



Also In This Issue:

- 2** CHICA 2011 Conference
- 2** Climate Change and Communicable Disease: What Are the Risks?
- 3** Tenth Anniversary of Teleclass Education
- 4** 2011 Tradeshow Schedule
- 4** Winter 2011 Virox Updates
- 5** MRSA and the Case for Cleaning in Healthcare Facilities
- 6** Green Team Updates

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Healthcare Environment Decontamination

PROF. MARKUS DETTENKOFER, UNIVERSITY MEDICAL CENTER FREIBURG, GERMANY

It is universally accepted that healthcare-associated infections pose a substantial risk to patients, and that contamination of the inanimate healthcare environment with microbial pathogens can lead to contamination of healthcare workers' hands thus providing a vector to infect vulnerable patients. Evidence exists that many of these pathogens survive well, thrive even, in environmental reservoirs. The conditions and mechanisms of decontamination, however, are still debated. And it should be kept in mind that the still generally low compliance with hand hygiene is the more urgent problem in infection control.

The benefits and disadvantages of surface disinfection compared with cleaning using detergent only have been discussed in detail in several publications (e.g., Rutala WA, Weber DJ. *Am J Infect Control* 2005;33:434; Dettenkofer M, Spencer RC. *J Hosp Infect* 2007;65 Suppl 2:55, Dancer SJ. *J Hosp Infect* 2009;73:378). Many American researchers believe it is reasonable to use hospital disinfectants on noncritical patient care surfaces, patient equipment surfaces, and housekeeping surfaces in patient care areas. Conversely Europeans argue against routine surface disinfection and favor surface cleaning without the use of biocidal substances, particularly in light of the risk of workplace injury (e.g., contact dermatitis to the ubiquitous benzalkonium chloride) and the selection for resistance, which poses a risk to humans and the environment.

In a systematic review we assessed the evidence with respect to the effects of using a detergent alone or a detergent-disinfectant to decontaminate inanimate surfaces in the healthcare setting (Dettenkofer M et al. *Am J Infect*

CONTINUED ON PAGE 6





In the decade since CHICA-Canada last held a national education conference in Toronto, the Infection Prevention and Control profession has seen monumental change. Emerging organisms presented new obstacles; re-emerging organisms returned as a concern. With these challenges a national awareness has emerged regarding the value of infection prevention and control and the dedication of its professional practitioners. The development of new healthcare and communication technologies have continued to influence clinical practice. Education has become even more important to keep Infection Prevention and Control Professionals (ICPs) at the highest level of competence. In addition to these challenges, ICPs are expected to be leaders. They are expected to use innovation to develop programs, educate and communicate. They are expected to influence and inspire their colleagues, other healthcare providers and the public in the prevention and control of infections. They are expected to be *Leaders in Action*.

Keynote speakers include:



Dr. Brian Goldman

ER physician, creator and host of CBC Radio's "White Coat Black Art"



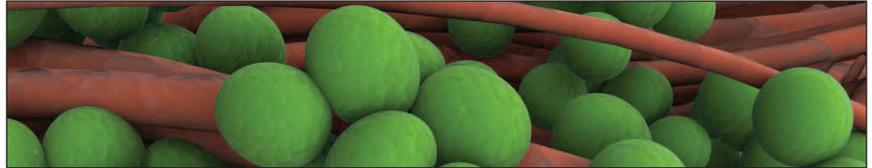
Dr. Didier Pittet

Epidemiologist at University of Geneva Hospitals, Professor of Medicine and Epidemiology at University of Geneva, Leader of WHO First Global Patient Safety Challenge

www.chica.org

Climate Change and Communicable Disease: What Are the Risks?

DR. ANDREW NICHOLS, PROF. JANET RICHARDSON FACULTY OF HEALTH UNIVERSITY OF PLYMOUTH AND DR VERONICA MAYNARD, PENINSULA COLLEGE OF MEDICINE AND DENTISTRY UNIVERSITY OF PLYMOUTH



The potential health impacts of climate change have been well documented and include health problems associated with heat waves, storms, floods, fires, droughts and infectious diseases. In addition, climate change is likely to have detrimental effects on agriculture and fisheries, ecosystems and economies, which in turn will also impact on health and wellbeing.

It has been argued that an increased risk of infection due to flooding is most likely to affect poorer countries. However, the greatest impact of a warmer climate on water borne disease in developed countries is likely to be via its detrimental effect on chemical coagulation used in the treatment of drinking water supplies, thus potentially leading to a reduced elimination of microorganisms from treated water. Numerous investigations into outbreaks of infection associated with drinking water have noted heavy rainfall events immediately preceding the onset of the outbreak. Such rainfall events are likely to increase the prevalence of organisms such as Cryptosporidia, Giardia and other indicator bacteria within streams, rivers or other recreational waters.

