

Sterile Technique and Infection Control

Diagnostics, Infection Control and Sterilization



Lesson Objectives:

1. Review guidelines and terms related to sterile technique
2. Explain the concepts of barriers and containment
3. Demonstrate sterile techniques
4. Describe surgical attire
5. Demonstrate methods of hand hygiene using the correct technique
6. Demonstrate correct gowning and gloving techniques
7. Demonstrate how to introduce sterile items onto the sterile field
8. Demonstrate and describe methods used to maintain the sterile field
9. Demonstrate the principles of Standard Precautions
10. Describe important components of the OSHA Bloodborne Pathogens Standard
11. Discuss the purpose and procedures used in transmission-based precautions

Primary Sources of Practice Standards

- Agency for Healthcare Research and Quality (AHRQ)
- American College of Surgeons
- Association for the Advancement of Medical Instrumentation (AAMI)
- Centers for Disease Control and Prevention (CDC)
- Occupational Safety and Health Administration (OSHA)
- Association of perioperative Registered Nurses (AORN)

Sterile Technique

- Sterile technique involves specific practices that are carried out to prevent contamination and infection of the surgical wound
- When an object/surface is sterile, it is completely free from all living microorganisms, including spores
- This term is absolute: Items are sterile, or they are not sterile
- Important terms related to sterile technique given in following slides



Sterility and Sterile Field

- **Sterility:**

- Complete absence of living microorganisms, including spores, proven by prescribed sterilization methods.

- **Surgical Conditions:**

- Surgery conducted under sterile conditions with all instruments, supplies, and drapes being sterile.

- **Sterile Field:**

- Defined area including draped patient, instrument tables, and team members in sterile attire, with strict boundaries maintained during surgery.

Contamination

- **Surgical contamination**

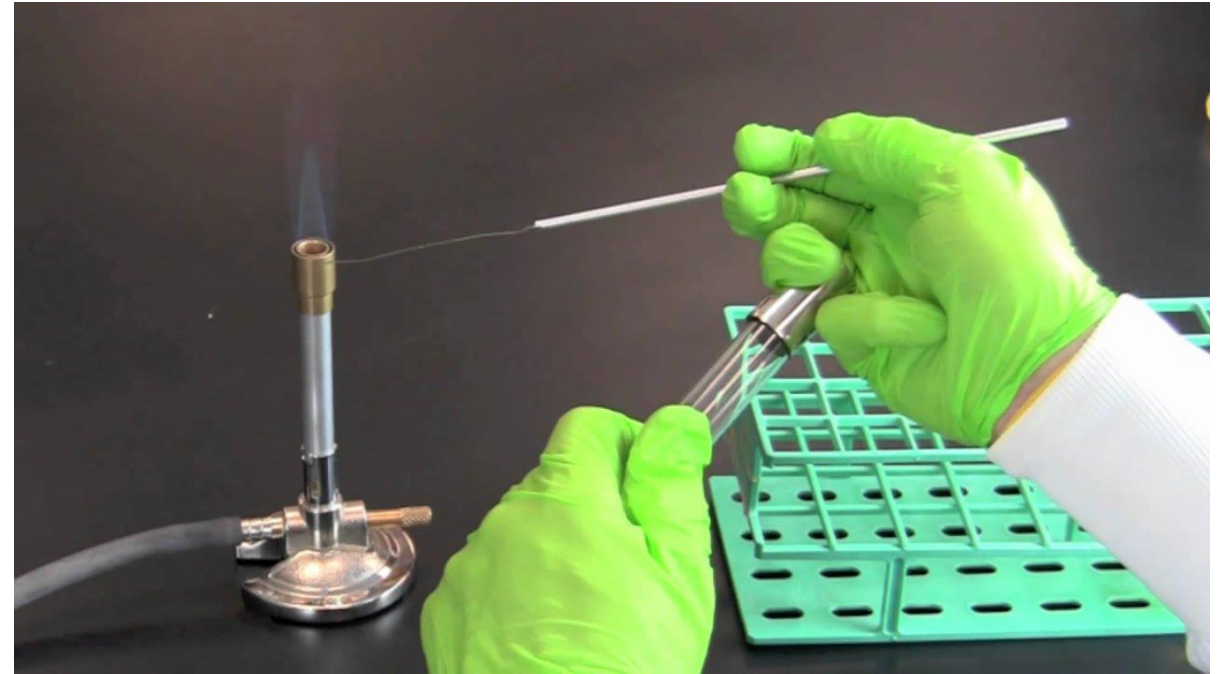
- Occurs when potentially pathogenic microorganisms are introduced into the surgical wound or any sterile area of the sterile field
- Simply: When a Non-Sterile item comes in contact with a Sterile Item. The Sterile Item is no longer sterile and is considered "Contaminated"

