



An evaluation of hand hygiene in an intensive care unit: Are visitors a potential vector for pathogens?



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Received 7 January 2015; received in revised form 17 March 2015; accepted 3 April 2015

KEYWORDS

Community-acquired infection;
Hand hygiene;
Intensive care unit;
Patient safety;
Healthcare-associated infection

Summary Patients in an intensive care unit (ICU) are frequently immunocompromised and might be highly susceptible to infection. Visitors to an ICU who do not adequately clean their hands could carry pathogenic organisms, resulting in risk to a vulnerable patient population. This observational study identifies pathogens carried on the hands of visitors into an ICU and investigates the effect of hand hygiene.

Two observers, one stationed outside and one inside the ICU, evaluated whether visitors performed hand hygiene at any of the wall-mounted alcohol-based hand sanitizer dispensers prior to reaching a patient's room. Upon reaching a patient's room, the dominant hand of all of the participants was cultured.

Of the 55 participating visitors, 35 did not disinfect their hands. Among the cultures of those who failed to perform hand hygiene, eight cultures grew Gram-negative rods and one grew methicillin-resistant *Staphylococcus aureus*. Of the cultures of the 20 individuals who performed hand hygiene, 14 (70%) had no growth on the cultures, and the remaining six (30%) showed only the usual skin flora.

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The visitors who do not perform hand hygiene might carry pathogens that pose a risk to ICU patients.

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Introduction

Multidrug-resistant organisms, such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* and carbapenem-resistant *Enterobacteriaceae*, present a significant challenge in the current healthcare environment [1]. Whereas these infectious agents are most commonly transmitted from patient to patient on the hands of healthcare workers, the involvement of visitors in patient-centered care in intensive care units (ICU) has major implications for healthcare-associated infections (HAI) [2]. If visitors carry certain pathogenic organisms on their hands and do not practice hand hygiene (HH) upon entry to the ICU, a vulnerable patient population might be at increased risk for infection [3]. These pathogens could include MRSA, *Escherichia coli*, *Proteus*, and *K. pneumoniae*, all of which are capable of causing life-threatening infections.

Although alcohol-based hand sanitizer (ABHS) is readily available throughout hospitals, its use among visitors is rarely evaluated or enforced [4,5]. For this study, we hypothesized that visitors might be colonized with pathogens that are potentially dangerous, particularly to immunocompromised patients [6]. Therefore, we assessed the potential role of visitors as a vector of pathogenic organisms by culturing their hands upon entry to an intensive care unit (ICU) in an academic medical center.

Materials and methods

Study design

This observational study was granted exemption by the University's Institutional Review Board as part of a safety and quality assurance initiative in an ICU of a tertiary care teaching hospital. The ICU has a central nurses' station and individual patient rooms. The entrance door to the closed unit must be electronically unlocked by an ICU staff member for a visitor to gain entry. Directly adjacent to the call button for ICU entry is a wall-mounted alcohol-based hand sanitizer dispenser.

Two observers, one stationed outside and one inside the ICU, evaluated whether visitors performed HH at any of the wall-mounted ABHS dispensers prior to reaching the patient's room. The observers were unobtrusively located, and visitors were not told that they were being observed. All of the visitors who sought admission to the unit during an observation period were asked to participate if they had not previously participated. Upon reaching the patient's room, each visitor was asked if he or she had performed HH before entry to the ICU and if he or she would volunteer to have his or her hand cultured as part of a hospital-wide initiative to reduce infection. The study was performed during visiting hours over a four-week period in the morning, afternoon, and evening. To ensure that there was no duplication on different days, the same observer approached the visitors and excluded anyone who had been previously cultured. In addition, each visitor was asked if he or she had already participated in the initiative and was not included if he or she had been previously cultured.

The cultures were taken from the visitor's dominant hand using the following imprint technique: first, four fingers (second through fifth) were imprinted (approximately 2 inches) for 3 s, followed by the thumb pad for another 3 s (all on the same plate). We selected the dominant hand because previous studies have shown that this hand tends to be the more contaminated [7,8]. The culture was a solid blood agar plate (trypticase soy agar with 5% sheep blood [TSA II]-BD) which is non-selective.

The same experienced investigator performed all of the cultures and was blinded to whether the specimens were from visitors who had or had not disinfected their hands. After 24 h of incubation at 37 °C, the total number of colony forming units (CFU) was counted and the organisms were determined based on the color and morphology. The microbiological workup was performed by the microbiology technologist assigned by the Infection Control Department to work on quality improvement projects pertaining to hands or environmental contamination. The organisms were identified by gross morphology, including Gram staining; rapid tests, such as those for catalase, coagulase, and oxidase; the Kirby Bauer susceptibility test; and

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