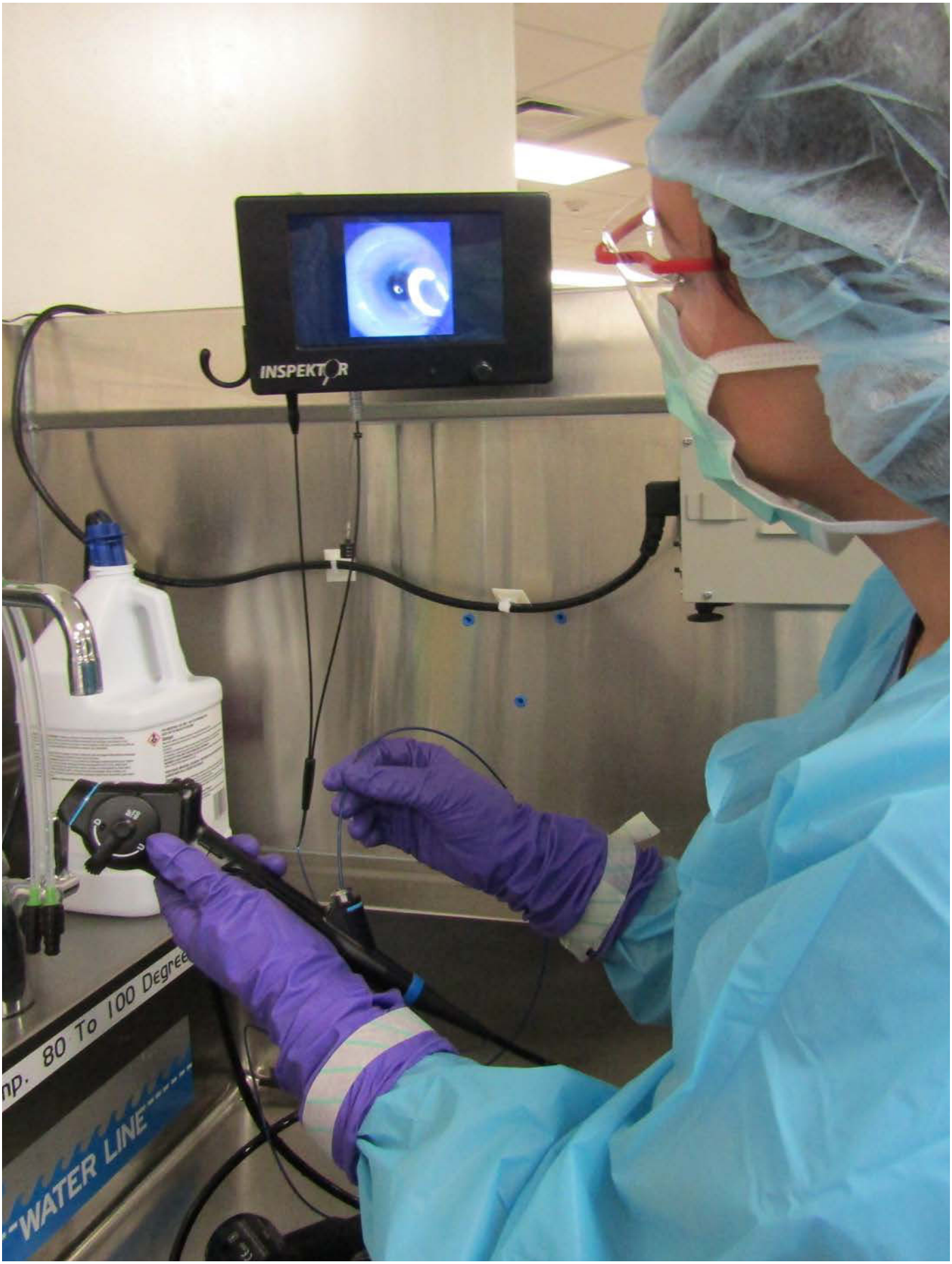
INSPEKTOR
80 To 100 Degree
WATER LINE

Borescope Inspection for Flexible Endoscopes:

A Guide to Getting Started

BY KEVIN ANDERSON, RN, CNOR, CSSM, CRCST, CHL, CIS, CER, CLINICAL EDUCATION SPECIALIST—HEALTHMARK INDUSTRIES

Certified Endoscope Reprocessor (CER) lessons provide members with ongoing education focusing on the maintenance and handling of endoscopes. These lessons are designed for CER recertification but can be of value to any CRCST.

