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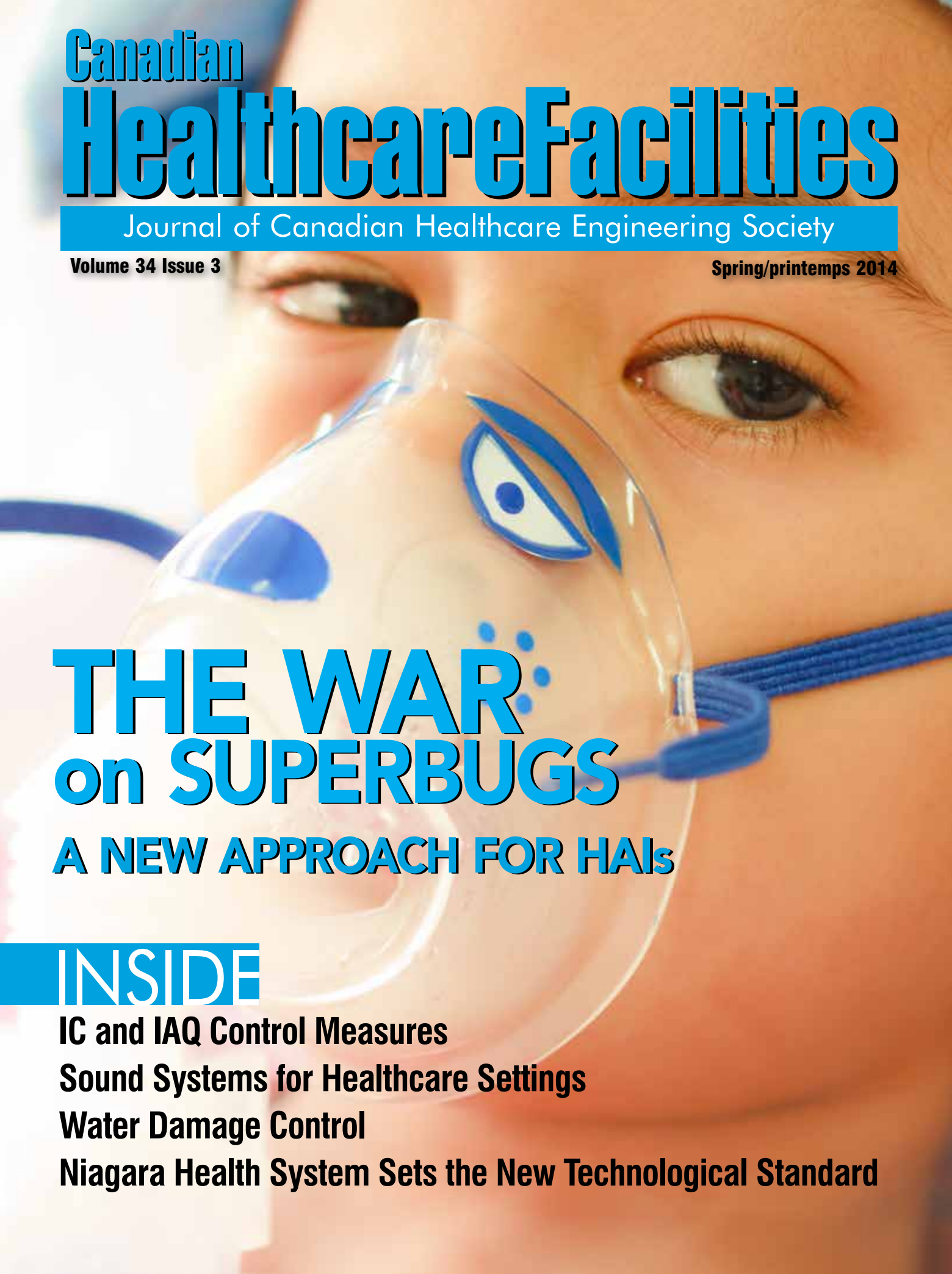

