hand washing can be achieved through routine hand washing with soap and water followed by an application of alcohol hand rub or washing with antiseptic solutions containing antimicrobial agents and ensures you are **"bare below elbows".**

**"Bare below the Elbow as per dress Code Policy " include:**

- Staff in clinical contact, direct patient care or involved in the cleaning of the environment/patient equipment, must be “bare below the elbow” to facilitate good hand hygiene practice.
- Sleeves should be short or rolled up
- All wrist and hand jewellery should be removed with the exception of a wedding ring
- Finger nails should be kept short, clean and free from nail vanish, artificial nails and nails extensions.

### 3.1.1 When should perform hand washing?

**WHO "FIVE** KEY moments for hand hygiene"

- ✓ Before touching a patient
- ✓ Before clean/aseptic procedure
- ✓ Immediately/After bodily fluids exposure
- ✓ After touching a patient
- ✓ After touching patient surroundings


**Additional Moments for Hand Hygiene**

- ✓ Before commencing work/after leaving work area
- ✓ Before and after preparing or eating food
- ✓ Before handling medicines
- ✓ Before wearing & after removing gloves*
- ✓ After handling contaminated laundry & waste
- ✓ After contact with used equipment
- ✓ After using the toilet
- ✓ After cleaning equipment or the environment.

**Standard hand washing procedure:**

- ✓ Remove jewellery.
- ✓ Wet hands thoroughly all over.
- ✓ Use pH neutral soap.
- ✓ Lather soap all over hands.
- ✓ Rub hands together vigorously for **15-20 seconds**. Pay particular attention to the fingertips, thumbs, wrists, finger webs and the backs of the hands.
- ✓ Rinse under running water.
- ✓ Pat hands dry with paper towels.

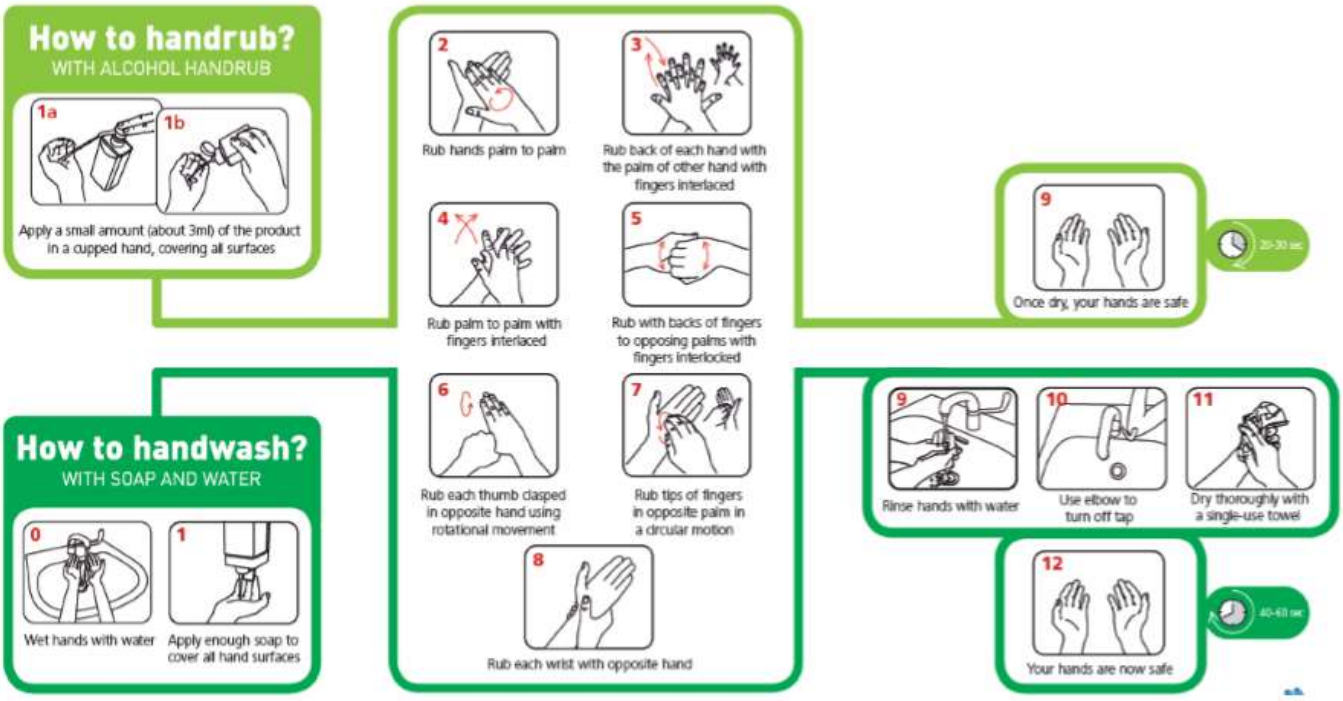
**Surgical hand washing/scrub:** removes transient organisms and a substantial number of resident organisms. Effective skin antisepsis can be achieved by:

