5. DISINFECTION AND STERILIZATION

5.1 Sterilization

5.1.1 Sterilization is defined as a process where all microbes are removed from a defined object, inclusive of bacterial endospores.

5.1.2 Methods of Sterilization Used

i. Steam autoclave

ii. Hot air oven

STERILIZATION	RECOMMENDATIONS
Hot Air Oven	160 ^{0}C for 1 hr, 180 ^{0}C for 30 min
Autoclave	Gravity-Displacement: • 30 min holding time at 121 ^{0}C • 1.1 kg/cm^2 or 15 lb/in^2 (PSI) Prevacuum : • 3 min holding time at 134 ^{0}C • 2.2 kg/cm^2 or 32 lb/in^2 (PSI)

5.2 Disinfection

Disinfection is a process where most microbes are removed from a defined object or surface, except bacterial endospores.

Disinfectants may be classified according to their ability to destroy different categories of microorganisms. The agent which destroys only vegetative bacteria is termed a low level disinfectant. If the agent is capable of rendering mycobacteria nonviable, it is termed as an intermediate level disinfectant. It is safe to assume that all the other categories of microbes which are classified more susceptible are also destroyed if efficacy against mycobacteria can be

demonstrated. High level disinfection is in other words sterilization wherein all microbial life is destroyed inclusive of endospores.

Classification of disinfectants:

5.2.1 High level disinfectants: glutaraldehyde 2 percent, ethylene oxide.

5.2.1 Intermediate level disinfectants: alcohols, chlorine compounds, hydrogen peroxide, chlorhexidine, glutaraldehyde (short-term exposure).

5.2.2 Low level disinfectants: benzalkonium chloride, some soaps.

5.3 General Equipment

Disinfection of General Equipment

Equipment	Frequency of Change	Recommendation
Oral Thermometer	Single for all IPD patients	After each use, the thermometer is disinfected by wiping with a swab saturated with 70 percent isopropyl alcohol. For OPD: Each thermometer is kept in a separate dry holder. After each outpatient session, the thermometer holder is washed in warm water and detergent, and the thermometer is disinfected in 70 percent alcohol for 5 minutes. Other methods for thermometer: immersion in gluteraldehyde, or hexachlorophene and cetrimide for at least 10 minutes

Rectal Thermometer	After each patient	Thoroughly wash with detergent and water, then dry. Store dry and separately from oral thermometers. Disinfect with 70 percent alcohol for 5 minutes.
Auriscope	After each patient	Disposable earpieces should be used where possible; when not available clean in detergent and water. Disinfect in CSSD or 70 percent alcohol for 5 minutes.
Ear pieces	After each patient	Wash with hot water and detergent, store dry. Disinfect in CSSD or 70 percent alcohol for 5 minutes.
Patient shaving (preop)	After each patient	Use disposable OR shaver blade, not a razor.
Sphygmomanometer Cuffs	As required	Change covers regularly (1 per week) and wash inflatable section in detergent and water, dry thoroughly or use 70 percent alcohol. Change after each use in infected patients.

Equipment	Recommendation
Bed ends and frames, Bedside locker, Cardiac table, Baby bassinets	Mop with 1 percent sodium hypochlorite. Allow to dry.
Bowls-Bedpans / Urinals	Heat disinfection in a rinse temperature of minimum 82°C for 2 minutes. If not possible, bed pans, urine pots, and kidney trays should

	be kept in 7 percent lysol for 24 hours or 3-5 percent sodium hypochlorite solution for 30 minutes; then they are washed with soap and water and dried in sunlight.
Bowls (washing)	Clean with detergent and water and store dry or as above.
Cleaning cloths, Brushes, and Equipment	Supplied daily from the laundry. They are provided for use and then discarded to wash. Wash brushes and buckets in detergent and water, then hang or invert to dry, then store dry. Disposable cloths are also available.
Curtain Rails	As for bed ends.
Hand Basins	Clean with detergent and water.
Lockers	Detergent and water as necessary and after patient discharge.
Mattresses and Pillows	All should be covered with an impervious plastic cover and should be wiped over with detergent and water if visibly contaminated. Mattresses should be cleaned regularly, and if contaminated, with the covers removed. If possible keep in sunlight for 24 hours. Plastic and rubber covers of mattresses and pillows should be washed with soap and water, cleaned with a suitable disinfectant, for example, 7 percent Lysol.
a) op Heads	Daily cleaning of mops. At the completion of each task of floor mopping, the mops should be thoroughly washed in a bucket containing HOT water and detergent. Squeeze as much water out of mop as possible and shake strands loose; leave hanging to dry in the sun if possible, or alternatively, in the cleaner's room. The bucket should be turned upside down to allow overnight drainage. Detachable mop heads should be sent to the laundry, while reusable mops should be cleaned in hot soapy water, then left to dry ideally in the sun.
Nail Brushes	The use of nail brushes is discouraged as they cause skin damage that may cause an increase in bacterial flora.

