In today’s world, the need for infection control has never been greater. Physicians, their staff, and patients are more concerned about the transmission of infection than ever before. Controlling bacterial contamination through sterilization has long been considered the most essential component in the infection control process and vital to patient safety. The result of proper instrument sterilization is the protection of the patient, physician, and staff from various infectious diseases.

The sterilization process, however, can be time-consuming, the equipment can be expensive, and mistakes can result in the unwanted spread of infection. Proper design of the instrument sterilization process and the processing area can help make sterilization more efficient, minimize environmental contamination, reduce errors, maintain the sterility of instruments, and ensure staff and patient safety.

This article outlines some basic guidelines to follow for setting up an instrument processing area in a medical practice and an instrument sterilization workflow process. These processes are modeled after the Center for Disease Control and Prevention (CDC) guidelines, and are designed to be used in accordance with general state board guidelines. If discrepancies exist, local state medical requirements should take precedence.

The Instrument Processing Area

The medical instrument processing area in a practice should be centrally located within the office, separated from the clinical area, but still easily accessed by staff. To reduce potential introduction of contamination into sterile environments, the area should have a traffic pattern that restricts it to authorized personnel only.

The work environments for processing equipment should be separated into four key areas: decontamination, packaging, sterilization, and storage. The areas should be designed to separate the sections where contaminated items are received, processed, and packaged from the areas where clean items are sterilized and stored. This separation can be achieved through partitions or spatially if the area is well designed and marked.

When laying out an instrument processing workspace, it is important to allow for a sink for hand-washing, storage cabinets or drawers, adequate lighting and electrical service, floors that are easily cleanable, and countertops that are water- and heat-resistant. It is also important to allow for proper ventilation when design-
Selecting an Ultrasonic Cleaner: Different Options for Different Needs

Every practice has different cleaning needs, depending on the number of patients and the types of procedures being performed. There are multiple size options available in ultrasonic cleaners, and physicians can choose the cleaner that best meets their practice’s individual needs. It is also important to evaluate the ease of use and the quality of the cleaner as well as the noise level. This is important to note because while ultrasonic cleaning is probably the fastest, most consistent, and safest method of cleaning instruments and components, most cleaners can be noisy, emitting a high-pitched sound during the cleaning cycle. When selecting an ultrasonic cleaner, review the power of the transducers and the uniformity of the coverage of cavitation. More powerful transducers and more uniform cavitation coverage will result in a more thorough cleaning of the instruments.

Instrument Sterilization Workflow

Step One: Transport Instruments to Steri-Center

Contaminated instruments should be transported to the processing area in a way that minimizes the risk of exposure to staff, patients, and the environment. Once the contaminated instruments are finished being used in the procedure room, they should be transported from the room in a closed, rigid, leak-proof container, and the staff who is transporting the instruments should be wearing appropriate personal protective equipment.

Step Two: Sort Instruments and Dispose of Waste Properly

Separate the reusable instruments from the disposables for sterilization. Disposable instruments should be properly disposed of and not sterilized for reuse. Sort the reusable instruments based on the type of sterilization that is going to be required and the materials the instruments are constructed of (e.g., carbon steel instruments should be sterilized separately from stainless steel to avoid corrosion). Some instruments may require a cold soak prior to sterilization. If instruments cannot be cleaned immediately, pre-soaking or maintaining them in a moist environment may improve the cleaning process. Dispose of any excess waste in a biohazard waste receptacle according to state EPA requirements.

Step Three: Rinse and Ultrasonically Clean Instruments

To minimize the risk of personnel injury, instruments should be cleaned with a hands-free mechanical process such as an ultrasonic cleaner or instrument washer prior to sterilization. Ultrasonic cleaning is the preferred process since it is safer and more effective than manual cleaning and more efficient in penetrating inaccessible areas such as crevices and joints. It is important to ensure that instruments are rinsed thoroughly and the majority of bioburden is washed off prior to placing them in an ultrasonic cleaner. Removal of debris may be easier if the instrument has had time to soften while in the holding solution. Visually inspect the instruments for residual debris and damage and re-clean or replace any instruments as appropriate. Hand scrubbing of instruments is not recommended because of the risk of “sticks” from sharp instruments. Personal protective equipment should also be used in the ultrasonic process. Instruments are placed in an ultrasonic cleaning basket that assures positioning of the instruments at the proper distance from the bottom of the tank while keeping them completely immersed in ultrasonic solution. Follow the manufacturer’s recommended instructions to ensure optimum results.

While some microorganisms may be destroyed in the ultrasonic cleaner, this process should not be considered an appropriate substitute for disinfection or sterilization. Additionally, only those chemicals that are specifically labeled as ultrasonic solutions should be used. Detergents, disinfectants, and various liquids not chemically prepared for such use should not be substituted. Solutions should be changed frequently to assure the continued effectiveness of the cleaner.

