

Prepare and Protect Your Organization from Epidemics

**Michael A. Pinto, CSP, CMP
Chief Executive Officer
Wonder Makers Environmental, Inc.
Kalamazoo, Michigan**

Introduction

Today, it is a good news/bad news scenario in regards to cleaning and infection control. The bad news actually comes in two parts. More than ever there is public awareness and concern about infectious agents, such as norovirus, methicillin-resistant staph aureus (MRSA), avian flu, SARS, and even seemingly common concerns, such as flu or athlete's foot fungus. The second aspect of the bad news is that this increased awareness has raised people's expectations that custodial/maintenance/restoration personnel will protect us from these threats.

Fortunately, there is some balancing good news for the facilities staff and safety/health professionals who are tasked with controlling these infection risks. In just the last few years, there has been an explosion of new tools, equipment, and procedures that not only help deal with infection threats but make overall cleaning more effective.

The long history of general infection control, as well as current documents from the World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), and the Department of Health and Human Services (DHHS), all agree that controlling outbreaks of infectious agents involves a combination of behavioral changes and enhanced cleaning. Although many safety and health professionals are generally familiar with appropriate equipment, chemicals, and procedures for cleaning microscopic contaminants, that knowledge must be matched with behaviors and preparatory steps that should be instituted by any organization that wants to provide continued services while coping with the effects of a local outbreak, epidemic, or pandemic.

Primary Concerns with Infection Control

For the past 150 years, infection control has been an important part of treatment in healthcare facilities. Today, however, the interest in infection control has spread to food processing facilities, schools, gyms, hospitality venues (such as hotels and cruise ships), prisons, offices, and homes. Because of its long history of infection control and more serious impacts on patients compromised by illness, the greatest amount of statistical information on infection control is related to the healthcare industry—and the numbers are astounding. It is estimated that in the

U.S., two million hospital-acquired infections occur annually. Of those, more than 100,000 lead to death every year. As such, healthcare-acquired infections kill more people each year than car crashes and homicides combined! Another way to interpret the numbers is that one out of every 20 people who enter a hospital develops an infection that they did not have when they arrived. For any particular hospital the average is 14 patient deaths per year from facility-acquired infections (known in the healthcare industry as nosocomial infections). The economic impact is also staggering. The 5 to 7 billion dollars per year spent on hospital-acquired infections breaks down to a minimum of \$13 million per day, \$825,000 per hospital, or \$2,500 per infected patient.

As significant as infection control is to the healthcare industry, that is not the only area of concern. Repeated reports of norovirus outbreaks on cruise ships, influenza closing schools, and antibiotic-resistant bacteria seriously injuring or killing athletes tell us that infection control efforts should go beyond healthcare facilities. Indeed, any location where people are in close quarters increases the risk of transmission of infectious agents. (See Table 1 for the average amount of floor space per occupant for a telling measure of why infections are so prevalent in some situations.)

Table 1. Average amount of floor space per occupant

Social Density	
Elementary schools	3.9 sq. ft.
Hospitals	7.8 sq. ft.
Offices	11.7 sq. ft.
Residences	16.2 sq. ft.

Understanding which areas are especially susceptible to infections helps us determine appropriate controls actions, but so does a basic knowledge of the types of infectious agents that cause the most problems. Two of the organisms that have garnered substantial public attention recently are methicillin-resistant *Staphylococcus aureus* bacteria (MRSA) and Norwalk-like viruses (noroviruses).

In October 2007, MRSA was national front-page news when an entire Virginia school district shut down for cleaning following the death of a high school student (CNN, 2007). The same week that the Virginia school district made the news, the Journal of the American Medical Association (Klevins, 2007) published a study that estimated 94,000 MRSA infections in the United States each year, with 18,000 of those resulting in fatalities. The report noted that while MRSA kills more people than HIV and AIDS the MRSA deaths are rarely tracked. Now that more extensive testing has begun, experts estimate that approximately 25-30% of the healthy population carries staph bacteria on their skin or in nasal passages. More significant is the estimate that 1% of the U.S. population carries the antibiotic-resistant MRSA strain.

