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Shine on Flexible Endoscope Reprocessing

2025 Webinar 02 | Series

Endoscope processing effectiveness: A reality check and call to action!

ASP Advanced Sterilization Products

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Intro

Flexible endoscopes, due to their complex design and exposure to biological materials during procedures, are challenging to reprocess effectively. They are heavily exposed to blood, mucus, and other secretions during procedures and may harbor billions of microbes before processing. Guidelines recommend thorough cleaning and high-level disinfection (HLD) or sterilization after each use.

While high-level disinfection (HLD) is intended to eliminate most pathogens, Ofstead's review of real-world evidence from 2019 to 2024 found that HLD often failed to eradicate all microbes, leaving patients at risk of infection ("Endoscope processing effectiveness: A reality check and call to action for infection preventionists and clinicians" published in AJIC 2025).

This webinar summarizes key evidence and underscores the urgent need for sterile processing professionals, infection preventionists, clinicians, and healthcare leaders to reevaluate and strengthen their endoscope reprocessing protocols to mitigate infection risks.

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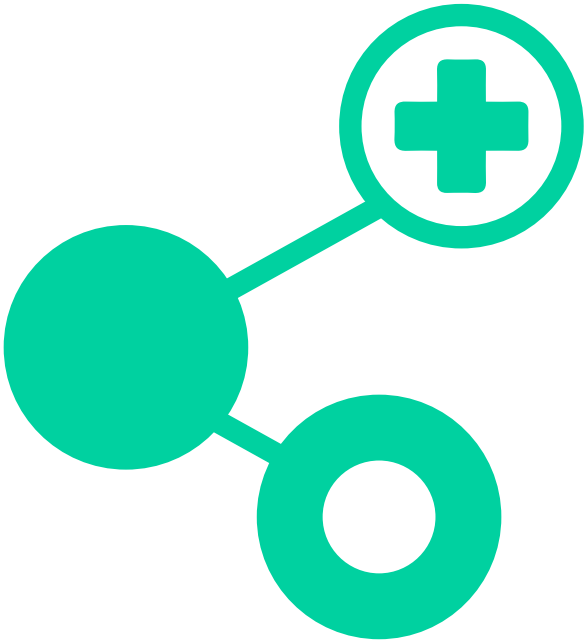
Topic • 01

Persistent Contamination Despite Reprocessing

Ofstead's literature review highlights that even when endoscope reprocessing is done in accordance with current guidelines, contamination often persists. This includes the presence of organic residues and viable microorganisms, which pose a risk of infection transmission.



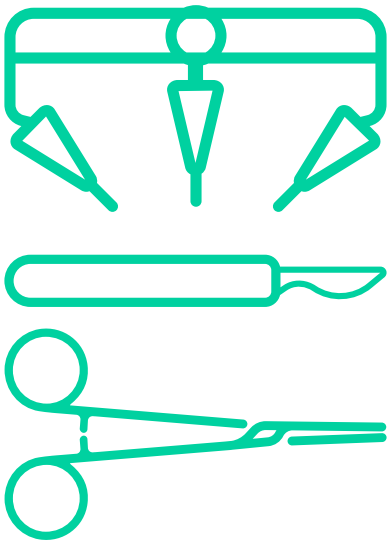
Topic • 02

Gaps in Reprocessing Protocols and Compliance

Many healthcare facilities struggle to maintain consistent adherence to reprocessing protocols. Factors include inadequate training, time constraints, and lack of standardized procedures, which contribute to variability in outcomes.

Topic • 03

Biofilm Formation and Device Design Challenges



The complex design of endoscopes, including duodenoscopes, makes them difficult to clean effectively to ensure that HLD or sterilization eliminate microbes. Biofilms can form inside channels, shielding pathogens from disinfectants and increasing the risk of patient exposure.

