University of Malawi
KAMUZU COLLEGE OF NURSING

Bachelor of Science in Nursing and Midwifery

Module 10

INF 109: Infection Prevention

No of hours*:* 100 hours

Credits*:* 10

Author:

Mandayachepa C Nyando

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ABBREVIATIONS

CDC	Center for Disease Control and Prevention
OSHA	Occupational Safety and Health Administration
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
PEP	Post Exposure Prophylaxis

Module Overview

(i) Module description

This module introduces you to infection prevention with focus on universal precautions which includes various types of infection prevention methods. Emphasis is placed on the barrier nursing, isolation and reverse isolation.

(ii) How to use this module

Each unit requires you to conduct **a field trip to the hospital** to observe how each unit is implemented. Make sure you read all the required and recommended books as these are directly relevant to the achievement of the expected study outcomes. The sub-headings are interrelated; as such, ensure that you have competently mastered the concepts of each unit before moving to the next one.

(iii) How the module fits into the programme

The knowledge contained in this module will be integrated/applied in the management of clients with several conditions, so as to prevent the spread of infection to your clients as well as to protect yourself from catching the infection while working in various health settings.

Overall Learning Outcomes

1. Explain essential elements of standard universal precautions in minimizing the risk of infection.

2. Demonstrate knowledge, skills and appropriate attitudes in the use of standard infection control precautions to prevent and control infection.

Assessment Criteria

Overall learning outcomes	Assessment Criteria
Explain essential elements of standard universal precautions in minimizing the risk of infection.	For a student to be assessed, he/she should competently explain the following concepts of universal precautions of infection prevention: - Wash hands - Use safe work practices - Isolation of patients - Process equipment using Infection Prevention recommended guidelines - Use of physical barrier
Demonstrate knowledge, skills and appropriate attitudes in the use of standard infection control precautions to prevent and control infection.	For a student to be assessed, he/she should competently demonstrate the following concepts of universal precautions of infection prevention: - Wash hands - Use safe work practices - Isolation of patients - Process equipment using Infection Prevention recommended guidelines - Use of physical barrier

Assessment Methods:

Professional logs (covering all the topics in this module)	40%
Examination	60%

Learning Contract

I will complete this module within the specified period in order to gain the appropriate knowledge, skills and attitudes. I am aware that I have to achieve the stipulated outcomes in readiness for clinical placement and assessments.

Student Name: …….

Student's Signature : ……..

Date:……..

UNIT 1: UNIVERSAL PRECAUTIONS

1.0 Introduction

Microorganisms are naturally present in the environment. Some are useful because they protect us from invasion of other infectious micro-organisms e.g. normal flora while others are harmful because they cause illnesses that are referred to as infectious diseases.

The efforts of many people are involved in maintaining a safe environment, however in health care setting; the priority is preventing diseases among individuals who may be ill and healthy. To prevent infections from occurring, techniques are used to control the spread of pathogens and this process is called Infection Prevention.

1.1 Universal Precautions

Universal precautions are infection control guidelines designed to protect workers from exposure to diseases spread by blood and other body fluids. The concept of universal precaution was developed in the mid 1980's as a result of HIV epidemic. The Center for Disease Control and Prevention (CDC) recognized that there was an urgent need to create strategies to protect health care personnel from infections carried in blood. In 1985, the CDC officially introduced the application of universal precautions to all persons regardless of their presumed infection status.

The Occupational Safety and Health Administration (OSHA) published the final Rule to improve the working conditions and promote safety for health care workers when caring for patients infected with blood borne pathogens. In 1996, the definition and recommendations for universal precaution was revised and given a new name of Standard Precautions. Today, Standard Precaution is the primary strategy to be used to reduce risk of transmission of pathogens from moist body substances and applies to all patients regardless of their diagnosis or presumed infection status.

General Precautions

The concept of **universal precautions** requires that all appropriate precautions be taken in handling blood or body fluids for all clients, rather than just those with diagnosed infection. It is based on the fact that many infections, such as HIV and hepatitis B, can be spread through blood and body fluids even in asymptomatic clients. **Tissues and** b**ody fluids are considered infectious. Body fluids which should be considered potentially infectious include any visibly bloody body secretions, semen, vaginal secretions, cerebrospinal, synovial, pleural, peritoneal, pericardial and amniotic fluids.**

The following are the precautions:

1-Consider every person infectious
2-Wash hands
3-Use safe work practices
4-Isolate patients
5-Process equipment using Infection Prevention recommended guidelines
6-Use physical barrier

Reasons for considering every person infectious

Activity 1.1
Why should every person be considered infectious?

In this era of HIV and AIDS, all clients are considered potentially infectious and therefore health personnel need to take precautions to protect themselves, their clients and cleaning and housekeeping personnel.

Hand Washing

Hand washing with soap is one of the easiest, cheapest and most important methods available for infection prevention. Clean and running water should be used. Soap should be kept in a soap rack because micro-organisms can multiply while the soap is in water.

Hand washing should be done:

1. Before and after any procedure
2. At the beginning and end of shift of work
3. Before contact with a patient
4. Between contacts with different patients
5. Before and after contact with wounds, dressings, specimens or beddings
6. After visiting the toilet
7. Whenever the hands are soiled

Use Safe Working Practices

1. There should be proper handling and management of sharps and wastes for example syringes should not be recapped.
2. Bins have to be 2/3 filled to prevent injuries

Isolate Patients

Isolation means to place a patient a part from others to prevent the spread of infection. This should be done when secretions or excretions can not be controlled.

Processing Instruments Using Infection Prevention

Recommended Guidelines

Some instruments need to be decontaminated before disposal for example catheters. This prevents transmission of infectious microorganism from the instruments to individuals in the hospital and the community. Some items which are supposed to be reused have to be decontaminated, cleaned, and sterilized.

Use of physical barriers

These are techniques used to prevent the transfer of pathogens from one person to another and are forms of isolating the host from microorganisms. These methods are referred to as barrier nursing. They are aimed at controlling pathogens by establishing aseptic barriers around the patient and health personnel. The most commonly used barriers are masks, gowns, gloves, private rooms.

Activity 1.2
Visit the hospital, observe and interview health workers how they implement this aspect of infection prevention. Specific activities must include how the following are performed: Consider every person infectious, washing hands, using safe working practices, isolate patients, process equipment using Infection Prevention recommended guidelines, use of physical barrier

Unit Summary
Universal precautions are infection control guidelines designed to protect workers from exposure to diseases spread by blood and other body fluids. There are different methods of infection prevention but the most important and yet the cheapest methods is **hand washing**.

Unit Assessment

Explain universal precautions of infection prevention.

