Decontamination—A Never-ending Saga?

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Objectives:
Discuss procedures to clean different types of instruments.

Describe the differences between manual and mechanical cleaning.

Describe factors that affect chemical action of cleaning agents.

As many of us know, all instrumentation is not created equal. What exactly does that mean and how does it affect the cleaning processes we use in our facilities? As most of you are aware, there are basically three grades of instruments: surgical grade, floor grade and disposable. Surgical grade refers to the instrumentation used in an OR and is generally made of surgical grade stainless steel. Floor grade instruments are also made of stainless steel but of a less pure grade. These instruments can be found in ER packs and some physician offices. Finally disposable instruments are exactly that, instruments put in disposable packs and are to used once and then sent back to the manufacturer for handling. The difficulty lies in that when instruments come to you, they may have all three grades within the contaminated set of instruments and it's up to you to pick them out. It does take practice but with help from your instrument manufacturer, you will learn how to spot each one of the differences in the types. Exposing floor grade and disposable instruments to the cleaning processes necessary to get them ready for reprocessing can sometimes make your job more difficult because if you don't spot the difference between a disposable and a surgical grade, the disposable can cause the surgical grade to rust and stain as well as destroy the passivation layer necessary to prevent pitting. So this is a long way to say that sorting of all instrumentation coming into the decontam area is imperative to get the right instrumentation together in order to prevent problems. Instrumentation also needing sorting are delicate instruments to prevent damage from careless handling, i.e., cataract scissors in with orthopedic instruments. Those instruments also needing manual cleaning, like suction cannulas need to be separated from those going thru the mechanical cleaning process.

An effective process that will assist in the prevention of damage to the instruments is to put the instrumentation in an enzymatic cleaner to keep the bioburdon moist. Enzymatic cleaners are used to facilitate rather than to clean the instruments. Enzymes break down complex organic molecules into simpler compounds that are usually water-soluble and more easily rinsed away with water. Enzymatic treatments will break apart proteins (proteases), fats (lipases) or starches (amylases). While enzymes are great, they must be rinsed from the instruments. Enzymes are considered to be proteinaceous solutions. (AAMI, 1996) Rinsing should not be done under running water as splashing and aerosolization will occur and create the possibility of contamination to the staff member. Instrumentation that needs to be rinsed should be done in a sink of water by immersion. Saline should never be used to rinse instruments as they can cause instrument deterioration. Any instrument that has the potential for holding large amounts of bioburden must be opened manually and inspected with the bioburden being removed with either brushes, pipe cleaners or forced air and water.

Once the bioburden has been removed, instruments that need to be manually cleaned must be done so by totally immersing the instrumentation in a sink of water to the point that the instruments are totally covered. The instruments needing to be cleaned must be done under the level of the water in order to keep microbes from being spread thru aerosolization. Don't forget that all lumens must also be cleaned under water with a low sudsing detergent and preferably a brush designed to go into the lumen. The cleaning detergent must be low sudsing or low foaming so that the staff member can see into the sink and prevent any punctures or cuts from sharp implements under the water level. These instruments can then be rinsed in another sink of water to remove the detergent residue. Those instruments that can be washed mechanically are generally opened, rinsed and put into a washer/decontaminator, washer/sterilizer or a washer/sanitizer. These pieces of equipment employ hot water temperatures of 60 degrees C to 95 degrees C (140 degrees-203 degrees F).

Trays should not be overfilled as it makes cleaning more difficult.

Washers work on the principle of impingement. Impingement is the spray force action of pressurized water against instruments being processed to physically remove bioburden. This means that washers are a lot like dishwashers in that they rely on a combination of water temperature, low sudsing detergents and a spray force action to remove the soil from devices being processed. Again, in order to be cleaned effectively, all items must be properly readied and placed in a manner that helps the mechanical washer to clean the instrumentation effectively.

