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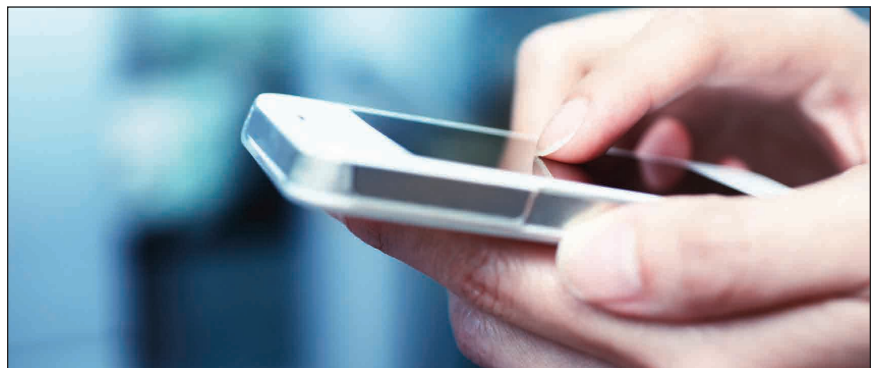
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Mobile Phones and Nosocomial Infections

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Inanimate objects in healthcare settings can become contaminated with different pathogens, healthcare associated infections (HAI) can spread through hand-to-surface-to-hand transmission. Among the most ubiquitous objects in modern society, including in hospital halls, laboratories, intensive care units and operating rooms, is the mobile phone. During every phone call a mobile phone comes into close contact with potentially contaminated human body areas such as the workers' hands, and also portals of entry such as the mouth, nose and ears. As mobile phones act as perfect habitats for microbes to breed, especially in high temperatures and humid conditions (such as the pocket or holster in which they are stored when not in use), HCWs' mobile phones may serve as reservoirs for microorganisms that could facilitate the transmission of bacterial isolates from one patient to another in different hospital wards.



The wide spread use of mobile phones among medical personnel in hospitals is a matter of controversy. The question of concern is how to use the mobile phones sensibly, getting their benefits and minimizing their risks. This study was conducted to determine the potential of mobile phones to harbour microorganisms in hospital environments and to evaluate its role in their transmission from the phone to HCWs' hands.

We enrolled 32 staff members in the study - 12 neurosurgeons, 8 anesthetists and 12 nurses. A questionnaire was submitted to all participants in the study to collect information on the extent of usage of mobile phones, the location of use, the use of headsets, the awareness of disinfection practices of mobile phones and the frequency of hand washing after using their phones:

2012 Conference Update

October

October 16th, 2012 - Annual Bug Day, Health Science Centre in Manitoba

October 16th to 19th, 2012 – ISSA/InterClean

October 25th to 26th, 2012 – CHICA Southern Alberta

October 30th, 2012 - Ottawa Public Health Infection Prevention and Control Annual Forum

November

November 1st to 2nd, 2012 – CHICA Nova Scotia Educational Symposium

November 2nd, 2012 - CHICA BC Education Day

November 2nd, 2012 - Day Nursery Operator's Education Session - Toronto Public Health

November 14th to 15th, 2012 - CIPHI Saskatchewan Educational Seminar

November 15th, 2012 - CIPHI Ontario Educational Workshop

Virox is 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.

Fall 2012 Virox Update

The Evolution of an Active: Accelerated Hydrogen Peroxide (AHP) for Surfaces, Devices and now HANDS!

In a Joint Research and Development Project, Virox and The Deb Group (a world renowned Hand Care company), have successfully formulated the Accelerated Hydrogen Peroxide (AHP) technology to be used as an antibacterial hand wash! Products will initially be sold in Europe and available through The Deb Group.

AHP is the first and only chemical disinfectant and cleaning technology that has been successfully formulated to be used as a low to intermediate level disinfectant on hard non-porous surfaces and equipment, as a high level disinfectant and chemical sterilant for semi-critical and critical medical devices, and now after more than 10 years of research and development, as an antibacterial hand wash! **To learn more about OxyBAC, please visit www.debgroup.com/uk**

Virox launches a new web site for the Accel product line!

