White paper

Improved efficiency and productivity

Enhanced accuracy and efficacy

Improved compliance

Easier scalability and standardization

Improved and safer user experience

5 advantages of automating the manual procedures in your ultrasound probe reprocessing workflow

A common mantra when examining the benefits of process automation in the workplace is "work smarter, not harder." Consider the differences between riding a bike and a high-speed rail. Both modes of transportation might get a rider from point A to point B, but one method is more efficient (requiring less manual work), arguably safer for the rider, has a smaller likelihood for wrong turns or mistakes, allows for multi-tasking, and features a seat that fits just about every individual regardless of their age, size, fitness level, skills or experience.

The automation of previously manual processes is nothing new, but rather a key element in innovation and process improvement that impacts almost every industry. In fact, a McKinsey study estimates that in 60% of occupations, at least one-third of constituent activities could be automated.[1]

The implications of automated technologies to the healthcare industry can offer substantial benefit to healthcare providers and the patients they serve. Specifically, automation of ultrasound probe high-level disinfection can improve efficiency and productivity, help enhance accuracy and efficacy, improve compliance with guidelines and standards, optimize scalability and standardization, and can ultimately impact both patient outcomes and clinician safety.

A look into current manual reprocessing procedures

For decades, soaking chemistries have been and remain the industry standard for manual HLD of ultrasound probes. Recently, an HLD wipe solution has been approved for clinical use. How this new product offering is accepted and its challenges in clinical implementation within the ultrasound environment remain unclear.

However, both processes require clinicians to wear Personal Protective Equipment (PPE), and be in a defined space that has proper ventilation (air exchange) with easily accessible eye wash stations due to direct exposure to hazardous chemicals – per OSHA requirements,[2] and manufacturer IFUs – making it impractical and unsafe to reprocess probes at point-of-care (POC) with patients present.

Manual soaking is typically conducted away from the patient environment due to open chemical exposure, ventilation requirements and need for a sink. If probes cannot be disinfected at the POC and must be transported to another room or a Sterile Processing Department (SPD), the transportation takes time and reduces the availability of these medical devices for clinical use.

HLD with wipes cannot be performed at POC with the patient in the room, due to exposure to gases emitted by the disinfectant chemistries.

Both methods also require users to follow extensive manual (and timed) steps. Deviations from these steps can result in damage to the probe, personal injury or inadequate disinfection – which can increase the risk of patient exposure to harmful pathogens.

The Spaulding Classification

Ultrasound probes are a reusable medical device used for imaging in a wide range of procedure types.

These probes must be reprocessed (disinfected or sterilized) before each procedure, to protect patients from the risk of cross-contamination or infection transmission.

To determine the appropriate level of disinfection or sterilization required, the FDA and other federal and international organizations use the Spaulding Classification. This classification system groups probes into three categories: Non-critical, Semi-critical and Critical – depending upon the patient contact site. **(Figure 1).** This paper will specifically examine high-level disinfection (HLD) processes – both manual and automated.

