STERILIZATION

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Notes
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Main Objectives:

- To be able to acquire knowledge on the early concepts of infection, evolution of surgical asepsis and sterilization.
- To be able to acquire knowledge and understanding on the different methods of sterilization as well as the sterilization processes/ procedures.
- To be able to know and get familiarized with the principles of aseptic techniques and be able to apply them in the clinical areas and Operating room.

Table of Contents:

Green means the nurse mentioned it ☺

Early Concepts Of Infection / Evolution of Surgical Asepsis / Sterilization

- **450 BC(Hippocrates)-**Wine & boiled H2O used to irrigate wounds.
- **1450 BC (Moses)-** Sterilization by fire
- **200 AD (Galen)-**Boiled the instruments in the care of wounded gladiators (soldiers).
- **1545 (Fracastorious-** Proclaimed that diseases were spread: by direct contact, by handling articles infected articles that infected people handled previously used & by transmission from a distance (airborne transmission).
- **1774 (Scheele)-** Discovery of Chlorine that used also in swimming pool ☺
- **1818 (Thenard)-** Discovery of Hydrogen peroxide.
- **1837 (Schwan)-** Beginning of sterilization by heat.
- **1847 (Semmelweis)-** Used chloro lime "solution" for puerperal sepsis prevention. Introduced washing of hands between patients.

Early Concepts Of Infection / Evolution of Surgical Asepsis / Sterilization

- **1850-1862 (Louis Pasteur)-** Found out that heat can kill germs (Pasteurization) and theorized that fermentation caused by particles of living matter are so small that they could be carried freely in the air.
- **1854 (Schroeder & Dusch)-** Introduced the use of filters in sterilization of high temperature pressure.
- **1859 (Wurtz)-** Discovered Ethylene oxide
- **1860 (Kuchenmeister)-** Discovered Phenol as sterilizing agent

Early Concepts Of Infection / Evolution of Surgical Asepsis / Sterilization

- **1860 (Joseph Lister) -** Advocated carbolic soaks, hand sprays, wound dressings, sutures.
- **1867 (Lister)-**Antiseptic principle in the practice of surgery. Discovered phenol for infection prevention after operation
- **1876 (Koch R.)-** Discovered bacillus anthracis as the cause of disease.
- **1878 (Tyndall)-** Tyndallization intermittent sterilization method.
- **1879 (Chamberland)-** The first autoclave was introduced.
- **1886 (Ernst Von Bergmann & associates)-** iscovered steam sterilizer under pressure as it is known today to kill heat resistant microorganisms.

Early Concepts Of Infection / Evolution of Surgical Asepsis / Sterilization

- **1888 (Davidsohn)-**Sterilization by boiling was introduced.
- **1894 (Reinecke)-** Sterilization action of 90% alcohol
- **1894 (William Stewart Halsted)-**pioneered the widespread use of rubber gloves during surgery.
- **1897 (Kinyoun)-** Dual structure of autoclave.
- **1900-**All sterilization equipment designed in USA & Europe
- **1908 (Grossich)-** Sterilization by Iodine tincture
- **1927 (Schrader & Bossert)-** Examination of sterilization action by Ethylene Oxide.
- **1929-** EO gas as anti- bacterial agent was introduced.
- **1933 (Underwood C.)-** Completion of high pressure steam sterilizer.
- **1940-** EO gas in industries & hospitals is used for sterilization

1927-1949 Eo introduced for sterilization

Early Concepts Of Infection / Evolution of Surgical Asepsis / Sterilization

- **1945-Gamma radiation-** Introduced & used on commercial basis for the sterilization.
- **1949 (Philips & Kaye)-** Build up theory of E.O. gas sterilization
- **1963 (Stone Hill)-** Development of Glutaraldehyde "chemical, known today as Cidex".
- **1980 - Antibiotics** are given before certain types of surgery to prevent infection "as prophylaxis "
- **1993-** Plasma Sterilizer was introduced.
- **1999-** OPA Cidex was introduced.

