SURGICAL ASEPTIC TECHNIQUE AND STERILE FIELD

Guideline for asepsis for invasive surgical procedures conducted in Community-based Health Care Settings
The surgical aseptic technique and sterile field guideline provides information, support and evidence-based practices to health care professionals performing invasive surgical procedures in community-based health care settings, such as dental clinics, podiatry clinics and medical clinics. Infection prevention and control is a continually evolving discipline which is based on research and evidence-based practice.

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ASEPTIC TECHNIQUE

The goal of aseptic technique is to protect the patient by preventing or minimizing postoperative infection by creating conditions and following procedures to prevent the introduction of microbial contamination to sterile fields, sterile equipment and the operative site.\textsuperscript{4,6}

GENERAL CONSIDERATIONS

1. Only sterile items are used within the sterile field.
   a. Prior to items being dispensed to the sterile field check the external and internal chemical indicators on and in the package, check for package integrity, and package expiration (if appropriate).

2. Items which display a manufacturer’s expiry date shall be considered unsafe for use after that date. (Rationale: Expiry dates do not guarantee either sterility or lack of sterility\textsuperscript{1}. Frequently expiry dates refer to the degradation of the product or a component of the product after the specified date.)

3. If in doubt about the sterility of the packaged item, it is not considered sterile. This includes:
   a. items found in unmonitored areas,
   b. any indication of the package being wet (eg. water stains, dampness or condensation in package).
   c. any package without chemical indicator (CI) showing a “pass” result,
   d. any package that has been dropped or,
   e. any package that shows evidence of crushing, perforations or holes.

4. Whenever a sterile item has been compromised, the package contents, gown or the sterile field involved must be considered contaminated. This may happen when:
   a. non sterile items contact sterile items;
   b. liquids or moisture soak through a drape, gown, or package (strikethrough)

5. Single-use medical devices shall only be used on an individual client for a single procedure and then must be discarded\textsuperscript{7}.

6. Reusable medical devices shall be reprocessed according to the manufacturer’s directions for use and in accordance with current Alberta Health Standards\textsuperscript{8}.
ESTABLISHING THE STERILE FIELD

1. Sterile drapes used to cover surfaces or operative fields shall provide a barrier against micro-organisms, liquids, and particulate matter. Drapes are only sterile at table level.
   a. The drape below the working surface is not under direct vision of the surgical team and is not considered sterile. The edges of the table top serve as a demarcation line between sterile and non-sterile.
   b. Any item that falls below the table level is considered unsterile. This applies to the edges of the drape and portion of suction and irrigation tubing that is handed off the sterile field.

2. If the drape does not cover the entire surface, a 1-inch margin around the edge of the drape is not considered sterile. (Figure 1)

3. The edges of packages are not considered sterile. When opening packages for a sterile procedure the packaging must be managed in a manner which prevents the wrapper from touching the sterile field or package contents.
   a. All flaps of non-woven wrap must be controlled to prevent them from touching the sterile field. (Figure 2)
   b. The sterile boundary of a peel-open package is the inner edge. Peel pouches should be peeled back not ripped or torn when opening. Devices should not be “pushed” through the peel pouch. The inner edge of the seal is the demarcation for sterile and non-sterile. (Figure 3)
   c. Items should not be “flipped” or dropped onto the sterile field. (Figure 4)

4. All flat surfaces shall be dry and dust free before placing a sterile bundle or drape on them. (Rationale: moisture may cause strike-through and contaminate the sterile field. Dust may become airborne and land on the sterile field.)
DISPENSING STERILE SUPPLIES

1. Supplies shall be opened as close to possible to the surgical start time. (Rationale: the potential for contamination increases with time and particles stirred up by movement of personnel, can settle on horizontal surfaces.)

2. Sterile supplies shall be handled as little as possible. (Rationale: increased handling increases the potential for contamination and prolongs set-up time.)

3. All items added to sterile field shall be assessed prior to opening for sterility by checking package integrity, and that chemical indicators show a “pass” result.

4. Large bundles or packages shall be opened on a flat surface. (Rationale: large and/or heavy items are difficult to open aseptically while being held in the circulating assistant’s hand.)

5. Items introduced onto a sterile field should be opened, dispensed, and transferred by methods that maintain sterility and integrity.

6. Methods of transfer include, but are not limited to the following:
   a. Place the item on the edge of the sterile instrument table with the inside of the wrapper covering your hand. Never reach over a sterile field and shake an item from its package.
   b. Expose the contents so the scrubbed assistant can remove the item from the wrapper or package using a forcep or by grasping the item. (Figure 5)
   c. Items shall not be flipped onto the sterile field. (Rationale: flipping creates air turbulence. It also creates the potential for contamination or damage.)

