S O L U T I O N S

VIROX® TECHNOLOGIES INC.

Also In This Issue:

No financial support has been provided by Virox Technologies Inc. to authors of articles included in this newsletter.

VOLUME 39

What Will it Take to Reduce Infections in the Hospital?

SANJAY SAINT, MD, MPH, AND SARAH KREIN, PHD, RN, UNIVERSITY OF MICHIGAN

The outbreak of Ebola, in Africa and elsewhere, was a stark reminder of the clear and present danger that infection represents in all our lives, and we need reminding. Despite all of our medical advances, more familiar infections still take tens of thousands of lives each year – and too often these deaths are avoidable.

Hospital infections kill 75,000 Americans a year — more than twice the number of people who die in car crashes. Most people know that motor vehicle deaths could be drastically reduced. What's not as widely appreciated is that the far greater number of hospital infections could be reduced by up to 70%.

Changes that would reduce infections are evidence-based and scientific, supported by the Centers for Disease Control and Prevention (CDC), For example, the campaign against hospital-acquired urinary tract infection —

CONTINUED ON PAGE 3

Virox Update

Introducing Prevention™ HLD8

The Virox® team is excited to introduce our newest brand of Accelerated Hydrogen Peroxide® based disinfectants. Prevention™ HLD8 is a FDA approved, high level disinfectant for the reprocessing of semi-critical instruments and devices. This unique disinfectant formulation provides high level disinfection in only 8 minutes and offers a 21 day re-use period, without the use of harmful or toxic chemicals or need for special ventilation. Even with a high level disinfectant, we aim to keep true to our pillars of strength. With Prevention™ HLD8 there is no need to compromise on germicidal efficacy, speed of disinfection, safety, and environmental sustainability.

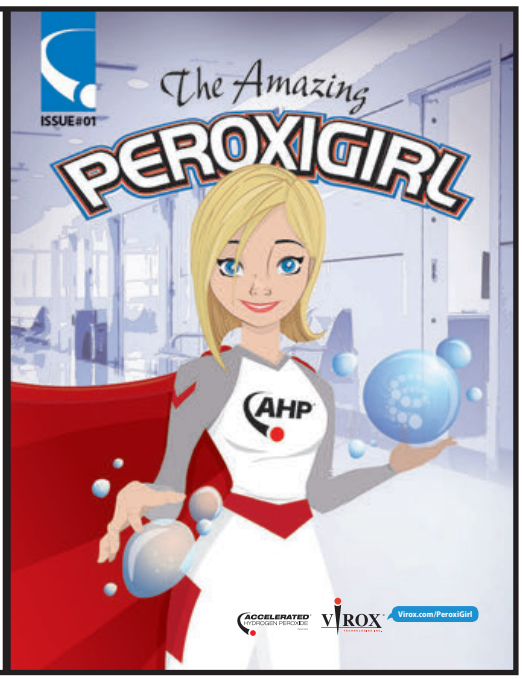
Prevention™ HLD8 will complement the line of surface disinfectant products in the Alternative Health, Professional Beauty, Companion Animal and Farm Animal markets in the United States.

Dr. Lucas Pantaleon Nominated to the NIAA Board

Virox®'s Senior Clinical Veterinarian Advisor, Dr. Lucas Pantaleon, DVM, MS, DACVIM, MBA has been nominated to the National Institute for Animal Agriculture's (NIAA) board of directors, serving until 2020.

NIAA is an association that provides a source for individuals and organizations to obtain information, education, and solutions for the challenges facing the animal agriculture industry. As a vital educational resource for the animal agriculture industry, Virox® has been a proud sponsor of NIAA since 2016.

Prevention™ HLD8 launching July 2017



PeroxiGirl™ to make her debut appearance June 2017

New Easier to Use Test Strips

Introducing our new and improved Precise™ indicator strips for use with 4.25% AHP® Surface Disinfectant Concentrates. When diluted at 1:16, 1:32, 1:64, and 1:128, our new test strips verify the correct concentration of hydrogen peroxide in 50-55 seconds! The new test strips have been designed to be more user friendly as you no longer need to calculate ppm. With the new Precise™ indicator strips all you have to do is Dip, Hold, and Match!

