Keep It Clean: A Visual Approach to Reinforce Hand Hygiene Compliance in the Emergency Department

Authors: Lynn L. Wiles, PhD, MSN, RN, CEN, Chris Roberts, BSN, RN, CEN, and Kim Schmidt, BSN, RN, Norfolk and Virginia Beach, VA

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Problem: Although hand hygiene strategies significantly reduce health care–associated infections, multiple studies have documented that hand hygiene is the most overlooked and poorly performed infection control intervention.

Methods: Emergency nurses and technicians (n = 95) in a 41-bed emergency department in eastern Virginia completed pretests and posttests, an education module, and two experiential learning activities reinforcing hand hygiene and infection control protocols.

Results: Posttest scores were significantly higher than pretest scores (t (108) = –6.928, P = .048). Hand hygiene compliance rates improved at the conclusion of the project and 3 months after the study (F (2, 15) = 9.89, P = .002).

Implications for Practice: Interfaces with staff as they completed the interactive exercise, as well as anecdotal notes collected during the study, identified key times when compliance suffered and offered opportunities to further improve hand hygiene and, ultimately, patient safety.

Keywords: Infection control; UV light technology; Experiential learning; Hand hygiene

Hand hygiene (HH) is considered the most crucial measure for preventing the spread of infection, yet studies document that HH is the most overlooked and poorly performed infection control intervention,[1] with a median compliance rate of 40%.[2] Health care–associated infections (HAIs) claim more lives annually than do AIDS, breast cancer, and motor vehicle crashes combined.[3] HAIs occur during the course of receiving treatment in health care settings[4] and affect 5% of all hospitalized patients[5] or 1.7 million people annually, resulting in 99,000 deaths.[6] In 2008, HAIs were classified as preventable complications that preclude hospitals from receiving reimbursement from the Centers for Medicare and Medicaid Services.[7]

The reduction of HAIs is a major objective outlined in The Joint Commission's Center for Transforming Healthcare report.[8] This report, along with documented low national HH compliance rates and unacceptable HAI rates, establishes the need for ongoing staff education and compliance monitoring. It has been suggested that "a multi-faceted intervention, including use of feedback, education, the introduction of alcohol-based hand wash, and visual reminders" may effectively improve HH compliance.[9] A pilot study implemented by investigators in the University of California, San Francisco, neurological ICU used video surveillance monitors and tickertape feedback to improve HH. Findings indicate that HH compliance in the rooms with the near–real-time feedback significantly exceeded the HH compliance in rooms that were not monitored.[10]

Because almost 40% of hospital admissions stem from the patients who make approximately 119 million annual ED visits,[11] ED staff have a unique opportunity to decrease HAI rates by improving HH compliance. Compliance can be improved by implementing Centers for Disease Control and Prevention (CDC) infection control guidelines as patients enter the health care system. The purpose of this project was to increase staff awareness about HH guidelines and improve HH compliance rates in the emergency department.

Lynn L. Wiles, *Member, Tidewater Chapter,* is Assistant Professor, Old Dominion University School of Nursing, Norfolk, VA, and Per-diem Staff Nurse, Sentara Virginia Beach General Hospital, Virginia Beach, VA.

Chris Roberts, *Member, Tidewater Chapter,* is Nurse Manager, Sentara Virginia Beach General Hospital, Virginia Beach, VA.

Kim Schmidt, *Member, Tidewater Chapter,* is Director of Emergency Services, Sentara Virginia Beach General Hospital, Virginia Beach, VA.

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For correspondence, write: Lynn L. Wiles, PhD, MSN, RN, CEN, 4608 Hampton Blvd, Norfolk, VA 23529; E-mail: lwiles@odu.edu.