Climate change may well be the most significant factor responsible for precipitating changes in the prevalence of arthropod borne diseases. It has also been suggested that as a result of the warming climate, the sand fly (which may carry Leishmania) could spread into northern areas previously unpopulated by this species of fly. In addition, there have been reports of vector species responding to climate change in Europe and North America, with latitudinal shifts in the population of ticks due to rising temperatures, resulting in changes in the incidence, distribution and transmission of tick-borne encephalitis. Factors such as temperature, humidity, levels of precipitation, soil moisture and sea level rise can all have an impact on the transmission of vector-borne infectious diseases, so determining how these factors may affect the risk to populations is not straightforward.

An increased risk of death and disease from food poisoning associated with climate change is anticipated, particularly given the effects of flooding together with the effects of higher temperatures on food storage and food hygiene. Rising temperatures and increased risk of flooding are also likely to affect the distribution and incidence of diarrhoeal disease, with commensurately increased risk of food contamination. Contamination may also result from flooding as a result of the remobilisation of chemicals and pesticides on the land, particularly in areas where industrial or agricultural land directly abuts residential land.

The knowledge that changing patterns of disease are related to changes in the climate and environment dates back to the time of Hippocrates. Consequently, it has been argued that healthcare practitioners should take responsibility for protecting the environment and for promoting the health of the public through working to prevent, mitigate and adapt to climate change and its impacts. Those healthcare professionals responsible for the control of communicable diseases in particular, should have the opportunity to discuss and debate the potential impacts of climate change on the incidence and prevalence of infections within the community and how such impacts might be mitigated.

Tenth Anniversary of Teleclass Education

JOHN VAN DYKE, VICE PRESIDENT, VIROX TECHNOLOGIES INC.

The screenshot shows the website interface for Webber Training. The top navigation bar includes the Webber Training logo, the text 'TELECLASS EDUCATION FOR INFECTION PREVENTION AND CONTROL', and links for 'TELECLASS SCHEDULE' and 'MEMBER LOGIN / LOGOUT'. A '2011 10 YEAR ANNIVERSARY' banner is visible in the top right. The main content area features a central image of four people in a meeting, with the heading 'Teleclass Education for Infection Prevention and Control'. Below the image, the objectives are listed: 'Objectives: Bring the best possible infection prevention and control information; to the widest possible audience; with the fewest barriers to access.' A paragraph below describes the program as an international lecture series. On the right side, there are several promotional boxes: 'Free Access Recordings Library' with a 'CLICK FOR ACCESS' button, 'FREE Poster Downloads' with a 'CLICK TO DOWNLOAD NOW!' button, 'TIME ZONE CONVERTER' with a 'CLICK LINK' button, and 'Partners & Sponsors' featuring the Virox logo and the text 'Engineering Revolutionary Disinfectants for the War Against Microbes'. A sidebar on the left contains a search bar and a list of navigation links: Certificate, Subscribe, About Teleclass Education, Members, Subscription Information, Free Poster Downloads, Free Access Recordings Library, Contact Information, Partners & Sponsors, How To..., Photo Gallery, Time Zone Converter, and Order Certificate. At the bottom left of the sidebar, there is a 'Become a Member' section with the text 'It's Easy! & It's Free!' and a photo of a woman.

In June, the remarkable infection control education program called Teleclass Education will turn ten years old. Prof. Syed Sattar of the University of Ottawa and Paul Webber of Webber Training Inc. launched this initiative with a simple 3-fold mandate: (1) to bring the best possible infection control information; (2) to the widest possible audience; (3) with the fewest barriers to access. The accomplishments noted below belie the success that has surrounded Teleclass Education. On behalf of the Virox Technologies team I would like to say how proud we are to have been a part of this program from the start and wish the organizers and volunteers all the best for the next decade of teleclasses.

- More than 70,000 people have registered as Webber Training Members to participate in Teleclass Education, and from almost every nation on the globe. In fact, representatives from international agencies often describe Teleclass Education as “the single most frequently accessed source for infection control information among healthcare professionals in developing nations”.
- The free-access Recordings Library on webbertraining.com averages more than 10,000 hits every month.
- The very top experts in infection prevention and control in the world accept invitations to give teleclass lectures, and often suggest lectures that they would like to give even before having been asked.