Green Team Update

The Virox® team continues our commitment to innovating, developing and improving peroxide based, environmentally sustainable cleaners and disinfectants so that our affiliates can reduce their environmental impact when consuming such necessary products. The focus on health and environmental sustainability is a legacy everyone at Virox® has embraced. Our "Adopt a Road" program for Coventry Road continues to be a Virox® family favourite.

Introducing PeroxiGirl™!

In a microscopic world not so far away, the Microbe Militia is spreading…conquering areas once thought to be safe, aggressively transmitting disease by contaminating hands, surfaces, and devices. In an effort to save hospitals around the world, the super scientists at Virox® Technologies formulated a superhero as the ultimate weapon in the war against the Microbe Militia. Introducing PeroxiGirl™, the only disinfectant superhero with the ability to fight on all three battle fields: hands, surface, and devices. To learn more about PeroxiGirl™ and her battle against the Microbe Militia visit virox.com/PeroxiGirl

Virox® Professional Beauty is Getting a Makeover!

To better serve the Professional Beauty industry, Virox® has launched a new Canadian website that provides not only information about our PREempt™ line of disinfectants, but educational tools and resources to help Professional Beauty establishments rejuvenate their infection control practices and provide a higher degree of care to their clients. For more information visit viroxprobeauty.com

CONTINUED FROM PAGE 1

one of the most common hospital infections in the world — seeks to minimize the use of internal, Foley catheters, a major vector of infection. Nurses who have always relied on Foleys to deal with patients who have urinary incontinence are told to use straight catheters intermittently instead, which increases their workload. Surgeons who are accustomed to placing Foley catheters in their patients for several days after an operation are told to remove the catheter shortly after surgery – or not to use one at all. Similar approaches can be used to reduce other common infections. If we know what needs to be done to lower the rate of hospital infections, why have the many attempts to do so fallen so woefully short?

Our research shows that a major reason is the unwillingness of some nurses and physicians to support the desired new behaviors. We have found that opposition to hospitals' infection prevention initiatives come from the three groups we call Active Resisters, Organizational Constipators, and Timeservers. While we know these types of individuals exist in hospitals since we have seen them in action, we suspect they can also be found in all types of organizations.

Active Resisters

Active Resisters refuse to abide by, and sometimes campaign against, an initiative's proposed changes. Some active resisters refuse to change a practice they have used for years because they fear it might have a negative impact on their patients' health. Others resist because they doubt the scientific validity of a change, or because the change is inconvenient. For others, it's simply a matter of ego, as in, "Don't tell me what to do." Some ignore the evidence. Many initiatives to prevent urinary tract infection ask nurses to remind physicians when it's time to remove an indwelling catheter, but many nurses are unwilling to confront physicians – and many physicians are unwilling to be confronted.

To win support among the active resisters, we recommend employing data both liberally and strategically. Doctors are trained to respond to facts, and a graph that shows a high rate of infection can help sway them. Sharing research from respected journals describing proven methods of preventing infection can also help overcome concerns. Nurse resisters are similarly impressed by such data, but we find that they are also likely to be convinced by appeals to their concern for their patients' welfare – a description, for example, of the discomfort the Foley causes their patients.

Organizational Constipators present a different set of challenges. Most are mid- to upper-level staff members who have nothing against an infection prevention initiative per se but simply enjoy exercising their power. Sometimes they refuse to permit underlings to help with an initiative. Sometimes they simply do nothing, allowing memos and emails to pile up without taking action. While we have met some physicians in this category, we have seen, unfortunately, a surprising number of nursing leaders employ this approach.

Timeservers

Timeservers do the least possible in any circumstance. That applies to every aspect of their work, including preventing infection. A timeserver surgeon may neglect to wash her hands before examining a patient, not because she opposes that key infection prevention requirement but because it's just easier that way. A timeserver nurse may "forget" to conduct "sedation vacations" for patients who are on mechanical breathing machines to assess if the patient can be weaned from the ventilator sooner for the simple reason that sedated patients are less work.

Organizational constipators and timeservers are more difficult to win over, largely because their negative behavior is an incidental result of their normal operating style. Managers sometimes try to work around the organizational constipators and assign an authority figure to harass the timeservers, but their success is limited. Efforts to fire them can sometimes be difficult.