- **Gross contamination**

- The contamination of a large area of tissue or the environment by an actual or potentially infective material

Aseptic Technique

- A method of doing and thinking used in surgery
- A method of performing tasks to reduce infection
- A method based on principles associated with the spread of microorganisms
- Objects of the technique
 - Containment
 - Confinement
 - Reduction



Concepts of Barriers

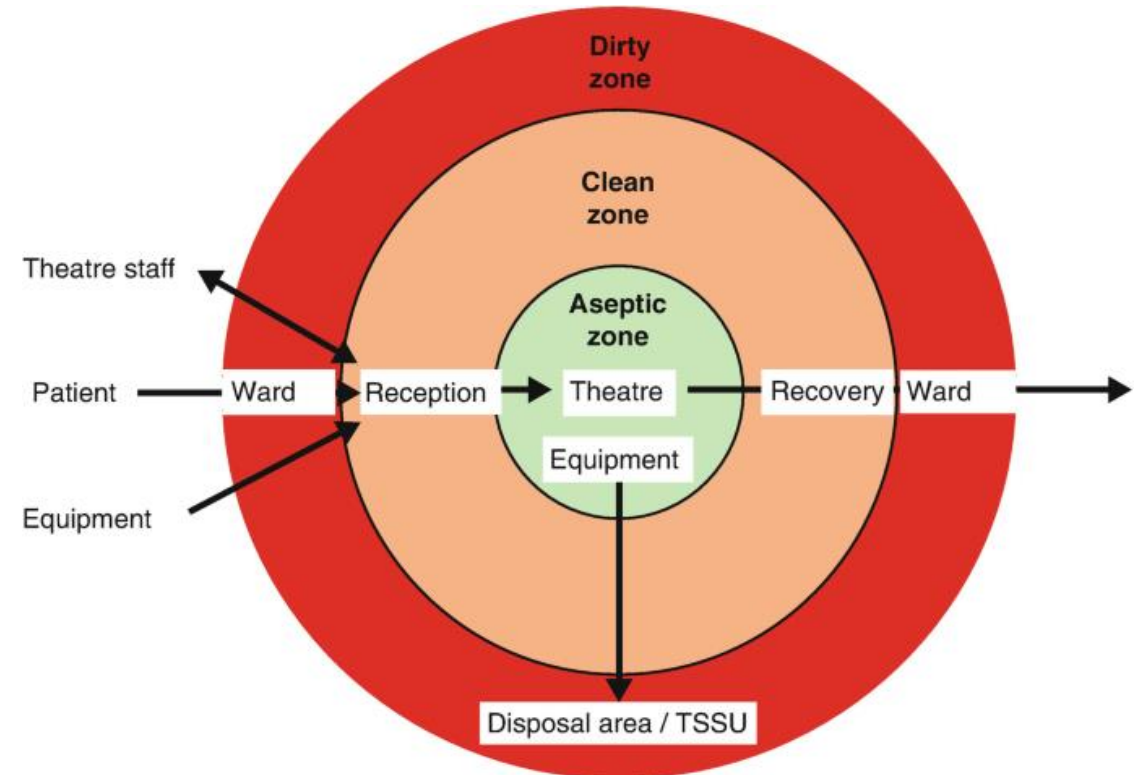
- A foundation principle of sterile technique is the concept and practice of placing a barrier between a source of contamination and a sterile surface
 - **Physical barrier**
 - Gowns, Gloves, Masks, Drapes
 - **Chemical barrier**
 - Antimicrobial Agents
 - **Distance**
 - Keeping Non-sterile items and persons away from Sterile Items

