

## Eight Strategies for Healthcare Environmental Management

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Hospital-associated infections (HAIs) reportedly kill more people each year than the combined total death count from breast cancer, prostate cancer, and AIDS. Patients suffering from HAIs occupy intensive care beds that are in increasingly short supply, and cost the healthcare systems in the United States and Canada many billions of dollars annually.

### The Big-Name Microbes

The most high profile of HAI infections are caused by multidrug-resistant organisms, such as methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococcus* (VRE). The incidence of HAIs due to *Clostridium difficile* and to noroviruses is increasing. Despite the challenges posed to the prevention of these infections, an infection control program consisting of improved personal and environmental hygiene practices, more stringent antibiotic prescribing, and surveillance will help to reduce the occurrence and adverse impact of these clinical problems.

Control of antibiotic-resistant bacteria (e.g., MRSA, VRE, and others) was addressed in a U.S. Centers for Disease Control and Prevention (CDC) guideline released in 2006 - "Management of Multidrug-Resistant Organisms in Healthcare Settings." The guideline sought to prescribe strategies to prevent the spread of drug-resistant infections in health care settings. Recognizing that the Environmental Services department in hospitals and long term care facilities has a crucial role in the battle to control

infections, the guideline was intended, in part, to aid collaboration between Environmental Services, Infection Prevention and Control, and clinical care departments.

### *Clostridium difficile*

A major hospital infection risk is exposure to *Clostridium difficile* (*C. difficile*). This bacterium has been a concern in health care settings for more than three decades. However, it recently received greater attention because of a new strain that appears to be more virulent and more resistant to fluorquinolones. This emergent strain of the bacterium produces 16 times more toxin A and 23 times more toxin B than previously-identified strains of *C. difficile*. Patients with *C. difficile* infection shed high levels of both the vegetative and spore form in their feces. Once exposed to air, the *C. difficile* vegetative form converts into a spore that can be hard to eliminate from the environment. *C. difficile* has recently reached endemic proportions in many facilities.

### Understanding Transmission of Infection

Infection is an active process of acquisition, and this process has been conceptualized as the "Chain of Infection." In general, there are five factors, or "links in this Chain," that must be present in order for infection to occur. These factors are: (1) an active pathogen of sufficient virulence to cause infection; (2) sufficient quantity of this organism to cause infection; (3) a susceptible host (patient); (4) a mode of transmission for the pathogen to reach the patient; and (5) the correct portal of entry (e.g., an open cut, mouth or eyes). Break or remove any of these links, and infection may not take place.

### Environmental Control of Infectious Agents

You may ask "how does Environmental Services contribute to infection prevention?" Looking at the links in the Chain of Infection, it's evident that environmental management of surfaces in healthcare facilities, when performed consistently and thoroughly, can reduce or eliminate

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"The secret of success is constancy of purpose"

Benjamin Disraeli

## Problems with Steam Cleaning & Microfibre

Nicole Kenny, Director of Technical Services, Virox Technologies Inc

“Hospital cleaning remains a cause of consumer and patient concern”, the letter began. This would, of course, catch my attention since the focus of my daily grind is the science around cleaning and appropriate disinfection of healthcare facilities. But the content of this Letter to the Editor in the August 2009 issue of the Journal of Hospital Infection articulated a warning about something I’d not previously considered. It very intelligently itemized some of the problems with using a decontamination system involving steam and microfibre cloth.

Authors Dancer (that’s Dr. Stephanie Dancer, also the Editor of the journal) and Griffith write that, considering the multi-factorial nature of the problem, and the layers of controlled trials and laboratory studies that are typically required before a new agent or process is introduced into the marketplace, it is “surprising that endorsement of steam and microfibre is not associated with more evidence”.

