



# Infection Control Management Project

## **Volume 13: Guidelines for**

## **Infection Control in Family Planning**

1. Protocols
2. Reference Text
3. Tool for Monitoring

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## Volume 14: Guidelines for

## Infection Control in Family Planning

### **Adapted by AAA Team from:**

1. Manual of National Standards for Family Planning, Prepared by FALAH Project – MOPW, Population Council, Jhpiego, USAID Islamabad
2. “How to Handwash” WHO 2009
3. Monitoring Tools Prepared by SIUT



# Infection Control in Family Planning

During surgical contraception, insertion/removal of IUCDs, insertion of implants and giving FP injections, **YOU MUST:**

1. **Consider every person**, (client or staff) as potentially infectious and susceptible to infection.
2. **Wash hands**, for preventing cross-contamination (person to person or contaminated object to person).
3. **Wear gloves**, (both hands) before touching anything wet, broken skin, mucous membrane, blood or other body fluids, or soiled instruments and contaminated waste materials, or before performing invasive procedures
4. **Use physical barriers** (protective goggles, face masks and aprons) if splashes and spills of any body fluids (secretions and excretions) are likely (e.g., cleaning instruments and other items).
5. **Use antiseptic agents** for cleansing the skin or mucous membrane prior to surgery, cleaning wounds, or doing hand rubs or surgical hand scrubs with an antiseptic product
6. **Use safe work practices** such as not recapping or bending needles, safely passing sharp instruments and suturing with blunt needles
7. **Safely dispose of infectious waste materials** to protect those who handle them and prevent injury or spread of infection to the community.

# Reference Text

## Hand Hygiene

**Handwashing:** The purpose of handwashing is to mechanically remove soil and debris from the skin, and reduce the number of transient microorganisms. **Handwashing with plain soap and clean water is as effective as washing with antimicrobial soaps.** Remember, plain soap causes less skin irritation.

**Handwashing is different from surgical hand scrub** and should be done:

Before

- Examining a client/patient
- Wearing gloves for any routine procedure/examination

After:

- Any situation in which hands may become contaminated, such as:
  - Handling soiled instruments and other items
  - Touching mucous membranes, blood, or other body fluids (secretions or excretions)
  - Having contact with a client.
- Removing gloves

### Method of Handwashing

Wash hands only when visibly soiled! Otherwise, use handrub!

Duration of procedure: 40-60 sec.



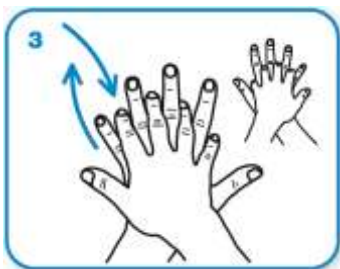
Wet hands with water



Apply enough soap to cover all hand surfaces



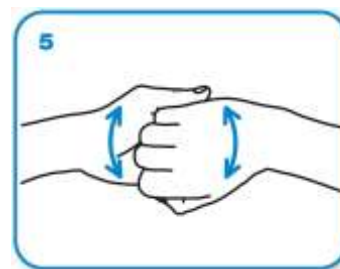
Rub hands palm to palm



Right palm over left dorsum with interlaced fingers and vice versa



Palm to palm fingers interlaced



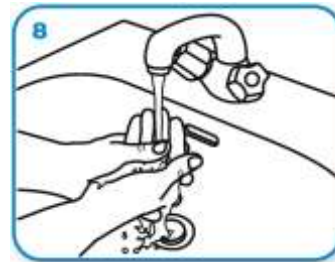
Backs of fingers to opposing palms with fingers interlocked



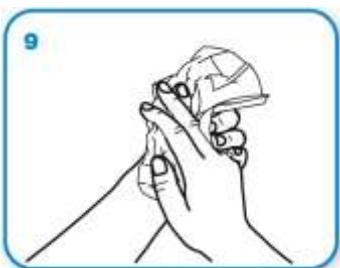
Rotational rubbing of left thumb clasped in right palm and vice versa



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa



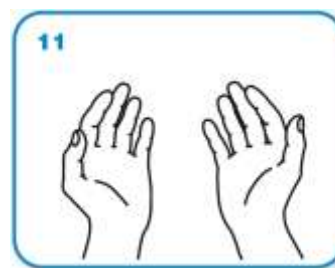
Rinse hands with water



Dry thoroughly with a single use towel



Use towel to turn off faucet



And your hands are safe

## Antiseptic Hand Rub

**Perform Antiseptic Hand Rub** before touching each client. Use of an antiseptic hand rub is more effective in killing transient and resident flora than handwashing with antimicrobial agents or plain soap and water. It is quick and convenient to perform, and gives a greater initial reduction in hand flora. Antiseptic hand rubs also contain a small amount of an emollient such as glycerin, propylene glycol, or sorbitol that protects and softens skin.

**Making antiseptic handrub:** A non-irritating, antiseptic hand rub can be made by adding glycerin, propylene glycol, or sorbitol to alcohol (2 ml in 100 ml of 60-90 percent ethyl or isopropyl alcohol solution). Use 5 ml (about 1 teaspoonful) for each application, making sure that it comes into contact with all surfaces of the hands. Rub hands together vigorously, paying particular attention to the tips of the fingers, the thumbs and the areas between the fingers, until the solution has evaporated and the hands are dry (15-30 seconds).

DO NOT USE HANDRUB in case hands that are visibly soiled, or potentially grossly contaminated with dirt or organic material. They must be washed with liquid soap and water.

