

Microbicide Use – The Double-Edged Sword

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Man has evolved in a world full of microorganisms, many of which are unrecognized and unnamed, and only a small fraction of these are pathogens for humans. However the ability for an unseen microbe to incapacitate or even kill a human instills a very instinctive fear of germs that is fed insatiably by the media and by advertising from manufactures of microbicides. It's only been within the last 15 or 20 years that there's been a pressure to sanitize everything with chemicals, and I think that we have to ask if this is a good thing. During this time there has been no lessening in the emergence of new diseases and it is a period notable for increases in antibiotic resistance. I don't need to tell you about the benefits of microbicidal chemicals. The intent here is to discuss the downside of microbicide use, the toxicity to humans and the environment.

If we consider all of the pesticides that are out there, there are more than 20,000 products, and many different active ingredients. Specifically for microbial control, the numbers are smaller – approximately 8,000 products and 300 active ingredients - but just 14 active ingredients appear in more than 90% of the available products in hospitals.

Microbicidal chemicals are toxic and designed to kill, but unless you swallow quantities of them you are unlikely to get enough exposure for acute organ effects. We're not talking about real, overt toxicity here. The effects are much more subtle and they show up in most instances at the cellular level. The immune system and defense mechanisms are primary targets, potentially



making those exposed more vulnerable to infections. Genetic and developmental effects are also possibilities from routine exposure. Discharge of these chemicals into water sources would be expected to result in similar cellular effects on species as diverse as small invertebrates, fish, amphibians and even mammals. There are examples of animals showing up with increased infections when exposed to toxic chemicals, though studies specifically linking microbicides with this phenomenon are lacking.

The additional toxicity of byproducts that are formed during microbial use is extremely important. Microbicides produce disinfectant byproducts because they are such reactive chemicals.

These byproducts can be more toxic than the original microbicide. This is the case with hypochlorite in drinking water, which has been very well studied. But other microbicide chemicals haven't been examined in terms of risks from the by-products that they form.

The other thing that is really important is the changes in microbial populations following disinfectant use. Inevitably you kill the easiest to kill organisms first, leaving you with the tougher ones, and if these happen to be pathogens then you have a problem. Moreover, there is evidence to suggest that bacteria surviving sub lethal exposures become more resistant on subsequent exposure. Clearly this is problematic for routine infection control measures, and illustrates the immense capacity of bacteria to adapt to stressors in their environment.

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"The secret of success is constancy of purpose"

Benjamin Disraeli

Preparing for the CIC Certification Exam

Sharon Krystofiak, CBIC President Elect, 2008 Chair, Strategic Planning Committee



Preparing for any exam is tough- even when it's on a subject that you feel you know well and really like. In school, at least we knew that the course would be ending at the end of the semester and we could move on. But this is your life now, your chosen profession.

The CIC certification exam is based on information received from thousands of people working in the field of infection prevention and control (the Practice Analysis- PA) . What job tasks are performed and how important these various components are to the practice are statistically analyzed to create the "Content Outline" which can be found on the CBIC website (www.cbic.org). Use this document as your guide for study. All questions are based on this outline and each test is equally balanced based on the results of the PA.

So how to prepare? Everyone in the field comes from a slightly different background. Education, training, job experience, learning style and mentors are all variables. Before sitting down to prepare for taking the CIC exam, think about your strengths and potential weaknesses. Tackle first those aspects of the profession with which you have the least experience. If you absolutely hated your microbiology class way back when you were in school, have another look at it now. It might be easier to learn some of those crazy terms like "Gram positive cocci in clusters" now that you are older, experienced, and have connections, particularly if you have a connection with a person working in the laboratory. Study doesn't always have to mean sitting with

a textbook. Some of us learn best by reading and looking at diagrams (visual learners) and some absorb knowledge better by hearing lectures and discussions (verbal learners).

Because we are such a diverse group of professionals, it is difficult to lay out a course of action that will work for everyone. A few basic suggestions include using a simple calculator to determine various infection rates. Many of us are used to just plugging numbers into an Excel file to update our graphs. This talent won't help you when you're only able to take a non-programmable calculator into the CIC test site. Brushing up on simple math skills is an easy way to prepare for those statistical questions. Do you remember what the various statistics mean? You might want to review that chapter in the APIC Text. While a general review of the basic chapters in the APIC Text is highly recommended, a little pencil-and-paper work is always good. Do you work with Employee Health staff, or do you wear that hat yourself? While most of us don't do "classic research," how would you know that a product is effective from the literature provided from the manufacturer? Can you separate the hype from the facts when reviewing articles in non-peer reviewed publication?

The amount of time you spend preparing should be based on your comfort level with the topics included in the Content Outline. When you can look at the various areas, say to yourself "I know about that," and feel ready, go for it. If at first, you don't succeed, try, try again.