THE WAR on SUPERBUGS

A NEW APPROACH FOR HAIs

INSIDE

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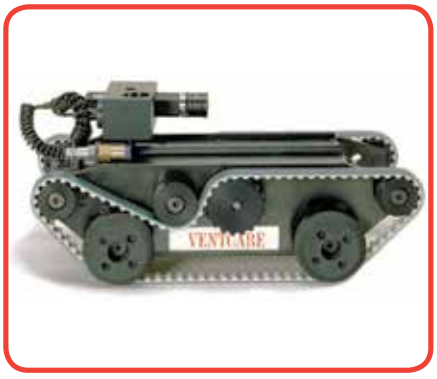

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Planning for the best, preparing for the worst

Welcome to Canadian Healthcare Facilities' spring 2014 issue. We are excited to follow the movers and shakers of CHES and document another season of innovation, challenge, and growth within the Canadian healthcare industry.

As any healthcare professional can attest, expecting the unexpected is part of the job. In this issue, we investigate some of the potential obstacles, problems, and challenges that can affect even the most prepared healthcare facilities and staff. In our cover story, The War on Superbugs, CHAIR Canada's Barry Hunt turns a spotlight on new prevention and protection measures for healthcare acquired infections (HAIs); while Peter Semchuk from IBI Group leads an in-depth account of indoor air quality (IAQ) and infection control (IC) strategies based on recent experiences.

Elsewhere, Michael Flatt of First General North America takes us through the ins and outs of managing a water damage crisis, and Robert Copeland at Plan Group shows us what steps the Niagara Health System has taken to put it at the forefront of information technology. AmpliVox's Don Roth also joins the conversation with his rundown of sound systems for healthcare facilities.

As always, CHF aims to inform and connect healthcare engineering stakeholders. Within these pages, you'll find updates from your colleagues across the country and news on exciting CHES events and opportunities. 2014 holds plenty of promise, and I'm sure there will be no shortage of issues, successes, and ideas to cover in the months ahead.

Of course, we are always open to your suggestions. If you have an idea for a story, please send it along to myself at stevem@mediaedge.ca, or CHF's editor, Matthew Bradford, at matthewb@mediaedge.ca.

Sincerely,

Steve McLinden
Publisher
stevem@mediaedge.ca

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Last year, HealthAchieve introduced its very first satellite location in Thunder Bay creating HealthAchieve North. Featuring keynote sessions broadcast live from the Toronto event, HealthAchieve North brought together health care providers in Northern Ontario to get a taste of the HealthAchieve experience. This year, expanding on that success, we are pleased to announce our second satellite location – in Halifax.

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Defining progress as the advancement towards perfection

Greetings. I hope everyone was able to enjoy everything this past winter had to offer without any lingering ill effects. The reports from Environment Canada indicate it was one of the top three coldest winters of the last 30 years.

These environmental extremes not only test our facilities' operational designs, but have a significant impact on our utility budgets. We experienced unprecedented volatility in the spot prices for natural gas, which has many contributing factors, such as resulting in storage levels at 18 per cent of capacity compared to 44 per cent one year ago and utility companies curtailing interruptible customers, all putting upward pressures on price.

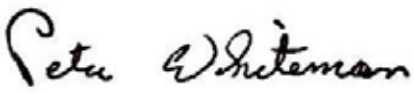
These environmental extremes are another stressor to our healthcare systems' sustainability challenges. To respond effectively and efficiently, we must incorporate ever-increasing green products and processes. Only through the adoption of appropriate strategies can we make significant progress.

We in healthcare must take more of a leadership role in investing in the development and implementation of efficient processes and truly embracing green products and technologies, not only for the sake of energy cost savings, but for the environmental impact reductions. We must adopt this mindset as being the only acceptable option. As environmental stewards, we must strive to reduce our carbon footprint and protect the environment with a global perspective. We need to encourage the research and development of renewable sources and invest in green power from sustainable sources that will also provide us with a hedge against rising fossil fuel prices.

Fossil fuels are a finite resource that is becoming too expensive and too environmentally damaging. In contrast, wind, solar, and deep geothermal is constantly being replenished and will never run out. We can adopt solar energy for heating, lighting, and the generation of electricity. Recent advancements also include solar cooling.

