LEARNING OBJECTIVES
1. Explain the importance of providing safe and functional instrumentation in a timely and cost-effective manner
2. Review basic points of inspection for six common instruments: scissors, needle holders, suction devices, retractors, hemostatic forceps, and tissue and dressing forceps
3. Explain how to determine if an instrument is rusted or stained, and how to assess the stability of an instrument’s finish
4. Outline basic care and maintenance procedures for laparoscopic instruments
5. Address the need for cleaning verification of surgical instruments

CENTRAL SERVICE (CS) TECHNICIANS MUST MEET EXACTING standards for surgical instrument processing to ensure that instruments are clean, sterile and properly functioning. Each surgical procedure must have the correct instruments – and complete sets that are available for use whenever they are needed. The wide variety of basic instruments, coupled with the increasing sophistication of specialty devices, make this responsibility increasingly important. This self-study lesson provides an overview of the topic that is central to the mission of every CS department.

OBJECTIVE 1: EXPLAIN THE IMPORTANCE OF PROVIDING SAFE AND FUNCTIONAL INSTRUMENTATION IN A TIMELY AND COST-EFFECTIVE MANNER
The success of every surgical procedure depends on the quality of the instruments being used. CS personnel have an ongoing responsibility to assure that the necessary instruments are available and in the right sets at the right time, and that they are functioning properly.
CS technicians handle thousands of instruments daily and each has the potential to significantly influence patient outcomes:
• Instruments that are not properly cleaned and sterilized pose a serious risk of infection.
• Damaged instruments can cause cases to be delayed or canceled. If undetected, these instruments can cause patient injury.
• Instruments that are not cared for and handled properly have a shorter useful life, thereby leading to higher repair and maintenance costs.
• If not processed in a timely manner,
Decontamination, inspection, assembly, packaging and sterilization procedures must be completed correctly if the goals of safe, functional and timely instrumentation are to be met.

A CS technician's education and training in instrumentation must be ongoing. The wide array of available instruments is continually supplemented with new, increasingly complicated and hard-to-process devices. Technicians must learn about the function and purpose of each instrument, paying close attention to details because instruments that look alike can be very different. They must also know details about decontamination, assembly and sterilization protocols for each device, and this cannot be done properly until each device is identified correctly.

Instrumentation management also involves knowing when instruments must be repaired or refurbished, when they must be replaced and when individual parts must be tested, repaired or replaced.

Another attribute effective CS technicians possess is the ability to work with others. This includes both coworkers who assist with processing, and customers, such as surgical staff, who use the products and services provided.

### OBJECTIVE 2: REVIEW POINTS OF INSPECTION FOR SIX COMMON INSTRUMENTS: SCISSORS, NEEDLE HOLDERS, SUCTION DEVICES, RETRACTORS, HEMOSTATIC FORCEPS, AND TISSUE AND DRESSING FORCEPS

The most important factors in extending the life of instruments are proper use, cleaning, sterilization and maintenance. Appropriate handling will, therefore, help ensure that surgical instruments perform as intended over the devices' life.

Preparation for decontamination of instruments begins at the point of use (during the surgical procedure). Throughout the procedure, the scrub personnel should keep instruments and equipment free of gross soil. If allowed to dry on surgical instruments, blood, organic material, debris and saline can result in corrosion, rusting and pitting. Industry guidelines recommend moistening instruments and keeping them wiped down at the point of use. This can be accomplished by wiping the surfaces with a sterile sponge moistened with sterile water and irrigating the lumens frequently with sterile water. Saline is corrosive and should not be used to clean instruments. Removal of organic material and debris at the point of use can improve the efficacy and effectiveness of cleaning and decontamination. Never let blood dry on any device. Soak instruments in an enzymatic solution, or cover them with a towel saturated with water immediately after use.

#### Scissors

Scissors are used to cut, incise and dissect tissue, suture and other material encountered in surgery. With the exception of those with serrated edges, all scissors are designed to be resharpened.

- Delays in processing instruments can put patients in danger, disrupt Operating Room (OR) schedules and create frustration for surgeons.

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than stainless steel and, once sharpened, they remain sharper longer; however, because the strips are attached to the scissors by welding or vacuum brazing, they cannot be replaced.

- Black handled scissors – Also known as microgrind or supercut scissors, their unique feature is the sharpening technique used on the edge of one blade, which will lance (slice) through tissue, rather than crushing or cutting like other scissors. While these scissors are the sharpest available, they also dull the fastest. They require special sharpening techniques and must be resharpened three to four times annually, depending on their usage.

Points of inspection for scissors include:
- Blunt tips – Tips should be rounded to prevent puncturing and tearing, and they should be inspected for corrosion and burrs.
- Sharp tips – See that both tips are present, and inspect them for bending or damage.
- Blades – Inspect for chips or burrs on cutting surfaces. Remember that tungsten carbide blades cannot be replaced. Inspect tungsten carbide inserts for cracks, and check for pitting where the tungsten carbide meets the stainless steel.
- Screw hinged area – Inspect both sides for cracking, staining and bioburden trapped in the head of the screw.
- Rings – Inspect for cracks. To inspect a scissor’s cutting action, open and close the scissors three or four times to assure a smooth glide that is not loose, tight, grinding or jumping.