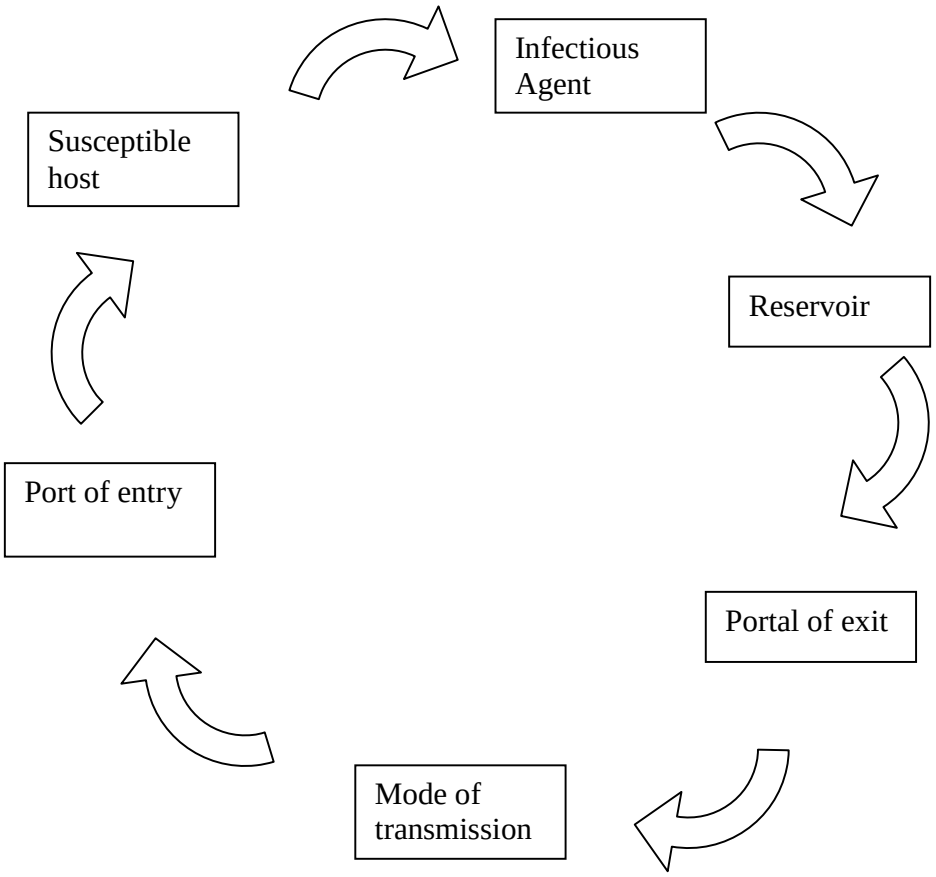
Demonstrate proper hand washing technique.

UNIT 2: CHAIN OF INFECTION

2.0 Introduction

This refers to classic concept of infection transmission. Infection refers to illness produced by microorganisms and it is one of the most common problems encountered by man.

2.1 The Disease Transmission Cycle



2.1.1 Infectious Agent

It refers to biological, physical or chemical entities capable of causing infections or diseases in humans. These include; viruses, bacteria, fungi, parasites.

Characteristics that affect the ability of the infectious agent to cause disease include: pathogenicity, virulence, invasiveness and specificity.

Pathogenecity:	Ability of the organism to harm and cause diseases.
Virulence:	vigor with which the organism can grow and multiply.
Invasiveness:	Ability of the organism to enter tissues.
Specificity:	Attraction of the organism to a specific host which might include

humans.

2.1.2 Reservoir

Reservoirs are sources, in which an infectious agent can survive, grow, multiply and wait to transfer to a susceptible host. Examples of sources are:

- Inanimate objects: Medicine, air, food, water, blood or any other material in which organisms can find nourishment or lie dormant and survive.
- Human sources: other patient, hospital personnel, visitors or patients themselves.
- Animals.
- Environment.

2.1.3 Portal of Exit

Are paths by which an infectious agent may live the reservoir, and include: the respiratory tract, genitourinary tract, and gastrointestinal tract, skin, mucous membrane, blood, transplacenta and wound drainage.

2.1.4 Mode of Transmission

Are the mechanisms used to transport the infectious agent from the reservoir to a susceptible host.
These modes have four main categories:

1. Contact: Transference of the infectious agent by touching or manipulating reservoir e.g. infected host, contaminated fomites, and contact with droplets.
2. Air born: easily confused with droplet contact, however, these are small like light bacteria and viruses contained in droplet nucleic.
3. Vehicle: substances that maintain the life of the agent until it is ingested or inoculated into the susceptible host e.g. water, blood, serum
4. Vector born: Arthropods or other invertebrate transmit the agent by biting the susceptible host e.g. mosquito, tics, flies and rodent.

The contact mode has three categories:

- Direct: person-to-person transmission. examples include touching, kissing, sexual intercourse
- Indirect: fomites maintain the life of the agent, example include: surgical instruments, urinary catheter bag, contaminated needles, dressings, and toys.
- Droplets: Large, heavy droplet particles forcibly expelled from the infected host. Example include: coughing, sneezing, singing.

2.1.5 Portal of Entry

Permits the organism to gain entrance into the host. Pathogens can enter susceptible host through mouth, nose, ears, eyes, vagina, rectum or urethra.

2.1.6
. Susceptible Host

A person whose own body defense mechanisms are unable at the time of exposure to withstand the invasion of pathogens. Characteristics influencing susceptibility are age, immune status, nutritional status, chronic or active disease history, sex, ethnicity, socio-economic, life style and hereditary

Preventing the spread of infections in health care facilities can only occur if the disease transmission cycle is broken at some point. Hospital equipment acts as reservoirs for micro-organisms. Following universal precautions, use of barriers, decontamination, and sterilization interrupts the chain thereby breaks the whole cycle. Mode of transmission, for example, contact and airborne can be broken by gloving and masking. Portal of exit and entry can be broken by use and handling equipment safely and sterilization. If the methods are followed properly, the chain breaks and the susceptible host remain safe.

Activity 2.1
Visit the hospital and observe and interview health workers how they implement this aspect of infection prevention. Specifically pay attention to how they break the chain of infection from one patient to another.

Unit Summary
Chain of infection involves infectious agent, reservoir, mode of infection, portal of exit, portal of entry and susceptible host. Therefore these need to be targeted in infection prevention.

Unit Assessment

Explain the chain of infection

UNIT 3: MAINTENANCE OF A SAFE HEALTH CARE ENVIRONMENT

3.0 Introduction

An environment which has many hazardous or dangerous objects poses a threat to life of both health workers and clients. The environment which is free from hazards or dangerous objects promotes good working and does not threaten lives of both clients and health workers. There has been a great concern over the safety of patients, guardians and health workers in the hospitals. Hospitals are very complex places with equipment which create a high potential for injury. Categories of patients who are very prone to injury are very young, weak and elderly. The nurses' role should be to minimize his or her risk for injury, teach clients or guardians about safety precautions in the hospital.

3.1 Characteristics of a Safe Environment

- Good Sanitation
- Safe work place
- Clean air
- Clean water

3.1.1 Sanitation

We need to have good environment free from microorganisms. These include; clean drains, clean sinks, clean surrounding and clean toilets. Also dump dusting of the room, cleaning of the floors with both chlorine and then with soap.

