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LEARNING OBJECTIVES

1. *Explain the importance of the manual cleaning process*
2. *Understand the effects of poor manual cleaning*
3. *Discuss general elements for a robust manual cleaning process*

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SELF-STUDY SERIES

Manual cleaning – the critical human element

by Cody McElroy, MBA, CSPM, CSPDT

Most of us perform manual cleaning every day. Picture a sink full of soapy water, a washcloth or sponge, a scrub brush and some steel wool pads, and a pile of dirty dishes, pots, cups, utensils, and cooking tools on the counter. Even if you use an automatic dishwasher, you may need to clean off the stuck-on food before you put the items into it, or they won't get completely clean. It takes time and effort to be sure your dishes and cooking tools are ready for their next use.

Now imagine a basin full of soiled surgical instruments waiting beside a sink. These delicate, complex tools have been inside a living human body repairing damage, removing infected or cancerous tissue, or diagnosing illness. Now they must be readied for the next surgeon or specialist who will need them to help the next patient. Clearly, this job is not as simple as washing your household items. Manual cleaning in a hospital sterile processing department (SPD) is a specific, complex, and labor-intensive process that cannot be taken lightly. Although technology and automation are integral to the instrument processing workflow, the manual precleaning process can't be automated – it requires a careful human touch.

Manual cleaning is serious business

Manual cleaning is arguably the most critical step of the cleaning process. To effectively clean a surgical instrument, technicians must remove all blood and soil. Blood, like other liquids, tends to flow over and into joints, hinges, grooves, and other difficult-to-clean locations. Unlike other liquids, the sticky blood (possibly mixed with other residual soils) then coagulates and dries into these grooves and joints, which creates a major cleaning challenge. "Any organic material or residual cleaning agents remaining on an item can inactivate chemical disinfectants or sterilants [and can] … protect microorganisms from destruction," according to ANSI/AAMI ST79:2017. Blood is not the only soil that must be removed from surgical instruments. Technicians must identify and remove a variety of biological and procedural soils, many of which require specific techniques.

Cleaning as part of the sterile processing cycle is defined as the "removal of contamination from an item to the extent necessary for further processing or for the intended use."[1] Instrument decontamination is a two-step process, and the first step is manual precleaning. Technicians must remove all gross soil during this

Figure 1: Cleaning is the first step in decontamination.

step or the subsequent reprocessing steps may not be effective.

Steps of the Cleaning Process:[1]

- Sorting: items such as utensils, basins, sharps, non-immersible items, and powered equipment are grouped separately to facilitate the cleaning process and help prevent damage to instruments.
- Disposal: used single-use instruments and other items are removed from the basins and trays of soiled reusable instruments.
- Pre-rinsing/pre-soaking: reusable devices are moistened and/or soaked in a cleaning solution to loosen soil on the surfaces of items. Although general detergents can be used, enzyme detergents are preferred for this process.
- Washing: each device is cleaned manually or mechanically, following the manufacturer's instructions for use (IFU) and using a process specifically designed for surgical instruments.
- Rinsing: critical water (water treated by deionization, reverse osmosis, or distillation) is used to remove all soils and solutions.
- Drying: using a non-linting cloth, instrument air and/or medical device drying systems, devices are thoroughly dried to prevent potential recontamination from residual moisture.
- Inspection: once cleaned and dried, each device is examined with bright light and magnifying tools to ensure that it is, at the very least, visually clean.

Sterile processing staff understand that the decontamination station is no ordinary sink. All soiled items that come into this space must be handled as if they represent a significant health risk (also known as standard precautions) because of the potentially infectious materials that may be on the items waiting to be processed.

Moreover, manual cleaning is a double-edged sword because in addition to following their department's written policies and procedures (which typically align with national standards), technicians must follow the specific IFU provided by device manufacturers to safely reprocess each device. Some instructions may require 20 or more individual steps to completely clean the surgical instrumentation and skipping even a single step in the process could leave soil behind. In addition, the process must be performed consistently on each device, and by every technician, to assure optimal decontamination results.