Terminologies

- **Sterilization**-the process by which all living microorganisms both pathogenic & non-pathogenic including spores are killed.
- **Sterile**-absence of all microorganisms including bacteria, mold spores and viruses.
- **Asepsis**- freedom from infection or the absence of microorganisms that cause diseases.
- **Sepsis** "opposite to asepsis "- generalized reaction to pathogenic microorganism, evident clinically by signs of inflammation & systemic manifestation of febrile condition.
- **Aseptic Technique** -practices that restrict microorganisms in the environment, on equipment, supplies & prevent the normal body flora "for ex ur hands" from contaminating the surgical wound. The method by which contamination with microorganisms is prevented.
- **Bactericidal**-agents capable of killing or inactivating bacteria.
- **Antiseptics**-substances that renders microorganisms on living tissue inactive by preventing their growth. They combat sepsis. They are use to disinfect body surfaces, on skin & tissue & inhibit the growth of endogenous bacteria.
- **Disinfection**-any process, which renders inanimate objects free of pathogenic bacteria. spores still their in opposite to sterilization. We use it like in endoscopy , Cystoscopy but if we have to break skin use sterilization .
- **Disinfectants**-agents that kill all growing or vegetative forms of microorganisms thus completely eliminating them from inanimate objects.
- **Contamination**-introduction of microorganisms to a sterile field.

The prevention of infection in health care areas is largely dependent on the following:

- Rigorous adherence to the principles of aseptic techniques by all personnel who performs any invasive procedures on patients.
- The sterility of all items directly used in such procedures.
- The disinfection of all surfaces and other items in the immediate environment like in OR.

Remember:

- There is no degree of sterility.
- An item is either sterile or non-sterile.
- It can never be relatively sterile.
- If u not sure that this item is not sterile than it’s non sterile !!

Take Note:

- Surgical instruments, linen and heat sensitive items are sterilized by the method recommended by the manufacturer.

- **No disposable items designed for sterile single use should be reprocessed** "resterilize".

- It is essential for a sterilizing agent to be in contact with every part or surface of each item to be sterilized for the specified period of time at the specified temperature.

Methods of Sterilization:

Physical Methods:

- 1. Dry Heat-Hot air ovens, infra red ovens.

  (Not available in KKUH)>she will not talk about >b/c it's not available in kkuh ☺
- 2. Moist heat- Steam Autoclave-(Available in KKUH)

Cool Chemical Methods:

- 1. E.O. Sterilizer- (Available in KKUH)
- 2. Plasma Sterilizer (Sterrad)- (Available in KKUH)
- 3. Liquid Chemicals

Other Methods

Physical Method:

Moist heat, at a raised atmospheric pressure

- **Steam sterilization** is the most inexpensive and effective method of sterilization. Steam under pressure permits permeation of moist heat to porous substances by condensation and results in destruction of all microbial life.

Ex. Steam autoclave (steam under pressure)

- Usual method of sterilizing surgical instruments, dressing, drapes, swabs, laps sponges and culture media.

Steam Autoclave

- An autoclave is a closed chamber in which items or objects are subjected to steam at high pressures and temperatures above 100ºC.

Types of Autoclaves:

- **Downward Displacement Autoclave-**

  Air is removed in two stages and sterilization is effected by an atmosphere of pure steam. Minimum exposure time is required for sterilizing instruments is 50 minutes at 131ºC or 60 minutes at 136ºC. (Not available in KKUH) >not explained by nurse b/c it's not available in kkuh ☺

- **High Vacuum / High Pressure Autoclave-** Air is removed by powerful pump. Steam penetrates the load instantaneously and very rapid sterilization of dressings, instruments, raytec swabs, lap sponges, other surgical items & packs is possible in 15 to 40 minutes at 134ºC. (Available in KKUH)

New Steris Autoclave

Preparation of Items Before STERILIZATION

1. Decontamination wash and decontaminate them
2. Disassembly
3. Washing wash them again
4. Drying
5. Packing
6. Loading in sterilizer

- Just imagine only how they sterilize !

Ultrasonic Washer

For delicate instruments like in vascular or neurosurgery

Washer & dryer
☺

Automated Washer

THE STEAM STERILIZATION PROCESS – FIVE DISTINCT PHASES:

- **PHASE I-**The **loading phase** - in which the objects or items are packaged and loaded in the sterilizer.

- **PHASE II-**The **heating phase** - in which the steam is brought to the proper temperature and allowed to penetrate around and through the objects in the chamber.

- **PHASE III-**The **destroying phase** or the time temperature cycle - in which all microbial life is exposed to the killing effect of the steam.