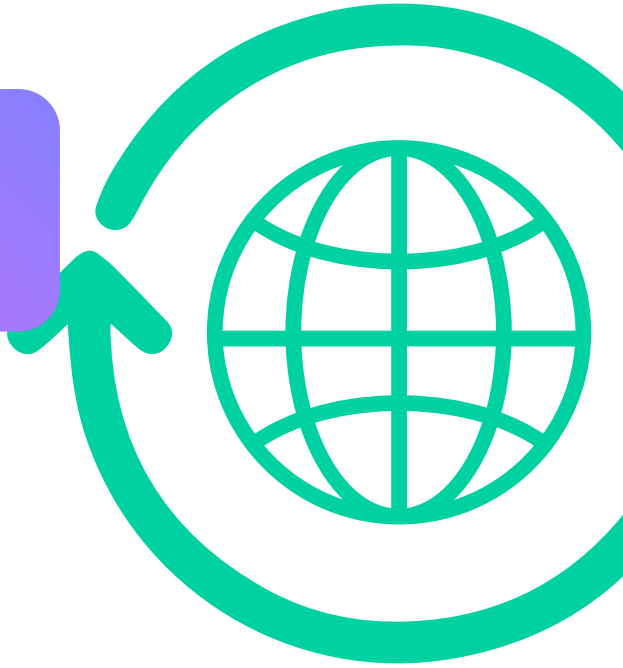
Topic • 04

Need for Quality Improvement

To reduce the risk of reprocessing failures, the review recommends multifaceted interventions including extensive training and competency testing for technicians, audits, optimizing cleaning to prevent the accumulation of soil and biofilm, and moving toward sterilization.

Topic • 05

Risk Assessment Strategies



Visual inspection is key to evaluating the effectiveness of pre-cleaning, manual cleaning, HLD or sterilization, drying, and storage. Tools such as lighted magnification and borescopes are essential for detecting endoscope defects and identifying suboptimal practices.

Topic • 06

Call to Action for Infection Preventionists and Clinicians

The author urges infection preventionists and clinicians to advocate for improved training, better equipment design, and institutional investment in quality assurance programs. The goal is to shift from a compliance mindset to a safety-first culture.

Key Findings

Persistent Contamination:

Studies reveal that a significant proportion of endoscopes remain contaminated post-reprocessing, with residual bioburden and potential pathogens present.

Outbreaks of Infection:

Reprocessing failures have resulted in outbreaks of infection involving every type of endoscope, including duodenoscopes.

Human Factors:

Failures in reprocessing are frequently attributed to skipped steps or improper execution by personnel, often due to inadequate training and complex instructions for use.

Design Challenges:

The intricate design of endoscopes, including narrow lumens and hard-to-clean components, hampers effective cleaning and disinfection.

Recommendations:

Risk Assessment: Healthcare facilities should conduct thorough risk assessments of their endoscope reprocessing practices.

Quality Improvement: Implementing proactive strategies and continuous quality improvement measures is essential to enhance patient safety.

Training and Competency: Ensuring that staff are adequately trained and competent in reprocessing protocols is critical.

How can we make endoscopes safer for patient use?

Make sure scopes are

clean
- Biochemical tests

intact
- Visual inspection

dry
- Visual inspection
- Droplet detection paper

Benefits of moving toward sterilization

- *Potentially higher reduction in microbial load*
- *Automated systems (no manual process like sometimes done for HLD)*
- *Endoscopes are cleaned, dried, and packaged prior to sterilization:*
  - *Reduced impact of water quality issues*
  - *No wet storage*
  - *Packaging protects scopes from contamination during storage*
- *Multiple quality indicators embedded in process:*
  - *Sterilizer parameters (with potential cycle failures from breaches [e.g., wet scopes])*
  - *Chemical indicators (external on packaging; inside peel pouch or tray ▸ transparency)*
  - *Biologic indicators*

Take home messages

1.Reprocessing Often Fails in Real-World Settings
Despite adherence to current guidelines, high-level disinfection frequently fails to eliminate microbial contamination from endoscopes, causing outbreaks of infection. This highlights a critical gap between protocol and practice.

