Handheld instrument maintenance is both an art and a science

by Michael Murphy

A wide array of instruments are used in surgical procedures today, ranging from delicate microsurgery needle holders to air- and battery-powered drills and complex endoscopic equipment. Surgery departments use the greatest number and variety of instruments are used by surgery departments, but the emergency room, endoscopy, delivery area of obstetrics, outpatient surgery areas, surgicenters, and critical care units use a wide array of instruments as well.

In facilities with a central service department, CSD staff is primarily responsible for retrieval, reprocessing, storage and distribution of surgical instrumentation. As a result, central service technicians must be able to properly care for the majority of instruments in their work setting, most of which fall into one of three broad categories: 1) Handheld, nonpowered surgical instruments; 2) tools powered by electricity, compressed gas, batteries, and light sources (i.e., laser); and 3) Endoscopic equipment used to perform minimally invasive surgery or examine internal organs through natural openings or very small incisions.

Together, these three categories represent a substantial financial investment and resource for every healthcare facility. The CSD technician is part of the team that ensures proper care and handling, which is essential in maintaining the value of this investment. The following are guidelines for maintaining handheld instruments in proper and safe working order.

New instruments

All new instruments must be cleaned and inspected for proper function before being put to use. Manufacturers apply a protective coating on new instruments, which is not water-soluble. Instruments are inspected by the manufacturer, but may be handled numerous times before reaching the facility. Since damage can occur before the instrument reaches its destination, be sure to carefully inspect all new instruments before they are catalogued into inventory.

Lubrication

Clean instruments with box locks may be immersed in a water-soluble lubricant solution, either mechanically or manually, in a process known as “milking.” This lubrication protects the hinges and box locks as metal moves on metal, and coats the instruments’ surface to reduce spotting, particularly useful in regions with hard water. The lubricating process is often considered an optional step in processing, although the Association of periOperative Registered Nurses (AORN) recommends that instruments with moving parts be lubricated after each mechanical processing. Only decontaminated instruments should be immersed in the solution.

Manual lubrication requires following the manufacturer’s instructions for dilution and expiration dating. If manually submerging instruments, use a perforated inside container to prevent the need to reach into the solution to retrieve the instruments, which can cause accidents.

Ultrasonic cleaning removes instrument “milk,” so the lubrication should be performed after ultrasonic cleaning and before sterilization. The use of instrument-lubricating solutions will sometimes mask incomplete cleaning of hinges and box locks by allowing them to move even with some debris present. If an instrument hinge or box lock is stiff, it should be inspected for debris.

After the instruments are removed from the lubricant bath, they should be machine dried or allowed to air dry. Not all instrument lubricants are suitable for use in steam and EtO sterilization. It is important to read the label before use.

It is important that the bioburden in the lubricant solution be monitored closely and the solution changed as needed.
**Instrument inspection**

Before decontaminated instruments are sterilized, they must be checked for cleanliness and proper working function. A lighted magnifying glass facilitates the inspection process. Each instrument should be visually inspected for cleanliness, corrosion or pitting, burrs, and nicks and cracks.

For example, closely inspect ratchets, serrations, box locks, hinges, and lumens. Check for cracks that commonly occur in the box locks, hinges and near the base of the jaws. Instruments with jaws and a box lock must be checked to ensure that the parts are freely moving and aligned correctly. If the instrument has teeth, the teeth must all be there and mesh properly.

Instruments that feature box locks and ratchets should be tested to see if the proper tension is maintained. If the tips of the instrument act as a clamp, the tips should just meet before the ratchet engages. As the ratchets engage, the entire jaw of the instrument should mesh. To test even more thoroughly, the clamp should be opened as a result of the tapping, it needs to be repaired.

Self-retaining retractors should be checked to make sure the ratchets hold adequately when the instrument is in the open position. You can check this by opening the retractor and putting pressure on both shanks. The ratchet should unlock when you apply minimal opposing pressure on the finger rings.