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A seminal study conducted almost a decade ago suggested that "clean" activities such as taking vital signs, shaking hands, or touching an area higher in organism growth like the groin can contaminate nurses' hands with 100 to 1000 colony-forming units of Klebsiella species.[12] Similarly, one study documented health care records as a source of bacterial transmission; investigators found that bacteria can survive on paper for up to 4 days and be transferred from paper to hands to clean paper.[13] Another study suggested that 63% of nurses' uniforms were contaminated with pathogens, including antibiotic-resistant microorganisms.[14] Moreover, 92% of the curtains in patient rooms in ICUs and medical/surgical units were contaminated within 7 days of being washed and harbored potential pathogens, including methicillin-resistant *Staphylococcus aureus* (21%), vancomycin-resistant enterococcus (42%), and other gram-negative rods, including enterococcus species or *S aureus* (66%).[15] During each patient encounter, health care workers are exposed to organisms that can be transmitted from patient to patient or health care worker to health care worker if proper HH recommendations are not followed.

Traditional education and social pressures to perform HH have not provided sustained improvements in HH compliance. Educational interventions that provoke fear for personal safety or disgust may be the most effective method to improve HH compliance.[16] Kolb's experiential learning theory served as the theoretical framework for this study because it focuses on using concrete, skill-based learning experiences to reinforce didactic content.[17] Based on Kolb's tenets, the experiential learning activity was designed with the expectation that simulation of spreading microorganisms would allow ED staff to *immediately see* the spread they caused. We believe that this approach has a more lasting impact than didactic learning alone because this strategy significantly improves nursing students' understanding of and compliance with HH protocols.[18]

Methods

The purpose of this descriptive pretest-posttest quality improvement project was to evaluate the impact of an experiential hand-washing learning activity and simulated infectious disease spread activity on ED clinical staff's knowledge of HH guidelines and adherence to HH protocols in an ED work environment. The following specific research questions were asked:

1. What is the baseline knowledge of the ED staff related to HAIs and the CDC HH guidelines?
2. What changes in the knowledge of the ED staff related to HAIs and the CDC HH guidelines occur after the learning activities?
3. What changes in HH compliance occur as a result of the learning activities?

This project took place in the 41-bed emergency department of a 276-bed acute care hospital that is accredited in trauma, stroke, and cardiac care. The hospital is located in a resort city in the mid-Atlantic region of the United States. All 95 ED RNs and technicians were invited to take part. Participation was voluntary, and no demographic data were collected. Completion of the online pretest implied consent.

Human subjects' protection approval was obtained prior to the project. Baseline HH knowledge was established using a 25-question online pretest. Next, volunteers participated in an experiential learning activity in which they applied Glo Germ lotion (Glo Germ Company, Moab, UT)[19] to their own hands and, after it dried, performed HH as per their usual routine. Researchers then shined an ultraviolet (UV) light on the participants' hands, providing a visual representation of the effectiveness of their HH and the spread of the Glo Germ throughout the hand-washing area. As needed, researchers reinforced the HH guidelines for staff who did not comply with CDC recommendations. In addition, during selected shifts, researchers placed a small amount of microsphere powder (Cospheric LLC, Santa Barbara, CA)[20] in common locations (eg, telephone, computer mouse area, point of care testing machines, and fax machine) throughout the emergency department (Figure 1). After 2 to 4 hours, the ED spaces and equipment were photographed using UV light. At the next monthly staff meeting, staff viewed a presentation that showed the spread of the microsphere powder throughout the emergency department and reinforced the need to comply with HH guidelines. Proper

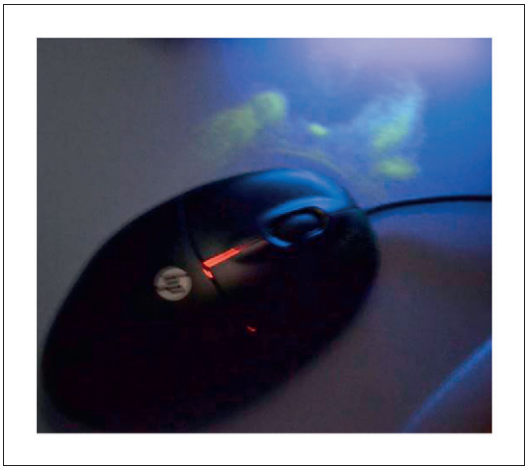

FIGURE 1

Ultraviolet photograph showing the spread of microsphere powder on a mouse and mouse pad.