



Protecting Patients and Staff from Infection Risks

Cleaning and disinfecting environmental surfaces

Health care–associated infections (HAIs) are a concern for every health care facility. Ideally, no one who entered a hospital would ever become infected as a result of the stay. But developing strains of multidrug-resistant organisms (MDROs) and other hard-to-kill microorganisms present a growing challenge. As the pathogens become more resistant to existing cleaning and disinfection methods, there is a push to use newer and/or stronger chemicals to destroy or inactivate them. Along with this is a desire to eliminate infectious organisms on all surfaces—in other words, disinfect anything and everything you can.

Wider use of stronger chemicals also has other effects. A growing body of evidence shows that exposure to cleaning chemicals can cause or worsen health conditions, particularly respiratory illnesses such as asthma. Anyone in the facility can experience these effects, but hospital workers are at particular risk because of their prolonged exposure.



Cleaning, disinfection, and sterilization of supplies are essential to maintaining a safe environment of care.

The CDHC Working Group

The Cleaning and Disinfecting in Healthcare (CDHC) Working Group brought together more than 40 infection preventionists and occupational health practitioners and researchers from four countries and diverse professional backgrounds.

Margaret Quinn, ScD, CIH, one of the authors of the paper that resulted from the study, credits the project’s success in great part to its diverse character. “It’s easy to become siloed in our own disciplines and not talk to each other,” Quinn says. “We felt strongly that infection prevention and occupational health concerns need to be considered together, not kept separate.”

To achieve this productive collaboration, the team made a commitment early on to educating each other. Respect and learning went hand in hand, according to Quinn. Participants felt comfortable openly discussing their varying approaches. For example, one discipline might be familiar with randomized clinical trials as a method of research, while another deals mostly with population-based epidemiology studies in real-world situations. Discussing these as a group gave all participants new insights and perspectives.

“The process was exciting,” Quinn says. “It was a great example of how multi-disciplinary groups can engage in solving the complex problems that face health care today.”

The people who do the cleaning are at risk, and so are any other staff members who occupy the spaces that require cleaning—which is everyone.

Kathleen Fagan, MD, MPH, is a medical officer for the US Occupa-

tional Safety and Health Administration’s (OSHA’s) Office of Occupational Medicine and Nursing. “About 15% of occupational asthma occurs in health care workers,” she says. “One of the primary causes is exposure to cleaning chemicals.”

In addition to asthma, exposure can lead to other respiratory illnesses like chronic bronchitis and sensitization. Skin disorders are a risk too, especially hand dermatitis.

Finding balance

Health care organizations must learn to balance the need to create a safe environment against the need to protect the health of staff. This can be a tricky business because infection prevention and control (IC) and occupational health professionals do not normally collaborate on these issues. The problem is complicated by gaps in the research, which leaves some areas lacking evidence-based

(continued on page 6)

Protecting Patients and Staff from Infection Risks

(continued from page 5)

guidelines. Hospitals trying to make decisions about how to make their IC practices safer for employees can find themselves without guidance.

A group of IC and occupational health researchers and professionals recently gathered to review the literature related to cleaning and disinfection of environmental surfaces. This multi-disciplinary and multi-professional group, the Cleaning and Disinfecting in Healthcare (CDHC) Working Group of the National Institute for Occupational Safety and Health (NIOSH) National Occupational Research Agenda (NORA),

recently published its findings and recommendations in the *American Journal of Infection Control*. The authors conducted a project to identify gaps in the existing research on the efficacy of cleaning and disinfection and the relationship to occupational health and safety.¹

“We wanted to create a road map for researchers and professional practitioners,” says Margaret M. Quinn, ScD, CIH. Quinn is a professor in the Department of Work Environment at the University of Massachusetts, Lowell, and one of the primary authors of the paper. (See “The CDHC Working Group,” page 5.)

The CDHC Working Group focused its efforts on cleaning and disinfecting practices used on noncritical environ-

mental surfaces and patient care items, as well as the occupational health risks associated with those practices. It did not examine items that require high-level disinfection or sterilization. (See “The Hierarchy of Decontamination,” below.)

Choosing products

One of the ways health care organizations can protect occupational health and safety is to select safer alternatives that avoid chemicals and fragrances correlated to respiratory irritation and other health symptoms.

Going green?

Some organizations have moved to “green” products assuming that they are less toxic and therefore safer. However, this is not necessarily the case. Currently, no standardized definition of *green cleaning* or *green disinfection* exists. Different organizations have developed their own criteria for what constitutes a green product. Even the term *green* itself may refer to products that are better for the environment but not necessarily safer for people to use.

The lack of research on whether green products are as effective at achieving disinfection at the levels required to provide safe health care is also a concern. Some green products may yield worse results while still causing illness in workers.

