

Sterilization and Operating Room Setup

Done By:

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🕒 **Introduction:** There is nowhere, perhaps, is more important to preserve the safety of the patients than in the **Operating Room**, many lives often depend on it...

🕒 **Evolution of Surgical Asepsis / Sterilization / Terminologies**

🕒 **Methods of Sterilization**

- Physical Methods
- Cool Chemical Methods
- Liquid Chemicals and other methods.

🕒 **Sterilization Processes**

- Preparation of items before sterilization
- Steam Sterilization process
- Methods and Testing the Effectiveness of the Autoclave
- Storage of Sterile Packages

🕒 **Principles of Aseptic Techniques for O.R. Set Up**

🕒 **Infection Control Measures / O.R. Guidelines**

🕒 **Early Concepts of Infection / Evolution of Surgical Asepsis /Sterilization**

450 BC (Hippocrates)-	<u>Wine & boiled H₂O</u> used to irrigate wounds.
1450 BC (Moses)-	<u>Sterilization by fire</u>
200 AD (Galen)-	Boiled the instruments in the care of wounded gladiators (soldiers).
1545 (Fracastorius)-	Proclaimed that diseases were spread: by <u>direct contact</u> , by <u>handling infected articles</u> that infected people handled previously & by <u>airborne transmission</u> .
1774 (Scheele)-	Discovery of <u>Chlorine</u>
1818 (Thenard)-	Discovery of <u>Hydrogen peroxide</u>
1837 (Schwan)-	Beginning of sterilization by <u>heat</u>
1847 (Semmelweis)-	Used chloro lime for puerperal sepsis prevention. Introduced <u>washing of hands between patients</u> .
1850-1862 (Louis Pasteur)-	Found out that <u>heat can kill germs (Pasteurization)</u> 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 <u>Ethylene oxide</u>
1860 (Kuchenmeister)-	Discovered <u>Phenol</u> as sterilizing agent
1860 (Joseph Lister) -	Advocated <u>carbolic soaks, hand sprays</u> .

	wound dressings, sutures.
1867 (Lister)-	Antiseptic principle in the practice of surgery. Discovered <u>phenol</u> for infection prevention after operation.
1876 (Koch R.)-	Discovered bacillus anthracis as the cause of disease.
1879 (Chamberland)-	The first autoclave was introduced.
1886 (Ernst Von Bergmann & associates)-	Discovered <u>steam sterilizer under pressure</u> as it is known today to kill heat resistant microorganisms.
1894 (Reinecke)-	Sterilization action of 90% <u>alcohol</u>
1894 (William Stewart Halsted)-	Pioneered the widespread use of <u>rubber gloves</u> during surgery
1900-	All sterilization equipment designed in USA & Europe
1908 (Grossich)-	Sterilization by <u>Iodine tincture</u>
1927 (Schrader & Bossert)-	Examination of sterilization action by <u>Ethylene Oxide</u> .
1929-	<u>EO gas</u> as anti- bacterial agent was introduced.
1933 (Underwood C.)-	Completion of high-pressure steam sterilizer.
1940-	EO gas in <u>industries & hospitals</u> is used for sterilization
1945-Gamma radiation-	Introduced & used on <u>commercial basis</u> for the sterilization.
1949 (Philips & Kaye)-	Build up theory of E.O. gas sterilization
1963 (Stone Hill)-	Development of <u>Glutaraldehyde</u> .
1980 - Antibiotics	Are given before certain types of surgery <u>to prevent infection</u>
1993-	<u>Plasma Sterilizer</u> was introduced
1999-	<u>OPA Cidex</u> 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	Generalized reaction to pathogenic microorganism , evident clinically by signs of inflammation & systemic manifestation of febrile condition.
Aseptic Techniques	Practices that restrict microorganisms in the environment, on equipment, supplies &

	prevent the normal body flora from contaminating the surgical wound. Methods 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 growth. Combat sepsis. Disinfect body surfaces, on skin & tissue & inhibit the growth of endogenous bacteria.
Disinfection	Any process, which renders inanimate objects free of pathogenic bacteria
Disinfectants	Agents that kill all growing or vegetative forms of microorganisms thus completely eliminating 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 perform and assist in any invasive procedures on patients.
- Sterility of all items directly used in such procedures.
- Disinfection of all surfaces and other items in the immediate environment.

