

Evaluating the Efficacy of Disinfecting Agents on External Fixator Devices

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Purpose: The purpose of this study is to evaluate and compare the efficacy of multiple disinfectant agents commonly used to remove bacteria from external fixator devices and to evaluate discrepancies in bacterial growth based on different locations of the external fixator device.

Methods: Sterile external fixator devices were assembled to include 4 commonly used junction types and colonized with *Staphylococcus aureus* overnight. The devices were treated with one of either isopropyl alcohol spray (70% IPA), chlorhexidine gluconate scrub (4% CHG) + IPA, Betadine (13% povidone-iodine) + IPA, or a ChlorPrep stick (2% CHG and 70% IPA). Bacterial growth at specified locations on each device was assessed by swabbing and then comparing the number of colony-forming units (CFU) to untreated controls. Swabbing sites, swabbing techniques, and disinfection techniques were standardized across all trials.

Results: All disinfectant-treated groups yielded significantly fewer bacteria when compared to the controls. Within the untreated controls, there was significantly more growth at the pin to 5-hole-pin-clamp junction when compared to the bar to pin-clamp junction and the pin to pin-clamp junction. While Betadine + IPA was the least effective overall, further analysis showed Betadine + IPA's ineffectiveness to be specific to the pin to 5-hole-pin-clamp junction and the bar to 5-hole-pin-clamp junction. The CHG + IPA group yielded no growth at these 2 junctions throughout all the trials but did allow for insignificant growth at the bar to pin-clamp junction.

Conclusion: All 4 disinfectant groups were successful at removing *S. aureus* from external fixators. In the controls, the presence of bacteria at the pin to 5-hole-pin-clamp junction was significantly greater than at 2 of the other 3 junctions evaluated; this finding suggests that *S. aureus* grew more effectively at this specific junction.

Additionally, Betadine + IPA was the least effective at the specific junctions where CHG + IPA was the most effective and vice versa. While a combination of CHG, Betadine, and IPA was not evaluated, one could infer that this would be the most effective modality for external fixator disinfection.