

Presentation Type:

Poster Presentation

Efficacy of Double Manual Cleaning Versus Automated Cleaning for Removal of Biofilm of Hinged Surgical Instruments

Dayane Costa, Postgraduate Program in Nursing, Federal University of Goiás; Roel Castillo, Sydney Adventist Hospital; Lillian Kelly Lopes, Clinics Hospital, Federal University of Goiás; Anaclara Tipple, Faculty of Nursing, Federal University of Goiás; Honghua Hu, Faculty of Medicine and Health Sciences, Macquarie University; Karen Vickery, Faculty of Medicine and Health Sciences, Macquarie University

Objectives: To evaluate the efficacy of double manual cleaning (DMC) with enzymatic followed by alkaline detergent for removing biofilm on hinged surgical instruments compared to automated cleaning by the washer-disinfector. **Methods:** Biofilm of *Staphylococcus aureus* (ATCC 25923) was formed in vitro on hemostatic forceps (Fig. 1). Biofilm-covered forceps were rinsed in distilled water and subjected to one of the following cleaning regimes (n = 5 forceps each): Group 1 forceps were soaked in sterile water for 5 minutes. Group 2-DMC forceps were soaked in enzymatic detergent, brushed 5 times on each face, rinsed with filtrated water (0.2 µm), soaked in alkaline detergent, brushed 5 times each face, rinsed with filtrated water (0.2 µm), and dried with

sterile cloth. For group 3-DMC plus hinge inner brushing (n = 5), the forceps were soaked in detergents and brushed as in group 2, including hinge inner brushing (2-mm lumen brush) (Fig. 1). In group 4 (automated cleaning in a washer/disinfector), forceps were prewashed, washed once, washed again, rinsed, thermally rinsed, and dried. After the treatments, forceps were evaluated for microbial load (counting of colony-forming units), residual protein (BCA protein assay kit), and biofilm (scanning electron microscopy). **Results:** There was no statistically significant differences between the microbial load and protein level contaminating the forceps subjected to DMC (group 2) and the positive control group. The DMC with hinge inner brushing group (group 3) and the automated cleaning group (group 4) demonstrated a significantly reduced microbial load: reduction averages of 2.8 log₁₀ (P = .038) and 7.6 log₁₀ (P ≤ .001), respectively. The protein level remaining on the forceps also significantly decreased: 2.563 µg (P = .016) and 1,453 µg (P = .001), respectively, compared to the positive control group. There was no statistically significant difference between DMC with hinge inner brushing and automated cleaning (groups 3 and 4) for all of the tests performed. None of the cleaning methods completely removed biofilm and/or soil from the forceps hinge internal region (Fig. 1). **Conclusions:** Automated cleaning had the best efficacy for removing biofilm. However, DMC with hinge inner brushing was an acceptable alternative cleaning method for sterilizing service units with only manual cleaning

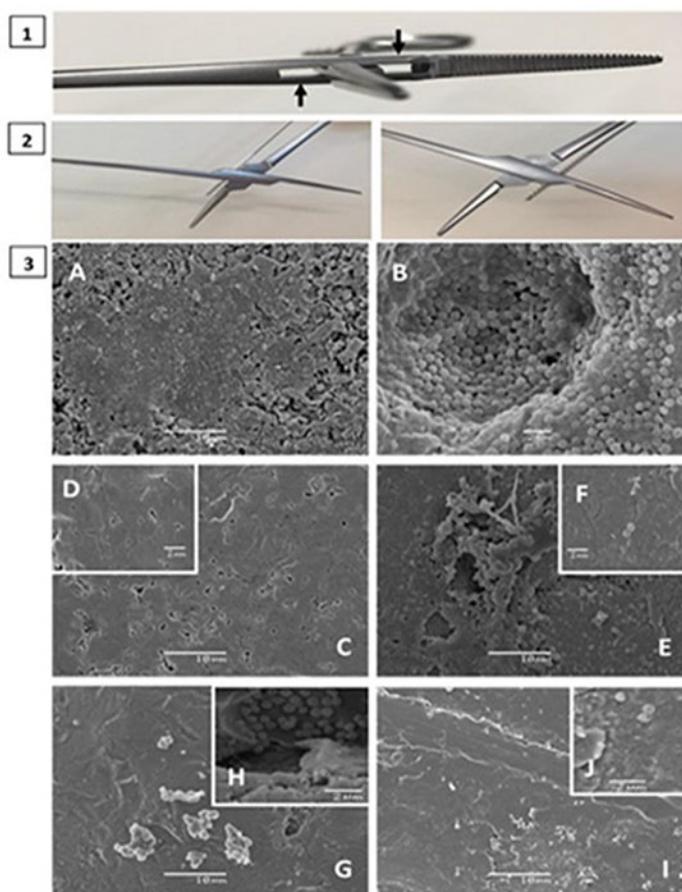


Figure 1. Haemostatic forceps inner hinge region (1) brushing (2), and microscopy images (3): A/B-Positive control; C/D-New forceps; E/F-Double manual cleaning; G/H-Double manual cleaning plus inner hinge brushing; I/J-Automated cleaning.