- **PHASE IV-**The **drying and cooling phase** - in which the objects are dried and cooled "b/c if u touch it and still moist >u'll contaminate item" , filtered air is introduced into the chamber, the door is opened and the objects are removed and stored.

- **PHASE V-**The **testing phase** - in which the efficiency of the sterilization process is checked. All mechanical parts of sterilizers, including gauges, steam lines and drains, should be periodically checked by a competent biomed engineer.

Loading Procedure

MAKING OF STERILE PACKAGES

- Packages/Instrument sets should have the following external indications, showing that they have been processed:

- **Autoclave tapes** show a package that has been through a sterilization cycle and should be visible outside of every package sterilized.
- Autoclave tape is designed **black** when a certain temperature inside the autoclave is reached. ” black= sterilized”
- Every package must be labeled as to its contents ”for ex appendectomy set “.
- Every package, tray or item is to be labeled with the processing date & Expiry date, autoclave used “steam, plasma , EO” and load number. This will assist locating processed items in case of recall.

STORAGE OF STERILE PACKAGES

- Sterile packages / items should be left untouched and allowed to be cooled before storage to avoid condensation inside the packs.
- Sterile packages must be handled as little as possible to reduce the risk of contamination.
- Event Related Sterility- An item that has been properly cleaned, sterilized, stored & handled will remain sterile unless it is opened or an event happens that compromises sterility.

STORAGE OF STERILE PACKAGES

Imp slide !!

- Sterile packages should be stored on open shelves.
  - The lowest shelf should be **8 inches off the floor.**
  - The highest shelf should be **18 inches from the ceiling.**
  - All shelves should be at least **2 inches from the walls.**

KKUH-CSSD Storage Room

STORAGE OF STERILE PACKAGES

- Sterile packages must be stored and issued in correct order.
- Sterile items are good for either **30 days or 6 months to 1 year** depending solely on how the packages are wrapped and what type of wrappers are used. When it's process in central supply department should be with 2 wrappers> standard.
- This is called the **shelf life** which refers to the length of time a package maybe considered sterile.

STORAGE OF STERILE PACKAGES

- Storage room must be subjected to regular **adequate pest control** to prevent contamination from rodents, ants and cockroaches.

- Traffic is restricted to CSSD (Central Sterilization Supply Department) personnel and trainees only.

Causes of failure to produce a sterile load

- Faults in the autoclave

  - Poor quality steam
  - Way it is operated
  - Failure to remove air and condensate
  - Faulty gauges and timings
  - Leaking door seals

Other Causes of Failure

- There are errors in loading:
  - Large packs
  - Excessive layers of wrapping materials
  - Over packing

- Recontamination after sterilization due to:
  - An inadequate air filter and leakage into the chamber
  - Wet or torn packs
  - Incorrect storage

METHODS OF TESTING THE EFFECTIVENES OF AUTOCLAVES:

- **Bowie Dick Test Pack-** a pack with a chemical indicator both on outside and inside to verify that steam has penetrated the pack & to test air leaks.
- **Mechanical-** chart and gauges usually carried out by Biomed Engineer.
- **Chemical-** by the use of autoclave tapes, strips and card. A daily test in an empty chamber using a heat sensitive tape. This is for high vacuum/high pressure autoclaves.

  Ex. Routine use of Browne's TST strips.

TESTING THE EFFECTIVENESS OF THE STEAM AUTOCLAVE:

- **First-** They run it empty for one cycle. (Dummy Run) – to warm up the machine.

- **Second-** They put inside in the middle of the chamber, the Bowie Dick Test Pack and run it again and finish the whole cycle. Oh high pressure- to test leaks and presence of air. (Yellow turns black)

- **Third-** They load it with items and trays for sterilization (little bit lower pressure). It is done once daily.

- **Fourth-** Live Organism- done once in every Saturday morning in CSSD (Central Sterilization Supply Department), KKUH.

Biological Indicator- Biological Spore Testing

- Testing of autoclaves is necessary to test autoclaves regularly with Geobacillus stearothermophilus, which is one of the most heat tolerant species of bacteria.
- If sterilization in an autoclave does not destroy the Geobacilus spores, the autoclave is not working properly.

COLD METHOD-Chemicals

- **Ethylene Oxide (EO)-**

  *Well established technique for sterilizing heat labile articles.