- Surgical hand wash/scrub using aqueous skin disinfectants. the disinfectant solutions available for surgical skin hand washing are: 4% Chlorhexidine gluconate skin cleanser, 7.5% Povidone iodine and 2% Triclosan skin cleanser. It is important that mixtures of the different types of antiseptic solutions are not used together as they may inactivate each other.

**How to use an alcohol-based hand sanitizer**

Alcohol-based hand sanitizers, which don't require water, are an acceptable alternative when soap and water aren't available. If you use a hand sanitizer, make sure the product contains at least 60% alcohol. Follow these steps:

- Apply the gel product to the palm of one hand. Check the label to find out the appropriate amount.
- Rub your hands together.
- Rub the gel over all the surfaces of your hands and fingers until your hands are dry.




**How to wash your hands:** It's generally best to wash your hands with soap and water. Over the counter antibacterial soaps are no more effective at killing germs than is regular soap. Follow these steps.

## 7. Steps To Wash Your Hands Properly

**Step 1 -** Wet your hands and apply enough soap (coin size).

**Step 2 -** Rub your palms together.

**Step 3 -** Rub the back of each hand.

**Step 4 -** Rub both your hands while interlocking your fingers

**Step 5 -** Rub the back of your fingers.

**Step 6 -** Rub your thumbs and the ends of your wrists.

**Step 7 -** Rinse both hands properly with water, and dry your hands with a clean towel or air.

## 2.2. Personal Protective Barriers (PPE)

**Personal Protective Barriers (PPE):** is used to prevent exposure of infectious materials on the other hand they act as a barrier to stop spread of germs. Some of the duties that you perform in the workplace may require you to protect yourself from either the environment in which you are working, infectious clients, or to protect the client from you if you are infectious. An examples of physical Personal protective equipment are (gloves, face masks, goggles, gowns, plastic or rubber aprons, and drapes

### 2.2.1. Purpose of PPE

- To prevent nosocomial infections in all hospitalized patients and clients attending healthcare facilities. It is a primary strategy in this regard.
- It reduces risk of transmitting microorganisms from known or unknown sources of infection
- It also provides rationale for appropriate use of limited infection prevention resources in caring for all clients and patients
- Apply to care of all clients and patients attending healthcare facilities because most people with HIV or other life-threatening blood-borne diseases do not have symptoms.
- To prevent body fluids, secretions and excretions (except sweat), non-intact skin and mucous membranes because increased risk of exposure by touching, accidental injury (needle stick), or contact (splashing or spraying of potentially contaminated blood or body fluids).

**Personal protective equipment may include:**-

- ✓ Face shields
- ✓ Gloves and goggles
- ✓ Head covers and shoe covers
- ✓ Masks and gowns.

**Face shields:** they cover and protect face from the infectious droplets and contact with contaminated materials during health care activity in order not to splash. Without face shields germs can get access from the mucous membrane of our body such as mouth and nose.

**Gloves:** gloves are the most probably used personal protective equipment, they covers hand and wrist protecting from exposure of droplets and contamination. Health care workers must use personal protective equipment when providing care to their patients or at working area because gloves protect both patient and client. Gloves should be used when issue on contamination is present. Also, when a caregiver has open wound on the hands, it is a must that he/she use gloves. The outside of the gloves should not be touched when removed as this is considered contaminated.

