Evaluation and Adoption of Hydrogen Peroxide Based Technology for Reducing Healthcare-Associated *Clostridium Difficile (C. difficile)* Infection Rates

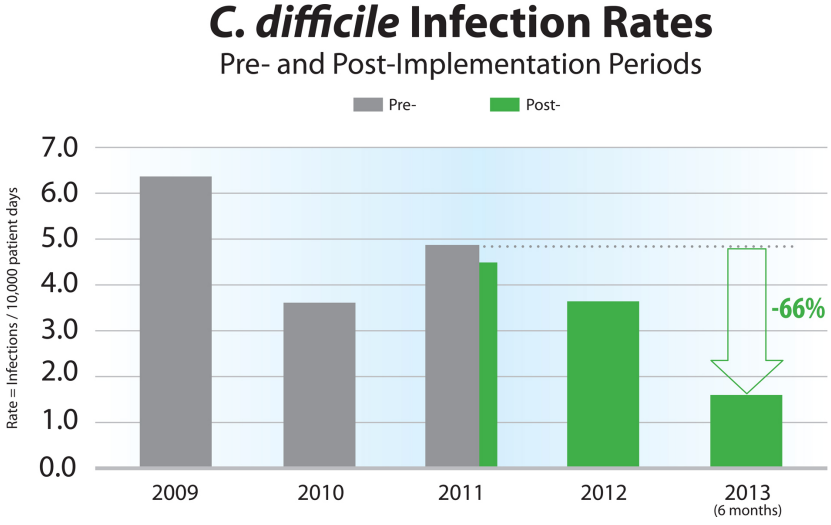
Healthcare Case Study
Pennsylvania Hospital
Philadelphia, Pennsylvania

August 2013

Summary

Pennsylvania Hospital reduced the rate of healthcare-associated *C. difficile* infections to far below national norms using the **Halo Disinfection System®** from Halosil International, a hydrogen peroxide and ionic silver solution applied in a dry mist, in combination with a comprehensive disinfection regimen.

Using the Halo Disinfection System, Pennsylvania Hospital reduced its healthcare-associated *C. difficile* rate by 66% to 1.65 new cases per 10,000 patient days from 4.9 during the first nine months of 2011. The introduction of bedside computer terminals in 2011 presented infection prevention challenges that simply overwhelmed traditional spray & wipe techniques. The process improvement efforts made by a multi-disciplinary team since the initial implementation of the Halo Disinfection System are evident in a review of the month-to-month *C. difficile* case counts in 2012.



Halosil™
INTERNATIONAL

Halosil International
91 Lukens Drive
New Castle, Delaware 19720 USA
Phone +1 302 454 8102
Fax +1 302 454 8009
www.halosil.com

Doc No. HFC616EN_E

Background

Pennsylvania Hospital, America's first hospital, is a 496-bed facility with an average daily census of 350 patients. The hospital has four infection preventionists and one dedicated EVS director on staff.

In July of 2011, the hospital experienced a three-fold increase in *C. difficile* cases. The infection prevention staff theorized that new Knowledge-Based Charting (KBC) computer systems that had been installed in every room were a likely source of infections. At the time, there was no computer cleaning policy or staff education in place. Once identified as the problem, disinfecting these large, complex surfaces presented challenges to the EVS staff.

In making the case for hydrogen peroxide-based disinfection, Pennsylvania Hospital conducted a trial from September 2011 through December 2011 with five HaloFogger® units and Halosil™ disinfectant. Four EVS supervisors were trained and a paper log system was created to track infected and treated rooms. *C. difficile* transfer and discharge rooms were targeted and prioritized. Rooms were cleaned and subsequently fogged with the dry mist of disinfectant. Nursing and EVS staff members were educated in Pennsylvania Hospital's 'Huddle Flash' meetings starting in September 2011.

Fogging was expanded to unoccupied rooms when time and staffing permitted, with a goal of fogging 100 patient care units per month. Later in the trial, emergency rooms where *C. difficile* cases had been treated were fogged, and procedure areas including the cath lab, nuclear medicine, intensive care nursery and operating rooms were disinfected with the system.

In spite of successful training and education of key staff members, several operational challenges emerged that complicated implementation. Removal of signage on infected rooms, inconsistent documentation of interventions, and the scheduling problems for the four EVS supervisors trained to use the System were barriers to full implementation.