This does not mean that organizations can't find cleaning products that combine effectiveness with greater occupational safety. The key is to read the safety data sheet for each product and assess the individual ingredients for their potential to cause harm and ensure that products are used as recommended by the manufacturer.

OSHA offers guidance on selecting green cleaning chemical based on a risk assessment approach. The US Environmental Protection Agency (EPA) offers guidance as well. Many health care organizations choose to require the use of EPA-registered disinfectants in their environmental surfaces cleaning

The Hierarchy of Decontamination

What is sometimes called the hierarchy of decontamination consists of four types of cleaning:

1. **Cleaning** removes soil and other organic material conducive to growth of microorganisms, usually with water, detergent, and mechanical action.
2. **Decontamination** removes disease-producing organisms.
3. **Disinfection** destroys most disease-producing organisms but not all forms of microbes. There are three levels of disinfection:
 - a. **Low-level disinfection** kills some viruses and bacteria but cannot be relied on to kill resistant microorganisms (mycobacteria or bacterial spores); uses chemical germicide registered as a hospital disinfectant by the Environmental Protection Agency (EPA).
 - b. **Intermediate-level disinfection** kills mycobacteria, most viruses, and bacteria but does not kill bacterial spores; uses chemical germicide registered as a “tuberculocide” by the EPA.
 - c. **High-level disinfection** kills all organisms except high levels of bacterial spores; uses chemical germicide registered as a sterilant by the EPA.

4. **Sterilization** destroys all forms of microbial life using a physical or chemical procedure.

According to the US Centers for Disease Control and Prevention (CDC), the following points apply:

- **Noncritical items** are those that only touch intact skin and are divided into two categories:
 - Noncritical patient-care items, such as stethoscopes, blood pressure cuffs, and crutches
 - Noncritical environmental surfaces, such as bed rails and patient furnitureBoth of these categories require basic cleaning and low-level decontamination.
- **Semicritical items** are those that come into contact with nonintact skin or mucous membranes, such as respiratory therapy equipment, anesthesia equipment, vaginal probes, and flexible endoscopes. They require high-level disinfection.
- **Critical items** are those that enter or contact sterile tissues or the vascular system, such as surgical instruments, cardiac and urinary catheters, implants, and needles that enter the vascular system. They require sterilization.

protocols. However, the EPA does not recognize asthma as one of the human health risks that must be assessed in its registration process.

Asking the right questions

The hazards of occupational exposure to cleaning products are not limited to the chemical composition alone. Other factors to consider when deciding which products to use include:

- **Physical characteristics.** Is it an aerosol or a liquid?
- **Methods of application.** Do you spray it on or wipe it on?
- **Elements of the built environment.** Is ventilation adequate?

Organizations also need to consider the type of personal protective equipment (PPE) that each product requires. This can be a challenge because cleaning products can be a complex blend of ingredients, and selecting the right PPE for the job can be confusing.

Reexamine the process

The second approach to minimizing the occupational health risks associated with cleaning chemicals is to re-examine the cleaning and disinfection processes. “It’s a good idea to think critically about

what, when, and how we clean and disinfect,” Fagan says. “We shouldn’t take any part of the process for granted.”


One aspect of cleaning and disinfection processes that can affect potentially harmful exposure to cleaning chemicals is the scope of their use. What, exactly, needs to be disinfected? According to Fagan, one of the gaps identified by the CDHC Working Group was a lack of guidance regarding best cleaning and disinfecting practices for environmental surfaces in nonclinical public spaces. For example, do tabletops in public waiting rooms need to be disinfected, or does cleaning alone provide sufficient protection against HAIs? Organizations should assess these situations in terms of what kind of cleaning is most efficient and appropriate in different areas and adjust policies and processes accordingly. If reducing the level of decontamination does not increase the risk of infection, then exposure to cleaning chemicals can be reduced.

Cleaning and disinfection of floors is another subject that the CDHC Working Group found to need further research and guidance. Floors are a big part of the physical environment—literally. Every room has a floor. Floors cover a large

surface area and are cleaned frequently, often with an added step to give a high-gloss finish. Still, the group found little evidence that floors in certain areas need to be polished or even need to be disinfected. If neither of these steps is needed reducing the chemical and particle exposures from floor cleaning could significantly decrease associated occupational and patient health risks.

The take-away

The complex issues discussed here can make safe environmental surfaces cleaning and disinfection seem overwhelmingly confusing. In the end, thoughtful assessment of products and processes, involving both IC and occupational health experts, can lead to safe, effective cleaning and disinfection.

“Safe and effective cleaning and disinfection is possible,” says Quinn, “but it relies on an understanding of issues from a cross-disciplinary viewpoint.” 

Reference

1. Quinn MM, Henneberger PK, et al. Cleaning and disinfecting environmental surfaces in health care: Toward an integrated framework for infection and occupational illness prevention. *Am J Infect Control*. 2015 May 1; 43(5): 424–434.