🕒 **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 don't use it

🕒 **Take Note:**

- Surgical instruments and heat sensitive items are sterilized by the method recommended by the manufacturer.
- No disposable items designed for sterile single use should be reprocessed.
- Sterilizing agent to be in contact with every part / 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 KKHU)
2. Moist heat- Steam Autoclave- (Available in KKHU)

- **Cool Chemical Methods:**
 3. E.O. Sterilizer- (Available in KKHU)
 4. Plasma Sterilizer (Sterrad)- (Available in KKHU)
 5. Liquid Chemicals
- **Other Methods**

- **Physical Methods:**

Moist heat, at a raised atmospheric pressure <u>Steam sterilization:</u>	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)
<u>Steam Autoclave:</u>		An autoclave is a closed chamber in which items or objects are subjected to steam at high pressure and temperature above 100°C
<u>Types of Autoclaves:</u>	 <u>Downward Displacement Autoclave-</u>	Air is removed in two stages and sterilization is effected by an atmosphere of pure steam. (Not available in KKHU)
	 <u>High Vacuum / High Pressure Autoclave-</u>	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 134°C. (Available in KKHU)
<u>Preparation of Items Before STERILIZATION</u>	<ol style="list-style-type: none"> 1. Decontamination 2. Disassembly 3. Washing 4. Drying 5. Packing 6. Loading in sterilizer 	
<u>New Steris Autoclave</u>		

<u>Ultrasonic Washer</u>		For delicate instruments like in vascular or neurosurgery
<u>Automated Washer</u>		Washer and dryer
<u>THE STEAM STERILIZATION PROCESS – FIVE DISTINCT PHASES</u>	<u>④ PHASE I - Loading phase</u>	In which the objects or items are packaged and loaded in the sterilizer.
	<u>④ PHASE II - Heating phase</u>	In which the steam is brought to proper temperature and allowed to penetrate around and through the objects in the chamber.
	<u>④ PHASE II I- Destroying phase</u>	Or time temperature cycle - in which all microbial life is exposed to the killing effect of the steam.
	<u>④ PHASE IV - Drying and cooling phase</u>	In which the objects are dried and cooled, filtered air is introduced into the chamber, the door is opened and the objects are removed and stored. If u touch it and still moist you'll contaminate item
	<u>④ PHASE V - Testing phase</u>	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
<u>Loading Procedure</u>		

<u>MAKING OF STERILE PACKAGES</u>	 <p>Ⓢ <u>Packages/Instrument sets should have the following external indications, showing that they have been processed:</u></p>	
	<ol style="list-style-type: none"> 1. Autoclave tapes show a package that has been through a sterilization cycle and should be visible outside of every package sterilized. 2. Autoclave tape is designed black when a certain temperature inside the autoclave is reached. 	<ol style="list-style-type: none"> 3. Every package must be labeled as to its contents. 4. Every package or tray is to be labeled with the <u>processing date, autoclave used and load number.</u> This will assist locating processed items in case of recall.
<u>STORAGE OF STERILE PACKAGES</u>	<ol style="list-style-type: none"> 1. Sterile packages should be left untouched and allowed to be cooled before storage to avoid condensation inside the packs. 2. Sterile <u>packages must be handled as little as possible</u> to reduce the risk of contamination. 	<ol style="list-style-type: none"> 3. <u>Event Related Sterility</u>- An item that has been properly cleaned, sterilized, stored & handled will remain sterile unless it is opened or an event happens that compromises sterility
4. Sterile packages should be stored on open shelves:		<ul style="list-style-type: none"> ▪ 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.
5. Sterile packages must be stored and issued in correct order.	<ol style="list-style-type: none"> 6. Sterile items are good for <u>either 30 days or 6 months to 1 year</u> 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". 7. <u>Shelf life</u> that refers to the length of time a package maybe considered sterile. 	<ol style="list-style-type: none"> 8. Storage room must be subjected to regular adequate pest control to prevent contamination from rodents, ants and cockroaches. 9. Traffic is restricted to CSSD (Central Sterilization Supply Department) personnel and trainees only.
<u>Causes of failure to produce a sterile load</u>	<p>Ⓢ <u>Faults in the autoclave</u></p>	<ol style="list-style-type: none"> 1. Poor quality steam and leaking door seals 2. Failure to remove air and condensate 3. Faulty gauges and timings
	<p>Ⓢ <u>Errors in loading:</u></p>	<ol style="list-style-type: none"> 1. Large packs and over packing 2. Excessive layers of wrapping materials
	<p>Ⓢ <u>After sterilization due to:</u></p>	<ol style="list-style-type: none"> 1. Large packs and over packing 2. Excessive layers of wrapping materials



