Paper #17

Reduction of Total and Viable Particles in the OR Setting by Using Ultraviolet In-Room Air Disinfection and Recirculation Unit

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Introduction: Postoperative infection is a major concern in total joint arthroplasty. It has been shown that the air is a major source of surgical wound contamination. Finding solutions to reduce airborne bioburden during surgery is critical.

Methods: A viable particle counter was deployed in an empty, positive-pressure operating room (OR) to measure total and viable particle counts (TPC and VPC). It was placed at the usual position of the surgical table during TJA cases. Over an 11-minute period, 8 air samples were taken. Five seconds before the 3rd and 6th sample occurred, someone walked in from the sub-sterile corridor to mimic a person entering the OR and then leaving during surgery. Ten experiments were performed as controls, and 10 experiments were performed with a crystalline ultraviolet C (C-UVC) unit actively circulating air for more than 30 minutes. Independent t-tests were used to determine statistical differences in TPC and VPC.

Results: After the first walk through occurred, TPC at the 4.5-minute mark measured 15,653 particles/m3 in the control cases, while it only measured 2,841 particles/m3 in the C-UVC cases (p=000.1). Also, overall TPC in the C-UVC cases were significantly lower compared to the control cases (36,310 vs 16,192 particles/m3; p=0.015). VPC in the C-UVC cases were also significantly decreased compared to the control cases following the first door opening as well (1,272 vs 120 particles/m3; p=0.01). Although, overall VPC was not significantly different between the groups (p=0.091). Similarly, TPC (p=0.267) and VPC (p=0.417) were not significantly different following the second door opening at the 7.5-minute mark.

Conclusion: C-UVC filtration has shown to be capable of significantly reducing TPC and VPC in a controlled OR setting. Further studies are needed to measure its impact on the TPC and VPC during regular TJA cases.

Notes