  *Colorless gas at ordinary temperatures

  *Has an odor similar to that of ether

  *Has an inhalation toxicity similar to that of ammonia dioxide or fluorinated hydrocarbons (Freon).

- In general, an exposure period of 4 to 7 hours is necessary for complete E.O. sterilization. *Temperature for sterilizing is 21º C to 60º C (70º F to 140º F).

- Used for sterilizing vascular and bone grafts, delicate instruments, plastic articles such as disposable syringes, surgical instruments such as cystoscopes, catheters, bacteriological media and vaccines.

E.O. Sterilizer

Ethylene Oxide (EO)

Skipped by nurse ☺

- Before EO sterilization, objects also need to be **cleaned thoroughly** and wrapped in a material that allows the gas to penetrate.
- Chemical indicators for EO should be used with each package to show that it has been exposed to gas sterilization process.
- Gas sterilizers should be checked once a week with commercial preparation spores, usually Bacillus Atropheus formerly Bacillus Subtilis Var. Niger.

Skipped by nurse ☺

- Objects processed by gas sterilization need special aeration according to manufacturer's recommendation before use to remove toxic residues of EO.

- Materials aerated in a mechanical aerator that provides a minimum of four air changes per hour and elevates the temperatures within the cabinet to 50º C to 60º C (122º F to 140º F) require 6-8 hours of aeration based on the composition of the sterilized items and the aerator manufacturer's instructions.

Advantages of EO Sterilization>Skipped by nurse ☺

- Used only if materials are heat sensitive and unable to withstand sterilization by saturated steam under pressure.
- Easily available and effective against all types of microorganisms.
- Penetrates through masses of dry materials; does not require high temperatures, humidity or pressures.
- Non- corrosive and non-damaging to items.

DISADVANTAGES OF EO

- Lengthy process with long exposure and aeration periods"7-8 hours" but it's v. effective also .
- Expensive and more complex process b/c after sterilization we have aerate the item to remove residues of Co2.
- Produce serious burns on exposed skin if not immediately removed.
- Insufficiently aerated materials can cause irritation, burns of body tissues, hemolytic of blood and diluents used with EO cause damage to some plastics.
- Toxic and may cause **Cancer**. *Precautions should be taken to protect personnel.

Plasma Sterilizer

- **Plasma Autoclave** > Now replace EO autoclave

*Low Temperature Hydrogen Gas Sterilizers.

*Employs 1.8 ml. of 58 % hydrogen peroxide vaporized in a sterilization chamber after a vacuum is created, the vapor is converted into plasma by means of radio –frequency energy.