Earn Continuing Education Credits

Online: Visit www.myhspa.org for online grading.

By mail: Mailed submissions to HSPA will not be graded or granted a point value (paper/pencil grading of the CER Lesson Plans is not available through HSPA or Purdue University). HSPA accepts only online submissions.

Scoring: Each online quiz with a passing score is worth two continuing education (CE) credits toward your CER recertification (six credits) or CRCST recertification (12 credits).

More information: HSPA provides online grading services for any of the Lesson Plan varieties. **Note: Purdue University ONLY provides grading services for the CRCST and CIS lessons. Please do not send the CER or CHL lessons to Purdue for grading.** Direct any questions about online grading to HSPA at 312.440.0078.

LEARNING OBJECTIVES

1. Review common causes of internal damage and debris in flexible endoscopes and how it jeopardizes patient safety
2. Review what the most recent standards and guidelines say about using borescopes to inspect the internal channels of flexible endoscopes
3. Discuss ways to implement an effective and efficient borescope inspection step for your flexible endoscopes

When I reflect about the endoscopy area in the healthcare facility where I used to work, I am astounded. It wasn't unusual for our three–procedure room endoscopy area to perform between 40 and 70 cases a day. That equates to hundreds of patients every week that didn't need to undergo more invasive surgery or who might be able to receive a life-altering therapy that would otherwise not be possible. It is truly remarkable what a highly efficient endoscopy team can accomplish for a local patient population, all while not having to make any incisions into a patient and allowing them to, in most cases, leave the facility the same day. It is critical that as professionals in the healthcare industry we continue to provide these services in an efficient, safe and effective manner.

As our flexible endoscopes and therapeutic procedures evolve, we too must evolve when it comes to how we process our equipment. We have learned in recent years that the flexible endoscopes we use to jump start the healing process may also do unintentional harm to the patients we seek to help. Sterile Processing (SP) professionals and others who processes flexible endoscopes are familiar with the many steps it takes to properly process a flexible endoscope to render it safe for use on another patient—and every step is important. But one step that has been introduced in recent industry standards and guidelines is critical to providing safe endoscopes for patients. That is the step of inspection. Inspection should include both external and internal surfaces of the endoscope. In a previous lesson plan, we addressed visual inspection of external surfaces. In this lesson, we focus on inspection using a borescope to look inside the accessible channels of a flexible endoscope. A borescope is a generic term used to describe a small camera or fiber-optic lens that can be passed through the

internal channels of flexible endoscopes and other lumened devices.

Objective 1: Review common causes of internal damage and debris in flexible endoscopes and how it jeopardizes patient safety

Recent peer-reviewed studies by Ofstead & Associates have shown that damage to the internal channels of flexible endoscopes is common and can occur any time a flexible endoscope is used. Channel damage might have occurred because the endoscope was kinked or bent more than it was intended to be. This type of damage may happen while transporting or handling the scope for setup or even during the procedure. Damage may also occur from the various instruments that are passed through the scope for the purpose of collecting specimens. It is also possible to have foreign objects stuck in the internal channels of endoscopes. It is common to use a clipping device during endoscopic procedures, and there have been documented cases where a clip gets stuck in the endoscope. Unfortunately, this isn't always discovered until the endoscope is used again on the next patient when it is pushed out of the channel with an instrument like a biopsy forceps. There have also been reports of broken cleaning brushes or bristles left inside the biopsy channels of flexible endoscopes.

Whether the internal damage to a flexible endoscope took place during the handling of the endoscope or during the procedure, it can have the same negative impact. Internal damage can occur even when the external appearance of the endoscope doesn't show obvious signs of damage. It is also possible to have damaged channels that don't show up when performing a leak test. Damaged endoscope channels can lead to ineffective cleaning and sometimes the formation of biofilm.

When proper cleaning isn't achieved, the following high-level disinfection (HLD) or sterilization process will be ineffective, leading to greater risk to the patient. With the emergence of potentially deadly, antibiotic-resistant infections, it is critically important that SP professionals get the cleaning process right every time. Unfortunately, there have been several U.S. Food and Drug Administration (FDA) warning letters regarding reports of flexible endoscopes, like cystoscopes and duodenoscopes, leading to patient deaths.