If single use towels are not available, air dry hands.

An emollient hand cream or any vegetable oil can be applied to protect skin from the drying effects of regular hand decontamination. In case of irritation, try a different product or just plain instead of carbolic or medicated soaps.

Popular commercial products (such as Safeguard, Bodyguard, Lifebouy) have no proven extra efficacy than normal soap. These may alter hand flora increasing resistance of organisms.

### Method of Handrub

Wash hands only when visibly soiled! Otherwise, use handrub!

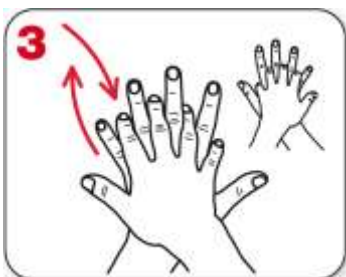
Duration of procedure: 30 sec.



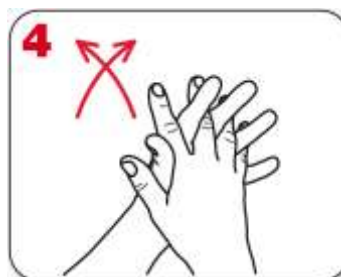
Apply a handful of alcohol handrub in a cupped hand and cover all surfaces



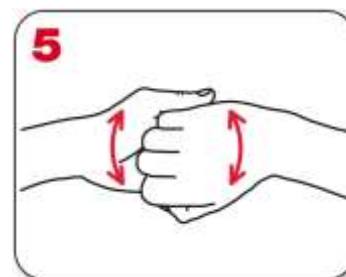
Rub hands palm to palm



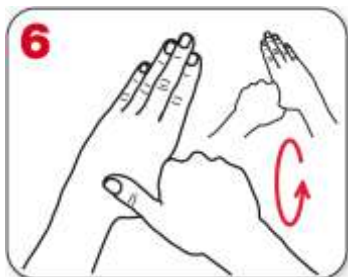
Right palm over left dorsum with interlaced fingers and vice versa



Palm to palm fingers interlaced



Backs of fingers to opposing palms with fingers interlocked



Rotational rubbing of left thumb clasped in right palm and vice versa



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa



And your hands are safe

## Surgical Hand Scrub

The purpose of the surgical hand scrub is to mechanically remove soil, debris, and transient organisms and to reduce resident flora during surgery. The goal is to prevent wound contamination by micro-organisms from the hands and arms of the surgeon and assistants.

The steps for performing simpler and shorter surgical hand scrub technique are:

- Step 1: Remove rings, watches, and bracelets.
- Step II: Thoroughly wash hands, especially between fingers, and forearms to the elbows with soap and water.
- Step III: Clean nails with a nail brush. (Nails should be trimmed to shortest)
- Step IV: Rinse hands and forearms with water and dry thoroughly with a clean, dry towel or air dry.
- Step V: Apply 5 ml (about 1 teaspoonful) of an antiseptic hand rub to hands and forearms and rub until dry, then repeat application and rubbing two more times for a total of at least 2 minutes, using a total of about 15 ml (3 teaspoonfuls) of the hand rub.
- Step VI: Keep hands up and away from the body; do not touch any surface or article prior to putting sterile or high-level disinfected (HLD) surgical gloves on both hands.

## Gloves

A separate pair of gloves must be used for each client to avoid cross-contamination. Handwashing must be done before wearing gloves as even the best quality latex surgical gloves may have unapparent defects or gloves may be torn during use.

## Types of Gloves

There are three types of gloves used in health care facilities:

- **Surgical gloves** should be used when performing invasive medical or surgical procedures.
- **Examination gloves** provide protection to health care workers when they are performing many of their routine procedures.
- **Utility or heavy-duty household gloves** should be worn for processing instruments, equipment, and other items, for handling and disposing of contaminated waste, and when cleaning contaminated surfaces.

When surgical gloves are reused, they must be checked carefully for tears or cuts before final processing.

**Table 1 – Glove requirement for Common Medical and Surgical Procedures**

Task/Activity	Gloves Needed	Gloves Preferred	Gloves Acceptable
Blood pressure check	No	-	-
Temperature check	No	-	-
Injection	No	-	-
IV Injection	No	-	-
Pelvic examination	Yes	Examination	HLD Surgical
IUCD insertion (loaded in sterile package and inserted using no-touch technique)	Yes	Examination	HLD Surgical
IUCD removal (using no-touch technique)	Yes	Examination	HLD Surgical
Norplant implants insertion and removal	Yes	Sterile Surgical	HLD Surgical
Vasectomy or laparoscopy	Yes	Sterile Surgical	HLD Surgical
Handling and cleaning instruments	Yes	Utility	No tears
Handling contaminated waste	Yes	Utility	No tears
Cleaning blood or body fluid spills	Yes	Utility	No tears

## Personal Protective Equipment and Drapes

Protective barriers, referred to as personal protective equipment (PPE), have been used for many years to protect clients from micro-organisms present on staff working in the health care setting. With the emergence of AIDS, HBV and HCV and the resurgence of tuberculosis and





strains of influenza in many countries, use of PPE has also become important for protecting the health care staff as well.

