

INFECTION CONTROL

It's important to provide a biologically safe environment during patient care. Also break the chain of infection by applying infection control practices to interrupt the transmission of micro-organisms.

Terminologies frequently used:

- Infection – is an invasion of the body by micro-organisms and their growth there.
- Disease – is a detectable alteration in normal tissue function.
- Pathogens- are micro-organisms that cause disease.
- Asepsis – is the freedom from disease or germs.
- Aseptic technique – is a method used to decrease the possibility of transferring micro-organisms.
- Susceptible – not possessing immunity to a particular pathogen.
- Nosocomial Infections – these are hospital acquired or associated infections.

Types of micro- organisms causing infection

These include: Bacteria (gram positive, negative, aerobic and anaerobic), viruses for example, the hepatitis virus, fungi (yeast and moulds) and parasites, for example, protozoa. The microbes cause various types of infections.

Signs of an infection

A localized infection can result in redness, swelling, warmth in the involved area, pain or tenderness, and loss of function of the affected part. Manifestations of a systemic infection include fever, often accompanied by an increase in pulse and respiratory rate, lethargy, anorexia, and tenderness and enlargement of lymph nodes that drain the area when an infection is present. Laboratory data can provide further insight into the presence of an infection process.

Chain of infection

This describes the requirement for the infectious process or the spread of disease. It is made up of six links. These are:

- i. Causative organism – disease carrying agent e.g. bacteria, virus or fungi.
- ii. Reservoir - The reservoir for growth and multiplication of microorganisms is the natural habitat of the organism. Possible reservoirs that support organisms pathogenic to humans include: people, animals, soil, food, water, milk, and inanimate objects.
- iii. Portal of exit - from reservoir or source, mode by which the causative organism leave the reservoir e.g. through blood, gastrointestinal tract or genitourinary tract.

- iv. Mode of transmission – connects the infectious source with its new host. It can be direct or indirect. Direct is through contact between susceptible host and an infected person or carrier through touch, kiss or sex. Indirect – may involve personal contact with an inanimate object e.g. touching contaminated instrument, blood, food or water or through a vector borne transmission – a vector is an animal or insect that serves as a means of transmitting infectious agents.
- v. Portal of entry – the point which the organism enters a new host.
- vi. Susceptibility of the host – the degree of resistance the potential host has to the pathogens.

Factors Affecting the Risk for Infection

The susceptibility of the host depends on various factors:

- Integrity of skin and mucous membranes – the skin protect the body against microbial invasion.
- The pH levels of the gastrointestinal and genitourinary tracts, as well as the skin, which help to prevent microbial invasion.
- Integrity and number of the body's white blood cells as well, provide resistance to certain pathogens hence a key factor affecting the risk of infection.
- Age, sex, race, and hereditary also influence susceptibility, for instance, neonates have immature immune system and geriatrics (have impaired physiologic functions for defense) appear to be more vulnerable to infection.
- Immunizations (natural or acquired) as well, are administered to resist infection.
- The level of fatigue.
- Nutritional and general health status.
- The presence of preexisting illnesses, previous or current treatments, and certain medications also play a role in the susceptibility of a potential host.
- Similarly, stress levels, if increased, may adversely affect the body's normal defense mechanisms rendering the individual susceptible to infections.
- Moreover, use of invasive or indwelling medical devices, provide exposure to and entry for more potential sources of disease-producing organisms, particularly in a patient whose immunity is compromised by disease.

Nosocomial infections

Nosocomial infection is an infection that is acquired in a hospital or other health care facility. It develops during a client's stay in the hospital or may manifest after discharge. Micro- organisms causing these infections may be endogenous (e.g. due to use antibiotics) or exogenous (from hospital staff and environment) or Iatrogenic as a result of diagnostic or therapeutic procedures e.g. from intravenous lines. Infection is spread to the susceptible patient in the clinical setting by

various means. Health care staff can spread infection, in addition to contaminated equipment, bed linens, or air droplets. The infection can originate from the outside environment, another infected patient, staff that may be infected, or in some cases, the source of the infection cannot be determined. In some cases the microorganism originates from the patient's own skin microbiota, becoming opportunistic after surgery or other procedures that compromise the protective skin barrier. Though the patient may have contracted the infection from their own skin, the infection is still considered nosocomial since it develops in the health care setting.

Infection prevention

The goal of infection prevention is to minimize post procedure infections in patients and prevent transmission of life threatening infections to patients, service providers, auxiliary staff and members of the community.

Standard Precautions

Standard precautions are a set of clinical practice recommendations designed to help minimize the risk of exposure to infectious materials, such as blood and other body fluids by both patients and staff. They help break the disease transmission cycle at the mode of transmission step.

A standard procedure is a procedure that should be followed routinely at all times. It should apply to every patient regardless of their presumed infection status. This is because you will not be able to tell who is infected with viruses such as HIV or hepatitis. Even the infected persons themselves may not know that they are infected. You should therefore follow the standard precautions when dealing with every patient.

The goal of the health practitioner is to prevent the spread of infection and to treat the existing infection. The transfer of pathogens from person to person can be decreased by limiting the dissemination of pathogens. The most practical way to accomplish this is through the use of barriers that prevent common vehicles from transmitting the pathogens. These include:

i. Hand hygiene

It is considered one of the most effective infection control measures in any setting. To prevent the spread of micro-organisms the nurse and clients should wash hands at the following times: Before and after direct contact with patients, before and after using gloves, before inserting urinary catheters, peripheral vascular catheters, or invasive devices that do not require surgical placement, If moving from a contaminated body site to a clean body site during patient care, After contact with objects (including equipment) located in the patient's environment.

