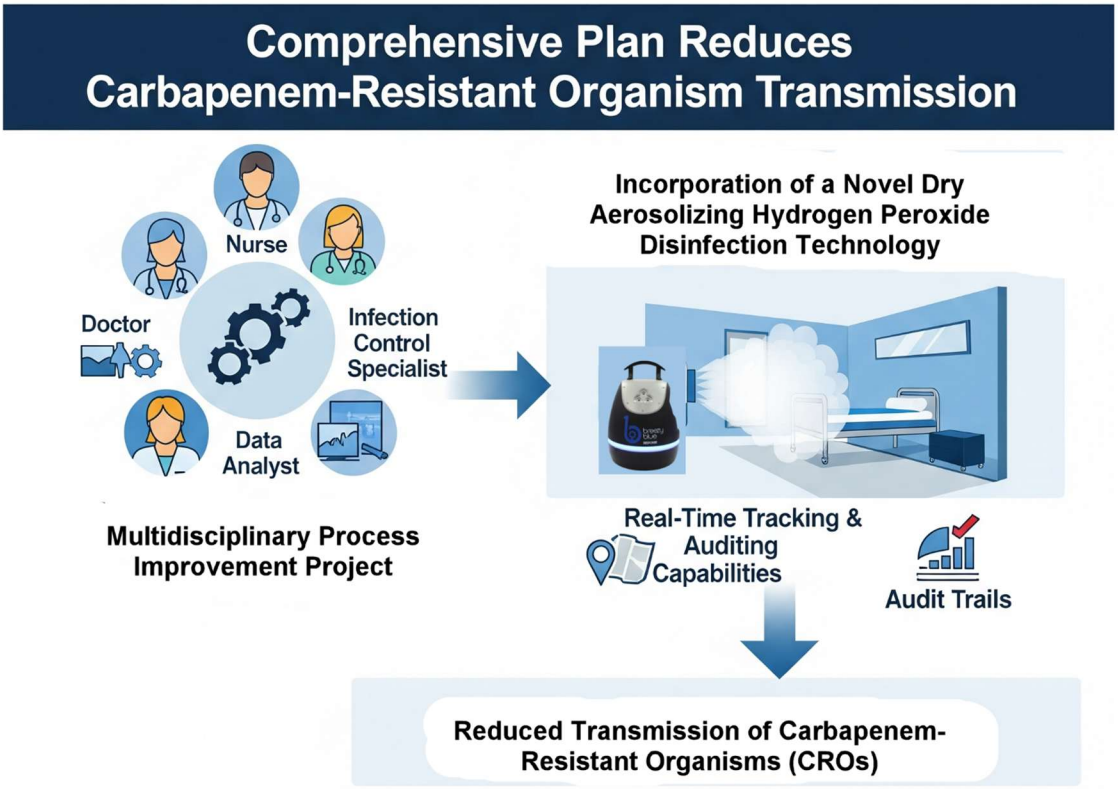
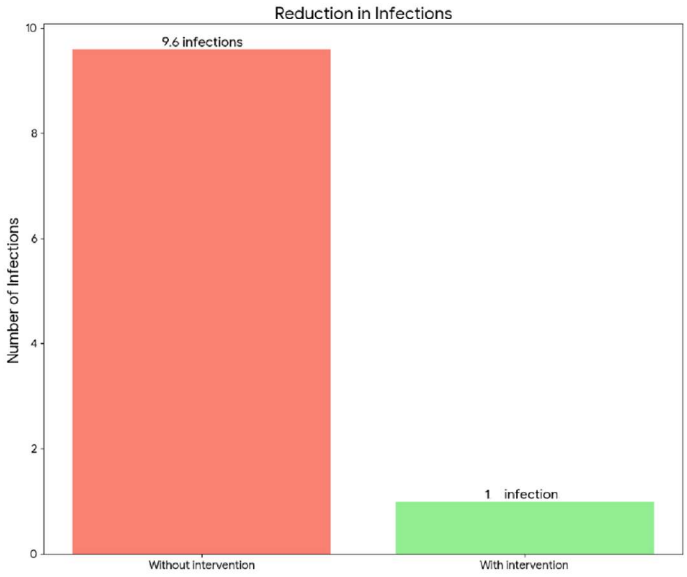
A comprehensive process improvement program utilizing a novel aerosolizing hydrogen peroxide disinfection technology reduces transmission of carbapenem resistant organisms