PPE includes gloves, masks/respirators, eyewear, (face shields, goggles or glasses), caps, gowns, aprons and other items. Sometimes, caps, masks, gowns, and drapes supplied to facilities are made of cloth or paper. The most effective barriers, however, are made of treated fabrics or synthetic materials (e.g., plastic) that do not allow water or other liquids (blood or body fluids) to penetrate them. Lightweight cotton cloth (with a thread count of 140/inch<sup>2</sup>) is the material most commonly used for surgical clothing (masks, caps, and gowns) and drapes. Unfortunately, lightweight cotton does not provide an effective barrier because moisture can pass through it easily, allowing contamination. Denims, canvas, and heavy twill, on the other hand, are too dense for steam penetration (i.e., they cannot be sterilized), are hard to wash, and take too long to dry. When fabric is used, it should be white or light in color in order to show dirt and contamination easily.

### **Types of Personal Protective Equipment**

**Gloves** protect hands from infectious materials and protect clients from microorganisms on health care providers' hands. They are the most important physical barrier for preventing the spread of infection, but they must be changed between each client contact to avoid cross-contamination. For example, examination gloves should be worn when handling blood, body fluids, and surfaces or equipment contaminated with secretions or excretions and while touching non-intact skin or mucous membranes.

**Masks** should be large enough to cover the nose, lower face, jaw, and facial hair. They are worn in an attempt to contain the moisture droplets expelled when health care providers or surgical staff speak, cough, or sneeze, as well as prevent accidental splashes of blood or other contaminated body fluids from entering the health care provider's nose or mouth. Unless the masks are made of fluid-resistant materials, they are not effective in preventing either.

**Eyewear** protects health care providers in the event of an accidental splash of blood or other body fluid by covering the eyes. Eyewear includes clear plastic goggles, safety glasses, etc. Prescription glasses or glasses with plain lenses also are acceptable. Masks and eyewear should be worn when performing any task in which an accidental splash into the face is likely (e.g., performing a surgical procedure or cleaning instruments).

**Caps** are used to keep the hair and scalp covered so that flakes of skin and hair are not shed into the wound during surgery. Caps should be large enough to cover all hair. The other purpose is also to protect the wearer from blood or body fluid splashes and sprays.

**Scrub suits or cover gowns** are worn over or instead of 'regular clothes. The main use of cover gowns is to protect the health care providers' clothing. Scrub suits usually consist of drawstring pants and a shirt. The neck of the shirt must not be cut so low as to slide off the wearer's shoulders. There is little evidence that scrub suits are needed during routine procedures when soiling of clothes is not likely.'

**Surgical gowns** were first used to protect clients from micro-organisms present on the abdomen and arms of health care providers during surgery. Surgical gowns made of fluid-



resistant materials 'do play a role in keeping blood and other fluids, such as amniotic fluid, away from clients to health care workers, particularly in operating, delivery, and emergency rooms. Lightweight cotton gowns, offer little protection. Under these circumstances, if large spills occur, the best things to do is shower or bathe as soon as possible after completing the operation or procedure. If surgical gowns are worn, sleeves should either taper gently towards the wrists or end with elastic or ties around the wrists.

In addition, the cuffs of the surgical gloves should completely cover the end of the sleeves.

**Footwear** is worn to protect feet from injury by sharps or fluids on the operating theatre floor. Theatre shoes/slippers must be kept clean and free of contamination from blood or other body fluid spills. All of the theatre shoes/ slippers must be washed daily with antiseptic solutions and must not be worn outside the theatre. Any shoe taken outside the operating theatre must not be taken to the theatre again unless it is thoroughly cleaned and washed with an antiseptic solution and dried properly.

**Drapes** are usually made of hemmed linen in squares of varying sizes. They are used to create an operative field around an incision, wrap instruments and items for sterilization, cover tables in the operating room, and keep clients warm during surgical procedures. The main types of drapes are:

- **Towel drapes** are used for drying hands, covering around the operative site, and wrapping small instruments. They are often made of heavier cotton cloth than other linen items, which makes them more water-resistant.
- **Drapes or lap sheets** are used for covering the client. They are large, usually made of lightweight cotton, and provide only limited protection to clients and health care providers.
- **Pack wrapper drapes** are large drapes that become a table cover when the sterile instrument pack is opened. This drape needs to be large enough only for wrapping the instruments and, when opened, to cover the tabletop completely.

### Using Drapes for Surgical Procedures

Using sterile towel drapes to create a work area around the incision limits the amount of skin that needs to be cleaned and prepared with antiseptic solution prior to placing the drapes. Although this area is often called the sterile field, it is not completely sterile. Cloth drapes allow moisture to soak through them and can help spread organisms from skin, even after surgical cleansing with an antiseptic agent, into the incision. Thus, gloved hands (sterile or high-level disinfected), sterile or high-level disinfected instruments, and other items should not touch the towel drapes once they are in place. Because cloth drapes do not serve as an effective barrier, clean, dry towel drapes can be used if sterile towel drapes are not available.

The way in which the operative site is prepared and draped depends on the type of procedure to be performed. The following guidelines for draping are designed to reduce overuse of costly sterile items and avoid unnecessary draping:



- All drapes should be applied around a completely dry, widely prepared area.
- If sterile drapes are used, sterile or high-level disinfected surgical gloves should be worn when placing the drapes. (When putting drapes in place, health care workers must take care not to touch the client's body with gloved hands.)
- Drapes should be handled as little as possible and should never be shaken or flapped.
- Always hold drapes above the area to be draped and discard if they fall below this area.

## Use of Antiseptic

Although antiseptics are sometimes used as disinfectants (e.g., Savlon or Dettol for processing instruments and other inanimate objects), they are not formulated for this use. They do not have the same killing power as chemical disinfectants (e.g., glutaraldehyde, hypochlorite, and peroxides) and should not be used for this purpose.