While some individuals think that the problem with MRSA infections has not really grown but just become better publicized, the facts tell a different story. Antibiotic-resistant infections were virtually unheard of in the 20 years following the general introduction of penicillin. From the 1960s until the early 1990s, MRSA infections were mostly confined to healthcare facilities, where the combination of compromised patients and increasingly invasive medical treatments allowed the skin contaminant to become the dominant cause of hospital staph infections. In fact, MRSA-related infections in healthcare facilities grew from 2% in 1974 to 63% in 2006. About 15

years ago, the first community-associated outbreaks of MRSA-caused infections were reported. Since then, such problems have been documented among prisoners, children, and athletes. In these community settings, MRSA infections often begin with what looks like normal skin infections, such as pimples, boils, or slightly swollen skin near the site of a wound. However, MRSA infections often progress to areas of swelling and pain radiating out from the initial area, draining pus, low-grade fever, lethargy, and other symptoms that indicate a greater assault by the bacteria on the body. In immune-compromised individuals, the MRSA bacteria can quickly produce life-threatening bloodstream infections, pneumonia, and other problems.

Noroviruses, on the other hand, are generally not considered to be life threatening for healthy individuals. The term norovirus covers a class of organisms that produce stomach flu-type symptoms. Nausea, vomiting, diarrhea, stomach cramping, low-grade fever, chills, headache, muscle aches, and tiredness are the usual symptoms that accompany a norovirus infection. Since these problems are caused by a virus, there is no medication to cure a norovirus, only products to deal with managing the symptoms. Without effective vaccines, antiviral medications, or effective antibiotics for treatment, the answer to norovirus management is prevention through infection control efforts.

Protect Your People First

No organization can provide valuable services to clients if its own team members are adversely impacted by the disease that they are trying to control in their facility. But protecting the individuals who interact with the public is not enough. The tough economic times of the last few years have forced most companies to trim staff to the bare essentials, so if the receptionist who provides initial information on services to potential clients is out sick, either people have to be pulled from the field or business opportunities are lost. Therefore, all staff members should be educated now regarding appropriate personal behavior that can minimize the spread of infectious agents. Pamphlets and posters can be obtained from a variety of credible sources regarding:

- Cough etiquette
- Proper hand washing
- Use of surgical masks to minimize the spread of bacterial and viral contaminants from individuals who are suspected or proven to be contagious

See “Resources” section at the end of this paper.

Unfortunately, having information and using it are two different things. Safety and health professionals must not only educate their team members about proper behavior, but they also must adopt proper procedures and motivate individuals to incorporate them into their daily routine. Facilitating proper infection-control behavior includes things as simple as purchasing enough boxes of tissues so that each employee has one at his or her work station. It should also include the installation of hand sanitizing stations near restrooms and food preparation areas. Although it may seem counter-intuitive, many experts recommend that hand-sanitizing stations be installed outside of restrooms rather than inside. That way, if touch points, such as bathroom door handles or push plates are contaminated, a person leaving the bathroom can sanitize his or her hands after touching the door.

Another small but important step that an employer can take to facilitate proper behavior is the strategic placement of wastebaskets so that hand towels can be used to open restroom doors and then be disposed of outside the restroom. Placing wastebaskets in easily accessible and visible

locations in common areas so that used tissues and other debris can be quickly and properly disposed of can also be helpful. Some infection control specialists feel that wastebaskets with self-closing lids can be effective in controlling the spread of biological contaminants.

While it may sound reminiscent of your mother's advice, closing the lid on a toilet before flushing has been shown to greatly reduce aerosolizing of "germs" from the stool. Employers that encourage their staff members to utilize this practice and emphasize it by installing seats with lids on toilets that do not presently have them are showing their employees that they are willing to take both large and small steps to protect them.

The Importance of Personal Hygiene for Infection Control

Whenever personal hygiene is discussed, the importance of hand washing cannot be overemphasized. Numerous studies by the American Society of Microbiology show that more than 17% of Americans do not wash their hands—even after bathroom use! But it's no wonder that the Center for Disease Control and Prevention (CDC) states that inadequate hand washing contributes to 50% of food-borne disease outbreaks.

