

Educational Article:

A Collaborative Approach to Targeting Zero Healthcare Associated Infections: A Focus on Hand Hygiene and Environmental Hygiene: A Patient Safety Perspective

J. Hudson Garrett Jr., PhD, MSN, MPH, FNP-BC, CSRN, VA-BC
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Introduction

According to the US Centers for Disease Control and Prevention, Hand Hygiene remains the single most important intervention in the quest for Targeting Zero Healthcare Infections (HAIs). Cleaning and disinfecting of environmental surfaces, referred to as environmental hygiene, in healthcare facilities is also crucial for reducing healthcare-associated infections (HAIs) and improving patient outcomes¹. Furthermore, healthcare organizations must comply with rigorous infection prevention and control standards to obtain accreditation from the Joint Commission and other regulatory agencies such as the Centers for Medicare and Medicaid Services. However, a recent survey by the Clean Spaces, Healthy Patients initiative of the Association for Professionals in Infection Control and Epidemiology (APIC) and the Association for the Healthcare Environment (AHE) found that around half of infection prevention and environmental services professionals find it difficult to locate useful resources about proper environmental hygiene practices, highlighting the need for additional education in this area². In healthcare settings, the majority of HAIs occur as a result of 1) the contaminated hands of the healthcare provider or patient, 2) The contaminated environmental surfaces that are common in a variety of healthcare settings (both inpatient and outpatient), or 3) the contaminated skin of the patient themselves (see figure 1 below).

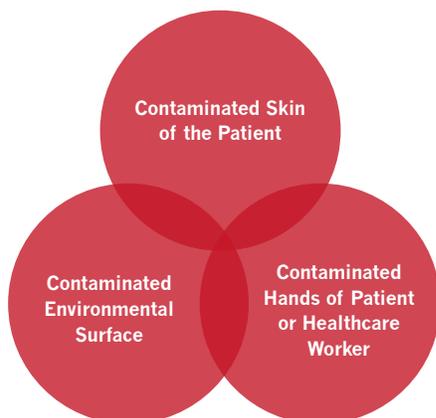


Figure 1: Three Common Sources of HAI Transmission in Healthcare Settings

Simple Interventions Yield Tremendous Outcomes: Impact of Hand Hygiene

According to the Director of the Division of the Healthcare Quality Promotion at the US Centers for Disease Control and Prevention, if healthcare providers (HCP) simply practice hand hygiene when indicated, we could potentially eliminate up to 70% of HAIs with this one practice. Given that we know most pathogenic microorganisms are transmitted via the hands, the more frequently the HCP practices hand hygiene, the higher the opportunity to mitigate HAI transmission raises dramatically. Healthcare Facilities should highly consider the placement of hand hygiene at the patient's bedside for routine use by both the patient and also their respective families. There are readily accessible, pre-packaged hand hygiene solutions available for this purpose. The nurse should also educate the patient and patient's family on the importance of hand hygiene, indicates for use, and the role of the patient in Infection Prevention. When healthcare providers engage the patients and their families directly, the results can be even more significant with the overarching goal of maintaining a clean environment within the healthcare facility.

The Impact of Environmental Hygiene on Healthcare-Associated Infections

One of the most frequent adverse events that occur during the treatment of other medical conditions and are associated with significant morbidity and mortality are HAIs. In the United States, an estimated 1.7 million HAIs occur in hospitals each year and these are associated with approximately 99,000 deaths. This equates to a rate of around 1 in 20 hospitalized patients will acquire an HAI during their hospitalization. HAIs also place a high economic burden on the healthcare system, costing United States hospitals an estimated \$28.4 to \$45 billion per year³.

Some of the most prevalent healthcare-associated pathogens, including *Acinetobacter baumannii*, *Clostridium difficile*, *Escherichia coli*, *Pseudomonas aeruginosa*, methicillin-resistant

Staphylococcus aureus (MRSA), Vancomycin-resistant enterococci (VRE), and other multidrug-resistant organisms (MDROs), can survive on environmental surfaces for months. Transfer of pathogenic microorganisms to patients typically occurs via the hands of healthcare staff, but can also occur directly from the environmental surface⁴.