Microfibre products cannot tolerate repeated exposure to chlorine-based products, which certainly complicates decontamination. “Clostridium difficile spores become embedded within microfibre and cannot be removed by routine laundering”, thus the need for bleach. This is true as well, to a lesser extent, with other environmental pathogens such as norovirus. In terms of cleaning performance, Dancer and Griffiths refer to a 2006 study that determined when used wet on a dry surface, the cleaning ability of several microfibre cloths was variable, and, in most cases, not significantly better than paper towel or conventional cloths.

There are some obvious problems with the use of steam on hospital surfaces, the most obvious among them is the challenge of disinfecting electrical/electronic surfaces. Frequently-touched items in modern healthcare facilities (computer keyboards, touch-screens, pagers, light switches, buttons or switches on electric items, etc.) constitute a significant hazard, requiring regular decontamination.

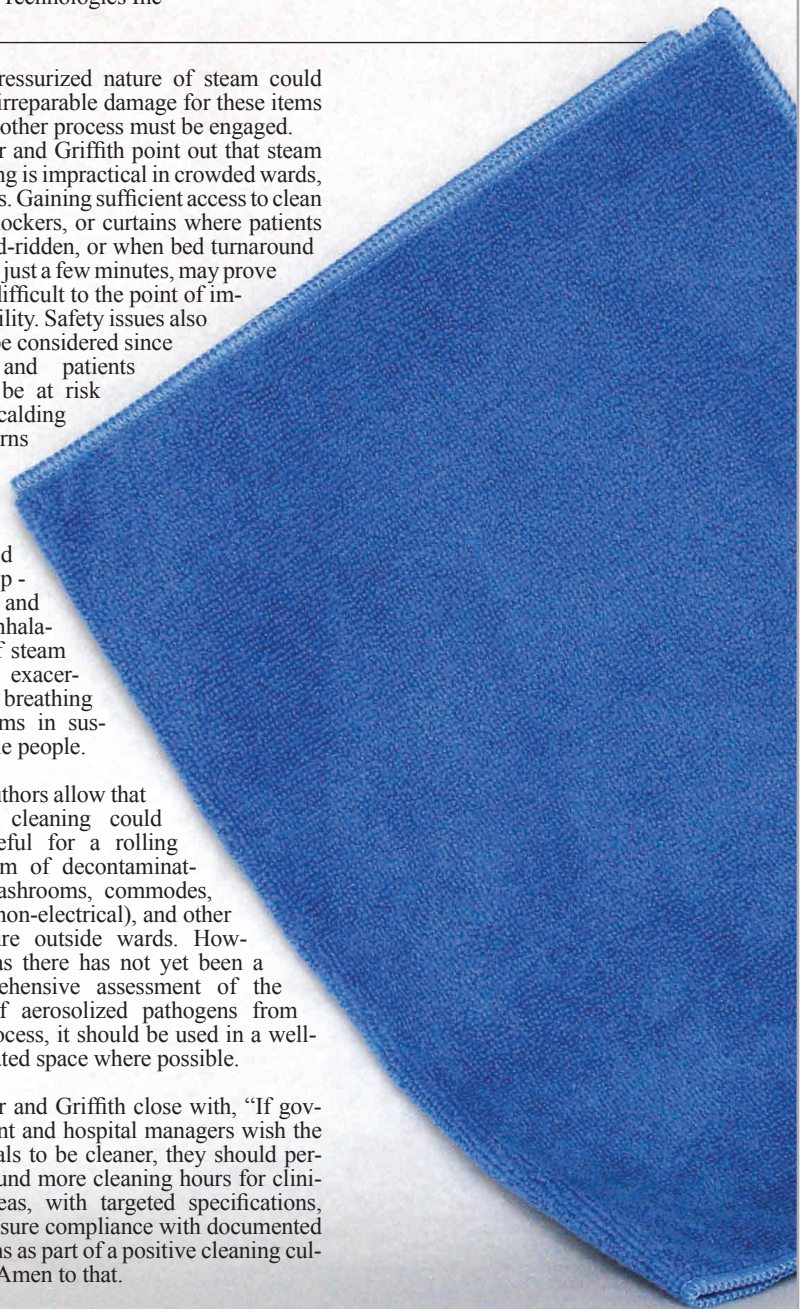
The pressurized nature of steam could cause irreparable damage for these items and another process must be engaged.