3.1.2 Work place

Workers should put on protective clothing like heavy duty masks, gloves, gumboots, aprons and all the necessary work clothing. The hospital environment includes all the physical surrounding of patients and staff, that is, structures, fittings and working objects like syringes. It is the responsibility of all heath workers and infection control practitioners that the environment and the activities carried out within it do not put the hospital community at risk.

3.1.3 Clean air

The number of microorganism present in the air within a room will depend on the number of people occupying that room, their activity and the rate at which particles settle or the air is replaced. For example in wards they should have windows so that air circulation should take place. This is so because if there are no windows, the bad air which is breathed out by the patient just remains in the room hence it can also lead to the spreading of the infection within the room. Also if there is a source of odour like soiled linen needs to be removed because they cause discomforts to patients.

3.1.4 Clean water

It depends on the location of the source and the quality of the water itself.

Activity 3.1
Visit the hospital, observe and interview health workers how they implement this aspect of infection prevention. Specifically pay attention to how they promote a hazardous free environment.

Unit Summary

An environment which has many hazardous or dangerous objects poses a threat to life of both health workers and clients. The environment which is free from hazardous or dangerous does not threaten lives of both clients and health workers. Good sanitation, a good work place, clean air and clean water are aspects that promote a good working environment.

Unit Assessment

Discuss how you can create a good environment for both clients and health workers in the hospital.

UNIT 4: HAND WASHING

4.0 Introduction

Hand washing is the removal of dirt organic materials and transient microorganisms from the hands. The use of water and soap remains important when hands are visibly soiled. For more than 100 years, research has shown that proper hand washing is the most important way to reduce the spread of infections in the health care setting. The hands serve as the conduits for the transfer of pathogens found circulating among patients and caregivers. Obviously, hands can propel infections from contaminated objects to the patients or from the facility staff member to the patient and vise versa.

Purposes of hand washing

1. To reduce the number of microorganisms on the hands.
2. To reduce the risk of transmission of microorganisms to clients from health care workers.
3. To reduce the risk of cross-infection among clients.
4. To reduce the risk of transmission of microorganisms to one self.

Activity 4.1
Explain when should a health worker wash hands in the clinical area.

When to wash hands

1. Immediately when arriving at work.
2. Before and after examining the client.
3. After touching anything that may be contaminated.
4. Before putting on gloves for clinical procedures.
5. After removing any type of gloves.
6. Before leaving work.
7. Before administering medication.

Procedure for routine hand washing materials

Materials required for hand washing include:

1. Soap
2. Continuous supply of clean running water.
3. Single use towels.

Steps

1. Thoroughly wash hands
2. Apply plenty soap
3. Vigorously rub all areas of hands and fingers together for at least 10-15 second and special attention should be paid on between fingers and under the nails.
4. Rinse hands thoroughly with clean water.
5. Dry hands with a paper towel or personal towel.

Avoid the following

1. Dipping hands in basins containing standing water. When no running water is available, use a bucket with a tap.
2. Sharing a single towel with a colleague.

Hand antisepsis

The goal of hand antisepsis is to remove soil and debris as well as to remove both transient and resident flora (microorganisms that live on or in our bodies without causing disease). The procedure is similar to that of plain hand washing using soap.

When to do hand antisepsis

Should be done before the following

1. Examining or caring for highly susceptible patients e.g. premature babies and AIDS patients.
2. Performing invasive procedures e.g. Placement of intravascular device.
3. Living the room of patients on contact precautions e.g. Hepatitis A or B.

Antiseptic hand rub

Use of antiseptic hand rub is more effective in killing transient and resident flora than hand washing with anti microbial agent or plain soap.
An emollient such as glycerin and alcohol that protects and softens skin is used.

Technique for antiseptic hand rubs

- Rub the solution vigorously into your hands especially between your fingers and under nail until dry.
- Alcohol based solution for hand rub can be made by adding 2mls of glycerin to 100mls of ethyl or isopropyl alcohol solution.

Surgical hand scrub

Purpose of surgical hand scrub is to mechanically remove soil, debris, transient and resident flora before doing a sterile procedure.
The goal is to prevent wound contamination by microorganisms from hands and arms of the surgeon and assistants.

Procedure

1. Remove rings, watches, bracelets.
2. Thoroughly wash hands especially between fingers and fore arms to the elbow with soap and water.
3. Clean nails with nail cleaner.

4. Rinse hands and fore arms with clean water
5. Apply an antiseptic agent all surfaces of hands and fore arms to the elbow.
6. Rub hands and fore arms vigorously for at least 2min.
7. Holding the hands higher than the elbow, rinse hands and fore arms thoroughly with clean water.
8. Keep hands up and away from the body, do not touch any surface or article.
9. Dry hands and fore arms with a clean, dry towel or air-dried.
10. Put sterile or high level disinfected gloves.

Summary

- Hand washing is very important as far as infection prevention is concerned. So health professionals should ensure that hand washing is followed to prevent the transfer of microorganisms to clients or to one self as "prevention is better than cure"

Activity 4.2
Visit the hospital and observe and interview health workers how they implement hand washing as an aspect of infection prevention. Practice how to wash hands properly in the hospital.

Unit Summary

Proper hand washing is the most important method to reduce the spread of infections in the health care setting. The hands serve as the conduits for the transfer of pathogens found circulating among patients and caregivers.

Unit Assessment

Discuss proper method of hand washing.
Demonstrate proper hand washing.

UNIT 5: PERSONAL PROTECTIVE EQUIPMENT

5.0 Introduction

Protective equipment is used to prevent or hinder transfer of infections agents from one person to another. They provide defense mechanism against **Nosocomial Infections** (Hospital Acquired Infections) e.g. Tuberculosis and Hepatitis B.

Examples of protective equipment include:

- Caps
- Masks
- Respirators
- Cradles
- Foot Wear
- Eye Wear
- Gloves
- Gowns and Aprons

5.1 Activity:
Role play use of protective wear in the hospital.

5.1 Caps

- Are used to keep the hair & scalp covered so that flakes of skin & hair are not shed into the wound during surgery
- Protects health workers from body fluids
- Should be large enough to cover **all** hair.

5.2 Masks

- Masks are worn to protect the clients from Air-borne diseases which can be spread by Infectious air droplets, shaking of bed clothes, a lot of movements in the wards.

5.3 Respirators

- Are specialized types of masks, called particulate respirators that are recommended for situations in which filtering inhaled air is necessary e.g. Caring for Pulmonary Artery Tuberculosis
- However they are expensive > Surgical Gloves

5.4 Cradles

- A Cradle is a metal, circular equipment used to cover a client to separate his/her wound/burns from contact with beddings
- Prevents further injury due to contact with the beddings
- Prevents infections that can occur if the wounds are exposed to open air
- Protects also the Health workers.