We as global occupants are making significant technological advancements to meet this challenge and I never cease to be amazed and inspired by the ingenuity and creativity of the human spirit. I have no doubt we will make the progress that is needed.

Have a great year, work hard, and play harder.



Peter Whiteman
CHES National President

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ALBERTA CHAPTER

It's another fine day in Alberta! Congratulations to the Facilities Maintenance & Engineering Department, along with the Clinical Engineering team in the South Zone of AHS, as they went live with E-Facilities the week of February 10. Congratulations also to Calgary, which went live on February 24, followed by the Edmonton, Central, North Zones, and Covenant Health on March 17. At time of print, the Protective & Parking Services and EMS groups were expected to go live on April 15.

As a result of all the work required in preparing and training for E-Facilities, our regularly scheduled CHES meeting in February has been cancelled. We are still pursuing the CHES meeting in April, which will be hosted by the Lethbridge facility.

On a somber note, Capital Management was advised of the departure of Penny Rae from Capital Management. She has assumed the role as acting chief information officer for information technology. Thank you Penny for your leadership and progressive thinking as we move forward in the provincial region. Brian Stevenson has taken over as acting senior vice president of Capital Management and we look forward to your initiative and leadership combined with your wisdom and past experiences.

Lastly, feedback from Capital Management senior leadership has resulted in the continuation of hosting the Clarence White Conference & Trade Show in Red Deer as opposed to Calgary. This decision was made based on financial implications. We appreciate the continued support and encourage the attendance in the trade show this November 24 to 25. Planning of the CHES National Conference is still proceeding and the chairman for the 2015 National Conference located in Edmonton is myself.

Preston Kostura, Alberta Chapter Chair

BC CHAPTER

CHES BC is calling for nomination for its upcoming executive positions. Our early feelers indicate that there is significant interest in joining the BC Executive. I am completing my final term as chair of CHES BC and am looking forward to turning the reigns over to Steve McEwan.

On the conference front, the 2014 Conference will once again be travelling back to Penticton, BC, and I hope to see everyone there for some wonderful networking and education sessions. Our education platform is completed with an excellent program. The trade show is now fully sold out and sponsorship opportunities are going fast.

With the introduction of the recently updated CSA Infection Control In Healthcare code, CHES BC has fielded a number of questions about the next CHES - Canadian Healthcare Construction Course, and this has been scheduled for Penticton to follow our provincial conference in early June of 2014.

Mitch Weimer, BC Chapter Chair

McConnell Institutional Food Fund

The J.W. McConnell Family Foundation has announced an Institutional Food Fund to support the work of public institutions in Canada which aim to serve more healthy, local, and sustainable food.

In recent years, certain hospitals, schools, and cafeterias across Canada have shown that they can transform their practices toward sustainability. These changes have been led by visionary champions and, in some cases, have been aided by supportive public policies or programs. However, specific supports, incentives, and learning opportunities are needed to embed such changes within mainstream procurement practices, and the stories and mechanisms of success need to be widely communicated across the country.

The Institutional Food Fund aims to support this work. For more information, visit www.mcconellfoundation.ca (under Sustainable Food Systems on the Programs page).

MANITOBA CHAPTER

CHES Manitoba will be holding its 2014 Annual trade show and Education Conference at the Victoria Inn again in Winnipeg on Wednesday May 21, 2014.

This year's conference is entitled "Keeping the Air Clean: Elements of Quality HVAC Maintenance". Registration is posted on the CHES website. Sessions will include HVAC Overview, Maintaining Rooftop AHU, Maintaining Internal AHU, Maintaining Your filtration, Humidification, and a roundtable maintenance discussion. These sessions will touch on portions of basic maintenance and include a more advanced look at AHUs and their maintenance.

The Manitoba Chapter sent out nomination requests to the chapter membership for the positions of vice chair, treasurer, and secretary. To date, we had not received any nominations, and the chapter executive will be meeting to discuss the next steps to ensure a full complement of executive members. If there is anyone from the MB Chapter who is interested, please contact one of the current executive members. We strive to bring new members into the executive, as well as hopefully keep some of existing executive involved.