Hospitals' administrative and medical leaders often play an important role in successful infection prevention initiatives by emphasizing their approval in their staff encounters, by occasionally attending an infection prevention planning session, and by making adherence to the goals of the initiative a factor in employee performance reviews. Some innovative leaders also give out physician or nurse champion-of-the-year awards that serve the dual purpose of rewarding the healthcare workers who have been helpful in a successful initiative while encouraging others by showing that they, too, could someday receive similar recognition. It may help to include potential obstructors in planning for an infec-

tion prevention campaign; the critics help spot weaknesses and are also inclined to go easy on the campaign once it gets underway.

But the leadership of a successful infection prevention project can also come from lower down in a hospital's hierarchy, with or without the active support of the senior executives. We found the key to a positive result is a culture of excellence, when the hospital staff is fully devoted to patient-centered, high-quality care. Healthcare workers in such hospitals endeavor to treat each patient as a family member. In such institutions, a dedicated nurse can ignite an infection prevention initiative, and the staff's all-but-universal commitment to patient safety can win over even the timeservers. The closer the nation's hospitals approach that state of grace, the greater the success they will have in their efforts to lower infection rates.

Cooperation — among doctors, nurses, microbiologists, public health officials, patients, and families — will be required to control the spread of hospital infections. Preventing infection is a team sport.

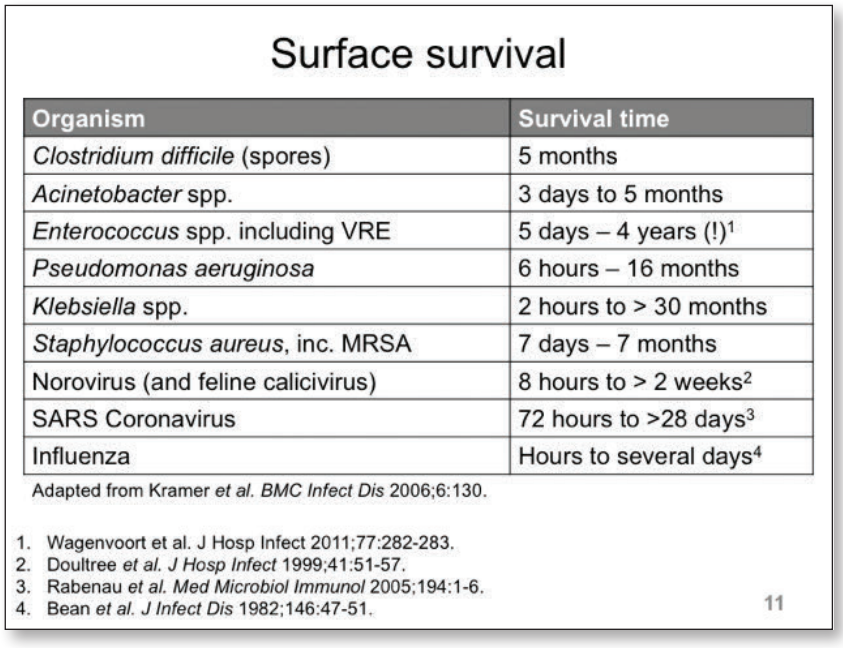
The Role of Dry Surface Contamination

DR. JON OTTER, IMPERIAL COLLEGE, LONDON

The following text is transcribed from excerpts of a teleclass lecture presented by Dr. Otter on February 28, 2017, and used with his permission. The entire recording and handout are available by request (contact nkenny@virox.com).

When I first became interested in this field of work, some 20 years ago now, I was a fresh undergraduate. The pervading view at that time was that environmental surfaces may contribute a little bit to the transmission of pathogens associated with healthcare-associated infections, but really it was a minor player. You'd only start looking for an environmental reservoir if you had an on-going outbreak. I think now the perception is that the environment plays a really significant role, and for some pathogens in some situations, the most significant role in transmission.

We now have pretty solid epidemiological data to show that if you are admitted to a room where the previous occupant had a pathogen along the lines of MRSA, VRE, *C. diff*, or Acinetobacter, the incoming occupant of that same room has an increased risk of acquiring that same pathogen. That is almost certainly due to inadequate cleaning and disinfection of the hospital environment. This could have implications that go far beyond where we would traditionally see the importance of the environment stop.



