BY SUSAN KLACIK

Keeping it sterile: Fundamentals of sterile storage

Using sterile items in surgery is a fundamental practice, not a rudimentary one that can or should be taken for granted. Put simply, using unsterile items can result in a patient infection. If sterile storage conditions are not appropriate, the items can become contaminated. Such contamination may go undetected, rendering items unsafe and unusable. Therefore, healthcare facilities must take action to create an environment that properly protects sterile packages. This includes securing a proper sterile storage environment and developing policies and procedures to help ensure sterile packages are safely stored and handled.

Sterile storage requirements

Sterilized items should be stored in a room that is environmentally controlled to maintain optimal conditions for sterile integrity of the packages and reduce the potential for contamination. The sterile storage area, preferably an enclosed room, should be easily accessible from the sterilization cooling, breakout, and case cart staging areas. It should be designated as a semi-restricted area, requiring those who enter to wear clean scrub attire. It should also be inaccessible to general traffic flow patterns or to untrained or unauthorized personnel.

All surfaces should be cleanable, durable, smooth, and seamless. Floors should have a cove base (ie, trim installed to transition from the floor to the wall). This provides a surface that allows for ease of cleaning and assists in preventing buildup of dirt and debris in crevices. The area should include hand hygiene stations and feature adequate lighting, both for personnel safety and so that package labels can be read easily.

The air supply should be as clean and dust-free as possible. Doors and internal windows should remain closed when not in use—and any windows to the external environment should remain closed at all times. Air pressure should be positive in relation to surrounding areas so air flows out of sterile storage when a door or window is opened, reducing the chance of airborne contamination. There should be no free-standing fans to agitate dust or debris. Temperature, humidity, and air pressure should be monitored and recorded at least daily.

Items arriving from vendors should be received in a breakout room. Ideally this room should be located adjacent to sterile storage so the packages can be safely removed from their shipping containers. External shipping containers and corrugated boxes can collect dust, debris, and insects during shipment and carry contaminants into the area. These cartons should not be allowed in clean/sterile storage areas.

Sterile items should be stored to protect against contamination and allow for adequate air circulation. The shelving must be at least eight inches above the floor, and the bottom shelf must be solid to protect items from environmental cleaning. Supplies on the top shelf must be 18 inches below the ceiling or sprinkler heads to ensure sprinkler system effectiveness. Although not required, a solid top shelf helps protect sterile items from dust. Shelving units should be at least two inches from outside walls to prevent contact between sterile items and condensation that could form on the interior surfaces of outside walls.

The design of the sterile storage area should be spacious enough to allow easy access to all shelves and for cart movement up and down the aisles. The shelves should be sized appropriately to fit the stored items. Trays that overhang shelving pose a safety hazard to all who work in the area and may become contaminated by people walking by and brushing against them. Sterile packages should be handled with care and positioned so they are not crushed, bent, compressed, or punctured. Sterile items should never be stored on floors or windowsills or near or under sinks, exposed water pipes, sewage lines, or air conditioning drains.

For safety and ease of handling, heavy instrument trays should be stored on middle shelves. Lightweight packages should be placed on higher shelves. Sterile packages should be carefully lifted and never dragged across shelving. Transport trays are available with solid or perforated bottoms to prevent tears in wrappers during handling. All equipment used to transport and store sterile packages should be maintained, organized, clean, and dry.

All personnel play role in sterility maintenance

Having a storage area designed to meet sterile storage requirements does not prevent all types of package contamination. Staff members can protect the integrity of the packages in the sterile storage area by following the handling protocols established by the healthcare facility. Soiled items should not be brought into the area.

Staff should maintain a high level of personal hygiene. This includes having clean hair and body; having short, natural nails (ie, no polished, lacquered, or artificial nails, or natural nails extending beyond the fingertips); and wearing clean, healthcare-issued scrub attire. Hand hygiene should be performed frequently by traditional soap-and-water handwashing or using waterless hand sanitizers according to facility policy. When handling packages, hands must be dry to prevent contaminating the contents.