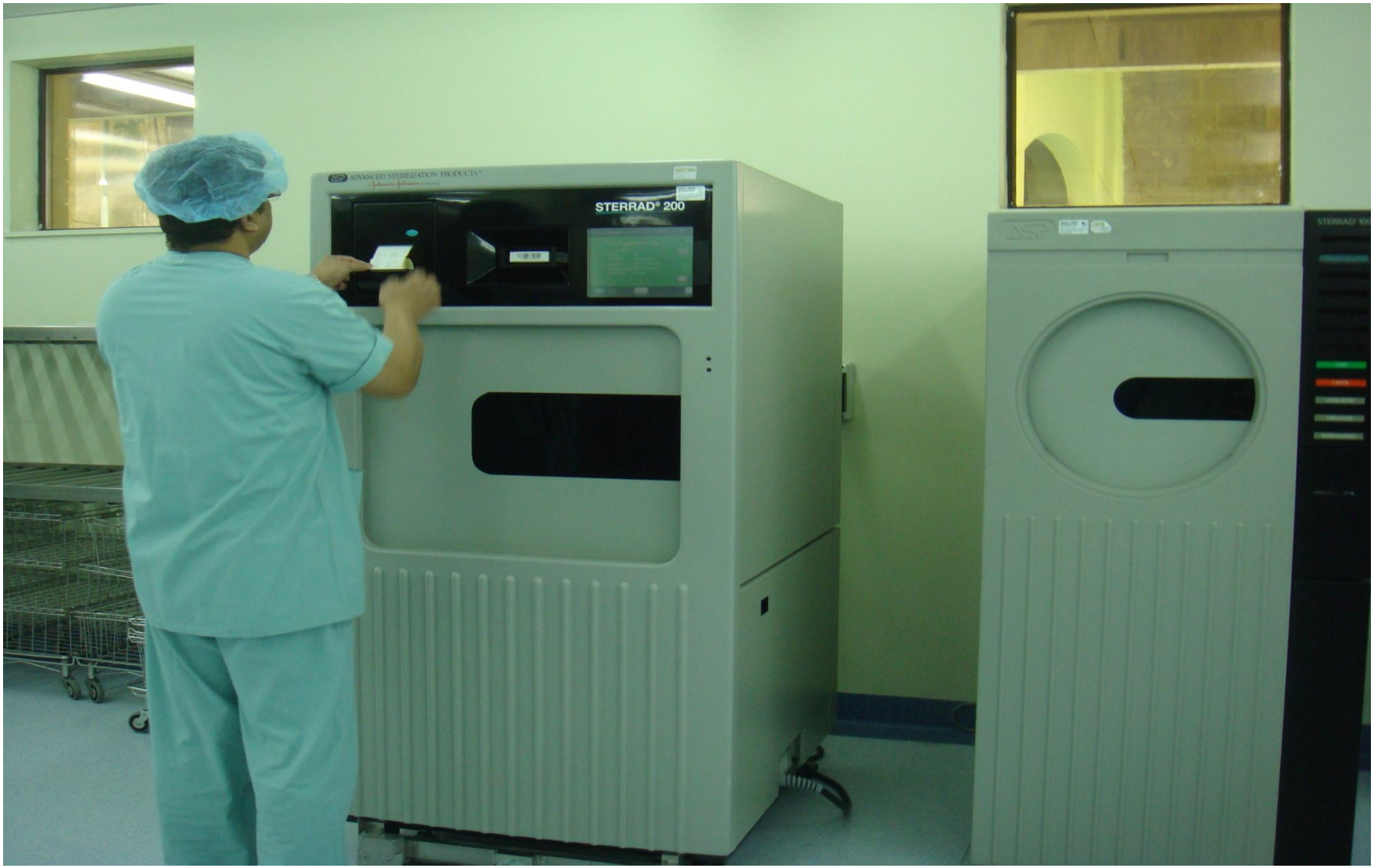
*Spore testing should be performed at the same interval as testing of other sterilizers.

Plasma Sterilization

- Used for moisture and heat sensitive devices, such as cameras, scopes and fiber-optic cables, microsurgical instruments , glass, ceramic & some electrical equipment.
- Operates at temperatures varying from 104°F-131°F (40°C-55°C). - I hour & 15 minutes.
- Advantages of plasma sterilization include speed and safety of use, and the process does not require aeration.
- FDA approved Plasma STERRAD, using cassettes of H2 O2 can be used to sterilize metallic & non-metallic items.

Old Plasma Autoclave

New Sterrad Plasma Autoclave



LIQUID CHEMICAL STERILIZATION

- When used properly liquid chemo sterilizers can destroy all forms of microbial life including bacterial, fungal spores, tubercle bacilli and viruses.

- Liquid chemicals can be used for sterilization when steam, gas or dry heat is not indicated or available.

Common Liquid Chemicals - Capable of causing Disinfection / Sterilization.

- **Aqueous Formaldehyde-** Oldest chemo sterilizers known to destroy spores; rarely used due to its pungent odor
- **2% Aqueous Glutaraldehyde (Cidex)-** Colorless liquid chemical with pungent odor.

*__Short soaking__ period(10 minutes-20 minutes) only provides __high level disinfection__ of instruments.

*__Complete immersion__ in activated glutaraldehyde solution for __10 hours achieves sterilization.__

*After immersion, all surfaces of the instruments must __rinsed thoroughly with sterile water__ before being used > to remove residues of cidex. *Any immersion of less than 10 hours will not kill spores that may be present and must be considered as only a disinfection process.

*Toxic & can cause nasal (respiratory mucosa), eye ,skin irritation.