Sterile Technique

- A sterile field should be continually monitored
 - If the field is not monitored, it could be contaminated
 - Never turn your back to the sterile field
- Maintaining Sterility is the responsibility of the entire surgical team
 - If any team member believes an item to be contaminated, it is contaminated
- Do not reach over the sterile field

Functional Zones of the Operating Room

- **Unrestricted zone**
 - Offices, Lounges, Pre-op/PACU, Patient/Visitor Traffic Areas
- **Semi-restricted zone**
 - Past the "Red Line"
 - Surgical Attire is required
- **Restricted zone**
 - The Procedure Rooms
 - Surgical Attire is required
 - Masking required when a sterile field is open



Operating Room Environment

- Heating, ventilation, and air conditioning (HVAC) are crucial for infection control
 - **Temperature and humidity**
 - 68-75°F Prevents Microbial growth and patient hypothermia
 - 30-60% Humidity Range
 - Too Humid (over 60%) promotes microbial growth
 - Too Arid (below 30%) promotes static/fire risk
 - **Air changes and filtering**
 - 15 Air Exchanges/Hour with 3 Clean
 - **Air pressure and flow**
 - Positive pressure continually pushes old air out
 - Door must be shut and air vents unobstructed

Personal Cleanliness

- Perioperative personnel must be meticulous about personal hygiene
 - Maintain good health
 - Prevent cross-infection to others
 - Minimize spread of microbes in surgical environment



Hand Hygiene

- **Purpose**
 - Reduce number of bacteria to an absolute minimum
 - Prevention from Dermatitis and other skin conditions
- **Fingernails**
 - Must be no longer than 2 mm
 - Long nails, nail extenders, and wraps must not be worn
 - It's up to a multidisciplinary team in the clinical setting to determine if nail polish can be worn
 - Chipping polish is an infection risk even when polish is permitted
- **Remove all jewelry**
- **Use hand lotions and creams**



When to Wash Hands

- At the beginning and end of each workday
- Before and after any contact with a patient
- Between contacts with potentially contaminated areas of the same patient
- Before contact with sterile packages
- Whenever hands are visibly soiled
- Before performing the surgical hand rub
- Immediately after contact with blood or body fluids, regardless of whether gloves were worn at the time of contact
- Before and after eating
- After toileting

Surgical Attire

- Worn to maintain high level of asepsis required in the surgical environment
- Surgical Attire Includes:
 - Scrub suit (pants, shirt or tunic over pants)
 - Disposable head covers (must cover all hair/facial hair)
 - Shoes made from solid nonfabric material, closed in front and back
 - Eyewear and face shield
 - Mask (Surgical Mask with ties, not "ear loops")
 - Nonsterile Jacket or Cover
- Surgical Scrubs should be donned and doffed within the OR Area
 - Scrub Machines or Clean Linen within the OR allow staff to change on the unit
- Shoes should not leave the OR environment, or Shoe covers should be worn

Surgical Scrub

- Perform immediately before donning sterile gown and gloves or after direct exposure (skin contact) with blood or body fluids
- Hand Rub - "Scrubbing"
 - Hand rub designated for use in preparation for surgery can be used before donning sterile gloves.
 - Because the application of hand rub products does not remove debris, the hands, including the subungual area, must be thoroughly washed before the product is applied.
 - After surgical scrub, personnel should proceed to the designated operating room
 - Arms and hand should not brush the scrub suit to avoid contamination
 - Hold towel away from the body

Watch the "Surgical Hand Scrub" video for a step by step guide of this process

Anatomical Surgical Hand Scrub Video



Anatomical Surgical Hand Scrub Video

Summary of Video:

- Wash Hands prior to Hand Scrub
- Clean Nails and fingertips. Work way up the hand and through arm.
- Do not go back over any area
- Rinse hands in one motion. Hold fingertips upward, so water drains downward

**Watch the "Brushless Hand Scrub" Video for
an overview of this Scrub**

Brushless Hand Scrub Video



Brushless Hand Scrub Video

Summary of Video:

- Brushless hand scrub can be used after the first surgical scrub of the day (brush scrub)
- Brushless hand scrub can be less caustic on hands
- Application follows similar procedure to brush hand scrub