**When to Wear Gloves**

**Gloves should be worn when:**

- There is a reasonable chance of hand contact with blood or other body fluids, mucous membranes, or non-intact skin,
- Performing an invasive medical procedures,
- Before handling soiled instruments, contaminated waste items or touch contaminated surfaces.
- When disposing contaminated waste items
- When Handling chemicals or disinfectants

**General rules**

- As a general rule, if the risk is to the patient then **"Sterile" gloves** are required. If the risk is to the user then **"Non-Sterile" gloves** will probably be sufficient.
- Gloves should not be worn when it is not required,
- If gloves are to be discarded, briefly immerse them in 0.5% chlorine solution,

- If gloves are to be processed and reused; soak the gloves in 0.5% chlorine solution for 10 minutes before cleaning, then sterilize or HLD (by steaming)
- Immediately after autoclaving, gloves are extremely friable and tear easily.
- Gloves should not be used for 24 to 48 hours to allow their elasticity to return and to prevent tackiness (stickiness)
- Latex rubber surgical gloves should be discarded after processing three times because the gloves tear more easily with additional processing
- After steaming; wear "wet" within 30 minutes or allow to dry for 4 to 6 hours before using.

❖ Remember wearing gloves does not replace the need for hand washing or use of antiseptic hand rubs, so that washing hand is essential before and after gloving.

**Surgical gloves can be reused.**

**When to Double Glove**

- The procedure involves coming in contact with large amount of blood or other body fluid, Orthopedic procedures in which sharp bone fragments, wire sutures and other sharps are likely to be encountered.

**Steps of glove removing**

1. Pull one glove near your wrist towards your finger tips until the glove folds over.
2. Carefully grab the fold and pull towards your finger tips. As you pull you are turning the inside of the glove outwards.
3. Pull the fold until the glove is almost off.
4. To avoid contamination of your environment, continue to hold the removed glove. Completely remove your hand from the glove.
5. Slide your finger from you glove free hand under the remaining glove. Continue to slide your finger towards your finger tips until almost half of your finger is under the glove.
6. Turn you finger 180 degrees and pull the glove outwards and towards your finger tips. As you do this, the first glove will be encased in the second glove. The inside of the second glove will also be turned outwards.
7. Grab the gloves firmly, by the uncontaminated surface (the side that was originally touching your hand). Release your grasp of the first glove you removed. Pull your second hand free from its glove. Dispose of the gloves properly.

**Other Issues with Gloves**

- Regloving after contamination
- Allergic reactions to gloves

**Do:**

- Use the correct size.
- Change surgical goves perdiodically during long procedures.
- Keep nails short.
- Pull gloves over cuffs of gown to protect the wrists.
- Use water-soluble hand lotions to prevent skin from drying.

**Don't:**

- Use oil-based and perfumed hand lotions.
- Store gloves where there are extremes in temp.

**Elbow-Length Gloves**

If elbow-length gloves are not available, an inexpensive, effective alternative can be easily made from previously used surgical gloves that have been decontaminated, cleaned, and dried.

**The steps for making elbow-length gloves are:**

**STEP 1:** Cut the four fingers completely off each glove just below the place where all the fingers join the glove.

**STEP 2:** Sterilize or high-level disinfect 2–3 pairs of cut-off (fingerless) gloves according to the recommended process for each method. After final processing, store the gloves in a sterile or high-level disinfected container until needed.

**step 1**

**step 2**

**step 3**

**step 4**

**Masks:** should fit comfortably over the nose and mouth. The same with a gown or apron, a wet mask is considered contaminated. The front of the mask is also contaminated. Masks should not be worn around the neck. For each client contact, a clean mask should be used.

**Gown**: is cloth covering and putted over clothes and tied behind that is long enough to cover your clothing. Because the outside of the gown is considered contaminated, this should not be touched when it is removed. A gown that is wet is, of course, considered contaminated also. A caregiver should wear a clean gown every client care. In case the gown is not available, apron should be worn to mask clothing during client contact.

