ASEPSIS

- General principals of asepsis were accepted after **Joseph Lister (Father of antiseptic surgery**) studied prevention of wound infection(1865-1891).

DEFINITIONS

- **CLEANING** - It is a process which removes **visible contamination** but does not necessarily destroy micro organisms. It is necessary prerequisite for effective disinfection or sterilization.

- **ASEPSIS** -Term used to describe methods which prevent contamination of wounds and other sites, by ensuring that only sterile object and fluids come into contact with them.

- **DISINFECTION** - it is a process which reduces the number of viable microorganisms to an acceptable level but may not inactive some viruses and bacterial spores.

- **STERLIZATION** - it is the process of destruction or removal of all microorganisms from article, surface or medium, including spores.

To achieve sterilization of any instrument three definite stages are to be completed-

- Pre sterilization cleaning
- Sterilization process
- Aseptic storage

PRESTERILIZATION CLEANING

Removal of the organic matters, blood and saliva which provide protective barrier for microorganisms and prevents its destruction.

There are three methods for cleaning

-Manual

-Ultrasonic

-Mechanical washing

MANUAL CLEANING

- Simplest and the cheapest method, but time consuming and difficult to achieve.
- Heavy duty gloves and glasses must be worn to protect needle stick injury and to protect eye.
- Material used for manual cleaning

  -Soaps

  -Detergents

ULTRASONIC CLEANING

Principle- conversion of electrical energy into vibratory sound waves which pass through a soap solution containing the instrument.

Used mainly for burs, bone files, bone cutter, artery forceps, saw etc.

MECHANICAL WASHING

Principle- High-pressure jets of water with or without a detergent which removes debris from instrument.

Small instrument like burs, blade are not suitable for this type of cleaning.

Classification of the method of sterilization

A. PHYSICAL

1. Heat
   a) Dry
   b) Moist
2. Irradiation

B. CHEMICAL

a) Gas
b) Liquid antiseptics

A. DRY HEAT

Killing is due to :

- Dehydration and oxidation of organisms

- Protein denaturation

- Toxic effects of elevated levels of electrolytes

Hot air oven :

It is used to sterilize items, which do not get damaged by high temp. such as laboratory glass, instruments with sharp cutting edges, scissors, clamps

Temp. & Time: The sterilization is complete if these two factors are achieved throughout the load.

Temperature	Time(Min)
180ºC	60

B. Moist heat

Causes denaturation and coagulation of proteins.

AUTOCLAVE :

Steam is the effective means of sterilization, because of its

1. High penetrating capacity.

2. It gives of large amount of heat to surface with which it comes in contact.

3. To achieve sterility, a holding time of at least 30 minutes at 120 ° C or 20 minutes at 132 °C at 1,1 above atmospheric pressure is required.

Sterilization control of the moist heat

Physical Indicator- an alloy designed to melt only after being subjected to relevant holding time.

Chemical indicator- Strips or tapes that change color once the correct conditions have been met.

Bacteriological test – detection of bacterial clumps on the instrument after its streilization

IRRADIATION

Radiation used of two types

1. Ionizing radiation, e.g., X-rays, gamma rays, and high speed electrons .
2. Non-ionizing radiation, e.g. ultraviolet light, and infrared light.

These forms of radiation can be used to kill or inactivate microorganisms.

1. Ionizing Radiation

X-rays, gamma rays are highly lethal to DNA and other vital constituents.

They have high penetration power.

There is no appreciable increase in temperature, thus referred to as **cold sterilization**.

Commercial plants use gamma radiation for sterilizing plastics, syringes, swabs, catheters etc.

2. Non-ionizing radiation

Two types of non-ionizing radiations are used for sterilization:-

A. Ultraviolet -

Short range UV(UVC) is considered **"germicidal UV".**

UV will destroy micro-organismal DNA.

Used mainly for air purification and water purification in hospitals.

B. Infrared –

It is most commonly used to purify air, such as in the operating room. Infrared is effective, however, it has no penetrating ability.

ETHYLENE OXIDE STERILIZATION (ETO)

- Used almost exclusively to sterilize medical products that cannot be steam sterilized or sensitive to radiation.
- *Mechanism of action:* It destroys micro-organisms by alkylation and cause denaturation of nucleic acids of micro-organisms.
- Plastics, rubber & photographic equipments can be sterilized by this method.
- Also used for mass sterilization of disposable items, plastic syringes,needles,catheters,blades etc..

B. CHEMICAL

1. Phenol Derivatives: Phenol, Cresol, Resorcinol, Chloroxylenol
2. Oxidizing agents :Pot.Permanganate, Hydrogen Peroxide, Benzoyol Peroxide
3. Halogens : Iodine, Chlorine
4. Biguanide : Chlorhexidine
5. Alcohols : Ethanol, Isopropanol.
6. Aldehydes : Formaldehyde
7. Acids : Boric acid, acetic acid
8. Metallic salts ; Silver Nitrate, Zince Sulfate,

Mechanism of action of chemical disinfectants :

Mechanism of action is nonspecific and complex:

1. Cell membrane injury.
2. Coagulation and Denaturation.