Plain soap is as effective as antimicrobial soap, provided the water is clean. Water that contains large amounts of particulate matter (makes the water cloudy) or is contaminated (high bacterial count) should not be used for performing a surgical hand scrub. In addition, antimicrobial soaps are costly and are more irritating to the skin than plain soap.

## Skin Preparation Prior to Surgical Procedures

Although skin cannot be sterilized, applying an antiseptic solution minimizes the number of micro-organisms around the surgical wound that may contaminate and cause infection.

Instructions:

- Step I: Ask the client to take bath before the surgical procedure
- Step II: Trim the hair close to the skin surface with scissors immediately before surgery. **Do not shave hair** around the operative site as it increases the risk of infection 5-10 fold because the tiny nicks in the skin provide an ideal setting for micro-organisms to grow and multiply.
- Step III: Ask the client about allergic reactions (e.g., pyodine preparations) before selecting an antiseptic solution
- Step IV: If the skin or external genital area is visibly soiled, gently wash it with soap and clean water and dry the area before applying the antiseptic.

Select the antiseptic solution from the following recommended products:

- Alcohol-based solutions (tinctures) of pyodine or chlorhexidine



- Alcohols (60-90 percent ethyl, isopropyl, or methylated spirit)
- Chlorhexidine gluconate (2-4 percent) (e.g., Hibitane, Hibiscrub, Hibiclens")
- Chlorhexidine gluconate and cetrimide, various concentrations (at least 2 percent) (e.&., Savlon)
- Iodine (3 percent); aqueous iodine iodophors (7.5-10 percent), various other concentrations (e.g., Betadine), Chloroxylenol (Parachloro-metaxylenol or PCMX 0.5-3.75 percent), various other concentrations (e.g., Dettol)

**Step V:** Using dry, high-level disinfected forceps and new cotton or gauze squares soaked in antiseptic, thoroughly cleanse the skin. Work from the operative site outward for several centimeters. (A circular motion from the centre out helps to prevent contamination of the operative site with local skin bacteria.)

**Step VI:** Allow enough time for the antiseptic to be effective before beginning the procedure. For example, when an iodophor is used, allow 2 minutes or wait until the skin is visibly dry before proceeding, because the active agent is released slowly.

**Note:** Do not allow the antiseptic to pool underneath the client's body because it can irritate the skin.

## Instructions for Cervical or Vaginal Preparation

For cervical and vaginal antisepsis, prior to inserting a uterine elevator for minilaparotomy or IUCD, select an aqueous (water-based) antiseptic such as an iodophor (povidone-iodine) or 2-4 percent chlorhexidine gluconate [e.g., Hibiclens or Savlon if properly prepared). Do not use alcohol or alcohol containing preparations, such as Dettol. Alcohols cause burn and they also dry and irritate mucous membranes, which in turn promote the growth of microorganisms. In addition, hexachlorophene [pl+iso+lex) is neurotoxic and should not be used on mucous membranes, such as the vaginal mucosa, because it is readily absorbed.

## Skin Preparation for Injections

According to WHO and its Safe Injection Global Network (SIGN), swabbing of clean skin with an antiseptic solution prior to giving an injection is unnecessary.

If the injection site is visibly soiled, wash the site with soap and water and dry with a clean towel, and then give the injection.



## Safe Practices in Operating Rooms

Just as clients must be protected from wound contamination and infections, the health care providers must also be protected from intra-operative injuries and exposure to clients' blood and other body fluids.

Preventing infections following an operation is a complex process that begins in the operating room by preparing and maintaining a safe environment for performing the surgery. Surgical aseptic techniques are designed to create such an environment by controlling the four main sources of infectious organisms: the client, health care providers, equipment, and operating room surroundings. Although the client is often the source of surgical infections, the other three sources are important and should not be overlooked.

Specific techniques required to establish and maintain surgical asepsis and make the surgical surroundings safer include the following:

- **Client considerations:** Skin cleaning pre-operatively, skin antiseptics, and wound covering.
- **Health care provider considerations:** Hand hygiene (handwashing and/or hand rub with waterless, alcohol-based antiseptic agents) or hand scrubbing; use and removal of gloves and gowns.
- **Room and equipment preparation considerations:** Traffic flow and activity patterns as well as housekeeping practices and decontamination, cleaning and either sterilization or high-level disinfection of instruments, gloves, and other items.
- **Surrounding considerations:** Maintaining an aseptic operating field and using safer operating practices and techniques

## Instruments Causing Injuries

The vast majority of sharps injuries in hospitals occur in the operating room and most are due to scalpel and suture needles being most frequently used during operations. Many other items can also cause sharps injuries and glove tears resulting in exposure to blood. Some of the most important **items that are used in an FP clinic and cause injury are:**

- Skin hooks and towel clips
- Sharp-pointed scissors and sharp-tipped mosquito forceps and dissecting forceps used in no-scalpel vasectomy (NSV)
- Sharp-toothed tenaculi
- Scalpel blades



- Hypodermic needles
- Suture needles
- Laparoscopy and implant trocars

Almost all of these injuries can be easily avoided with no extra expenditure. For example:

- Use a small Mayo forceps (not fingers) when holding the scalpel blade, putting it on or taking it off, or loading the suture needle. (Alternatively, use disposable scalpels with a permanent blade that cannot be removed.)
- Always use tissue forceps, not fingers, to hold tissue when using a scalpel or suturing.
- Use a hands-free technique to pass or transfer sharps (scalpel, needles, and sharp-tipped scissors) by establishing a Safe or Neutral Zone in the operative field.
- Always remove sharps from the field immediately after use.
- Make sure that sharps containers are replaced when they are only three quarters full and place containers as close to and convenient for the health care provider as possible (i.e., within arm's reach).