- Webber Training is invited to broadcast live lectures as teleclasses from several international conferences.
- Webber Training now has teleconference Bridge Lines in New York, London, Geneva, Sydney, and Hong Kong for the benefit of their members in those regions.
- DVDs with the recordings and handouts of several years worth of teleclasses are available for free to people in developing nations, and several hundred have been sent out. People in those regions are permitted and encouraged to duplicate the DVDs and distribute as they wish, meaning that the several hundred original copies could very well represent the tip of an iceberg.
- Several national and international infection control journals make space available for free to promote Teleclass Education.
- Free Infection Control Posters created by Webber Training and sponsored by Virox and other companies can be found in almost every hospital in Canada, and in many American, British, Australian, New Zealand, South African, and other healthcare facilities around the globe.

Find out more about this infection control education initiative at the Webber Training web site, www.webbertraining.com

Tradeshow Schedule

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

February

February 15, 2011 - Annual TPIC / RICN's Education Day

April

April 1 to 4, 2011 - SHEA 2011 Annual Scientific Meeting

April 7 to 8, 2011 - BC PICNET Education Day

April 14, 2011 - CHICA Eastern Ontario Education Day

May

May 12 to 13, 2011 - CIPHI Communicable Disease Conference

May 16 to 17, 2011 - AIPI Conference

May 28 to June 2, 2011 - CHICA Canada National Conference

We are very excited about participating in 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.

2011 CHICA Scholarship

The Virox Patron Scholarship is in its 9th year and to date Virox Technologies and the Patron Partners (Diversey, DEB, STERIS and Webber Training) have contributed over \$120,000.00 towards the annual scholarship which has provided the opportunity for over 100 Infection Control Practitioners to attend the annual CHICA-Canada Conference. The scholarship is open to all Infection Control Practitioners across Canada. The deadline close was January 31, 2011. Good luck to those who applied.

Winter 2011 Virox Update

AHP Receives Another Patent

We have received yet another patent for AHP-based technology. The new patent "hydrogen peroxide based skin disinfectant" has been approved in Australia and New Zealand. Currently most hand sanitizers are based on high concentrations of alcohols, which are flammable. Our patented hydrogen peroxide based hand sanitizers are both effective and safe to the users and to the environment. This now brings the number of issued patents for our Accelerated Hydrogen Peroxide (AHP) technology to ten with a further nine patents pending.

The Accel Product Line Has a Fresh New Look and a New Wipes Format!

In the Autumn of 2010, the Accel Instrument Cleaners & Disinfectants products went through a label redesign, and Accel PREvention High Level Disinfectant was renamed Accel HLD5. In 2011 some further exciting new changes include the redesign of the Accel TB Liquid and Wipes labels and the addition of a smaller 60 wipe canister.

Three Publications on AHP in 2010

2010 was a banner year with 3 publications in peer reviewed journals. The first published in September was conducted by Dr. Michelle Alfa and her research team at St. Boniface Research in Winnipeg, MB. The study titled "Improved eradication of Clostridium difficile spores from toilets of hospitalized patients using an Accelerated Hydrogen Peroxide as the cleaning agent" (BMC Infectious Diseases 2010, 10:268, <http://www.biomedcentral.com/1471-2334/10/268>) used Oxivir TB, a Health Canada DIN and US EPA registered 1-step cleaner-disinfectant. The study was the first to provide data that a one-step cleaning process using AHP can significantly reduce the load of C.difficile spores in the toilets of patients with CDAD during non-outbreak conditions. The results of the study demonstrated that the AHP intervention results in spore levels nearly equivalent to previously published studies using a 5000 ppm bleach solution and without the workplace safety concerns.

The second study was published in November in the American Journal of Infection Control. The study, titled "Evaluation of sporicidal activities of selected environmental surface disinfectants: Carrier tests with the spores of Clostridium difficile and its surrogates" (AJIC 2010;38:718-722) was conducted by Dr. Navid Omidbakhsh, VP of Open Innovation at Virox Technologies. The study compared the germicidal efficacy of bleach (5000ppm) to a DIN registered AHP-based sporicidal surface disinfectant and illustrated that the germicidal efficacy of a product is dependent upon contact (wet dwell) time. To achieve the required 6-Log reduction to achieve sporicidal label claims, both products tested required a 10-minute contact time. The study also highlighted the importance of detergency properties of a product to ensure even distribution of the disinfectant on the surface.

