

Recommendations for Cleaning and Disinfection in Medical Ultrasound to Prevent Human Papillomavirus (HPV) Transmission

For: BC Health Authority Reprocessing & Infection and Prevention Control Programs

Introduction

Infection prevention and control is critical to delivering safe, high-quality care to patients undergoing sonographic procedures. Ultrasound is generally considered a relatively safe procedure when compared with radiation-based imaging techniques, however, poor ultrasound probe reprocessing protocols and environmental cleaning and disinfection may result in a risk of patient cross-infection. Recently published studies have raised concerns regarding the efficacy of commonly used disinfectants against Human Papillomavirus (HPV). The purpose of this document is to provide updated guidance regarding cleaning and disinfection in this setting.

Probe Cleaning and Disinfection

External probes that only come into contact with intact skin are considered noncritical devices and require cleaning and **low-level disinfection** after every use as described below.

All **internal probes** are classified as semi-critical devices (e.g., vaginal, rectal and transesophageal probes, as well as intraoperative probes used for needle guidance during biopsies, aspirations, drainages, etc.). For maximum safety, these devices require cleaning, followed by **high-level disinfection** between each patient use and a probe cover or condom as an aid to keep them from becoming grossly contaminated. If condoms are used as barriers, the condoms should be non-lubricated and non-medicated. Although internal ultrasound probes are routinely protected by single-use disposable probe covers, leakage rates of 0.9% to 2% for condoms and 8% to 81% for commercial probe covers have been observed in recent studies¹. Studies have also revealed that these probes remain contaminated with a variety of bacterial and viral pathogens despite the use of disposable covers, followed by low-level disinfection^{2,3}.

The following specific recommendations are made for the cleaning and disinfection of ultrasound probes:

1. **External** ultrasound probes that come into contact with intact skin require cleaning and low-level disinfection between uses according to the manufacturer's instructions.⁴
2. **Internal** ultrasound probes that come into contact with mucous membranes require cleaning with enzymatic detergent followed by high-level disinfection according to the manufacturer's instructions. A clean probe cover should be applied prior to use and removed prior to cleaning. For sterile procedures, a sterile probe cover should be used.⁴

HPV

Traditionally, high-level disinfection of internal ultrasound probes has been accomplished through immersion of the instruments in either glutaraldehyde or *ortho*-phthalaldehyde. Human papillomavirus (HPV), a common human pathogen, has been found on ultrasound probes, especially those used for vaginal scans⁵. A recent study tested the susceptibility of HPV to commonly used clinical disinfectants including ethanol, isopropanol, glutaraldehyde, ortho-phthalaldehyde, phenols, peracetic acid-silver (PAA-silver) and hypochlorite⁶. The results of the study indicated that only oxidizing chemistries such as hypochlorite and 1.2% PAA-silver-based disinfectant were able to produce >99.99% reduction in infectivity of HPV. All other disinfectants showed slight or no reduction in infectivity. The main concern arising from this study is the conclusion that HPV is resistant to most high-level disinfectants.

At this time, the best recommendation that can be made is employing an oxidizing-based high-level disinfectant with label claims for non-enveloped viruses. Other considerations such as instrument compatibility with the disinfectant, as well as employee health and safety, should be included in product selection.

Immersion of probes in fluids requires attention to the individual device's ability to be submerged. Although some scan heads, as well as large portions of the cable, may safely be immersed up to the connector to the ultrasound scanner, only the scan heads of other models may be submerged. Before selecting a method of disinfection, consult the instrument manufacturer regarding the compatibility of the to-be-used agent with the probes.

The ultrasound transducer handle may also be a reservoir for microbial contaminants and a potential source of cross-infection. In some instances, patients come into direct contact with handles or indirect contact may occur via the healthcare provider's hands or probe cover. **It is also recommended that probe handles should be disinfected according to the manufacture's recommendations^{7,8}.**

Environment Cleaning and Disinfection

A recent study sampled trans-abdominal and trans-vaginal transducer cords, keyboards and gel⁹. Skin and environmental organisms were isolated along with the opportunistic pathogens. The study recommended a review of current guidelines to include keyboard and cord disinfection and gel handling. Other areas, such as the examination bed and rails, door handles and benchtop surfaces, may also act as sources of cross-infection. **Infection prevention and control measures should include hand hygiene prior to and following every examination. Exam tables, rails and keyboards should be disinfected after each patient. Probe holders, cords and gel bottles should be cleaned and disinfected at the start and end of each day. Gel bottles should never be "topped-up". Empty bottles should be cleaned and disinfected prior to refilling. The ultrasound machine should be cleaned at least once a week.**

Conclusion

Adequate probe reprocessing and procedure set up is essential. The level of preparation depends on the type of examination performed. Routine high-level disinfection of internal probes between patients is mandatory, plus the use of a high-quality single-use probe cover to avoid gross contamination during the examination. Given the recent evidence that HPV may not be sensitive to the commonly employed high-level disinfectants, it seems prudent to employ disinfectants that use oxidizing chemistries. The manufacturer's recommendations should be followed in order to avoid damaging the probes. Other basic infection prevention and control measures, including hand hygiene and environmental cleaning and disinfection, are also essential to prevent the transmission of pathogens in medical ultrasound.

References

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