A safer method of passing sharps (scalpels, suture needles, and sharp scissors) during surgery, called the hands-free technique, has recently been recommended. This technique for sharps is inexpensive, simple to use, and ensures that the surgeon, assistant, or scrub assistant never touches the same instrument at the same time.

Instruments passed with the hands-free technique (besides those listed above) include anything sharp enough to puncture a glove (e.g., trocars, sharp-tipped mosquito forceps, and loaded needle holders). Using the hands-free technique, the assistant places a sterile or high-level disinfected kidney tray/basin, or other suitable small container, on the operative field between the assistant and the surgeon. The container is designated as the Safe or Neutral Zone in which sharps are placed before and immediately after use.

Another way to do this is to have the assistant place the instrument in a container and pass it to the surgeon. The surgeon lifts the instrument out of the container, which is left on the operative site until the surgeon returns the instrument to it. The assistant then picks up the container and returns it to the Mayo stand.

**Table: Reducing the Risk of Exposure**

<b>Function</b>	<b>Safer</b>	<b>Less Safe</b>	<b>Least Safe!</b>
Skin incision	Cautery	Disposable scalpel	Scalpel with removable blade
Cutting	Scissors, blunt tip or cautery probe	Scissors, sharp tip	Scalpel
Haemostasis	Blunt suture needles, staples, or cautery	Sharp suture needles	Wire sutures



Sponging with gauze while using scalpel	Surgeon does the sponging: assistant only reacts	Assistant sponges only on request	Assistant sponges spontaneously (no communication)
Retraction	Blunt retractor	Sharp retractor	Fingers or hands
Sharps transfer	Neutral zone	Hand-to-hand (communication)	Hand-to-hand (no communication)
Surgical gloves	Double-gloving	Single-pair of gloves or double-gloving with reprocessed gloves	Single pair of reprocessed gloves
Closing peritoneum (small, 2-3 cm incision)	Do not close	Purse string closure using tissue forceps to grasp needle	Purse string closure using fingers to grasp needle

## Safe Handling of Hypodermic Needles and Syringes

In the operating room, scalpels and suture needles are the leading source of penetrating injuries. Hypodermic (hollow-bore) needles cause the most injuries to health care providers at all levels. Consider:

- Surgeons and assistants are most often stuck by hypodermic needles during procedures.
- Cleaning staff are most often stuck by needles when washing soiled instruments.
- Housekeeping staff are most often stuck by needles when disposing of infectious waste material.

### Safety Tips for Using Hypodermic Needles and Syringes

- Use needle and syringe only once.
- Do not disassemble the needle and syringe after use.
- Do not recap, bend, or break needles prior to disposal.
- Dispose of the needle and syringe in a puncture-resistant container.

If the needle has to be recapped, use the one-handed recap method:

- First, place the needle cap on a firm, flat surface; then remove your hand.
- Next, with one hand holding the syringe, use the needle to "scoop" up the cap.

**Figure: One Handed Recap Method**



## Sharps Containers

Using sharps disposal containers helps prevent injuries from sharps. Sharps containers should be fitted with a cover, and should be puncture-proof, leak-proof, and tamper-proof (difficult to open or break). If plastic or metal containers are unavailable, use containers made of dense cardboard (cardboard safety boxes) that meet WHO specifications. If cardboard safety boxes are unavailable, easily available objects can substitute as sharps containers:

- Tin with a lid
- Thick plastic bottle
- Heavy plastic bottle
- Heavy cardboard box

## Recommendations for Safe Use of Sharps Containers

All sharps containers should be clearly marked "SHARPS" and have pictorial instructions for their use and disposal.

- Place sharps containers away from high-traffic areas and as close as possible to where the sharps will be used. Do not place containers near electric switches, overhead fans, or thermostat controls where people might accidentally put one of their hands into them.
- Attach containers to walls or other surfaces if possible. Position the containers at a convenient height so staff can use and replace them easily.
- Never reuse or recycle sharps containers.
- Mark the containers clearly so that people will not unknowingly use them as garbage receptacles.
- Do not fill the safety box beyond three-quarters of its capacity.
- Avoid shaking a container to settle its contents to make room for more sharps.

## Infection Prevention Techniques

Asepsis and aseptic techniques are general terms used to describe the combination of efforts made to prevent entry of micro-organisms into any area of the body where they are likely to cause infection. The goal of asepsis is to eliminate or reduce to a safe level the number of micro-organisms on both animate (living) surfaces such as skin and other body tissues, and inanimate objects (e.g., surgical instruments).

Antisepsis is the prevention of infection by killing or inhibiting the growth of micro-organisms on skin and other body tissues.





# Instrument Processing

Steps for infection prevention techniques are necessary for all surgical procedures, including FP and maternal and child health care. The steps are:

## Decontamination

Decontamination is the first step in handling large surfaces (e.g., examination or operating tables), surgical instruments, and linen and gloves contaminated with blood or body fluids during or following surgical procedures. This step, taken before cleaning, makes the handling of these contaminated objects safer for the health care providers, especially cleaning personnel, and it reduces the risk of transmitting infections.