Outside items, such as cell phones and purses, should not be permitted into the sterile storage area unless they have undergone cleaning and disinfection. If badge lanyards are worn, they should be placed in a pocket or contained in some manner to avoid catching them on the shelving or packaging. Lanyards should also be cleaned and disinfected on a routine basis so they do not contaminate sterile items.

Purchased items should be removed from their shipping containers in the breakout room in a manner that will protect their integrity. As previously addressed, external shipping containers and corrugated boxes should not be brought into the sterile storage area. When multiple sterile items are removed from boxes to transport to sterile storage, they should be loaded onto a cart. Transporting items by cart is easier and safer than hand carrying numerous items. Items should be placed on the cart loosely and securely to protect contents. Items should not hang off the edges of the cart. The bottom shelf of the cart should be solid to protect the items from dirt and dust contamination. The transport cart should be cleaned when soiled and placed on a routine cleaning schedule.

Some purchased sterile supplies are packaged in shelf boxes designed to be placed in clean or sterile storage areas. Each shelf box can contain one or multiple items. Because they are packaged inside exterior shipping boxes, they are not exposed to exterior conditions. It is important to remove the shelf box from the outer shipping carton in the breakout area and place it on the sterile storage shelf. This practice provides extra protection for the sterile package and reduces the handling of the sterile items, especially if the shelf box contains multiple items.

Items should be placed in the correct location to prevent unnecessary handling, and sterile packages must be handled gently to prevent crushing or other damage. Do not stack sterile packages unless specifically stated in the item and packaging manufacturers' instructions for use. Consider packages that come in contact with the floor for any period of time to be contaminated, and discard or reprocess them as appropriate.

Sterile items should be stored to protect against contamination and allow for adequate air circulation.

Processes to maintain cleanliness

To maintain the sterile integrity of the packages, it is important to keep the sterile storage area clean, dry, and free of dust and debris. The floors should be damp mopped at least daily and when soiled. Dry mopping is not recommended because it results in dust getting into the air currents and then being deposited onto surfaces, including packages. Trash should be emptied at least daily and whenever trash bins are full. Walls and vents should also be on a routine cleaning schedule. Standards for environmental cleaning should be the same as those for the operating room.

Shelves, storage bins, and transport carts in sterile storage should undergo routine cleaning at a frequency determined by the facility. Before shelves are cleaned, sterile packages should be gently removed. The shelves should be cleaned and completely dried before gently returning the items. Shelf cleaning should be documented.

High-touch objects and surfaces, such as handles, doorknobs, and computer keyboards, should be identified. Policies and procedures should be in place to have these surfaces cleaned and disinfected at least daily. This reduces the contamination of environmental surfaces that are touched frequently.

If items are not properly protected or something unexpectedly happens, stored items may become contaminated. Providing the appropriate sterile storage environment and training personnel about proper handling and other essential sterile storage practices is critical for ensuring that the items remain sterile and ready for patient care. **ORM**

—Susan Klacik, BS, FCS, ACE, CHL, CIS, CRCST, AAMIF, is clinical educator at Healthcare Sterile Processing Association (HSPA) and its representative to the Association of the Advancement of Medical Instrumentation (AAMI). Klacik has authored numerous articles and represents IAHCSMM for regulatory affairs dealing with sterilization and disinfection.

Resources

Association for the Advancement of Medical Instrumentation (AAMI). ANSI/AAMI ST79:2017 & 2020 Amendments A1, A2, A3, A4 (Consolidated Text). Comprehensive guide to steam sterilization and sterility assurance in health care facilities.

Association of periOperative Registered Nurses (AORN). "Guideline for Sterilization." Guidelines for Perioperative Practice. 2023.

Healthcare Sterile Processing Association (HSPA). Sterile Processing Technical Manual. 9th ed. Chicago: HSPA. 2023.