<u>METHODS OF TESTING THE EFFECTIVENES OF AUTOCLAVES:</u>	<u>Mechanical</u>	Chart and gauges usually carried out by Biomed Engineer.
	<u>Chemical</u>	Use of sensitive autoclave tapes, strips and card. A daily test in an empty chamber. For high vacuum / high pressure autoclaves Ex. 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. Ex. Browne's TST strips.
	<u>Biological Indicator</u>	Live organism
<u>Biological Indicator- Biological Spore Testing</u>	1. Testing of autoclaves is necessary to test autoclaves regularly with Geobacillus stearothermophilus , which is one of the most heat tolerant species of bacteria	2. If sterilization in an autoclave does not destroy the Geobacillus spores , the autoclave is not working properly.
<u>TESTING THE EFFECTIVENES S OF THE STEAM AUTOCLAVE:</u>	<u>First:</u> They run it empty for one cycle. (Dummy Run) – to warm up the machine. <u>Second:</u> They put inside in the middle of the chamber, the Bowie Dick Test Pack and run it again and finish the whole cycle. On high pressure- to test leaks and presence of air. (Yellow turns black)	<u>Third:</u> They load it with items and trays for sterilization (little bit lower pressure). It is done once daily . <u>Fourth:</u> Live Organism- done once in every Saturday morning in CSSD, KKHU.



➤ **COLD METHOD-Chemicals :**

<u>1.Ethylene Oxide (EO)</u>	<u>2.Plasma Sterilizer</u>	<u>3.LIQUID CHEMICAL STERILIZATION</u>
<ul style="list-style-type: none"> *Well established technique for sterilizing heat labile articles. *Colorless gas at ordinary temperatures *Odor similar to that of ether. *Inhalation toxicity similar to that of ammonia dioxide and fluorinated hydrocarbons (Freon). 	<ul style="list-style-type: none"> *Plasma Autoclave (Now replace EO autoclave) *Low Temperature Hydrogen Gas Sterilizers. FDA approved Plasma STERRAD, use cassettes of H2 O2. 	<ul style="list-style-type: none"> Liquid chemo sterilizers can destroy all forms of microbial life including bacterial, fungal spores, tubercle bacilli and viruses when used properly.
<ul style="list-style-type: none"> ♣ In general, exposure period of 4 to 7 hours is necessary to complete E.O. sterilization. *Temperature for sterilizing is 21° C to 60° C (70° F to 140° 	<ul style="list-style-type: none"> ♣ Operates at temperatures varying from 104°F- 131°F (40°C-55°C). – 45 minutes to 1 hour. 	

F).F		
<p>Usage: For sterilizing vascular and bone grafts, delicate instruments, plastic articles such as disposable syringes, surgical instruments such as cystoscopes, catheters, bacteriological media and vaccines.</p>	<p>Usage: Used for moisture and heat sensitive devices, such as cameras, scopes and fiber-optic cables, microsurgical instruments, glass, ceramic & some electrical equipment. Almost all non-metallic and metallic items.</p>	<p>Usage: Can be used for sterilization when steam, gas or dry heat is not indicated or available</p>
<p><u>The procedure:</u> Before EO sterilization, objects to be cleaned thoroughly and wrapped in a material that allows the gas to penetrate.</p> <p>Chemical indicators for EO should be used with each package to show it has been exposed to gas sterilization process.</p> <p>Gas sterilizers should be checked once a week with commercial preparation spores, usually Bacillus Atropheus formerly Bacillus Subtilis Var. Niger.</p> <p>Objects processed by gas sterilization need special aeration –[airing] according to manufacturer’s recommendation.</p> <p>Materials aerated in a mechanical aerator that provides a minimum of 4 air changes per hour and elevates the temperatures within the cabinet to 50° C to 60° C (122° F to 140° F) require 6-8 hours of aeration based on the composition of the sterilized items and the aerator manufacturer’s instructions.</p>	<p><u>The procedure:</u> Employs 1.8 ml. of 58 % hydrogen peroxide vaporized in a sterilization chamber after a vacuum is created.</p> <p>*Vapor is converted into plasma by <u>means of radio-frequency</u> energy.</p> <p>*<u>Spore testing</u> should be performed at the same interval as testing of other sterilizers.</p>	
<p>■ <u>Advantages of EO Sterilization:</u></p> <ul style="list-style-type: none"> ▪ For heat sensitive items and unable to withstand sterilization by saturated steam under pressure. ▪ Penetrates through masses of dry materials; does not require high 	<p>■ <u>Advantages of EO Sterilization:</u> include speed and safety of use (poses no dangers), and the process does not require aeration.</p>	

temperatures, humidity or pressures. ■ Non- corrosive and non- damaging to items.		
■ DISADVANTAGES OF EO: ☉ Lengthy process with long exposure and aeration periods. ☉ Produce serious burns on exposed skin if not immediately removed. ☉ Insufficiently aerated materials can cause irritation, burns of body tissues, hemolysis of blood and diluents used with EO cause damage to some plastics. ☉ Toxic and may cause Cancer . ☉ Expensive and more complex process		
	 <p><u>New Sterrad Plasma Autoclave</u></p>	

Common Liquid Chemicals - Capable of causing Disinfection / Sterilization

1. **Aqueous Formaldehyde**- Oldest chemo sterilizers known to destroy spores; rarely used due to its pungent odor.