## 2.3. Handling of sharp items:

Needle stick injuries Needlesticks and other sharps-related injuries which expose workers to bloodborne pathogens continue to be a significant hazard for hospital employees. OSHA estimates that 5.6 million workers in the healthcare industry and related occupations are at risk of occupational exposure to bloodborne pathogens. Bloodborne pathogens are pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and others.

According to the Centers for Disease Control and Prevention (CDC), about 385,000 sharps injuries occur annually to hospital employees. reporting injuries and infections.

Safe handling and Incinerating (burning) items, use plastic or galvanized metal containers with tight-fitting covers, use puncture resistant sharps containers for all disposable sharps, Place waste containers close to where the waste is generated, use PPE when handling wastes, and washing hands after handling wastes are best practices in handling sharp items.

**Hazards of needle stick injuries**

Accidental punctures by contaminated needles can inject hazardous fluids into the body through the skin. There is potential for injection of hazardous drugs, but injection of infectious fluids, especially blood, is by far the greatest concern. Even small amounts of infectious fluid can spread certain diseases.

Accidental injection of blood-borne viruses is the major hazard of needle stick injuries, especially the viruses that cause AIDS (the HIV virus), hepatitis B, and hepatitis C. The risk of infection after exposure to infected blood varies by blood-borne pathogen. The risk of transmission after exposure to HIV-infected blood is about 0.3%, whereas it is estimated to be up to 100 times greater for hepatitis B virus (30%) and could be as high as 10% for hepatitis C virus.

**How do needle stick injuries occur ?**

A needle-stick injury is the result of an accident with a needle. Several studies show that needles cause injuries at every stage of their use, disassembly, or disposal. But there is disagreement as to why the accidents are so common among health care workers or why simple solutions fail to solve the problem. Equipment design, nature of the procedure, condition of work, staff experience, recapping, and disposal have all been mentioned as factors that influence this occurrence.

**Who are at risk of having needle stick injuries?**

Anyone is at risk for needle stick injuries. They may especially happen to:

- Children with relatives or neighbors using needles.
- Cleaners of public toilets, parks, trains, and cinema seats.
- Health caregivers who use needles most of the time while working.
- People who share needles for use with illegal drugs.
- Police and security officers especially while searching suspects or their property.

**How can needle stick injuries be prevented?**

- **At work:**
    - Always use gloves when handling needles that are exposed to blood or other body fluids.
    - Do not put the cap back on a needle, bend or break a needle by hand, or use a cutting device.
    - Get a vaccination against certain diseases, such as hepatitis, for protection.
    - Learn the right way to handle and throw away needles, scalpels, and other sharp objects.

- Put all sharp objects in a holder marked just for sharp objects. A puncture-proof, closed container with a lid may be used to contain needles. The containers are placed in areas where needles are used. It should be replaced before it becomes

**Equipment Design**

Safer innovative devices using protected needle devices or needle-free systems with self-sealing ports would alleviate many of these injuries. There is accumulating evidence suggesting that syringes with safety features reduce needle-stick injuries.

**Nature of Procedure**

Critical situations during clinical procedures include:

- Withdrawing a needle from a patient, especially if staff attend to bleeding patients while disposing of the needle.
- Having the device jarred by a patient.
- Pulling a needle out of the rubber stopper of a vacuum tube which can jab the hand in a rebound reflex.
- Injuries commonly occur when workers try to do several things at the same time, especially while disassembling or disposing of needles.

**Conditions of Work**

Work conditions that might contribute to an increase in the number of needle-stick injuries include:

- Staff reductions where nurses, laboratory personnel and students assume additional duties.
- Difficult patient care situations.
- Working at night with reduced lighting.

**Recapping**

Recapping can account for 25 to 30 percent of all needle stick injuries of nursing and laboratory staff. Often, it is the single most common cause. It is extremely dangerous to hold a needle in one hand and attempt to cover it with a small cap held in the other hand. Injuries occur three different ways:

- The needle misses the cap and accidentally enters the hand holding it.
- The needle pierces the cap and enters the hand holding it.
- The poorly fitting cap slips off of a recapped needle and the needle stabs the hand.