2.Biofilm and Device Design Complicate Cleaning
The intricate design of flexible endoscopes—including duodenoscopes—makes them prone to biofilm formation, which protects microbes from disinfectants and increases infection risk.

3.Routine Surveillance and Auditing Are Essential
The article calls for routine visual inspection and audits of reprocessing practices. These measures may contribute to optimizing reprocessing outcomes.

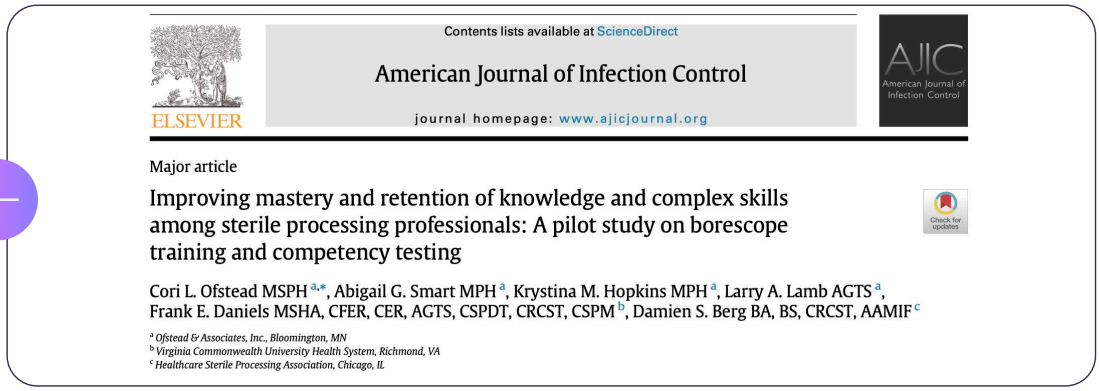
4.Training and Accountability Must Improve
Inconsistent staff training, lack of competency assessments, and time pressures contribute to reprocessing failures. Institutions should invest in education, oversight, and accountability.

5.Benefits of Sterilization
Sterilization provides a larger margin-of-safety and higher reduction in microbial load than HLD, and offers other benefits. These include the automation of critical steps, the elimination of risks associated with storing wet scopes, and the prevention of post-reprocessing contamination during storage.

6.A Cultural Shift Is Needed
The researchers urge a shift from a compliance-based mindset to a safety-first culture. Infection preventionists and clinicians should advocate for systemic improvements and evidence-based practices to improve patient safety.