We are excited to announce the launch of new web sites for the Accel product line! The Accel websites (Canada www.viroxaccel.ca, United States www.viroxaccel.com) are now live. The focus of these web sites is to provide the infection prevention and control community with information pertaining to the Accel product line, including technical product sheets, product use instructions, MSDS sheets and accessories. We would love to hear your feedback or suggestions! Contact us at info@virox.com.

2012 Virox Cleaning, Disinfection and Sterilization Symposium

The second bi-annual pre-conference *Symposium on Cleaning, Disinfection and Sterilization* was a success! Over 200 infection prevention and control professionals and public health inspectors attended the symposium at the 2012 CHICA Canada Conference. This biannual event is intended to provide infection control, public health and pre-hospital professionals an opportunity to learn more about cleaning, disinfection and sterilization. All presentations can be downloaded on the Virox website under Infection Control Resources, Educational Opportunities. (http://www.virox.com/infection_control/educational/viroxday.aspx).

GREEN TEAM UPDATES

We did it! On August, 28th the Green Team submitted our LEED project (Leadership in Energy and Environmental Design) for review. As a chemical manufacturer, our site would be the first that we are aware of in North America to achieve LEED Certification. Knowing that we have quite an uphill battle we conservatively hoped to obtain the level of "Certified" which requires a minimum of 40 points. What we have learned is that a company can completely change their culture and embrace something with such passion that we ended up submitting a total 54 points which would put us at the "Silver" level!



Now we just have to wait with fingers crossed that we are able to address and overcome any objections the reviewers may have. In the interim, the following are the areas that we are most proud of.

Energy Efficiency rating is in the 27th percentile above the national median. Some

GREEN TEAM UPDATE ON PAGE 4

Decreasing Operating Room Environmental Pathogen Contamination through Improved Cleaning Practice

LEE NESBITT, VIROX TECHNOLOGIES INC.



During the past decade, there has been an increasing awareness of the role of the hospital environment as a reservoir of multidrug-resistant organisms. However, the interactions between healthcare worker's hands, patients, objects, and the hospital environment has primarily been studied only in intensive care units and wards. In a recent article (*Infect Control Hosp Epidemiol. 2012 Sep;33(9):897-904. Epub 2012 Jul 24*) the authors showed that there is evidence that the hospital environment, including operating rooms, is often not cleaned thoroughly or in a manner consistent with relevant hospital policies.

This study was performed from April through December 2011 at Jackson Memorial Hospital, a 1,500-bed teaching hospital affiliated with the University of Miami Miller School of Medicine. A transparent fluorescent gel marking system (DAZO) was used to mark operating room surfaces before the first case of the day, and these surfaces were subsequently evaluated 24 hours later using a UV lamp. These objects included bed control panels, anesthesia-related equipment, Mayo stands, over-table lamps, and floors. The presence of UV material at 24 hours was considered to represent a lack of cleaning of the object tested.

After 2 cycles of covert baseline data collection, operating room cleaning personnel from all shifts were reeducated regarding cleaning expectations for specific objects and were provided with the UV marker and environmental culture results. Other than the regular feedback of results, no major input regarding the cleaning of the operating rooms was provided by the infection control department.

The most striking improvement during the study was related to the anesthesia equipment, which increased more than 150%. Other objects that showed significant improvement in thoroughness of cleaning included bed control panels, Mayo stands, and overhead lamps. The objects that failed to show clear improvement included floors, intravenous poles, and operating room entry door handles.

Education combined with objective feedback using UV markers has previously been shown to improve the thoroughness of environmental cleaning in a range of healthcare settings.. During this study too, improvement was accomplished exclusively through ongoing objective performance feedback to the environmental services staff. The sustainability of improved hygienic practice needs to be evaluated more extensively since the impact of such programs may deteriorate once feedback is no longer ongoing.

Based on the findings in this article and existing literature, operating rooms might not be the clean settings that healthcare providers commonly believe them to be. This study demonstrated that simple programmatic improvement in the thoroughness of disinfection cleaning in the operating room area can significantly decrease surface contamination with organisms that have the potential for transmission to patients and healthcare workers.