2.4. **Instrument and material processing:** are process designed for instruments in order to reduce the risk of transmitting infections that are spread wholly or partly by airborne, droplet, or contact routes between hospitalized patients, health workers and Equipment's. for example contact with Enteric pathogens (hepatitis A, echo viruses) and herpes simplex used with wet or draining skin, eye, or wound infections that may be very contagious.

**Antimicrobial agent:** Any agent that kills or suppresses the growth of microorganisms. Biocide: A chemical or physical agent that kills all living organisms, pathogenic and nonpathogenic.

2.4.1. **Key components of instrumental processing are**

- Decontamination
- Cleansing
- Sterilization

**Decontamination:** is the process of making inanimate objects safer to handle by staff before cleaning. It is done by soaking the equipment's in **0.5%** chlorine solution.

***Principles:*** Inactivates HBV and HIV, makes items safer to handle and must be done before cleaning

❖ **Instructions for Preparing Dilute Chlorine Solutions**

$$\text{Total parts (TP) of H2O} = \frac{\text{\% concentrate}}{\text{\% Dilute}} - 1$$

**E. g** to make a 0.5% chlorine solution from 5% bleach

$$\text{Total parts (TP) of H2O} = \frac{\text{5\% Concentrate}}{\text{0 .5\% Dilute}} - 1 = 9 \text{ Total parts (TP) of H2O}$$

❖ **To make a 0.5% chlorine solution from 5% bleach, mix 1 part bleach with 9 parts of water.**

**Decontamination practices are:**

- Unclasped the instruments before soaking.
- Place used instruments in 0.5% chlorine solution.
- Soak instruments for **10-20 minutes** & rinse immediately with warm water & then wash adequately with soap and cold water.
- Wipe surfaces (exam tables) with chlorine solution.
- Flush syringe and needles with 0.5% chlorine solution.

**Cleaning:** removes organic material that protects microorganisms against sterilization and HLD. Also it inactivates disinfectants. **Cleaning** is method of mechanically reducing the number of microorganisms, and it must be done before sterilization and High level dis infection (HLD) to be effective.

**Practices after items are decontaminated:**

- ✓ Use PPE during cleaning
- ✓ Disassemble instruments
- ✓ Wash with detergent, water, and a soft brush.
- ✓ Scrub instruments under the water surface until visibly clean.
- ✓ Thoroughly rinse with clean water.

**Sterilization:** is the process of completely destructing or removal of all microorganisms including spores. It is the recommended method for processing instruments and other items that will come in contact with the bloodstream or tissues under the skin

The efficiency of a sterilization process is often related to the degree of severity of treatment e.g. length of exposure to heat. The effectiveness of any method of sterilization is also dependent upon four other factors:

- ✓ The type of microorganism present, Some microorganisms are very difficult to kill while others die easily.
- ✓ The number of microorganisms present, it is much easier to kill one organism than many. Also the amount and type of organic material that protects the microorganisms.
- ✓ Blood or tissue remaining on poorly cleaned instruments acts as a shield to microorganisms during the sterilization process.
- ✓ The number of cracks and crevices on an instrument that might harbor microorganisms, because icroorganisms collect in, and are protected by, scratches, cracks and crevices such as the serrate.

**Methods of sterilization**: there are two main kinds of sterilization namely **Heat sterilization and chemical.** Irradiation and filtration are also other methods of sterilization

1. **Heat sterilization:** heat sterilization could be by either of **Dry or wet heat.** Dry heat is cheaper than wet heat sterilization but it is less reliable. It is known that microbes vary enormously in their capacity to resist heat. The main effect of heat is the **degradation** of organic matters especially the proteins here are some examples of different levels of microbial tolerance to heat treatment

- M. tuberculosis 65-100 0C
- Fungi & viruses 60-100 0C
- HIV 60 0C 30 min
- HBV >80 0C
- Spores>100 0C

**Moist heat:** Also called Autoclaving (steam under pressure). It is done at 121°C at 15 pounds pressure over the square inch for 15 minutes (15 lb/in$^2$), It is a very good method for sterilizing almost anything, except heat-labile substances (like some plastics).

