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POWERED SURGICAL INSTRUMENTS

LEARNING OBJECTIVES

1. List common types of powered surgical instruments
2. Review powered surgical instrument accessories
3. Identify cleaning principles for powered surgical instruments
4. Review preparation and sterilization principles for powered surgical instruments

Instrument Continuing Education (ICE) lessons provide members with ongoing education in the complex and ever-changing area of surgical instrument care and handling. These lessons are designed for CIS technicians, but can be of value to any CRCST technician who works with surgical instrumentation.

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POWERED SURGICAL INSTRUMENTS (PSI) PLAY A UNIQUE ROLE IN the operating suite. They reduce the time of surgical procedures and provide functionality and consistent performance in surgical procedures. PSIs are complex surgical devices and the processes used to clean, inspect and sterilize them are also complex. This lesson will focus on general principles of PSI care and handling. *Note: Always follow the manufacturer's instructions for use (IFU) for the specific PSI being processed.*

OBJECTIVE 1: LIST COMMON TYPES OF POWERED SURGICAL INSTRUMENTS

The term "powered surgical instruments" describes instruments that are powered by an external power source. PSIs are powered by one of three basic sources:

Battery Power

Battery-powered instruments are powered by rechargeable batteries. Because they work with a battery that is inserted into their handpiece, they do not have a cable or cord attached. Battery-powered instruments require a charger, and batteries must be charged before being dispensed. It is important to remember that not all batteries are compatible with all battery-powered instruments.

Electrical

Instruments powered by electricity must be connected to an electrical power source. They come equipped with a power cord or power unit.

Air Power (Pneumatic)

Air powered instruments run using compressed air or nitrogen. They require

an air source to operate. Air (nitrogen) is delivered through an air cord attached to a free-standing tank or an air access port in a column, ceiling or wall.

PSIs are also grouped by their shape and the way they are held. The most common shapes are pencil grip and pistol grip. The following photo provides an example of each type.

In addition to their power source, shape and grip, PSIs are differentiated by the mechanical action they provide. Some PSIs are designed to saw, others are designed to drill and others provide additional specialized actions. Specific accessories and actions will be addressed in Objective 2.

OBJECTIVE 2: REVIEW POWERED SURGICAL INSTRUMENT ACCESSORIES

Every PSI has a power source and a handpiece; however, many handpieces require specific accessories in order to function. Common attachments include:

Saw Blades

There are several PSIs designed to saw bone. Types of saw styles and attachments



Figure 1: Battery-powered surgical instrument



Figure 2: Batteries on charger



Figure 3: Electrical-powered surgical instrument with cord



Figure 4: Pneumatic-powered surgical instrument with hose

Figure 5: Pencil grip-powered surgical instrument



Figure 6: Piston grip-powered surgical instrument



Figure 7: Powered surgical instrument with attachments





When performing manual cleaning, be sure to manipulate movable parts and brush cannulas and areas that cannot be accessed with a cleaning cloth. Be sure to perform manual cleaning as specified in the device's IFU.

include oscillating saws that use a side-to-side motion to cut; sagittal saws that use a back-and-forth motion to cut; and reciprocating saws that use a push-and-pull motion to cut. Some saws are designed for special functions, such as sternal saws that are used to open the sternum for open heart surgery. Most of the blades that accompany these saw attachments are disposable. Saw blades are designed to cut bone and can dull quickly. Blades should never be reprocessed and reused unless the manufacturer has provided specific instructions to do so.

Rotary Attachments

PSIs designed for use with rotary attachments include drills, burrs and reamers. These accessories come in various styles and sizes, and some drills are designed for specific applications, such as micro drills designed to drive very small wires through bone during ear surgery. Many drill bits and burrs are disposable and should not be reused. Reamers, such as spherical, femoral or axial reamers used for hip surgery, are reusable.

Other Specialized Devices and Attachments

Some other common PSIs and attachments include: dental drills used in the repair and reconstruction of jaw bones and teeth; cebatomes that are used to remove cement; and dermatomes that remove skin.

Many handpieces are dispensed with several attachments that enable them to be used in multiple applications. *Note: The cleaning requirements for each piece may be different, so it is imperative to diligently follow the manufacturer's IFU.*

OBJECTIVE 3: IDENTIFY CLEANING PRINCIPLES FOR POWERED SURGICAL INSTRUMENTS

Cleaning of PSIs is a complex process. Their configuration is sometimes difficult to clean and handpiece cleaning relies on manual processes. While each PSI is different, basic cleaning processes should include:

Point-of-Use Cleaning

Disposable components, such as drill bits, burrs and saw blades, should be removed and discarded at point of use. Components should be wiped to remove gross soil. It is important to keep components moist so blood does not dry on the instrument; however, handpieces and some accessories cannot be immersed. For those items, an external spray designed for use with the specific instrument may be used. Another option is wrapping the components in a moist towel. PSIs should be transported to the decontamination area and cleaned as soon as possible after use.

Initial Decontamination

Once the components are received in the decontamination area they should be sorted to separate components that

must be hand cleaned from ones that may be cleaned using a mechanical cleaning process.

The biggest challenge when cleaning PSIs is conducting a thorough cleaning process while preventing fluid invasion. Fluid invasion occurs when fluid (cleaning solution, rinse water, etc.) enters the handpiece of a PSI. That fluid may impede the function of the device and shorten its life. Fluid can also contaminate the interior of the device. Such contamination makes it impossible to sterilize the device, and in some models, may create a risk of the fluid inside leaking out onto the sterile field during use. Internal moisture may also corrode batteries, motors and switches.

