Decontamination 101

Point-of-Use Cleaning, Containment and Transporting Contaminated Surgical Instruments

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Point-of-use (POU) cleaning of surgical instruments is a crucial component of surgical instrument management. POU cleaning is the beginning point of the decontamination and sterilization process, and is essential to patient safety.

CSTs are responsible for managing the POU care and handling of contaminated reusable items to contribute to the decontamination process performed by the Sterile Processing Department (SPD) technicians. This involves following manufacturer instructions that are validated methods for reprocessing surgical instruments. It is imperative that the surgical team works together to precisely follow these instructions.

WHY IS POINT-OF-USE CLEANING AND DECONTAMINATION SO IMPORTANT?

The importance of POU cleaning, safe transportation of contaminated devices to SPD and timely processing of devices cannot be overstated. POU cleaning is crucial for minimizing cross-contamination during containment and transportation from the operating room to SPD. The

LEARNING OBJECTIVES

- Determine why point-of-use cleaning is critical to patient safety
- Identify the FDA's six criteria for providing written reprocessing instructions
- Review ANSI/AAMI's standards for cleaning and decontamination
- Discuss the steps of transporting containers to the SPD
- Analyze the role the CST plays in POU cleaning

CST's understanding of standards and recommended best practices for POU cleaning, containment and transportation contributes to the overall goal of ensuring quality patient care.

In recent years, emphasis on decontamination processes, infection control and prevention of cross-contamination as related to surgical devices has increased, in part due to the reports regarding the use of contaminated endoscopes that have led to multiple patient infections and deaths.[1-4] Decontamination and sterilization are issues that healthcare professionals have increased their focus on to prevent the spread of hospital-acquired infections (HAIs) and surgical site infections (SSI). State and federal government agencies have published guidance documents while manufacturers are being held accountable for providing detailed cleaning instructions.[5]

To emphasize the importance of POU cleaning, in 2011, 157,500 SSIs were reported for inpatient surgeries.[6] Between 2006-2008, the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) reported 16,147 SSIs.[6] NHSN reports that SSIs have an approximate mortality rate of 3%.[6] They are the costliest type of HAI with an estimated annual cost of $5.3 billion and approximately one million additional inpatient days annually.[6] There are three types of SSIs:[7]

- Superficial incisional: Involves the skin and subcutaneous layer and occurs within 30 days postoperatively.
- Deep incisional: Involves the deep tissues such as the fascia or muscle(s) with the incision. It occurs within 30 days postoperatively without an implant or occurs within one year if an implant is in place and the infection appears to be directly related to the surgical procedure.
- Organ/body cavity: Involves any part of the anatomy other than the incision. It also occurs within 30 days postoperatively without an implant or occurs within one year if an implant is in place, and the infection appears to be directly related to the surgical procedure.

(Please refer to the referenced website for further details regarding the three types of SSIs; there are additional parameters that must be met for each type.)

Lastly, POU cleaning is important to improving the efficiency and effectiveness of the decontamination process and aids in prolonging the life of instruments.[8] Blood and other body fluids as well as saline are corrosive and can cause pitting of the finish on surgical instruments. If allowed to dry, the substances are difficult to remove and can prevent the sterilizing agent to reach the surface of instruments. Instruments with lumens or cannulated instruments are prone to substances drying on the inside or the lumens are blocked by organic material. Lastly, biofilm can form on the surfaces of instruments. Microbes, such as *Staphylococcus aureus*, can form a matrix composed of lipids, polysaccharides and proteins that assists the cells to stick together and firmly adhere to the surface of instruments that cannot be easily removed. Biofilm is particularly challenging in instruments with lumens. Once biofilm forms, harsh methods for removal including direct friction and/or oxidizing chemicals, which are required but contribute to shortening the life of the instruments.[8] Therefore, prompt POU cleaning is important to reducing the microbial population on instruments and preventing biofilm formation.[8]

POU cleaning is crucial for minimizing cross-contamination during containment and transportation from the operating room to SPD. The CST's understanding of standards and recommended best practices for POU cleaning, containment and transportation contributes to the overall goal of ensuring quality patient care.

POINT-OF-USE CLEANING AND THE ROLE OF THE CST

The myth that following manufacturer's instructions will impede turnover time may make surgery departments hesitant to enforce these steps. However, pre-cleaning has the opposite effect and ensures that the surgical instrumentation is sterile for every patient. The purpose of manufacturer's instructions for use (IFU) is to make surgical devices safe for use not only for the patient but for all healthcare professionals who come into contact with contaminated surgical instrumentation. The manufacturer's instructions guide the stages of processing a contaminated device. The manufactur-

er of the device is the primary source of knowledge when assessing how the device should be cleaned.

The manufacturer is required to meet the FDA's six criteria for providing written reprocessing instructions that users can understand and can follow:[7,9]

1. Labeling should reflect the intended use of the device.
2. Reprocessing instructions for reusable devices should advise users to thoroughly clean the device.
3. Reprocessing instructions should indicate the appropriate microbicidal process for the device.
4. Reprocessing instructions should be technically feasible and include only devices and accessories that are legally marketed.
5. Reprocessing instructions should be comprehensive.
6. Reprocessing instructions should be understandable.[9]

(Please refer to the referenced website for further details regarding the FDA's six criteria for providing written reprocessing instructions as there are extra parameters that are advised.)

