

# Principles of Aseptic Technique

## Terminology

<b>Antimicrobial</b>	An agent or action that kills or inhibits the growth of microorganisms.
<b>Antiseptic</b>	A chemical agent that is applied topically to inhibit the growth of microorganisms.
<b>Asepsis</b>	Prevention of microbial contamination of living tissues or sterile materials by excluding, removing or killing micro-organisms.
<b>Autoclave</b>	A steam sterilizer consisting of a metal chamber constructed to withstand the pressure that is required to raise the temperature of steam to the level required for sterilization. Early models were termed "autoclaves" because they were fitted with a self-closing door .
<b>Bactericide</b>	A chemical or physical agent that kills vegetative (non-spore forming) bacteria.
<b>Bacteriostat</b>	An agent that prevents multiplication of bacteria.
<b>Commensals</b>	Non-pathogenic microorganisms that are living and reproducing as human or animal parasites.
<b>Contamination</b>	Introduction of microorganisms to sterile articles, materials or tissues.
<b>Disinfectant</b>	An agent that is intended to kill or remove pathogenic micro -organisms, with the exception of bacterial spores.
<b>Pasteurization</b>	A process that kills non spore-forming microorganisms by hot water or steam at 65-100oC.
<b>Pathogenic</b>	A species that is capable of causing disease microorganism in a susceptible host.
<b>Sanitization</b>	A process that reduces microbial contamination to a low level by the use of cleaning solutions, hot water or chemical disinfectants.
<b>Sterilant</b>	An agent that kills all types of microorganisms.
<b>Sterile</b>	Free from microorganisms.
<b>Sterilization -</b>	The complete destruction of microorganisms.

Since the pioneering work of such surgeons as Joseph Lister, who introduced the use of carbolic acid antiseptics in 1865, and William Halstead, who advocated the use of surgical gloves in 1898, surgeons have strived to eliminate surgical infections through the use of aseptic technique. Potential sources of contamination are well defined. They include the patient and the surgical environment: the surgeon and support staff, the instruments, sutures, drapes and all other equipment which can have contact with the surgical field.

## **Equipment**

The equipment in areas used for aseptic surgery should be easy to clean and portable to simplify sanitization of the area. The operating table should be constructed with a durable surface material impervious to moisture, which can be readily cleaned. Plastic or stainless steel is frequently used for this purpose. Useful table design features which assist patient positioning include height and tilt adjustments. Instrument tables provide the physician ready access to the surgical instruments and minimize the risk of sterilized instrument contamination by contact with non-sterile fields. Adequate lighting is essential for performing surgical procedures.

## **Assembling Equipment**

Since the majority of sterile procedures done in the clinic is suturing of a patient, the following guidelines are structured for this instance. For any other procedures, ask the physician which equipment they would prefer.

Sterile Dressing Tray

Sterilized Suture Set

Fenestrated Drape

5cc syringe

18 gauge needle

27 gauge ½ inch needle (1 ¼ inch needle for digital blocks)

Sterile gauze

Sutures

Normal Saline

Hibitane

Blue incontinent pad.

Finger cot or penrose tubing as needed. (When using sterile penrose tubing for a tourniquet, an additional needle driver or clamp must be opened and placed on the tray)

Sterile Gloves.

Packs should be placed on a dry instrument tray and the outer wrapping carefully unfolded by touching only the corners of the outside drape surface. Avoid reaching over the sterile field. The sterile field should not be opened too early. Any other sterilized supplies which can be opened onto a sterile field should be made ready at this time.

Note the following when opening sterile packages: (not including commercially prepared packages).

The sterilization date should be checked; the shelf life of wrapped instruments is generally considered to be up to 6 months. (Since the turnover of our equipment is frequent, sterilization dates are not currently used.)

The adhesive indicator tape should be noted for the appropriate color change and the pack description should be checked, when applicable.

1. Open the sterile suture set. Unwrap carefully on top of counter, without coming into contact with the equipment inside.
2. Open the sterile dressing tray.

Place the dressing tray on the instrument table. Tear plastic wrap at perforation and slide tray out onto table. Grasp the upper flap of the outer wrap and pull away from your body to open it. Pick up the blue plastic forceps and grasp the visible corner of the wrapping. Pull to the side to open all of the way. You can use your fingers to hold the corner in place. Grasp the second corner of the wrapping and pull to the other side. Grasp the last corner of the wrapping and pull towards you. Using the blue forceps, adjust the plastic tray, moving it slightly to one side. Using the blue forceps: Remove the white drape and place it beside the tray, inside the sterile field\*. Remove the garbage bag and set aside. Remove cotton balls and discard. Remove metal forceps and discard. Pick up each piece of the sterile suture set and place it on the sterile field beside the plastic tray.

3. Add additional contents to dressing tray

Grasp the edges of each package, hold upside down over the sterile field and slowly pull the package open. Ensure that the contents drop directly onto the sterile field without coming into contact with any non-sterile objects. If re-arrangement is necessary use sterile forceps.