2.2% **Aqueous Glutaraldehyde (Cidex)**- Colorless liquid chemical with pungent odor.

♣ **Short soaking** period for 10 to 20 minutes only provides **high-level disinfection**.

♣ **Complete immersion** in activated cidex solution for **10 hours achieves sterilization**.

- ♣ After immersion, all surfaces of the instruments must be **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 :

3. **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.
4. **Alcohol- 70% Isopropyl Alcohol**- Effective & rapidly acting disinfectants. *Alcohol gel preparations today have been introduced & long-standing effect, fast in action & more users friendly.
5. **Chlorexidine**- Useful skin antiseptic & highly active against vegetative bacteria **(used in hand scrubbing)**
6. **Hypochlorite**- Broad spectrum chlorine disinfectant effective against viruses, fungi, bacteria & spores. ***Disinfectant of choice against hepatitis B virus**

➤ **Other Methods of Sterilization:**

Gamma Radiation

It's 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

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.

Should be used only on: Emergency situation like dropped instrument and when insufficient time to process by the preferred wrapped and sterilization method.

Flash sterilization should not be used for implantable devices.

Principles of Aseptic Techniques

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

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

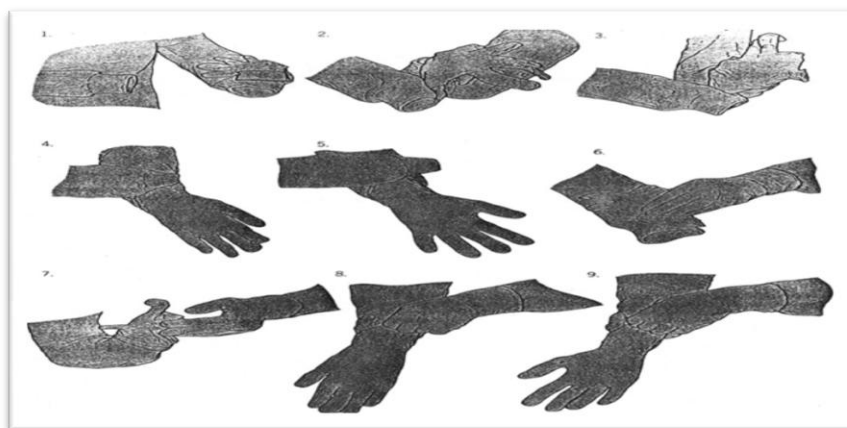
Points of Emphasis:

- ♣ **Surgical team members must wear the scrub suit attire with the surgical cap, surgical facemask 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.
- ♣ **First surgical hand scrub - should be at least 5 minutes.** The subsequent hand scrub should be at least **2 to 3 minutes**.
- ♣ **Keep nails short. No rings & other jewelry, no artificial nails.**
- ♣ Principle to be applied: “ **Fluid flows in the direction of gravity.**” **Hands are held higher than elbows.**
- ♣ Dry hands with a sterile towel & don sterile gown & gloves.

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.

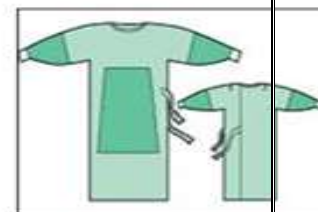
Don Sterile Gown / Gloves:

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.

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

<u>Gowns are considered sterile only on the:</u>	<u>Areas of gown considered unsterile are:</u>
<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 1. Gown's neckline 2. Shoulders 3. Under the arms 4. Back
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.	<p>Not to allow the hands or any items to fall below the level of sterile field.</p> <p>No sitting nor leaning against unsterile surface because of great contamination</p>



Skin Preparation (Skin Prepping) :

- ♣ Surgical site is cleaned with appropriate antiseptics.
- ♣ **Antiseptics to be used in O.R. should be a combination of 2 antiseptics with different mechanisms of action could be better at fighting bacteria than a single antiseptic.**
- ♣ Example: Povidone Iodine 70% & 70 % Alcohol ((better use both first iodine and then alcohol.))
Chlorohexidine 0.5 % & 70% Alcohol
- ♣ Apply antiseptic at the line or center 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