Both manufacturer and users have essential roles to play to guarantee safe and effective processing of the reusable medical device.[7]

The decontamination process is a three-stage process: POU cleaning, manual, and mechanical cleaning. This section will focus primarily on the principles of POU cleaning that involves the CST. The information will also center on the standards as published in the ANSI/AAMI ST79: 2017 *Comprehensive guide to steam sterilization and sterility assurance in healthcare facilities*. Professional organizations such as AST and AORN publish recommended best practices for decontamination and sterilization; however, the best practices are based upon the ANSI/AAMI standards, and those will be referenced in this article.

As stated in the ANSI/AAMI standard, the initial POU cleaning should occur during surgical procedures.[8] The CST should wipe the used instruments as needed with a sterile sponge that has been moistened with sterile water. Additionally, cannulated instruments and instruments with lumens should be irrigated with sterile water without creating aerosols.[8] This prevents blood and body fluids from drying on the instruments, prevents blockage of lumens by organic material, and prevents the formation of biofilm. Since the CST can be busy during surgical procedures, CSTs need to exhibit critical thinking skills to prioritize what needs to be accomplished and at what point during surgical procedures the time can be taken to quickly wipe off instruments. It is recommended the CST have available on the sterile field a separate basin with sterile water where instruments can be immersed. For example, during a total hip arthroplasty after the femoral reamers have been used and it is certain the surgeon has completed that step of the procedure, the CST then can place the used reamers in the basin of water.

ANSI/AAMI state that cleaning and decontamination should occur as soon as possible after instruments have been used.[8] Additionally, the standard states "all instruments opened in the operating or procedure room should be considered contaminated whether or not they have been used."[8] The CST may have inadvertently touched instruments on the back table that were not intended for use during the procedure. Or the instruments could be splashed by blood and body fluids as well as by irrigating solutions or the water from the basin used to wipe off instruments during the procedure. The following are several important aspects for the care and handling of instruments to prevent damage and to aid in improving the efficiency of reprocessing by the SPD technicians that CSTs should follow.

- Once the patient has left the OR, the CST will begin the process of breaking down the sterile Mayo stand and back table, which includes cleaning the instruments.
- The CST should not use sodium hypochlorite (bleach) or saline to clean and/or soak the instruments as these liquids are corrosive and can cause pitting of the finish on the instruments. The CST should use sterile water.
- Instruments that consist of more than one piece should

be disassembled according to a manufacturer's IFUs. All the pieces should be kept together and placed into their respective container, instrument tray or other transportation pan to avoid pieces from being misplaced as well as assist SPD technicians when they re-assemble the instrument tray. (Note: From this point on "respective container, instrument tray and transportation pan" will be referred to collectively as "containers.")

- All reusable instruments should be placed into their respective containers to prevent damage.[8]
- Ring-handled instruments will need to be re-strung on stringers and arranged in a single layer in the container(s); they should not be stacked on top of each other to prevent damage.
- Ratcheted instruments will be left open. If the ratchets are left closed the POU cleaning agent will not reach all surfaces of the instruments. Additionally, if the ratchets are left closed it slows down the SPD technicians who must go through the instruments to confirm they are not ratcheted.
- Heavy instruments will need to be placed in separate containers from delicate instruments (microsurgical instruments endoscopic instruments, endoscopes, etc) to prevent damage. If they need to be placed in the same container, the heavy instruments will need to be placed on the bottom with a towel moistened with sterile water or the pretreatment agent and laid down on top of the heavy instruments, so the delicate instruments may be placed on top.[8]
  - Endoscopic instruments and endoscopes, in particular, are prone to biofilm buildup. Due to their unique cleaning procedures they will need to be identified and placed into a separate container.
- Instruments that have sharp or semi-sharp features, such as Gelpi and Weitlaner retractors and Lambotte osteotomes, will need to be placed in a separate container and labeled "sharps" or placed with the heavy instruments. It will need to be communicated to the SPD technicians if the sharp instruments are mixed in with the heavy instruments.
- Instruments with lumens or channels will need to be flushed with sterile water prior to placement in a container.
- An instrument requiring repair will need to be identified with a tag that is visible to the SPD technicians who are responsible for removing the instrument for service and sending out for repairs, if repairable.[8]
- Instruments manufactured of dissimilar metals such as brass, chrome or titanium, will need to be placed in separate containers to prevent electrolytic deposition of the metals that damages instruments.
- Prior to transport, the CST will need to complete one of the following as recommended by ANSI/AAMI to prevent organic soils from drying[8]:
  - Place a water-moistened towel over the instruments;
  - Place instruments inside containers that are specifically designed to maintain humid conditions; or
  - Apply a pretreatment agent, such as an enzymatic foam spray, to the instruments.