5.5 Footwear

Is worn to protect feet from injury by sharps or heavy items that may accidentally fall on them

Includes:

- Rubber boots
- Leather shoes

5.6 Eyewear

Protects staff from accidental splashes of body fluid by covering the eyes

Includes:

- clear plastic goggles
- safety glasses
- face shields

These are used in procedures like performing cesarean section.

5.7 Gloves

Gloves are hand worn barriers that are used to protect the service providers from contact with infectious microorganisms that can be found in blood, other body fluids, & wastes.

Includes:

- Latex gloves
- Heavy Duty gloves
- Surgical gloves

5.8 Gowns and Aprons

Gowns and Aprons prevent the spread of microorganisms from the nurse to the patient

They also prevent contamination of the nurse's clothing from the patient. Those should be worn during invasive procedures likely to result in splashing of blood or any body fluids.

5.2 Activity:
Visit the hospital, observe and interview health workers how they use personal protective equipment as an aspect of infection prevention.

Unit Summary

Protective equipment is used to prevent infectious agents from one person to another. These include: caps, masks, respirators, cradles, foot wear, eye wear, gloves, gowns and aprons.

Unit Assessment

Explain how you can use different protective wear in the hospital environment.

UNIT 6: SAFE USE AND DISPOSAL OF SHARPS

6.0 Introduction

Sharps are objects that can damage the skin and cause injury. They include lancets, scalpels, needles and broken glass. Improper management of discarded needles and other sharps can pose a health risk to the public and health workers. Injuries from needles and other sharp items are the number one cause of infection in staff from blood-borne pathogens.

6.1 Types of sharps

The most common types of sharps are syringes and other similar injection devices as well as blades and contaminated glass.

Other types include:

- Scalpels
- Scissors
- Culture dishes
- Cheatle forceps

6.2 Categories of Sharps

Sharps are categorised into:

1. Uncontaminated sharps
   These are sharps that are free from biohazardous chemical and radioactive contamination e.g. needles which are not used
2. Biohazardous sharps
3. These are sharps that are contaminated with biohazardous material and are disposed of as medical waste e.g. cannulae already used for I.V insertion.
4. Chemically contaminated sharps
   These are sharps that are contaminated with hazardous chemicals
5. Radioactive sharp

These are sharps that are contaminated with radioactive materials

6.3 Safe Handling of Sharps

Health care workers can accidentally injure other people when handling sharps during a procedure.

Use the hands-free technique

- The assistant puts the sharp e.g. cannulae in a sterile kidney basin or other safe zone in the sterile field.
- The person conducting the procedure picks up the sharp item from the sterile field, use it and returns it to the safe zone.

Avoid recapping needles:

- Dispose sharps in puncture-proof containers such as metal box, heavy cardboard box
- Wear utility gloves when handling sharps
- Proper handling of sharps should be observed as improper handling of contaminated sharps can cause infection throughout the hospital.

6.4 Disposal of sharps

Sharps in clinical area should be put in clinical waste containers before incineration

Sharps containers

All sharps containers must;

- Be leak and puncture-proof
- Have a handle that allows lifting with only one hand (so that the container falls away from the body when it is carried)
- Have a non re-openable lid
- Be designed to be used with one hand
- Carry a chemical or biological hazard sign
- Be sealed and replaced when it is no more than two-thirds full
- Should be located in any area where sharps are used e.g. injection room

6.5 Broken Glass

- Follow the following when disposing broken glass:
- Wear heavy duty gloves
- Use a newspaper or other similar thick papers to collect the glass
- Wrap the glass securely in the paper
- Put the wrapped glass in a cardboard box which should be marked ‘broken glass’, handle with care or with yellow biohazard tape.

6.6 Decontamination of Sharps

Sharps should be decontaminated before being processed for reuse or disposal.

Activity 6.1

Demonstrate the procedure on decontamination hospital items.

Procedure for Decontamination

- Drop the needles into a container of 0.5% chlorine solution and let them soak for 10 minutes.
- Remove the needles and syringe from the solution either by gloved hands or by using pick-ups (lifters, cheatle forceps)
- Rinse them in plain water.
- Clean them in soapy water and plain water again
- Dispose in a sharps container, or if the materials are reusable, leave to dry and transfer for sterilization.

Activity:6.2

Visit the hospital, observe and interview health workers how they implement decontamination and sterilization of hospital equipment.

Unit Summary

Sharps are objects that can damage the skin and cause injury .They include lancets, scalpels, needles and broken glass. Improper disposal and management of discarded sharps can pose a health risk to the public and health workers.

Unit Assessment

Discuss how you can prevent needle stick injuries in the hospital.

UNIT 7: DISPOSAL AND SAFE HANDLING OF WASTE

7.0 Introduction

Safe handling of wastes means that wastes are handled in such away that they do not contaminate other clean and non used items. It also applies to health workers handling these items without contaminating themselves and others including clients.

7.1 Safe handling of wastes

7.1.1 What are wastes?

Wastes are unwanted things that are contaminated or uncontaminated.

7.1.2 Types of wastes

7.1.2.1 ***Clinical or contaminated wastes***

These involve materials that are considered potentially hazardous and can contribute to the spread of infections. These materials include; used gloves, aprons, catheters, IV tubing, linen and anything that is soiled.

7.1.2.2 ***Potentially Contaminated Wastes***

These are materials that are non hazardous or that are at low risk of causing a disease. These materials include; left over food, plastic papers, stationery, empty bottles and others.

7.1.3 Waste disposal

These are measures taken to get rid of waste. One of the major principles in infection prevention in nursing practice is waste disposal. In nursing, proper disposal of wastes is one of the fundamental principles in infection prevention. However, 80% of the infections developing in hospital settings are due to the health personnel, not following the infection prevention procedures and one of the factors contributing to the diseases in the hospitals is improper waste disposal.

7.1.3.1 ***Disposal of Contaminated Waste***

Contaminated wastes are categorised into sharps and other wastes.

7.1.3.2 ***Disposal of Other Wastes***

These include gloves, linen, Macintosh, face masks, canulars bandages, faecal matter, urine, pus, sputum or other body secretions.

These wastes are further divided into reusable and non-reusable wastes.

7.1.4 Reusable Wastes

These include wastes like linen, draw mackintosh, and draw sheets, soiled instruments .e.g. urinal and bedpan. Wastes like linen, urinal and bedpan draw mackintosh, and draw sheets are soaked in 0.5% chlorine for 10 minutes before laundry. They are then rinsed with plain, clean water, then are washed in soapy water and then rinsed with plain water again.

7.1.5 Non-reusable wastes/Body wastes

These include soiled bandages, plasters, gloves, IV lines, Oxygen tubings, canulars, faecal matter, sputum, urine, and cotton swabs e.g.

These are dipped in 0.5% chlorine before un-gloving to reduce micro-organisms that may remain in the hands and get transmitted to the nurse as well as other people in contact with them and then are properly disposed.