Meghan Johnson, BSN, RN, Rehabilitation Hospital of Southern New Mexico/Advanced Care Hospital of Southern New Mexico, Las Cruces, NM
Timothy Short, Pharm.D., Director of Pharmacy, Rehabilitation Hospital of Southern New Mexico/Advanced Care Hospital of Southern New Mexico, Las Cruces, NM
Savannah Stevenson, RN, CCS, Rehabilitation Hospital of Southern New Mexico/Advanced Care Hospital of Southern New Mexico, Las Cruces, NM
Erik Kulstad, MD, MS, University of Texas Southwestern Medical Center, Dallas, TX
Kathy Warye, BS, Principal, Infection Prevention Partners

Introduction: Providing high quality post-acute services to chronically critically ill patients in a long term acute care hospital (LTACH) who are recovering from serious illness is often complicated by the potential for hospital acquired infections (HAI) and the transmission of multidrug-resistant organisms (MDRO) such as carbapenem-resistant Acinetobacter baumannii (CRAB). The majority of CRAB isolates in the U.S. produce carbapenemases (enzymes that deactivate carbapenems and other β-lactam antibiotics), rendering these treatments ineffective. We sought to quantify the effect of implementing a robust carbapenem-resistant organism (CRO) mitigation strategy that incorporated a novel dry aerosolizing hydrogen peroxide (aHP) disinfection technology. The technology treats a 1,000 sq. ft. space in 1 minute and allows the room to be reoccupied in 15 minutes. In comparison to other fogging systems, rooms do not have to be sealed, and the technology may be remotely activated, providing real-time tracking and auditing capabilities.
Methods: After implementation of our process improvement program, we measured the number of patients known to be colonized or infected with CROs admitted to the facility over a 24 month period, and quantified the number of in-facility transmissions that occurred over this timeframe. The process improvement program included increased involvement of the pharmacist-driven interdisciplinary antimicrobial stewardship team. Core elements of the project included staff education and training, data collection and reporting, real-time monitoring and feedback, compliance audits, and environmental cleaning protocols utilizing the novel aHP disinfection system (Breezy Med, Albuquerque, NM) for all LTAC patients.
Results: Over the 24 month timeframe from January 2023 to July 2025, 24 patients known to be colonized or infected with (CROs) were admitted. During this time, only two cases were detected after admission, with one of these determined after epidemiologic investigation to have been unlikely in-facility transmission. Compared to the lowest per-admission reproduction number of 0.40, where a total of 9.6 patient in-facility transmissions would be expected, this represents a significant reduction in transmission rate ($p<0.004$).
Conclusions: A comprehensive multidisciplinary process improvement program including the incorporation of a novel aerosolizing dry hydrogen peroxide disinfection technology that allowed real-time tracking and auditing capabilities was associated with a statistically significant reduction in transmission of carbapenem resistant organisms compared to expected rates.





Notes: Lowest R0 estimates obtained from Haverkate MR, Bootsma MC, Weiner S, Blom D, Lin MY, Lolans K, Moore NM, Lyles RD, Weinstein RA, Bonten MJ, Hayden MK. Modeling spread of KPC-producing bacteria in long-term acute care hospitals in the Chicago region, USA. Infect Control Hosp Epidemiol. 2015 Oct;36(10):1148-54. doi: 10.1017/ice.2015.163. Epub 2015 Jul 24. PMID: 26204992; PMCID: PMC8381217.