## Chlorine Solutions for Decontamination and High-Level Disinfection

WHO recommends 0.5 percent chlorine solution for decontaminating surfaces and instruments before cleaning. The solution is fast-acting, very effective against hepatitis and HIV viruses, inexpensive, and readily available as common bleaching agents (sodium hypochlorite solutions). It is extremely useful for decontaminating large surfaces such as examination tables. These surfaces should be wiped with 0.5 percent chlorine solution, and rinsed with water and dried to prevent corrosion.

To decontaminate examination/operating table tops, wipe the surface with 0.5 percent chlorine solution. For articles such as linen, gloves, and instruments, soak them in 0.5 percent chlorine solution for 10 minutes. This solution can be prepared from household liquid bleach or powder available in different concentrations.

Chlorine solution is also effective in high-level disinfection of instruments. A major disadvantage is corrosion of metals if instruments are left too long in the solution. Using a plastic container, however, you can safely soak stainless steel instruments in 0.1 percent chlorine solution for up to 20 minutes for high level disinfection. Afterwards, rinse them with boiled water and dry them promptly to prevent corrosion. The solution deteriorates rapidly; hence, use a fresh one daily and also whenever the solution becomes visibly cloudy.

## Preparation of Chlorine Solution

### Precautions

- Turn off the fan.
- Wear gloves, cap, mask, and eye glasses to avoid splashing in eyes and preventing irritating effects.
- Always use plastic containers and spoons.
- Make fresh solution, every day; discard the solution if it becomes cloudy.
- Do not expose the solution to direct sunlight.



## Method of Preparation

Formula for preparing 0.5 percent chlorine solution:

- Bleaching powder:
  - Grams per litre = % of dilution required / % of concentration of powder x 1000
- Liquid bleach:
  - Parts of-water = % of concentrate given on container (liquid bleach) / % of dilution required – 1

## Steps for Preparation

- Calculate the amount of water and bleach.
- Put the calculated parts of clean tap water in a plastic container.
- Add calculated parts of liquid bleach/powder (when preparing with powder, add small amount of water to make the paste and then add the rest of the water).
- Stir well.

## Cleaning

Cleaning is the process that physically removes all visible blood, body fluids, or any other foreign material such as dust or soil from the inanimate objects. It improves the quality of subsequent high-level disinfection or sterilization.

To clean examination/operating table tops, linen, gloves, and storage containers, wash organic material that remains after decontamination with detergent and water. Then wipe the table top and rinse other items with clean water. For cleaning instruments, use a brush to remove all particles.

## Sterilization

Sterilization is the process that eliminates all micro-organisms, including bacterial endospores, from inanimate objects. Some of the sterilization techniques are mentioned below.

### Sterilization through Autoclaving

For this purpose, temperatures of 121°C and 15 pounds pressure (pounds per square inch) are required for 20 or 30 minutes (when unwrapped or wrapped respectively), depending upon the article to be sterilized. These temperatures are achieved by the use of an autoclave in which steam generated drives out the air, increases the pressure, and raises the temperature to the required level.

Remember to properly load the autoclave with appropriately wrapped and positioned instruments and other equipment; otherwise, sterilization will be inadequate. Also, insert a sterilization indicator tape to ensure that all objects are exposed to the hot steam.

Sterilization of many instruments, such as those with cutting edges and glass syringes, is better performed with dry heat. Temperatures of 170°C are required for 20 or 30 minutes (when unwrapped or wrapped respectively). To ensure even heating, an electric oven fitted with a fan is necessary.



### Chemical Sterilization

Chemical sterilization achieves disinfection by using liquid chemicals and is recommended for equipment and items that cannot be autoclaved. Chemicals destroy or inhibit the growth of bacteria and other micro-organisms similar to heating, i.e., by protein coagulation or enzyme inhibition. The objects that are easiest to sterilize chemically are those with a smooth, flat, and firm surface such as a laparoscopic instrument.

Items are sterilized by soaking them in a particular chemical solution (such as the one containing glutaraldehyde), followed by rinsing them in sterile/boiled water.

Cidex, which contains glutaraldehyde, is a commonly available solution used for sterilization. Other products containing glutaraldehyde or other chemical sterilizers may be locally available, but make sure that the solution to be used is appropriate for sterilization.

Remember that:

- Glutaraldehyde is irritating to the skin, eyes, and respiratory tract. While using it, wear gloves, limit exposure time, and keep the area well ventilated.
- The length of time that glutaraldehyde solutions can be used varies, usually from 14-30 days. Always follow the manufacturer's instructions regarding proper storage temperatures and expiry date. Solutions should be replaced any time they become cloudy.

Formaldehyde is potentially cancer-causing and extremely irritating to the skin, eyes, nose, and respiratory tract. Therefore, routine use of formaldehyde for sterilizing instruments and other items is not recommended.

Instructions for chemical sterilization:

- Choose the appropriate disinfectant.
- Follow directions for proper dilution of the chemical.
- Soak items in the solution for the required period of time.
- Completely immerse clean items in disinfectant.
- Rinse items thoroughly with sterile or boiled water or sterilized normal saline.
- If needed, dry the items with a sterile towel, or let them air dry.
- Use the sterile items immediately, or store them in a suitable, tightly closed sterile container for up to 1 week.

### **High-Level Disinfection**

High-level disinfection (HLD), through boiling or the use of chemicals, eliminates all micro-organisms, viruses, bacteria, parasites" and fungi, with the exception of some bacterial



endospores such as tetanus and gangrene. HLD for instruments that perforate skin and mucous membranes is acceptable-only when autoclaving is not possible and all earlier stages of processing are observed.

