

# Reduction of *Candida auris*, fungi, and aerobic bacteria utilizing Advanced Photohydrolysis Technology with impact on *Candida auris* colonizations and HAIs

Kimberly Trosch, RN, BSN, Amy Carenza, BBA, Kirk Huslage, MSPH, BSN, RN, CIC, FAPIC, Uzoamaka Obiekwe, MPH, MLS(ASCP), CIC, Deborah Birx, MD

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## INTRODUCTION

The continued rise of antimicrobial resistance (AMR) and reduction of pharmacological options has created an urgent need for new countermeasures to prevent the spread of multidrug-resistant organisms (MDROs) (1). Infections caused by the MDRO *Candida auris* (*C. auris*) are of specific concern since it is a pathogen that easily spreads among patients in healthcare facilities and is associated with high mortality and AMR (2). Attention must be given to pathogen reservoirs and transmission pathways, including surfaces of floors, which have an underappreciated potential to transfer pathogens to hands from objects in contact with the floor (3).

## MATERIALS & METHODS

An experimental study to explore the impact of advanced photohydrolysis (AP) technology on colony forming units (CFUs) of aerobic bacteria, fungi, and *C. auris* inside a hospital unit with active *C. auris* infections was performed from September 2023 to January 2024. Baseline pre-activation samples were compared to post-activation samples, which occurred every four weeks on Tuesday mornings prior to daily environmental services (EVS) cleaning. Patient outcomes of *C. auris* colonization and HAI rates were compared 8 months before and after AP technology activation. *C. auris* point-prevalence testing was performed during the observation period according to local health department protocols. HAIs were evaluated by the same infection preventionist and defined by NHSN standards for catheter associated urinary tract infections (CAUTIs), central line associated bloodstream infections (CLABSI), *Clostridioides difficile* (CDIFF), and methicillin resistant *Staphylococcus aureus* (MRSA) (4).

## CONTINUOUS DISINFECTION TECHNOLOGY

The AP technology adapts the science of photolysis for the built environment using airflow and a UV-C bulb that is enclosed within a proprietary honeycomb shaped photocatalyst and installed in the HVAC duct. The ambient humidity in conditioned air is transformed through a photochemical reaction as it travels through the matrix of the photocatalyst. Identical to the natural atmospheric reactions, the water (H<sub>2</sub>O) is broken down into trace oxidative molecules which continuously diffuse into the environment of care and neutralize pathogenic compounds.

## RESULTS

Pairwise comparisons with a Bonferroni correction found median floor fungal CFUs achieved a statistically significant reduction of 99% (p=0.11) from Baseline to Post-Activation #4 (Figure 1). Aerobic bacteria decreased 98% (Figure 2); *C. auris* by 66% (Figure 3) but did not achieve statistical significance. The rate of patient *C. auris* colonization after admission decreased 67% (Figure 4) and aggregate HAI rates decreased 75% (Figure 5).

### Additional Findings:

High-touch surface samples showed reductions in mean CFUs of aerobic bacteria by 82% (6,456 to 1,161) and fungi by 99% (2,089 to 15). *C. auris* was reduced by 100% from Baseline to Post-Activation #3 (41 to 0) but increased in Post-Activation #4 due to two positive samples in a patient room with an active *C. auris* infection. Both samples tested under 500 CFU/cm<sup>2</sup>, which is associated with lower infection risk from environmental bioburden (5).