Instruments made up of multiple parts must be checked to ensure all pieces are there and fitting together properly. Sliding parts must move smoothly and screw-on retractors function easily; if either resists, check for misthreading. Also, look for bends on instruments with lumens (e.g., trocars and needles).

Check needle holders by grasping a suture needle of appropriate size in the jaws and closing the instrument to the second ratchet. This should make it impossible to turn the needle with your fingers. Use care to avoid being stuck by the needle during this procedure.

Scissors hinges shouldn’t be stiff, but should retain enough tension to bring cutting surfaces smoothly together. First, check the cutting edges for gouges or burrs. Then, use this simple test to determine the sharpness of scissors: cut into a piece of ordinary absorbent cotton or a piece of latex. A sharp pair of scissors will cut through cleanly, all the way to the tips, without having the cotton fold between the blades. (Microsurgery scissors can also be tested in this way using a cotton ball or piece of kidskin.) Never use paper to test the cutting edge of surgical scissors, because this method is not a true test for sharpness and it dulls the instrument.

Instruments needing repair should be put aside. As these are precision devices, they should be repaired or sharpened only by those with specific training in this type of work, whether on staff or out of house. An improperly repaired instrument may not work the next time it is used or, of greater consequence, may cause injury to a patient.

**Sterilization**

Most handheld surgical instruments are sterilized by being exposed to saturated steam under pressure. However, some manufacturers may recommend low-temperature sterilization, such as ETO sterilization and aeration or gas plasma sterilization, for delicate microsurgery instruments.

There’s a general belief that low-temperature sterilization processes protect delicate, high-carbon-content cutting edges and instruments made of different metals from the rigors of rapid heating and cooling present in steam sterilization. To date, no published scientific evidence demonstrates whether low-temperature sterilized instruments last longer, so this issue calls for the judgment of your healthcare facility, in consultation with the surgical instrument manufacturer. Sterilization with ETO will affect the processing turnaround time and may result in greater inventories of instruments. Other low-temperature sterilization methods have shorter turnaround times.

**Instrument storage**

Instruments must be thoroughly dried before being put in the storage area. The storage area must remain dry and humidity controlled. Instruments with ratchets should be stored in the open position. Locking the ratchets puts constant tension on the jaw, shanks, and box lock, which could cause damage.

It’s common knowledge that healthcare facilities have a large financial investment in medical instrumentation and devices. The central service department technician is part of the team that cares for that investment by properly maintaining and handling these items. Careful maintenance will ensure that instruments and devices will function as intended so no harm comes to patients or staff.

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CONTINUING EDUCATION TEST — JULY 2003

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Mark the correct answer

1. Instruments are inspected by the manufacturer, but may be handled numerous times before reaching the facility.
   - True
   - False

2. Clean instruments with box locks may be immersed in a water-soluble lubricant solution, either mechanically or manually, in a process known as “softening.”
   - True
   - False

3. Empty back-up syringe containers would best be ultrasonic cleaning removes instrument “milk,” so the lubrication should be performed after ultrasonic cleaning and before sterilization.
   - True
   - False

4. All instrument lubricants are suitable for use in steam and EtO sterilization
   - True
   - False

5. Instruments with jaws and a box lock must be checked to ensure that the parts are freely moving and aligned correctly.
   - True
   - False

6. There is no need to check instruments made up of multiple parts to ensure all pieces are there and fitting together properly.
   - True
   - False

7. Scissors hinges should be stiff, and should retain enough tension to bring cutting surfaces smoothly together.
   - True
   - False

8. Most handheld surgical instruments are sterilized by being exposed to saturated steam under pressure.
   - True
   - False

9. There’s a general belief that low-temperature sterilization processes protect delicate, high-carbon-content cutting edges and instruments made of different metals from the rigors of rapid heating and cooling present in steam sterilization.
   - True
   - False

10. Instruments must be thoroughly dried before being put in the storage area.
    - True
    - False