The third study titled "Theoretical and Experimental Aspects of Microbicidal Activities of Hard Surface Disinfectants: Are Their Label Claims Based on Testing Under Field Conditions?" (J AOAC INTERNATIONAL 2010;93:1-8) compared several commercially available disinfectants to compare the efficacy of the product as used in the real world. AHP, alcohol-containing quats, and quat-phenolic-alcohol gave acceptable wettability, while quat and phenolic alone, as well as bleach, covered the treated surface unevenly. The findings show that label claims, especially those for contact times, fail to reflect the way many hard-surface disinfectants are used in the field.

We look forward to continuing to work with healthcare facilities and research centres to develop publications that provide the much needed science behind the use of disinfectants.

GREEN TEAM UPDATE ON PAGE 6

MRSA and the Case for Cleaning in Healthcare Facilities

NICOLE KENNY, VIROX TECHNOLOGIES INC.

We continue to debate the importance of cleaning in healthcare facilities in relation to increased numbers of patients acquiring Multi-Resistant *Staphylococcus aureus* (MRSA). In an article in *The Lancet*, Dr. Stephanie Dancer expertly presents her case for improving the status and budget allocation of healthcare cleaning.

Stephanie Dancer, MD, FRCPath was until very recently the Editor of the *Journal of Hospital Infection* in which many of the most influential articles on the science of hospital cleaning and disinfection are presented, and is widely known as perhaps the preeminent champion of environmental cleaning in healthcare. The *Lancet* article identifies the two main functions of cleaning in healthcare. The first is non-microbiological – to improve or restore appearance, maintain function, and prevent deterioration. The second is microbiological – to reduce the numbers of microbes present and any substances that support their growth or interfere with subsequent disinfection or sterilization.

Visual appearance is an unreliable guide to the presence of pathogenic microbes and rates of infection. Perhaps targeting the areas in a healthcare facility that constitute the highest risk for the presence of MRSA would be a feasible option in the short term - the greatest risk for patients is contaminated near-patient hand-touch sites in clinical areas. This is borne out by studies that have seeded viral or other molecular fragments onto a door handle or a telephone, and then charted their movements over the course of a few days. Such studies show the importance of sites that human hands touch more frequently, and can be used as an indicator for what might happen regarding the spread of MRSA.

Dr. Dancer asserts that the role of near-patient hand-touch sites in MRSA transmission (and, indeed, other hospital pathogens) has not been given the priority that it deserves. Examples of these sites include bed rails, bedside lockers, infusion pumps, door handles, and various switches, including the nurse-call button. Many of these oft-touched sites are typically only poorly cleaned. The responsibility for cleaning many hand-touch sites often rests with the ward nurses, who are invariably very busy and almost permanently understaffed in many facilities. Studies have shown an increased risk of infection after periods of inadequate nurse staffing or excessive workload. During these times, concentration of available cleaning resources on high-risk hand-touch sites may be the most cost-effective strategy.

Dr. Dancer's article does not question that prioritizing hand hygiene is the single most beneficial intervention in the control of most infectious pathogens, including MRSA. However, it is impossible to get everyone to perform hand hygiene at the most appropriate time, an experience borne out time and again in every healthcare facility. And even if everyone does clean their hands properly, the effects of exemplary hand hygiene are eroded if the environment is heavily contaminated with MRSA.

People look towards hospitals and other healthcare facilities to treat the sick and set appropriate standards of hygiene. But modern healthcare facilities are



often cluttered, overcrowded, and visibly dirty. Cleaning staff and hours have been drastically reduced over the past decade, and regenerating interest in the removal of dirt in the 21st century will require monumental effort. Aside from its low hierarchical status, cleaning costs money, it is hard work, and it is difficult to measure its impact or assess it against the risk of acquiring MRSA.

The *Lancet* article concludes with these words. "There has been enough debate and too many recent documents, guidelines, and audits. We should take the half-century's worth of data that we have and try to change things while we still can. We do not yet know exactly what impact cleaning could have on control, but this ignorance should not be used as an excuse for doing nothing."

For a reference to the full article contact nkenny@virox.com.

CONTINUED FROM PAGE 1

Control 2004;32:84). Our broad search of peer reviewed as well as informal data identified 236 articles meeting the inclusion criteria. Interestingly, none of these described a meta-analysis, systematic review, or randomized controlled trial, and only four described completed cohort studies with concurrent or historical controls meeting the criteria for final inclusion. None of the articles showed lower infection rates associated with routine disinfection of surfaces compared to cleaning with detergent only. Despite further studies on this issue published since then this chapter of hospital infection control is far from being closed.