7. Sterile solution must be poured into a sterile receptacle. The scrubbed assistant holds the receptacle away from the table or places it on the edge of the draped surface eliminating the need for the circulating assistant to reach across the sterile field. (Figure 6, 7)

8. Once the contents (sterile solution) of the bottle have been dispensed into the sterile receptacle, discard any remaining solution. (Rationale: re-application of caps is a questionable technique as the pour spout and cap may have been contaminated. The edge of a container is considered contaminated after the contents have been poured; therefore, the sterility of the contents cannot be ensured if the cap is replaced.)
9. Once a patient has entered the operatory where sterile supplies have been opened, those supplies shall be discarded/dismantled in the event the procedure is cancelled or if they are not used. (Rationale: potential for cross-contamination will be prevented).

MAINTAINING A STERILE FIELD

1. The circulating assistant shall not touch or reach over sterile items or areas. (Rationale: invisible shedding of skin laden with micro-organisms may contaminate sterile items or areas.) (Figure 8)

2. The scrubbed assistant shall not touch or reach over unsterile items or areas. (Rationale: contamination of sterile gown or gloves may occur.)

3. When a scrubbed assistant opens a sterile table cover or drape it is opened first toward the sterile individual. This minimizes the chance of the scrubbed assistant becoming contaminated by contacting a non sterile surface. (Figure 9)

4. If the circulating assistant opens a sterile pack, the wrap is opened first away from the circulating assistant to prevent contamination of the pack. (Figure 10)

5. Movement within the sterile field must not contaminate the field. Sterile personnel stay close to the sterile field. If sterile personnel must change positions during the procedure they can move face to face or back to back. They must never turn their back on the sterile field.  

6. Open sterile supplies/set-up shall not be left unattended and shall be continuously monitored for possible contamination. (Rationale: sterility of unattended items cannot be ensured without direct observation. Event-related sources of possible contamination can occur at any time.)

7. The sterile set-up shall not be covered. (Rationale: removing a table cover without contaminating the sterile area cannot be achieved. The drape below the level of the tabletop is considered contaminated, and the cover would touch the table top during removal.)

8. [Image of incorrect practice]

9. [Image of correct practice]

10. [Image of correct practice]
SURGICAL HAND ANTISEPSIS

- Process of removing as many microorganisms as possible from the hands and forearms by mechanical washing and chemical antisepsis before participating in a surgical procedure.

- Should be performed prior to donning sterile gloves or sterile gowns and gloves for surgical or other invasive procedures.

- Can be achieved with either an antimicrobial surgical scrub agent (surgical hand scrub) or an alcohol based antiseptic surgical hand rub (surgical hand rub) with documented persistent and cumulative activity.¹²

GENERAL CONSIDERATIONS

- If hands are visibly soiled they must be washed and dried prior to performing surgical hand antisepsis.

- All rings, wrist watches and bracelets must be removed prior to starting surgical hand antisepsis. (Figure 11)

- Hair covers, protective eyewear and surgical mask must be donned prior to initiating the surgical hand antisepsis. (Figure 12)

- Objective of surgical hand antisepsis is to reduce the transient and resident flora. Skin can never be rendered sterile. It can be made surgically clean by reducing the number of organisms present with the mechanical action associated with scrubbing. Surgical hand antisepsis is only effective if all surfaces of the hand are exposed to the mechanical cleaning and chemical antisepsis.

- Water flows down so hands should be held above the level of the elbow both during the scrub and rinsing if a surgical hand scrub is used. Contact with the faucet or other potential contaminants must be avoided. (Figure 13)

- Thorough drying is essential as moist surfaces allow pathogens to multiply. A sterile towel must be used to dry hands following a surgical hand scrub.

- If a surgical hand rub product is used, the manufacturer’s instructions for its use must be followed and the product must have a persistent effect and be fast drying.
SURGICAL ASEPTIC TECHNIQUE AND STERILE FIELD

SURGICAL HAND RUB

1. Remove hand and arm jewelry including rings, watches and bracelets.

2. Don hair cover, a surgical mask and protective eyewear.

3. Wash hands with plain soap and warm water; cleanse nails with disposable nail cleaning device (prior to the first scrub of the day or if hands are visibly soiled).
   a. Clean under the nails (subungual area) of both hands under running water using a disposable nail cleaner.
   b. Rinse hands and forearms under running water.
   c. Dry hands and forearms thoroughly with a disposable paper towel.
4. Dispense the manufacturer’s recommended amount of surgical hand rub product, using a hands free dispenser.

   a. Apply the product to the hands and forearms according to the manufacturer’s written instructions. Pay particular attention to the areas between the fingers.

   b. Repeat the product application process as directed.

   c. Rub thoroughly until completely dry.