GREEN TEAM UPDATES

Continued from page 2

of the ways we achieved this level included a complete lighting retrofit in the warehouse to more energy efficient lights as well as installing motion sensors in offices so our lights will turn off after a period of time with no movement. 74.63% of on-going consumable purchases (stationary, office supplies etc) are certified green. Even our paperclips are green! 129.46% of our electric powered equipment (computers etc) meets the LEED sustainability criteria. How to exceed 100%? You buy the greenest of the greenest! 99% of our furniture purchased met LEED Sustainability including office chairs, the recycled content of the lab furniture we purchased and a mango wood credenza – mango wood is a renewable resource don't you know!

A complete retrofit for our indoor plumbing (toilets, urinals and faucets) was completed resulting in a 53.2% reduction of potable water use.

The area we are probably most excited about is our Solid Waste Management Program which incorporates our recycling programs. Our waste stream audit, where someone literally digs through our garbage, showed that 95% of the solid waste we generate is diverted from landfill! This is no small feat, and something that the consultants we have been working with have never come across!

We still have a ways to go. Our preliminary review has been conducted and we now have 27 pages of questions, clarifications and additional supporting documentation to provide, but we're on our way and very proud of what we have accomplished thus far.

Me, Myself ... Us

NICOLE KENNY, VIROX TECHNOLOGIES INC



A recent issue of the Economist magazine pointed out that we are not individuals. When considering the entirety of the human form we are not one but many. Each of us is an ecosystem of tens of trillions of cells, 90% of which are bacteria rather than cells descended from the sperm and egg of our parents. This ecosystem, this microbiome, when in balance, feeds and protects itself (us). In times of imbalance though it is now believed to contribute to the chronic health issues that plague the developed world – obesity, diabetes, heart disease, autism, asthma, and much more.

One wonders then about the potential for negative impact of active disinfectant residuals left on surfaces and skin by some of the products that are used in our developed world.

Virox Sponsors Russell Olmsted Teleclass Lecture



The medical sciences in general, and infection prevention and control research in particular, are swimming in data, new discoveries, new recommendations for best practices, etc. The challenge is separating the wheat from the chaff, and finding a way to make it work in your facility. Actually, in most cases the first challenge is locating the good wheat to begin with.

Critique and Use of the Scientific Evidence – Sharpening Skills

On November 29, 2012, Russell Olmsted, immediate Past President of the Association of Professionals in Infection Control (APIC), will present this lecture in the Teleclass Education lecture series.

The objectives of the lecture are as follows:

- List at least one bibliographic search engine to identify evidence related to the practice of infection prevention and control.
- Describe concepts used in critical appraisal of scientific evidence.
- List elements used to score quality and strength of peer reviewed studies.
- List at least one strategy involved in application of evidence to prevent infection.

We would like you to join this teleclass as our guest. Just e-mail Mikeisha Paul (mpaul@virox.com) with the subject line "Teleclass registration", and your contact information in the body of the e-mail. We will arrange with the organizers of the teleclass lecture series to get you registered without cost to you.

Combating Biofilms

NICOLE KENNY, VIROX TECHNOLOGIES INC

When manufacturers of hospital-grade disinfectants make claims about their chemicals' ability to kill bacteria, they are invariably referring to the planktonic form of the microbes. Planktonic bacteria are free-floating, non-aggregated organisms, and certainly they cause disease. However, in nature, and in the hospital environment, the most natural bacterial state is that of biofilm, and that is a completely different animal as far as disinfection is concerned.

Biofilms consist of water, bacterial cells and extracellular polymeric substances referred to as "matrix". Aside from the infections that they cause from contamination of healthcare surfaces and instruments, microbial biofilms affect world economy to the tune of billions of dollars with regard to equipment damage, product contamination, and energy losses.

Prevent Attachment

Bacterial attachment to a surface is a universal phenomenon in nature and is essential for biofilm formation. In recent years, a series of different approaches have been developed to reduce microbial attachment, including biochemical approaches, physicochemical approaches, and biological approaches. For example, electro-polished stainless steel was shown to significantly reduce attachment and biofilm formation by bacterial cells than textured stainless steel surfaces. Also, some articles propose biosurfactants that produce probiotic bacteria as potential biofilm control agents.

Young biofilms are often more susceptible to antimicrobial agents than mature biofilms. The high cell density in the mature biofilms can induce cell-to-cell communication (quorum sensing) systems, which increase the expression of genes contributing to antibiotic and biocide resistance, and the release of protecting DNA.