Sharpness tests for scissors depend upon their size. For scissors larger than 4.5 inches, use red test material. For scissors smaller than 4.5 inches, use yellow test material. Conduct the tests on scissors before trays are assembled. Note: While most test material contains latex, non-latex materials are available.

**Needle Holders**

Needle holders are used to drive suture needles to close or rejoin wounds and surgical sites. They are made of stainless steel, and those with gold-ring handles have tungsten carbide inserts in the gripping portion of the jaws. In addition to being harder than stainless steel, these inserts offer several other advantages:
- The tungsten carbide inserts last longer than stainless steel.
- They grip the suture needle more precisely.
- When the jaws wear out, the inserts can be replaced (unlike other needle holders). Points of inspection for needle holders include:
  - Jaws – Jaws first wear out at their tips. If the blades are serrated, inspect the serrations for wear; look for cracked or missing inserts and worn or chipped edges. Inspect jaws for dark-colored bioburden and stains. If the needle holder has smooth jaws, close the ratchets and hold the device up to light. If you see light between the jaw tips, the device needs repairing.
  - Neck – Inspect for cracks.
  - Box lock – Inspect for cracks on both sides, and for blood and baked-on bioburden.
  - Shanks – See that they are not bent or misshapen.
  - Ratchet – Test ratchets by opening and closing. This action should be precise and smooth. When ratchets are closed completely, all edges should meet evenly.

**Suction Devices**

Suction devices extract (suction) blood and fluids from the surgical site. Points of inspection include:
- Tips – Inspect for sharp or abraded edges, dents and trapped surgical debris.
- Shaft – Inspect for bending or dents.
- Suction control – See that the control device is free of debris.
- Stylet – Confirm that it can be inserted at the proximal end. Note: The stylet should not be inserted during sterilization.

When cleaning suction devices, use a cleaning brush recommended by the device manufacturer that enters and completely exits the other side of the suction device, and ensure that the bristles touch all interior surfaces.

**Retractors**

Retractors are used primarily to move aside tissue and organs and keep them exposed during a surgical procedure. Points of inspection for retractors include:
- Distal ends – Inspect for bent blades or prongs.
- Release lever – When the release lever is used, it should spring back into place and open and close smoothly.
- Screw – Inspect for cracks and ensure it is secure. For multi-part retractors with multiple screws, ensure all screws are present.
- Spring area – Check for cracks.

**Hemostatic Forceps**

Hemostats are used primarily to control blood flow by occlusion (stopping the flow of blood in a vein or artery). They are designed to hold on all ratchet settings and they should never be used to clamp any type of tubing or other materials. Points of inspection include:
- Tips – Tips of serrated hemostatic forceps (such as Mosquito, Rochester, Pecan, Crile and Kelly) should all be intact and straight, and interfit precisely. Inspect
OBJECTIVE 3: EXPLAIN HOW TO DETERMINE IF AN INSTRUMENT IS RUSTED OR STAINED, AND HOW TO ASSESS THE STABILITY OF AN INSTRUMENT’S FINISH

While stains can be removed, rust causes permanent damage (pitting) to instruments. To determine if a brown-orange discoloration is a stain or rust, rub a pencil eraser over the discoloration. If the discoloration is removed and the exposed surface metal is smooth and clean, this is a stain. If there is a pit mark, however, this is corrosion and rust will likely continue to spread.

The metal finishes of old or plated surgical instruments may flake off, which may cause metal particles to enter a surgical site when the instrument is used. The first indication of flaking is the appearance of the metal surface under the finish. To assess the stability of an instrument’s finish:

- While wearing examination gloves, hold the instrument above a piece of white paper and rub the instrument aggressively with your gloved hands.
- Examine the paper for metal flakes.
- If there are flakes on the paper, discontinue use of the instrument immediately.

Note: When assembling trays, use storage or sterilization racks and tip protectors to protect delicate surfaces and cutting edges.

OBJECTIVE 4: OUTLINE BASIC CARE AND MAINTENANCE PROCEDURES FOR LAPAROSCOPIC INSTRUMENTS

Rigid Endoscopes

Most rigid endoscopes are used during laparoscopic procedures. They consist of an eyepiece with glass lenses, fiber optic light bundles and a metal shaft containing the lens train, fragile glass fibers and objective lens. They are very fragile and must be inspected before and after every endoscopic procedure. After every procedure, the endoscope must be inspected for scratches, dents, protrusions and evidence of distal tip burrs or other surface irregularities. Avoid touching the telescope’s ocular (proximal) or objective (distal) lenses. Touching the lenses could leave behind fingerprints and debris that will impair the view and possibly cause scratches.