Surface survival

Organism	Survival time
Clostridium difficile (spores)	5 months
Acinetobacter spp.	3 days to 5 months
Enterococcus spp. including VRE	5 days – 4 years (!)[1]
Pseudomonas aeruginosa	6 hours – 16 months
Klebsiella spp.	2 hours to > 30 months
Staphylococcus aureus, inc. MRSA	7 days – 7 months
Norovirus (and feline calicivirus)	8 hours to > 2 weeks[2]
SARS Coronavirus	72 hours to >28 days[3]
Influenza	Hours to several days[4]

Adapted from Kramer *et al. BMC Infect Dis* 2006;6:130.

1. Wagenvoort et al. J Hosp Infect 2011;77:282-283.
2. Doultree *et al. J Hosp Infect* 1999;41:51-57.
3. Rabenau *et al. Med Microbiol Immunol* 2005;194:1-6.
4. Bean *et al. J Infect Dis* 1982;146:47-51.

11

Microbial survival

These pathogens survive on dry surfaces for a lot longer than we might expect. If we look at something like *C. diff* spores, it will come as no surprise that they survive for months and months on environmental surfaces. But when you look at something like MRSA or Klebsiella, you may not expect them to survive for months, but they do. The most amazing study reflecting this was done with VRE, and it shows that VRE can survive for in excess of 4 years on dry surfaces, which is the longest survival time I think that I have ever seen recorded.

There's this dynamic interchange between surfaces and hands and patients. There have been a couple of really clever studies that have shown that if you touch a surface in the room of a patient with a pathogen, or you touch the patient themselves, then you pretty much have an equal chance of picking up that pathogen on your hands. Yet compliance with hand hygiene has been shown to be significantly higher with direct patient contact than after contact with the environment. So, could it be then that contamination acquired from surfaces is relatively more important than contamination acquired from patients?

I'd like to spend some time thinking about what we can do to improve our cleaning and disinfection approach. But before I do I'd like to give you a couple of current perspectives on the inanimate environment, first around the role of biofilms and then the potential for airborne spread of contamination.

The biofilm effect

When we look for biofilms on a dry surface in the hospital environment, low and behold it's there, and it's surprising how often it's identified on hospital surfaces. In a study out of Australia they identified biofilm on 93% of the 50-odd surfaces tested in the ICU. Around 20% of the biofilms contained MRSA, 10% contained ESBL and VRE. So not only were the biofilms there, they were harbouring pathogens that were resistant to antibiotics.

This has some important implications I think. It means that "inanimate" is not an accurate description of the environment at all. It's teaming with life. You might even start thinking in terms of an "environmentome". What does that look like? What is in it? And can we do anything to modify it?

The presence of biofilm would certainly explain why vegetative bacteria survive on surfaces for so long. It could also explain, to a degree, why they're so difficult to get rid of. It could also explain, perhaps, that when you sample a surface and expect to find the pathogen there you often don't. Maybe it's because your swab is being rubbed over the top of the biofilm and it's not actually picking up viable bacteria. They're hiding within.

Improving existing procedures

Let's look at the very basics of hospital cleaning and disinfection. What do we actually clean? Do we need to wash the walls weekly, or should we clean high touch surfaces in a patient room 10 times a day? The answer is we don't really know, but it does seem that a focus on high-touch areas is sensible and is supported by the evidence that we have so far.

Then who cleans what? Checklists can be really important here. Imagine a situation where there is an orphaned item in a patient room – the cleaners thought

that the nurses were cleaning it; the nurses thought the respiratory therapists were cleaning it; the respiratory therapists thought the cleaners were cleaning it; in actual fact, nobody was cleaning it. So getting people around a table, to decide who cleans what, is a vital first step.

What agents do we use? This would depend on the situation. If you're looking at *C. diff* then you would certainly need a sporicide. Agents with sporicidal capacity may also may also help with vegetative bacteria because they act faster, so therefore you don't need quite as long a contact time, however sporicidal agents are known to have associated safety risks which should be evaluated prior to use.

What material should we use? Microfiber might help. Disposable wipes are a useful innovation, with pro's and con's. The bucket method is probably the most cost effective, but is it really the most effective, all things considered?

How exactly do we educate staff? More than we currently do would be a good first step, but it's certainly difficult, particularly with a workforce that has a high turnover.