Surprisingly, the situation is not much better in healthcare professions. Even though it is common knowledge that contaminants are frequently spread by patient-to-patient contact, 34 separate studies reviewed by the American Medical News Service confirmed that doctors are not washing their hands regularly between patients. One frightening study, which was done by the Hospital of Saint Raphael's in New Haven, Connecticut, estimates that healthcare professionals only wash their hands thoroughly 40 percent of the time.

It is not just medical professionals who are lax in their personal hygiene. In a survey of 1,008 men and women the *Clean Hands Report Card* (SDA 2006) found:

- 68% don't wash their hands long enough to effectively remove germs and dislodge dirt (i.e., wash with soap for at least 20 seconds)
- 36% seldom wash their hands after coughing or sneezing
- 31% don't wash before eating lunch

For decades, study after study has shown that improving personal hygiene in all sectors could eliminate nearly half of all infections. That is why images representing infection control and personal hygiene dominate the center of our framework for understanding and controlling infectious contaminants. Still, that leaves 50% of infections that need to be mitigated through other methods. So, we will take a closer look at custodial practices and selection and use of chemicals as other important steps related to infection control.

Practice What You Preach

Although it is often overlooked, safety and health practices should be extended to custodial services as well as primary operations. When was the last time that you looked at custodial practices for your own facility? Are your custodial workers utilizing practices that reflect cleaning for health as well as cleaning to look clean?

When custodial practices are examined in regards to infection control, a "cleaning conundrum" is quickly revealed. Most custodial activities are geared toward the big stuff that makes the building look better. However, it is the attention to detail—the little stuff—that often makes the biggest difference in infection control. Therefore, effective custodial practices must

integrate procedures that allow buildings to look better and procedures that help buildings perform better.

A Review of Custodial Practices

The time to review custodial practices and improve worker training is now, so that they are cleaning for health as well as appearances. Although some changes can be implemented in the face of an infection-control emergency, such adjustments will be most effective if they are building on a pre-existing knowledge base rather than trying to implement an entirely new system. Custodial managers and all cleaning staff should be trained and frequently reminded that proper removal of litter and visible dirt is only part of the cleaning process. The removal of these materials should be done in a fashion that minimizes airborne particulates and volatile organic compounds while also addressing common infection hot spots, such as public touch points and bathroom facilities. The move toward microfiber cleaning cloths, vacuums with enhanced filtration, and damp mopping of hard surface floors with microfiber fabrics are all improvements instituted over the last decade to minimize the amount of airborne particulates generated during normal cleaning processes. The move toward green-style cleaning chemicals, which are effective against microorganisms but break down into non-hazardous components, is a direct response to occupants' health concerns related to exposure to volatile organic compounds (VOCs).

For example, a new study released in December 2007 by the Environmental Working Group found that "certain chemicals commonly found in hospitals increased the risk of disease to the nurses exposed to them as well as their children if exposure takes place during pregnancy." Although the study examined a number of hospital chemicals beyond those used by the custodial staff, such as anesthetic gases and medications that must be administered by a nurse, they also keyed in on cleaning agents and hand disinfectants. Such reports give additional momentum to a growing trend to identify and utilize chemicals that are effective anti-microbial agents with low side effects for the users and building occupants. The lesson from all of this is that an examination of custodial practices, equipment, and supplies should be done every two to three years to ensure that staff members have the proper training and materials to prevent infectious outbreaks and respond to them appropriately if they do occur.

Reviewing custodial practices may sound daunting, but new approaches developed by cleaning and custodial professionals make it relatively simple. One painless technique that has produced impressive results is the color coding of cleaning equipment. Rather than using a single scrub brush or mop to clean kitchen surfaces and then using the same equipment to clean a bathroom or locker room, the necessary tools for such activities are restricted to certain areas of the structure in order to minimize the potential for cross contamination. The cleaning industry has even settled on some basic colors so that there is consistency among custodial personnel who move from one building to the next. Currently, the color coding of cleaning equipment is structured as follows:

- Red: High risk (toilets, bathroom floors, biohazard)
- Yellow: Specialty (labs, general restroom, locker rooms)
- Green: Kitchen and food service
- Blue: General (halls, offices, guest rooms, classrooms)

The manufacturers have gone so far as to adopt the color system for disposable items as well as equipment. As such, many vendors offer wiping cloths, scrub pads, and mop heads in a variety of colors, along with buckets, brooms, vacuums, and other durable items.