Removal

For many reasons, bacterial cells within a biofilm are far more resistant to traditional biocides. The activity of antimicrobial agents against biofilms is largely hindered by the dense micro-colonies embedded in the EPS matrix, but there is also a phenotypic change in the microbes, increasing their resistance. Tests show that even when biocides such as quaternary ammonium disinfectants penetrate to the very heart of the biofilm, the microbes within are largely not impacted.

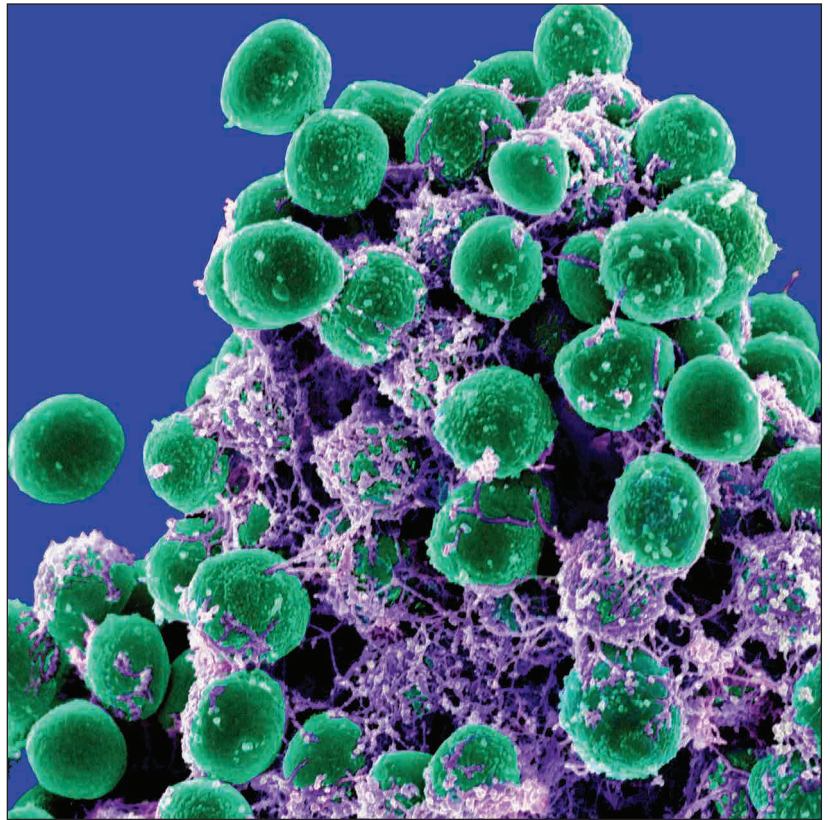
Two types of biocides are in common use against biofilms - aldehydes and oxidizers. Glutaraldehyde has been used for many years in the decontamination of flexible endoscope channels, although in recent years its use has been discouraged due to fixative tendencies and health hazards. Also, Alfa et al found that repeated use of Glutaraldehyde to decontaminate scopes actually contributed to biofilm buildup resistant to the biocide.

Oxidizers are increasingly popular in biofilm removal. The oxygen-producing nature of oxidizing biocides such as accelerated hydrogen peroxides and acidified bleach have been found to strip even mature biofilm from surfaces, without necessarily destroying all of the microbes within the biofilm. A follow-up wipe or rinse removes the matrix and microbes, rendering the surface safe to use.

More reliable techniques for investigating biofilms and better model systems for evaluating control strategies are still required. It is unlikely that label claims for hospital disinfectants will ever mention effectiveness against biofilms since their complexity and multi-species nature make real-life and reproducible tests extremely difficult if not impossible. The importance of biofilm in the daily battle against disease transmission cannot be overemphasized and it is crucial that we seek a better understanding of what weapons are effective.

Thanks to Prof. Liang Yan of the Technical University of Denmark for his assistance in the research for this article.

Biofilm image by Brent Ardaugh.



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After the staff members had finished their shifts, all participants were asked to disinfect their hands using an alcohol based hand rub. Cultures were obtained from the fingers of both hands by covering blood agar plates with five fingertips to show properly disinfected hands. Then they were asked to do a short phone call on their personal mobile phones and sampling was repeated using the fingers of the hand used to make the phone call.