With a mechanical washer, there are several cycles that the items go thru. There is usually a prewash, then an enzymatic cycle followed by a wash cycle. After the wash cycle comes the rinse cycle then there is a thermal cycle of around 180 to 200 degrees. A heated pure water rinse can be added to best remove cleaning chemicals from surgical instruments and finally some machines have the ability to do a lubrication cycle as well as a drying cycle.

Ultrasonic cleaners are also another method of mechanical cleaners. This type of cleaning is enhanced by the use of sound waves which in a sense, causes the water/solution to vibrate very fast, approximately 20,000 to 30,000 times per second. Ultrasonic vibrations create tiny air bubbles that grow larger and larger until they implode (collapse). That implosion dislodges soil from instrument's surface, as well as crevices, hinges, and other hard to reach areas within the instrument. One thing about ultrasonics that staff sometimes forget, water must be degassed every time it is changed in the sonic cleaner. When the water is changed, excess gas bubbles are formed. These gas bubbles can fill the cavitation bubbles and reduce the energy released during the implosion. In order to break the formed bubbles, once the machine is filled, turn the machine on and allow it to run for 5-10 minutes. Unless you want to damage the equipment, don't turn the ultrasonic machine on until the tank is filled.

I have seen people, in fact, I'm one of them, that used to use the wire brush as well as scouring powder for cleaning instruments. That is not the best process to use in cleaning instruments in that they are very abrasive and will scratch instrumentation which can cause staining, pitting and eventual rusting. Instruments, likewise, should never be exposed to alcohol as a cleaning or soaking agent. Alcohol will bind protein, making it all but impossible to remove. You'd think you needed a stick of dynamite to get the proteins off. Also, be very careful in using a bleach solution to soak instruments in. A one (1) in ten (10) solution is effective in killing HIV virus or any MRSA bacteria. Therefore it is not necessary, nor is it good for the instruments to soak any surgical instrument in bleach only, as it will completely ruin the instrument. The bleach breaks down the passivation layer and allows the bleach to start working on the metal underneath. It doesn't take long before the instrument is deeply pitted and if the instrument is not completely stainless steel, it will completely ruin the instrument to the point of having to buy a replacement.

When choosing a cleaner, there are several things to keep in mind. First, check with the manufacturer of both the washer and the instrument manufacturer to see what their recommendations are in regards to the use of detergents. Most recommend the use of a low sudsing detergent that can be rinsed off completely so we don't leave any debris or detergent on which can cause spotting or staining or even prevent that particular site on the instrument from being sterilized. Cleaning solutions that contain surfactants are more difficult to rinse off which can cause the instrument to not open cleanly or it gets that gummy feeling when being used in the OR.

Detergents should also be low in alkalinity. An alkaline product can assist in the cleaning process by increasing the solubility of the soils present. Available alkalinity simply means that there is s percentage of alkaline that is not tied up in the formulary of the product and is therefore considered free to work. The pH of an alkaline product can also be lower which is less aggressive on stainless steel. Remember that all instrumentation, whether being cleaned manually or mechanically, should be broken down into it's most basic parts in order to facilitate cleaning. Please check with the instrument manufacturer to obtain details for disassembly and reassembly because after all, if it can be taken apart, it must go back together.

The process of learning about decontamination and all its' attributes continues to be a life long practice. There is always something new or some new instrument that needs to be handled differently. It is up to us to

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1. The three grades of instrumentation are; floor, surgical and disposable.
   TRUE FALSE

2. Disposable instruments can cause surgical instruments to stain.
   TRUE FALSE

3. Delicate instruments include Orthopedic equipment.
   TRUE FALSE

4. Enzymatic cleaners keep bioburden moist.
   TRUE FALSE

5. Enzymatic treatments break apart proteins, fats and starches.
   TRUE FALSE

6. Saline should always be used to rinse instrumentation.
   TRUE FALSE

7 Instruments that need to be manually cleaned can be done at the counter.
   TRUE FALSE

8. It is OK to overfill trays when using the washer/decontaminator..
   TRUE FALSE

9. Water must be degassed every time it is changed in the sonic cleaner
   TRUE FALSE

10. Pure bleach is safe to use on all instrumentation.
    TRUE FALSE

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