

Utilizing Passive Light Emitting Diode (LED) Disinfection Technology to Effectively Reduce Microbial Contamination in a Trauma Room



J Sutton, MPH, CIC¹; E Cardinale, MSN, RN-BC, CIC¹; C Bissinger, BSN, RN, CEN²;
S Epstein, MSBmE, MD, FACS²; L Nummi, DNP, ARNP²; C Holder MD¹

¹ Department of Infection Control, Bayfront Health St. Petersburg | ² Department of Trauma, Bayfront Health St. Petersburg



Introduction

Standard housekeeping methods are inadequate at removing microbial contamination from the modern day healthcare environment. Healthcare systems have started implementing an array of advanced disinfection technologies to assist with surface disinfection. Most of these technologies require the room to be sealed, making them impractical for some applications. This study evaluates a passive LED disinfection system in an environment that cannot be closed, a level II trauma room.

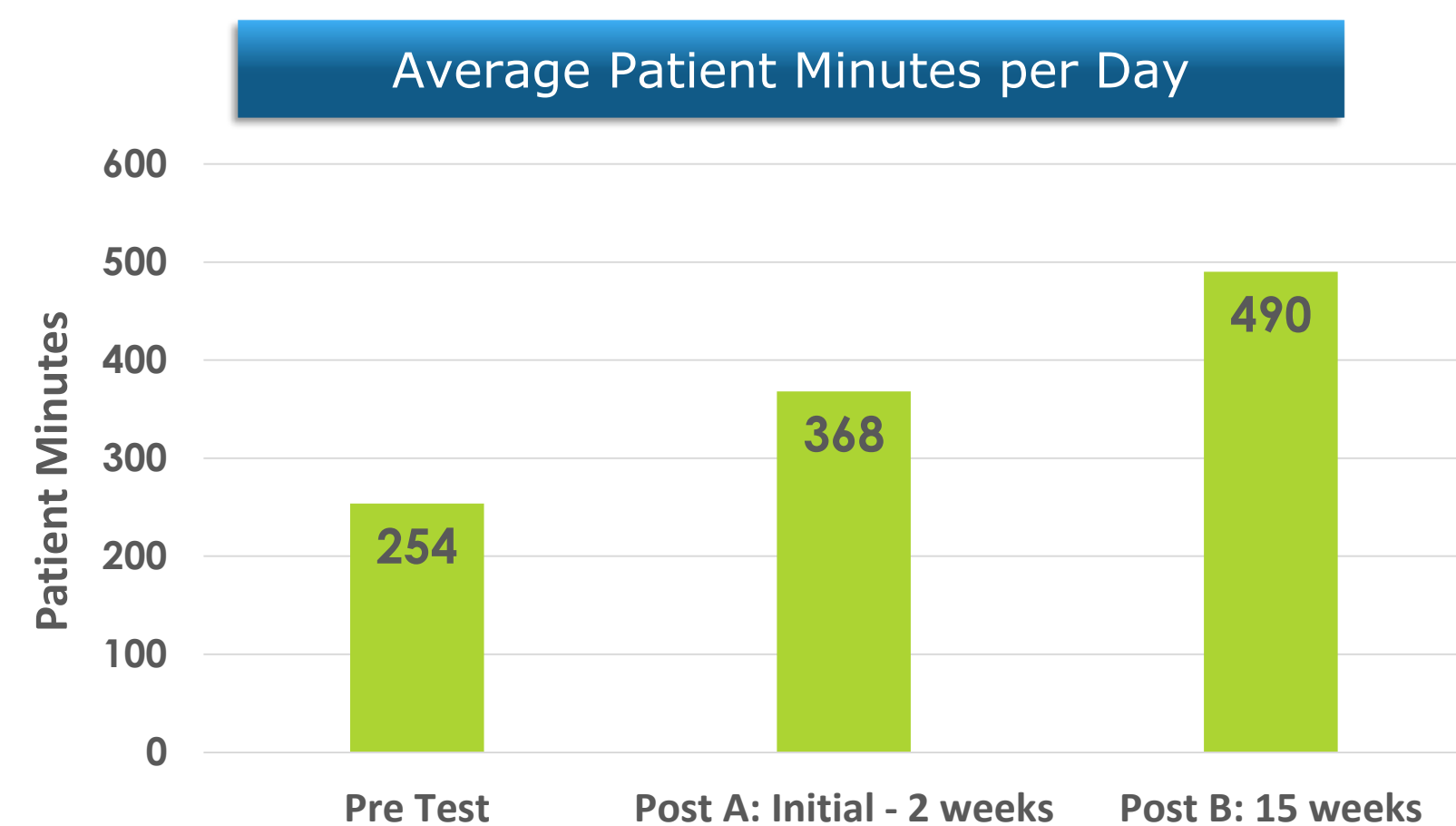
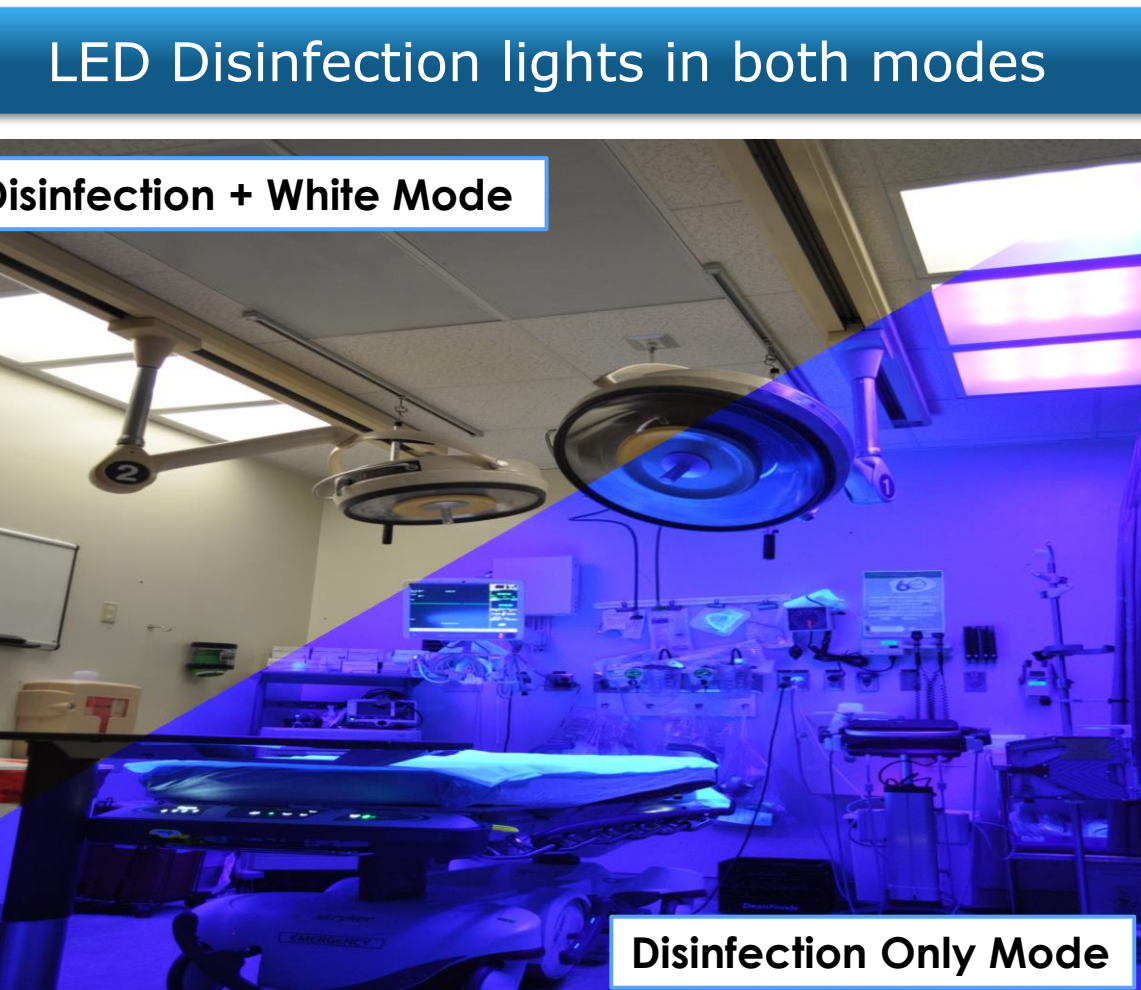
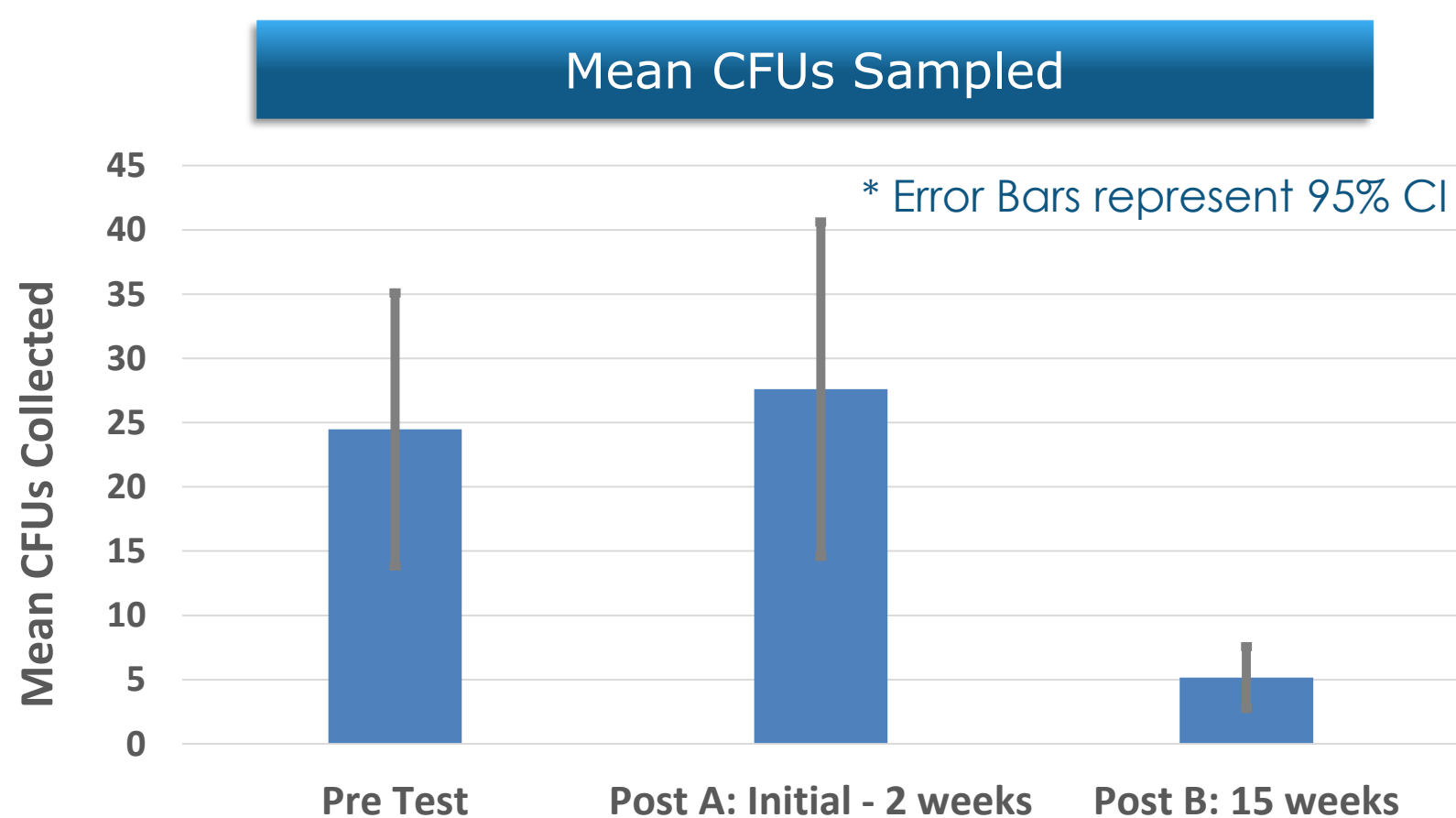
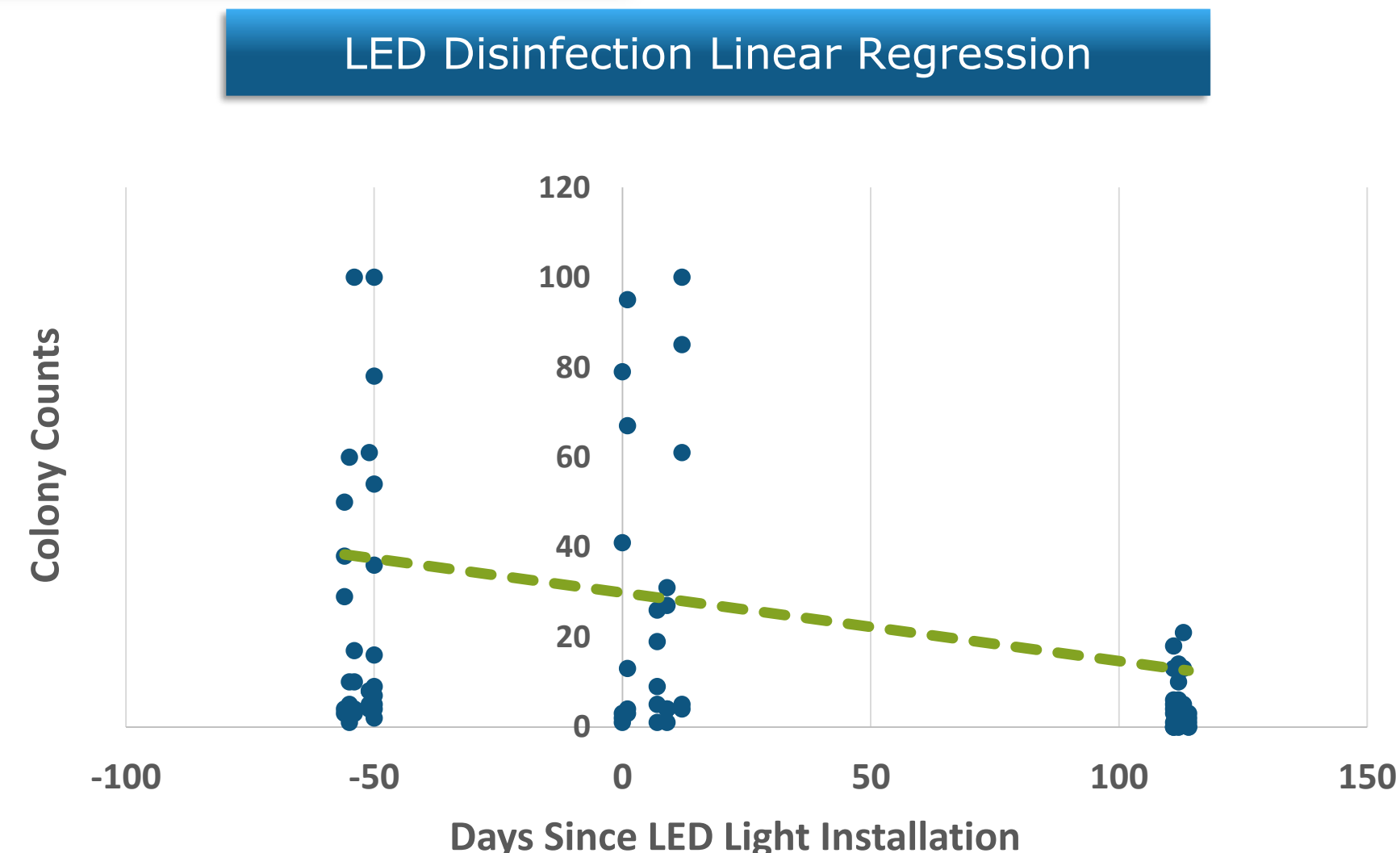
Methods