Fig. 1.

available, as is the case in most low- and middle-income countries. Neither automated nor any manual cleaning regimes were able to completely remove biofilm and soil from the forceps hinged area, and the amount of protein left after automated and DMC plus hinge brushing was higher than the recommended. Cleaning is the most important step for the reprocessing of reusable medical devices; thus, efforts must be undertaken to improve cleaning in different social and economic realities and scenarios.

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Evaluation of a Continuous Decontamination Technology in an Intensive Care Unit

Tami Inman BSN, RN, CIC, INTEGRIS Southwest Medical Center;
David Chansolme, MD, INTEGRIS Southwest Medical Center

Background: The scientific literature increasingly indicates the need for the development of continuous disinfection to address the persistent contamination and recontamination that occurs in the patient rooms despite routine cleaning and disinfection.

Methods: To determine a baseline microbial burden level on patient room surfaces in the intensive care unit (ICU) of a large urban hospital, 50 locations were swabbed for total colony-forming units (CFU) and the prevalence of methicillin-resistant *Staphylococcus aureus* (MRSA). Once the baseline in ICU patient rooms was established, 5 novel decontamination devices were installed in the HVAC ducts near these patient rooms. The devices provide a continuous low-level application of oxidizing molecules, predominately hydrogen peroxide. These molecules exit the duct and circulate in the patient room through normal convection, landing on all surfaces. After activation, environmental sampling was conducted every 4 weeks for 4 months. The effect from continuous low levels of oxidizing molecules on the intrinsic microbial burden and the prevalence of MRSA were analyzed. In addition to external laboratory reports, the facility tracked healthcare-associated infections (HAIs) in the unit. HAI data were averaged by month and were compared to the preactivation average in the same unit. **Results:** The preactivation average microbial burden found

on the 50 locations were 179,000 CFU per 100 in². The prevalence of MRSA was 71% with an average of 81 CFU per 100 in². After activation of the devices, levels of microbial burden, prevalence of MRSA, and average monthly HAI rates were all significantly lower on average: 95% reduction in average microbial burden (8,206 CFU per 100 in²); 81% reduction in the prevalence of MRSA (13% vs 71%); 54% reduction in the average of health-care-onset HAIs. All data were obtained from the averages of sampling data for 4 weeks during the 4-month trial period. **Conclusions:** The continuous application of low levels of oxidizing molecules throughout the patient rooms of an ICU demonstrated 3 outcomes: reduced overall surface microbial burden, lowered the incidence of MRSA, and significantly decreased the monthly average HAI rate. Please note, the ICU ran other infection prevention interventions at this time, including standard cleaning, as well as and their standard disinfecting techniques.

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Firefighters Fighting Germs - Evaluation of a Disinfecting Protocol for Use in the Fire Service

Christine McGuire-Wolfe, Pasco County Fire Rescue

Background: Pasco County Fire Rescue (PCFR) is a rapidly growing suburban fire department located in Florida. PCFR employs >500 firefighters (all cross-trained as either emergency medical technicians or paramedics) in 27 stations to provide both emergency medical services (EMS) and fire suppression response. Although multiple studies have established that pathogens are present in both apparatus and stations within the fire service, there is a knowledge gap regarding the effectiveness of cleaning and disinfecting protocols in this specific setting. **Methods:** In total, 65 high-touch surfaces in 11 vehicles (ambulances and engines) and common areas of 2 fire stations were swabbed before and after disinfection. Vehicle surfaces swabbed included seats, cabinet doors, door handles, stretchers, medical equipment, keyboard, steering wheels, shared headsets and hand rails. Inside the stations, the refrigerator handle, television remote, radio and alarm buttons, door handles, and locker handles were swabbed. Immediately

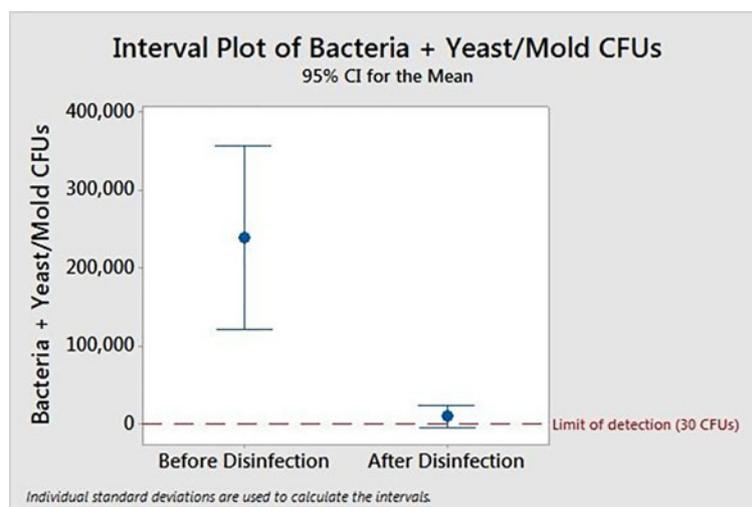


Fig. 1.