**Steam sterilization requires four conditions:**

1. adequate contact
2. sufficiently high temperature
3. correct time
4. sufficient moisture

**Advantages of moist heat (autoclave).**

- ✓ Most commonly used effective method of sterilization
- ✓ Sterilization cycle time is shorter than with dry heat or chemical sterilants.

**Disadvantages of moist heat (autoclave).**

- ✓ Requires a continuous source of heat (wood fuel, kerosene or electricity)
- ✓ Requires equipment (steam sterilizer), which must be expertly maintained to keep it in working condition
- ✓ Requires strict adherence to time, temperature and pressure settings
- ✓ Repeated sterilization cycles can cause pitting and dulling of cutting edges of instruments (i.e., scissors)
- ✓ Plastic items cannot withstand high temperatures

**Dry heat** • This is a hot air oven sterilization method done at 170°C for 1 hour or 160°C for 2 hours and can be used to sterilize glasses and metals

**Remember:**

- ✓ Exposure time begins only after the sterilizer has reached the target temperature.
- ✓ Do not overload the sterilizer
- ✓ Leave at least 7.5 cm [3 inches] between the items and walls of sterilizer
- ✓ Overloading alters heat convection and increases the time required to sterilize

**Advantages of dry heat:**

- ❖ Effective method, as dry heat by conduction reaches all surfaces of instruments, even for instruments that cannot be disassembled.
- ❖ Protective of sharps or instruments with a cutting edge (fewer problems with dulling of cutting edges).
- ❖ Dry heat leaves no chemical residue.
- ❖ Eliminates wet pack problems in humid climates

**Disadvantages of dry heat:**

- ❖ Plastic and rubber items cannot be dry-heat sterilized because temperatures used (160–170 oC) are too high for these materials.
- ❖ Dry heat penetrates materials slowly and unevenly.
- ❖ Requires oven and continuous source of electricity.

- When using dry heat to sterilize instruments wrapped in cloth, be sure that temperature does not exceed 170oC (340oF). Use dry heat only for items that can withstand a temperature of 170oC (340oF).
- 170oC (340oF) 60 minutes
- 160oC (320oF) 120 minutes
- 150oC (300oF) 150 minutes
- 140oC (285oF) 180 minutes
- 121oC (250oF) overnight
- Needles and other instruments with cutting edges should be sterilized at lower temperatures 160oC (320oF)], because higher temperatures can destroy the sharpness of cutting edges. Depending on the temperature selected, the total cycle time (preheating, sterilization time and cool down) will range from about 2.5 hours at 170oC to more than **8 hours at 121oC**.

**Other Heat methods include**

**Flaming:** is done to loops and straight-wires in microbiology labs. Leaving the loop in a Bunsen burner until it glows red ensures that any infectious agent gets oxidized completely into small molecules. Commonly used for small metal or glass objects, but not for large objects .

**Incineration**: will also burn any organism to ash. It is used to sanitize medical and other bio hazardous waste.

**Boiling**: boiling in water for 15 minutes is unsuitable for sterilization. It is simple and familiar, though is hazardous and cumbersome. Boiling will kill bacteria and viruses, but it is ineffective against many bacterial spores and prions. High-level disinfection is best achieved by moist heat such as boiling in water (100°C for one minute holding time), which kills all

organisms except for a few bacterial spores. It is important to note that boiling equipment items in water will not achieve sterilization.

**Steps of boiling:-**

**Step 1:** Clean all items to be high-level

**Step 2:** Open all hinged instruments and disassemble those with sliding or multiple parts. Place bowls and containers upright so they fill with water. Make sure that all items are completely submerged because water must touch all surfaces for HLD to be achieved.

**Step 3:** Cover the pot or close the lid on the boiler and bring the water to a gentle, rolling boil.

**Step 4:** Once the water is in a rolling boil, start timing for at least 1 minute. Use a timer or make sure to record when the boiling begins. From this point on do not add or remove any water or items.