Efficacy of the system was determined by sampling environmental surfaces exposed to the LED light. The trauma room was cultured in 5 locations using RODAC plates, during three separate time intervals: Pre-Installation (Pre, n=30), Post initial 2 weeks (Post A, n=25), Post initial 15 weeks (Post B, n=25). Colony counts were enumerated after 48 hours. Trauma room usage was monitored for average patient minutes per study day, using the electronic medical record. Results were analyzed using 1-way repeated-measures ANOVA, with Tukey HSD for further post-hoc analysis.

Results

- There was a statistically significant effect over time on reduction in microbial surface contamination; $F(2, 48) = 4.61, p = 0.0147$.
- The mean colony counts and average patient minutes per study day for the three intervals were Pre = 24.47, 254; Post A = 27.6, 368; Post B = 5.16, 490.
- The Tukey HSD resulted in a significant difference between the Pre vs. Post B, $p = 0.02$; as well as the Post A vs. Post B, $p = 0.009$.

Data



Conclusion

This study demonstrates that the LED disinfecting lights significantly reduced the microbial surface contamination in a trauma room at 15 weeks, even when room usage increased. The results suggest that LED Disinfection may not produce immediate results. Over time however, the lights are effective at reducing the overall microbial contamination. Further research is needed to determine precisely when a significant reduction in microbial surface contamination occurs.

Study Limitations

- Large break between Post A and Post B (13 weeks) makes it difficult to determine how soon after installation the technology significantly reduces contamination
- Contamination rates can vary greatly between patients due to the nature of trauma.
- A larger sample size may remove some variation from day to day

References

Edmiston, Jr., PhD, C. E. et al., 2015. Assessment of an Innovative Antimicrobial with Surface Disinfectant in the Operating Room Environment Using ATP-Bioluminescence Assay. *American Journal of Infection Control*, 1 March, 43(3), pp. 283-5.

Lewis, MD, B. D., Spencer, MEd, M., Rossi, MD, P. J., Lee, MD, C. J., Brown, MD, K. R., Malinowski, MD, M., . . .

Otter, J. A., Yezli, S. & French, G. L., 2011. The Role Played by Contaminated Surfaces in the Transmission of Nosocomial Pathogens. *Infection Control and Hospital Epidemiology*, 32(7), pp. 689-699.

Rutala, W.A., Gergen, M.F. and Weber, D.J. (2015) 'Room Decontamination with UV Radiation', *Infection Control; Hospital Epidemiology*, 31(10), pp. 1025-1029.

Spencer, MEd, BSN, RN, CIC, M., & Edmiston, JR, PhD, CIC, C. (2014, December). The Role of the OR Environment in Preventing Surgical Site Infections. *AORN*, 100(6), 603-608.

Weber, D.J. and Rutala, W.A. (2015) 'Understanding and Preventing Transmission of Healthcare-Associated Pathogens Due to the Contaminated Hospital Environment', *Infection Control; Hospital Epidemiology*, 34(5), pp. 449-452.