

## ***Sterilization and Operation Room Set-up*** ***Dr. Mohammad Saquib Mallick***

### **Sterilization:**

- The process by which all microorganisms including spores are killed.

### **Disinfection:**

- The process of destroying all pathogenic organisms, except spore-bearing ones.
- Not used for surgical instruments.

### **Antiseptics:**

- Reduce the quantities of microbial life on living tissues, particularly on the skin of a patient.
- Are used before surgery or needle insertions, and health care practitioners use them prior to palpating or operating on a patient.
- Example: when starting an IV, we rub alcohol on the surface to decrease the number of microorganisms, thus decreasing the chance of getting infections, but the risk is still there.
- Usually two layers:
  1. Iodine.
  2. Alcohol.

### **Disinfectants:**

- Refer to chemicals or procedures that clean and reduce the number of pathogens on equipment or other clinic surfaces.
- Do not necessarily kill all viruses, bacteria, and spores (this can only be achieved by sterilization).

## **Different Methods of Sterilization**

### **Steam autoclaves:**

- The most popular method of sterilizing equipment.
- Use heat and pressurized steam to achieve sterilization.
- Most important and least expensive.
- At 250 degrees Fahrenheit, it takes 15 minutes to sterilize equipment which is placed under 30 pounds per square inch (PSI) of pressure, or 30 minutes to sterilize equipment under 15 PSI.
- Cannot be used to sterilize:
  - Instruments that melt (plastic).
  - Instruments that rust (iron metal).
  - Large quantities of instruments (mass scale).



### **Dry heat autoclaves:**

- Also used, but not as popular as steam autoclaves.
- They lack the moisture and pressure of a steam autoclave, so they take much longer to sterilize equipment.
- They are used to sterilize equipment that may rust or otherwise be compromised by exposure to steam or chemicals.

### **Chemical sterilization**

- Uses gas or cold chemicals.
- Ethylene oxide gas is used to sterilize fine instruments and others which cannot survive the high temperatures of an autoclave, e.g. plastics and electronics
- It is effective, but because it is highly flammable, it is impractical in many environments and also takes longer time than heat processes for sterilization.
- Liquid agents, like formaldehyde and aqueous glutaraldehyde, are also used, but they smell bad and can irritate the skin. Hospitals use these to soak instruments that can't be sterilized by other methods. They are very quick in sterilizing instruments (five minutes or less).
- Only used in acute cases and for materials that can't withstand heat (e.g. lensed and air-powered instruments, glassware and paper or rubber products).

### **Gamma radiation**

- 100% sterilization.
- Used in mass scale (many syringes).

### **Preparation of Items before Sterilization**

- Decontamination by disinfectants (commonly water and soap).
- Disassembly.
- Washing.
- Drying.
- Packing.
- Loading in sterilizer.

#### NOTE:

- *Each item has to be sterilized according to the manufacturer's guidelines and specifications.*

### **Routine Tests for Sterilizer Performance**

- Bowie Dick test pack; a piece of paper that changes color when reaching the temperature desired.
- Mechanical; chart and gauges.
- Chemical; tape, strip and card.
- Biological; indicators which contain organisms.

## Precautions

- Autoclave:
  - Not all items can be sterilized by autoclaving.
  
- Ethylene oxide:
  - Highly inflammable and very toxic.
  - Over exposure may be carcinogenic.
  - Due to the depletion of the ozone layer, it has been recommended to be withdrawn.
  
- Glutaraldehyde, CIDEX:
  - Toxic corrosive material causing eye, nose, lung and skin irritation, headache, dizziness and slowed reactions.
  - Date when mixed.
  - Store in appropriate storage container in a well ventilated room.
  - Staff to wear protection while handling CIDEX.

## Scrubbing up

- Scrubbing from tip of finger to elbow with a disinfectant.
- Minimum recommended time is five minutes for washing the hands to elbow using bacteriostatic solution, usually hibiscrubs or Betadine.
- After scrubbing, the hands are clean but *not* sterile.
- The outer surface of sterile gloves and gown should not be touched with bare hands.
- The scrub up team must always keep hands above waist level. Below the waist level is not considered sterile.

## Patients Needs in the O.R.

- Dignity should be maintained at all times.
- Operation performed must be confidential.
- Patients' psychological status must always be taken in consideration. Noise level must be kept to a minimum.
- Care of anesthetized patients.
- Patients' safety; when using different equipment in the O.R.

### NOTE:

- *Counsel the patient before operation. If he/she can not, ask parents.*

## Preparation of the O.R.

- Thorough cleaning of operating rooms between cases using damp cloths (damp dusting).
- All items used for surgery must be sterile and when preparing the instruments for surgery, precaution must be taken to ensure sterility at all times.
- The area at the operating table is considered to be sterile. Once the patient is draped, only scrubbed personnel are authorized to go near the sterile field.
- Precaution must be taken not to touch and contaminate sterile fields and instrument trolleys by non scrubbed personnel.

- Movement and conversation must be kept to the minimum.
- All items used in surgery (e.g. instruments, gauze, blades and needles) must be accounted for.
  - There should be a minimum of three checks done by the scrub nurse:
    1. Before starting the operation.
    2. Before the start of closure.
    3. At the end of skin closure.
  - No items leave the O.R. without authorization by the scrub nurse or surgeons performing the surgery.

### **Universal Precautions**

- All patients are considered to be potentially infected, and all personnel must protect themselves by using gloves, masks and eye protectors.

#### NOTE:

- *For double protection, surgeons must wear two gloves when dealing with HIV and/or hepatitis infected patients.*
- *When the spread of an organism is suspected in an operating theater, it should be closed.*

### **O.R. Clothing**

- No one is authorized to enter the O.R. unless in scrub suits, covers over head (caps) and shoes (strictly for the O.R. only).

### **Operation Room Set-up**

- The operation theater department is used by four different departments:
  1. Department of surgery.
  2. Department of OB-GYN.
  3. Department of orthopedics.
  4. Department of anesthesia.
- The chairman of the department of surgery is responsible for administrative decisions, policy and procedures of the theater users.
- The O.R. must have strict rules and regulations to ensure high standards and patient's safety.

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*For extra reading*  
**Lawrence's Essential of general surgery**  
**Chapter 26 519 – 524**

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