	If a nailbrush is required, a sterile, antiseptic impregnated brush may be used. Reusable brushes require autoclaving between uses.
Toilet Bowls	At least daily brushing with a commercial bowl cleanser. Additional cleaning as necessary for stubborn stains.
Toilet Brushes	Should be rinsed in flushing water, and stored to dry.
Walls	Remove visible soiling with detergent as necessary.
Clinic Trolleys	Clean with a cloth dampened with detergent and water.
Ampoules/ vials	Wipe neck (ampoule) or top surface of rubber cap (vials) with a 70 percent isopropyl alcohol impregnated swab and allow to dry before opening or piercing.
Cardiac monitors, Defibrillators and ECG equipment	If patient contact, then surface is cleaned and disinfected.
Fixtures and fittings	In clinical areas wipe damp, dust daily with detergent solution.
	In known contaminated and special areas, wipe damp dust with a disinfectant solution.
Furniture and ledges	In clinical areas clean damp dust daily with warm water and detergent.

Disinfection of Specialist Outpatient Equipment

A toothbrush may be used for cleaning the instruments. Workers should be asked to wear utility gloves while cleaning instruments.

5.4 Decontamination

The objective of decontamination is to protect individuals who handle surgical instruments and other items which have been in contact with blood or body fluids, from serious diseases. Once instruments and other items have been decontaminated, they can be safely further processed. This consists of cleaning and finally either sterilization or high-level disinfection.

5.4.1 Decontamination Tips: Use a plastic container for decontamination to help prevent:

- Dulling of sharps (for example, scissors) due to contact with metal containers.
- Rusting of instruments due to a chemical reaction (electrolysis) that can occur between two different metals (that is, the instrument and container) when placed in water.

- Do not soak metal instruments that are electroplated (that is, not 100 percent stainless steel) even in plain water for more than an hour because rusting will occur.

5.4.2 How to prepare a disinfectant cleaning solution: A disinfectant cleaning solution is one that contains both a disinfectant and a detergent (soap).

5.4.3 Precautions when using chlorine solutions: Although chlorine-containing solutions (sodium hypochlorite) are excellent, inexpensive disinfectants, they should NOT be mixed with cleaning solutions containing an acid (for example, phosphoric acid), ammonia or ammonium chloride (NH_2Cl). Doing this will release chlorine gas and other by-products that can result in temporary illness (nausea, tearing, headache or shortness of breath) to staff breathing fumes in a poorly ventilated area.

NOTE: To find out if a cleaning solution contains ammonia, first check the label. If it does not say there is ammonia, you may be able to detect ammonia when opening the product by its pungent, burning smell.

If you are exposed to chlorine gas or ammonium chloride or other unpleasant (noxious) gases with strong odors, leave the room or area immediately until the room can be completely ventilated.

5.4.3 Instructions

Step 1: Prepare a 0.5 percent chlorine solution from liquid concentrates or from chlorine compounds.

Step 2: Add enough detergent to the 0.5 percent chlorine solution or other disinfectants to make a mild, soapy cleaning solution.

5.4.4 After decontamination, instruments should be rinsed immediately with cool water to remove visible organic material before being thoroughly cleaned. For example, some healthcare facilities now keep two buckets in the procedure areas or operating rooms, one filled with 0.5 percent chlorine solution and one with water, so that the instruments can be placed in the water after soaking in the chlorine solution for 10 minutes. Although this will help to prevent corrosion, even leaving the instruments in plain water for more than 1 hour can lead to rusting.

WHO recommends 0.5 percent chlorine solution to be used for decontaminating instruments before cleaning them. The objective of **decontamination** is to protect individuals who handle surgical instruments and other items which have been in contact with blood or body fluids, from serious diseases. Once instruments and other items have been decontaminated, they can safely be further processed. This consists of **cleaning** and finally either **sterilization** or **high-level disinfection**.

5.5 Fumigation or Fogging

Bacillocid Fumigation:

5.5.1 Fumigation can be done using 2 percent Bacillocid (100 ml in 5 litres of water). The room must be kept closed for 6 hours before use by housekeeping personnel.

5.5.2 Fumigation is done only in the high-risk areas like ICU, PICU, NICU, Labour room; OT wards are excluded for fumigation (done only if required).

5.5.3 Surface cleaning for the wards may be done using 2 percent Bacillocid (100 ml in 5 litres of water).