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Enhancing Environmental Cleaning and Disinfection Practices in Diverse Healthcare Settings during the COVID-19 Pandemic

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Abstract

Inadequate cleaning and disinfection practices in the healthcare setting create an environment where infectious pathogens can linger for days or even weeks on high-touch surfaces. This presents an increased risk of infection transmission to healthcare workers and patients. This simulation-based intervention for environmental service workers (ESWs) was an innovative, evidence-based solution to improve environmental cleaning practices and protocol compliance in three diverse healthcare settings to transform public health.

Keywords: Physical Environment, Environmental Cleaning, Environmental Disinfecting, Healthcare, COVID-19

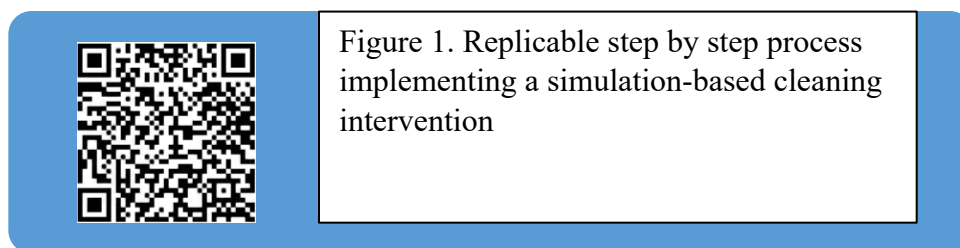
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If the physical environment is not adequately disinfected in healthcare settings, pathogens such as the novel SARS CoV-2 coronavirus, COVID-19, can survive for extended periods of time, especially on high-touch surfaces. Inadequate disinfecting poses a significant risk for direct contact, cross-contamination, and nosocomial spread of the virus (Rădulescu et al., 2020). Hospitals, community-based clinics, and medical offices are tasked with providing adequate, site-specific education to their staff as a primary means of addressing the challenge of infection control. However, Marek and colleagues (2014) found that when environmental service workers (ESWs) disinfect clinical surfaces, they do so appropriately only 50% of the time. This significant practice gap is most often a result of insufficient education, skills, and knowledge related to disinfection protocols, cleaning practices, and equipment, including chemical supplies and personal protective equipment (PPE) (Donskey, 2013). Simulation-based competency training for both onboarding and ongoing education using fluorescent markings and on-the-spot feedback may increase ESW confidence in adequate disinfection protocols for terminal cleaning to help prevent the spread of COVID19.

From January 2020-April 2020, simulation-based educational interventions were conducted, and data were collected at three healthcare sites from different regions of the United States: an urban academic medical center in the southeast, an urban hospital in the southern mid-Atlantic, and a rural independent nurse practitioner (NP) office in the northeast. At each site, the process consisted of pre-intervention observation and assessment of surface disinfection practices, a simulation-based educational intervention for ESWs with on-the-spot feedback, and a post-intervention assessment of surface disinfection practices using Glo Germ™ kits. Hand-held ultraviolet lights were used to assess whether the high-touch areas that had been pre-marked with fluorescent powder were effectively “disinfected” by the ESWs. Both hospital sites followed the same clinical disinfection protocols and implemented the same simulation training template. For an updated replicable guide to implementing this training for inpatient C-diff and COVID-19 cleaning and outpatient COVID-19 cleaning simulations, see Figure 1.

Figure 1

Guide to implementing environmental disinfection training



The independent NP practice site in the northeast followed the pre-established office cleaning protocols and implemented an appropriately modified simulation training. Cleaning of exam rooms was conducted by office staff. However, commercial staff conducted the end-of-day non-biowaste trash, vacuuming, and cleaning the bathrooms.

Eleven participants completed the simulations and an ESW self-efficacy questionnaire, pre- and post-implementation. Face validity of this tool was established by simulation and ESW experts. The survey consisted of four items related to ESW confidence levels with a five-point Likert

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scale response. Pre-and post-implementation surveys documented a positive delta mean (27%) of ESW confidence in identifying appropriate disinfection chemicals, (28%) of confidence in adequate dwell times, (18%) of confidence in appropriate handwashing, and (9%) of confidence in correctly using PPE. A generalized Cochran-Mantel-Haenszel test was conducted to compare the pre- and post-data. A significant difference (p -value =0.0071) was noted representing an overall increase in ESW confidence.

During post-intervention debriefing and discussions, ESWs were assured that the learning environment was safe and that mistakes are viewed as learning opportunities. Participants from both inpatient and outpatient clinical areas expressed the need for further review of established cleaning and disinfection protocols, suggesting that the results of this study are generalizable.

The following opportunities for improvements were noted:

- Emphasizing the importance of completing all cleaning steps in the correct order
- Ensuring awareness of all steps to be completed for cleaning equipment
- Emphasizing compliance with all chemical protocols
- Allowing mattresses to dry completely before placing them back on the bed
- Ensuring each ESW aware of the responsibilities for each area at all times to minimize confusion regarding who cleans what equipment and with which chemical
- Ensuring awareness of the type of PPE to wear in various clinical situations

While no universal standards exist to measure the cleanliness of healthcare environments, ESWs can play a key role in enhancing patient outcomes by using effective environmental cleaning and infection control practices. This study occurred at the onset and early stages of the pandemic; subsequent COVID19-specific disinfection protocols continue to evolve. This paper provides an easily adaptable method of implementing onboarding and ongoing simulation-based competency training and education. The use of fluorescent markings and on-the-spot feedback can increase ESW confidence in appropriately completing disinfection protocols to aid in the continuing battle against the spread of COVID-19.

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