Sterilization

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Objectives

¬At the end of the session, you will be able to:

1. Acquaint with the set up in the operating room.
2. Describe the fundamental principles of aseptic techniques in the OR
3. Demonstrate the correct technique of the surgical scrub, gowning and gloving technique.
4. Explain the importance of time out process.
5. Familiarize the sterilization procedures

Color Index:

-Doctor's Notes -Surgery Recall -Doctor's Slides -Extra explanation -Important

Correction File

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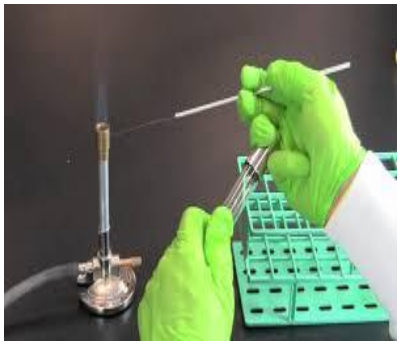
●Proper aseptic techniques

-Its essential for **infection** control in surgeries & it includes:-

-Reduce (or if possible; remove) all microorganisms from hands & objects.

-Employ sterile instruments.

-Reduce patient risk of exposure to microorganisms.



●Steps to do before & during surgery to prevent Post-op infection:-

-Hand washing

-Surgical Attire

-Surgical scrub, sterile gowning & gloving

-Patients surgical skin prep

-Using surgical barriers (surgical drapes and PPE)

-Using safe operative technique

●What's Asepsis?

The complete Absence of microorganism that cause disease

●Principles of Aseptic techniques:

-Only sterile items are used within the sterile field

-Sterile persons are gowned and gloved
(Gowns are only sterile from waist to shoulder)
(Gloved hand must be kept in sight at all times)

-Only the top of a draped table is considered sterile

-Sterile persons touch only sterile items or areas

-Unsterile persons should keep off sterile field

-The edges of anything that encloses sterile contents are considered unsterile (sterility is only in the center; edges arent sterile!)

- Sterile field is created as close as possible to the time of use

- Sterile areas are continuously kept in view

- Sterile persons keep contact with sterile areas to a minimum (if you're sterile, stay close to sterile area as short as possible)

Asepsis cont'...

•Surgical Hand Antisepsis:

•Process of removing as many microorganisms as possible from the hands and arms by mechanical washing and chemical antisepsis before participating in a surgical procedure; **however skin is never sterile!**

•Its effectiveness depends on:

- The preparation before cleansing

-The choice of antiseptic solution

-The cleansing method

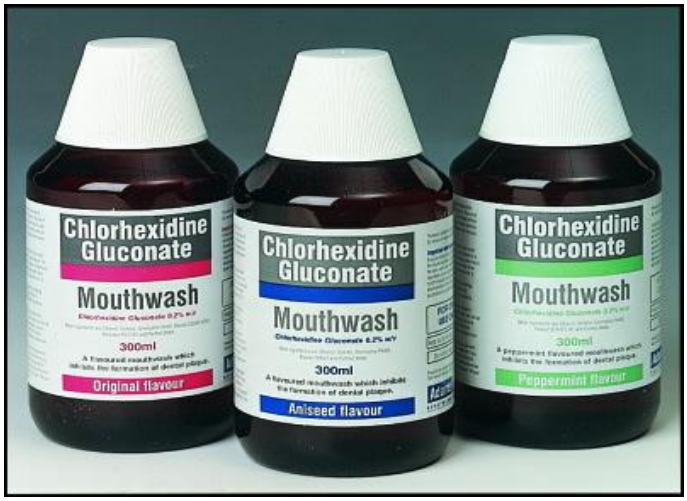
-The duration for hand cleansing

•Effective Antiseptic Solutions examples:

-Antimicrobial soaps, aqueous scrubs (ex. biguanides), alcohol rubs

-Alcoholic chlorhexidine has greater residual antimicrobial activity

-Tanner et al claims that biguanides (ex: Chlorohexidine gluconate) are more effective in removing microorganism on hands than Iodophors (ex. Providone iodine)



Wearing surgical scrub

●Preparation:

- Removal of finger rings/jewelry, nail polish and artificial nails

- Surgical scrub brush & antimicrobial soap must be used.