CDAD Consensus

Excerpts from the International Infection Control Council global consensus conference on infection prevention and control practice for *Clostridium difficile* associated disease (CDAD)

Based on Standard Precautions or Routine Practices, do you need to do anything differently for environmental cleaning (non-critical) when the patient has C. difficile? What, how and at what frequency?

Twice daily for high contact/frequently touched areas and once daily for the rest as a minimum standard – high contact areas include commode, toilet, mattress, sink handles, door knobs, and bedrails. Need to remove superfluous or uncleanable equipment or furniture from the environment. During an outbreak consider increasing the frequency of cleaning and monitoring.

Extra cleaning for C. difficile

Once the patient is discharged or precautions are discontinued, clean the patient environment with a sporicidal agent. Note that precautions should continue until cleaning is complete. Clean room or area from high level to floor removing disposables, clean all equipment as per policy, change curtains. If the patient's space is in a multi bed area, clean the defined patient space. Clean toilet or commode. Use same cleaning method for terminal cleaning for single cases or outbreak of CDAD. In outbreaks consider alternative methods of terminal cleaning e.g., hydrogen peroxide fogging or other disinfectant with sporicidal activity against *C. difficile*.

Based on Standard Precautions or Routine Practices, do you need to do anything differently for equipment cleaning (semi-critical, critical) when the patient has C. difficile? What, how and at what frequency?

Nothing different for critical or semi critical items for CDAD: follow current guidelines. Non critical items: ensure that practices follow the existing protocols and that there is an assigned responsibility for cleaning. Need formalized check-list for cleaning.

Virox Update

RESCUE Sporicidal Wipes

Virox Technologies Inc. has just received the DIN for the first and only sporicidal environmental surface disinfectant wipe in Canada! Rescue Sporicidal Wipes are effective against *C. difficile* spores in 10 minutes and are part of a "C. difficile Intervention™ Program" developed by Virox Technologies Inc.

Congratulations 2008 CHICA Scholarship Winners

Virox and the Patron Members (Johnson-Diversey, Butchers, Deb, STERIS and Webber Training) would like to congratulate the 2008 CHICA Scholarship winners. Ten Infection Control Practitioners from across Canada were chosen by the CHICA-Canada Board of Directors. This year's winners are: Molly Blake, Annette Blanchard, Debbie Lam-Li, Lynn Mercer, Harriet Potters, Paula Price, Nancy Robertson, Faith Stoll, Samantha Woolsey and Ilana Warner.

Partnerships in Paediatric Patient Safety Corporate Sponsor

In our continued support of facilities dedicated to patient safety, Virox will once again be the event sponsor for the Sick-Kids Foundation 4th Annual Partnerships in Paediatric Patient Safety Symposium: Spreading the Word. This event will be held on Wednesday June 11th at Sick-Kids Hospital (Main Auditorium). For more information on this event please contact the Patient Safety Symposium organizers at 416-813-7358 or by email at patientsafety@sickkids.ca.

AHP7 Indicator Test Strips launched

An important part of instrument reprocessing is confirmatory testing of the chemical disinfectant being used to ensure that the Minimum Inhibitory Concentration (MEC) is present in the solution to ensure chemical sterilization occurs. Virox in partnership with IBT Inc have developed a new and easy to use dip-and-read test strip from the Accel CS 20 product. The test kit is available from the distributors where the products are purchased.

New Website Launched Update: www.virox.com

There have been some exciting changes to the website such as a section devoted entirely to infection control that provides resource materials such as guidelines, protocols, outbreak information, technical bulletins etc as well as a section devoted to hot topics in infection control. We hope you will take the opportunity to check it out!

Virox Technologies Inc. New Corporate Headquarters

Virox Technologies Inc was founded in 1998 and has quickly grown into an industry leader in hydrogen peroxide-based disinfectants and cleaners. With worldwide demand for Virox's patented Accelerated Hydrogen Peroxide® technology, anticipation of registration of several new, innovative products and further expansion into new markets, Virox has recently purchased a 42,000 square foot building in Oakville, ON that will become the new corporate headquarters in July.

If you are interested in learning more about how the Professional and Technical Services team at Virox can provide educational or consulting opportunities at your facility please contact Nicole Kenny at 1-800-387-7578 x118 or via email at nkenny@virox.com.

Conference & Education Spring Schedule

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

June 2 – 5 – CHICA-AIPI Canada Annual Conference in Montreal (Corporate sponsor for the Stanier Institute Symposium on June 4th)

June 11 – Sick Kids Partners in Paediatric Patient Safety Symposium in Toronto

June 12 – 13 – CHICA Northwestern Ontario in Thunder Bay

June 15 – 19 – APIC Annual Conference in Denver

June 19 – Hamilton and Neighbouring Districts Infection Control in Hamilton

June 20 – CHICA-MB Annual

June 26 – Waterloo-Wellington Regional Infection Control Network Annual Partnership Forum in Waterloo.