Common Liquid Chemical Disinfectants

- **OPA Cidex-(0.55% ortho-phthalaldehyde)-**Clear, pale-blue liquid (pH, 7.5), contains 0.55%the non-glutaraldehyde solution for disinfection of flexible endoscopes and other medical devices. *The gentlest reprocessing options available, which means it can substantially reduce instrument damage and repair costs.
- **Alcohol- 70% Isopropyl Alcohol-** Effective & rapidly acting disinfectants. *Alcohol gel preparations today have been introduced & long standing effect, fast in action & more users friendly.
- **Chlorexidine-** Useful skin antiseptic & highly active against vegetative bacteria > used in hand scrubbing .
- **Hypochlorite-** Broad spectrum chlorine disinfectant effective against viruses, fungi, bacteria & spores. *Disinfectant of choice against hepatitis B virus.

Other Methods of Sterilization: Gamma Radiation

- **Gamma Radiation-** Radioactive material, such as a Cobalt-60 source, emits radiation (gamma rays).* Pure energy that is generally characterized by its deep penetration & low dose rates.

- Gamma Radiation effectively kills microorganisms throughout the product and its packaging with very little temperature effect.
- Used on commercial basis for the sterilization of a wide variety of pre-packaged hospital items and devices.
- Total sterilizing time is measured in days.

Flash Sterilization

AORN 2007 - AORN Standards

Section three – Practice IV, 2

- Flash sterilization may be associated with increased risk of infection to patients because of pressure on personnel to eliminate one or more steps in the cleaning and sterilization process. It is essential that all steps in the sterilization process be performed in a conscientious manner.

- ***"Flash sterilization"*** should be used in selected clinical situations & in a controlled manner. *Use of flash sterilizer should be kept to a minimum & only for emergent use.

- Flash sterilization should be used only when there is insufficient time to process by the preferred wrapped or container method, and should not be used as a substitute for insufficient instrument inventory.
- Flash sterilization should not be used for implantable devices.

Principles of Aseptic Techniques

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ADON-O.R.

Aseptic techniques are sets of practices / procedures performed under careful, controlled conditions in order to minimize contaminations of pathogens.

- **Most strictly applied in the O.R.** because of direct & extensive disruption of skin & underlying tissues.

- These practices ensure safe & effective ways in establishing & maintaining sterile field in which surgery can be performed safely.

- Aseptic techniques help to **prevent or minimize surgical site infection.**

All items used within the sterile field must be sterile.

Point of emphasis:

- Sterile items presented to the sterile field must be checked for:
  - * Package Integrity
  - * Expiration Date
  - * Chemical Process Indicator
- Tears in barriers & expired sterilization dates are considered breaks in sterility.
- Use of unsterile items contaminate the sterile field.
- Sterile field is created as well as sterile packages are opened as close as possible to time of actual use.
- Moist areas are not considered sterile.

- Scrubbed personnel should function within a sterile field.

Surgical team is made up of:

* Sterile members or scrubbed personnel-

  work directly in the surgical field.

  Ex. Surgeons, Scrub nurse, O.R. Technician

* Non-sterile members or unscrubbed personnel.

  Ex. Anesthetists, Circulating nurses,

  Anesthesia Technicians, X-Ray Technician, students ☺

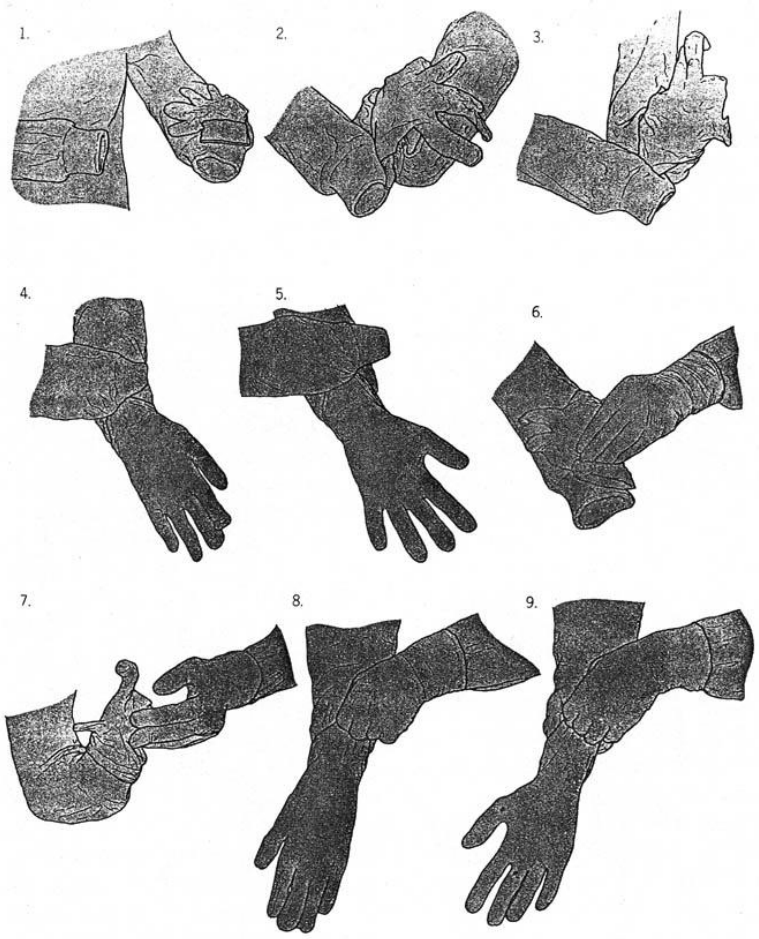
- Points of Emphasis:
- Surgical team members must wear the scrub suit attire with the surgical cap, surgical face mask before performing surgical hand scrub.