-Wash both of your hands and arms, lathering up well (Rinse and dry)

-Clean underneath your fingernails with a nail file

●Arms & hands cleaning:

-Remove sterile disposable brush-sponge from its wrapper and moisten it

-Lather fingertips with sponge side of brush, then using brush side of brush scrub the spaces under the fingernails of the right or left hand with 30 circular strokes

-Lather digits; scrub 20 circular strokes on all four sides of each finger

-Lather palm, back of hand, heel of hand and space between thumb and index finger (scrub 20 circular strokes) on each surface)

-Forearm scrub – divide the forearm into 3 inch increments (the brush is 3 inches lengthwise)

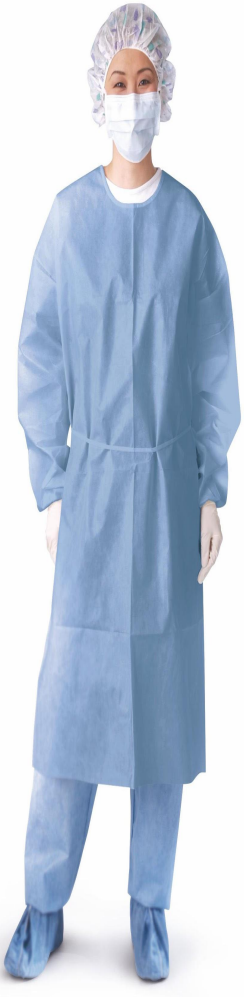
- Use the sponge side of the brush lengthwise to apply soap around wrist
- Scrub 20 circular strokes on all four sides of wrist
- Then move up the forearm – lather, & scrub ending 2 inches above elbow

-Discard the brush

-Rinse hands and arms, allow the water to drip from the elbows

-After final rinse, turn water off and keep scrubbed hands and arms in view

-Inside the operating room, dry hands and arms with a sterile towel before donning a sterile surgical gown and gloves



Wearing surgical scrub cont'...

•Steps in drying your sterile hands:

-Reach down to the opened sterile package containing the gown, and pick up the towel (Be careful not to drip water onto the pack)

-Open the towel full-length, holding one end away from the non-sterile scrub attire (bending slightly forward makes it easier)

-Dry both hands thoroughly but independently (To dry one arm, hold the towel in the opposite hand and, using the oscillating motion of the arm, draw the towel up to the elbow)

-Carefully reverse the towel, still holding it away from the body & Dry the opposite arm on the unused end of the towel

•Gowning techniques:

-Reach down to the sterile package & lift the folded gown directly upward

-Step back away from the table and provide yourself with a wide clear area

-While Holding the folded gown, carefully locate the neckline. Holding the inside front of the gown just below the neckline with both hands & pull, let the gown unfold, while keeping the inside of the gown toward the body (Do not touch the outside of the gown with bare hands)

-Holding the hands at shoulder level, slip both arms into the armholes simultaneously

-The circulator nurse brings the gown over the shoulders by reaching inside to the shoulder and arm seams, The gown is pulled on, leaving the cuffs of the sleeves extended over the hands, The back of the gown is securely tied or fastened at the neck and waist

Wearing surgical scrub cont'...

• Gloving by the Closed Glove Technique:

-This method is Preferred method over open-gloving technique
-Provides a bacterial barrier between patient and surgeon

• Steps:

-Using the right hand and keeping it within the cuff of the sleeve, pick up the left glove from the inner wrap of the glove package by grasping the folded cuff

-Extend the left forearm with the palm upward, place the palm of the glove against the palm of the left hand, grasping in the left hand the top edge of the cuff, above the palm.

-In correct position, glove fingers are pointing toward you and the thumb of the glove is down

-Grasp the back of the cuff in the left hand and turn it over the end of the left sleeve and hand. The cuff of the glove is now over the stockinette cuff of the gown, with the hand still inside the sleeve

-Grasp the top of the left glove and underlying gown sleeve with the covered right hand. Pull the glove on over the extended right fingers until it completely covers the stockinette cuff

-Glove the right hand in the same manner.

-Use the gloved left hand to pull on the right glove

Wearing surgical scrub cont'...

-Finally, tie the gown:

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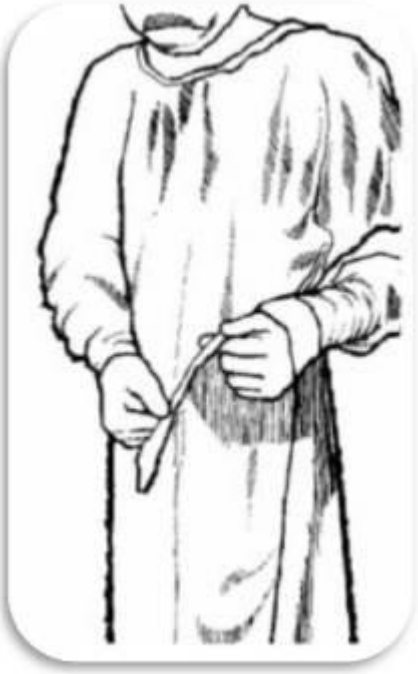

