Clinical Bulletin

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Ultrasound probe design features enable POC cleaning

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Factors supporting the option of reprocessing of ultrasound probes at the point of care

The joint Australiasian College for Infection Prevention and Control (ACIPC) and Australasian Society for Ultrasound in Medicine (ASUM) Guidelines for Reprocessing Ultrasound Transducers support point of care reprocessing of ultrasound probes when the products used are safe and measures are taken in designing clinical workflows.[1] The majority of guidelines and standards relating to centralised reprocessing of semi-critical devices are primarily aimed at endoscopes which are highly complex medical devices with intricate reprocessing requirements.[2] Ultrasound probes and endoscopes differ significantly in design, clinical use and levels of contamination (bioburden). These differences show that while centralised reprocessing is appropriate for endoscopes, ultrasound probes can optionally be reprocessed at POC without compromising process or safety to staff and patients.

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Ultrasound probe design features enable POC cleaning

Ultrasound probe reprocessing is less complex than reprocessing of other semi-critical medical devices (e.g. endoscopes) due to their design. The majority of ultrasound probes are simpler, smaller and non-lumened. There is precedence for cleaning semi-critical instruments at point of care as endoscopes are typically pre-cleaned bedside in a process which involves cleaning of the exterior of the scope along with lumen flushing. As ultrasound probes are generally non-lumened, there is no need to flush meaning that aerosols are less of an issue. A dedicated sink is often not required and the probe can usually be cleaned at POC with detergent wipes.

Ultrasound probe reprocessing has a higher margin of safety

Ultrasound probes are typically soiled with up to 10^3 microorganisms after an examination presenting an infection transmission risk if not properly reprocessed prior to the next procedure.[3-5] Generally, cleaning and HLD each reduce contamination by 10^{4-6} microorganisms for a total of 10^{8-12} microorganisms removed from the device after reprocessing (8-12 $\log_{10}$ reduction).[6] Under the worst case reprocessing scenario of only an 8 $\log_{10}$ reduction, ultrasound probes would still be appropriately decontaminated with an excess of 10^5 microorganisms 'overkilled' (Fig 1A).

Complex devices like endoscopes are often soiled with ten million times more microorganisms than ultrasound probes (up to 10^{10} microorganisms[6]). This is partly due to the fact that endoscopes are not protected by a disposable sheath as is the case with intracavity ultrasound. Under the same worst case reprocessing scenario, endoscopes might still be contaminated with 10^2 microorganisms reflecting minimal and sometimes insufficient margin of safety (Fig 1B).[6]

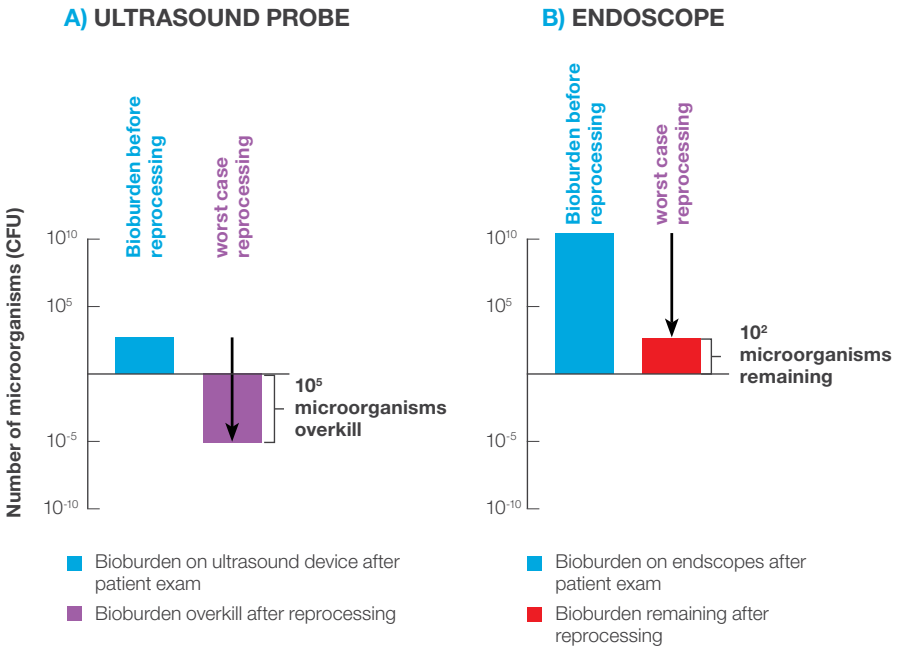

Figure 1: Worst case reprocessing is defined as an 8 log reduction after reprocessing.[6] **A)** Ultrasound probes encounter up to 10^3 microorganisms after a patient exam and worst case reprocessing will still result in a 10^5 microorganism overkill. **B)** Endoscopes encounter ten million times more bioburden during a patient exam, suggesting a possibility of 10^2 microorganisms remaining after worst case reprocessing.[6] The small margin of safety and complexity associated with endoscope reprocessing means that centralised reprocessing by dedicated staff is preferred. However centralised reprocessing of ultrasound probes may not be essential, and may be safely performed at POC with appropriate workflows and risk assessments in place.

Automation enhances reprocessing compliance

A recent study found automation is a key factor in improving reprocessing procedure compliance.[7] The prospective study across five sites found significantly improved compliance with the facilities' endoscope reprocessing protocol where automation was able to replace manual reprocessing. These differences were observed despite reprocessing staff being specially trained and dedicated to endoscope reprocessing. Automation minimises human error and maximises reproducibility with each reprocessing cycle. Ultrasound probe reprocessing is comparatively less complex than endoscopes and compliance is achievable with new automated technologies at POC.

POC ultrasound probe disinfection

Some guidelines recommend that complex semi-critical medical device reprocessing be preferentially performed in a centralised manner. In looking holistically at the risks posed by POC reprocessing of ultrasound probes, it is possible to perform reprocessing at POC for these devices so long as appropriate precautions are taken. The choice to optionally reprocess at POC is important due to the widespread use of semi-critical ultrasound probes across many departments and clinical settings (e.g. acute care hospitals versus primary care in a community setting). Ultrasound probes are generally simple devices, have a wider margin of safety when reprocessed and are supported by the availability of automated POC reprocessing technologies. In addition to these factors, careful design of clinical workflows following risk assessments can enable safe ultrasound probe reprocessing at POC.

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