

Effects of Daily and Terminal Hard-Surface Cleaning on Hospital Acquired C.Diff Infections

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Clinical Question: In hospital rooms of patients with Clostridium Difficile infections, does daily and terminal cleaning of surfaces reduce the number of hospital-acquired C.Diff infections?

Sources of Evidence:

- Hacek, DM., Ogle, AM., Fisher, A., Robicsek A., & Peterson LR. (2010). Significant impact of terminal room cleaning with bleach on reducing nosocomial clostridium difficile. *American Journal of Infection Control*, 38(i5), 350–353. <https://doi-org.ezproxy.lib.ndsu.nodak.edu/10.1016/j.ajic.2009.11.003>
- Orenstein, R., Aronhalt, K.C., Mcmanus, J.E., & Fedraw, L. A. (2011). A targeted strategy to wipe out clostridium difficile. *Infection Control & Hospital Epidemiology*, 32(11), 1137-1139. doi: 10.1086/662586
- Ramphal, L., Sumhiro Suzuki, McCracken, I. M., & Addai, A. (2014). Improving hospital staff compliance with environmental cleaning behavior. *Baylor University Medical Center Proceedings*, 27(2), 88-91. Retrieved from <https://ezproxy.lib.ndsu.nodak.edu/login?url=https://search-ebshost-com.ezproxy.lib.ndsu.nodak.edu/login.aspx?direct=true&db=ccm&AN=107897&site=ehost-live&scope=site>
- Vandini, A., Temmerman, R., Frabetti, A., Caselli, E., Antonioli, P., Balboni, P. G., . . . Mazzacane, S. (2014). Hard surface biocontrol in hospitals using microbial-based cleaning products. *PLoS ONE*, 9(9), 1-13. doi:10.1371/journal.pone.0108598

Synthesis of Evidence:

Four articles were reviewed as evidence in this report. Four quasi-experimental designs were utilized.

Hacek et. al. (2010) conducted a pre-post quasi-experimental study. The purpose of the study, in response to an increased number of C. difficile infections, was to study the implementation of terminal room cleaning with dilute bleach to reduce the amount of C. difficile spores. The study utilized the North Shore University hospital system, which is a 3-hospital system. The sample size was all of the admissions within two years who did not previously have C.Diff upon admission. The intervention tested was bleach cleaning, rather than quarternary ammonium-based products. The findings concluded that the average number of hospital acquired CDI patients decreased from 0.85 to 0.45 during bleach cleaning, which is a 45% decrease in C. diff infections.

Ortenstein (2011) conducted a pre-post quasi-experimental design that evaluated daily cleaning with germicidal bleach wipes. The purpose of the study was to evaluate daily cleaning with germicidal bleach wipes on the wards with a high incidence of hospital-acquired Clostridium difficile infections. The study took place in two medical units at St. Mary's hospital in Rochester, MN and included the patients who were admitted who did not previously have hospital-acquired CDI prior to their admission. The sample size included two units of 1,249 bed hospital in a 12-month period per 10,000 patients. The intervention tested was daily room cleanings with bleach wipes. The results concluded that daily room cleaning with germicidal bleach wipes sustained a reduction in HAI C.diff infections by 55%.

Ramphal et. al. (2014) performed a pre-post quasi-experimental study design that took place in Cook's Children's Medical Center. The purpose of the study was to reduce the incidence of healthcare-associated infections that require environmental cleanliness of frequently touched objects within the hospital environment. The study tested 4,257 "high touch objects" in patient rooms for the presence of bacteria. The intervention tested in this study was education to staff about proper room cleaning. After patients were discharged from Cook's Children's Medical Center, a medical student would wipe the high-touch surfaces with clear glow germ gel before any routine room cleaning was performed. The results concluded that every few months, the number of high-touch objects were significantly cleaner with proper education.

Vandini et.al. (2014) conducted a quasi-experimental study design that took place in three hospitals. The purpose of the study was to evaluate the effect of a novel cleaning procedure, based on the mechanism of biocontrol, on the presence and survival of several microorganisms responsible for HAI's on hard surfaces in a hospital setting. The sample size was 20,000 microbiological samples within the hospitals. The intervention tested was the use of microbial-based cleaning products composed of spores of *Bacillus subtilis*, *Bacillus pumilus*, and *Bacillus megaterium*. The study looked at surface sampling and culture-based microbiology tests by taking 20,000 samples between 6-8 hours after cleaning from a broad variety of surfaces. The results concluded that after three days of microbial cleaning that the cleaned surfaces dropped below the "detection level" of the analysis limit for *C. diff* bacteria.

Conclusion:

While synthesizing the evidence it was found that daily and terminal cleaning, proper education, and the use of bleach or other cleaners, such as the microbiological agents, significantly reduced the number of hospital-acquired *C. diff* infections.

Implications for Nursing Practice:

There is evidence to suggest implementing daily hard-surface cleaning in hospitals to reduce hospital-acquired *C. diff*. infections. By implementing a standardized daily cleaning program with bleach or microbiological agents, along with proper education, could significantly reduce *C. diff* infections, provide a safe, clean, and healthy environment for patients, shorten hospital stays, and cut down on costs for both the hospital and the patients.