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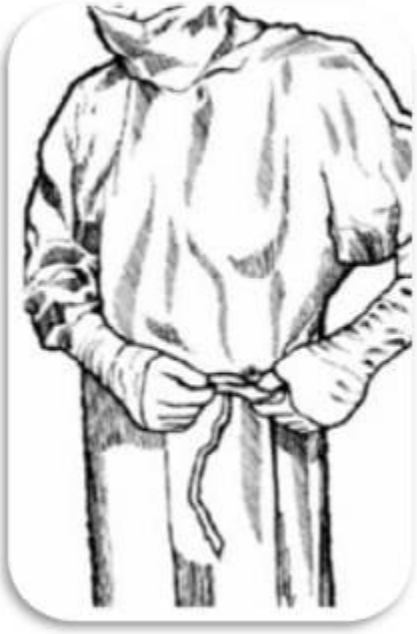

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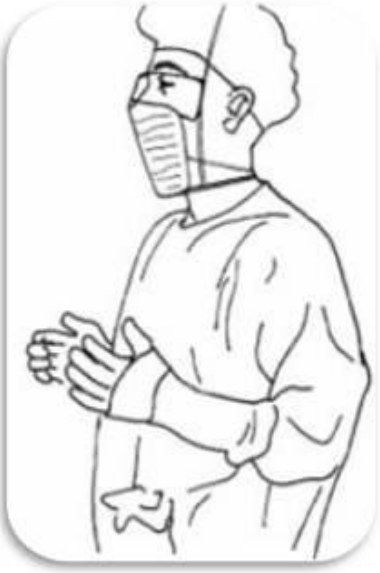

Disinfection and Sterilization

Definition of terms:

Cleaning	Sterilization	Disinfection
The physical removal of organic material or soil from objects, is usually done by using water with or without detergents	The destruction of all forms of microbial life; it is carried out in the hospital with steam under pressure, liquid or gaseous chemicals, or dry heat.	Defined as the intermediate measures between physical cleaning and sterilization, is carried out with pasteurization or chemical germicides.

The level of disinfection achieved depends on several factors:

- Contact time
- Temperature
- Type and concentration of the active ingredients of the chemical germicide
- The nature of the microbial contamination.

Types of disinfection

- ***High-level disinfection*:** can be expected to destroy all microorganisms, with the exception of large numbers of bacterial spores.
- ***Intermediate disinfection*:** inactivates *Mycobacterium tuberculosis*, vegetative bacteria, most viruses, and most fungi; does not necessarily kill bacterial spores.
- ***Low-level disinfection*:** can kill most bacteria, some viruses, and some fungi; cannot be relied on to kill resistant microorganisms such as tubercle bacilli or bacterial spores.

Medical devices, equipment, and surgical materials are divided into three general categories based on the potential risk of infection involved in their use:

- Critical items
- Semicritical items
- Noncritical items

1-Critical items:

Critical items are instruments or objects that are introduced directly into the bloodstream or into other normally sterile areas of the body.

★ **Examples are surgical instruments, cardiac catheters, implants, pertinent components of the heart-lung oxygenator, and the blood compartment of a hemodialyzer.**

Sterility at the time of use is required for these items

2-Semicritical items:

These items come in contact with intact mucous membranes, but they do not ordinarily penetrate body surfaces.

- ***Examples* are noninvasive flexible and rigid fiberoptic endoscopes, endotracheal tubes, anesthesia breathing circuits, and cystoscopes.**

Sterilization is not absolutely essential.

3-Noncritical items:

Noncritical items are those that either do not ordinarily touch the patient or touch only intact skin.
Such items include crutches, bedboards, blood pressure cuffs, and a variety of other medical accessories.
These items rarely, if ever, transmit disease. Consequently, washing with a detergent may be sufficient.

Note:

Items must be thoroughly cleaned before processing, because organic material (e.g., blood and proteins) may contain high concentrations of microorganisms. Also, such organic material may inactivate chemical germicides and protect microorganisms from the disinfection or sterilization process.

For noncritical items

cleaning can consist only of
1) washing with a detergent or a disinfectant-detergent,
2) rinsing,
3) thorough drying.

Steam sterilization

- Steam sterilization is the most inexpensive and effective method for sterilization.
- Steam sterilization is unsuitable for processing plastics with low melting points, powders, or anhydrous oils.
- Items that are to be sterilized but not used immediately need to be wrapped for storage.
- Sterility can be maintained in storage for various lengths of time, depending on the type of wrapping material, the conditions of storage, and the integrity of the package.