Daily cleaning – how often should this be? Every day? Twice a day? Terminal cleaning - again, a more stringent protocol seems sensible. How should that look? I've raised more questions than answers, but much of how we configure our cleaning and disinfection policies is not as evidence-based as I would like.

What can we do to provide objective data around improving the cleaning and disinfection process? We need to have visual assessment of cleaning, but it's certainly not going to provide that objective evidence that we're seeking. Microbiological cultures can be useful, but they're too slow to give us anything like real-time feedback. Could we start looking at ATP markers or fluorescent markers? I think that they have very similar prospects, but some advantages and disadvantages, so choosing between them could be tricky.

Innovations

There are more innovative ways of improving surface cleaning and disinfection, beginning with something a little out of the box. What we do to treat the patients can have a knock-on effect to the environment. For example, this was a study looking at vancomycin or metronidazole vs. fidaxomicin with the rate of contamination with *C. difficile*. When patients were treated with vancomycin/metronidazole, somewhere between 50% and 60% of the rooms have *C diff* contamination. Whereas when the patient is treated with fidaxomicin, that figure was between 30% and 40%, and a similar trend was seen among the number of sites contaminated within each room. So on balance, the fidaxomicin reduced the level of environmental contamination compared with the standard care and treatment, possibly resulting in less impact on the next patient in the room.

Looking now at antimicrobial surfaces. On slide 25 there is a brief overview of some of the options for treatment using antimicrobial surfaces and surface treatments. We have the metals, basically copper and silver. We have chemicals, like organosilanes and light-activated antimicrobials. And then we have a third category, which is physical alteration of surfaces – doing something to make the surfaces more cleanable. So the ideal antimicrobial surface would have active biological activity that would make it antimicrobial, but would also improve cleanability. If you could combine those two you could come up with a very powerful approach to provide a very powerful background level of contamination reduction, which would hopefully have a knock-on effect and reduce transmission.

Another approach is to try to reduce contamination at the source, not by antibiotic treatment but by biocide treatment of the patient. Using chlorhexidine, you are able to reduce not only the level of environmental contamination, you also reduce the rate of acquisition. The data are pretty stark and impressive I think, and argue strongly for using chlorhexidine for daily bathing of patients.

I've mentioned disinfectant wipes already. These are, potentially and theoretically, a really useful innovation. They come pre-soaked with the right amount of disinfectant, they remove the reliance on the operator to dilute the disinfectant correctly, and they reduce over-wetting or under-wetting. Several studies have indicated that the use of wipes does lead to the reduced transmission of infection, partly because they have that convenience and that ready-access that means that disinfection is just done much more often, as part of the daily routine.

What are the key drivers that lead to the failure of the cleaning and disinfection process? We have some external factors, like a cracked and broken hospital environment, like the presence of biofilms on hospital surfaces. We have some

Candidate	Application	Pros	Cons
Metals			
Copper	Manufactured in / liquid disinfectant	Rapidly microbicidal; large evidence-base; evidence of reduced acquisition.	Sporicidal activity equivocal; cost, acceptability and durability may be questionable.
Silver	Manufactured in / liquid disinfectant	Broadly microbicidal.	? sporicidal; tolerance development; relies on leaching so surface loses efficacy over time.
Chemicals			
Organosilane	Liquid disinfectant	Easy to apply.	Limited microbicidal activity; questionable "real-world" efficacy.
Light-activated (e.g. titanium dioxide or photosensitisers)	Manufactured in / liquid disinfectant	Broadly microbicidal; can be activated by natural light.	? sporicidal; requires light source for photoactivation (some require UV light); may lose activity over time.
Physical alteration of surface properties			
"Liquid glass" (silicon dioxide)	Liquid application	Reduces deposition; improves 'cleanability'.	Not microbicidal; some evidence of reduced contamination; unknown required frequency of application.
Sharklet pattern	Manufactured-in	Reduces deposition; reduced. biofilms.	Not microbicidal; not feasible to retrofit.
Advanced polymer coatings (e.g. PEG)	Manufactured-in	Reduces deposition; some can be 'doped' with copper or silver.	Not microbicidal; may be expensive; scale up to large surfaces questionable; not feasible to retrofit.
Diamond-like carbon (DLC) films	Manufactured-in	Reduces deposition; can be 'doped' with copper or silver.	Not microbicidal; likely to be expensive; feasibility of scale up to large surfaces questionable; not feasible to retrofit.