The other wastes are disposed in the bins, which are lined with polythene paper bags. Whenever the bins are ¾ full, they are tied and labelled and are thrown in to the main/central bin. The bags are labelled to ensure that the ones moving them to the main bin as well as people surrounding are aware of what waste they are dealing with and protect themselves. From the main bin, the city assembly then collects the wastes.

Some of the wastes like sharps are sent to the incinerator to be burnt according to the hospital setting. Some may heat them in a big hole. These wastes are expected to be kept in minimal contents since they are very expensive to dispose.

Faecal matter and urine are disposed directly into the toilets.

7.1.6 Contaminated Floor

Faecal matter, sputum, pus, vomits and blood on the floor are sprinkled with 0.5% chlorine for 10 minutes and then mopped/wiped out with a mop.

Urine is not sprinkled/decontaminated with 0.5% chlorine because it contains uric acid and other chemicals, which react with chlorine causing irritating /offending smell.

Contaminated mattresses and examination coach are wiped wit 0.5% chlorine to decontaminate.

Activity7.1
Visit the hospital, observe and interview health workers on how they handle wastes to ensure their safety. Follow up the wastes up to the hospital and the city assembly dumping sites.

Unit Summary

Safe handling of wastes implies that health workers handle wastes without contaminating themselves and clients and there is no contamination of other clean and non used items.

Unit Assessment

Explain how you can safely dispose off hospital generated wastes from the ward up to the city assembly dumping site.

UNIT 8: METHODS OF DECONTAMINATION AND STERILIZATION

8.0 Introduction

Decontamination and **Sterilization** are two highly effective infection prevention measures that can minimize the risk of transmission of disease causing microorganisms to Healthcare Workers, especially Nurses and Midwives, Physicians Cleaning and Housekeeping staff. This is particularly so when they handle soiled medical instruments, surgical gloves or other items. These measures are also important steps in breaking the infection transmission cycle for patients. Both processes are easy to do and are inexpensive ways of ensuring that patients and staff are at a lower risk of becoming infected from contaminated instruments and other inanimate objects.

Background

Health care workers especially those responsible for performing surgical procedures, processing surgical instruments and equipments (Nurses. Physicians, and Midwives), are at risk of contacting Hepatitis B virus, Hepatitis C Virus and HIV. Therefore on the measures which the WHO put in place to protect these staff and clients, Decontamination and Sterilization appears to be among the procedures. More than 20 years ago it showed that decontamination markedly reduces the level of microbial contamination of surgical instruments. It is therefore recommended that instruments and other items be decontaminated and sterilized to minimize the risk of infection.

8.1 Decontamination

It is the process that makes inanimate objects (Non-Living) safer to be handled by staff, especially cleaning personnel before cleaning. Such objects include surgical instruments, gloves, large surfaces e.g. pelvic examination or operating tables.

Decontamination is the first step in handling used (soiled) surgical instruments, reusable gloves, and other items. This process is important for pre-treating instruments and objects that have been in contact with blood or body fluids.
This process makes items safer to be handled by Nurses, Physicians, and other personnel who clean them, thus immediately after using such objects they should be placed in 0.5% of chlorine for maximum time of 10 minutes. Surfaces which have in contact with blood or body fluids should also be decontaminated by 0.5%chlorine.

After decontamination surgical instruments should be immediately rinsed with plain water to prevent corrosion. Once the instruments and other items have been decontaminated they need to be further processed by cleaning and finally to undergo sterilization or high level disinfection.

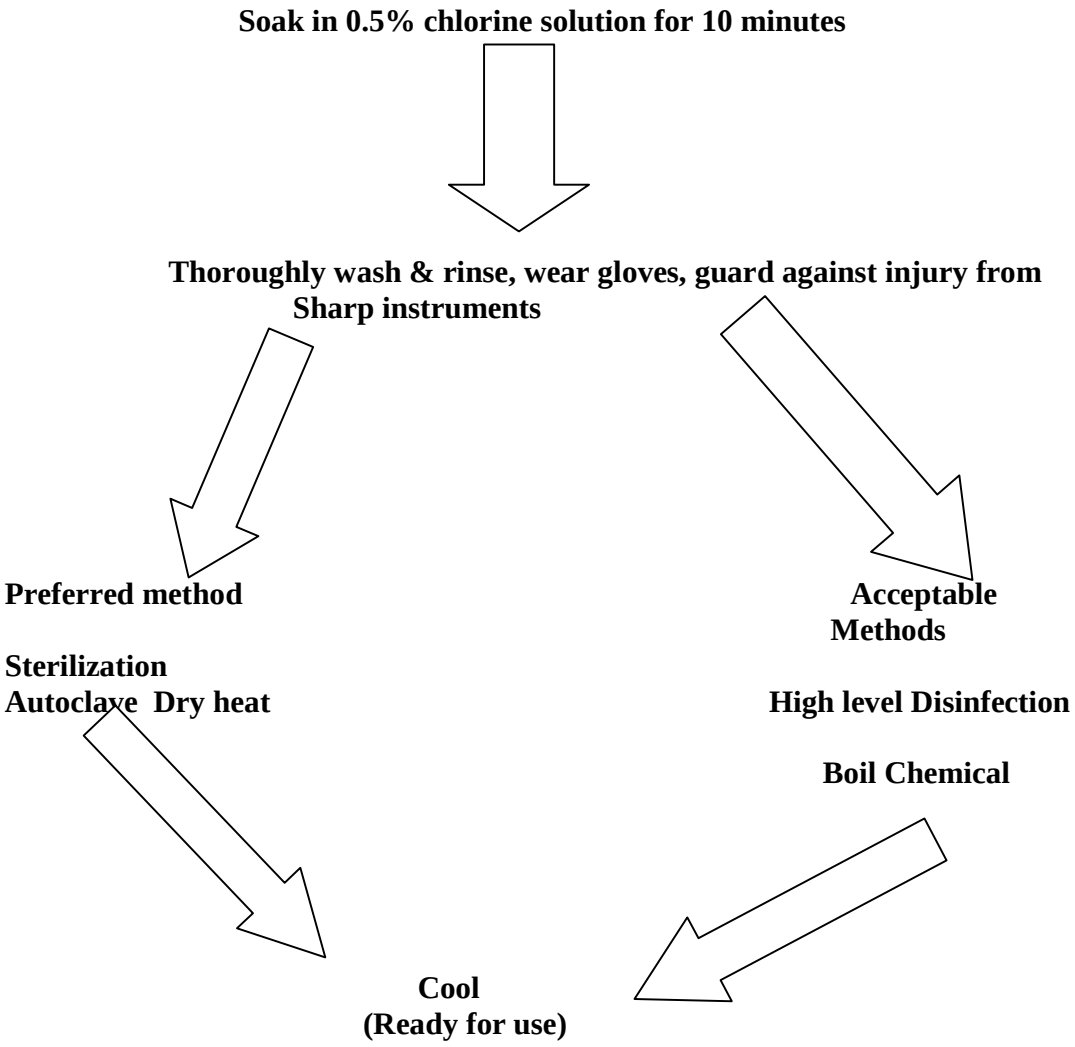
Decontamination tips

1. Use a plastic container to prevent:
    - Rusting of mental container due to chemical reactions (electrolysis)
    - Do not soak instruments that are electroplated when in plan water for more than an hour because rusting will occur?