#### High-Level Disinfection by Boiling

- Use a container with a lid for boiling instruments.
- Make sure that the items being processed for HLD are completely immersed in water.
- Boil all instruments for 20 minutes, calculating the time after the boiling point is reached.
- Do not add to or remove anything from the pot/container after water begins to boil.
- Air dry before use or storage.

#### High-Level Disinfection by Chemicals

Where boiling is not possible, HLD can also be done by using chemicals like glutaraldehyde or 0.1 percent chlorine solution.

When using a glutaraldehyde solution:

- Prepare it according to the instructions.
- If possible, use an indicator strip each time to determine if the solution is still effective.
- After preparing the solution, put it in a clean container with a lid.
- Mark the container with the date the solution was prepared and the date it expires.

When using a chlorine solution:

- Prepare the 0.5 percent chlorine solution as described for decontamination using boiled water. Fresh solution should be made each day or more often if the solution becomes cloudy.
- Items must be completely immersed in solution. Open all hinged instruments and disassemble items with sliding or multiple parts.
- Soak for 10 minutes.
- Prepare 0.1 percent chlorine solution.
- Immerse the items for 20 minutes.
- Rinse items thoroughly with boiled water



**Table: Infection Prevention in Processing Instruments and Equipment**

Process	It is the first step in handling dirty instruments; reduces risks of hepatitis B, C and HIV	It removes particulate matter and improves the quality of subsequent HLD or sterilization	It destroys all viruses, bacteria, parasites, fungi and some endospores	It destroys all microorganisms including endospores
<b>Instruments</b>	<b>Decontamination</b>	<b>Cleaning</b>	<b>High-Level Disinfection</b>	<b>Sterilization<sup>1</sup></b>
Pelvic exam table top or other large surface area	Wipe off with 0.5% chlorine	Wash with detergent and water if organic material remains after decontamination procedure	Not necessary	Not necessary
Linens (caps, gowns, masks and surgical drapes)	<ul style="list-style-type: none"> <li>Soak in 0.5% chlorine solution for 10 minutes if contaminated with blood or body fluids prior to cleaning</li> <li>Rinse and wash immediately<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>Wash with detergent and water, removing all particles</li> <li>Rinse with clean water</li> <li>Air dry</li> </ul>	Not necessary for caps, gowns and masks For surgical drapes: <sup>3</sup> <ul style="list-style-type: none"> <li>Boil or chemically HLD</li> <li>Air-dried surgical drapes should be ironed before use</li> </ul>	Not necessary for caps, gowns and masks For surgical drapes: <ul style="list-style-type: none"> <li>Autoclave at 121°C (250°F) and 106kPa (15lbs/in<sup>2</sup>) for 20 minutes</li> </ul>
Gloves (rubber or plastic)	<ul style="list-style-type: none"> <li>Soak in 0.5% chlorine solution for 10 minutes prior to cleaning</li> <li>Rinse or wash immediately<sup>4</sup></li> </ul>	<ul style="list-style-type: none"> <li>Wash with detergent and water, removing all particles</li> <li>Rinse with clean water and check</li> </ul>	If touching only mucous membranes or broken skin (e.g. for pelvic exam or IUCD insertion): <ul style="list-style-type: none"> <li>Boil for 20 minutes in a container with a lid (start</li> </ul>	If used for surgery: <ul style="list-style-type: none"> <li>Autoclave at 121°C (250°F) and 106kPa (15lbs/in<sup>2</sup>) for 20 minutes</li> </ul>

<sup>1</sup> If unwrapped, use immediately; if wrapped, may be stored up to 1 week prior to use.

<sup>2</sup> Avoid prolonged exposure to chlorine solution to minimize corrosion of instruments and deterioration of rubber or cloth products

<sup>3</sup> If sterilization (dry or autoclave) not available, these items can be HLD either by boiling or soaking in chemical disinfectant.

<sup>4</sup> Instruments with cutting edges or needles should not be sterilized at temperature above 160°C to avoid dulling.

		<ul style="list-style-type: none"> <li>for holes</li> <li>Air dry</li> </ul>	<ul style="list-style-type: none"> <li>timing when water begins to boil)</li> <li>Gloves must be immersed completely in water</li> <li>Do not add anything to container after water begins to boil</li> <li>Air dry before use or storage</li> </ul>	
Instruments for pelvic examination and IUCD insertion (e.g. specula, tenacula, forceps and uterine sounds)	<ul style="list-style-type: none"> <li>Soak in 0.5% chlorine solution for 10 minutes</li> <li>Rinse or wash immediately<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>Using a brush, wash with a detergent and water, removing all particles</li> <li>Rinse with clean water</li> <li>Air dry</li> </ul>	<p>Boiling</p> <ul style="list-style-type: none"> <li>Boil for 20 minutes in a container with a lid (start timing when water begins to boil)</li> <li>Instruments must be immersed completely in water during boiling</li> <li>Do not add anything to container after water begins to boil</li> <li>Air dry before use or storage</li> </ul> <p>Chemical: Soak for 20 minutes in:</p> <ul style="list-style-type: none"> <li>A glutaraldehyde and rinse well in water that has been boiled for 20 minutes</li> </ul>	<ul style="list-style-type: none"> <li>Dry heat for 1 hour after reaching 170°C (340°F) or</li> <li>Autoclave at 121°C (250°F) and 106kPa (15lbs/in<sup>2</sup>) for 20 minutes</li> </ul>
Instruments for voluntary sterilization and Norplant insertion	<ul style="list-style-type: none"> <li>Soak in 0.5% chlorine solution for 10 minutes</li> <li>Rinse or wash immediately</li> </ul>	<ul style="list-style-type: none"> <li>Using a brush, wash with a detergent and water, removing all particles</li> <li>Rinse with clean water</li> </ul>	<p>Acceptable:<sup>3</sup></p> <ul style="list-style-type: none"> <li>Boil or do chemical HLD as above</li> </ul>	<ul style="list-style-type: none"> <li>Dry heat for 1 hour after reaching 170°C (340°F)</li> </ul>