Dancer and Griffith point out that steam cleaning is impractical in crowded wards, or units. Gaining sufficient access to clean beds, lockers, or curtains where patients are bed-ridden, or when bed turnaround time is just a few minutes, may prove to be difficult to the point of impossibility. Safety issues also must be considered since staff and patients could be at risk of scalding and burns from

carelessly handled equipment, and the inhalation of steam may exacerbate breathing problems in susceptible people.

The authors allow that steam cleaning could be useful for a rolling program of decontaminating washrooms, commodes, beds (non-electrical), and other furniture outside wards. However, as there has not yet been a comprehensive assessment of the risk of aerosolized pathogens from the process, it should be used in a well-ventilated space where possible.

Dancer and Griffith close with, “If government and hospital managers wish the hospitals to be cleaner, they should perhaps fund more cleaning hours for clinical areas, with targeted specifications, and ensure compliance with documented systems as part of a positive cleaning culture”. Amen to that.





## Virox Update

### AHP Receives FDA Approval!

The Accelerated Hydrogen Peroxide (AHP) Technology has been approved by the FDA in the United States. Registration is as an 8 minute high level disinfectant for the reprocessing of heat-sensitive critical and semi-critical devices and surgical instruments under the brand name Resert XL HLD and marketed by The Steris Corporation. Resert XL HLD is a ready-to-use, device compatible, workplace safe, environmentally preferable alternative to OPA and glutaraldehyde disinfectants. Resert XL HLD does not require special ventilation or fume hoods. For more information, please visit [www.virox.com](http://www.virox.com).

### Virox Technologies Expands Corporate Headquarters

Virox Technologies Inc has expanded its corporate headquarters to accommodate an expanded Professional and Technical Services (PTS) wing. The PTS group works with all Virox licensed partners to develop and execute training programs, marketing plans and sales activities. The PTS team at Virox is also a consultative resource for the Infection Control Community. This includes clinical studies, the development of protocols and educational training on topics such as microbiology, disinfectant chemistries, and product usage.

Since moving to Coventry Road one year ago, Virox has experienced rapid growth with the increasing demand for and popularity of the Accelerated Hydrogen Peroxide (AHP) disinfectant and cleaning technology. As a research and development driven company, there are a number of new products in process for registration in Canada, the United States, Asia and European countries as well as growth into new markets making further expansion for Virox inevitable.

### Congratulations to our Strategic Partner DEB Group Limited on their New Corporate Headquarters!

On August 3rd, 2009 DEB Group Limited relocated to a new corporate headquarters in Denby, Derbyshire. For over 65 years, the Deb Group has been establishing skin care regimens for all types of workplace

and public environments, spanning industrial, commercial, healthcare and food sectors. Deb products are sold in over 100 countries. We estimate that 40 million people use their products every day. Deb provides employers with innovative skin care programs that maximize employee participation through carefully devised, reliable skin care systems, supported by quality products that are both pleasant-to-use and cost effective.

### GREEN TEAM UPDATES

The Virox team has long prided itself on developing and manufacturing cleaners and disinfectants that provided a safer and greener alternative for end users. Proof of this comes with several Green Seal and EcoLogo registered cleaners as well as Canada's first EcoLogo registered disinfectant-cleaner. For 2009, we were challenged to look internally at our all activities within the company from materials management to production, research and development to sales and put the concept of "SUSTAINABILITY" into practice.

To meet this challenge, we created a "GREEN TEAM", which includes members from each department. Over the past 6 months the team has been working to develop our Corporate Sustainability Document and set objectives and goals for the team and company for the next 5 years. Thus, our core competency statement: "Virox is committed to innovating, developing and improving peroxide based environmentally sustainable cleaners and disinfectants that allow our affiliates to reduce their environmental impact when consuming such necessary products. A focus on health and environmental sustainability is a legacy we will pass on to future generations."