One way to ensure an effective cleaning process is to inspect the internal channels of our endoscopes with a borescope. Direct visualization of the internal channels allows SP technicians to identify damage, debris or foreign objects prior to HLD or sterilization and use on the next patient. If a defect is noted during inspection, the endoscope may then be recleaned or sent out for repair. This will help prevent the spread of potentially deadly hospital acquired infections (HAIs) from contaminated endoscopes.

Objective 2: Review what the most recent standards and guidelines say about using borescopes to inspect the internal channels of flexible endoscopes

To ensure that we build our policies and procedures according to the latest evidence, we can rely on our industry standards and guidelines for direction. For processing flexible endoscopes, we can look to the Association for the Advancement of Medical Instrumentation's ANSI/AAMI ST91:2021 *Flexible and semi-rigid endoscope processing in health care facilities*. Section 7.8.3 deals specifically with borescope inspection. This section begins, "The internal channels of a flexible endoscope that are accessible can be inspected by a borescope or other appropriate inspection method. Those conducting the inspection should be trained to identify damage and retained contaminants." It is important to note that the use of the word "can" means that it is possible to use borescopes for inspecting endoscope channels.

ST91, Annex E (informative), E.4 Visual inspection process, elaborates: "Magnifiers and borescopes are used to inspect where the unaided eye cannot see, including assessment for defects in functionality, damage including pitting, stains, repair needs, missing or damaged components, imperfections, retained items, compromised integrity of materials and seals, and residual moisture in or on the endoscope."

This section also references several recent articles that "have suggested that the use of the unaided eye for inspecting endoscopes is not enough and the use of enhanced visual inspection is helpful in ensuring that any endoscope is as defect-free as possible."

The Association of periOperative Registered Nurses (AORN) recommends "to use a clean borescope to visually inspect accessible channels of flexible endoscopes before sterilization or high-level disinfection (HLD)." The AORN Guidelines are evidence-based and reference several studies to support the use of borescope inspections in flexible endoscopes. It is also important to note that both ST91:2021 and the AORN Guidelines recommend that every borescope be processed in accordance with its manufacturer's instructions for use (IFU).

Objective 3: Discuss ways to implement an effective and efficient borescope inspection step for your flexible endoscopes

Once a facility has made the decision to add a borescope inspection to the endoscope processing procedure, it is important to determine when borescope inspections will be performed. According to ANSI/AAMI ST91:2021, borescope inspection should occur after the endoscope is manually cleaned and dried, but before HLD or sterilization. Drying the scope channels after manual cleaning and before borescope inspection will make any debris or damage easier to identify. Should a technician find signs of damage, the endoscope should be sent for repair in accordance with the facility's policies and procedures.

It is also possible to find stains or residual debris inside the channels of the endoscope. One possible action that could be taken is to reclean the endoscope. Dry the endoscope and repeat the borescope inspection. If the staining or debris remains, cleaning verification (CV) tools may be used to help confirm that the internal surfaces of the endoscope are clean. If results remain inconclusive, then it is recommended that the facility reach out to the endoscope manufacturer for guidance. A borescope may also be used after HLD or sterilization for quality control auditing. When using a borescope to inspect the internal channels at this part of the process, ST91 states, "the endoscope shall be processed again before clinical use."

Before implementing a borescope inspection in your endoscope reprocessing cycle, thorough training should be provided to all technicians responsible for performing this task. Technicians need to know why borescope inspection is important and what the industry standards recommend regarding borescope inspection. ST91, Annex E.6, Borescope inspection of an endoscope, lists specific areas "to inspect for damage or retained debris, including the instrument/suction channel, channel openings/valve housings, distal tip, and forceps elevator recess." Training should also include examples of both normal and abnormal borescope inspection findings. (See **Figures 1 to 4**) Lastly, training will need to provide guidance as to what to do with an endoscope when debris or damage are found.

After training is completed, competency should be assessed and documented. To determine competency, a technician should be able to perform the inspection using the borescope equipment properly while being able to explain a range of findings as well as what to do with the scope when abnormalities are found. Competency should be assessed at regular intervals as established by the facility and include all personnel responsible for processing flexible endoscopes.

While it may sound obvious to provide proper training and assess competency with borescope inspection, it is not uncommon to find situations where not all staff on all shifts have the required training or competency documentation. In the fast pace of the real world, we sometimes shift staffing around and put a technician in an assignment, like endoscope processing, who may not have received the proper training. Without proper training and competency, borescope inspection may lead to unintended costs in time due to rework or in money because of unnecessary repairs.