Additional Resources from Cori Ofstead

American Journal of Infection Control



Sources

1. Ofstead CL, Smart AG, Hurst LL, Lamb LA. Endoscope processing effectiveness: A reality check and call to action for infection preventionists and clinicians. Am J Infect Control. 20 2. AAMI, ANSI. ANSI/AAMI ST91: 2021 Flexible and Semi-rigid Endoscope Processing in Health Care Facilities. Arlington, VA: Association for the Advancement of Medical Instrumen 3. Day LW, Muthusamy VR, Collins J, Kushnir VM, Sawhney MS, Thosani NC, et al. Multisociety guideline on reprocessing flexible GI endoscopes and accessories. Gastrointest Endosc. 2021;95:1133.60. 4. AORN. Guidelines for Perioperative Practice: 2023 Edition. Guideline for Processing Flexible Endoscopes. Denver, CO: 2023. 5. Society of Gastroenterology Nurses and Associates. Standards of infection prevention in reprocessing flexible gastrointestinal endoscopes. Chicago, IL: 2023 6. Haak J, Klempien I, Hans JB, et al. Endoscope-associated outbreak of OXA-181-carbapenemase-producing Klebsiella pneumoniae and its implications for hygiene management. J Hosp Infect. 2025. 7. Yang AF, Sherman A, Nazarian E, Haas W, Mehr J, Pedrani M, et al. Evidence of transmission of New Delhi metallo-ß-lactamase-producing Klebsiella pneumoniae through a gastrointestinal endoscope without an elevator channel. Infect Control Hosp Epidemiol. 2024:1-6. 8. Suleyman G, Shallal A, Ruby A, et al. Use of whole genomic sequencing to detect New Delhi metallo-B-lactamase (NDM)-producing Escherichia coli outbreak associated with endoscopic procedures. Infect Control Hosp Epidemiol. 2024;45(8):965-972. 9. Gubler J, Ruby A, Chami E, Weaver J, Suleyman G. EP 63 Management of a New Delhi metallo-B-lactamase (NDM)-producing Escherichia coli outbreak and large-scale exposure event associated with endoscopes. Am J Infect Control. 2024;52. 10. Kurtz DL, Morgan MG. Tracing high-level disinfection in physician practices to improve safety with single-use disposable flexible endoscopes. Am J Infect Control. 2023;51:54. 11. Montero MC, Helms A, Mikolajczak A, Silkaitis C. High-level disinfection evaluation in the ambulatory setting. Am J Infect Control. 2023;51:225-6. 12. Tuvo B, Scarpaci M, Cosci T, Ribechini A, Briani S, et al. Adoption of improved reprocessing decreased microbiological non-compliance for bronchoscopes. Int J Environ Res Public Health. 2022;19. 13. Centers for Medicare and Medicaid Services. Rio Grande Hospital in Del Norte, CO; January 28, 2024 14. Centers for Medicare and Medicaid Services. Virginia Mason Medical Center in Seattle, WA; 2024. 15. Centers for Medicare and Medicaid Services. Rice Medical Center in Eagle Lake, TX; 2022. 16. Centers for Medicare and Medicaid Services. Prosser Memorial Hospital in Prosser, WA; 2021. 17. FDA. Shirakawa Olympus Co. OES Cystonephrofiberscope 19761963. Silver Spring, MD: July 17, 2024. 3002808148-2024-06480. 18. FDA. Shirakawa Olympus Co. Evis EUS Ultrasound Bronchofiberviedoscope 559016. Silver Spring, MD: June 18, 2024. 3002808148-2024-05526. 19. FDA. Aizu Olympus Co. Evis Exera III Gastrointestinal Videoscope 20051185. Silver Spring, MD: August 23, 2024. 9610595-2024-16917. 20. FDA. Aizu Olympus Co. Evis Exera III Duodenovideoscope 17219263. Silver Spring, MD: June 28, 2023. 9610595-2023-09430. 21. Ofstead CL, Wetzler HP, Doyle EM, Rocco CK, Visrodia KH, Baron TH, et al. Persistent contamination on colonoscopes and gastroscopes detected by biologic cultures and rapid indicators despite reprocessing performed in accordance with guidelines. Am J Infect Control. 2015;43:794-801. 