2. After decontamination, instruments should be rinsed immediately with cold water to remove visible organic material before being thoroughly cleaned.

3. Once instruments and other items have been decontaminated they can further be processed.

8.2 Decontamination Process



8.3 Formulas and Reasons for Decontamination

1.To make reusable materials to be safe to be handled before cleaning.
To make materials that are to be disposed free from microorganisms that can cause infection.

Activity 8.1
Practice on how to prepare chlorine from the original strength to 0.5 percent.

FORMULA FOR MAKING 0.5% CHLORINE SOLUTIONS

1. From concentrated chlorine solution to dilute solution.

$$\text{Total parts of water} = \frac{\text{(\% concentrated solution)}}{\text{(\% dilute solution)}} - 1$$

E.g.: If the concentration of the chlorine is 5% and you would like to make a 0.5 dilute solution, we can find total parts of water to be added as follows.

$$\text{Total parts of water} = \frac{5\%}{0.5} - 1$$

Therefore the total part of water to be added is 9. This can also be in the form of ratio that is equal to 1:9.

2. From concentrated powdered chlorine to dilute solution.

$$\text{Grams/litre} = \frac{\text{(\% dilute)}}{\text{(\% concentration)}} \times 1000$$

E.g.: If the concentration of the powder is 35% and you would like to make a 0.5% dilute solution it will be: $\frac{0.5\%}{35\%} \times 1000$
This will be approximately 14 grams/ litre.

8.4 Sterilization

Sterilization is the process that destroys all microorganisms, including bacterial endosperms from inanimate objects.

Sterilization should be used for instruments such as, surgical gloves and other items that come in direct contact with the blood stream or normally sterile tissues It can be achieved by high-pressure steam **(autoclave),** dry heat **(oven),** chemical sterility or physical agents **(radiation).**Because sterilization is a **process, not a single event,** all components must be carried out correctly for sterilization to occur.

Effectiveness: To be effective, sterilization requires **time, contact, temperature** and, with steam sterilization and **high pressure.**

The effectiveness of any method of sterilization is also dependent upon four other factors:

These are:

1. **The type of microorganism present.** Some microorganisms are very difficult to kill while others die easily.

2. **The number of microorganisms present.** It is much easier to kill one organism than many.

3. The amount and type of organic material that protects the microorganisms **Blood** or tissue remaining on poorly clean instruments acts as a shield to microorganisms during the sterilization process.

4. **The number of cracks and crevices on an instrument that might harbor microorganisms.**
Microorganisms collect in, and are protected by, scratches, cracks and crevices such as the serrated jaws of tissues forceps.

8.5 Methods of Heat Sterilization

High-pressure, saturated steam using an **autoclave,** or **dry heat** using an **oven,**
Are the most common and readily available methods used for sterilization.

1. High-pressure steam sterilization (Autoclave) is an effective method of sterilization but is the most difficult to do correctly, It is generally the method of choice for sterilizing instruments and other items used in healthcare facilities. Autoclave temperature should be 121^{o} C and pressure 106 kea in 30 minutes for unwrapped items and wrapped items the pressure should be 202kPa for 15 minutes. Where electricity is a problem, instruments can be sterilized in a no electric steam sterilizer using kerosene or other fuel as a heat source.

2. Dry-heat sterilizers (ovens) are good in humid climates but need a continuous supply of electricity, making them impractical in many remote (rural) areas. Furthermore, dry-heat sterilization, which requires use of higher temperatures, can be used only with glass or metal objects. The temperature is 170^{o} C for one hour.

3. Radiation
Ultraviolet light rays are also in hospitals and industries for sterilization. They provide a safe and quick method for microorganism.

4. Chemical Methods
There are several chemicals that works either by interfering with the metabolism of microorganisms or by destroying the protoplasm of the organism.
There are basically two types of anti-invectives: Those

A. Applied for local action such as disinfectants and antiseptics i.e. applied to the skin, to the body excretion such as the feaces.

B. With systemic action such as antibiotics and specialized agents, such as para-ammosalicylic acid which is effective against tuberculosis bacillus.

Remember:
1. Exposure time begins only after the sterilizer has reached the target temperature.
2. Do not overload the sterilizer. (Leave at least 7.5 cm [3 inches] between
The items and walls of sterilizer.) Overloading alters heat convection.

Activity: 8.2
Visit the hospital, observe and interview health workers on how they decontaminate used equipment as aspect of infection prevention. Practice at least two methods of decontamination.

Unit Summary
Decontamination and **Sterilization are** measures that can minimize the risk of transmission of disease causing microorganisms to healthcare workers, especially nurses and midwives, physicians, cleaning and housekeeping staff. These measures are also important steps in breaking the infection transmission cycle for patients. Both processes are easy to do and are inexpensive ways of ensuring that patients and staff are at a lower risk of becoming infected from contaminated instruments and other inanimate objects.

Unit Assessment

Explain the difference between decontamination and sterilization.

UNIT 9: STAFF HYGIENE AND DRESS/UNIFORMS

9.0 Introduction

Health workers are encouraged to follow different methods of preventing infection as they provide heath services to the people because infection is a painful fact of life and the chief cause of death. Staff hygiene is a number of series of precautions that staff members undertake to care for themselves and improve their general appearance in order to prevent infection. It is unacceptable of industry concerned with the delivery of health care to ignore the health of its own members (Meers et al 1997). In order to ensure staff hygiene, number of hospitals operate comprehensive staff health programmes providing medical examination on entry, immunization and a 'walk in' service for medical problems for instance when injury arise at the workplace.

9.1 Dressing of health workers

Activity 9.1
Role play on dressing of nurses, hospital servants and patient attendants

9.1.1 What nurses should put on

- They should put on white uniform i.e. dresses, skirts, and a pair of trousers, blouse or a Safari shirt.
- Flat covered black, or white, or brown leather shoes.
- White or navy blue or black cardigan.
- Badges worn according to cadres.
- Green Scrubs for theatre and labour ward.
- Plaited hair should not dangle and be tied above the nape of the neck.

9.1.2 What nurses should not put on

- Must not put on wrist watch, Jewellery, except a plain band wedding ring and small slipper earrings.
- Must not wear strong perfume.
- Hair must be kept clean and fingernails short.
- Nail polish must not be worn.

9.1.3 Staff members working in ICU and operation departments (theatre and burns unit)

- Staff members can either be doctors, nurses and different specialist. They should put on appropriate clean uniform. Masks, gowns, plastic aprons and closed shoe and gumboots to protect the lower extremities. Plastic aprons provide more protection than fabric gowns, though gowns made of waterproof materials would be much better.