Fluid invasion is dangerous – posing patient safety risks – and costly because of the associated instrument repair and replacement. It is essential to hold the handpiece in a position that will prevent fluid from entering. Many decontamination areas use a cleaning air hose or battery connected to (or inserted in) the device to prevent fluid invasion. Cleaning hoses and batteries can be made by designating a used hose or battery to remain in the decontamination area for cleaning. Many facilities mark those accessories with instrument tape to help ensure that they do not get mixed in with usable hoses and batteries.

When performing manual cleaning, be sure to manipulate movable parts and brush cannulas and areas that cannot be accessed with a cleaning cloth. Be sure to



perform manual cleaning as specified in the device's IFU. Remember, not all soil is visible, so meticulous cleaning of all areas is critical.

It is also important to rinse all components thoroughly as residue from cleaning chemicals may impede the sterilization process and harm patients. Instruments should be dried as directed by the manufacturer's IFU.

OBJECTIVE 4: REVIEW PREPARATION AND STERILIZATION PRINCIPLES FOR POWERED SURGICAL INSTRUMENTS

When PSIs arrive in the assembly area they must be inspected to help ensure they are functional and ready for use. All attachments should be inspected for cleanliness and manipulated to ensure that moving parts move freely.

Unlike most other instruments, PSI inspection usually includes handpiece testing; this requires that the assembly area have access to each type of power source, compressed air, electricity and batteries. A charged battery can be used to test battery-powered devices. Once the device is connected, it should be run on all available settings to ensure it is in working condition prior to sterilization.

Some devices may require lubrication. Check the specific manufacturer's IFU for lubrication requirements.

Air-powered handpieces must be tested using the correct pounds per square inch. Excessive air pressure can damage the device and exert excessive pressure on the air hose. Like battery-powered instruments, air-powered instruments should be tested on all available settings. Hoses for PSI should be coiled loosely when they are prepared for sterilization.

After inspection, all components should be disassembled to facilitate the sterilization process. Some devices come with a container specially designed for the device and its components.

Others may need to be placed in generic mesh instrument trays. Regardless of the containment method used, when packaging PSIs it is important to protect delicate components and return handpieces to the neutral (off) position. Do not overcrowd trays and place items in a manner that will allow the sterilant to contact all surfaces.

Sterilization cycles may vary. Be sure to sterilize using the cycle specified by the manufacturer. Upon completion of the sterilization cycle, adequate time is needed for the instrument tray to cool before handling the PSI tray.

CONCLUSION

Powered surgical instruments are necessary for many surgical procedures. They reduce the length of surgery and provide consistent performance, and they represent a significant investment to any healthcare facility. Both Surgery and Central Service departments should be inserviced in the proper care and handling of these complex devices. Proper care and handling of powered surgical instruments will keep patients safe and extend the life of the devices. 

REFERENCES

- Association of periOperative Registered Nurses. 2015. Recommended Practices for Cleaning and Care of Surgical Instruments, Guidelines for Perioperative Practice.
- Mobile Instrument Service and Repair. 2014. Powered Surgical Instruments. The Challenge of Reprocessing.
- Rothrock J. 2011. Alexander's Care of the Patient in Surgery, 14th Edition.
- Dyonics. 2012. Powered Instruments, Instructions for Use, Smith and Nephew.

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CIS Self-Study Lesson Plan Quiz - Powered Surgical Instruments

Lesson No. CIS 254 (Instrument Continuing Education - ICE) • Lesson expires March 2019

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1. There are _____sources of power used for powered surgical instruments.
 - a. Two
 - b. Three
 - c. Four
 - d. Five
2. Batteries are fully interchangeable between different models of powered surgical instruments.
 - a. True
 - b. False
3. Pneumatic-powered surgical instruments use nitrogen as a power source.
 - a. True
 - b. False
4. Powered surgical instruments are differentiated by:
 - a. Power source
 - b. Shape and grip
 - c. Mechanical action
 - d. All the above
5. Common powered surgical instrument attachments include:
 - a. Saw blades
 - b. Drill bits
 - c. Rotary attachments
 - d. All the above
6. Cleaning requirements are the same for all powered surgical instrument attachments.
 - a. True
 - b. False
7. Reamers can be attached to the _____ handpiece.
 - a. Sternal saw
 - b. Sagittal saw
 - c. Rotary
 - d. All the above
8. Cebatomes are designed to:
 - a. Remove skin
 - b. Remove cement
 - c. Have a side-to-side cutting action
 - d. Have a back-and-forth cutting action
9. Many of today's powered surgical instruments can be mechanically cleaned.
 - a. True
 - b. False
10. The biggest challenge of cleaning powered surgical instruments is:
 - a. Removing dry on soil
 - b. Testing the handpieces for proper function
 - c. Conducting a thorough cleaning process, while preventing fluid invasion
 - d. Keeping the appropriate attachments with the correct handpiece
11. To prevent fluid invasion during cleaning:
 - a. Do not immerse handpieces
 - b. Use a decontamination hose or battery
 - c. Hold the device in a position that will protect it from fluid invasion
 - d. All the above
12. When cleaning powered surgical instruments, it's necessary to:
 - a. Manipulate all moving parts
 - b. Brush all cannulated areas
 - c. Follow the manufacturer's instructions
 - d. All the above
13. During the assembly process:
 - a. Each handpiece must be tested for function
 - b. Drill bits and sawblades should be attached to the handpiece for sterilization
 - c. Cannulas should be moistened for sterilization
 - d. All the above
14. All powered surgical instruments and their attachments need to be lubricated before sterilization.
 - a. True
 - b. False
15. Powered surgical instruments should be disassembled for sterilization.
 - a. True
 - b. False

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