Compare the Impact of an Improved Hydrogen Peroxide Disinfectant and a Quaternary Ammonium on Surface Contamination and Healthcare Outcomes

NICOLE KENNY, PROFESSIONAL AND TECHNICAL SERVICES, VIROX TECHNOLOGIES INC.

Dr. John Boyce, known to all of us for his work in the decontamination of hospital surfaces and instruments, among other things, claimed to be "trying to retire" in 2017, but clearly he can't quite stop producing really interesting research. He is the lead author of a study, published in the American Journal of Infection Control in April of this year, that I was intimately involved with. The study claims to be the first prospective, cluster controlled crossover trial comparing a quat disinfectant with an IHP disinfectant in a real-world health care setting.

I'd first like to explain a bit of nomenclature. In current scientific literature, and in this article, you will find the term "Improved Hydrogen Peroxide" or "IHP". Since "Accelerated Hydrogen Peroxide®" (AHP®), is a brand name and regis-tered trade mark owned by Virox, the more generic IHP is used in its place. In the Boyce article, they mean the same thing.

Dr. Boyce, and his colleagues at Yale-New Haven Hospital in Connecticut, iden-tify that quaternary ammonium–based disinfectants are widely used in health care in the United States, but have several disadvantages. They conducted a quality improvement project to compare the effectiveness of IHP-containing wipes and a quat disinfectant currently in use on reducing surface contamina-tion and health care outcomes. It was a 12-month prospective cluster controlled crossover trial, conducted on 4 patient wards located on 2 campuses at Yale-New Haven.

On each campus, 2 wards were randomized to have housekeepers continue performing daily and discharge cleaning using the quat disinfectant used in the rest of the hospital, or to perform daily and discharge cleaning using disinfectant wipes containing 0.5% IHP. During months when study wards were assigned to use the quat disinfectant, rooms of patients with *C. difficile* infection were cleaned daily and at discharge with bleach wipes. When study wards were as-signed to use the IHP disinfectant, all quat-based wipes and bleach wipes were removed from the wards, bleach wipes were not used for daily or discharge cleaning of rooms occupied by patients with *C. diff*, and a concentrated IHP technology in solution form was used to clean floors. After 6 months, the ward assignments were reversed.

The authors found that mean aerobic colony counts (ACC) after cleaning were significantly lower with IHP than with the quat disinfectant. Also, high-touch surfaces yielded no growth after cleaning with IHP significantly more often than with quat. Microbiologic results in the Boyce study were consistent with several earlier studies of IHP-based disinfectants which found that the IHP products ef-fectively reduce contamination of inoculated disks and environmental surfaces in healthcare settings.

Of particular interest in this study, the incidence density of *C. difficile* infection in this study was lower on IHP wards than on quat wards, even though the 0.5% IHP product used does not have an EPA-registered sporicidal claim. In contrast quat disinfectants have poor activity against *C difficile spores*. Dr. Boyce points out that IHP-based disinfectants also have several other advantages when com-pared with quat disinfectants, including short contact times, the lowest EPA toxicity rating (category IV), lack of reduced efficacy in the presence of organic material, and no significant binding to cloths made of cotton or cellulose, which does occur with quat-based disinfectants.

The Boyce study closes with the suggestion that IHP-based disinfectants are more effective than quat-based disinfectants in reducing bacterial contamina-tion on surfaces. They also suggest that IHP-based disinfectants may be more effective than quat disinfectants in reducing health care–related outcomes.

If you would like a copy of the Boyce article, "Prospective cluster controlled crossover trial to compare the impact of an improved hydrogen peroxide disin-fectant and a quaternary ammonium-based disinfectant on surface contamina-tion and health care outcomes", please contact Olivia Lattimore (olattimore@virox.com). We look forward to more studies along this line.

Remembering Prof. Graham Ayliffe

DR. TINA BRADLEY, LABORATORY MANAGER, HOSPITAL INFECTION RESEARCH LABORATORY, BIRMINGHAM, UK

For more than 4 decades of my professional life I have been fortunate to know and work with Professor Graham Ayliffe (March 1926 – May 2017), and it is with sadness that I note his passing, just days ago. In the field of infection control, Professor Ayliffe was a giant among his peers.