To that end we will be moving away from the use of white boxes to kraft (brown). This small change decreases our environmental impact by choosing to use a product that requires less processing during manufacturing. As well, we have issued reusable stainless steel water bottles to all employees and have installed a water system that filters and cools tap water thereby allowing us to evict bottled water entirely. First steps; not necessarily big ones, but in the right direction.

We look forward to keeping you updated on our evolving initiatives!

## Conference Schedule

Virox representatives will be participating in the following functions during the upcoming months:

### September

**September 10 to 11:** CHICA NA - "Vision and Ventures: Infection Control in the Real World" in Edmonton, Alberta

**September 14 to 15:** CSAO Conference in Toronto, Ontario

**September 16:** Windsor-Essex IPAC Conference in Windsor, Ontario

**September 18:** CHICA-SASKPIC in Saskatoon, Saskatchewan.

**September 20 to 24:** ASHES in Reno, Nevada

**September 25:** Ruth Ruttan Footcare Conference in Gormley, Ontario

**September 30 - October 1:** CAEM 2009 Conference & Tradeshow in Grimsby, Ontario

### October

**October 1:** 2009 York Region Education Day in Markham, Ontario

**October 4 to 7:** 70th Annual CIPHI Ontario Branch Educational Conference in London, Ontario, speaking at the event will be Lee Nesbitt, Manager of Professional and Technical Services.

**October 6 to 9:** ISSA in Chicago

**October 13:** TPIC Education Session, speaking at the event will be Nicole Kenny, Director of Professional and Technical Services.

**October 21:** APIC Greater New York in New York

**October 30:** CKICC in Chatham, ON

### November

**November 12 to 13:** CHICA NS in Halifax, Nova Scotia

We are very excited about participating in and/or sponsoring each of these conferences & education days. We wish the best to all of the various organizers and would like to thank them for their dedication and effort in organizing these very important educational opportunities. We look forward to attending and talking to all of the participants.

## Just When You Thought It Was Safe to Go Back on the Seas!!

Nicole Kenny, Director of Technical Services, Virox Technologies Inc



A couple of years ago, we were all abuzz about an article by Dr. Philip Carling (et al) on hospital cleaning and the evaluation of hospital cleaning methods. Having met Dr. Carling at one of the meetings and being impressed with the volume of work he has produced, I remember wondering aloud if he ever took a vacation. Apparently he can work and holiday at the same time.

Almost by accident I came across another, more recent Carling article, "Cruise Ship Environmental Hygiene and the Risk of Norovirus Infection Outbreaks: An Objective Assessment of 56 Vessels over 3 Years". Published electronically in *Clinical Infectious Diseases* on October 7, 2009, Dr. Carling and two eminent colleagues, Lou Ann Bruno-Murtha and Jeffrey Griffiths it is an interesting read, and changes one's perspective on the propagation of norovirus outbreaks on cruise ships.

Norovirus infection outbreaks occur frequently in closed populations, such as cruise ship passengers. In this study, Carling and colleagues covertly evaluated the thoroughness of disinfection/cleaning of cruise toilet seats, flush handles or buttons, toilet stall inner handholds, stall inner door handles, restroom inner door handles, and baby changing table surfaces. Using the same novel targeting method employed to high acclaim in the other article that I mentioned, they surveyed 56 cruise ships, operated by 9

cruise lines and evaluated the results between July 2005, and August 2008.

Of 8,344 objects tested, an average of just 37% (range, 4%–100%) were cleaned daily during non-outbreak conditions. The thoroughness of disinfection/cleaning did not differ by cruise line and, interestingly, did not correlate with the CDC's Vessel Sanitation Program inspection scores. More than half the vessels had overall thoroughness of disinfection cleaning scores less than 30%, although several of these low-scoring ships had near-perfect CDC sanitation scores.