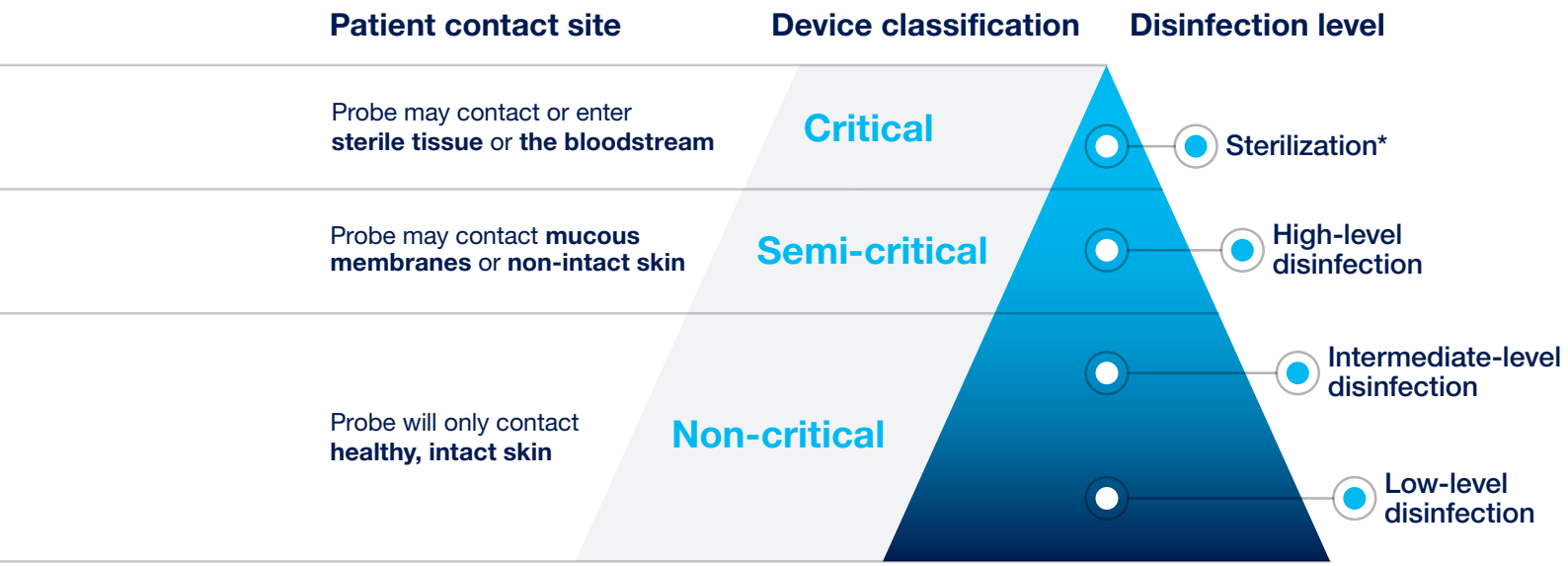

Figure 1. *The Spaulding Classification high-level disinfection cycle is presented here. *Critical probes must be sterilized, however if sterilization is not possible, the CDC permits high-level disinfection with use of a sterile sheath.*

5 benefits of automation

1. Improved efficiency and productivity

Reprocessing probes at POC with the option of having the patient in the room, allows clinicians to streamline the workflow so that the probe never has to leave the room for reprocessing. This POC reprocessing can reduce the number of probes needed to be held in inventory for procedures, as technicians do not need to wait for probes to return from a reprocessing room.

During an automated cycle, less hands-on time is dedicated to ultrasound probe disinfection, translating to more hours available for healthcare providers to focus on caring for their patients or turning over a room and preparing for their next patient, while probes are simultaneously reprocessed.

To HLD probes at POC with the patient present, the HLD solution must be fully enclosed so that neither the clinician nor the patient is exposed to chemicals – either directly or in gaseous form; hence the requirements for PPE, ventilation, eye wash stations, and in some cases limits on the number of reprocessing cycles that a user can complete in one shift when using manual methods.

These requirements make current manual HLD methods impractical to employ at POC as neither soaking nor wiping processes are enclosed. Manual reprocessing methods tie up valuable clinician time with hands-on tasks and can decrease the number of probes available for patient procedures.

"With an enclosed, automated system, I can hit the button, walk away and come back at the end of the cycle knowing it's clean and ready for the next patient."

Lynn Stebner – Section Head, Ultrasound
Royal Inland Hospital, Interior Health

A 2013 Ochsner study found that utilizing an automated HLD system could save an average of 7.5 hours per week when compared to their previous manual process. The cost of the system and its weekly maintenance paid for itself, if just 1.5 more ultrasound examinations were performed each week[3]

2. Enhanced accuracy and efficacy

Existing manual reprocessing methods involve multiple and complicated steps which are wholly dependent on the user to perform accurately, in the correct order, and for precise lengths of time. An automated and enclosed system can remove multiple potential points of failure due to human error, including variables such as:

- Temperature
- Chemical concentration and dose
- Chemical contact time
- Chemical efficacy testing
- Recontamination or exposure in the room
- Documentation gaps or inaccuracies
- Inconsistent execution across users and departments
- Inconsistent user training or experience levels

Some manual HLD methods are not able to disinfect the entire probe, as not all probe handles can be immersed in liquid soaks.[4] Cleaning and HLD are necessary for both the probe head and handle to reduce the risk of infection transmission.

A study found that following soaking, 80% of probe handles remained contaminated with potentially pathogenic organisms, with one isolate including MRSA.[5]

Without these manual variables to consider, clinicians can be confident that the probe (and handle) are successfully disinfected to the appropriate level, in every reprocessing cycle.

3. Improved compliance

With fewer opportunities for human error, automated processes can also support policy compliance improvement and audit-readiness.

A recent study observing endoscope reprocessing found significantly improved adherence to guidelines with increasing automation of the steps (increasing from only 1.4% to 75.4% compliance – an improvement of over 5,000%!).[6] These differences in compliance with standard operating procedures (SOPs) were observed despite staff being specially trained and dedicated to reprocessing.

Bonus: A solution that both automates the HLD process, and also automates the documentation of that cycle data can support an organization's audit-readiness and give department leaders a holistic view into an organization's disinfection practices, procedure trends and inventory usage.

"[Manual reprocessing] was a bit of a nightmare. It was challenging to meet the requirements from The Joint Commission when manually keeping track of test strips, expiration dates, soaking times, etc."