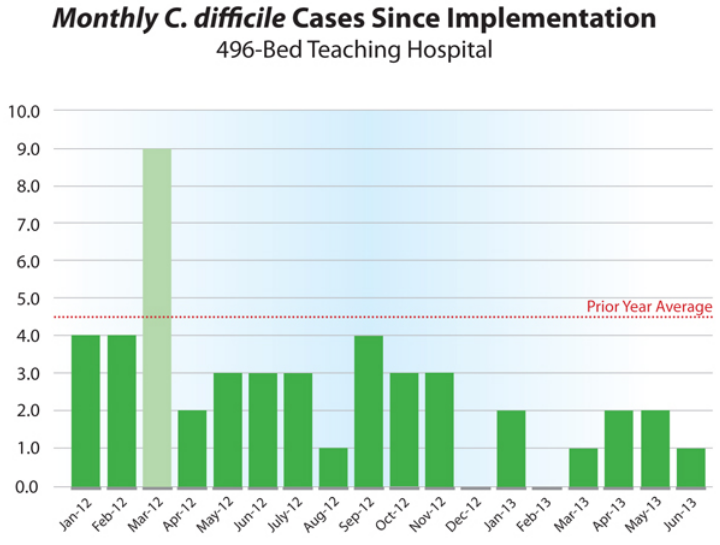
Results

During a four-month evaluation period, Pennsylvania Hospital reduced hospital *C. difficile* infection rates approximately 30% by treating isolation rooms with the HaloFogger and disinfectant. Estimated cost per room per treatment was under $10 in consumable disinfectant. Total return on investment (ROI) was calculated in order to justify capital purchases. Interestingly, the only expense reduction needed to justify the expenditure was the annualized reduction in costs ($10,455) associated with not changing privacy curtains.

With these favorable results and compelling ROI models, the use of the Halo Disinfection System in Pennsylvania Hospital was approved.

Challenges

After the initial success, in March 2012 the number of healthcare-associated *C. difficile* cases jumped from 4 to 9 in a single month. Upon investigation, the source of the increase was interruptions of treatment schedules due to unclear staff accountability - only 7% of rooms identified as isolation had been fogged that month.



To facilitate accountability, the disinfection log was put on a public drive and accessible by all EVS and infection prevention staff members. The infection prevention department checked *C. difficile* patients, sent updates to EVS staff several times per week and tracked compliance. Additionally, fifteen EVS staff members were trained on the use of the HaloFogger to minimize the impact of staff issues. Pennsylvania Hospital initiated further measures to reduce *C. difficile* including a more thorough cleaning regimen, a fluorescent gel monitoring program, and an antimicrobial stewardship program.

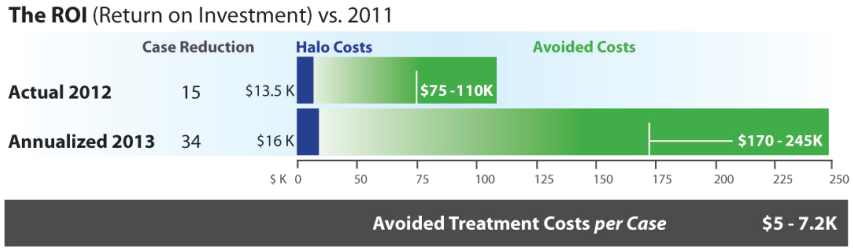
After intervention, *C. difficile* room treatment compliance increased from 7% to over 93% from March 2012 through June 2013, with 276 out of 301 *C. difficile* isolation rooms fogged.

Collecting and reviewing data while collaborating among departments is the ultimate key to success. Without the partnerships between EVS, infection prevention and nursing, the impressive outcomes would not have been achieved. Having a joint commitment to patient health and safety made these groups instrumental in the success of the new disinfection and monitoring program at Pennsylvania Hospital.

Conclusion

The Halo Disinfection System from Halosil International, in conjunction with a comprehensive cleaning, disinfection and compliance monitoring system, was effective in significantly reducing *C. difficile* rates at Pennsylvania Hospital. As a result of the program, Pennsylvania Hospital reduced its *C. difficile* rates from 4.9 to 3.65 per 10,000 patient days in the first full year of implementation, and continued decreases to 1.65 for the first half of FY13. For the first time since *C. difficile* has been tracked, Pennsylvania Hospital had two months with zero new cases.

Using standard costs, the ROI since implementation has been greater than $10 for every $1 spent.



As a result of their efforts, Pennsylvania Hospital was recognized and awarded Penn Health's Quality and Patient Safety Award. The project team members included staff from infection prevention, EVS, administration, nursing and an infectious disease physician.

References:

Pennsylvania Hospital presentation for the Health Care Improvement Foundation, Antimicrobial Stewardship Collaboration, March 2013.

Scott, R Douglas II, *The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention*, Centers for Disease Control and Prevention (www.cdc.gov), March 2009.