

Methods of Microbial Control

Sterilization

Sterilization is a process that destroys or removes all viable microorganisms, including viruses. Any material that has been subjected to this process is said to be *sterile*. Control methods that sterilize are generally reserved for non-living objects. Most sterilization is performed with a *physical agent* such as heat, a few chemicals can be classified as sterilizing agents because of their ability to destroy spores. *Remember that the destruction of spores is not always a necessity, because most of the infectious diseases of humans and animals are caused by non-spore-forming microbes.* sterilization achieved by many methods :

1. Autoclaving(moist heat)

Autoclave is a apparatus for sterilizing items by using Steam under pressure 121°C, pressure of 15 psi(pounds per square inch) for 10 to 40 minutes, depending on the nature of items, kills spores. it used for Sterilization of heat-resistant materials made of glass, cloth, rubber, metal; media; a few plastics; canned food ,pipettes, petri plates and decontamination of cultures.

2. Dry-heat sterilization

Dry-heat sterilization is achieved by **hot-air oven**. Dry oven is usually electric ,heated circulated air transfers its heat to the materials in the oven. Materials that can resist hot temperatures and dehydration such as ;glassware, metals, powders, oils (no paper or cotton put in oven will char). Depending on the type of oven and the material being decontaminated , a cycle takes 12 minutes to 4 hours to complete and involve temperatures of 150°C to 180°C.

3. Bacteriological filter

Filtration is used for sterilization liquids that cannot **withstand heat**, including serum and other blood products, vaccines, drugs, enzymes, and *media*. The fluid is sterilized by passing through a filter with openings large enough for the fluid to pass through but too small for microorganisms to pass through .Microbiological filters are thin membranes of cellulose acetate, polycarbonate, and a variety of plastic materials (Teflon, nylon) whose pore size can be carefully controlled and standardized. Most filters are perforated by very uniform pores. The pore diameters differ from coarse (8 µm) to ultrafine (0.02 µm). It has the disadvantage of not removing soluble molecules (toxins) that can cause disease.



4. **Ultraviolet (UV) radiation**

Ultraviolet (UV) radiation lethal at (260 nm.) because UV radiation passes immediately through air, a little through liquids, and only **poorly** through solids materials such as (glass, metal, cloth, plastic, and even paper).UV lamps are sometimes placed on the ceiling of rooms or in biological safety cabinets (hood) to sterilize the air and any exposed surfaces.

5. **Ethylene oxide gas**

Ethylene oxide is a colorless substance that exists as a gas at room temperature .it is one of a very few gases generally used for chemical sterilization because, when using need to strict procedures, it is a sporicidal and microbicidal .Ethylene oxide is rapidly penetrating packing materials but requiring from 90 minutes to 3 hours. It is used for heat-sensitive items such as disposable petri dish and syringes, sutures and catheters. Its explosiveness makes it dangerous to handle and carcinogen.



Disinfection

Disinfection refers to the use of a physical process or a chemical agent (a disinfectant) to destroy vegetative pathogens but not bacterial spores .It is important to note that disinfectants are normally used only on non-living objects because they can be toxic to living tissue. Examples of disinfection include applying a solution of 5% bleach to an examining table, boiling food tools used by a sick person, and immersing thermometers in an iodine solution between uses.

Chemical disinfectant: such as; Phenol and its derivatives (*Lysol, cresol ,degol and dettol*) and Chlorine ,Formalin , Ethylene oxide.



Antisepsis

chemical agents called **antiseptics** are applied directly to skin and mucous membranes), wounds, and surgical incisions to destroy or inhibit vegetative pathogens Examples of antisepsis include preparing the skin before surgical incisions with iodine compounds, swabbing a wound with hydrogen peroxide, and ordinary hand washing with a germicidal soap.

Antiseptic such as; *Tincture iodine ,Hexachlorophene ,Cresol ,Benzoic acid , Boric acid,*