- Surgical hand scrubbing should be performed prior to the donning of sterile gown & sterile gloves.

Surgical Hand Scrubbing

- Surgical Hand Scrub is performed before come in contact with sterile field.
- The **first surgical hand scrub should be at least 5 minutes** and the subsequent hand scrub should be at **least 2 to 3 minutes.**
- **Keep nails shorts. No rings & other jewelry, no artificial nails.**
- Principle to be applied: **“ Fluid flows in the direction of gravity.” Hands are held higher than elbows.**

After donning the sterile gown is donning the sterile gloves.(Closed Gloving Technique is recommended in O.R.) Never let the fingers extend beyond the stockinette cuff.



Don Sterile Gown / Gloves

Point of Emphasis:

- Gown should not touch any unsterile parts.
- Gloves outer side is not touched by bare hands.
- Scrub nurse may assist other personnel in donning sterile gown & sterile gloves.

The sterility is limited to the portions of the gowns directly viewed by the scrubbed person.

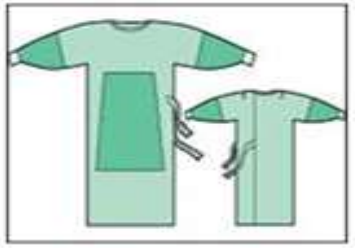
- Gowns are considered sterile only on the:
  1. Front of gown from chest to the level of the sterile field.
  2. Sleeves of gown from 2 inches above the elbow to the cuff.

Note: Cuff should be considered unsterile due to it tends to collect moisture & it is not an effective barrier. Therefore, cuff should always be covered by sterile gloves.

Scrubbed Personnel

- **Areas of gown considered unsterile are:**

1. Gown's neckline
2. Shoulders
3. Under the arms
4. Back



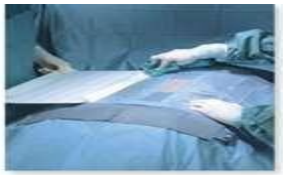
- Not to allow the hands or any items **to fall below the level of sterile field.**

- No sitting nor leaning against unsterile surface because of great contamination

Skin Preparation (Skin Prepping)

- Surgical site is cleaned with appropriate antiseptics containing Povidone-Iodine 70%, Alcohol 70 % & Chlorexidine 0.5%, better use both first iodine and then alcohol.
- Apply antiseptic at the line of proposed incision site in concentric circles moving towards the periphery.
- Cotton tipped applicators with antiseptics are needed to clean the umbilicus thoroughly.
- Antimicrobial tincture or paint may be applied according to surgeon's preference.

Sterile drapes are used to create a sterile field.



- **Surgical Drapes** are sterile materials used to maintain the sterility of the operation field.
- Surgical Drapes establish an aseptic barrier minimizing the passage of microorganisms from non sterile to sterile areas.
- Sterile surgical drapes should be placed on the patient, parts of O.R. table & equipment included in the sterile field, leaving only the incision site exposed.

DRAPING PROCESS

- Only the scrubbed personnel should handle sterile drapes by cuffing the draping material over the gloved hand.

When draping, the surgical drapes should be compact, held higher than the O.R. table & draped from the prepped incision site to the periphery.