Drying the Hands, Gowning and Gloving

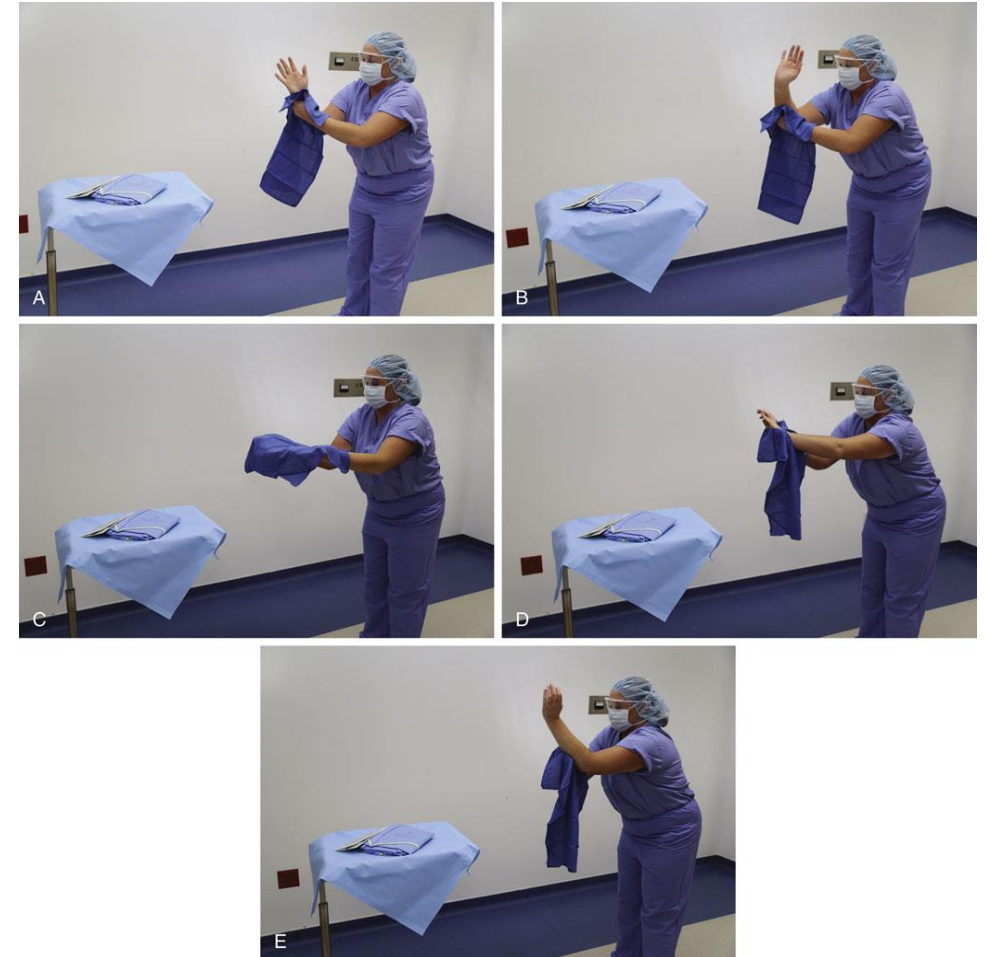
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- **Sterile Gowns and Gloves:**

- Provide a barrier between wearer's skin and sterile field.
- Selected based on surgical facility needs and procedures.

- **Drying Hands:**

- Keep hands up post-scrub to prevent water dripping.
- Avoid towel contamination by holding away from body.
- Towel handed off to circulator or dropped into kick bucket.