22. Ofstead CL, Heymann OL, Quick MR, Eiland JE, Wetzler HP. Residual moisture and waterborne pathogens inside flexible endoscopes: Evidence from a multisite study of endoscoAm J Infect Control. 2018;46:689-96. 23. Ofstead CL, Heymann OL, Quick MR, Johnson EA, Eiland JE, Wetzler HP. The effectiveness of sterilization for flexible ureteroscopes: A real-world study. Am J Infect Control. 2017;45:888-95. 24. Ofstead CL, Smart AG, Hopkins KM, Wetzler HP. The utility of lighted magnification and borescopes for visual inspection of flexible endoscopes. Am J Infect Control. 2023;51:2-10. 25. Barakat MT, Girotra M, Huang RJ, Banerjee S. Scoping the scope: Endoscopic evaluation of endoscope working channels with a new high-resolution inspection endoscope (with video). Gastrointest Endosc. 2018;88:601-11. 26. Thaker AM, Kim S, Sedarat A, Watson RR, Muthusamy VR. Inspection of endoscope instrument channels after reprocessing using a prototype borescope. Gastrointest Endosc. 2018;88:612-9. 27. Zhou MJ, Huang X, Liu LL, He RP, Hu L, et al. Investigation of the internal conditions of 213 reprocessed endoscopic channels. Surg Laparosc Endosc Percutan Tech. 2023;33:4-11. 28. Chen TT, Nguyen MV, Cerrato C, Berger JH, Vartanian KB, et al. Clinical evaluation of miniature flexible scope for diagnosis of ureteroscope working channel defects. J Endourol. 2023;37:628-33. 29. Wallace MM, Keck T, Dixon H, Yassin M. Borescope examination and microbial culture results of endoscopes in a tertiary care hospital led to changes in storage protocols to improve patient safety. Am J Infect Control. 2023;51:361-6. 30. Yassin M, Clifford A, Dixon H, Donskey CJ. How effective are the alcohol flush and drying cycles of automated endoscope reprocessors? Stripped endoscope model. Am J Infect Control. 2023;51:527-32. 31. Ofstead CL, Hopkins KM, Preston AL, James CY, Holdsworth JE, Smart AG, et al. Fluid retention in endoscopes: A real-world study on drying effectiveness. Am J Infect Control. 2024;52:635-43. 32. Nerandzic M, Antloga K, Robinson N. Alcohol flush does not aid in endoscope channel drying but may serve as an adjunctive microbiocidal measure: A new take on an old assumption. Am J Infect Control. 2023;51:772-8. 33. Okamoto N, Sczaniecka A, Hirano M, Benedict M, et al. A prospective, multicenter, clinical study of duodenoscope contamination after reprocessing. Infect Control Hosp Epidemiol. 2022;43:1901-9. 34. Tuvo B, Scarpaci M, Cosci T, Ribechini A, Briani S, et al. Adoption of improved reprocessing decreased microbiological non-compliance for bronchoscopes. Int J Environ Res Public Health. 2022;19. 35. Houri H, Aghdaei HA, Firuzabadi S, Khorsand B, Soltanpoor F, Rafieepoor M, et al. High prevalence rate of microbial contamination in patient-ready gastrointestinal endoscopes in Tehran, Iran: An alarming sign for the occurrence of severe outbreaks. Microbiol Spectr. 2022;10. 36. Guadagnin SVT, Costa DM, Primo MGB, Silva AA, et al. Significant increased bacterial contamination with endoscope overnight and weekend storage times. J Gastroenterol Hepatol. 2023;38:1559-65. 37. Van der Ploeg K, Vos MC, Erler NS, Bulkmans AJC, et al. Impact of duodenoscope reprocessing factors on duodenoscope contamination: A retrospective observational study. J Hosp Infect. 2024. 38. Ayres AM, Wozniak J, O'Neil J, Stewart K, Leger JS, Pasculle AW, et al. Endoscopic retrograde cholangiopancreatography and endoscopic ultrasound endoscope reprocessing: Variables impacting contamination risk. Infect Control Hosp Epidemiol. 2023;44:1485-9. 