- ♣ **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.
- ♣ 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 :

- ♣ Unscrubbed person should open the wrapper of a sterile item flap farthest away from him first and 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 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.**

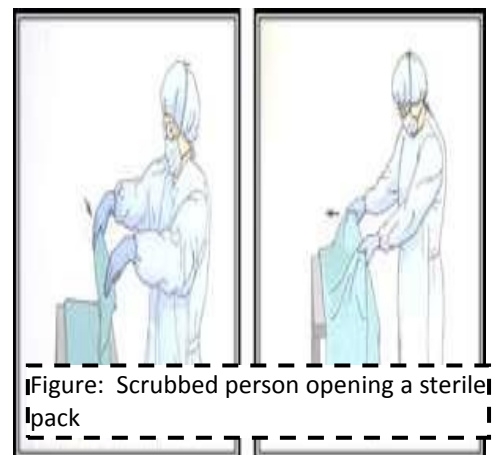
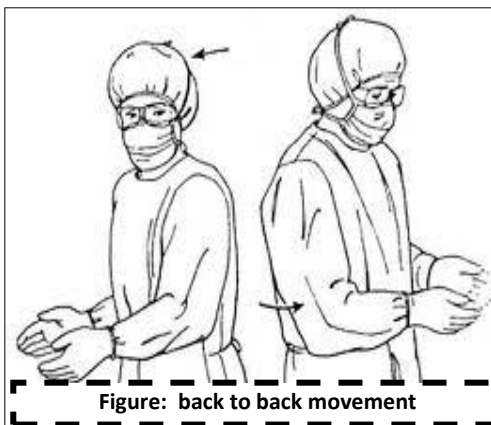
A sterile field should be constantly maintained and monitored.

- ♣ All surgical team members should maintain a **vigilant watch (careful)** 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** of 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.



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. **Safe distance or margin of safety** is important in identifying safe boundaries between sterile and unsterile areas.

O.R. Personnel

- ♣ 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 surgical 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.
- ❖ **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

- ♣ Surgical team members must practice these principles of aseptic technique to prevent the transfer of microorganisms into the surgical wound during the intra operative period.
- ♣ **O.R. set up must be in an aseptic environment.**
- ♣ Surgical team members responsibility- **to develop a strong surgical conscience, adhere to the principles of surgical asepsis and correct any improper techniques witnessed in the OR.**

O.R. Zones / Areas

- Ⓢ **Unrestricted Areas** - where street clothes are permitted. Ex. Changing Rooms, O.R. Receiving & Transfer areas
- Ⓢ **Semi –restricted Areas** – Hallways, corridors, equipment storage rooms, utility rooms & staff sitting rooms.
- Ⓢ **Restricted Areas** – Inside Operating theaters

Proper Surgical Attire in the O.R.:

- Ⓢ Provides barrier between O.R. personnel & patient
- Ⓢ Protection of O.R. personnel against exposure to infectious microorganism.
- Ⓢ **KKUH Policy** – All O.R. personnel who enter the semi-restricted areas & restricted areas of O.R. must wear freshly laundered surgical scrub suits intended only to be used within the O.R.

Infection Control Guidelines:

- Ⓢ Air quality & ventilation – Maintain at least 15 air changes cycle per hour & at least 3-4 fresh air changes (positive pressure)
- Ⓢ Effective O.R. cleaning – Terminal cleaning
- Ⓢ Effective medical equipment cleaning & disinfection
- Ⓢ Effective laundry cleaning
- Ⓢ Disposal of sharps
- Ⓢ Waste management- Risk wastes & non-risk wastes
- Ⓢ Standard Precautions

Reducing Surgical Site Infections:

- Ⓢ Use prophylactic antibiotics
- Ⓢ Remove hair properly through hair clipping.
- Ⓢ Ensure glycemic control – adequate control serum glucose levels on diabetic patients.
- Ⓢ Prevent hypothermia.
- Ⓢ Proper surgical operating technique
- Ⓢ Provide supplemental O2 during surgery.
- Ⓢ Limit O.R. traffic – Visitor Control Policy, Visitor's permit
- Ⓢ Designate specific rooms and routes – Traffic Pattern
- Ⓢ Use of disposable items – No reprocessing is allowed. Follow manufacturer's instructions.
- Ⓢ Monitor staff's health.

Universal Protocol – for Preventing Wrong-site, Wrong-Procedure & Wrong – Person Surgery(WHO)

- Ⓢ Marking of the surgical site Surgical Safety Checklist
- Ⓢ Pre-operative verification process-Sign in
- Ⓢ Time-out before start of procedure
- Ⓢ Post-Op Verification Process- Sign Out