

Evaluation of a Programmatic Approach to Improving Patient Room Cleaning Outcomes

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ISSUES:

Many patient rooms are not well cleaned, and there is increasing evidence that a programmatic approach to environmental hygiene can improve outcomes.¹ Cleaning of high touch objects is critical to prevent transmission of pathogens from the environment to the patients.² Methods used to monitor and evaluate the effectiveness of environmental hygiene are often subjective.³

PROJECT:

A pilot study was conducted at two sites, a 650-bed urban hospital and a 350 bed non-urban hospital, to evaluate the impact of a new programmatic approach on environmental hygiene (EH) practices, efficiency, sustainability and staff satisfaction. The program included the use of products, tools, processes, enhanced staff training and engagement, staff surveys and objective EH monitoring tools such as fluorescent marking gel and environmental cultures to monitor effectiveness of environmental cleaning. A pre- and post-intervention assessment of EH practices, efficiency, product usage and staff competency was conducted.

METHODS:

- EH practice effectiveness was evaluated by measuring the percentage of high touch objects (HTO's) cleaned as evidenced by the removal of a fluorescent gel mark that was applied to HTO's before discharge cleaning. If, after Environmental Services (ES) staff performed discharge cleaning, the fluorescent gel mark was disturbed, it was documented as a "pass". If the gel mark was not disturbed, it was documented as a "fail".
- At Site A, in addition to gel marking, an environmental culture obtained from the same HTO's was used to measure total aerobic colony counts before and after cleaning. Any value for culture colony forming units (cfu) that was above a 0 was considered a failure. Therefore, the culture data was coded as either pass or fail.
- For all gel and culture data collected, an attribute agreement analysis was performed in Minitab. This analysis identified what percent of the results agreed—both gel and culture "pass" or both "fail" (where gel removal=pass and culture result 0 cfu=pass).
- A best practices audit tool was employed to evaluate practices during direct observation.
- Room turnover, defined as the time the ES staff entered the patient room to the time that room cleaning was completed, was used as a measure of efficiency.
- Dispenser accuracy was evaluated by measuring disinfectant concentration parts per million (PPM) in dispensed use solution.
- Pre- and post-intervention chemical and water consumption was used to measure sustainability.
- The effectiveness of classroom and hands-on training on EH best practices was measured using a 10 question staff competency exam.

RESULTS:

- EH practice effectiveness, as measured by the percent passing in disturbance of a fluorescent marking gel on high touch objects at Site A and Site B, was 85.3% and 83.1%, respectively. Pre-Intervention EH practice effectiveness was 55.7% and 78.4% at Site A and Site B, respectively. (See Table 1)

Table 1. Environmental hygiene practices, as measured by percent pass in disturbance of a fluorescent marking gel on high touch surfaces pre- and post-intervention

Site	# HTO's marked Pre- Intervention	% Pass Pre-intervention	# HTO's marked Post- Intervention	% Pass Post-intervention
Site A	564	55.7%	360	85.3%
Site B	464	78.4%	1063	83.1%

- There was a higher correlation between gel disturbance "pass" and 0 cfu "pass" after implementing a multi-modal environmental hygiene program at Site A. (See Table 2)

Table 2. Percent agreement between gel disturbance and 0 cfu culture, Site A.

Period	# of HTOs	% Agreement between "pass" gel & 0 cfu "pass" culture
Pre-intervention	168	60.1%
Post-intervention	295	78.6%



- The best practices audit tool for direct observation identified several areas for improvement, including:

- Training to prevent food/drink on carts
- Techniques to organize carts and minimize cross-contamination
- Support of best practice cleaning and efficiency
- Reinforcement of the proper use of PPE

(See Photos Left)

- Pre-intervention evaluation identified inaccuracies in hospital dispensing systems. Post intervention, samples taken identified 75% accuracy at Site A and 100% accuracy at Site B.
- The discharge cleaning time improved by 23.8% at Site A and 6% at Site B.
- Water and chemical usage on floors and surfaces decreased at both sites. (See Table 3)

Table 3. Decreases in water and chemical usage on floors and surfaces

Site	Water Usage Decrease	Chemical usage decrease on floors	Chemical Usage decrease on surfaces
Site A	94%	85%	74%
Site B	84%	95%	43%

- Staff competency scores measured pre-and post-intervention increased from 60% to 88% at Site A and from 78% to 90% at Site B.

LESSONS LEARNED:

Use of a programmatic approach incorporating products, tools and processes, enhanced staff training and engagement, staff surveys and objective environmental hygiene monitoring tools can improve environmental hygiene practices, efficiency, sustainability and staff satisfaction. Fluorescent marking gel is a surrogate marker for bacterial contamination in patient rooms when used as part of a comprehensive environmental hygiene program.

REFERENCES:

- Carling PC, Parry MM, Rupp ME, Po JL, Dick B, Von Behren S.; Healthcare Environmental Hygiene Study Group. Improving cleaning of the environment surrounding patients in 36 acute care hospitals. *Infect Control Hosp Epidemiol.* 2008 Nov;29(11):1035-41.
- Hayden MK, Bonten MJ, Blom DW, Lyle EA, van de Vijver DA, Weinstein RA. Reduction in acquisition of vancomycin-resistant enterococcus after enforcement of routine environmental cleaning measures. *Clin Infect Dis.* 2006 Jun 1;42(11):1552-60.
- Carling PC, Bartley JM. Evaluating hygienic cleaning in healthcare settings: What you do not know can harm your patients. *Am J Infect Control.* 2010;38(5):Supplement 1.

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