If the hands are not visibly soiled or in areas where sinks are not available one may use alcohol-based hand rubs (sanitizers). When used repeatedly, alcohol-based hand rubs cause less dryness

and skin irritation than soap products do. Those who have sensitive skin may benefit from use of an alcohol-based product that contains lotion.

Hand washing technique

Apply a palm full of product into a cupped hand (enough to cover all surfaces of both hands). Rub palms against palms. Interlace fingers palm to palm. Rub palms to back of hands. Rub all surfaces of each finger with opposite hand. Remember to rub over each thumb and finish off by rubbing both wrists. Continue for 20- 30 seconds or until the product is dry. Rinse thoroughly and dry using a drier or paper towel.

Supporting defenses of a susceptible host

People are constantly in contact with micro- organisms in the environment. The following measures can reduce a person's susceptibility to microbial infections:

- a) **Hygiene** - Body hygiene including bathing and good oral care removes micro- organisms which can cause infection.
- b) **Nutrition** - A balanced diet keeps the body healthy, the skin intact and enhances its ability to expel micro- organisms.
- c) **Fluid** - adequate intake permits adequate output which flushes the bladder and the urethra removing micro- organisms that could cause an infection.

ii. Sterilization and disinfection

Several processes are used to destroy microorganisms. **Disinfection** destroys all pathogenic organisms except spores. It can be used when preparing the skin for a procedure or cleaning a piece of equipment that does not enter a sterile body part. Sterilization destroys all microorganisms, including spores. It is usually performed on equipment that is entering a sterile portion of the body e.g. in surgical procedures. Disinfection and sterilization of contaminated or infected objects and good hand hygiene diminish and often eliminate microorganisms as potential sources of infection.

iii. Using personal protective Equipment and supplies

Healthcare agencies are required to provide employees with the equipment and supplies necessary to minimize or prevent exposure to infectious material. The personal protective equipment (PPE) includes gloves, gowns, masks, and protective eye gear. Let us discuss briefly on each of the PPE.

Gloves

Gloves are worn to protect the nurse or health worker from getting infections from a patient, to reduce the likelihood of the nurse transmitting infection to patients or the transferring infection from one patient to another. Gloves are worn only once and discarded appropriately according to

agency policy. Then hands are thoroughly decontaminated with meticulous hand hygiene. Each patient interaction requires a clean pair of gloves, and some care activities for an individual patient may necessitate changing gloves more than once. Gloves should always be changed prior to moving from a contaminated task to a clean one.

Gowns

Gowns are usually worn to prevent soiling of the healthcare worker's clothing by the patient's blood and body fluids. They provide barrier protection and are donned immediately before entering the patient's room. A waterproof or impervious gown is used if there is an increased likelihood of contact with the patient's blood or body fluids.

Masks

The CDC recommends that masks be worn: When close to the patient if the infection is transmitted by inhaling large-particle aerosols, which usually travel short distances (about 3 feet) for example, measles.

When you are close to the patient and the infection is transmitted by small-particle droplet nuclei, it can remain suspended in the air and travel longer distances for example, the TB bacteria. Masks also discourage the wearer from touching the eyes, nose, and mouth, thus limiting contact of organisms with mucous membranes. A mask is worn only once and never lowered around the neck and then brought back over the mouth and nose for reuse.

Protective eyewear

Protective eyewear, such as goggles or a face shield, must be available whenever there is a risk of contaminating the mucous membranes of the eyes. For example, suctioning a tracheostomy or assisting with an invasive procedure that may result in splattering of blood or other body fluids requires eyewear.

iv. Disposal of spoiled equipment and supplies

Appropriate handling of soiled equipment and supplies is essential in order to prevent exposure of health workers to contaminated body substances as well as prevention of environmental contamination.

Bagging – These refers to placing articles contaminated or likely to have been contaminated with body exudates into a bag impervious to micro-organisms before they are removed from the client's room. Place garbage and soiled disposal equipment in the plastic bag that lines the container and tie the bag. Disassemble special procedure trays into component parts and send the components for laundry or decontamination appropriately.

Linen - Handle soiled linen as little as possible before placing it in the laundry bag.

Laboratory specimen - should be placed in leak proof containers with a biohazard label.

v. Isolation practices

In addition to barriers, specific precautions have been established to prevent the transmission of infection. Historically, the term isolation, a protective procedure that limits the spread of infectious diseases among hospitalized patients, hospital personnel, and visitors, has been used. In 2007, the CDC updated its specific guidelines for transmission-based precautions. The revised guideline continues the designation of two tiers of precautions:

- a) Standard precautions:** precautions used in the care of all hospitalized individuals regardless of their diagnosis or possible infection status. These precautions apply to blood, all body fluids, secretions, and excretions except sweat, non- intact skin, and mucous membranes. New additions here are Respiratory Hygiene/Cough Etiquette, safe injection practices, and directions to use a mask when performing high-risk prolonged procedures involving spinal canal punctures.

Transmission-based precautions: Precautions used in addition to standard precautions for patients in hospitals with suspected infection with pathogens that can be transmitted by airborne, droplet, or contact routes. New to the 2007 guidelines, is a directive to don personal protective equipment (PPE) when entering the room of a patient on contact or droplet precautions.

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