5. Don sterile surgical gown and gloves.
SURGICAL HAND SCRUB

1. Remove hand and arm jewelry including rings, watches and bracelets.

2. Don hair cover, surgical mask and eye protection.

3. If hands are visibly soiled, remove soil by washing hands and forearms with soap and water before starting the surgical scrub.
   a. Clean under the nail (subungual areas) of both hands under running water using a disposable nail cleaner.
   b. Rinse hands and forearms under running water.

4. Use an approved scrub solution according to the manufacturer’s written instructions.
   a. Apply the scrub solution to wet hands and forearms. Sponges, if used, must be soft and non-abrasive.
b. Time the application of the scrub solution according to the manufacturer’s written directions to allow adequate product contact with skin.

c. For each hand visualize each finger, thumb, hand and arm as having four sides. Wash all four sides effectively, keeping the hands elevated.

d. Avoid splashing surgical attire.

e. Discard sponge (if used) after use.

f. Rinse hands and arms under running water in one direction from the fingertips to elbows as often as needed to remove soap. Care must be taken to ensure fingers, hands and arms do not touch the faucet and the hands remain above the level of the elbows. If the water is controlled with hand control levers then the water must be turned off by a circulating assistant.

g. Ensure hands are held away from the body with hands and forearms held higher to prevent contamination by allowing the water to run from the clean to less clean area. Keep the surgical attire dry as the sterile gown cannot be donned over wet or damp attire without potential contamination of the gown by strike-through moisture.

h. Dry hands with a sterile towel.

5. Don sterile gown and gloves.

HAND HYGIENE TIPS

1. Nails must be natural, clean, short and appear healthy.

2. Nail polish if worn must be fresh (4 days or less) and never chipped.

3. Do not wear artificial nails or nail enhancements.

4. Remove all hand and arm jewellery for invasive surgical procedures.

5. If you have cuts, abrasions, weeping dermatitis or fresh tattoos on exposed skin you should not scrub.
GLOVING AND GOWNING

- Following completion of the surgical hand antisepsis, it is important to correctly don a sterile surgical gown and sterile gloves.
- Gowns are only considered sterile in the front from the axilla (armpit) to the level of the sterile field and sleeves from 5cm (2 inches) above the elbow to cuff. The neckline, shoulders, under arms, sleeve cuffs and the back are considered unsterile. (Figure 14)

STERILE GOWNS ARE

- Made of a material that is resistant to penetration of blood and other fluids.
- Folded to allow the gown to remain sterile during donning.
- Large enough to adequately cover the scrubbed person.
- Stockinette cuffs are considered unsterile and shall always be covered by sterile gloves because:
  a. They tend to collect moisture,
  b. They are not an effective barrier and,
  c. They become contaminated when the scrubbed person’s hands pass through the cuff.

GENERAL CONSIDERATIONS

- Gowns are donned before gloves.
- The scrubbed assistant gowns and gloves from a separate table or surface that is waist height, away from the main sterile field (to avoid any chance of contaminating the sterile field) using the “closed gloving” technique.
- The scrubbed assistant gowns and gloves the dentist/surgeon (and other sterile team members) using the assisted “open gloving” technique.

GOWNING AND CLOSED GLOVING

1. Reach and lift the folded gown directly upward. Do not touch the wrapper and ensure the gown remains folded until after stepping back from the gown table into an unobstructed area. (Figure 15)
2. Holding the folded gown like a book by its binding, carefully locate the neckline and armholes. (Figure 16)
3. Hold the inside front of the gown just at the armholes with both hands, let the gown unfold, keeping the inside of the gown toward the body and the hands in the armholes. Do not touch the outside of the gown with bare hands. If the top of the gown drops inadvertently, consider it contaminated. Discard and have a new gown pack opened. (Figure 17)

4. Extend both arms into the armholes simultaneously as the gown and its sleeves unfold.

5. The circulating assistant, stands behind the scrubbed assistant and brings the gown over the shoulders by reaching inside to the shoulder and arm seams. (Figure 18) The gown is pulled on, leaving the cuffs of the sleeves extended over the hands. Do not push the hands through the cuffs. The back of the gown is securely tied at the waist first, followed by the neckline. (Figure 19) If the gown is a wrap around style, the sterile flap to cover the back is not touched until the scrubbed assistant has donned gloves or by use of a sterile item handed to a circulating assistant.

