PREVENTING CONTAMINATION

• Wear clean surgical attire and a surgical head covering when entering an OR or invasive procedure room for any reason (eg, stocking supplies, delivering equipment, transporting specimens).
• When open sterile supplies are present, wear a clean surgical mask that covers the mouth and nose and is secured in a manner that prevents venting at the sides of the mask.
• Wear a surgical mask during:
  - placement of central venous catheters
  - placement of peripherally inserted central catheters
  - guidewire exchanges
  - high-risk spinal canal procedures (eg, myelogram, lumbar puncture, spinal anesthesia)
  - interventional radiology procedures
• In collaboration with an interdisciplinary team that includes an infection preventionist and occupational health professional, determine whether use of a powered air-purifying respirator (PAPR) is allowed when a sterile field is present.
• If PAPR use is allowed, create a standardized procedure for PAPR use that includes protection of the sterile field from contamination.
• Perform hand hygiene before opening sterile supplies.

Wearing clean surgical attire that has been laundered by a health care-accredited laundry facility, wearing a clean surgical mask, and performing hand hygiene may prevent contamination of the sterile field. The use of PAPRs may be indicated for respiratory protection of personnel from certain airborne diseases, but PAPR use may contaminate the sterile field because the respirator does not filter the wearer’s exhaled air.

GOWNING & GLOVING

• Select the type of surgical gown by the task and anticipated degree of exposure to blood, body fluids, or other potentially infectious materials.
• Select and wear a surgical gown that wraps around your body, completely covering the back.
• Perform surgical hand antisepsis before donning a sterile gown and gloves.
• Use sterile technique when donning, wearing, and changing the sterile gown and gloves.
• Glove without assistance by touching only the inside of the glove.
• Perform initial gowning and gloving with assistance in the following order:
  - Don a surgical gown with the gown cuffs remaining at or beyond the finger tips.
  - Insert your hand into the glove held open by the scrubbed team member, with the gown cuff touching only the inside of the glove.
• Perform gloving with assistance in the following order when the gown cuff is at the wrist:
  - Leave the gown cuffs at the wrist level, with the fingers and hand exposed.
  - Don the glove by inserting your hand into the glove held open by the scrubbed team member, with the gown cuff touching only the inside of the glove.
• Wear two pairs of sterile surgical gloves using a perforation indicator system.
• Completely cover gown cuffs with gloves.
• Inspect all gloves for integrity after donning, before contact with the sterile field, throughout use, and when an outer glove perforation is discovered and outer gloves are changed.
STERILE FIELD

• Prepare the sterile field as close as possible to the time of use.
• Open the sterile field for only one patient at a time.
• Do not use the OR or procedure room for more than one patient at a time.
• Prepare the sterile field in the OR or procedure room where it will be used.
• Place only sterile items on the sterile field.
• Keep instruments and sterile field separate for procedures that involve different wound classifications (ie, clean, clean-contaminated, contaminated, dirty).

• Use clinical judgement when a gown sleeve is contaminated to determine whether a sterile sleeve should be worn to cover the area of contamination or if the gown should be removed, surgical hand antisepsis performed, and a new sterile gown and gloves donned.
• Change surgical gloves worn during invasive surgical procedures:
  - after each patient procedure
  - every 90 to 150 minutes
  - when a visible defect or perforation is noted or when a suspected or actual perforation from a needle, suture, bone, or other object occurs
  - immediately after direct contact with methyl methacrylate
  - after touching optic eye pieces on the operative microscope
  - after touching a fluoroscopy machine
  - after touching a surgical helmet system hood or visor
  - when suspected or actual contamination occurs
• Change gloves in a location away from the sterile field.
• Change a sterile glove with assistance during a procedure in the following order:
  - Allow the glove to be removed by an unscrubbed team member without altering the position of the gown cuff (ie, not pulling the cuff down over your hand).
  - Insert your hand into the glove held open by the scrubbed team member.

Implementing sterile technique when donning and wearing sterile gowns and gloves reduces the risk of wound contamination and surgical site infections that may result from direct contact of perioperative team members’ skin or clothing with the sterile field.

STERILE DRAPES

• Handle drapes as little as possible and in a controlled manner that prevents contamination.
• Do not lean across an unsterile area.
• During draping, shield gloved hands by cuffing the interior portion of the drape material over the sterile gloves.
• Place sterile drapes first at the surgical site then outward toward the peripheral areas.
• Cover unsterile equipment (eg, the Mayo stand) on the top, bottom, and sides with a sterile drape before it is introduced to or brought over a sterile field.

