Optimizing Environmental Hygiene: The impact of combined daily-use sporicide, objective environmental monitoring Beaufort Memorial and best practices training on environmental hygiene and infection control outcomes

Background

This study evaluates the combined impact of replacing standard disinfectants and environmental hygiene practices with an EPA-registered peroxyacetic acid / hydrogen peroxide sporicidal daily disinfectant, enhanced environmental hygiene training and implemention of objective environmental hygiene monitoring on environmental hygiene and infection control outcomes.

Methods

A six month pre / post-intervention study was conducted by a Percent of High Touch Objects Cleaned multi-disciplinary team at a community hospital. Outcomes measured included: thoroughness of cleaning of high touch objects, operational efficiency, environmental surface bacterial burden (BB), hospital onset *Clostridium difficile* infection rates, disinfectant material compatibility, chemistry and water use. Thoroughness of cleaning was measured as a percentage of high touch objects (HTOs) cleaned as evidenced by removal of a fluorescent gel marker in a 10% sample of patient rooms (Photo 1). Operational efficiency was measured by time and motion studies of discharge cleaning. BB was evaluated by environmental cultures for total aerobic colony counts (ACC) before and after disinfection. Surfaces with 2.5 CFU/cm2 or more were defined as dirty and those without BB were defined as clean. Standardized infection ratios (SIR), as reported to National Healthcare Safety Network, were used to measure hospital onset *Clostridium difficile* infection rates. Disinfectant material compatibility was Graph 3 evaluated through visual inspection and photographs after 6 months of disinfection with the hydrogen peroxide/peroxyacetic acid sporicide. Daily Standardized Infection Ratio Q3 2012-Q1 2015 disinfectant product and water usage was tracked.

Photo 1



Photo 2



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Graph 1









Graph 2

Graph 4



Results

Cleaning of HTOs during discharge cleaning improved from 78% in the pre-intervention period to an average of 88% post-intervention (Graph 1). In time and motion studies, the average discharge room turnover time in the pre-intervention period was 36 minutes compared to 27 minutes post-intervention, for a time savings of nine (9) minutes. In the pre-intervention period, 50% of dirty surfaces were effectively cleaned. During the implementation period, 85% of surfaces that were contaminated before disinfection had no BB after disinfection, confirming the increased effectiveness of the intervention disinfectant (p=0.02) (Graph 2). Hospital-onset C.difficile SIR was reported as 1.629 in the quarter prior to intervention and decreased to 0.667 at end of the six (6) month intervention without additional C. difficile prevention measures (Graph 3). No damage was noted after approximately 60 applications (every three days x 6 months) of the hydrogen peroxide/peroxyacetic acid sporicide to a new mattress (Photo 2). Visual inspection of additional high touch objects also found no evidence of material damage. In the six (6) months prior to the intervention, quaternary ammonium compound disinfectant was used for discharge cleaning of non-C. difficile rooms and bleach wipes were used to clean C. difficile rooms. 44 gallons of quaternary ammonium compound and 5632 gallons of water were consumed for daily and discharge cleaning of non-isolation rooms. Bleach wipes were purchased and used by both nursing and environmental services staff, so an accurate record of the amount of product used by EVS specifically for discharge cleaning could not be ascertained. In the intervention period, 96 gallons of sporicidal disinfectant and 4096 gallons of water were consumed for daily and discharge cleaning of all patient care areas, providing a savings of 1536 gallons of water.

Conclusion

The combined impact of replacing a quaternary ammonium compound plus bleach with an EPA-registered peroxyacetic acid / hydrogen peroxide sporicidal disinfectant, providing environmental hygiene training on best practices, and implementing objective environmental hygiene monitoring resulted in improved thoroughness of cleaning and faster discharge room turnover times, low bacterial burden on environmental surfaces, decreased hospital onset C. difficile infection rates and improved material compatibility (Graph 4).

HOSPITAL

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