Ron McKee – MBA, BSMI, RDMS, RVT, EMT
System Administrative Officer, MUSC Health, Imaging

4. Easier scalability and standardization

Establishing an automated reprocessing method can also support standardization of workflow and SOPs across a department, facility, or even a large IDN with multiple clinics or satellite locations. The simpler the workflow, the easier it is to scale and empower staff, without the administrative burden of hands-on user competency training for multiple SOPs.

"Consistency is key. We have the same workflow for every probe HLD cycle, and the automation reduces the incidence of human error. In a large facility, risk mitigation is a primary concern."

Candace Goldstein – B.S., RDMS
Ultrasound System Educator, Scripps Health

For those responsible for overseeing infection prevention and reprocessing efforts, automation makes disinfection reproducible in every cycle. Automation is an investment in consistent confidence without compromise.

5. Improved and safer user experience

Multiple studies illustrate the risks associated with manual reprocessing, including a high-risk of chemical exposure,[7,8,9,10,11] as users must manually prepare the chemical, reprocess the probe, and dispose of the waste once the chemistry expires.

Because an automated, enclosed disinfection system removes manual handling or direct contact with caustic chemicals, users can enjoy a safer and more comfortable disinfection process without the need for extensive PPE, ventilation requirements, washing stations, and direct exposure to hazardous waste.

The 2013 Ochsner study concluded that the adoption of an automated HLD system was viewed to be easier and safer to use than the manual system and led to higher satisfaction among sonographers.[3]

"My sonography techs are saying [switching to an automated HLD solution] is the best quality improvement purchase – ever. It's enhanced everyone's workplace safety and quality."

Michelle Grant – Ultrasound Modality Manager,
Jefferson Radiology

Automation is supported by guidelines and studies

These benefits of automation are also echoed and endorsed by numerous organizations and guidelines. The CDC recognizes automated reprocessing of reusable medical devices has advantages over manual methods, including standardization, reproducibility and reducing the likelihood essential steps will be skipped.[12]

The Society of Diagnostic and Medical Sonography states that "Automated processes are preferable due to the reduced risk of operator error."[13] The ECRI Institute notes automated HLD ultrasound probe reprocessors have advantages over manual methods, including ease of use, improved disinfection efficacy and improved chemical safety.[14]

92% *of respondents preferred standardization of facility-wide products and processes for reprocessing ultrasound probes.*[15]

91% *of respondents preferred to use automated processes for probe reprocessing.*[15]

Summary

Automation of probe reprocessing can have multiple benefits for patients, clinicians and facilities, including improvements in efficiency, accuracy, compliance, standardization and safety.

When considering process options for HLD of ultrasound probes, automated systems can be an efficient and cost-effective way to prevent patients from the risk of infection. Therefore, we can update the previously stated mantra, to "work smarter, safer, happier, more efficiently, and accurately… not harder."

References

1. https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages#part1. **2.** OSHA Standard 29 CFR 1910.151(c). **3.** Johnson S et al. (2013) Evaluation of a hydrogen peroxide-based system for high-level disinfection of vaginal ultrasound probes. J Ultrasound Med 32:1799–1804. **4.** Alfa MJ 2015. Infect Control Hosp Epidemiol 36(5): 585-5862. **5.** Ngu A 2015. Infect Control Hosp Epidemiol 36(5). **6.** Ofstead CL et al. 2010. Gastroenterol Nurse 33(4): 304-311. **7.** J OccupHealth.2006 Nov;48(6):413-6. **8.** J Allergy ClinImmunol. 2004;114:392-7. **9.** Journal of Endocrinology. 2008; 22(9):2181-2184. **10.** J In Vitro FertEmbryo Transf. 1985;2(3):132-7. **11.** Lawson CC, et al. Am J ObstetGynecol. 2012;206:327.e1-8. **12.** CDC 2008. Guideline for Disinfection and Sterilization in Healthcare Facilities. **13.** SDMS rev. 2020. Guidelines for infection prevention and control in sonography: Reprocessing the Ultrasound Transducer. **14.** ECRI Institute 2018. Cleaning and Disinfecting Diagnostic Ultrasound Transducers: Our Recommendations. **15**. Carrico RM et al. 2018. Am J Infect Control 46(8): 913-920.

Nanosonics, Inc. (Americas)
7205 E 87th Street, Indianapolis, IN 46256, USA. T: 1-844-876-7466 E: info@nanosonics.us W: www.nanosonics.us

Nanosonics Limited (Manufacturer)
7-11 Talavera Road, Macquarie Park, NSW 2113, Australia. T: +61 2 8063 1600 E: info@nanosonics.com.au W: www.nanosonics.com.au

nanosonics
Infection Prevention. For Life.