I would also like to remind everyone that after the May 2014 Education Day, I will be stepping down from the CHES MB chair position, as my two year term will be complete. Craig Doerksen will be taking on the role of chair for the next two years. He brings with him a tremendous amount of experience to the MB Chapter executive. Please join us in supporting Craig as he moves the MB Chapter forward over the next two years, as I assume the position of past chair for the next two years.

The MB Chapter is still looking to fill vacant spots for Manitoba representatives for the national committees. Currently, we are still looking for a MB Chapter representative for the Communications Committee at this time. Please contact anyone on the MB Chapter executive if you are interested.

I would like to thank the other members of the Manitoba Executive for their ongoing involvement and direction with the MB Chapter as we move forward to promote the chapter across the province.

These include Craig Doerksen (vice chair), Tom Still (treasurer), and Gary Yuel (secretary).

Reynold J. Peters, Manitoba Chapter Chair

NEWFOUNDLAND & LABRADOR CHAPTER

We have our PD Day confirmed for April 28th at the Guvnor Inn in St. John's, and the committee has been meeting regularly on the planning of the PD Day. The day will feature six speakers and the topics will cover air filtration, fire stoppage, water treatment, heat pump technology, automatic vehicle location, and moving active healthcare facilities. Currently, these topics are at the forefront of healthcare in Newfoundland.

We would like to thanks our sponsors, Chemaqua, Power vac-Belfor , Trane Atlantic, Telus/Hitech Communications, Camfil Farr, and Health Care Relocations. Without the sponsors we would not be having a PD Day. We have sent out an email to all members asking them to save the date and inform them an information brochure will follow shortly.

We are waiting on speaker bios and company logos before we can proceed with the brochure. We will be in a good situation to send out the brochure the first week of March.

Brian Kinden, NL Chapter Chair

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THE WAR ON SUPERBUGS

A NEW APPROACH FOR HAIS

By Barry Hunt

Healthcare Acquired Infections (HAIs) are the fourth leading cause of death in Canada, taking more lives than car accidents, breast cancer, and HIV combined. Canada has one of the highest incidences of HAIs in the world, where one in ten Canadians who spends a night in hospital catches an infection from that hospital, and one in 20 infected patients dies. That's 200,000 Canadians infected each year and 10,000 deaths; and the problem continues to get worse.

Something has to change and, believe it or not, it involves you, the healthcare facility manager. You manage the physical environment and often manage housekeeping as well; two keys to solving this problem.

It's believed that 80 per cent of HAIs are transmitted by touch. Until recently, the primary focus on treating this problem has been staff and visitor hand hygiene. Yet despite decades of hand hygiene education and promotion, the HAI statistics get worse every year.

What's more, the hand hygiene statistics are questionable at best. Studies show that staff wash their hands three times more often when they know they are being monitored. While Canadian hospitals continue to publicly self-report hand hygiene compliance rates of 90 per cent and above, the real numbers are often between 15 and 40 per cent.

Changing people's behaviour is hard and should not be relied upon as a primary means of defence, especially for something as critical as hospital infections. It can help, though, to locate sinks and alcohol-based rub (ABR) stations in the most convenient locations possible. Studies show that second to monitoring, location makes the biggest difference in hand hygiene compliance.

Ironically, patient hand hygiene has largely been ignored even though it's often the route to infection inside patient rooms. The bed rails, nurse call buttons, and overbed tables that are in repeated contact with patients' hands are often significant reservoirs for today's superbugs, which include C. difficile, MRSA, and VRE.

While we were all taught as kids to wash our hands before dinner, this rarely happens in our hospitals. Patients confined to beds have limited access to wash facilities and ABRs are only just now beginning to be provided for patient use.

A NEW APPROACH

To make a real change, we need to take a new approach that extends far beyond hand hygiene. We need to take an engineered approach, and that's where you, the healthcare facility manager, comes in.