Monitoring of steam sterilization processes:

- to check the highest temperature that is reached during sterilization and the length of time that this temperature is maintained.
- heat- and steam-sensitive chemical indicators can be used on the outside of each pack.
- a large pack might have a chemical indicator both on the outside and the inside to verify that steam has penetrated the pack.

Microbiological monitoring:

Microbiological monitoring of steam sterilizers is recommended at least *once a week* with commercial preparations of spores of *Bacillus stearothermophilus* (a microorganism having spores that are particularly resistant to moist heat, thus assuring a wide margin of safety).

Sterilization of implantable items

Implantable items, such as orthopedic devices, require special handling before and during sterilization; thus, packs containing implantable objects need to be clearly labeled so they will be appropriately processed. To guarantee a wide margin of safety, it is recommended that each load of such items be tested with a spore test and that the sterilized item not be released for use until the spore test is negative at 48 hours. if it is not possible to process an implantable object with a confirmed 48-hour spore test before use, it is recommended that the unwrapped object receive the equivalent of full-cycle steam sterilization and not flash sterilization.

Ethylene oxide gas sterilization:

- It is more complex and expensive process than steam sterilization
- It is usually restricted to objects that might be damaged by heat or excessive moisture.
- Before sterilization, objects also need to be cleaned thoroughly and wrapped in a material that allows the gas to penetrate.

The most appropriate chemical germicide for a particular situation can be selected by responsible personnel in each hospital based on:

- the object to be disinfected,
- the level of disinfection needed,
- and the scope of services, physical facilities, and personnel available in the hospital.

Recommendation

Cleaning

All objects to be disinfected or sterilized should first be thoroughly cleaned to remove all organic matter (blood and tissue) and other residue.

Indications for Sterilization and High-Level Disinfection

- Critical medical devices or patient-care equipment that enter *normally sterile tissue* or the *vascular system* or through which blood flows should be subjected to a sterilization procedure before each use.
- Laparoscopes, arthroscopes, and other scopes that enter normally sterile tissue should be subjected to a sterilization procedure before each use; if this is not feasible, they should receive at least high-level disinfection.
- Equipment that touches *mucous membranes*, e.g., endoscopes, endotracheal tubes, anesthesia breathing circuits, and respiratory therapy equipment, should receive high-level disinfection.

Methods of Sterilization

- Whenever sterilization is indicated, a steam sterilizer should be used unless the object to be sterilized will be damaged by heat, pressure, or moisture or is otherwise inappropriate for steam sterilization. In this case, another acceptable method of sterilization should be used.
- Flash sterilization [270°F (132°C) for 3 minutes in a gravity displacement steam sterilizer] is not recommended for implantable items.

Use and Preventive Maintenance:

Manufacturers' instructions should be followed for use and maintenance of sterilizers.

Chemical Indicators:

Chemical indicators that will show a package has been through a sterilization cycle should be visible on the outside of each package sterilized.

Use of Sterile Items

An item should not be used if its sterility is questionable, e.g., its package is punctured, torn, or wet.

Reprocessing Single-Use or Disposable Items

- Items or devices that cannot be cleaned and sterilized or disinfected without altering their physical integrity and function should not be reprocessed.
- Reprocessing procedures that result in residual toxicity or compromise the overall safety or effectiveness of the items or devices should be avoided.

Role of CSSD: Control Sterile Supply Department

- Rinsing
- Cleaning
- Drying
- Inspection and assembly
- Packaging
- Labelling
- Sterilisation
- Storage
- Distribution

Summary

- Proper aseptic technique is one of the most fundamental and essential principles of infection control .

- This stepwise process of proper aspetic technique should be performed every single time in the OR

Questions

1. The definition of asepsis is:

A. Soiled or infected with organisms
B. Capable of producing disease
C. Absence of microorganisms

2. Cross contamination is defined as:

A. Producing or capable of producing disease
B. Transmission of microorganisms from patient to patient and from inanimate objects to patients.
C. Severe toxic state resulting from infection with pyogenic organisms

3. Which is the best technique for you to use when rinsing your hands and forearms after a surgical scrub?

A. Rinsing is not performed after a surgical scrub because it will reduce the antimicrobial activity of the cleansing solution.
B. Rinsing should start at the elbow with the water running down back down to the hand
C. Rinsing should start with the hand positioned such that the water runs off the elbow rather than down to the hands

Ans: C, B , C