Other specific cleaning improvements that should be considered during the biannual custodial review include preventive steps to reduce contamination, as well as cleaning techniques. The use of barrier mats at all entry points minimizes the amount of soil tracked into the building—a source of a wide variety of bacterial and fungal contaminants. Other innovative cleaning techniques that should be considered include:

- Vapor cleaning with steam rather than chemicals to disinfect floor surfaces
- Electrostatic sprayers for better coverage with less product (MAGNETspray)
- Personnel cleaning assignments by specialty rather than by area
- Application of surface coatings utilizing the latest nanotechnology to produce durable, easy-to-clean surfaces (some coating manufacturers even build antimicrobial properties right into the products)

Emphasizing the Benefits of the Basics

However, even the greatest technology will prove ineffective if it is not used properly on a consistent basis. Custodial efforts for infection control must continue to emphasize the basics of regular cleaning of frequent touch points. Special emphasis should always be given to doorknobs, pushbars, handicap buttons, sink handles, and water fountains.

Although not generally included in the work scope for custodial personnel, cleaning of electronic components of shared workstations can also have a big impact on reducing the transmission of infectious agents. A whole class of keyboards, computer mice, touch screens, and other computer accessories that are waterproof and washable are now available. Integrating such equipment into the workplace allows for the regular cleaning of frequently touched surfaces that were previously forbidden to the custodial crew.

While all this may sound exotic or prohibitively expensive, the value of incorporating such specialized cleaning surfaces is coming to light through carefully controlled studies. One such report, recently published in the *Journal of Infection Control*, carefully tracked the costs and benefits of upgrading custodial practices. In one New York City day care center, aggressive infection-control custodial efforts produced the following positive impacts for the staff and children in the first twelve months:

- Number of illnesses – reduced 24%
- Antibiotic usage – reduced 24%
- Doctor visits – reduced 34%
- Absenteeism – reduced 46%

In summary, review your operation to determine if your custodians are:

1. Focusing surface cleaning on touch points such as door handles, light switches, computer keyboards, mice, etc.
2. Utilizing anti-microbial sprays or wipes properly (approximately four square feet of surface area or a single critical touch point per side of disposable pre-wetted wipe)
3. Migrating away from standard vacuum cleaners to HEPA-filtered vacuums
4. Vacuuming hard surfaces instead of using dry push mops
5. Replacing string mops and water buckets with floor-cleaning systems that use disposable pads and spray cleaner/sanitizers at the point of operation

6. Utilizing appropriate personal protective equipment (PPE) and meeting regulatory requirements for respiratory training and fit testing
7. Installing auto-dispense disinfectants in toilet bowls and urinals in order to restrict the growth of microorganisms in those critical fixtures between regular cleanings

Selecting and Using Chemicals

Chemicals are such an important, yet often mysterious, part of infection control efforts that this section of our family portrait would be best represented by Doc Brown of the *Back to the Future* movies. Chemical companies are constantly dreaming up so many new formulations that end users can be forgiven if they believe that mad scientists populate their laboratories muttering terms like “flux capacitor” and “biocidal efficacy.”

The users’ wariness of claims made by chemical manufacturers is further heightened by a confusing trend. Over the past decade, advertising literature has constantly touted the increased strength and greater effectiveness of cleaning chemicals being brought to the market. But at the same time, the number of community-related cases of MRSA infections and healthcare-acquired infections (HCAI) has risen dramatically. The simple answer to this apparent contradiction is that stronger chemicals are *not* a substitute for effective cleaning practices. Both the physical cleaning and the selection of chemicals must be blended into a consistent process if real progress is to be made on the infection control front.

Chemical Confusion

One of the barriers that must be surmounted when integrating chemicals into infection control efforts is the confusing terminology that has developed. Is a biocide the same as an antimicrobial? What is the difference between a sterilizer and a sanitizer? Are soap and water considered chemicals? Does it make a difference if the soap used is a product that anyone can buy at a grocery store? Are “green” chemicals really less toxic than other products? While it takes some work to digest the details of these terms, cleaning and restoration professionals must make the effort if they are going to make good decisions regarding which products to use and be able to effectively communicate their recommendations to customers.