First, everyone needs to understand the issue of superbugs, the microbes that are resistant to most—or sometimes all—known antibiotics. We've created them; our hospitals have become incubators for superbugs. If someone gets an infection in a hospital, it is 70 times more likely to be a superbug than if they get an infection outside of a hospital.

It's not surprising when you think about it. Superbugs emerge in an evolutionary process when normal bacteria are challenged with antibiotics but not completely defeated. There may be a genetic mutation that allows a small population to survive and then propagate a new generation of strong progeny. A patient with MRSA or C. difficile may leave superbugs behind on surfaces in her room where they continue to grow to later be picked up and transferred weeks or even months after she is gone. In fact, studies show that there is a significantly greater risk of catching a superbug in a room that was previously occupied by an infected patient. The fact that up to 80 per cent of infections are transmitted by touch explains why outbreaks tend to cluster in areas in a hospital. The fifth floor may have a VRE outbreak while the seventh floor may have a C. difficile outbreak.

Despite everyone's best intentions, most surfaces in a patient room are not cleaned, or are not cleaned to a level sufficient enough to prevent infection, even during a "terminal clean" of an isolation room after a known infectious case. The typical range of surfaces cleaned is between 20 and 50 per cent. Housekeeping staff time pressures aside, even the surfaces that are cleaned can quickly become recontaminated if a few superbugs are left behind given the materials we are currently using.

UV disinfection of patient rooms can reduce bacteria counts by 99.9999 per cent. That's known as a 6-Log reduction by Infection Control Practitioners, and considered to be low enough to prevent infection and future recontamination. Using UV for sterilization is not new, but the concept of complete room sterilization is. Studies show that using UV room disinfection between patients can reduce

hospital infection rates by 50 per cent. Kudos to Toronto East General, Winnipeg Health Sciences, and Vancouver General for being the first hospitals in Canada to implement UV room disinfection.

Stainless steel is most often specified for architectural interiors, including door hardware, corner guards, etc. It's durable, looks hospital clean, and is widely believed to help in infection control. However, stainless steel is just about the worst material choice to make. Its scratches harbour bacteria and it has zero antimicrobial properties. Studies show bacteria, including superbugs, thrive on stainless steel surfaces.

Instead of using stainless steel, consider using copper, or copper coatings, brass, and other copper alloys containing at least 60 per cent copper. Copper is the best biocidal metal available, meaning it actively and quickly kills bacteria, and destroys viruses. Studies show that replacing the high touch surfaces in patient rooms, particularly the ICU, can also reduce hospital infections by 50 per cent. Some copper products now being introduced to the hospital market for infection control will have a modest cost premium but many products, especially door hardware, were originally available in brass materials longer before the recent rise in popularity of stainless steel.

Every time a toilet flushes a microbe gets its wings, traveling for up to 90 minutes contaminating surfaces, people, and clothing. Toilets can become launchpads for disease, especially for C. difficile and VRE. Toilet aerosols were determined to be the primary means of transmission in several outbreak sites during the well documented SARS epidemic of 2003. Still, we continue to help mobilize toilet aerosols by installing updraft ceiling exhaust fans in patient washrooms when we should be exhausting washrooms low and behind the toilets. Washrooms are neutral in pressure relative to the patient room, which in turn is neutral to the corridor allowing the free flow of airborne particles. Ideally, all patient rooms should be treated as isolation rooms where the washrooms are negative in pressure to the patient room which in turn is negative to the corridor, with at least a closed door if not an anteroom. Now that CSA Z8000 requires single patient rooms, it's not much of a stretch to include glass doors, similar to a typical ICU.

A BIG PAYBACK

True, there is a cost to implementing UV, copper, and HVAC changes, but there is also a quick, substantial, and sustained payback. In addition to the $2 billion spent annually on infection control practitioner salaries and hand hygiene stations, we spend 2 per cent of healthcare costs treating HAIs, adding another $4 billion per year. Cutting the hospital infection rate by 50 per cent would free up $2 billion per year that could be spent providing better healthcare services for Canadians. Better yet, cutting the infection rate by 80 per cent would save Canada $3.2 billion dollars, 160,000 infections, and 8,000 deaths per year. That worthy goal is the mission of the recently formed non-profit Coalition for Healthcare Acquired Infection Reduction (CHAIR).

