Are Your Instruments REALLY Clean? Best Practices for Decontamination

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****This in-service has been Approved by the CBSPD, Inc. for 1.25 CEUs.**

Objectives

- To describe the proper cleaning protocols, equipment and supplies
- To discuss different technologies in cleaning equipment
- To understand the difference between cleaning and decontamination
- To review the cleaning agents used

Definitions

Cleaning – According to the Association for the Advancement of Medical Instrumentation (ST-79), cleaning is defined as "the removal of contamination from an item to the extent necessary for further processing or for the intended use." This process involves soil removal, usually with detergent and water, of adherent visible soil (i.e. blood, pus, protein) from the surfaces, crevices, serrations, jaws and lumens of instruments, devices and equipment, by a manual or mechanical process that prepares the items for safe handling and/or further decontamination."

Decontamination - According to OSHA, decontamination is "the use of physical or chemical means to remove, inactivate, or destroy blood-borne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal."

Cleaning is the first and most critical step in breaking the chain of disease transmission. So how do we ensure proper cleaning?

We need a "CIA" process.

- **C** = Cleaning thoroughly
- **I** = Inspection carefully for cleanliness, defects
- **A** = Accuracy – follow the manufacturer's instructions accurately each and every time

According to Healthcare Purchasing News on line (June 2009), "The Joint Commission will ask healthcare workers to provide the manufacturers' instructions for instrument sterilization, and to describe and demonstrate how instruments are being cleaned and decontaminated according to those written instructions; observe the cleaning of instruments…."

It is important to understand that cleaning is the FIRST step in the Decontamination process. It may be all that is needed. However for critical and semi critical and critical devices, follow with disinfection or sterilization.

We must also understand that sterilization and high level disinfection are a multi-step processes; change just one step and the process can be nullified. Cleaning is important because the process of disinfection or sterilization is dependent upon direct contact of the sterilant or disinfectant with the surface of the item. Protein left on items can be "baked on" in the sterilizer. The better we clean, the more microorganisms are removed from the device. The fewer microorganisms on the device, the better the chance for effective sterilization or high level disinfection.

The steps in the use of an item include:

- Soiled transport
- Decontamination
- Preparation/Packaging
- Sterilization
- Cooling/unloading
- Storage
- Distribution/transport
- Use

Therefore, high level disinfection and sterilization are multi-step processes. Proper cleaning is the **FIRST** step in these processes.

Universal Precautions

All used supplies and equipment is considered contaminated. They should be collected and transported to the Decontamination area in a manner that minimizes potential contamination of staff, patients or the environment (confined and contained). Use a covered cart, tote bins, or closed carts for transportation. All bins, carts, bags, used for soiled transport should be identified with a biohazard label.

Decontamination Area Physical Design

The Decontamination area should be enclosed area and accessible from outside corridor. It should have negative air pressure with 10 air exchanges per hour. All materials (floors, walls, worktables) should be made of material to withstand washing. The temperature should range from 60-65^{o}F (AAMI) to reduce microbial growth and for staff comfort due to the personal protective equipment worn in the area.

The Steps in the Cleaning Process

- Contain contaminated items at the point of use
- Transport to Decontamination
- Sort
- Soak
- Wash
- Rinse/Dry

What Factors Impact Cleaning?

To understand how cleaning can be affected; we need to know/understand the following:

- Type of soil to be cleaned (blood, sputum)
- Items to be cleaned (simple or complex)
- Water quality (pH, hardness…)
- Temperature (cycles, cleaning solutions)
- Chemical activity (cleaning solution)
- Mechanical action (manual - "arm power-scrubbing", spray arms)
- Human factor (training)
- Verification of the process (cleaning effectiveness testing)
- Influence of the standards (AAMI, AORN, CDC)

Where to get the Information

Manufactures validate that an instrument can be reliably cleaned and sterilized / disinfected and is therefore reusable. **Users** (healthcare reprocessing personnel) verify that cleaning / sterilization equipment is working and that in-hospital cleaning / sterilization methods are consistently performed.

Containment/Transportation of Soiled Items

In the OR, personnel should wipe gross soil and debris from instruments throughout the surgical procedure. In other areas of the facility usually there is usually a dedicated room to store soiled items until picked-up. All transport carts must be cleaned/disinfected after each use. All items should be contained for transportation to the Decontamination area to ensure protection of patients and personnel.

Compliance Issues

Are personnel performing Decontamination activities wearing personal protective equipment (PPE)? Are leakproof, puncture proof containers available at the point of use? Are all contaminated items labeled as Biohazard? Are all body fluids contained to minimize spills?

PPE

- Need an impervious gown with sleeves (no aprons). Arms must be completely covered.
- Head cover (not PPE but prevents hair from getting into trays)
- Shoe covers (to protect shoes from body fluids)
- Decontamination gloves tightly fitted at wrist. These are thicker than regular gloves.
- Face shield
- Mask – AAMI recently changed this recommendation to "If there is any risk of splash **or splatter**, PPE should include a **fluid-resistant** face mask and eye protection. PPE used to protect the eyes from splash could include goggles, full-length face shields, or other devices that prevent exposure to splash from all angles."