Surgical instrument design varies greatly, and technicians must use the proper cleaning tools for each device. The most basic cleaning tool, the cleaning brush, comes in 10 or more different styles, a variety of lengths and diameters, and has bristles made of stainless steel, copper, or soft nylon. Using the wrong cleaning brush can damage devices or may not remove all soil. A common brushing error is using an abrasive cleaning brush on soft metal or plastic instrumentation. The resulting surface scratches create pits and groves that trap soils and microorganisms and impede the next step in the process (disinfection or sterilization).

Consequences and contributors to poor cleaning

Any failure to effectively clean surgical instruments before placing them in a mechanical washer or sending them over to the clean side for inspection and assembly can present risks to the patients we as healthcare professionals all serve. Surgical site infections (SSIs) due to improperly cleaned surgical instruments can be deadly to patients. A 2012 study from the National Center for Biotechnology Information reported a spike in surgical site infections related to dirty surgical instruments. In this study, 20% of the patients became sick, and *Staphylococcus sp.* bacteria were found on the instruments and in the surgical packaging.[2] In addition to infections, foreign materials such as bone and blood can cause allergic reactions or inflammation, and can potentially lead to anaphylactic shock.

Factors that can negatively impact the cleaning process include water quality, water temperature, cleaning chemistries, type of soil, human factors, and poor quality assurance. For example, medical devices such as endoscopes with lumens and robotic arms with channels must be manually cleaned to ensure that the lumen/channel is clean and free of any debris. If the department has hard water that is not treated (water quality), the chemistry they use may not work as effectively. If the wrong cleaning chemistry is used for the soils on the device (cleaning chemistries, soil type), some soils may not be fully removed. Then, if the lumens are not thoroughly flushed with critical or deionized water (water quality), pyrogens and biofilm can collect inside the lumen. If these cannulated items aren't properly inspected after cleaning (quality assurance, human factors), bioburden may be missed and may become fixed onto internal surfaces during the sterilization process. Any residual soils can lead to bacterial colonies called biofilms forming within the instruments. Those biofilm-covered surface areas will not receive sterilant during the sterilization cycle and will retain organisms within the biofilm that can infect the next patient on whom the device is used.

In addition to these direct risks, there are indirect risks and consequences that can negatively impact the surgical department and the hospital's bottom line. SSIs can cost hospitals valuable time spent notifying patients, correcting poor habits, and re-educating staff. They can also cause lost operating room time which can also affect revenue. According to an article published by Eloquest Healthcare, "While costs of an SSI vary widely based on the degree of infection and the site of surgery, the estimated average cost of an SSI can be more than $25,000, increasing to more than $90,000 if the SSI involves a prosthetic implant. Overall, SSIs cost the US healthcare system an estimated $3.5 to $10 billion annually."[3]

The impact of patient infections does not stop with the patient and costs associated with treating that patient. As the lawsuit filed by 67 patients of Adventist Hospital in Denver shows, infectious outbreaks caused from improperly cleaned surgical instruments can impact hospitals financially and reputationally. The 67 patients alleged that their surgical site infections were caused by dirty instruments. Investigation by state officials confirmed 76 instances in which dirty instruments were found in the operating room.[4] Even if the hospital settles the lawsuit before it goes to trial, community distrust could drive patients, and their revenue, away from the facility.

Developing a robust manual cleaning process

Because a department's manual cleaning functions have a direct impact on the health and safety of patients, it's essential that every SPD establishes a robust manual cleaning protocol.

Physical setup

A best-practice protocol begins with an optimal workspace. First and foremost,

Self-Study Test Answers: 1. D, 2. A, 3. B, 4. A, 5. C, 6. C, 7. A, 8. D, 9. D, 10. C

ensure that your decontamination area is up to code in terms of physical parameters like negative air pressure, ambient temperature, and a dirty-to-clean workflow. Next, have the appropriate personal protective equipment available and confirm that all staff can properly put on and remove the PPE. Ensure that task lighting is appropriate and work surfaces and equipment provide ergonomic support. It may also be worthwhile to consider a pass-through window so that manually cleaned and rinsed items can be passed directly through to the prep and pack area.

Follow instructions

Once the physical parameters are met, all IFU should be reviewed to ensure that surgical instruments are being effectively cleaned according to their respective instructions. IFU for all the instruments in the department's inventory should be easily available and accessible to technicians, whether in paper form or electronically.