CHAIR is comprised primarily of Canadian volunteer doctors, researchers, infection control, and industry professionals who are committed to evaluating, advocating, educating, and supporting case studies, clinical trials, and standards to reduce HAIs in Canada. It's an exciting time, as companies are rapidly developing new products, hospitals are testing and implementing UV and copper solutions, and the CSA Steering Committee for Healthcare Standards has formed a task force on HAI reduction and may authorize development of a future CSA standard on hospital touch surfaces. There are exciting new developments in this field emerging almost weekly.

As for your hospital, there will be budgeting issues with implementing a solution. Infection control departments have budgets to monitor infections, but they don't have budgets to prevent infections through changes to the physical environment. In fact, many infection control practitioners are unaware of the significant role the physical environment plays in causing HAIs.

This dual problem of information and budget silos is common in healthcare but needs to be overcome to effect a solution. CHAIR is committed to helping Healthcare Facility Managers by educating and engaging both infection control practitioners and healthcare executives to break down both the knowledge and financial barriers to implementation. ■

Barry Hunt is chairman of the Coalition for Healthcare Acquired Infection Reduction. For more information, visit www.chaircanada.org.

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BREATHING EASY
DURING NEW CONSTRUCTION
IC and IAQ Control Measures

By Peter Semchuk

Design teams, contractors, and health care facility staff face continual challenges regarding best practice procedures required during the construction of new or renovation of existing health care facilities for the implementation of indoor air quality (IAQ) and Infection control (IC) procedures.

On the newly completed Fort Saskatchewan and Strathcona Community Hospital, the IFC Project Team chose an innovative path for these critical procedures utilizing a collaborative approach for developing and implementing these procedures during the various stages of construction of these new health care facilities.

Fort Saskatchewan and Strathcona Community Hospital

MANAGING THE IC/IAQ ISSUE

Recent published reports identify over 90,000 deaths per year in the USA associated with infections. A significant portion of these deaths are attributable to airborne pathogens exasperated during the renovation and maintenance of existing facilities, construction methodology, or practices enacted on newly constructed health care facilities. The dust that is raised during these activities acts as a vehicle to transmit fungal spores throughout the building.

That said, what if the dust could be minimized during construction, allowing for notability less ability to transmit fungal spores throughout the life of the facility?

“Project team participants can face challenges in obtaining an integrated approach to incorporating a combined IC/IAQ Management Plan.”

Managing a hospital’s internal environment during construction or a renovation may result in the reduction of risk of future patient infections. The practices used on these projects have resulted in development of new innovations that are changing the future of health care construction. This real life experience translates into an increased awareness of how enacting IC/IAQ processes during new hospital construction can have a lasting impact on improved patient safety throughout the life cycle of the building.

Enacting fundamental changes to current construction cleaning procedures, in conjunction with managing the internal environment of the facility during construction using specialized construction air handling equipment to control internal temperature and humidity, are primary procedures that must be implemented. Ongoing QA/QC inspection and monitoring of these procedures ensures compliance.

MODERN PRACTICES

Construction sites are often cluttered and debris ridden, reflecting multiple trades and construction practices. Clean-up procedures are typically intermittent with final cleaning assigned as part of the final project close-out process.

Indoor air quality, by integration or implementation of antiquated temporary facilities and equipment providing internal heating and cooling through direct fired combustion air heaters and high velocity circulation fans, in conjunction with open and discontinuous external building envelope enclosures, reflect past accepted practices for control of interior building environments.