Technician Wearing Correct PPE

Sorting - sorting of contaminated items facilitates the cleaning process. Sort like items; basins, utensils, non-immersible items, delicate items, etc. Sorting can prevent damage to devices.

Soaking - You can pre-soak with a detergent however the use of enzyme detergents is preferred. Enzymes assist in the loosening of soils to facilitate removal.

Water Quality - What effect does water quality have on my detergent/cleaning? Water can contain rust, minerals and other components which can interfere with action of detergents/enzymes. This can then impact on the quality of cleaning. Your water quality should be routinely tested, at least twice a year.

Detergent Selection – There is no single cleaning agent that will remove ALL types of soil, or is safe to use with all types of reusable devices. Detergent selection can be confusing!

Enzymatic Cleaners are organic substances which assist in the breakdown of soils. They are excellent for devices with lumens. There are several types of enzymes:

- Proteolytic enzymes for protein soils
- Lipolytic enzymes for fatty/marrow soils
- Amylase enzymes for carbohydrate residues

Enzymes are sold as single, dual or triple enzymes. Their effectiveness dependent upon concentration, use temperature and contact time. Enzymes are sold as liquid concentrates or powder. Liquids are easier to mix and are preferred. Enzyme solutions should be prepared at the point of use. Always follow the enzyme manufacturer's instructions for use including concentration, contact time and water temperature.

Enzymes break up blood soils; however detergents remove fibrinogen (protein present in blood plasma, responsible for clotting of blood). Most facilities use an enzymatic detergent so both soils can be removed with none product.

Principles of Cleaning – Follow these simple steps to ensure proper cleaning:

- Always refer to the instrument manufacturer's instructions for use. Don't assume you know how to clean the instrument!
- All items must be in the fully **open position**
- **No stringing of instruments!**
- All items should be disassembled, if possible
- Sets with large numbers of instruments may need to be separated into two or more pans
- Prevent damage to instruments by placing delicate items on top, heavier items on bottom
- Do not mix different metal types (i.e. stainless steel with non-anodized aluminum, brass, copper, chrome plating)
- Electrolysis can occur in wet, hot chambers of washers or ultrasonic cleaners - causes one metal plating to transfer to another metal
- Must carefully measure the detergent and the water!

Manual Cleaning - May be the only cleaning process available or the method recommended by the instrument manufacturer. When manual cleaning remember:

- Items should be submerged, disassembled
- It is preferable to use 3-sink method; wash, rinse, final rinse
- Manual cleaning can also be used to remove deposits which were not removed during the pre-soak

Manual Cleaning Implements include

- Soft bristle brushes. You need a variety of sizes and lengths. The brushes can be single use or reusable. If reusable, they need to be cleaned at least each shift using the method recommended by the brush manufacturer. You should check the condition of the brushes each shift and replace as needed.
- Soft cloths – should not generate lint

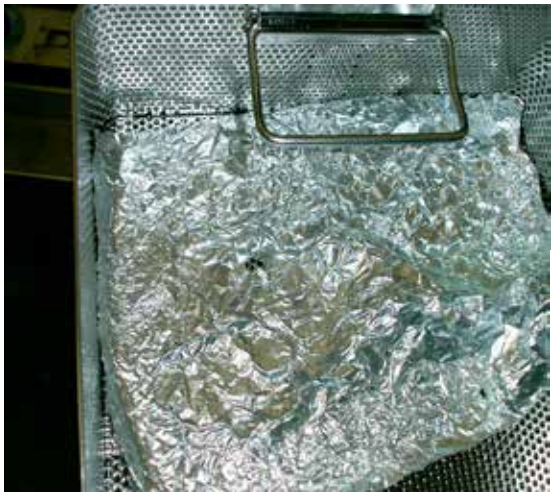
- No abrasive items
- No sponges/surgeons scrub brushes
- No materials which are permeable; i.e. wood

Ultrasonic Cleaning – An ultrasonic cleaner uses sound waves that are transmitted through a solution (water). The sound waves produce tiny bubbles which implode - results in scouring action that cleans. This mechanical process is known as "cavitation". Ultrasonic cleaning is very effective to remove soils in hard-to-reach areas (box locks, mouth teeth, etc.). Generally, you can only use detergents specifically formulated for ultrasonic cleaners (low foaming). You should check the label of the detergent to make sure it specifies the detergent is compatible with ultrasonic cleaners. The water temperature is usually 100 - 140 ^{o}F. Ultrasonic cleaning can be used after manual cleaning; grossly soiled items should never be placed in an ultrasonic cleaner; the soils can interfere with the cavitation process.

The water solution should be changed frequently based upon volume; usually every 1-2 uses. Do not place plastic containers/baskets in the sonic cleaner; plastic absorbs the sound energy. Instead make sure only metal mesh baskets are used.