4. Pour liquid contents onto dressing tray.

Uncap liquid bottle. Pour a small amount of liquid into the garbage can. This washes away any bacteria on the lip of the bottle that might otherwise be poured into the sterile field. Using a slow and controlled approach, gently pour liquid into sterile tray. Do not allow any part of the bottle to touch the sterile field. If liquid spills onto the sterile field, it is no longer considered sterile, as moisture allows for free passage of microorganisms through fabric from the surface below.

5. Prepare local anaesthetic

Swab the top of the anaesthetic with alcohol. Leave the alcohol swab in place until it is used.

6. Position the patient.

Tape the blue incontinent pad to armrest, or under area to be sutured. The blue pad is not a sterile drape, it is simply used to prevent blood or cleansing agents to drip onto the floor.

7. Position light over area to be sutured.

8. Place sterile gloves on stool for physician.

\* 1 inch of the outer edge of the sterile field is not considered sterile. Therefore it is acceptable to use your hands to position the sterile field within that 1 inch. Ensure that no sterile equipment is in contact with that area. Once a non sterile object is in contact with the sterile field, it is no longer considered to be sterile. Therefore, the vial of anaesthetic, sharps container, or any other non-sterile items should not be placed on the dressing tray. You should not touch anything on the sterile field without wearing sterile gloves. The sterile forceps should be used only for sterile gauze or instruments. They should not be used for non-sterile gauze. A clean, gloved hand is adequate for reaching into canisters which contents have not been sterilized.

It is important to remember that sterility is used to ensure that no foreign matter or bacteria contaminate the wound. When the physician places used gauze on the sterile field, though not ideal, it is acceptable because it contains the same bacteria already part of the patient's natural flora. The plastic garbage bag or the biohazard box should be within reach of the physician, though they do not commonly use these.

## **Sterile Gloves**

On occasion it is a good idea to wear sterile gloves, in case your assistance is needed without compromising the patient. This should only be done after the physician has everything needed on the tray, and the anesthetic is drawn up. Should you touch any non-sterile item after the gloves are on, you are no longer considered sterile. It may be necessary to adjust the light during the procedure. In doing so, you can use one hand to make any adjustments and keep the other hand sterile.

Sterile surgical gloves are packaged with the cuff of each glove turned down. This allows the gloves to be put on without the bare hands ever touching the outside surface of the glove. One glove is picked up by the turned-down cuff and pulled onto the hand with the cuff left turned down. Using the gloved hand, pick up the remaining glove by inserting the fingers into the cuff and pulling it onto the opposite hand. Then the glove cuff is lifted over and onto the arm or clothing cuff and the process repeated on the other hand. This technique is known as "open gloving." Remove the powder on the outer glove surface by wiping the gloved hands with damp sterile gauze. Arms and hands should be held above the waist at all times. Aseptic technique is maintained when the gloves only touch sterilized equipment within the sterile field.

## **Sterilization**

Sterilization is the process that is intended to kill or remove all types of microorganisms. There are two principal sterilization methods:

- 1) Physical (dry heat or saturated steam)
- 2) Chemical (ethylene oxide gas or chemical liquids).

Factors which determine the method to be used are the type of micro-organisms involved, the nature of the article to be sterilized and the time available for sterilization. We currently use a combination of the two methods to ensure sterility.

### **Physical Methods (Steam)**

Steam sterilization (frequently referred to as autoclaving) depends on the use of steam above 100°C. Temperatures ranging from 121-134°C at pressures of 15-30 psi are generally recommended. The biocidal action of moist heat is a denaturation of major cell constituents. Many sterilizers are designed to provide an automatic sterilization cycle. In the first stage of the cycle, air is evacuated and the chamber brought to the pre-set sterilizing temperature, which is maintained for a holding period sufficient to kill all microbial contaminants. Minimum holding times for the sterilization of medical equipment are 15 minutes at 121°C, 10 minutes at 126°C, and 3 minutes at 134°C. The steam is then removed and instrument packs are allowed to dry or liquids cool. The drying stage may be adjusted to suit the load. Packs should not be too densely packed in the autoclave to allow for adequate steam or gas penetration.

Steam sterilization has the advantage of rapid penetration of wrapped materials with the destruction of all viruses and bacteria, including the most resistant spores. The sterilization of different supplies is more readily controlled than in other types of sterilizers. However oils, grease and powdered substances cannot be sterilized by this method. The steam autoclave must be maintained in good repair and operated correctly in order to perform to specifications. Sterilization failure can occur when machines are not regularly serviced.

### **Chemical Methods (Liquids)**

The use of chemical solutions as a sterilization technique for surgical equipment is frequently employed, but it should be stressed that most solutions only disinfect and do not guarantee sterility. Equipment must be thoroughly cleaned before immersion, as chemical action is ineffective in the presence of proteins or fats. The ideal immersion time in Coldspor, or other available chemical agent is 2-3 hours.

Follow the instructions posted for use of the autoclave.