Three of the ships visited would experience ship-wide norovirus outbreaks within 4 months of the evaluation. Mean thoroughness of disinfection/cleaning of these 3 ships was substantially less than the mean thoroughness of disinfection/cleaning of the 40 ships that did not experience norovirus infections.

So what then shall we take from this study? Shall we resolve to keep our feet on dry land? Maybe cruise line management should not be so quick to blame the hapless traveler or crew member for continuing norovirus outbreaks. Perhaps they should just make sure that the toilets are cleaned - the low thoroughness of disinfection/cleaning scores in this study were able to very closely predict subsequent norovirus infection-prone vessels. I, for one, will be taking along a packet of AHP disinfectant wipes when (if) I next take a cruising vacation.

## The Facts

- The World Health Organization (WHO) estimates that at any time, more than 1.4 million people worldwide are affected by infections acquired in hospitals
- Cleaning, disinfection and sterilization saves lives and improves patient outcomes
- Between 5% and 10% of patients admitted to modern hospitals in the developed world acquire one or more healthcare-associated infections
- The Centers for Disease Control and Prevention (CDC) estimate that approximately 1.7 million healthcare-associated infections occur annually in hospitals in the United States, and are associated with nearly 100,000 deaths each year
- Healthcare-associated infections are also an important problem in extended care facilities, including nursing homes and rehabilitation units
- Transmission of healthcare-associated pathogens most frequently occurs via the hands of healthcare workers, who inadvertently contaminate their hands during various patient care activities
- Contaminated surfaces in healthcare facilities contribute to the spread of healthcare-associated pathogens. Contaminated surfaces can act as sources from which healthcare workers contaminate their hands, and in some instances, patients acquire pathogens following direct contact with contaminated equipment or other surfaces
- Providing patients with a safe environment of care requires a high level of compliance with recommended hand hygiene policies and appropriate cleaning and disinfection of medical equipment and environmental surfaces

**With thanks to Dr. John Boyce**



## 2010 CHICA Cleaning, Disinfection and Sterilization Symposium

In line with our mandate to provide educational opportunities to the Infection Control Community, Virox has partnered with CHICA-Canada to sponsor a pre-conference day on Cleaning, Disinfection and Sterilization at the Vancouver 2010 CHICA National conference on Monday May 31st at the Sheraton Vancouver Wall Centre. Register before April 30th to receive the early bird registration discount of \$150. Education is the only way whereby the professional keeps himself prepared to develop actions that stand out for the quality of care. This symposium is a unique opportunity for infection control, public health and pre-hospital professionals involved in the prevention and control of infections to learn more about the topic of Cleaning, Disinfection and Sterilization from some of Canada's most respected Microbiologists, Patient Safety and Infection Control experts. The day



promises to provide the most current information on disinfection of the environment, medical device reprocessing, patient safety, audit tools and occupational health and safety. The breadth of subject matter is sure to lead to debate of best practices, reflection on misconceptions and lead us to search for responses in face of the challenges we face in our daily practice and research. It is in this sense that Virox is hopes to furnish information, practical skills and common ground for everyone who is actively in and interested in cleaning, disinfection and sterilization.

For more information on the day please check out the CHICA-Canada website at [www.chica.org](http://www.chica.org).

**We hope to see you there!**



## Eight strategies for healthcare environmental management

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the first two links – presence of microorganisms and their numbers. Surfaces and objects can serve as “reservoirs” for microorganisms. Some of these organisms can be picked up by the hands when the surface or object is touched and carried to the patient or another surface or object. Even if gloves are worn by healthcare providers, the potential is still there for transferring environmental organisms from one site to another or to another patient.