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.



About IFIC

Dr. Michael A. Borg

Director: Infection Control Unit, Mater Dei Hospital, Malta
Chair: International Federation of Infection Control

The International Federation of Infection Control (IFIC) is predominantly an umbrella organisation of societies and associations of healthcare professionals working in infection control and related fields worldwide. There are more than 70 member societies, from the Australian Infection Control Association to the Infection Control Association of Zimbabwe.

Goals

The goals of the Federation are to: (1) promote high quality educational opportunities, (2) provide a communication network of support by members via the International Journal of Infection Control and the IFIC website, (3) maintain a liaison with the World Health Organisation and other organisations to promote infection prevention worldwide and especially in limited resource settings, and (4) draw on the expertise of member organisations to support each other and to assist with formation of national infection control societies in countries that are in the early stages of infection control development.

Education materials

IFIC's infection control manual, "Basic Concepts in Infection Control", is authored by experts on infection control. The intent of the manual is to provide a scientific foundation for basic infection control principles, mainly to countries

with limited resources. Past editions of the book have been translated into Albanian, Arabic, Chinese, Croatian, French, Greek, Lithuanian, Persian, Spanish, Thai and Turkish languages. The book is available for download, free of charge, from our website. IFIC has also developed lecture slides based on the second edition of "Infection Control: Basic Concepts and Training". Like all our educational materials, the PowerPoint presentations are available free of charge and can also be downloaded from the IFIC web site. "Information Resources in Infection Control" provides key references, publications, and website addresses for infection control practitioners worldwide. The booklet is updated on an annual basis.

Publications

The official publication of the Federation is the International Journal of Infection Control (IJIC) published electronically biannually. The journal provides a forum for publication of research articles as well as submissions dealing with local infection control challenges and practices. The journal is free access and located at a separate website www.ijic.info. Unlike most other open access journals, no fee is requested to publish articles. IJIC also differs by offering help to authors whose first language is not English through correction or editing of manuscripts.

In such circumstances, the manuscript would be sent for editing to third parties (who are separate from the reviewers) and who have indicated their willingness to help in such a task. We would be grateful if you could communicate this to your colleagues and encourage them to submit manuscripts for peer review. IFIC also publishes an e-newsletter that is also circulated to the membership on a quarterly basis, and submissions are always welcome.

IFIC web site

The IFIC web site (www.theIFIC.org) provides a source of information about IFIC goals and activities, a location where infection control professional can obtain information and resources as well as a forum for networking with organizations, agencies and IFIC corporate sponsors.

IFIC Conferences & Scholarships

IFIC holds an annual conference in conjunction with a members society. Recent conferences were held in Budapest, South Africa, Turkey, Croatia, Malta and Egypt. Several IFIC Scholarships are awarded at each Congress to chosen applicants, active in practice of infection control, following submission of a descriptive abstract judged by an independent scientific review committee. Preference is given to participants in settings with limited resources. In October of this year the conference will, for the first time, be held in a South American country, Santiago, Chile.

We gratefully acknowledge our colleagues and member societies around the world for the ongoing financial support and/or expertise that they provide to the International Federation of Infection Control.



9th Congress of the international Federation of Infection Control IFIC

October 14 -17 - Santiago, Chile
Sheraton Santiago, Hotel & Convention Center
www.ific2008.cl

Targeted Cleaning To Decrease MRSA Contamination

Nicole Kenny, Virox Technologies Inc.

“We continue to debate the importance of hospital cleaning in relation to increasing numbers of patients acquiring (MRSA) ... However, there is little direct evidence for the effectiveness of cleaning because it has never been afforded scientific status. Hospital hygiene is usually assessed visually, but this does not necessarily correlate with microbiological risk.”

In an October 31, 2007 review in *The Lancet*, Dr. Stephanie Dancer proposes that hospitals should consider using targeted cleaning to decrease methicillin-resistant *Staphylococcus aureus* (MRSA) transmission, rather than focusing almost exclusively on hand hygiene.

Dr. Dancer recommends targeting high-touch surfaces in hospitals, including door handles, bed rails, infusion pumps,

and switches located in patient areas, and that this additional cleaning would be easier to implement than continuing to struggle toward improvements hand hygiene compliance. “There can be no doubt that prioritising hand hygiene is the single most beneficial intervention in the control of MRSA and many other pathogens. However, the problem with the cleaning of hands is that it is impossible to get everyone to do it at the most appropriate time.”

Starting and maintaining an environmental cleaning program is easier and more likely to achieve a reduction of infection than is another hand-hygiene initiative. Several studies before now have indicated that even exemplary hand hygiene is ineffective if the environment is heavily contaminated with MRSA.