- Tables are only sterile at the table level.
- Once the drape is placed, it should not be moved or re-arranged & only the top surface of the draped area is considered sterile.

All items should be dispensed to the sterile field by methods that preserve the sterility of the items & integrity of the sterile field.

- When opening the sterile items, unscrubbed person should open the wrapper flap farthest away from him first and the nearest wrapper last to prevent contamination by passing an unsterile arm over a sterile item.
- After a sterile package or container is opened, the edges are considered unsterile.
- An inch safety margin is usually considered standard on package wrappers, whereas the sterile boundary on a wrapper used to drape is at the table edge.

Dispensing solution to the sterile field

- Either the entire bottle contents should be poured into the receptacle or the remainder should be discarded.
- Edge of the bottle cap is considered contaminated once the cap has been removed from the bottle.
- Solution receptacle (jug/basin) should be placed near the edge of the table or held by the scrubbed person & pouring should be done at the edge of the table & not at the middle.
- Fluid/solution should be poured slowly to avoid splashing. Splashing can cause strike through and contamination of the sterile field.

A sterile field should be constantly maintained and monitored.

- All surgical team members should maintain a vigilant watch over the sterile field and point out any contamination immediately.

- When a breach of sterility occurs, an immediate & appropriate action to be taken to correct the break in the technique & to reduce further risk of contamination. Contaminated item must be removed immediately from the sterile field.

Movement around a sterile field must not cause contamination.

- Surgical patient's **operative site is the center of the sterile field** & all the scrubbed personnel should remain close to this area without wandering around the room. **Movements can cause contamination** the sterile field.

- Surgical team should move only from sterile areas to sterile areas. If they change positions they should turn **back to back or face to face** and maintain a safe distance close to the sterile field.

Figure 4-7 (A, B, and C) Sequence of one sterile person going around another. They pass each other back to back, keeping well within the sterile area and allowing a margin of safety between themselves.

Movement back to back.
Scrubbed person opening a sterile pack

Points of Emphasis

- Scrubbed personnel should keep their arms & hands within the sterile field at all times to avoid any accidental contact with unsterile items or areas.
- Always keep gloved hands in sight & kept at waist level or above because below the waist is contaminated.
- Scrubbed personnel must maintain a safe distance when approaching unsterile objects and personnel. This safe distance or margin of safety is important in identifying safe boundaries between sterile and unsterile areas.
- Non- sterile personnel should always remain in non-sterile area and in contact only non-sterile items to prevent contamination of the sterile field.
- Non-sterile personnel should always face the sterile field on approach and should never walk between 2 sterile fields.
- O.R. personnel with colds & URTI should avoid working inside the theater or else wear double masks.

Items of doubtful sterility must be considered unsterile.

- When a sterile barrier is permeated, it must be considered contaminated.
- Once set up, the sterile field should be monitored constantly.
- When sterile field is left unattended, personnel, airborne contaminants, passage of liquid through material, undetected perforations in material, moisture soaks through a drape or package strike through occurs, these contaminate the sterile field.
- When delivering sterile supplies onto the sterile field, never contact or reach over any portion of the sterile area. Non sterile items should not cross above a sterile field.
- The margin of safety is generally identified as a minimum of 12 inches.
- Avoid sneezing, coughing or talking directly over a sterile field.

Sterile Wound Dressing

- Dressing material should only be opened during wound dressing time.
- Wound or surgical site should be cleaned & dried before application of the dressing material.
- Dressing material should be applied before surgical drapes are removed to avoid contamination of the incision.

Take note

- All surgical team must practice these principles of aseptic technique to prevent the transfer of microorganisms into the surgical wound during the intra operative period.
- It is the surgical team members responsibility **to develop a strong surgical conscience, adhering to the principles of surgical asepsis and correcting any improper technique witnessed in the OR.**

References:

- King Khalid University Hospital Infection Control Manual (1430-2009) p. 36 - 47
- AORN Standard Recommended Practices & Guidelines copyright 2006 p. 431 - 659
- Rothrock, J.C. ed. Alexander's Care of the Patient in Surgery 9th ed.(St. Louis Mosby Year Book, 1991) p.46-101
- Mangram AJ, Hospital Infection Control & Prevention (CDC) 1999 24/4 p.247-278
- Goldman, Maxine A. Copyright 2008 p.1-98