Cleaning a surface or object with detergent/soap/surfactant and water will remove microorganisms and soil from a surface. Dr. Earle Spaulding in the 70’s thought of cleaning as a “physical disinfection” process. In many instances, cleaning, particularly the housekeeping surfaces (e.g., floors, walls, windows) is adequate for environmental management. If additional reductions in microbes are needed (e.g., medical equipment, bed rails, etc.), treatment of the surface with a chemical disinfectant is indicated after cleaning.

### The Eight Strategies

A panel of experts devised a simple set of strategies for Environmental Services (ES) in healthcare facilities. The eight strategies were not intended exclusively for acute care, although some may sound very acute-careish.

**1 - Focus on high-touch areas** — Clean patient/resident rooms as frequently as possible. Focus particularly on high-touch areas such as doorknobs, bed rails, light switches, call buttons, bed trays and bathrooms.”

**2 - Prioritize technique over chemicals** — Focus on the cleaning technique used rather than the type of disinfectant being employed. A thorough cleaning procedure will help to ensure successful dis-

infection by removing the organic matter that would challenge the disinfectant’s active ingredient.

**3 - Adhere to product instructions** — Manufacturers of disinfectant products are required to clearly identify the appropriate methods, dilutions, contact times, etc for using their products. If the label requires the product to be diluted, there’s a reason. Deviations can throw off the ionic balance and create a workplace hazard.

**4 - Weigh the risks of using sporicides** — Hospital-grade surface disinfectants at their use-dilution generally don’t work against *C. difficile* spores. Chemical disinfectants containing sodium hypochlorite at 5000 ppm (i.e. 1:10 dilution of bleach) has sporicidal properties, but lower concentrations may not be strong enough to completely destroy spores. Cleaning, however, can help in this regard by removing fecal matter thereby reducing the numbers of *C. difficile* spores. A sporicide with comparatively low toxicity, fast activity, and in a thickened formulation to prevent runoff (and potential spread of spores) may be more effective for toilets. If sporicides are used ensure staff wear appropriate PPE.

**5 - Identify how chemicals impact patients, staff and the environment** — Choose only the most effective cleaning and disinfection products. At the same time, consider the amount of wear and tear those products will have on the surfaces being cleaned. Bleach-based solutions, for example, can be corrosive to certain metals and emit potentially harmful fumes. Be aware that many cleaners and disinfectants can cause dermatitis, occupationally-acquired asthma, eye irritations, and other adverse conditions if hazard precautions are not followed. Check the information found in the product’s Material Safety Data Sheet (MSDS).

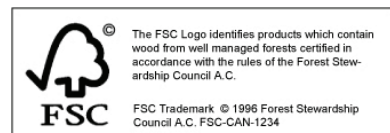
**6 - Create multidisciplinary teams** — Create multidisciplinary teams to zero in on infection risks. Clinical staff, for example, need to know how dust from

a nearby construction project will travel through their facility’s ventilation system, or be aware of the safety issues related to cleaners and disinfectants. Likewise, ES directors should receive training in chemistry, infection control, industrial hygiene and materials science.

**7 - Check each other’s work** — Create checklists to detail the steps involved in cleaning a room. Such a strategy can be difficult to follow because of the pressures on ES staff to turn rooms around quickly. However it will go a long way to ensuring uniformity in cleaning performance. Audits to verify compliance with housekeeping cleaning protocols are a useful tool to provide feedback to staff.

**8 - Underscore the benefits of hand hygiene** — Emphasize the critical nature of personal hygiene among ES staff, and all employees and patients/residents. Microorganisms don’t travel from point A to point B by themselves. They tend to be moved very often by people touching surfaces that have been contaminated by soiled hands, by coughs, or by sneezes.

Infection “prevention” is the rightful place for Environmental Services, a role that is often invisible and under appreciated compared to infection “control”. Optimizing the role of Environmental Services is crucial to the health of the patients/residence who use the services of our healthcare facilities. The ideas contained in and generated by the Eight Strategies will create a pathway toward “prevention”, thus reducing the need for the ever so much more expensive “control” of infections unnecessary.



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