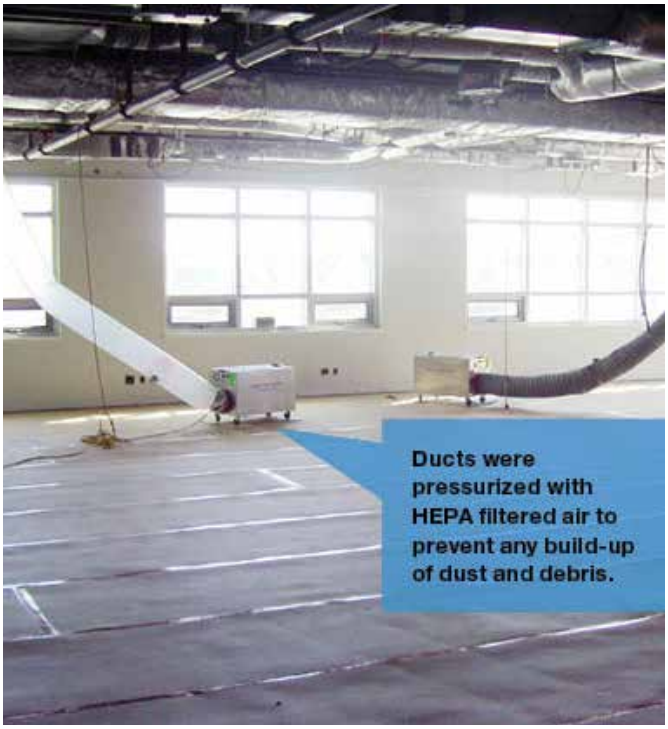
In today’s project environment—particularly in health care—these past practices are no longer acceptable. Standards such as CAN-CSA-Z8000-11: Canadian Health Care Facilities Construction Design, Construction Facility Engineering and Physical Plant and

CAN-CSA-317.13.07: Infection Control During Construction Renovation and Maintenance of Health Care Facilities mandate more stringent policies and procedures not just for renovations within occupied facilities, but for construction of new health care facilities as well.

How can accepted standards be easily implemented during renovations of existing buildings or construction of new healthcare facilities? Stringent policies and procedures prescribed in the accepted standards are often difficult to meet and, in some instances, are counterproductive.

Integrating these standards with other project parameters, such as Canada Green Building Council (CaGBC) – LEED Indoor Environmental Quality Credit 3.1 – Construction IAQ Management Plan during construction and Credit Indoor Environmental Quality Credit 3.2 – Construction IAQ Management Plan / Testing Before Occupancy, can be a challenge. Often, these parallel requirements are mandated to be incorporated into these specialized publicly funded capital projects.

This is certainly the experience and challenge that faced the IFC team involved on the Fort Saskatchewan and Sherwood Parks Community Hospital projects, as all provincially funded capital projects in Alberta are required to achieve a LEED Silver Certification through the Canada Green Building Council (CaGBC).



IMPLEMENTING THE IC/IAC MANAGEMENT PLAN

Project team participants can face challenges in obtaining an integrated approach to incorporating a combined IC/IAQ Management Plan.

The incorporation of both CSA Standards and LEED Indoor Environmental Quality Credits 3.1/3.2 result in an integrated IC/IAQ plan that is implemented from the initial stages of enclosure of the building, through to substantial completion and end user facility turn-over.

At the final stages of contract document development, and transitioning through the procurement process and early stages of construction, a project team needs to be assembled to develop and oversee an integrated IC/IAQ Management Plan. This IC/IAQ team should be multi-disciplinary and include all relevant project participants and stakeholders, and not be limited to the design team and the construction manager or contractor.

In developing the IC / IAQ Plan, the preliminary goal is to limit the potential future (post-occupancy) generation of fungal spores and bacteria resulting from the construction process.

The aim is to:

- Control dust generation.
- Prevent dust from infiltrating occupied (or completed) areas of the facility.
- Prevent generation of aerosols from contaminating water sources.
- Prevent mould and bacteria growth.
- Prevent dust infiltration into HVAC System.
- Maintain ambient interior temperature and humidity controls, and control or preventing dust and debris build-up.
- Incorporate these temperature and humidity controls, thereby mitigating a future source of nutrients from spores and bacteria being minimized to a large extent.

Additionally, the turn-over of the completed facility is typically enacted sooner with less need to address final recurring deficiencies such as re-cleaning duct-work or addressing expansion or shrinkage of sensitive interior architectural finish material installations.