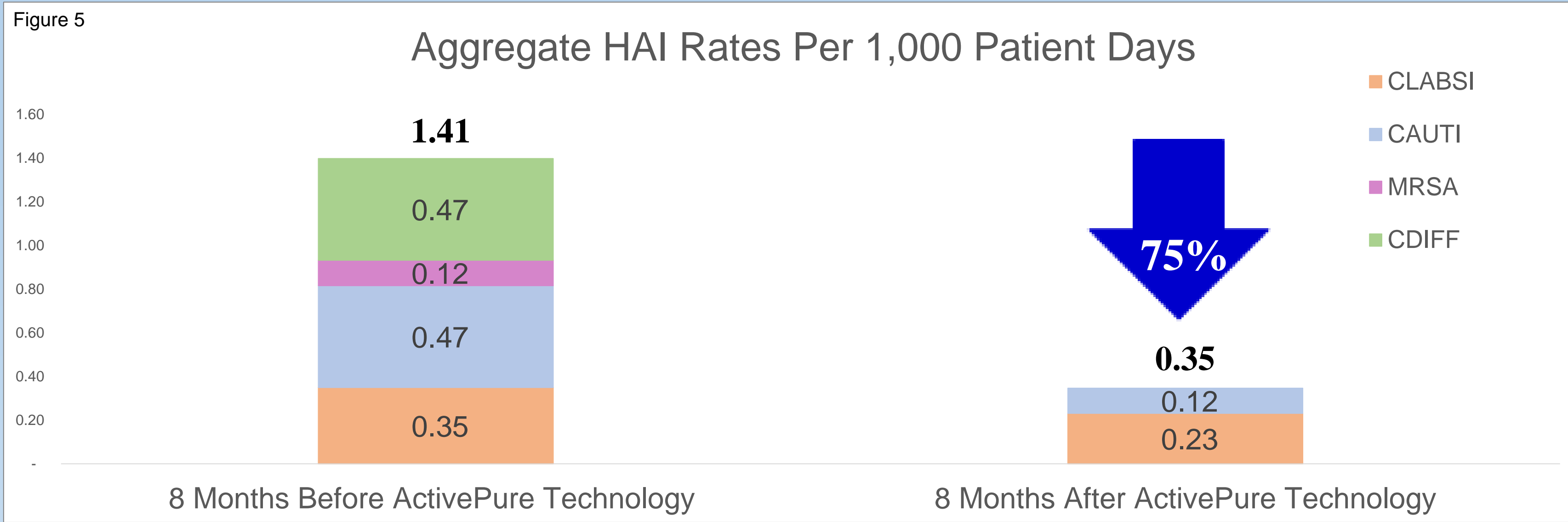
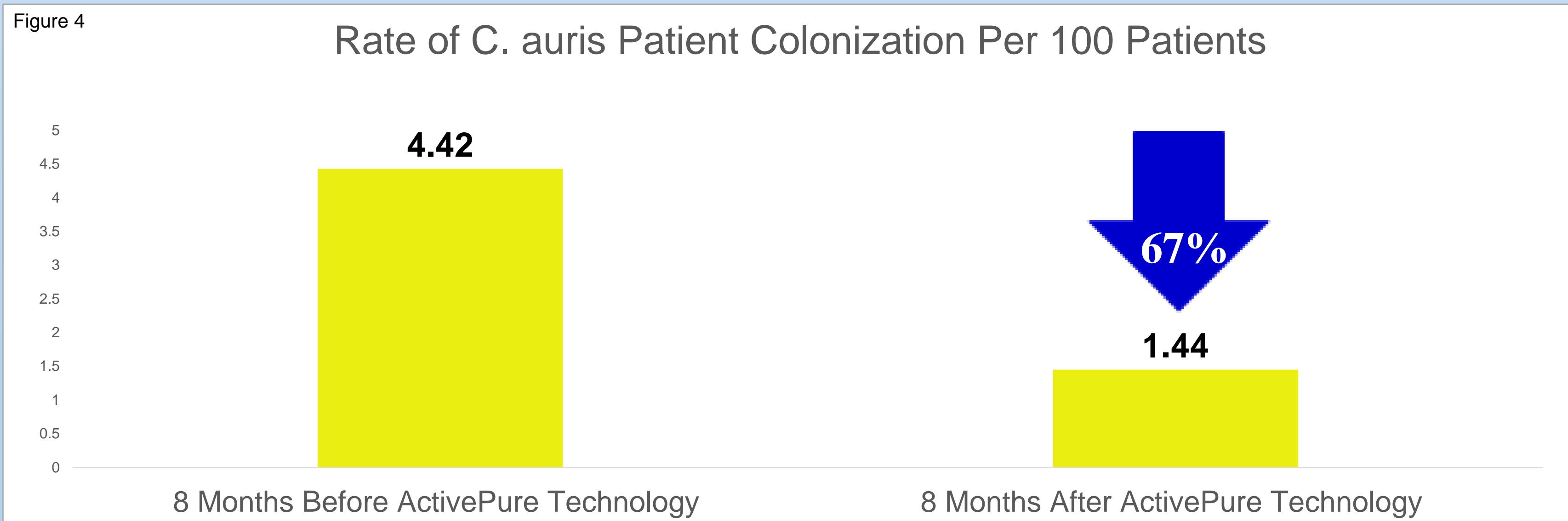
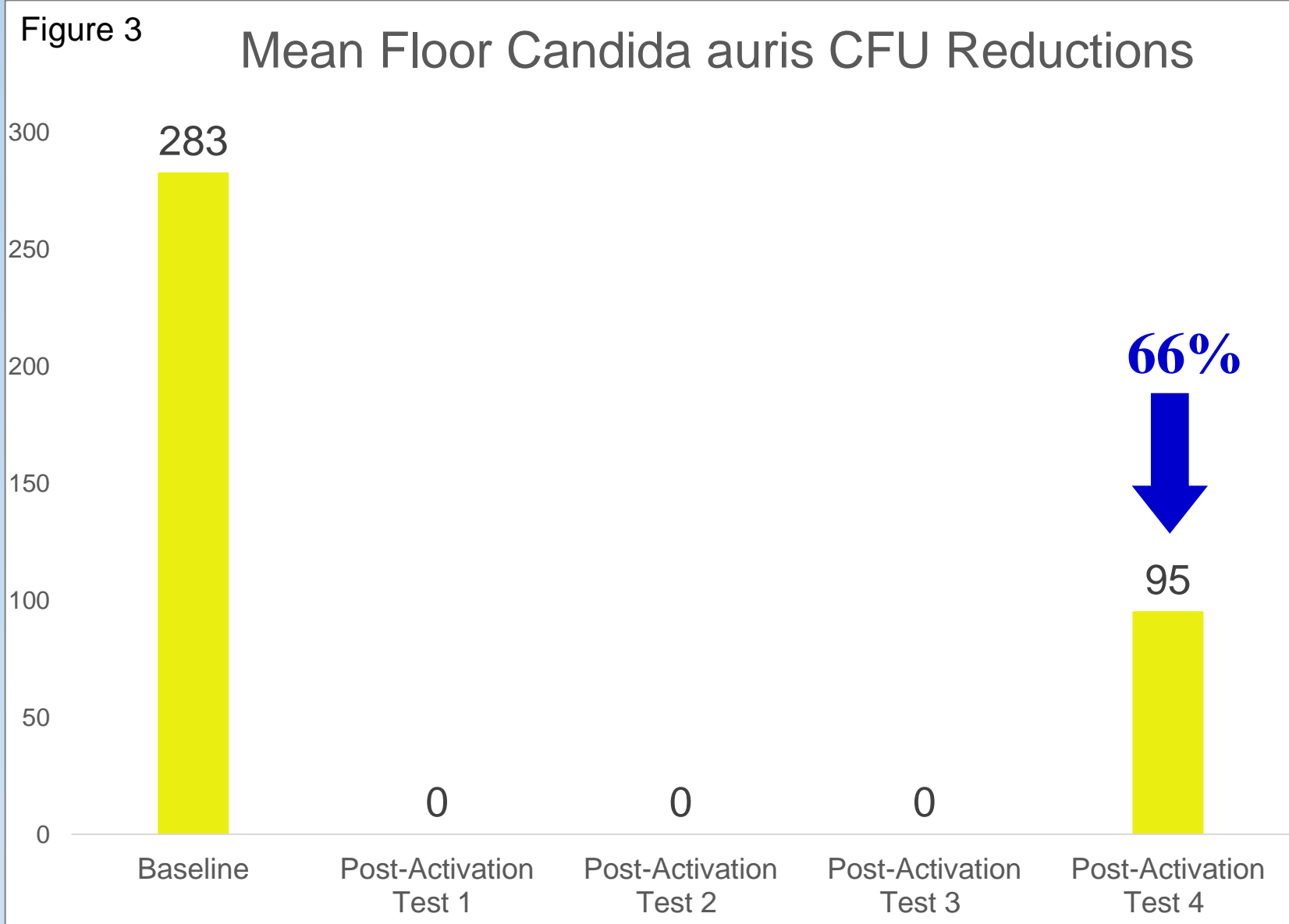
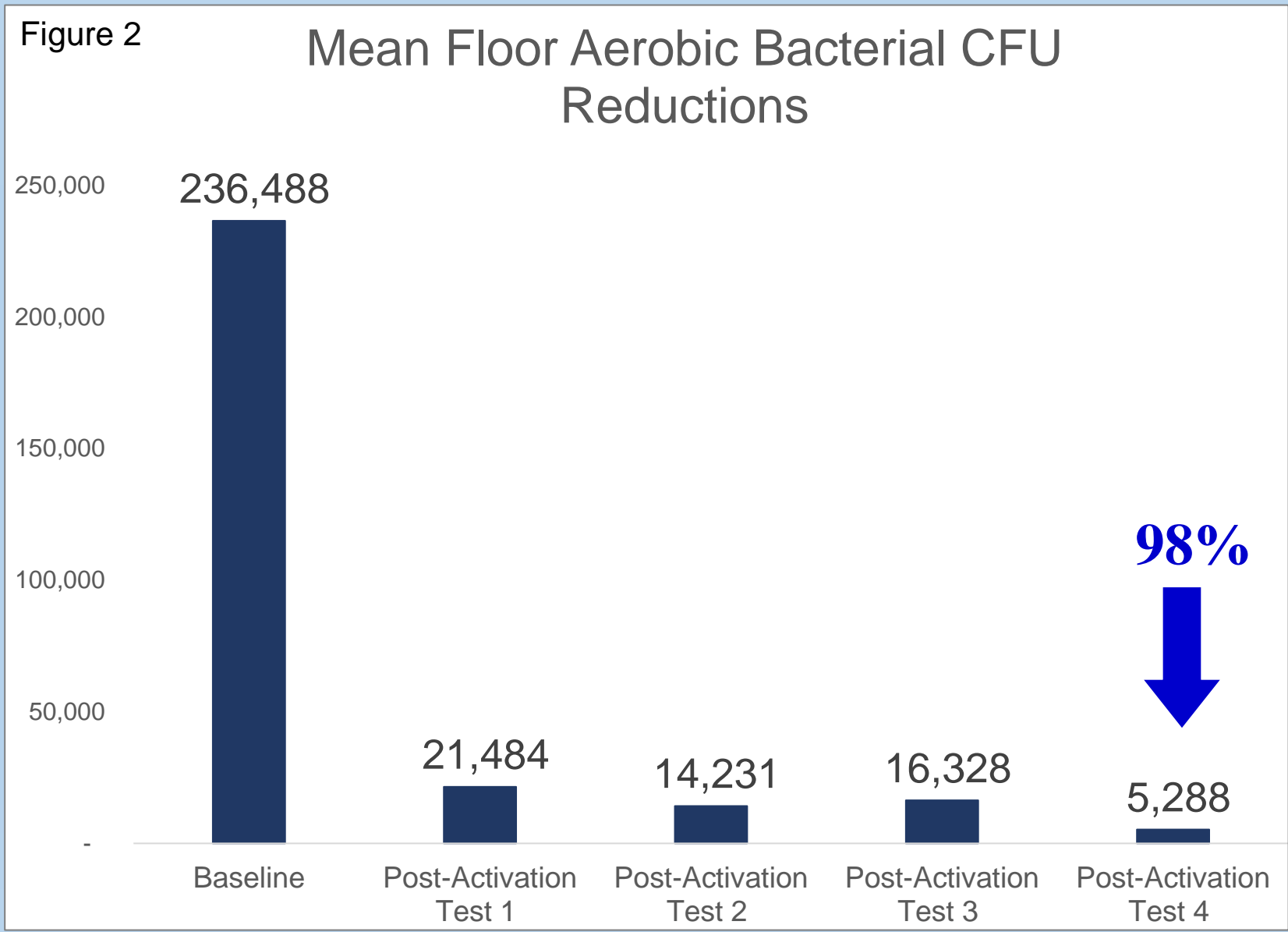
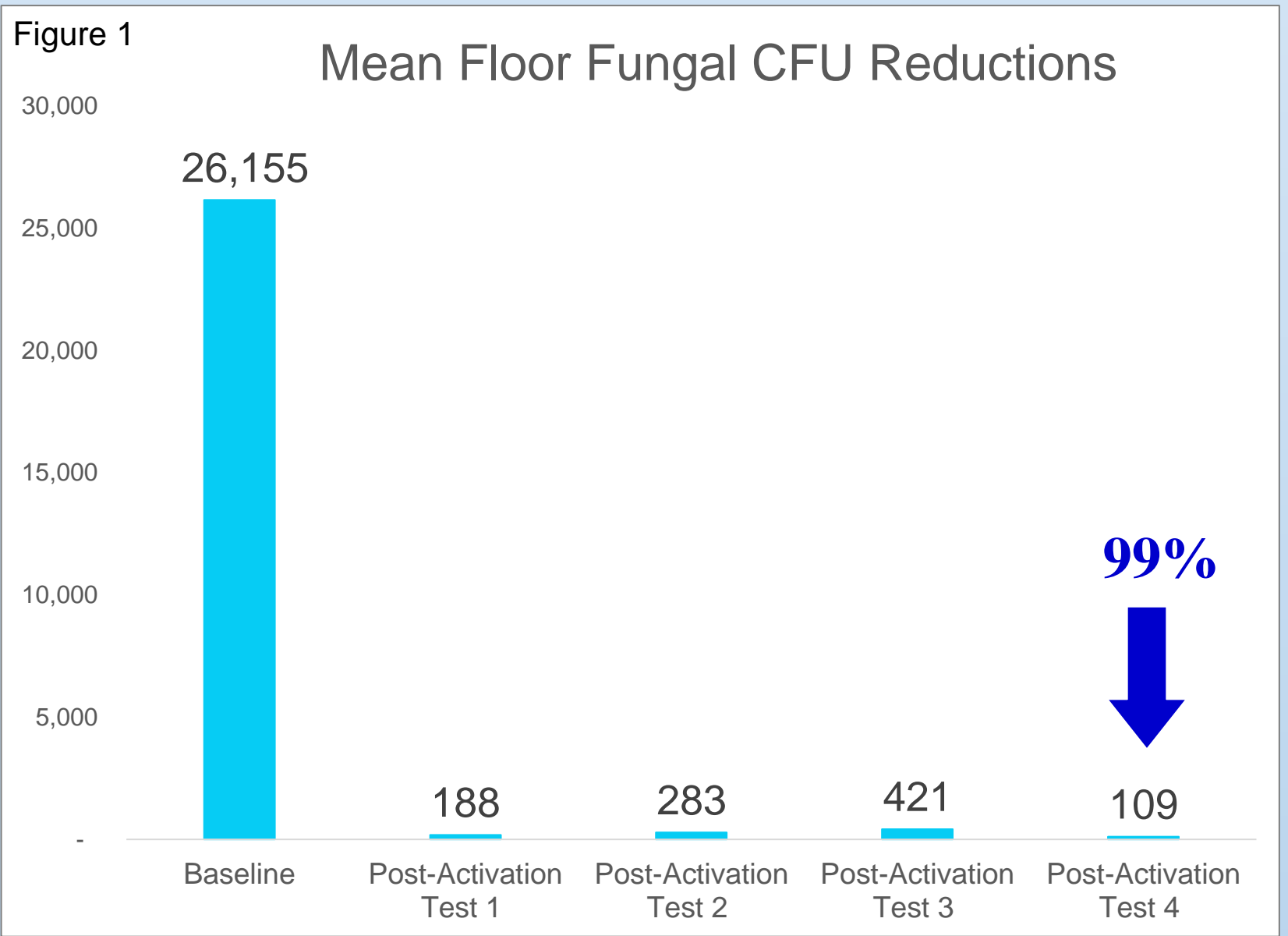
## CONCLUSION

These findings of significant reductions in microbial bioburden and abated pathogen acquisition demonstrate the positive impact that AP continuous disinfection technology can have on the environment and patient outcomes, without additional skilled labor or increases in cleaning and disinfection practices.

## SUMMARY

An experimental study to explore the impact of advanced photohydrolysis (AP) continuous disinfection technology on colony forming units (CFUs) of aerobic bacteria, fungi, and *C. auris* inside a hospital unit was performed from September 2023 to January 2024. Patient outcomes of *C. auris* colonization and HAI rates were compared 8 months before and after AP technology installation.

Median floor fungal CFUs achieved a statistically significant reduction of 99% (p=0.11) from Baseline to Post-Activation #4 (Figure 1). Aerobic bacteria decreased 98% (Figure 2); *C. auris* by 66% (Figure 3). The rate of patient *C. auris* colonization after admission decreased 67% (Figure 4) and aggregate HAI rates decreased 75% (Figure 5).



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