6. Using cuff covered hands take the sterile gloves from the circulating assistant. Remember to be careful and not touch the external wrapper of the gloves when taking the gloves and to keep hands inside the cuff at all times during the gowning and gloving procedure. (Figure 20)

7. Using cuff covered hands place the gloves in the paper wrapper on the surface that held the gown. Place the glove paper in front of you like a book. Open the two sides like a book by grasping the lower inner corners of the bottom fold. Lift both corners open and fold under at the same time. This will ensure the wrapper remains open and not fall closed during the gloving process. (Figure 21)

8. Extend the dominant forearm with the palm upward.

9. With the covered non-dominant hand, pick up the glove for the dominant hand from the inner wrap of the glove package by grasping the cuff, lifting straight up, place it on the dominant palm thumb side down. The glove fingers will be pointing toward the body. (Figure 22)
10. Grasp the upper glove cuff with the cuffed non-dominant hand while holding the underside of the cuff with the cuffed dominant hand. Peel the cuff of the glove over the dominant cuffed hand, over the end of the sleeve. Hold the sleeve and glove cuff with the non-dominant hand and pull back the sleeve while wiggling the fingers of the dominant hand to extend them into the glove. The glove should cover the entire stockinet cuff of the sleeve. (Figure 23)

11. Using the gloved hand, pick up the remaining glove and place it with the palm of the glove against the palm of the non-dominant hand. Grasp the back of the cuff of the glove above the palm in the gloved hand and turned over the sleeve and hand. (Figure 24)

12. The cuff of the glove is now over the stockinette cuff of the sleeve with the hand still in the sleeve.

13. Grasp the top of the glove and underlying gown sleeve with the gloved hand and pull the sleeve allowing the glove to be pulled onto the non-dominant hand. (Figure 25)

14. Grasp the tie and protector. Remove one tie from the protector. Hand the protector to the circulating assistant. Turn to wrap the back panel of the gown around the scrubbed assistant, covering the previously tied inner waist ties. Carefully pull the tie out of the protector held by the circulating assistant and tie to secure the gown. (figure 26-28) The ties must not drop below waist level before it is tied. If ties drop the circulating assistant ties the gown at the back.
GOWNING AND OPEN GLOVING

1. Sterile gowns for each member of the team are handed to the scrubbed assistant in a manner which maintains sterility. The gown is then placed on the sterile field.

2. The scrubbed assistant picks up the gown and holds it away from the sterile field and allowing it to unfold with the inside of the gown held toward the individual being assisted with gowning and gloving. (Figure 29) The scrubbed assistant protects their gloved hands by holding the gown with a cuff over the glove and allows the individual being assisted to reach into the sleeves of the held gown. (Figure 30) A circulating assistant reaches to grasp the inside of the gown and carefully bring it up and over the shoulders being sure not to touch the outside of the front of the gown. The inside ties of the gown at the neck and waist are tied by the circulating assistant. The individual being gowned allows their hands to extend beyond the cuffs of the gown and ensure their hands remain above waist level not touching the gown.

3. Once the gown is on, the scrubbed assistant picks up the right glove and holds it with the cuff (to protect the gloved hands from touching the bare hand of the individual being assisted with gowning and gloving). The palm of the glove is turned toward the ungloved individual’s hand with the glove directly opposed to the thumb of the individual’s hand. Using fingers stretch the cuff to open the glove. (Figure 31) The individual being assisted with gloving will place their hand in the glove and the cuff will extend up the sleeve to cover the stockinette of the sleeve. (Figure 32)

4. The scrubbed assistant repeats this process. With the second glove the individual being assisted can help to open the glove by placing the gloved hand under the cuff of the glove to increase the opening while inserting the ungloved hand. Again the cuff will be pulled up to cover the entire stockinette cuff of the sleeve.

5. Once gloving is completed the wrap around tie can be handed to the scrubbed assistant to allow the gown to be closed. (Figure 33-34)
REFERENCES


GLOSSARY

**Circulating Assistant** (unsterile person)
An individual who performs hand hygiene and assists sterile persons to gown, glove and set up the sterile field.

**Scrubbed Assistant** (sterile person)
An individual who performs surgical hand antisepsis (either a surgical hand rub or surgical hand scrub) and dons surgical attire (sterile gown and gloves, surgical mask, eye protection and hair covering). This person may set up and maintain the sterile field and assist the surgical team to perform the surgical procedure.

**Assisted Gowning and Gloving Technique**
A gowned and gloved individual assists another scrubbed individual with gowning and gloving.

**Open-gloving Technique**
Gloving technique in which the scrubbed person’s hands slide all the way through the sleeves and cuffs when the gown is put on prior to donning gloves.

**Closed-gloving Technique**
Gloving technique in which the hands are not extended from the sleeves and cuffs when the gown is put on. Instead the hands are pushed through the cuff openings as the gloves are pulled into place.

**Donning**
To put on (an article of clothing or wear).

**Doffing**
To remove (an article of clothing or wear).

**Strike-through**
An event whereby sterile drapes or packages become contaminated due to soaking through or forcing through of moisture or air.