As far back as 1964 Prof. Ayliffe (or Dr. Ayliffe as he was then), with his colleague Prof. Edward Lowbury, had the foresight to establish the Hospital Infection Research Laboratory (HIRL) at Dudley Road (now City) Hospital. The HIRL carried out one of the first large prevalence surveys of hospital infection, involving over 30 hospitals in the West Midlands. Outbreaks of infection were studied and a detailed assessment of an isolation ward in the prevention of spread of staphylococcal infection was made. Other studies included the emergence of antibiotic resistance and the role of plasmids. The development of tests for chemical disinfectants (and subsequently standards), the decontamination of endoscopes and other items of medical equipment, and various types of sterilizer were studied. The routine use of alcohol hand disinfection in hospital wards was introduced into the UK using the '5 stroke' or 'Ayliffe' technique, which is recognized by the World Health Organization. Over 400 papers have been published on these and other topics by Prof. Ayliffe and laboratory staff.

The Hospital Infection Research Laboratory has developed an international reputation, mainly as a result of Prof. Ayliffe's efforts, receiving visitors from all over the world for training and discussions, and he visited most of these countries to lecture and give advice and received several awards for services to infection control. His visits included most European countries, the USA, Canada, Argentina, China, Japan, Australia, India and most countries in the Middle East. I imagine his passport makes for interesting reading. The WHO also became interested in improving infection control and with the support of an interested international group of infection control nurses and medical microbiologists formed the International Federation of Infection Control (IFIC) in 1987. He was elected Chairman of the IFIC in 1990.

I joined the team in 1975, straight from school with O levels, and was very fortunate to work with not only Prof. Ayliffe, but also Barry Collins and John Babb - Ayliffe, Babb and Collins were sometimes referred to as 'the ABC of infection control'.

An early interest was the training, practice and the appointment of infection control nurses. In 1970, he was involved in the setting up of the Infection Control Nurses Association (ICNA, now the Infection Prevention Society) and was President of the Association in 1976. Two decades later, on the occasion of his retirement, an annual lecture was inaugurated in his name to acknowledge his services to hospital infection and to the Association. The success of the ICNA led Prof. Ayliffe to be the first Chair of a similar organization, the Hospital Infection Society (later the Healthcare Infection Society, HIS) in 1980, mainly to meet the special needs of medical microbiologists and infection control officers. He went on to become President in 1988, and was awarded the first medal of the Society for services to control of infection in 1996. The Graham Ayliffe Training Fellowship was established by the HIS in 2013. The Graham Ayliffe International Federation of Infection Control (IFIC) Annual Certificate in Excellence was inaugurated in Malta and I was privileged to be the first recipient of this award.

Prof. Ayliffe was the first editor of the Journal of Hospital Infection which is now one of the world's leading journals on this subject (my first publication was in the first edition of this journal in 1980). He also served on the editorial boards of a number of other journals. He was the co-author or co-editor of 10 books and wrote chapters for many others. The Control of Hospital Infection, a practical handbook, written with EJL Lowbury, AM Geddes and JD Williams in 1975 is well-known both nationally and internationally; the 5th edition (Ayliffe's Control of Healthcare-Associated Infection) was published in 2009. In 2004 he was awarded, with his co-author Mary English, the medical history prize for the year, presented by The Society of Authors and the Royal Society of Medicine for the book "Hospital Infection: From Miasmas to MRSA."

In his private life, away from his passion for infection prevention and control, Prof. Ayliffe was an experienced fencer and was selected for the English team in the annual quadrangular match in 1960. He was President of Birmingham Fencing club for over 20 years and continued to fence into his 80s. He even authored a book on the history of Birmingham Fencing Club. He is also a keen fly fisherman and birdwatcher.

I can honestly say that I would not be in the role that I am now without the support and knowledge that I have been given, particularly by Prof. Ayliffe. His enthusiasm for infection prevention and control had never waned and I shall miss his inquiring mind and our discussions very much.

CONTINUED FROM PAGE 5

issues around product – is the product actually fit for purpose? Fundamentally though, the real challenge around cleaning and disinfection in hospitals, or anywhere else for that matter, is the reliance on the human operator to ensure adequate formulation, distribution, and contact time of whatever agent you're using.