CONTAINMENT AND TRANSPORTATION OF CONTAMINATED ITEMS TO SPD

Contaminated items will need to be contained during transport to the decontamination room of the SPD. ANSI/AAMI recommends bins with lids, enclosed carts or rigid sterilization containers.[8] Containment prevents airborne and/or contact spread and cross-contamination of microorganisms. OSHA requires that the containers or carts are marked with the biohazard label, red bag or a method that clearly identifies the enclosed items as being contaminated.[8] CSTs use surgical case carts to "pick" and transport the equipment, instrumentation and supplies needed for a procedure; these are then often used to transport the contaminated items to SPD since it is fully enclosed. However, as previously mentioned, the cart must have some type of label that identifies enclosed items are contaminated.

Containers should meet the following parameters[8]:

- Manufactured of material that can be easily decontaminated; or
- The container is intended for single use and manufactured of material that can be incinerated or disposed of according to the manufacturer's IFUs.

For example, surgical case carts are typically made of steel making it easy to decontaminate by hand or mechanical (an "assembly line" process of mechanical cleaning of case carts is available on the market referred to as "cart washers"). Additionally, the wheels of the carts should be routinely cleaned to prevent debris from interfering with the wheels' movement.[8]

As long as the manufacturer's written IFUs confirm, rigid sterilization instrument containers with closed valves or intact, dry filters can be used to transport contaminated items to SPD with no further coverings required, such as a red bag, as long as the external surface of the container has not been contaminated by blood, body fluids, or other fluids.[8] If the external surface is contaminated, the container must be placed in a bin, cart or covered by a red bag for transportation.

Lifts can be used to transport containers of contaminated

items directly to the SPD decontamination area; in this instance, the lift is considered equivalent to an enclosed surgical case cart.[8] A lift will need to meet the following parameters[6]:

- is not used to transport clean or sterile items;
- cleaned on a scheduled basis that is documented by SPD;
- directly travels to and is located in the decontamination area; and
- is large enough to allow all the containers to be positioned flat and not on their sides.

Transportation routes need to be designed to provide efficient pickup and delivery of containers to SPD, and high traffic areas should be avoided, whenever possible.

CONCLUSION

POU cleaning of surgical instrumentation is a vital component in the prevention of infection and cross-contamination. POU cleaning should not be taken for granted and must be performed as soon as possible. POU cleaning assists in decreasing the turnover time of surgical instrumentation and making the process of decontamination a safer activity for CSTs and SPD technicians.

ABOUT THE AUTHOR

Tyronne Johnson, CST, CRCST, BA, has been a Certified Surgical Technologist since 1995. His career expanded from a graduate of the military operation room specialist program at Fort Sam, Houston, Texas, to a sterile processing educator at South Nassau Community Hospital. His passion for teaching has helped many surgical and sterile processing technology students find long-lasting careers in the healthcare field. Tyronne earned his BA in business administration from Ashford University in 2013, and in 2015 he became a full-time faculty member at Kingsborough Community College in Brooklyn, New York. Tyronne is currently working on an executive master of business administration degree at Baruch College in Manhattan.

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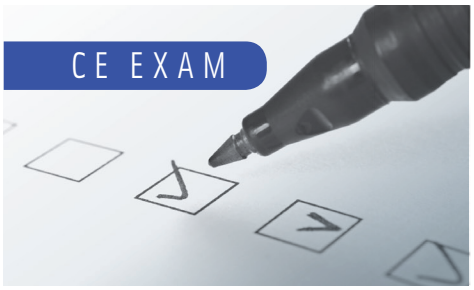

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1. From 2006-2008, the CDC and NHSN reported how many SSIs?
a. 13,000 **c.** 16,147
b. 15,552 **d.** 18,248

2. Then in 2011, how many SSIs were reported for inpatient surgeries?
a. 15,000 **c.** 157,500
b. 150,000 **d.** 175,257

3. The CST should wipe the used instruments as needed with a sterile _____ that has been moistened with sterile _____.
a. Sponge, water
b. Sponge, saline
c. Towel, water
d. Towel, saline

4. As stated in the ANSI/AAMI standard, the initial POU cleaning should occur at what stage?
a. During room set up
b. During the time out
c. During the surgical procedure
d. During post-op

5. Which of the following can cause corrosion and pitting on the finish of surgical instruments?
a. Blood
b. Body fluids
c. Saline
d. All of the above

6. Which type of SSI includes the deep tissues and occurs within 30 days?
a. Organ/body cavity
b. Deep incisional
c. Superficial incisional
d. Both b and c

7. According to the ANSI/AAMI guideline, cleaning and decontamination of an instrument should start:
a. ASAP
b. During the final suture
c. After the patient leaves the room
d. Only after transport to SPD

8. The decontamination process has how many stages?
a. 1
b. 3
c. 5
d. 7

9. Prior to transport, the CST will need to complete what steps in order to prevent organic soils from drying?
a. Place a water-moistened towel over the instruments
b. Place instruments inside humid-specific containers
c. Apply a pretreatment agent to the instruments
d. All of the above

10. Manufacturer's written reprocessing instructions are required to meet how many of the FDA's criteria?
a. 10
b. 6
c. 12
d. 9

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