Drying the Hands, Gowning and Gloving

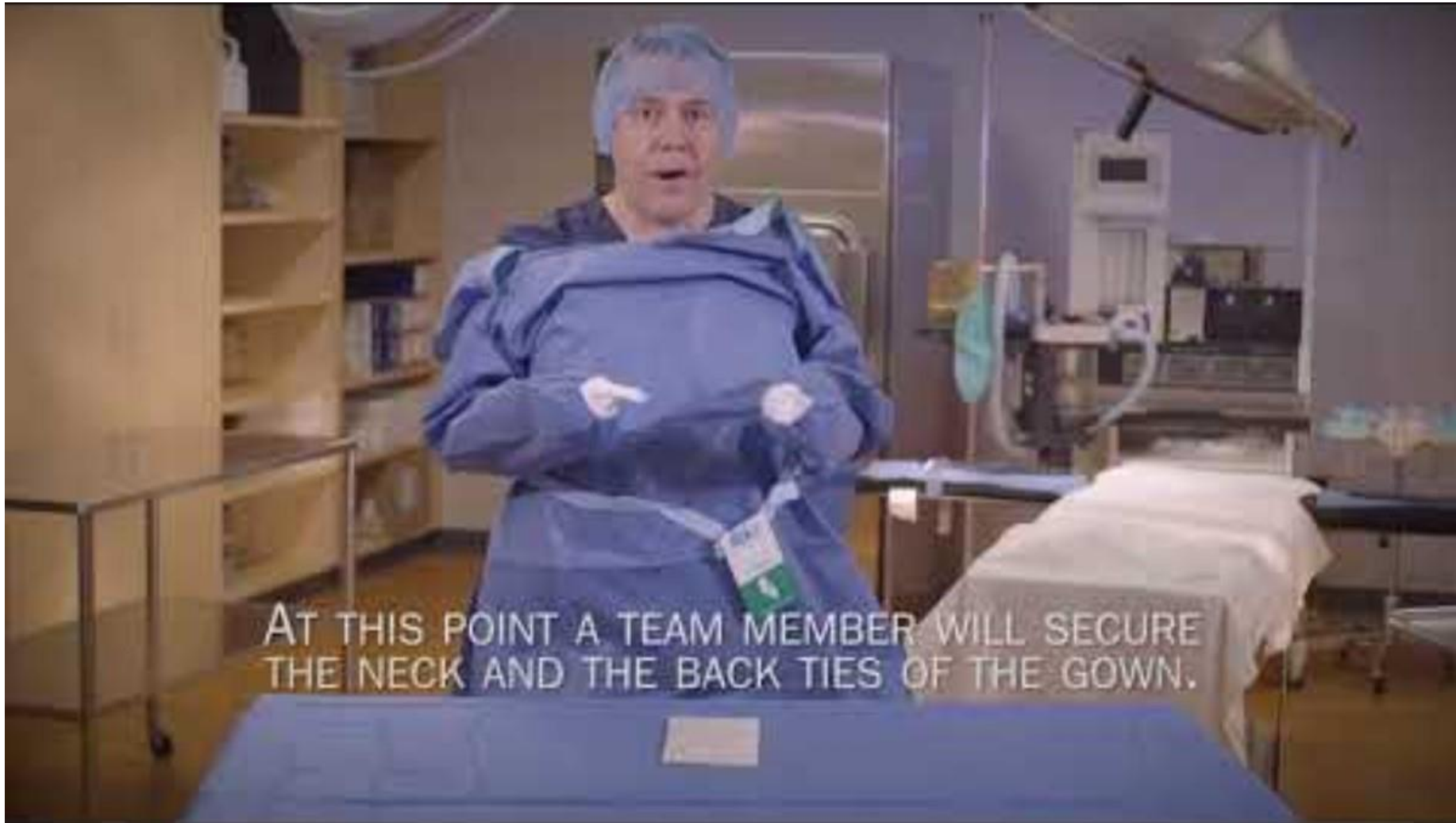
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- **Unassisted Gowning:**

- Surgical gowns worn by all sterile personnel.
- Donned immediately before surgery; changed if contaminated.
- Gowns have moisture-proof barrier; wraparound type.
- Inside surface contacts scrub suit; outside surface sterile from waist to axillary line and hands to elbows.
- Gowns folded inside-out for easy donning.
- Circulator assists with securing ties and back flap.
- Avoid advancing hands too far into cuff; secure gown back flap after gloving.

Watch the "Gowning and Gloving Self " Video for an overview on gowning yourself

Gowning and Gloving Self Video



Gowning and Gloving Self Video

Summary of Video:

- Open Gown like a book
- Hands never come out of cuffs
- "Closed Glove Technique" Pull glove cuff over gown cuff

Next, Watch the "Gowning and Gloving another person" Video for gowning another person

Gowning and Gloving Another Person Video



Gowning and Gloving Another Person Video

Summary of Video:

- Towel to Dry Hands
- Gown – Reverse of gowning self – protect your hands from contamination
- Gloves – Start with the right hand, then left

Preparing the Sterile Field – Opening a Surgical Case

- **Sterile Equipment Preparation:**

- Two steps: case opening and case setup.
- Case opening done by nonsterile staff.
- Case setup performed by scrubbed team member.
- Surgical technologist (ST) and circulating nurse may open case together initially.
- ST performs surgical hand antisepsis before case setup.

