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Guideline for Ultrasound Transducer Cleaning and Disinfection

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Recent literature highlights the need for improved education on probe (transducer) cleaning materials and processes.¹⁻⁵ The clinician sonographer must be aware of the various disinfection protocols with each associated transducer type to ensure patient safety.

Principles of transducer cleaning policy include:

1. A stratified hierarchy of disinfection based on the use and pathogens encountered.
2. Adequacy of disinfection, not sterilization.
3. Adequacy of probe covers which protect beyond the size of common pathogens
4. Emphasis on initial cleaning, including removal of gel with manual care, and disinfection at the correct level

According to the American Institute of Ultrasound in Medicine (AIUM), “Infection control is an integral part of the safe and effective use of ultrasound in medicine.”⁶ In recognizing the importance of infection control, this ACEP statement provides membership with recommendations for the use of ultrasound gels, protective covers, probe cleaning and disinfection. More information may be found in the chapter on ultrasound safety and infection control within the *Ultrasound Program Management* textbook.⁷

The American College of Emergency Physicians (ACEP) does not endorse or recommend any specific commercial products. It recommends following manufacturer instructions, local law and institutional infection control regulations, as well as knowledge of CDC, OSHA and Joint Commission guidelines. The ACEP Clinical Ultrasound Accreditation Program (CUAP) ensures that quality and safety processes are demonstrated by accredited programs.⁸

1. Definitions regarding types of ultrasound transducers:
 - a) Critical Devices: instruments that penetrate skin or mucous membranes (not used in ultrasound)
 - b) Semicritical Devices: transducers that come into contact with mucous

- membranes but do not penetrate membranes (endocavitary/endovaginal probes, transesophageal probes, etc.)
- c) Noncritical Devices: instruments that come into contact with intact skin, but not mucous membranes (linear, curvilinear and phased array transducers)
2. Definition of types of disinfection
- a) Low-Level Disinfection will destroy most bacteria, some viruses and some fungi. Use of:
 - i) soap and water
 - ii) quaternary ammonia sprays or wipes
 - b) High-Level Disinfection removes all microorganisms except for bacterial spores, unless used under specialized conditions. Use of:
 - i) chemical sterilants or germicides
 - ii) physical sterilization

According to the Centers for Disease Control and Prevention (CDC) Guideline for Disinfection and Sterilization in Healthcare Facilities (2008)⁹:

"Cleaning is the removal of visible soil (e.g., organic and inorganic material) from objects and surfaces and normally is accomplished manually or mechanically using water with detergents or enzymatic products. Thorough cleaning is essential before high-level disinfection and sterilization because inorganic and organic materials that remain on the surfaces of instruments interfere with the effectiveness of these processes."

"Disinfection describes a process that eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects."

3. Protective barriers
- a) Protective barriers such as medical gloves, condoms and probe covers are regulated by an "acceptable quality level" (AQL), which is interpreted as an acceptable quality limit.
 - b) Probe covers with pore sizes < 30 nm are available, and block most viruses including HPV (50 nm).
 - c) Sterile adhesive film dressing (eg, Tegaderm, OPSITE) may be considered a barrier and is effective against > 27 nm organisms. Prudent judgement regarding the potential for probe surface contact with non-intact skin should be made. Referral to manufacturer recommendations is warranted.

4. Ultrasound Gel

Both sterile and nonsterile gel exists. Non-sterile ultrasound gel has been implicated in outbreaks of nosocomial infections. Sterile gel is recommended where there is concern for potential infection. If nonsterile gel is used, care should be taken to discard multidose containers when empty (ie, avoid refilling) and to avoid direct contact between the dispensing tips of gel containers and surfaces of transducers or skin. They should also be discarded after 28 days from opening or less depending on use. Single-use packets (sterile and/or bacteriostatic) are also an option.

Gel used on a patient under droplet or contact precautions should be discarded after use, including both multidose containers and single-use packets.

5. Recommendations

- a) Linear, curvilinear and phased array transducers placed on clean, intact skin are considered

- noncritical devices and require low-level cleaning after each use.
- b) Transducers which are used during percutaneous procedures (vascular access, thoracentesis, paracentesis, arthrocentesis, pericardiocentesis, lumbar puncture, regional anesthesia and other procedures) should be covered with a single-use sterile probe cover during the procedure, then cleaned with low-level disinfection between uses.
 - c) Internal transducers (endocavitary probe for intra-oral procedures / transvaginal examinations and transesophageal probes) are semicritical devices that should be covered with a single-use probe cover and undergo high-level disinfection between uses.
 - i) The operator should be properly gloved while performing internal examinations, removing probe covers, and cleaning internal probes. During probe cover removal, care should be taken to avoid probe contamination with patient fluids. After completion of the exam, the operator should perform adequate hand hygiene.
 - ii) Operators should be aware of institutional high-level disinfection procedures and workflow which may include communication with supply technicians, adoption of equipment covers, or probe tracking systems.
 - d) Single-use sterile gel packets should be used when infection is a concern. These include:
 - i) Invasive procedures that involve cutaneous puncture
 - ii) Ultrasound examinations performed on nonintact skin or near fresh surgical sites

Summary

1. Probes used only for external use on intact skin without contamination of blood or bodily fluids should be cleaned using low-level disinfection between each use.
2. Probes used externally for percutaneous procedures should be covered with single-use protective covers and sterile gel applied. They should subsequently be cleaned using low-level disinfection.
3. Probes used internally on mucous membranes and internal orifices should be covered with high-quality single-use probe covers during each examination, followed by high-level disinfection between each use.

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