The unit should have a cover to contain aerosols. Items should not be stacked (one tray at a time). The unit needs to be de-gassed each time the water is changed. Tap water contains air which can interfere with cavitation. Degassing removes the air. Place an empty metal mesh container in the sonic unit and run a cycle to remove the air. Never use the sonic with an empty chamber – damage can occur to the chamber walls.

As a piece of cleaning equipment, the sonic cleaner should be tested weekly, preferably daily, to make sure the unit is working correctly. There are several tests on the market. Follow the manufacturer's instructions for use and document all testing. Manufacturer's tests are more accurate than foil testing.



Aluminum foil test **Sonocheck**

Washer/Decontaminators – Disinfectors – These mechanical cleaners provide cycles of cleaning, rinsing disinfection and drying. They may also provide high level disinfection depending on temperature, exposure times and disinfecting agent used. These units provide excellent cleaning. They are usually multi-level, have a greater capacity, and have spray arms top and bottom of racks yielding improved cleaning action. Another type of mechanical cleaner is an indexing (tunnel) washer. These units have a cart-wash continuous throughput. Each process separate and performed in a separate chamber. They require a large amount of space. Most incorporate the ultrasonics in the process.

Washer-Decontaminator **Indexing (Tunnel) Washer**

Loading of Washers - Improper loading of mechanical washers is the # 1 cause of cleaning failures. You need policies and procedures to direct this practice. All items must make direct contact with the water and detergent. You should not place basins/bowls over instruments which can prevent the detergent

and water from making contact with all surfaces of the devices/instruments. All silicone mats should be removed before cleaning. Multi-level sets should have each level washed separately. Stringing of instruments is not recommended because it increases turnaround time in SPD, can increase employee exposure and it is not productive since instruments have to be unstrung in Prep for inspection. All instruments should be completely opened.

Mechanical Cleaning Detergents – These detergents are usually liquids. There are three types available

> **Neutral pH** - least corrosive to instruments. These have negligible alkalinity with a pH of 7 to 9. They are safe for use on plastic, aluminum and anodized aluminum trays.
>
> **Moderate pH, low available alkalinity** - These have a pH of 9 to 11. The available alkalinity is less than 2%. They are safe for stainless steel instruments but may be mildly corrosive to aluminum, brass and copper.
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> **High pH, high available alkalinity –** These are most effective for heavy soil removal. They may be more prone to scale and deposit formation and may be detrimental to instruments (can remove the protective chromium oxide layer from stainless steel instruments - accelerates corrosion). There is no "safe" high alkaline detergent. If you are using an 11-13 pH, high alkaline detergent you must follow with a citrus acid neutralization wash.

Rinsing - The most important part of the cleaning process. Rinsing is essential to remove loosened debris. It should be performed under running water (if manual cleaning). Deionized/distilled water is preferred for the final rinse to prevent mineral deposits on the instruments.

Items with Lumens – These devices have internal passageways and require special cleaning. Enzymatic detergents are ideal for these items. However, to effectively clean inside lumens you must have the proper size brush (diameter and length) to create friction inside all surfaces of the lumen for cleaning.

Minimally Invasive Instruments – Are more challenging to clean because debris and body fluids can get beneath the insulation. The older generations represent the greatest challenges for cleaning because they cannot be disassembled. You must follow the instrument manufacturer's instructions for cleaning including using any devices/methods recommended. There are newer devices, i.e. water cleaning pistols, force flushers that can facilitate cleaning. The newer versions are easier to clean because they can be disassembled and/or have a clean-out port to force flush fluids inside. All personnel processing these instruments should be trained with competencies verified.

Powered Equipment - includes various drills. Power equipment should never be immersed or come in contact with saline. They should not be processed in an ultrasonic cleaner. You should follow the manufacturer's instructions for disassembly; cleaning and lubrication.

Robotic Instruments – these specialty instruments require careful manual cleaning. They are expensive instruments and need to be handled with care. There is a 10-step process for manual cleaning which

requires a special high pressure hose to flush fluids through the channels. At the end of the process, the instruments are cleaned in an ultrasonic cleaner. These instruments cannot be processed in a mechanical washer.

Cleaning effectiveness testing – AAMI recommends weekly testing of the cleaning process to ensure we are cleaning effectively. There are many products on the market; products to test the mechanical washers, ultrasonic cleaners, cart washers, lumens, and even a product to test cleaning of the Robotic instruments. These products provide important information such as detergent/water issues with the washers, loading issues with staff, problems with sonic cleaner, etc. It is important to follow the test manufacturer's instructions for use. Make sure you know how to perform the test and how to interpret and document the results.

CONCLUSION: With all this being said…why do we still have dirty items going to the OR? Why did they leave Decontam that way? Why weren't they properly inspected in Prep/Pkg? Why do we short-cut the cleaning process? Remember, successful cleaning requires that we remember that **ALL SOILS,** visible and invisible **MUST** be removed. **INSPECTION** of items is essential. And, we **Must follow all manufacturer's instructions!**

QUIZ ON "Are Your Instruments REALLY Clean?"

Please click on the link below to take the quiz.

https://www.spdceus.com/ceus/are_your_instruments_really_clean_quiz.htm

Good Luck!