**Step 5:** Lower the heat to keep the water at a gentle, rolling boil. Too vigorous boiling may damage items and will speed the evaporation of the water.

**Step 6:** After 1 minute holding time, remove items using dry, high-level disinfected pickups. Place items to air-dry on a high-level disinfected tray or on a high-level disinfected container that is away from dust and insects and in a low-traffic area. Never leave boiled instruments and other items in water that has stopped boiling; they can become contaminated as the water cools.

**Step 7:** Store the dry items in a high-level disinfected and covered container and use items immediately or keep in a covered, dry, high level disinfected container and use within one week.

**Step 8**: The boiler should be emptied and dried.

4. **Chemical sterilization**: is an alternative to high-pressure steam or dry-heat sterilization. Chemical sterilization (often called **cold sterilization**). Objects can be chemically sterilized. But if using high-pressure steam or dry-heat sterilization would damage them. Chemicals (disinfectants and antiseptics) vary greatly in ability to kill microorganisms by either of three mechanisms :-
    - disruption of lipid containing membranes
    - modification of proteins
    - modification of DNA and includes

**Disinfectant:** A disinfectant is a chemical agent that destroys most pathogens but may not kill bacterial spores. Chemical disinfection should only be used if heat treatment is impractical or if it may cause damage to the equipment.

**Disinfection**: Disinfection is the elimination of many or all pathogenic microorganisms, with the exception of bacterial spores using antiseptics and disinfectants.

**Levels of disinfection**: There are three High level disinfection

1. **High level disinfection (HLD):** eliminates bacteria, viruses, fungi and parasites but does not reliably kill all bacterial endospores .is the only acceptable alternative to sterilization and can be achieved by boiling, chemical high level disinfect and steaming
2. **Intermediate level disinfection (ILD):** Inactivates vegetative bacteria, Mycobacterium and most fungi and viruses, but do not necessarily kill spore-forming bacteria
3. **Low level disinfection (LLD)** : kills most vegetative bacteria and some enveloped, medium sized viruses and fungi but not the most resistant microorganisms such as M. tuberculosis or bacterial spores.

**Irradiation:** irradiation kills microorganisms by damaging their DNA by utilizing ultraviolet light. This is usually used for air disinfection in labs and operating theaters. An example of radiation is Gamma irradiation used for sterilization of single–use disposable syringes.

**Filtration:** Filtration is used to sterilize (remove microorganisms from) liquids which cannot be sterilized by heat (e.g., antibiotics, serum, injectable drugs and vitamins • Filters are made of special substances (ceramic, asbestos, cellulose ester).


Figure of different Instrumental processing

| Self-Check -1 | Written Test |
|---|---|

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

1. Describe hand washing procedure.
2. List out Purpose of using Personal protective equipment.

***Note:*** **Satisfactory rating – 8> points** **Unsatisfactory - below 8 points**

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Question**

# Answer sheet

1_____

_____

_____

2_____

_____

_____

3_____

_____

_____

_____

| Operation Sheet 1 | Hand washing techniques |
|---|---|

**Techniques for washing hands properly**

**Step 1 -** Wet your hands and apply enough soap (coin size).

**Step 2 -** Rub your palms together.

**Step 3 -** Rub the back of each hand.

**Step 4 -** Rub both your hands while interlocking your fingers

**Step 5 -** Rub the back of your fingers.

**Step 6 -** Rub your thumbs and the ends of your wrists.

**Step 7** - Rinse both hands properly with water, and dry your hands with a clean towel or air.

| **Operation Sheet 2** | **Glove removing techniques** |
|---|---|

**Steps of glove removing**

**Step-1** Pull one glove near your wrist towards your finger tips until the glove folds over.

**Step-2** Carefully grab the fold and pull towards your finger tips. As you pull you are turning the inside of the glove outwards.

**Step-3** Pull the fold until the glove is almost off.

**Step-4** to avoid contamination of your environment, continue to hold the removed glove. Completely remove your hand from the glove.

**Step 5-**Slide your finger from you glove free hand under the remaining glove. Continue to slide your finger towards your fingertips until almost half of your finger is under the glove.