Design Bugs Out

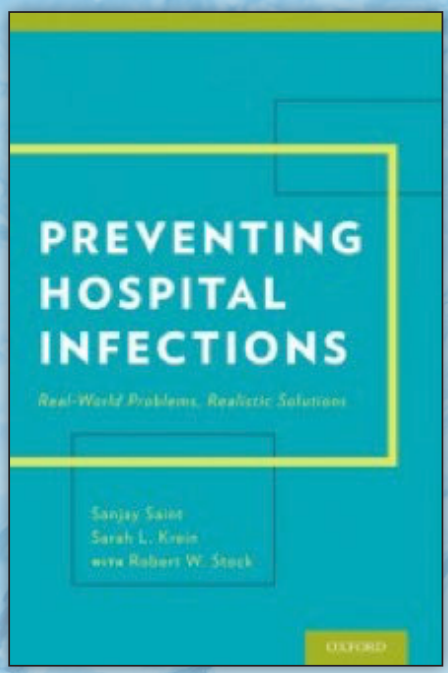
Before we draw our thoughts to a conclusion I want to talk about the design of a hospital and whether we can go further than we currently do in order to "design bugs out". If you look at scanning electron micrographs of bed rails you can see clearly that the difference in the surface finish is stark. If you're a microbe you might choose the nooks and crannies of a rough surface to hide in rather than a smooth finish. We know that the smoother the surface, the better it is for cleaning. However, there is a problem because smooth hospital bedrails, while they might be great for cleaning, are not so good when you actually try to hang on to them for grip. We need to keep in mind the function of the device that we're looking at.

There's a really cool project called "Design Bugs Out" that was launched by the UK Department of Health some years ago now. They were trying to take traditional pieces of hospital furniture and replace those with more cleanable versions. They achieved this goal, and some of those pieces are now commercially available and doing quite well.

The role of the environment in the transmission of pathogens has come a long way, and most would now accept that the environment plays a key role in the transmission of some pathogens, some of the time. It may even be the most important transmission route of some pathogens, sometimes. The fact that being admitted to a room where the previous occupant has had a pathogen increases the risk of acquiring that pathogen is powerful evidence that the environment is important. Furthermore, that by doing a better job of cleaning and disinfection you can mitigate or even eliminate that increased risk, cements that epidemiological link. There are two separate approaches to improving standards of hygiene – improve existing methods or we can try something new. I don't think those are mutually exclusive. I think that we can and should pursue both of those at the same time by improving our training, by introducing objective markers, by looking at ways that we can control contamination of the source, by keeping ourselves abreast of changes and technological improvements in cleaning and disinfection, and by doing what we can to improve the design of hospitals.

> *'Given the choice of improving technology or improving human behavior, technology is the better choice'.*
>
> Dr Bob Weinstein

Preventing Hospital Infections



Millions of people develop a healthcare-associated infection each year, many of those infections resulting in premature death. Such infections are generally preventable by means of evidence-based, quality-improvement interventions, but too many hospital staff members resist these efforts. The technical know-how exists to prevent infection, but the human, adaptive problem often remains untreated and unresolved. This book is designed to meet that challenge.

Preventing Hospital Infections leads readers through a step-by-step description of a quality improvement intervention as it might unfold in a model hospital, pinpointing the likely obstacles and offering practical strategies for how to overcome them. The text draws on the extensive personal clinical experience of the authors, including examples, anecdotes, and down-to-earth, practical guidance.

Sanjay Saint, MD, MPH is the Chief of Medicine at VA Ann Arbor and the George Dock Professor of Internal Medicine at the University of Michigan. Sarah Krein, PhD, RN is a research scientist at VA Ann Arbor Center for Clinical Management Research and a Research Professor of Internal Medicine at the University of Michigan. Robert W. Stock is a former editor, writer, and columnist for The New York Times.

Their book, "Preventing Hospital Infections: Real-World Problems & Realistic Solutions", is published by Oxford University Press. ISBN 9780199398843

VIROX TECHNOLOGIES INC.

2770 Coventry Road, Oakville, ON L6H 6R1
Tel:(905) 813-0110 · Toll Free:1-800-387-7578
Fax:(905) 813-0220 · E-mail:info@virox.com
Website:www.virox.com