It is estimated that 20–40% of HAIs result from transmission by a healthcare worker after touching either another patient or a contaminated environmental surface (**Figure 1**). In addition, increasing evidence has been accumulated for the role of environmental surfaces in the transmission of infectious microorganisms. In fact, some of the most important healthcare-associated pathogens, including *Acinetobacter baumannii*, *Clostridium difficile*, *Escherichia coli*, *Pseudomonas aeruginosa*, Methicillin-Resistant *Staphylococcus aureus* (MRSA), Vancomycin-Resistant *enterococci* (VRE), and other multidrug-resistant organisms (MDROs), can survive on environmental surfaces for months. As a result, in its Action Plan to Prevent Healthcare-Associated Infections, the United States Department of Health and Human Services (HHS) pointed to the importance of environmental hygiene in the prevention of *C. difficile* infection⁵. Effective environmental hygiene solutions would also target other pathogens, such as MRSA and VRE, to help prevent HAIs as well as meet rigorous infection prevention requirements set by healthcare accreditation agencies.

Proper Selection of an EPA-Registered Disinfectant

Because disinfectants are used in hospital settings to prevent or destroy pests (microorganisms), they are regulated as pesticides by the Antimicrobial Division in the Environmental Protection Agency (EPA) Office of Pesticides Program under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). As such, they must be tested for safety and efficacy using established methods before they can be registered by the EPA for sale or distribution⁶.

The EPA regulates the labeling of disinfectants in the United States. The directions for use portion of a disinfectant's label must be clearly written, so they can be easily understood and followed. Directions for use include sites or surfaces where the disinfectant can be used and the microorganisms that can be effectively controlled at each site, information on how to prepare and handle the disinfectant, including dilution or mixing instructions and compatibility with other products, and

information on instructions for use, contact times, rates, and frequency of application.

Contact times are specified on the labels of EPA-registered disinfectants. Surfaces must be exposed to the disinfectant for the contact time listed, which can range anywhere from one to ten minutes depending on the disinfectant and target microorganism. In order to effectively control all microorganisms included on the product's label, the longest contact time must be utilized. For all antimicrobial products used to control pathogens in the healthcare environment, the EPA also requires that each strain listed on the label be supported by appropriate efficacy data. These efficacy claims can provide the basis for evaluation of new or existing disinfectants. With Multi-Drug Resistant Organisms (MDROs) continually emerging, the disinfectant should ideally have a broad antimicrobial spectrum.

FIFRA requires that all label instructions on EPA-registered products be explicitly followed, and any off-label use comes with the risk of enforcement action. This includes adhering to contact time, using with only compatible products, and following dilution, application, storage, and disposal instructions. Accreditation agencies will also assess for correct use of disinfectants and for staff education in this area. Therefore, reviewing disinfectant labels with staff is essential for insuring that the appropriate products are being used correctly for all target microorganisms, as well as for successful accreditation. In addition, when evaluating disinfectants, the user should consider the possible impact to the patient of the product's use.

Evidence-Based Practices to Environmental Surface Disinfection

The CDC provides guidelines for the specific use of EPA-registered disinfectants in healthcare settings. These guidelines should also be used to comply with Infection Prevention standards and National Patient Safety Goals outlined by The Joint Commission.

The CDC Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008, begins by outlining the Spaulding classification scheme for patient-care items and equipment. Based on the potential for an item to transmit infection, it can be classified as critical, semicritical, or noncritical. Noncritical items are defined as such because they only come in contact

with intact skin of the patient and their sterility is therefore not critical. The CDC has added an additional noncritical category, environmental surfaces, which encompass surfaces that typically do not make direct contact with patients. These surfaces can be further divided into housekeeping surfaces, such as bed rails, furniture, floors, and walls, and medical equipment surfaces, such as bedpans, blood pressure cuffs, instrument carts, and knobs or handles on machines. Because disinfectants are used commonly around patients, healthcare facilities should carefully choose their disinfecting products to focus on products that are patient-friendly and ideally do not have strong fragrances that could potentially be irritating to patients⁷.