Results

Following the use of the alcohol-based hand rub, culture sampling revealed no growth from all HCWs' hands. After the use of a mobile phone, the rate of bacterial contamination of HCWs' hands increased to 93.7%. *Klebsiella pneumoniae* and coagulase negative *Staphylococcus* were the primary isolates.

Microbiological analysis revealed that the same microorganisms were recovered from both mobile phones and HCWs' hands, with the same antibiograms and same biochemical profiles. Two isolates of *S. aureus* (14.3%) were methicillin resistant, and 38.5% of Gram-negative bacilli were MDR.

Our results are similar to other studies: Brady et al. showed that 89.7% of mobile phones were contaminated by bacteria; Ulger et al. stated that 94.5% of phones showed evidence of bacterial contamination and the isolated microorganisms were similar to hand isolates; Elkholy and Ewees stated that the rate of mobile phone contamination was 96.5%; Snigh et al. reported that out of 50 mobile phones that were cultured, 98% were positive; Goldblatt found that, one fifth of the cellular phones used by HCWs harboured pathogenic microorganisms and may serve as vectors for health care transmission of microorganisms.

All HCWs who were participating in the study carried their mobile phones to different wards, operating theatres, recovery rooms, ICU, etc inside the hospital, and elsewhere outside the hospital. They would answer and make phone calls on their mobiles while attending patients. None of them used headsets or ever cleaned his mobile or washed his hands after using the mobile phone.

Discussion

Whereas strict attention is paid to changing clothes, removing jewelry, undertaking hand hygiene measures, and storing personal objects in changing rooms to reduce the transfer of microorganisms from the external clinical environment into the operating environment, most expensive mobile phones often accompany staff into the operating environment as currently no local policy restricting the use of mobile phones in clinically sensitive areas is in place. This lack of attention may be indicative of little awareness about potential risks posed by mobile phone microbial contamination and their role as vehicle for transmission of infections.

A major education campaign should be undertaken to raise awareness about mobile phones as a possible vehicle for transmission of different pathogens inside the hospital and also to the outside community. This education campaign should be assessed periodically by microbial sampling of mobile phones used in the hospital. If such sampling shows that mobile phones continue to be contaminated, additional strategies will have to be considered. Routine cleaning

of mobile phones with disinfectant wipes may be effective in reducing the risk of cross-contamination. In the future, mobile phones could be produced with protective material against bacterial contamination.

In conclusion, mobile phones may act as a reservoir of microorganisms associated with HAI that can be transmitted into the operating environment by medical staff as same organism was cultivated from both the mobile phone as well as the hand of the same healthcare worker. Restriction of mobile phone use in clinically sensitive areas, such as operating environment and ICU as a start point, is recommended. Moreover, screening of HCWs' mobile phones inside the hospital should be done while doing environmental screening.

Infection Prevention and Control Related to Electronic (IT) Devices in Healthcare Settings

A new Practice Guideline was issued by the Community and Hospital Infection Control Association (CHICA-Canada) in October, 2012, to address the issues of electronic devices in healthcare settings. Recommendations coming out of that guideline include the following:

1. Hand hygiene should be performed between patient contact and before and after accessing a device.
2. Manufacturer's guidelines for use, cleaning/disinfection and maintenance should be reviewed to ensure these guidelines meet the standards for cleaning and low-level disinfection that are necessary for exposure to Multi-Drug-Resistant Organisms.
3. Items that cannot be adequately cleaned should not be used, or should be designated as "clean" and not be accessed in patient rooms or be touched by patients.
4. If an item cannot be cleaned with a hospital-grade disinfectant and is necessary for patient care, a risk assessment should be done with infection prevention and control to determine the best approach to mitigate the risk of transmission of microorganisms.
5. All touch-surfaces of IT devices used at, or near, point-of-care must be cleaned and disinfected with a hospital-grade disinfectant if used or touched during the encounter with the patient.
6. The surface of telephone components, pagers and computer 'mice' should be cleaned in a manner that prevents damage to internal systems from excessive fluid.
7. If an item cannot be adequately cleaned and will be accessed in a patient room or touched by patients, it requires a cleanable cover.
8. The user/owner of the device is responsible for routine cleaning and disinfection of the device and that responsibility must be clearly communicated.

Download the full Practice Guideline at www.chica.org/links_position.php