- **Creating the Sterile Field:**

- OR furniture and equipment positioned to prevent contamination.
- Sterile supplies brought in on closed case cart.
- Supplies opened using sterile technique.

Watch the "Setting up for Surgery" video for a demonstration of setup

Setting up for Surgery Video



Setting up for Surgery Video

Summary of Video:

- While non-sterile: Circulator and Scrub open sterile pack, instruments and supplies
 - Establish the sterile field
- Scrub "scrubs in" - Gowns/Gloves self and begins to setup
 - Drape all tables
 - Bring Instruments to table
 - Towel Roll for "string". Clamp, Needle Holder and scissor instruments will go here
 - "Pan" - the inner instrument casket will be used for organizing other instruments
 - Move supplies to where they need to go
 - Tip: Touch it once, do not move items multiple times for a more efficient setup

Creating the Sterile Field

(Slide 1 of 4)

- **Sterile Item Distribution:**

- Method depends on type, wrapping, weight, and size.
- Various packaging systems exist for sterile supplies.
- Quality packaging opens cleanly; inferior may contaminate.

- **Heavy Equipment Handling:**

- Positioned on table or stand.
- Wrapper opened with sterile technique.
- Light items passed directly or placed on sterile field.

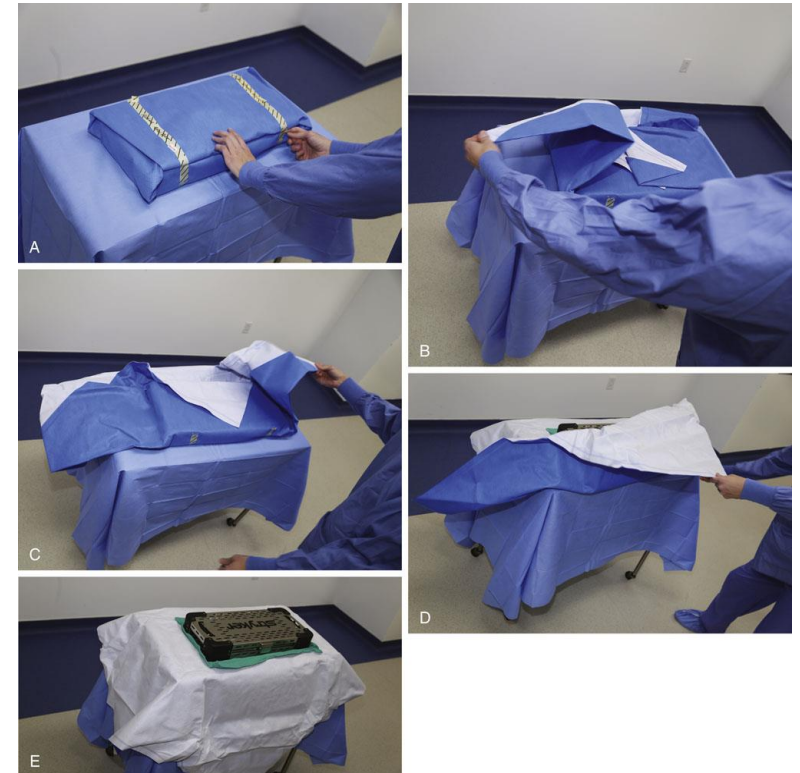
- **Package Integrity Check:**

- Verify outside integrity and chemical indicators.
- Damaged packages are contaminated and removed.
- Fraying indicates possible contamination, requiring reprocessing.

Creating the Sterile Field

(Slide 2 of 4)

- **Clean Wrapper Disposal:**
 - Discard into designated receptacles.
 - Avoid placing on operating table or other surfaces.
- **Draping the Back Table:**
 - Necessary for opening a case.
 - Basic pack opened on the back table.
 - Preassembled case packs customized for specific surgeries.
- **Envelope-Wrapped Packs:**
 - Common wrapping technique.
 - Open flaps in specific order for sterile technique.