Dr. Dancer suggests that Environmental Services personnel should be included as part of the infection control team and that hospitals undertake a larger investment in hospital cleaning. Ultimately a savings would be realized in the reduced MRSA transmission and thereby reduced costs.

The final word goes to Dr. Dancer. “Cost of drugs alone to treat MRSA, without even considering the costs of extended bed-stay for infected patients, justifies targeting domestic resources in clinical areas ... Furthermore, the increasing prevalence of MRSA and other multiple-drug-resistant bacteria ... support the prioritisation of cleaning and other control measures before definitive validation”.



Microbicide Use – The Double-Edged Sword

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In one study from California they identified four types of microbicides that were responsible for most occupational illnesses. These four chemical agents include hypochlorite, quaternary ammonium chlorides, chlorine gas (more confined to water treatment than regular hospital use), and glutaraldehyde. Hospital workplace exposure to microbicide toxicity would be mainly through skin and by inhalation. Patients might be exposed through active ingredient residuals on surfaces, as well as through inhalation and exposure to accidental spills. The noticeable problems that they cause typically present as hypersensitivity reactions, contact dermatitis, and in some cases asthma. Always these chemicals require very cautious handling and storage.

Quaternary ammonium compounds (quats) are legendary in that they are probably the most widely used microbicide in North America. One survey that we did many years ago found them to be in more than 70% of registered biocides. Their primary level of activity is at the microbial membrane, where they tend to poke holes in the membrane and make them leaky. They quite often have somewhat lower human toxicity than hypochlorite or glutaraldehyde, but they are still sensitizers and you can find contact dermatitis and occupational asthma from exposure to these chemicals. Moreover, they are somewhat refractory to environmental breakdown, although some bacteria can use them as a food source. They are used in such large quantities in institutional, industrial, and consumer products that I think we will probably find them turning up in drinking water, when the water plant is downstream from municipal sewage outfalls. Non-chlorine oxidizers are tending to take over from quats in many cases; most notably hydrogen peroxide, and peracetic acid.

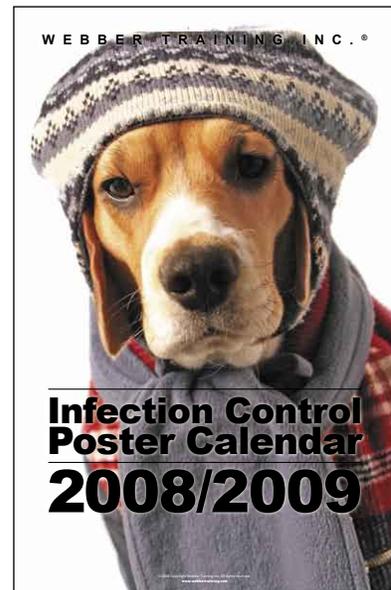
I have mentioned above the importance and problems of sub lethal exposure to microbicides, and this is a very important point to emphasize. Although none of us cares whether or not bacteria are exposed to toxins from the point of view of the health of the bacteria, those toxins are potentially changing those bacteria in much the same way that antibiotics change bacteria. They can induce resistance. Ironically, bacteria are often used to assess the mutagenicity (genotoxicity) of chemicals. The results are used to extrapolate how mutagenic they might be in humans. Nobody pays attention however to the effect that they might have on the bacteria themselves. We already know the problem that we have with antibiotics, which are after all just another toxin. We need to think about this very carefully and although there is little that can be done on this at the hospital level, we at least need to understand the issues.

To sum up: both humans and species living in water and soil environments are exposed simultaneous and sequential to pathogens and chemicals, and the risks are likely to be synergistic. There are many such chemicals involved, some of which are microbicides which get diluted as they are discharged in sewage. Such exposure is increasing with increasing prevalence of antimicrobial use. This is especially true of healthcare settings, but domestic and other uses of microbicides are growing rapidly. The toxicology of many chemicals is inadequately recognized, and the possible potentiation of infections by them is poorly understood. There are major gaps in our knowledge of the combined effects and the real-life exposures to chemicals and microbes. Therefore, I consider that microbial control can create just as many problems as solutions. Strategies need to be put into rationalize microbicide use to those situations where the benefits can be shown to clearly outweigh the risks. It is particularly important to avoid the problematic exposure of pathogens to sub-lethal levels of microbicides. Microbicides are therefore useful but they are dangerous and it's a double-edged sword that we need to use with a great deal of care.

Excerpted from the Webber Training teleclass lecture, "The Human and Environmental Toxicity of Microbicidal Chemicals" (April 3, 2008). For a copy of the lecture recording on Enhanced CD, contact Nicole Kenny (nkenny@virox.com)

Genius ain't anything more than elegant common sense.

Josh Billings



Look for the new Webber Training Poster Calendar at APIC and CHICA Conferences.

Several professionally designed posters are available for download in the Free Poster Downloads section of www.webbertraining.com

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