Next, ensure that all cleaning tools, like brushes, are appropriate and available, and review the tools' IFU. Be sure that all instructions for cleaning and disinfecting each tool are being followed. Also, review the IFU for the cleaning chemistries being used in the department. Check to make sure technicians are meeting temperature, material compatibility and application requirements.

To assure that instructions are followed completely and consistently, they must be fully understood. If a device's instructions are not being followed, a tutorial may be called for to refresh everyone on the IFU. And whenever new instruments or manufacturers are introduced to the sterile processing department, an in-service should be provided on the instructions to assure proper processing of the new items.

Train staff well

In many departments, change is constant. SPD staff may change, and when technicians leave, their reprocessing knowledge specific to your department leaves with them. New people will have to learn your way of doing things. Instruments may change or be replaced with newer versions. When surgeons request new devices, everyone needs to learn how to reprocess them. To address ongoing changes, it's critical to ensure that you have a robust competency-based education and training program in place, and that you regularly audit or inspect for compliance. Your competency program should be based on your department and facility policies and procedures and each specific device's IFU. It's also helpful to have a record-keeping method in place to verify competency and document completed training and education. This can be recorded in your tray tracking system or on paper.

Competencies should be performed on an annual basis by a department educator or leader. If your department and team are large, it can be helpful to perform competency reviews on each employee's date-of-hire anniversary to avoid having to evaluate a large group all at one time. Competency checklists must also be reviewed and revised/updated periodically to keep up with changing instrumentation and IFU.

Engage your stakeholders

Actively engaging other departments that depend, in part, on your success can also prove to be extremely beneficial. Their knowledge, expertise and feedback can add value and help the SPD align with infection control standards and guidelines. Experts to collaborate with include representatives from infection control/prevention, facilities, surgical services, and patient/staff safety.

Manual cleaning matters

Improving patient safety is everybody's responsibility in a healthcare facility. However, reprocessing teams charged with disinfecting reusable surgical and diagnostic devices used on numerous patients are even more accountable for protecting those patients by doing their jobs extremely well.

Because the health and safety of patients and staff are at stake, manual cleaning cannot be taken lightly. It's the first and most critical step in the decontamination/sterilization cycle, and if it's not performed well, every step that follows is at risk of failing to achieve a device that's safe for reuse. Hospital leaders who invest in SPD education, people and resources will help ensure a successful patient outcome and a healthy bottom line for the hospital. But never forget that optimal patient safety also rests in each technician's two hands. HPN

Figure 2: Staff must be competent in all aspects of cleaning and inspection of surgical instrumentation.

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CONTINUING EDUCATION TEST • MARCH 2022

Manual cleaning – the critical human element

Circle the one correct answer:

1. **What is the first step of the decontamination process?**
   a. Assembly and packaging
   b. Inspection
   c. High level disinfection
   d. Cleaning
2. **What type of water is used to rinse surgical instrumentation?**
   a. Critical Water
   b. Tap Water
   c. Water with added copper
   d. Any type may be used
3. **What can residual soil do when left on an instrument?**
   a. Kill microorganisms
   b. Inactivate chemical disinfectants
   c. Enhance sterilization
   d. Protect the instrument from damage
4. **What was the root cause of infection at the National Center for Biotechnology in 2012?**
   a. Dirty surgical instruments
   b. Poor surgical technique
   c. Expired antibiotics
   d. Malfunctioning sterilizer
5. **Which is a factor that affects cleaning?**
   a. Type of sterilizer used
   b. The packaging materials
   c. The quality of the water used
   d. The surgical procedure
6. **About how much can the US healthcare system spend on surgical site infections annually?**
   a. $25,000
   b. $90,000
   c. $10 billion
   d. $3 trillion
7. **What should be accessible to the technicians who are precleaning surgical instruments?**
   a. Instructions for use
   b. Sterilizer's operation manual
   c. Operating room's procedure list
   d. Risk assessment
8. **When developing a robust manual cleaning process, which other departments should be engaged?**
   a. Infection control/prevention
   b. Facilities
   c. Surgical services and patient/staff safety
   d. All the above
9. **Which tools are used to develop staff cleaning competencies?**
   a. Surgical instrument IFU
   b. Facility policies and procedures
   c. Cleaning chemistry IFU
   d. All the above
10. **How often should competency evaluations be performed?**
    a. During onboarding
    b. On staff birthdays
    c. Annually
    d. Every 5 years

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