• Use isolation technique during bowel surgery and procedures involving resection of metastatic tumors by:
  - organizing the sterile field in a manner that minimizes the risk of sterile field exposure to intestinal tract bacteria or cancerous cells from metastatic tumor excisions
  - initiating isolation technique immediately before resection of the bowel or metastatic tumor and concluding when the resection or anastomosis is complete
  - no longer using instruments or items that had contact with the inside of the bowel lumen after it has been closed or that were used for metastatic tumor excision
  - removing contaminated instruments and items from the sterile field or placing them in a separate area that will not be touched by members of the sterile team
  - changing surgical gloves and changing the surgical gown when soiled
  - covering existing sterile drapes with new sterile drapes
  - using clean instruments to close the wound after anastomosis or resection
• Implement isolation technique using either a single sterile field or a dual sterile field.
• Use a wound protector according to the manufacturer’s instructions for use (IFU) for procedures that enter the gastrointestinal or biliary tract.

Preparing a sterile field for patients undergoing operative or other invasive procedures reduces the risk of microbial contamination and is a cornerstone of infection prevention. The prevention of surgical site infections is critical, and adherence to sterile technique during an invasive procedure can reduce the patient’s risk for infection.
• Cover unsterile equipment that will be positioned immediately adjacent to the sterile field with a sterile drape.
• Drape large equipment (eg, microscopes, robotic arms, C-arm fluoroscopy unit) as close as possible to the time of use and in accordance with the drape manufacturer’s IFU.
• Do not move the portion of the sterile drape that establishes the sterile field after initial positioning.
• Secure surgical equipment (eg, tubing, cables) used on the sterile field with nonperforating devices.
• Consider only the top surface of the sterile drape to be sterile and items that fall below the level of the sterile field to be contaminated.
• Consider the upper portion of a C-arm drape to be contaminated when a C-arm is moved into lateral position.
• Do not bring the sterile drape below the level of the OR bed up into the sterile field.
• Do not use adhesive incise drapes that do not have antimicrobial properties.
• Use iodophor-impregnated adhesive incise drapes (unless the patient has an allergy to iodine) in accordance with the manufacturer’s IFU.

Sterile drapes provide a barrier that minimizes the passage of microorganisms from unsterile to sterile areas and reduces the risk of health care–associated infections.

INTRODUCTION OF STERILE ITEMS
• Introduce sterile items to the sterile field as close as possible to the time of use.
• Before introducing sterile items to the sterile field, inspect items for:
  - sterility of the contents, as noted on the packaging
  - the expiration date, when applicable
  - package integrity
  - product integrity (eg, discoloration or particulate formation in medications and solutions)
  - verification that the external chemical indicators have changed to the correct color, indicating that the parameters for sterilization have been met
• Perform a risk/cost/benefit analysis with an interdisciplinary team to determine whether items that are not labeled as sterile (eg, antiseptic solution) or not packaged for sterile delivery to the sterile field (eg, vancomycin powder) may be used on the sterile field.
• Isolate items that are not labeled as sterile but have been approved for use from other items on the sterile field.
• Do not lean or reach over the sterile field when delivering sterile items to the sterile field.
• Present sterile items directly to the scrubbed team member or place them securely on the sterile field.
• Present heavy or sharp items directly to a scrubbed team member or open on a separate clean, dry surface.
• Transfer medications and sterile solutions (eg, normal saline) by:
  - transferring to the sterile field as close to the time of use as possible
  - transferring in a slow, controlled manner using a sterile transfer device (eg, sterile vial spike, filter straw, plastic catheter) unless the medication is packaged for sterile delivery
  - transferring into a receptacle that is placed near the sterile table’s edge or is held by a scrubbed team member
  - verifying and labeling immediately after transfer
• Do not remove medication vial stoppers from vials for the purpose of pouring medications unless they are specifically designed for removal by the manufacturer.
• Pour from the container once and do not replace the cap; discard any remaining fluids in the open container at the end of the procedure.

The US Food and Drug Administration does not require skin antiseptic agents to be sterile but has requested that manufacturers voluntarily clarify on their label their sterility status (ie, sterile, nonsterile). Reuse of open containers may contaminate sterile solutions from drops contacting unsterile areas then running back over the container opening.

OPENING STERILE PACKAGING SYSTEMS
• Inspect rigid sterilization containers before they are opened for:
  - intact external locks
  - secured latch filters
  - intact valves
  - tamper-evident devices
  - the correct color change for external chemical indicators
• Open items packaged in sterile barrier systems according to the manufacturers’ IFU, if available.
• Open rigid containers in the following order:
  - Unscrubbed Person:
    - Lift the lid up and toward you while moving the lid away from the container.
» Inspect the integrity of the lid filter or valve and consider the contents to be contaminated if the filter is dislodged, damp, or not intact.
» If there are filters in the bottom of the container, inspect the integrity of the filters after removal of the basket by the scrubbed person.

- Scrubbed Person:
  » Lift the inner basket out and above the container without contacting the unsterile surfaces of the table or container.
  » Before placing instruments on the sterile field, examine the internal chemical indicator for the correct color change and inspect the inside surface of the container for debris, moisture, contamination, or damage.