9.1.4 Kitchen staff

- Preparation of food in hospitals is especially difficult and dangerous. Staff should wear clean and well ironed uniform, a head gear or hat to cover a head, closed shoes to prevent contamination.
- General hygiene of staff is to keep a kitchen clean, proper storage of food in order to have a microbial free environment.

9.1.5 Laundry staff

- Dress in appropriate uniform
- When handling soiled items they should put on gloves, gumboots, masks and a plastic or waterproof apron as they are putting them in a washing machine or any kind of contact during the entire process of washing linen and any other item.

9.1.6 Domestic cleaners

- During there course of work, staff who clean healthcare establishment should put on heavy duty gloves, gumboots, plastic apron and mask and a recommended uniform.
- In order to ensure general hygiene, use of disinfectants and proper handling and disposal of dirty contribute to the good health off the staff members.

9.1.7 Responsibility of policy makers/employers in promoting staff hygiene.

- The health industry should prepare detailed policies and management of staff member who have been exposed to the risk of infection, particular the blood borne viruses. The services should include counseling and teaching those who have been infected and those at a risk of being infected respectively.

- Education is vital part of ensuring staff hygiene. On first employment staff members should be instructed to avoid infecting themselves and encourage them be insistence on a ‘safety first’ attitude to work as part of the process of ensuring good hygiene. Encourage them to report all accidents and proper handling of sharp instrument to avoid infections.

- Immunization policy has to be fallowed by every health care unit. This should be designed to protect staff from infection such as tuberculosis, hepatitis B etc. Requirements vary according to the category of staff since exposure differs with different work areas.

- Staff should wash hands thoroughly with soap and water:
  a) Before starting work
  b) After breaks
  c) After visiting the toilet
  d) After coughing into the hand or handkerchief
  e) Before and after wearing gloves. Keep it in mind that gloves may develop defects or tears after extended use that’s why it’s important to wash hands after removing gloves.

- When you have cuts or abrasions, wash well with running water, cover the cut with water proof dressing in order to prevent contamination in the course of carrying out a procedure.
- Always wear protective gear during tracheal suctioning, wound irrigation and surgical procedures and when washing contaminated equipment.
- Wear appropriate protective gear when handling linen which is soiled, hold soiled linen away from the body and place the linen in a plastic bag before putting it in a linen receptacle.
- Those in authority should ensure that there are always available resources for use by various staff members to prevent them from contracting infections. They should also ensure that proper methods of using the resources are followed and well maintained.

Unit Summary

Staff hygiene is a number of series of precautions that staff members undertake to care for themselves and improve their general appearance in order to prevent infection. In order to ensure staff hygiene, number of hospitals operate comprehensive staff health programmes providing medical examination on entry, immunization and a ‘walk in’ service for medical problems for instance when injury arise at the workplace.

Unit Assessment

Explain how the health workers can maintain staff hygiene

UNIT 10: CLIENT EDUCATION

10.0 Introduction

Client Education is a system of activities concerning health issues for example, infection prevention, intended to produce learning in the client by the nurse (Kozier, 2004).

It is effective client or patient teaching from all disciplines of health that enables prevention of diseases of either for those that are sick or well.

The overall purpose of client education is to ensure the patient and, when appropriate, his or her significant other(s) are provided with education to enhance knowledge, skills, and behavior change. Patient education needs are to be continually assessed, identified, and addressed.

This education includes instructions in the specific knowledge and skills needed by a client to meet their needs. In selecting resources of patient's education, the educator should bear in mind that education should be adapted to appropriate age, developmental needs, culture and language for the specific client. The education process should always be addressed as part of interdisciplinary process of care.

The provision of patient education is extremely important in the hospital and clinic setting. All educational activities should be delivered in a timely, efficient, caring and respectful manner. The educational process should also be documented carefully by all individuals providing the instruction.

Patient education is more than giving information. Education involves the process of assessment, setting goals, implementation and evaluation. Effective educators utilize a wide variety of skills (such as empathy, caring, good communication, and unconditional positive regard) in working with their patients and their family members.

Education should be provided in a manner that:

- Facilitates understanding of the patient's health status, health care options, health care options selected,
- Encourages participation in decision making about health care options,
- Increases patient/significant other(s) potential to follow the therapeutic health care options,
- Maximizes care skills,
- Increases the patient/significant other(s) ability to cope with the patient's health status/prognosis/outcome, and

Enhances the client's significant other(s) role and understanding of their responsibility in continuing care and promoting a healthy lifestyle

10.1 Factors that prevent clients from gaining information

1. Health professionals limited awareness about effective educational strategies for adult patients and their cost effective in improving patient's long term quality of life.
2. Patient's socialization into the biochemical approach to health problems {through accepting prevalent cultural and media representations of health ca re} and therefore taking for granted that goal of all healthcare interventions is "cure". They may not understand the chronic care, rehabilitation model which aims at prompting wellbeing through self management, self reliance and adaptation.
3. Patient's quest for asking questions of health professionals especially nurses and physicians perhaps, because they are busy and have other patients to attend to.
4. Having questions ignored or side stepped by health professionals. The health professionals may view questions as irrelevant.
5. Patient's difficulties in relating general risks estimated to their personal health e.g. some individuals believe that it is only other people who are susceptible to smoking relating diseases hence they may not see any personal need to give up smoking.
6. Patient unfamiliarity with technical terms and various roles and responsibilities of different health professionals may prevent them relating as an equal partner during consultation about illness management.
7. Patient's capacity to learn or recall information may be impaired by anxiety and illness symptoms such as pain.

10.2 Factors that may aid client understanding, comprehension and recall of message

1. Emphasizing and repeating the most important points
2. Keeping explanations relatively simple (without compromising the patient).
3. Ensuring that most important points are given at the beginning and end of sessions.
4. Giving specific rather than general information and instructions.
5. Avoiding jargons { confused speeches}
6. Checking the patients understanding of most points
7. Involve the clients when giving the education through their participation.

10.3 Levels of preventive health education

Preventive health education is the most effective way to promote function and falls into three levels or categories. These are:

1. ***Primary education:*** this means teaching the clients skills necessary to stay health or to avoid diseases. For example proper hand washing, wearing of gloves, proper use of toilets.
2. ***Secondary or preventive education:*** this means teaching clients the knowledge and skills for early detection or prevention of infections or dysfunction. For example pus in the eyes, a clean would starts developing pus etc.
3. ***Tertiary education:*** this is the category of preventive education which deals with already recognized disease process. For example teaching AIDS patient to avoid infectious areas such as where there are tuberculosis patients, meningitis patients etc.

Activity: 10.1
Visit the hospital and observe health workers on how they give health education to both clients and guardians.

Unit Summary

Client education is important in prevention of diseases of either for those that are sick or well. Patient education needs are to be continually assessed, identified, and addressed. Education includes instruction in the specific knowledge and skills needed by the patient and his or her significant other(s) to meet the patient's needs.

