

A Handheld Ultraviolet-C Light-Emitting Diode Decreases Contamination Near the Operative Field

Jason Michael Jennings¹, Roseann M Johnson², Yasmin Yazdani Farsad², Rachael Turner, Jessell Owens³, Douglas A Dennis²

¹Colorado Joint Replacment, ²Colorado Joint Replacement, ³Great Basin Orthopaedics

INTRODUCTION: Periprosthetic joint infection (PJI) may result from pathogen to patient transmission within the environment. The purpose of this study was to assess the impact of a handheld ultraviolet-c (UV-C) light-emitting diode (LED) disinfection device on the decontamination of high-touch surfaces in the operating room (OR).

METHODS: High-touch surface areas near the operative field from previous studies had been identified as the least likely to be thoroughly cleaned between operative cases and were utilized for this study. The surfaces included: anesthesia machine vitals screen, supply cabinet doors, nurse's documentation station, electrocautery control unit, and the anesthesia cart table. Tryptic soy agar (TSA) contact plates were used to determine the bacterial load of the selected surfaces before the initiation of the case, after the case was complete, before manual cleaning, and after disinfection of the LED device. The plates were then incubated for 48 hours at 36^o +/- 1^o C. Colony forming units (CFU) were recorded 24 and 48 hours after incubation. Mean, median, and range of CFU were recorded. The perioperative cleaning teams were not aware of this study. CFU counts for each arm were compared using negative binomial regression.

RESULTS: Average CFU per surface before and after the surgical case were 14.1 (range 0-200) and 13.5 (range 0-200) respectively; these were not significantly different (p=0.9397). Manual cleaning reduced average CFU 74% to 3.35 (range 0-200) per surface (p=0.0162). Disinfection with the handheld LED unit further reduced the average CFU by 92% to 0.28 (range 0-4) per surface (p<0.0001).

DISCUSSION AND CONCLUSION: A handheld UV-C LED disinfection device may decrease environmental contamination near the operative field on high-touch surface areas. Further research is warranted with this technology to determine if this correlates with a decrease in PJI.