Examine the endoscope for optical clarity. Holding the light post up to a light source, look through the lens and view a sheet of non-glare white paper, with printing. Start with the scope’s distal tip (about three inches from the paper) and move the tip until it is about one-quarter inch from the paper. The printing should appear crisp and clear, with minimal distortion.

If the printing is discolored or hazy, this indicates improper cleaning, chemical residue, a cracked or broken lens, moisture within the shaft, or external shaft damage which has broken some fibers. Clean the outside of the proximal and distal lenses with a lint-free applicator saturated with 70% isopropyl alcohol. Repeat the inspection process. Do not use the scope if the view through either lens remains cloudy or distorted after cleaning.

Inspect the optical fibers surrounding the lens train at the scope’s tip. Hold the light post toward a moderately bright light (such as an overhead light) and look at the distal tip. The light carriers should be seen as white areas at the perimeter of the lens. Black dots and irregular or shadowed areas may indicate broken or damaged fibers. Pointing the tip of the scope toward a bright light and observing the light post provides the same information.

Check the eyepiece seal for signs of visible damage. Assemble the telescope into the desired instrument by aligning the locking pin with the notch on the

Tissue and Dressing Forceps

Tissue and dressing forceps are tweezer-like instruments. The primary purpose of forceps is to manipulate, grasp and hold tissue. Note: Tissue forceps have teeth and dressing forceps (also called thumb forceps) do not.

Points of inspection include:

- Jaws – Inspect serrations for blood or bioburden. They should fit together and not overlap.
- Box lock – Check for cracks on both sides of the hinged area (the most common site for blood and baked-on bioburden).
- Ratchet – Test by opening and closing the hemostat before each tray assembly. The action should be smooth and the ratchet should hold on each engagement (click). To determine if a ratchet is sprung, set the hemostat on the first ratchet and then tap both rings softly and evenly on a flat table. If the hemostat does not remain closed on the first ratchet, or springs open while tapping, it needs repairing.

Immediately after use, the rings of homeostatic forceps should be opened completely. Blood and bioburden should not be allowed to dry on a hemostat.

• Teeth – See that teeth are not cracked or broken off and that they interfit smoothly.
• Distal serrations – Inspect serrations for blood or baked-on debris.
• Proximal end – Check for cracks.
• Other tests – Be sure the forceps do not click or stick when closing the instrument.

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Check the eyepiece seal for signs of visible damage. Assemble the telescope into the desired instrument by aligning the locking pin with the notch on the
instrument. Inspect for proper alignment of the telescope in the instrument by visually confirming a clear view.

Laparoscopic instruments are used in minimally-invasive surgical procedures, where small incisions are necessary. There are several common inspection points:

- Grasper – Inspect for bioburden in the jaws and for bioburden and cracks in the working mechanism. The shaft should be inspected for nicks and cuts.
- Scissors – Test scissors to see that they can cut through at least one thickness of facial tissue.
- Needles – Inspect for cracks and burrs.
- Linkage wear – Test to determine if the inner linkage is worn, stretched or fatigued. Wiggle the drive ring or handles back and forth. If the jaw does not move, the linkage has been altered. If the handles move, the jaw should move well.
- Insulation testing – Visually inspect the entire shaft for nicks or cuts after each use. Lightly pull back on the insulation at the collar (distal end); if the insulation slides, the insulation needs to be replaced. The insulation on the instrument shaft should be tested with an approved insulation tester to ensure there are no pin holes. If pin holes are detected, the instrument should be reinsulated.
- Hooks and spatulas – The insulated area should be inspected for cracks, chips and pin holes. The distal tip should also be examined for chips, rough edges and debris.

**OBJECTIVE 5: ADDRESS THE NEED FOR CLEANING VERIFICATION OF SURGICAL INSTRUMENTS**

**Cleaning Efficacy Tests**

Cleaning efficacy tests that are performed after cleaning should be used. These tests help verify the ability of a cleaning process to remove organic soil and microbial contamination that occurs during the use of surgical instruments.

There are various methods that can be used to evaluate the results of the cleaning process. The most common method is a visual inspection, which often involves the use of a lighted magnifying glass; however, residual organic soil and microbial contamination might be present even though the device “looks clean.” Additionally, visual inspection is not possible for the interior of lumens without the use of tools that have a light source and camera.

Ideally, cleaning verification by CS technicians should include:

a) visual inspection combined with other verification methods that allow the assessment of both external surfaces and inner housing and channels of medical devices, (e.g., Protein detection or adenosine triphosphate tests, magnifying devices and lumen cameras).

b) testing the cleaning efficacy of equipment.

c) monitoring key cleaning parameters (e.g., Temperature).{2

It is critical that healthcare facilities verify that staff members who perform the reprocessing of medical devices are consistently achieving the expected level of cleaning. The organization’s on-premise quality assurance program should include ways to verify that the cleaning equipment used for reprocessing of medical devices is working properly. It is not possible for the interior of lumens to be visually confirmed with tools that have a light source and camera.

Commercially-prepared tests are available and readily available for all surgical procedures.

**REFERENCES**


Part of this lesson was adapted from:


**ADDITIONAL RESOURCE**