Disinfectants that will be used around patients should have the following characteristics:

- Non-Toxic
- Preferably Non-Scented, No added Fragrance
- Quick Overall Contact Time
- Broad-Spectrum against both gram negative and gram positive bacteria, viruses (including bloodborne pathogens such as HIV and HBV), mycobacterium, and pathogenic fungi such as *Candida albicans*

Although environmental surfaces typically do not come into direct contact with patients, they can still become contaminated and contribute to transmission of infectious agents via the hands of healthcare staff. In addition, patients do routinely touch high-touch surfaces within their immediate environment to include over-bed tables and in-room phones. For this reason, “high-touch” surfaces are considered to carry a higher risk of cross-infection than “low-touch” surfaces, and should be cleaned and disinfected more often according to CDC guidelines. Recently, high-, medium-, and low-touch surfaces were quantified on a general medical-surgical floor and in an intensive care unit (ICU). High-touch surfaces were in close proximity to the patient and included bed rails, over-bed tables, IV pumps, and bed surfaces on medical-surgical floors, accounting for 48.6% of contacts recorded. In ICUs, bed rails, bed surfaces, and supply carts were high-touch surfaces, accounting for 40.2% of contacts recorded. An organization’s risk assessment and Infection Prevention and Control plan should include similar studies of each area of the healthcare facility, allowing detailed cleaning and disinfecting protocols to be developed. Special attention should be paid to those surfaces which will routinely come into contact with the

patient.

A healthcare facility’s Infection Prevention and Control team should use these recommendations to develop detailed environmental hygiene schedules and methods that comprise part of their Infection Prevention and Control plan. These vary based on the surface types in each area and the degree of soiling or contamination that is likely. The CDC guidelines should also be consulted when selecting disinfectants for environmental hygiene procedures. Disinfectants should be chosen using a careful, evidence-based process that evaluates the efficacy and safety profile of any products being evaluated, keeping in mind that the patient comes first!

Strategies for an Active Engagement of the Patient in the Infection Prevention Process

Patients literally have the power to take Infection Prevention into their own hands. Patients are encouraged by The Joint Commission to “Speak Up” regarding their own care to the healthcare delivery team⁸. Given that patients frequently contaminate themselves by contaminating their hands, patients should routinely practice hand hygiene.

Hand Hygiene opportunities for patients include the following examples:

- 1) Before Eating
- 2) After Using the Restroom
- 3) After contact with contaminated environmental surfaces such as touching their IV pole or nurse call light
- 4) After contact with shared items such as magazines or in room phones or TV remotes

It is not an unrealistic idea to engage the patient’s family in the environment of care (EOC) process beyond hand hygiene to include environmental surface disinfection. Facilities should carefully consider including the patient’s family as an extended component of the Infection Prevention and Control program. The more individuals that are fully engaged in the EOC program, the cleaner the patient’s overall environment will be.

Conclusion

In order to reduce the morbidity and mortality associated with HAIs, and to comply with stringent Infection Prevention and Control standards of accreditation agencies, environmental

hygiene and a holistic approach to hand hygiene which includes the patient and their families must become an integral part of daily routines in healthcare facilities. Evidence-based guidelines also need to be followed to ensure that appropriate disinfectants are used for specific surfaces and microorganisms, and focus on patient safety and quality outcomes. Of particular importance is adherence to the label instructions of EPA registered disinfectants, including dilution ratios and overall contact time required to kill pathogens. The last line of defense in Infection Prevention is the patient and their families. Healthcare providers must now more actively engage these resources in environmental and hand hygiene. Other valuable resources include the Association for Professionals In Infection Control and Epidemiology, the Centers for Disease Control and Prevention, the Environmental Protection Agency, the Department of Health and Human Services, The Association for the Healthcare Environment, and the Occupational Safety and Health Administration.

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**For more information,
contact Dr. Hudson Garrett at hgarrett@pdihc.com**