Sterilization and Chemical Disinfectants

REDUCING MICROBIAL LOAD

- Sterilization.
- High Level Disinfection
- Disinfection
- Cleaning

CLEANING

- The Removal of Soil and Organic Material from items and Objects

DISINFECTION

The Removal or Destruction of Harmful Micro-organisms but not bacterial spores

STERILIZATION

The Complete destruction or Removal of all Living micro-organisms including bacterial spores

Classification of Infection From Equipment and Environment and suggested level of Decontamination

- **Low Risk**
  - Items in contact with:
    - A) Normal and Intact Skin.
    - B) Inanimate objects which do not come in contact with the patient. (i.e. walls, floors, ceilings and furniture)

- **Low Risk**

  ⇒ Cleaning and drying is usually adequate

- **Intermediate Risk**

  Equipment which

  A) Does not penetrate the Skin.
  B) Does not enter sterile areas of the body.
BUT comes in contact

A) With mucous membranes
B) Non intact skin
C) Other items contaminated with virulent or transmissible organisms (e.g. respiratory equipment, thermometers, endoscopes)

- **Intermediate Risk**

⇒ Cleaning followed by Disinfection is usually adequate

- **High Risk**

Items Penetrating

A) Sterile Tissues.
B) Body Cavities.
C) Vascular System
   (i.e. venflons, central lines, catheters, drainage tubes)

- **High Risk**

⇒ Disinfection followed by Sterilization is required. High level Disinfection may sometimes be appropriate if sterilization is not possible

**Sources of infection in ICU**

- Endogenous flora
- Nosocomial flora
- Cross infection from other patients
- Technical equipment
  - ventilators
  - humidifiers, etc
- Tap water and other environmental sources
The vicious circle

High consumption Disinfectants

Destruction of normal flora

Super infections with still more resistant and virulent organisms

Selection for resistance & virulence

Why can spread of resistant organisms in hospitals not be controlled by traditional infection control measures?

- Infectious inoculums extremely small in predisposed patients
- Effectiveness of hand Disinfection and isolation procedures is often hampered by compliance problems
Important infection control measures

The critically ill patient

- Septicaemia of unknown origin is no proper basis for empirical antibiotic therapy
- Impossible to cover the patient against all possible pathogens
- Solution: Establish a working hypothesis as basis for empirical therapy

Creating a working hypothesis as basis for empirical therapy

1. Identify primary focus
2. Probable organism
3. Choice of Disinfection
How is therapy evaluated?

- When is Disinfection is still indicated?
- If yes, choose the disinfected with:
  - best clinical effect
  - best ecological profile
  - lowest toxicity
  - lowest cost prize

Abuse in Cleaning and Disinfection

- Effect on infection morbidity
- Occupation Health Hazard
- Emergence of resistant bacteria
- Cost-effectiveness

Bleach (Presept Tabs, Milton)

- Has a very good effect on viruses and bacterial by a strong oxidising effect.
- Does not become deactivated when comes in contact with organic material.
- Can be used for spillages and surface decontaminations of heavily soiled equipment.
- Can irritate the skin and be corrosive for certain equipment.
- Preparations are in tablet form (dissolved in water) and Granules.

Iodine Preparation

- Wide range of bacterial, virucidal and fungal activity.
- Inactivated by organic matter.
- Useful for skin preparation prior insertion of peripheral lines.
- Preparation both in alcohol and in aqueous form.
- Can be used for antiseptic hand wash.

Chlorhexidine in aqueous saponeous solution

- Very good skin disinfectant.
- Has no effect whatsoever as an environmental disinfectant.
- Effect on the skin is considered to be fair but if abused can cause skin dryness.
- Can be used as antiseptic skin wash since its wide spectrum activity against bacteria, fungi and some viruses.
Cetrimide - Saponeous Solution

- Very good wound cleanser as for removing road debris.
- It is a quaternary ammonium compound mixed with Chlorexidine gluconate.
- Not to be used as an environmental disinfectant.
- Not to be routinely used for wound cleansing.

Phenolics (hycolin)

- Wide range of Bacterial activity including Tubercle bacilli. Also good fungal activity.
- Poor activity against bacterial spores and Viruses.
- Can be absorbed through the skin.
- Absorbed by rubber and plastic.
- Stable and not readily inactivated by organic material.

Alcohol (70% Isopropanol)

- Destroys both bacteria and fungi.
- No effect on bacterial spores.
- Poor effect against viruses.
- To be used on clean surfaces since does not penetrate organic material.
- Useful for skin Disinfection.
- Can damage certain equipment.

Glutaraldehyde (Cidex, Asep)

- It kills Bacteria, Viruses, fungi rapidly.
- Tubercle Bacilli within 60 minutes.
- Bacterial Spores in 3-10 Hours.
- Penetrates organic material slowly.
- Highly irritate to skin and can cause Dermatitis, running nose and asthma.
- Can be used as a Chemical sterilant and widely used for Fibre –Optic Endoscopes.