39. Cimen C, Bathoorn E, Loeve AJ, et al. Uncovering the spread of drug-resistant bacteria through next-generation sequencing based surveillance: transmission of extended-spectrum ß-lactamase- producing Enterobacterales by a contaminated duodenoscope. Antimicrob Resist Infect Control. 2024;13:31. 40. FDA. Hoya Corporation Pentax Video Duodenoscope 20461509. Silver Spring, MD: October 16, 2024. 251897-2024-00064. 41. FDA. Aizu Olympus Co. Bronchofiberscope 19431155. Silver Spring, MD: May 30, 2024. 9610595-2024-10947. 42. FDA. Shirakawa Olympus Co. Cysto-Nephro Videoscope 193688041. Silver Spring, MD: December 22, 2023. 3002808148-2023-14796. 2025 Ofstead & Associates, Inc. 43. FDA. Aizu Olympus Co. Evis Exera III Gastrointestinal Videoscope 17044116. Silver Spring, MD: June 1, 2023. 9610595-2023-08305. 44. FDA. Hoya Corporation Pentax Video Bronchoscope 16981873. Silver Spring, MD: May 22, 2023. 9610877-2023-00013 45. FDA. Hoya Corp. Pentax Fiberoptic Bronchoscope 13447528. Silver Spring, MD: February 3, 2022. 9610877-2022-00227. 46. FDA. Olympus Medical Systems Corp. Evis Exera II Duodenovideoscope 12257429. Silver Spring, MD: August 1, 2021. 8010047-2021-09611. 47. FDA. Olympus Medical Systems Corp. Evis Exera III Gastrointestinal Videoscope 12180700. Silver Spring, MD: July 16, 2021. 2951238-2021-00363. 48. FDA. Olympus Medical Systems Corp. Evis Exera III Gastrointestinal Videoscope 12180793. Silver Spring, MD: July 16, 2021. 2951238-2021-00364. 49. FDA. Olympus Medical Systems Corp. Evis Exera II Bronchoscope 9936669. Silver Spring, MD: April 8, 2020. 8010047-2020-02042. 50. FDA. Olympus Medical Systems Corp Forceps/Irrigation Plug 10446531. Silver Spring, MD: August 24, 2020. 8010047-2020-05781. 51. Derickx LAJ, Willemse-Erix D, van Piggelen A, et al. An outbreak of Pseudomonas aeruginosa urinary tract infections following cystoscopy traceable to a malfunctioning drying cabinet. Infect Prev Pract. 2024;6:100378. 52. Yang AF, Sherman A, Nazarian E, et al. Evidence of transmission of New Delhi metallo-ß-lactamase-producing Klebsiella pneumoniae through a gastrointestinal endoscope without an elevator channel. Infect Control Hosp Epidemiol. 2024;45(8):973-978. 53. Veater JB, Jones-Manning C, et al. Pulling the plug on a Pseudomonas outbreak: ancillary equipment as vectors of infection. J Hosp Infect. 2023;140:110-116 54. Dabaja-Younis HK, Schechner V, Firan I, et al. Identification and control of two outbreaks of unrelated New Delhi metallo-ß-lactamase-producing carbapenem-resistant Escherichia coli traced to the same endoscope defect. Infect Control Hosp Epidemiol. 2023;44:1673-1675 55. Fernández-Cuenca F, López-Cerero L, Cabot G, et al. Nosocomial outbreak linked to a flexible gastrointestinal endoscope contaminated with an amikacin-resistant ST17 clone of Pseudomonas aeruginosa. Eur J Clin Microbiol Infect Dis. 2020;39:1837-1844. 56. Kumarage J, Khonyongwa K, Khan A, et al. Transmission of MDR Pseudomonas aeruginosa between two flexible ureteroscopes and an outbreak of urinary tract infection: The fragility of endoscope decontamination. J Hosp Infect. 2019;102:89-94. 57. Rauwers AW, Troelstra A, Fluit AC, et al. Independent root cause analysis of contributing factors, including dismantling of 2 duodenoscopes, to an outbreak of multidrug-resistant Klebsiella pneumoniae. Gastrointest Endosc. 2019;90:793-804. 58. Sorbets E, Evrevin M, Jumas-Bilak E, et al. An outbreak of Pseudomonas aeruginosa urinary tract infections following outpatient flexible cystoscopy. Am J Infect Control. 2019;47:1510-1512. 59. FDA. Flexible bronchoscopes and updated recommendations for reprocessing: FDA safety communication Silver Spring, MD. June 25, 2021.

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