**Step-6** Turn you finger 180 degrees and pull the glove outwards and towards your finger tips. As you do this, the first glove will be encased in the second glove. The inside of the second glove will also be turned outwards.

**Step-7** Grab the gloves firmly, by the uncontaminated surface (the side that was originally touching your hand). Release your grasp of the first glove you removed. Pull your second hand free from its glove. Dispose of the gloves properly.

| **Operation Sheet 3** | **Procedure of boiling items** |
|---|---|

**Steps of boiling:-**

**Step 1:** Clean all items to be high-level

**Step 2:** Open all hinged instruments and disassemble those with sliding or multiple parts. Place bowls and containers upright so they fill with water. Make sure that all items are completely submerged because water must touch all surfaces for HLD to be achieved.

**Step 3:** Cover the pot or close the lid on the boiler and bring the water to a gentle, rolling boil.

**Step 4:** Once the water is in a rolling boil, start timing for at least 1 minute. Use a timer or make sure to record when the boiling begins. From this point on do not add or remove any water or items.

**Step 5:** Lower the heat to keep the water at a gentle, rolling boil. Too vigorous boiling may damage items and will speed the evaporation of the water.

**Step 6:** After 1 minute holding time, remove items using dry, high-level disinfected pickups. Place items to air-dry on a high-level disinfected tray.

**Step 7:** Store the dry items in a high-level disinfected and covered container and use items immediately or keep in a covered, dry, high level disinfected container and use within one week.

**Step 8**: The boiler should be emptied and dried.

| Operation Sheet 4 | Process of waste management |
|---|---|

**Steps in waste management**

**Step 1** Waste Minimization

**Step 2** Segregation/ Separation

**Step 3** Handling, i.e. collecting, storing

**Step 4** Treatment

**Step 5** Transporting and Disposal

| LAP Test | Practical Demonstration |
|---|---|

Name: _____ Date: _____

Time started: _____ Time finished: _____

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within 2 hour.

**Task 1.** Perform proper hand washing procedure.

**Task 2.** Properly wear sterile gloves.

**Task 3.** Show how to make elbow length glove.

## List of Reference Materials

https://www.youtube.com/watch?v=LUCqzJO_XTI&spfreload=10

REFERENCES


1. American Society of Microbiology, Report of the ASM Task Force on Antibiotic Resistance. Washington DC : 1995.
2. ASPEN Board of Directors. Standards of Practice for Nutrition Support Dietitians. Nutr Clin Pract 2000 Feb; 15: 53 – 59.
3. Aust. Dept. of Health and Ageing, Infection control guidelines for the prevention of transmission of the infectious diseases in the health care setting, 2004.
4. Boyce JM, Pittet D. Guideline for Hand Hygiene in Health-Care Settings. Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Society for Healthcare Epidemiology of America/Association for Professionals in Infection Control/Infectious Diseases Society of America. MMWR Recomm Rep 2002;51(RR-16):1-45.
5. Buggy D. Can anaesthetic management influence surgical-wound healing? Lancet 2000; 356(9227): 355-7.
6. CDC. Guidelines for Environmental Infection Control in Health-Care Facilities. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). MMWR 2003;52(RR10);1-42.
7. CDC. Guidelines for preventing health-care—associated pneumonia, 2003. MMWR 2004; 53(RR03);1-36.
8. CDC/ISDA/ASBMT, Guidelines for Preventing Opportunistic Infections Among Haematopoietic Stem Cell Transplant Recipients, 2000.
9. CDC Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings 2007.
10. Center for Disease Control and Prevention, Guideline for Prevention of Catheter-associated Urinary Tract Infections, 1981.
11. Centers for Disease Control and Prevention. Updated information regarding mosquito repellents. Available at www.cdc.gov/ncidod/dvbid/westnile/Repellent Updates.htm (Accessed on March 15, 2007).
12. C. Glen Mayhall. Hospital Epidemiology and Infection Control, The Association for Professionals In Infection Control and Epidemology, Principles and Practice, 1996.
13. Construction-related nosocomial infections in patients in health care facilities;2001:2752
14. Control Practices Advisory Committee, 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, June 2007

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