		<ul style="list-style-type: none"> <li>• Air dry</li> </ul>		
Needles and syringes	<ul style="list-style-type: none"> <li>• Fill assembled needle and syringe with 0.5% chlorine solution</li> <li>• Soak for 10 minutes prior to cleaning</li> <li>• Rinse by flushing three times with clean water</li> </ul>	<ul style="list-style-type: none"> <li>• Disassemble, then wash with detergent and water, removing all particles</li> <li>• Rinse with clean water</li> <li>• Air dry</li> </ul>	<p>Acceptable<sup>3</sup></p> <ul style="list-style-type: none"> <li>• Boil or do chemical HLD as above</li> </ul> <p>Place items that float in a weighted, processed bag</p>	<ul style="list-style-type: none"> <li>• Dry heat for 1 hour after reaching 170°C (340°F) or</li> <li>• Autoclave at 121°C (250°F) and 106kPa (15lbs/in<sup>2</sup>) for 20 minutes</li> </ul>
Storage containers for instruments	<ul style="list-style-type: none"> <li>• Soak in 0.5% chlorine solution for 10 minutes</li> <li>• Rinse or wash immediately<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Wash with a detergent and water, removing all particles</li> <li>• Rinse with clean water</li> <li>• Air dry</li> </ul>	<p>Boil container and lid as above; if container is too large, then:</p> <ol style="list-style-type: none"> <li>1. Fill container with 0.5% chlorine solution and soak for 20 minutes</li> <li>2. Rinse with water that has been boiled for 20 minutes and air dry before use</li> </ol> <p>Disinfect weekly, and when empty or contaminated</p>	<ul style="list-style-type: none"> <li>• Dry heat for 1 hour after reaching 170°C (340°F) or</li> <li>• Autoclave at 121°C (250°F) and 106kPa (15lbs/in<sup>2</sup>) for 20 minutes (30 minutes if wrapped)</li> </ul> <p>Disinfect weekly, and when empty or contaminated</p>
Endoscopes (laparoscopes)	<ul style="list-style-type: none"> <li>• Wipe exposed surfaces with gauze pad soaked with 60-90% alcohol</li> <li>• Rinse immediately</li> </ul>	<ul style="list-style-type: none"> <li>• Disassemble, then wash with detergent and water, removing all particles</li> <li>• Rinse with clean water</li> <li>• Air dry</li> </ul>	<p>Soak for 20 minutes in:</p> <ul style="list-style-type: none"> <li>• Glutaraldehyde solution</li> <li>• Rinse in water that has been boiled for 20 minutes</li> </ul>	<p>Sterilize daily if possible, using chemical sterilization. Soak in:</p> <ul style="list-style-type: none"> <li>• Glutaraldehyde for 10 hours</li> <li>• Rinse with sterilized water or water that has been boiled for 20 minutes</li> </ul>

# Monitoring Tool

S. No.	Infection Control Measures	Yes	No	Not Applicable	Comments
<b>A</b>	<b>Hand Hygiene:</b> Health care worker (HCW) observed				
1	Hand hygiene prior to clinical procedure/ examination				
2	Hand hygiene after clinical procedure/examination				
3	HCW nails are short and clean				
4	Handwashing sink is available				
4a	• Running water available in sink				
4b	• Soap available with sink				
4c	• Hand Drying Method: (a) towel, (b) paper, (c) air-dry				
5	Alcohol rubs available				
5a	• Alcohol rub at point of patient care				
5b	• Ratio of rub to patient ____:____				
5c	• Alcohol rub dispenser filled				
5d	• Dispenser in working order				
<b>B</b>	<b>Personal Protective Equipment:</b> HCW observed:				
1	Wearing gloves when handling blood and body fluids				
2	Gloves removed after task completed				
3	Hand hygiene after removal of gloves				
4	Going from one patient to another with same gloves				
5	Wearing gowns when splashing/soiling likely to occur				
6	Gown removed after task completed				
7	Going from one patient to another with same gown				
8	Wearing mask				
	Using eye wear				
7	Wearing cap				
8	Wearing footwear				
9	Wearing N95 mask for TB patients				
<b>C</b>	<b>Using drapes appropriately</b>				
1	Around incision				
2	For wrapping small instruments				



S. No.	Infection Control Measures	Yes	No	Not Applicable	Comments
3	Covering tables in the OT				
4	Keeping client warm				
<b>D</b>	<b>Measures for Asepsis</b>				
	Client has taken bath prior to surgical procedure				
1	Skin preparation prior to surgical procedure				
2	safe procedures for making skin incision & their closing				
3	Using instruments/items that are properly sterilized				
<b>E</b>	<b>Other Measures</b>				
1	Handling of hypodermic needles and syringes safely				
2	Using sharps disposable containers				
3	Decontamination of instruments/items				
4	Using clinical waste containers				