Step Four: Rinse with Clean Water and Dry Instruments

After being ultrasonically cleaned, the instruments should be rinsed in clean water, and in certain situations, distilled water. Then dry the instruments before packaging by either allowing them to air dry, by patting them down, or through the use of an instrument dryer. If required, follow manufacturers’ recommendations to lubricate or use rust inhibitors that are appropriate for sterilization.

Step Five: Pouch or Wrap Instruments

In order to prevent instrument recontamination, it is important to package items since placement of unwrapped sterilized instruments in a contaminated drawer, tray, or other receptacle undermines the purpose of infection control.
Transmission of infections. If the use of sterilized instruments is a routine occurrence in the practice, it is important to have more than one method of sterilization or multiple sterilizers available to use as a backup in the event equipment breaks down, supplies run low, or electricity is unavailable or to avoid disruption in the practice.

Steam sterilization is the most commonly used and recommended method of sterilization. To achieve optimal sterilization conditions inside the chamber of steam sterilizers, it is necessary to remove the air trapped inside the chamber once the sterilizer door is closed. Traditionally, steam sterilizers have been classified by the method used to remove this air.

Gravity displacement sterilizers rely on gravity to force the air out of the bottom of the chamber through a mechanical valve at the beginning of the heating phase. Once specific conditions (temperature, pressure, etc.) inside the chamber are reached, this valve closes and remains closed throughout the remainder of the cycle. Thus there is the potential for small amounts of air to remain trapped in the chamber after the valve closes. This trapped air can result in incomplete sterilization under certain conditions.

Another traditional steam sterilizer type is the pre- and post-vacuum sterilizer. These sterilizers use a vacuum pump to remove air from the sterilizer chamber prior to and during the heating phase. Because this method uses a pump to draw the air out of the chamber and its contents instead of relying on gravity to cause the air to be moved to the bottom of the chamber and escape through an open valve, it can remove more air from the sterilizer chamber than gravity displacement sterilizers. In this type of steam sterilizer, the vacuum pump is also used at the end of the sterilization cycle to remove moisture from the sterilizer contents to shorten the drying time. Pre- and post-vacuum sterilizers tend to be significantly more expensive and also cost more to maintain because of the added components and complexity.

The third and newest type of steam sterilizer is the Steam–Flush Pressure–Pulse model. This sterilizer uses an electronically operated valve in place of the mechanical valve used on gravity displacement sterilizers to remove the air from the sterilizer chamber and its contents. Since the valve is electronically controlled, it can be opened numerous times as required to vent the air from the chamber, thus maximizing air removal. This type of steam sterilizer offers the low maintenance and low cost of the gravity displacement sterilizers with the more effective air removal of the prevacuum sterilizers. This allows some sterilizers of this type to pass air removal tests that are only required by prevacuum sterilizers (an example would be the Ritter M11 UltraClave Automatic Sterilizer), which removes more air from the chamber than gravity displacement sterilizers.

Whatever type of sterilizer is being used, follow the sterilizer manufacturer’s instructions for specific instrument packaging, sterilizer operation, and maintenance to ensure reliability of the equipment and correct operating procedures.

Chemical Indicators should be used in every cycle to validate that the sterilizer reached the appropriate cycle conditions necessary to achieve sterilization. Biological Indicators should be used in the sterilizer at least once a week to validate that the sterilizer is killing all microorganisms.

When loading the sterilizer, care must be taken not to pierce the instrument packaging with instruments, marking devices or other sharp objects. Correct loading of the sterilizer is required to achieve consistent, effective sterilization. Consult the sterilizer operator’s manual for directions on maximum...
load limits and proper placement of items to be sterilized.  

A normal sterilization cycle includes four phases: a heating phase (the period of time when the sterilizer is heating up to achieve appropriate sterilization temperature); an exposure phase (the actual time required for sterilization of the load); a venting phase (the period of time when the chamber vents the steam and depressurizes); and a drying phase (the period of time when the sterilizer is drying the instruments). The instruments should not be removed from the sterilizer until the full operating cycle is complete and the instruments and/or packaging is dry to prevent compromising packaging and re-contaminating the instruments.

**Step Seven: Storage in a Dry, Protected Area**

Sterilized instruments should be stored in a clean, dry and protected place that has minimal airflow. Instruments should not be stored unpackaged as this will cause them to become contaminated from hands and airborne microorganisms when doors or drawers are opened. Packaging should be placed on clean shelves or in clean drawers. Instrument packages should be rotated on a “first in, first out” basis. To minimize the possibility of contamination, instruments should remain packaged until they are required for a procedure and the packaging should be inspected prior to use of the instruments to assure the packaging is in tact. If the sterile barrier (packaging) has been punctured or gotten wet, the instruments should be re-sterilized before using them on a patient.

Kim Maalouf is product manager, sterilization products, at Midmark Corporation.

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