Creating the Sterile Field

(Slide 3 of 4)

- **Instrument Trays:**
 - Prepared in trays or closed systems.
 - Follow manufacturer's instructions.
 - Heavy trays opened on small table, creating sterile field.
- **Basins Handling:**
 - Open in place without reaching over.
 - Move around package to open.
- **Peel Pouches:**
 - Open by peeling top edges.
 - Flipping items onto field requires caution.
 - Present items directly to sterile team member.



Creating the Sterile Field

(Slide 4 of 4)

- **Sharps Handling:**

- Passed directly or unwrapped in plain view.
- Caution against hiding sharps among instruments.
- Warn if sharp item accidentally covered.

- **Fluids Distribution:**

- Prevent contact with non-sterile surfaces.
- Hold bottle away from edge when pouring.
- Follow specific procedures for medication distribution.

- **Small Wrapped Packages:**

- Open envelope-style or blister packs.
- Open blister packs carefully to prevent contamination.



Watch the video on "Opening surgical supplies" in the next slide for better understanding of the concept

Opening Surgical Supplies Video



Opening Surgical Supplies Video

Summary of Video:

- When non-sterile open sterile packages away from yourself, then towards
- When Sterile, open towards yourself, then away
- Verify the sterility of items before opening them:
 - Package integrity: No rips, holes/tears, or moisture
 - Expiration date – for supplies
 - Sterility Indicators – for instruments/blue wraps/peel-packs

Maintaining a Sterile Field

- Break in sterile technique is an event that results, or may have resulted, in contamination of a sterile surface within the sterile field
- Contamination during surgery
 - The item or the area contaminated must be isolated or removed
 - Replace the item as needed:
 - Open a Peel-Pack instrument or New Supply
 - Re-drape a table/stand

Infection Control in Perioperative Environment Standard Precautions

- Applies to all patients in all types of patient care environments
- Focus on and the handling of tissues, blood, body fluids, and any other potential infectious material
- Personal protective equipment must be used whenever there is risk of direct contact with blood, body fluids, or other potentially infectious material



OSHA Bloodborne Pathogens Standard

- Reduces health care worker exposure to blood, body fluids, and other potentially infectious materials
- Includes a special set of regulations for handling and disposing of sharps
 - Neutral zone and no touch technique
 - Human factor
 - Postexposure prophylaxis



Transmission-Based Precautions

- **Transmission-Based Precautions Overview:**

- Implemented for highly infectious diseases when Standard Precautions are insufficient.
- Used in addition to Standard Precautions.

- **Airborne Transmission Precautions:**

- Reduce risk of transmission of airborne agents.
- Droplets remain suspended in air, disperse widely.
- Patient wears surgical mask during transport.
- Healthcare personnel wear respiratory protection within 3 feet.
- Precautions for measles, varicella, tuberculosis.

Transmission-Based Precautions

Droplet Precautions

- Reduce risk of transmission by large aerosol droplets.
- Droplets spread from mouth, nose, oropharynx, and trachea.
- Travel distance \leq 3 feet, don't remain suspended.
- Patients separated by 3 feet, healthcare workers wear masks.
- Precautions for *Haemophilus influenzae*, *Neisseria meningitidis*, streptococcal pharyngitis, rubella.

Contact Precautions

- Used for infections transmitted by direct contact.
- Gloves worn, hands washed before/after contact.
- Healthcare personnel wear protective gowns.
- Items contacting patient disinfected or sterilized.
- Precautions for herpes simplex virus, impetigo, abscesses, cellulitis, decubitus ulcers, disseminated herpes zoster, *Clostridium difficile*, multidrug-resistant bacteria.

Hazardous Waste

- Solid waste generated in the diagnosis, treatment, or immunization of humans or animals, in research that involves people or animals, or in the production or testing of biologicals
- Regulated by the EPA, FDA, OSHA, and Nuclear Regulatory Commission (NRC).
- Also regulated at the state level

Watch the Video from Chapter 9 of the E-book

- Watch the video on "Surgical Attire ", "Scrubbing, Gowning and Gloving" from **Surgical Technology - Elsevier eBook on VitalSource, 8th Edition** by logging into your Evolve account
- [Click Here](#) to access the video on Surgical Attire!
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