Once a person acquires some basic knowledge regarding the terminology used in the industry, they can begin the process of evaluating various chemicals for use in infection control, both for preventive and emergency response situations. The phrase, “Buyer beware,” should always be the starting point when considering the purchase and use of chemicals. Approach marketing claims with skepticism, since many chemical manufacturers tend to oversell their products. While most organizations that advertise to the cleaning and restoration industry are legitimate and helpful allies, there are some true scam artists out there selling worthless, and potentially harmful, junk.

When selecting a product, think about the surface type (whether it is porous or non-porous), the pH level (both of the surface being cleaned and of the chemical), the manufacturer’s instructions for use (whether the chemical needs to be rinsed or neutralized), and potential compatibility problems (whether a cleaner can be used in an area where a disinfectant is to be applied without creating an adverse reaction).

The most important aspect of chemical use for infection control is proper application. Follow labeling information, but understand that, under EPA regulations, information may be included on items other than the label, such as package inserts and instructional fliers. It is always

a good idea to use equipment dedicated to an individual chemical whenever possible. Avoid using the same spray bottle for a window cleaner (which often contain ammonia) and then filling it with stain remover (which often contains bleach or oxidizers), as hazardous gases can form even in small containers (in this example, hydrazine, chloramines, or nitrogen trichloride).

Step It up a Notch

Once you start thinking this way, you can really step it up a notch by considering an often overlooked but daily utilized piece of equipment—your vehicles. When was the last time the cabs of your trucks or the interiors of the company’s cars were cleaned? Sanitizing them and applying a protectorant that prevents microbial growth significantly reduces the potential for your employees cross contaminating your facility from the work they are doing in other buildings. By employing these services in house, you can gain experience and add personal anecdotes to your discussions with clients.

You also need to think about the availability of critical materials for your operation, since it is difficult to provide services to clients if you don’t have sufficient supplies. Therefore, give some careful thought to items that could cause a critical roadblock in your operations if they were gone. Then, stock up on those things that may be in short supply in the case of an epidemic. Pre-purchasing is especially wise for equipment and supplies with a long shelf life that can be used later if problems do not materialize. Some specific items that cleaning and restoration contractors may want to consider for pre-purchase are filtering facepieces, surgical-style gloves, protective suits, lab coats, microfiber cleaning cloths, sanitizing chemicals, and even HEPA filters for their vacuums and negative air machines.

The Connection between Policies and Procedures

The best pre-planning will be ineffective if you do not develop and communicate the policies that you intend to follow in an influenza emergency situation. Rather than having to make snap decisions at the last moment about how to treat or pay ill workers, think about it now. Review your current policy manual and make adjustments to accommodate the following concerns:

1. Determine who will be responsible for responding to ill individuals in the workplace, either through an established health clinic or as a first aid duty.
2. Share your plans with employees and clearly communicate expectations.
3. Examine policies for leave and employee compensation and review with managers, supervisors, and employees so they are up-to-date on sick leave policies, leave donation, and employee assistance services that are covered under the different employee-sponsored health plans. Leave policies should be flexible and non-punitive.
4. Plan for the possibility of unscheduled leave that encourages employees who are sick to stay at home to care for themselves and others who are ill with the flu or children dismissed from school.
5. Establish policies for flexible worksites (e.g., telecommuting) and flexible work hours (e.g., staggered shifts) if needed.
6. Communicate policies for employee access to, and availability of, health care, mental health, and social services, including corporate and community resources.

Educate, Facilitate, Motivate

As mentioned at the beginning of this article, an organization that wants to not only survive but also offer important services during influenza emergencies or other local events related to infectious contaminants needs to educate, facilitate and motivate its own team, as well as its potential clients. The time to start that process is now.

Resources

CNN. "Bacteria that killed Virginia teen found in other schools."
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Soap and Detergent Association, "America's Clean Hands Report Card—Can't Rise Above a 'C' Level." (<http://www.cleaning101/newsroom/09-18-06.cfm>), retrieved March 24, 2010.

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