Recent guidelines and recommendations reflect this lack of evidence and are mainly based on expert consensus. Robert Koch-Institute (Germany) issued its revised guideline on household cleaning and surface disinfection in 2004. That document recommends detergent-based cleaning for most surfaces and targeted surface disinfection for surfaces that frequently come into contact with hands and skin of patients or personnel. The lack of evidence in support of routine disinfection of surfaces is also reflected by the Centers for Disease Control and Prevention (USA) guideline on environmental infection control. Likewise, the Hospital Isolation Precaution Working Group (UK) stated that "Hot water and detergent are sufficient for most purposes".

The importance of cleaning with a detergent using up-to-date technologies must be highlighted. However, in circumstances of heavy organic soiling, such as blood or body fluid spills, rapid disinfection is inevitable and necessary in order to prevent fixation. In these circumstances, not all disinfectant products perform equally. The efficacy of different methods of surface disinfection and cleaning to reduce microbial loads and prevent the dissemination of micro-organisms in a laboratory model (wet mop technique) has been studied (Exner M et al., J Hosp Infect 2004;56 Suppl 2:S70). This investigation found that when aldehydes and peroxides were used as the disinfectant agent, *S. aureus* was not smeared and spread to other surfaces. By contrast, smearing and spread to other test surfaces did take place when using water, surfactants, and even certain types of disinfectants (glycol derivatives, quaternary ammonium compounds and alkylamines).

New disinfectants, mainly peroxygen compounds, show good (and even sporicidal) properties and will probably replace more problematic substances such as chlorine-releasing agents. For preventing the transmission of prions, new methods and substances show promising activity. The transmissibility of viruses like norovirus shows the need for sound data on how different disinfectant classes perform with respect to inactivation. The same applies for biofilms or other forms of surface-adherent microbes, which pose a special challenge to decontamination.

Although resistance to biocides is generally not judged to be as critical as antibiotic resistance, scientific data generally discourage the widespread use of biocides, especially in low concentrations and in consumer products Carson RT et al. J Antimicrob Chemother 2008;62:1160). Increased use of biocides, particularly in many household products, is in conflict with the principle that antiseptics and disinfectants (incorporated into formulated products) should be used only when necessary and then only with a full appreciation of the factors influencing

their activity. Even the widespread use of silver as a biocide – commonly in appliances such as refrigerators or toilet seats - is likely to support the development of resistance without proven beneficial effect. New technologies and products (like hydrogen peroxide vapour decontamination) must be evaluated with sound methods to demonstrate their properties and their restrictions.

Conclusions

Targeted surface disinfection is indispensable in modern healthcare facilities. However, disinfectants may be hazardous to personnel and patients, as well as the environment, and require special safety precautions. Unrestricted use of biocides, especially in low concentrations, may lead to the development of resistance. Disinfection and cleaning are established components of hospital infection control, and special situations require special procedures, e.g. when treating infected or severely immunocompromised patients or patients colonized with multi-resistant pathogens. New technologies and biocidal substances with promising properties should be further evaluated. As emerging resistant pathogens will challenge healthcare facilities in the coming years even more than at present, there is a need for well-designed (multicenter) studies addressing the future role of disinfection in hospital infection control (Dettenkofer M et al. J Hosp Infect 2011;77:7).

CONTINUED FROM PAGE 4

GREEN TEAM UPDATES

2010 was an exciting year for Virox and the Green Team and ended on a high on December 15th with Virox receiving our ISO 14001 certification. ISO 14001 sets out requirements for an Environmental Management System (EMS) which can be employed by an organization to measure and document their environmental impact and requires the organization to take a hard look at all areas where its activities have an environmental impact. It can lead to benefits such as the following: reduced cost of waste management, savings in consumption of energy and materials, lower distribution costs, improved corporate image among regulators, customers and the public, and framework for continual improvement of environmental performance. This is a great first step as we focus our efforts in 2011 on achieving LEED-EB certification.

The Green Team also focused their efforts on building a robust Recycling Program. The downside of being a manufacturer is the amount of waste generated due to the packaging received with raw materials – especially corrugate and plastic wrap. Our plant now has a single-stream recycling program that recycles corrugate, plastic (bottles and shrink wrap) and paper. In 2010, 205 m³ of recyclable waste was diverted from landfill through our recycling program, enough to fill a pipe 1 meter across and 62 stories tall.

We are proud of how the company and all employees have embraced the focus on health and environmental sustainability and as we start 2011 we look forward to continuing to build a legacy that focuses on reducing our environmental impact that can be passed on to future generations.