

Maximum Sterile Barrier

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1. Video 1 depicts a neonatology fellow preparing for a procedure that requires a sterile barrier. Of the following, the step(s) that this fellow performs INCORRECTLY is (are):
 - A. Pumping the soap dispenser with his foot
 - B. Drying his hands after washing
 - C. Opening the package of gloves
 - D. Donning a sterile gown
 - E. Placing gloves on his hands



Video 1. [Click here to view the video.](#)

2. The fellow then meets with his attending physician, who reviews the steps of maximizing a sterile barrier before a procedure. The fellow demonstrates these new skills to his attending physician (Video 2), who is quite pleased with the fellow's improved technique except for ONE step. This incorrect step is:
 - A. Pumping the soap dispenser with his foot
 - B. Drying his hands after washing
 - C. Donning a sterile gown
 - D. Placing gloves on his hands
 - E. Tying the gown

AUTHOR DISCLOSURE Drs Trivedi and Vachharajani have disclosed no financial relationships relevant to this article. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.



Video 2. Click here to view the video.

CORRECT RESPONSES

- Answers B, C, E. Three steps were performed incorrectly in Video 1. These were: drying his hands after washing, opening the package of gloves, and placing the gloves on his hands.
- Answer E. The fellow did not use gloved hands to tie his gown.

CRITIQUE

A sterile barrier is required for many neonatal procedures, including the placement of a central venous catheter (CVC) or a chest tube. The creation of this sterile barrier requires meticulous attention to multiple steps to minimize the risk of a hospital-acquired infection or a central line-associated bloodstream infection. The preparation is similar to a surgeon preparing for surgery in the operating room.

The Centers for Disease Control and Prevention maximum sterile barrier (MSB) precautions are defined as wearing a mask, sterile gown, sterile gloves, and cap and using a full body drape (similar to the drapes used in the operating room). In a randomized, controlled trial of adult patients with cancer, use of MSB precautions was compared to the use of sterile gloves and a small drape during insertion of a nontunneled CVC. The results showed that the MSB group had fewer episodes of catheter colonization and

septicemia. The timing and type of infections also varied, with the MSB group having a later onset of infections and decreased *Staphylococcus* and *Candida* species. (1) The use of MSB precautions (with a mask, cap, sterile gloves, gown, and large drape) was compared with control precautions (mask, cap, sterile gloves, and small drape) in the placement of a CVC in adult patients and showed a decreased risk of skin colonization at the insertion site in patients with MSB precautions. (2) Multiple other studies have shown similar benefit in using MSB precautions for central line placement.

Intensive educational programs directed at improving infection control practices have shown that catheter-related bloodstream infections decrease with this intervention. (3) (4)(5) Several quality improvement collaboratives to reduce the incidence of central line-associated bloodstream infections in critically ill neonates have shown a significant reduction in infections following staff education, standardization of skin preparation, new antiseptic agents, and/or checklists for CVC insertion and maintenance. (6)(7)(8)(9) These approaches are reviewed in Garber and Puopolo. (10)

The steps that are required to create an MSB before placing a CVC in a neonate include the following:

1. Wear a hat and a mask.
2. Remove the sterile gown and gloves from their packages and place them on an equipment tray.
3. Wash hands with soap and water, paying attention to the scrubbing of the palms, interdigital spaces, and nail beds.
4. Scrub the forearms up to the elbows.
5. Dry hands, forearms, and elbows (in that order) with the sterile towel provided with the gown; be careful to avoid dripping water onto sterile gown or field.
6. Don the gown.
7. Place sterile glove on first hand, touching the “inside cuff” of the gloves only, and then use the gloved hand to touch the exterior of the second glove (note: even though hands have been scrubbed, they are not sterile and must not touch the exterior of the sterile gloves); the sterile gloves should cover the cuffs of the gown.
8. Using gloved hands, hand the tag attached to the ties to an assistant, and “spin” counter-clockwise while the assistant holds the tag.
9. Hold the second tie while the assistant pulls the tag away.
10. Tie a knot on the side of the gown using gloved hands.

It is important to remember that gowns are considered to be sterile in the front from the waist level to a few inches below the neck opening and the sleeves from above the elbows to the cuffs. Thus, the back of the gown and any area below the waist level are not sterile. If the gown or sterile gloves are punctured or touch an a sterile area, a change is required.

During Video 1, the fellow makes several errors that prevent him from creating a sterile barrier. These mistakes include the following: drying his hands with unsterile paper towels, opening the sterile package of gloves with his hands, and touching the exterior of the sterile gloves with his hands. All of these steps were appropriately performed in Video 2, except for tying of the gown as the fellow still hands the tag to the assistant with ungloved hands. All of the appropriate steps in creating an MSB are shown in Video 3. Of note, ideally, the sterile gloves should cover the cuffs of the sterile fields (not shown in the videos).



Video 3. [Click here to view the video.](#)

American Board of Pediatrics Neonatal—Perinatal Content Specification

- Know the effective techniques for control of healthcare associated infection in the nursery, neonatal intensive care unit, and obstetrical unit.

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