Figure 1: A normal endoscope channel

Figure 2: Scratched endoscope channel

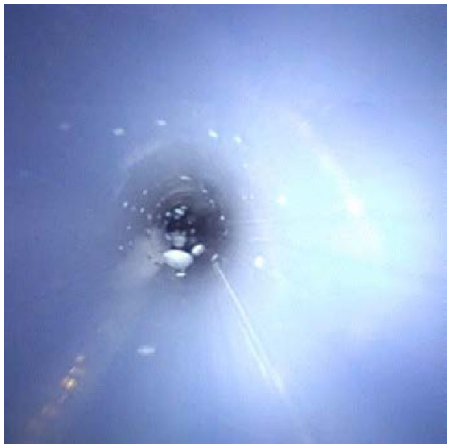

Figure 3: Fluid and residual simethicone inside an endoscope channel

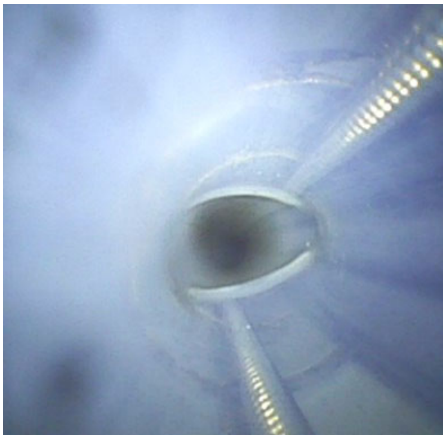

Figure 4: Endoscope channel buckling

Another strategy for successful implementation of borescope inspection is to designate a space for the inspection. Having the proper space for the inspection step is a strong visual reminder for technicians that once an endoscope reaches that specific space, it is to be properly inspected, externally with lighted magnification and internally with a borescope. Sometimes a designated space is hard to come by because we are working in a department that was designed well before there was much emphasis placed on inspection. If this is the case, then visual aids or signs can help to remind technicians to perform the inspection.

The rate of frequency of borescope inspection is another important detail to work out. Will technicians be expected to perform borescope inspections on every endoscope? Will borescope inspections be prioritized for endoscopes designated as "high risk" such as duodenoscopes and bronchoscopes? In the beginning, it may be an advantage to start borescope inspections on select models of endoscopes so that technicians get used to specific model types and can become familiar with and efficient in completing the borescope inspection process.

Once borescope inspections are being carried out without increasing processing time and technicians are confident in interpreting and responding to findings, then other endoscope models can be introduced to the inspection process. While technicians will get more effective and efficient with borescope inspections over time, it is likely that the inventory of flexible endoscopes will need to be increased. Borescope inspections, along with any other enhancements made to your endoscope process, will take time. Without the proper inventory of endoscopes, technicians may be pressured to skip critical inspection steps and miss potentially dangerous defects or debris inside an endoscope.

Conclusion

Implementing borescope inspections of endoscope internal channels has the potential to prevent broken or dirty endoscopes from being used on patients. This practice is supported by recent evidence found in peer-reviewed studies as well as updated industry standards and guidelines. Implementation of borescope inspections, however, is not without its challenges. It is important to be strategic when starting any new process. When possible, designate a space to facilitate proper visual inspection, including borescope inspections. Use signage and other visual aids to prompt technicians to perform the new borescope inspection step. Ensure that staff are properly trained and competent with the equipment. Lastly, consider implementing borescope inspection in phases to minimize the impact on throughput and scale up as technicians' efficiency improves and flexible endoscope inventory is added. As the borescope inspection process becomes more robust and efficient, the facility should see improvements in patient outcomes. P

RESOURCES

American National Standards Institute/ Association for the Advancement of Medical Instrumentation. ANSI/AAMI ST91:2021 *Flexible and semi-rigid endoscope processing in health care facilities.* Available for purchase at www.aami.org.

Association of periOperative Registered Nurses. *Guideline for Processing Flexible Endoscopes.* 2022.

Ofstead, C. L., Hopkins, K. M., and Eiland, J. E. "Borescope Inspection of Endoscope Working Channels: Why and How?" *Endoscopy International Open* 10, no. 1 (January 14, 2022): E109–E111. doi: 10.1055/a-1512-2813.