Unit Assessment

Explain factors that prevent clients from gaining information during health education

UNIT 11: ISOLATION AND BARRIER NURSING

11.0 Introduction

Isolation means to place a patient away from others to prevent the spread or contraction of infection. This is one of the most important aspect of infection prevention. Protective isolation is used to protect a high-risk person from exposure to pathogens. Precaution systems namely; category specific isolation, disease specific isolation, body substance isolation, have been developed to prevent transmission of pathogens from an infected person to others.

11.1 Category Specific Isolation

Isolation done according to:

11.1.1 Routes of disease transmission

a. **Strict isolation**
- Is designed to prevent transmission of every contagious or virulent infection that are spread by both air or contact e.g. rabies, small pox.
- All barriers are used every time the room is entered.

b. **Contact isolation**
- Is designed to prevent transmission by close or direct contact with a client who has a highly transmissible infection e.g. scabies, ringworm.

c. **Respiratory isolation**
- Is designed to prevent transmission by droplet transmission through air e.g. flu

d. **Tuberculosis isolation**
- Is designed to prevent small particle transmission of microorganisms suspended in the air from patients' with active cases of tuberculosis.

e. **Enteric precautions**
- Are designed to prevent transmission of infections by direct or indirect contact with feces e.g. cholera.

f. **Drainage –secretions precautions**
  - Are designed to prevent transmission of infections by direct or indirect contact with purulent secretions or body cavity drainage

g. **Blood body fluid precautions**
- Are designed to prevent transmission by infected blood or body fluids. These include saliva, semen, peritoneal fluid and tears.

11.1.2. Disease Specific Isolation

- Depends on accurate identification of the effective organisms
- These precautions are aimed at interrupting the mode of transmission by identifying which secretions, excretions, body fluids or tissues are or might be infective.

- Each specific disease is identified as to whether a gown, gloves, masks, or private room is required.
- The health care provider is required to make decisions based on the patient's age, mental status and overall status concerning minimum precautions necessary to prevent transmission of the organism.

11.1.3 Body Substance Isolation

- Was developed to control cross infection of the patients in intensive care units, but this method also proved promising to limit the spread of the AIDS virus.
- The cardinal rule is never to touch with bare hands anything wet that comes from a body surface or body cavity.
- Body substances include: saliva, blood, urine, feces, wound and other drainage.
- This is used in all patients.

11.1.4. Protective Isolation

- Used to prevent infection for people whose body defenses are known to be compromised.
- Patients who are neutropenic as a result of chemotherapy, radiation therapy or immunosuppressive medications are prime candidate and patients with extensive burns or dermatitis are at high risk.
- Placed in private rooms.
- All people coming in contact with the individual must wear gowns, gloves and masks, hand washing practice, food treated at highest level of disinfection. All this is to ensure that the environment of patients stays as free from pathogens as possible.

Activity 11.1
Practice barrier nursing

11.2 Barrier Nursing

11.2.1 Introduction

Barrier nursing is the technique used to prevent the transfer of pathogens from one person to another, are form of isolating the host from microorganisms its aim is to contain pathogens by establishing aseptic barriers around the patient and health personnel.

11.2.2 The most commonly used barriers are:

1. Masks: prevent transmission of infectious agents through the air.
2. Gowns: avoid soiling of clothes
3. Gloves
4. Private rooms: decreases the chance of transmission
5. Goggles
6. Water proof disposal bags for linen and trash
7. Labeling and bagging of contaminated equipment and
8. Specimen and control of airflow into sterile areas and out of contaminated areas.

Gloves, masks, gowns and goggles are not effective when worn wet and for long periods. They have to be changed after touching each and every patient.

Unit Summary

Isolation is one of the most important aspect of infection prevention. Protective isolation is used to protect a high-risk person from exposure to pathogens.

Unit Assessment

Explain how you would isolate clients.

UNIT 12: PROTOCOL FOR ACCIDENTAL NEEDLE PRICK-POST EXPOSURE PROPHYLAXIS (PEP)

12.0 Introduction

Health care workers, in order to achieve goals have to take some safety measures for own safety, continuity and sustainability of services. With the current trend of health problems and hazards attached; some points worth noting are:

a) HIV infection and health care workers.
b) HIV transmission to health care workers.

HIV Transmission is becoming an increasingly a great health hazards for health care workers in the clinical setting, especially Nurses. Transmission among others may be through:-

- Injury through sharp instruments – penetrating the skin
- Open wounds, sores, mucous membranes.

Most injuries from sharp instruments are inefficient.
There is a 1:300 chance, but take care!

- Other infections – Syphilis, Malaria and Hepatitis B.

Activity 12.1
Visit the hospital and observe how nurses are at risk of HIV infection.

12.1 Risk of infection with HIV

The risk of infection becomes greater if one is pricked under the following conditions:-

- Deep injury – penetrating skin
- Visible blood on needle
- Source was in patient's artery/vein
- Source has advanced HIV and AIDS
- Mucus membranes – High volume of blood

-+ Viral Load in the blood:-

1. ^Immunisuppression
2. AIDS phase
3. Very HIV Infection

Therefore, consider the above for Post Exposure Prophylaxis (PEP).

12.2 Steps for PEP

- Bleed the wound by squeezing.
- Clean the wound immediately with 0.5% Chlorine solution
- Do an immediate baseline HIV test to determine status.
- Test the client who is the source of the blood, if he / she can be identified.
- Obtain a tetanus vaccine for future protection.
- Obtain a hepatitis B vaccine for future if current status is negative.
- Some facilities may have access to newer HIV drug (ARV) regimes - - start on them within 72 hours of exposure.
- Use condoms for six months until second HIV test results are negative.
- Prevention of needle stick injuries is essential to the health of your clients, your staff, your families and your community.

Note: PEP varies from hospital to hospital you need to find out from your health facility what the policy is for PEP

Unit Summary

HIV transmission through sharp instruments injury, is becoming an increasingly a great health hazard for health care workers in the clinical setting, especially Nurses. However, **Post** Exposure Prophylaxis (PEP) has proved to reduce HIV transmission by preventing replication of the HIV.

Unit Assessment

Discuss PE P protocol.

Learning/Teaching Approaches

Lectures, group discussions, field trips, presentations, role play, clinical simulations, enquiry based learning, directed and self-directed study.

Learning Resources

- Infection Prevention Books
- Clinical skills laboratory
- DVD player
- TV Screen
- Video tapes,
- Faculty members
- Senior Students
- Hospital staff
- Practical work
- Internet
- IP models

Required Reading

Kennamer, M. (2002). *Basic infection control for health care providers*. New York: Delmar.

Ayliffe, G.A.J (2000). *Control of hospital infection: a practical handbook*. London: Arnold.

Robinson, J (2005). *Essentials of health and wellness*. New York: Thomson Delmar Learning.

Supplementary Reading

Ayliffe, G.A.J (1999). *Hospital – acquired infection: principles and preventio*n.

Gray, J.A.M (2001). *Evidence – based healthcare. Edinburgh*: Churchill Livingstone.

Booyens, S.W (2001). *Introduction to health services management*. Kenwyn: Juta Co. Ltd.