• Inspect wrapped sterile packages for intact tape and external chemical indicators for the correct color change before they are opened.
• Open wrapped sterile packages in the following order:
  - Open the farthest wrapper flap and secure the flap in the hand that is holding the item.
  - Open each of the side flaps, one at a time, and secure the flaps in the hand that is holding the item.
  - Open the nearest wrapper flap and present the item to the scrubbed team member.
  - Before the sterile item is placed on the sterile field, visually inspect the entire wrapper for integrity and presence of moisture.
• Inspect paper-plastic pouches (ie, peel pouches) for intact seals and for the correct color change of external chemical indicators.
• Present pouches to the scrubbed team member or open them onto the sterile field by pulling back the flaps without touching the inside of the package or allowing the contents to slide over the unsterile edges.

Checking that container locks, latch filters, valves, and tamper-evidence devices are intact helps to verify there has not been a breach of the container seal. Instrument tray wrappers used in accordance with the manufacturer’s IFU provide a barrier against contamination of the contents. Holes or tears in instrument wrappers interrupt the barrier properties of the wrapper, calling into question the sterility of the contents.

MAINTAINING THE STERILE FIELD
• Monitor the sterile field for contamination and breaks in sterile technique.

• Take corrective action immediately when a break in technique occurs or as soon as it is safe for the patient.
• Consider instruments contaminated when found:
  - assembled or clamped closed
  - with organic material (eg, blood, hair, tissue, bone fragments) on or in the instrument
  - with other debris (eg, bone cement, grease, mineral deposits) on or in the instrument
• When contaminated instruments are found in an instrument set, consider the entire set contaminated.
• When items are found to be contaminated, take the following corrective actions:
  - remove the contaminated item
  - remove any other items that may have come in contact with the contaminated item
  - change gloves if you have touched the contaminated item
  - any other corrective actions after thoughtful assessment and informed decision making based on the individual situation
• Position the surgical site and instrument tables within the air curtain when a unidirectional ultraclean air system is being used.
• Position heater-cooler devices away from the sterile field, and direct the airflow exhaust of the equipment away from the sterile field.
• Implement interventions to minimize personnel exposure to potentially infectious materials and reduce contamination of the sterile field when using intraoperative debridement devices with irrigation, including:
  - wearing personal protective equipment
  - wearing a surgical helmet system
  - training personnel on correct use of the device
  - using manufacturer’s recommendations for power, irrigation, and suction settings that limit mist, splatter, or spray, if patient care allows

Continual observations for breaks in sterile technique may prevent microbial contamination. Breaks in sterile techniques may expose the patient to increased microbial contamination.
MOVEMENT IN THE OR

- Scrubbed team members:
  - Remain close to the sterile field and touch only sterile areas or items.
  - Keep hands and arms above waist level at all times.
  - Do not fold arms with hands positioned in the axillary area.
  - Avoid changing levels, and be seated only when the entire procedure will be performed at that level.
  - Do not turn your back on the sterile field.
  - During position changes, turn back to back or face to face while maintaining distance from other team members, the sterile field, and unsterile areas.
  - Do not position yourself between the horizontal unidirectional ultraclean air delivery system air curtain and the surgical site.
  - Do not leave the sterile field to retrieve items from the sterilizer.
  - Use shielding devices (eg, lead aprons, mobile shields) that reduce radiological exposure in order to stay near the sterile field when radiology equipment is used.

- Unscrubbed team members:
  - Face the sterile field on approach.
  - Do not walk between sterile fields or scrubbed persons.
  - Do not reach over an uncovered sterile field.
  - Stay as far back from the sterile field and scrubbed persons as possible.
  - Do not walk between the horizontal unidirectional ultraclean air delivery system air curtain and the sterile field.
  - Limit nonessential conversations in the presence of a sterile field.
  - Keep doors to the operative or invasive procedures rooms closed as much as possible.
  - Keep the number and movement of individuals in an operative or invasive procedure room to a minimum.

Airborne contaminants and microbial levels in the surgical environment are directly proportional to the amount of movement and the number of people in the OR or procedure room.

COVERING THE STERILE FIELD

- Cover the sterile field if it will not be used immediately (eg, procedural delay, sterile field for closure, multiple tables) or during periods of increased activity (eg, pre-incision, repositioning).
- Cover the portion of the sterile field that is not in use if it will not be used immediately (eg, implants, instruments not in use).
- Cover the sterile field with a sterile drape in a manner that allows the cover to be removed without compromising the sterility of the table.
- In collaboration with an interdisciplinary team that includes an infection preventionist, develop and implement measures to minimize the risk of contamination to covered sterile fields:
  - develop a standardized procedure to delineate the specific circumstances under which the sterile field should be covered, and clarify the length of time a sterile field may be covered
  - post signs notifying personnel that a covered sterile field is in the room
  - limit traffic in the OR or procedure room with a covered sterile field
  - directly observe the covered sterile field

Exposure to air may affect the event-related sterility of open sterile items and sterile fields. Covering the sterile field reduces contamination over time. Opening instruments and sterile supplies as close as possible to the time of use is the primary strategy to reduce exposure to potential air contamination; covering the sterile field may be used as a secondary strategy to reduce the potential for contamination from exposure to the OR environment.