RISKS ASSOCIATED WITH FAILURE OR INABILITY TO ENACT A IC / IAQ IMPLEMENTATION PLAN

The risks of failing to enact an IC/IAQ Implementation Plan are considerable when you take into account the long term effects that will be inherited by the facility management and clinical staff of health care facilities.

Some risks include:

- Fungus and bacteria (such as aspergillus and legionella), which have a high mortality rate of immune deficient persons, may be developed.
- Construction activities that will generate dust, and spread the fungal spores and bacteria will likely occur.
- Plumbing system interruptions that can introduce bacteria to the water supply, or allow water to sit and allow existing bacteria to grow will likely occur; specifically, during interior renovations or as a result of routine maintenance procedures.
- Water and/or humidity damage to construction materials can allow micro-organisms in the environment to thrive before and after installation.
- Contamination of duct work and/or mechanical equipment during construction, which can create a warm environment for micro-organisms to grow and create a repository for such micro-organisms.

The generation and the amount of dust and debris vary through phased or staged activities within a facility during the execution of the construction process. This applies to both renovation or new construction. The degree of dust and debris accumulation can be extensive during the rough-in stages, and will typically diminish to minor quantities during the final finishing phases. This can be complicated with execution of various scopes-of-work throughout the facility construction site, not occurring at the same time, through designated zones and progressive phases. As a consequence of this reality, the

"The implementation of an IC/IAC Plan and its site specific requirements will vary depending on a number of factors."

construction team in the first instance will develop the initial implementation of the IC/IAQ Plan.

SIX PRIMARY GOALS

The contractor's expertise and implementation of the work through required construction "means and methods" will determine the initial implementation strategy. Once this initial review and implementation process is complete a further detailed review and final acceptance of the IAQ Plan by the IFC Team will be required prior to onsite execution. Six primary target initiatives are typically enacted or incorporated into the development of a IC / IAQ Plan.

These goals are identified as:

- Goal 1: Controlling dust and debris accumulation.
- Goal 2: Preventing dust from infiltrating occupied (or completed) areas.
- Goal 3: Preventing generation of aerosols from contaminating closed water sources.
- Goal 4: Preventing mould and bacteria growth.
- Goal 5: Preventing dust infiltration into HVAC Systems.
- Goal 6: Maintaining ambient temperature and humidity controls.

PHASED IMPLEMENTATION

Implementation of an IC/IAQ Plan and its site specific requirements will vary depending on a number of factors such as the size and configuration of the facility in question, and the phased construction sequencing identified by the contractor.

In regards to the Fort Saskatchewan Community Hospital, the configuration of the hospital is broken into three main components consisting of the In-Patient Unit, the Diagnostic and Treatment Unit which is the central core, and the Health Services quadrant which is for all intents and purposes a commercial annex to the health care facility.

The phased implementation of fit-up interior construction of this facility allowed for air-locked vestibules to be introduced between each of these zones / phased areas. In so doing, this allowed increased control of the indoor air quality within each of these areas, depending on what stage of construction each of them was at.

Management and maintenance of indoor air temperature and humidity was affectively controlled as a consequence of this zoned control approach. The approach for implementing an IC / IAQ Management Plan for health care facilities takes into account the different phases of construction being undertaken during the interior fit-out of a new building, or existing facility being renovated.

For this project, the IFC Team identified five separate phases of construction generally reflecting the construction activities and the resulting dust and debris generated during each of the successive phases.

Each phase had different measures instituted, such as walk-off mats, protective enclosures, positive pressure vestibules, and other control and cleaning procedures reflecting the various stages of construction within assigned control zones.

The five phases of implementation included the following requirements:

- Phase 1A: Rough-in of underground services with moderate to heavy equipment used resulting in significant generation of dust and debris. This phase is complete when pouring of concrete slab-on-grade is in place. Major areas of concern are accumulation of dust and construction debris within the interior cavity of exterior wall assemblies and any migration of moisture into composite wall assemblies as a result of moisture control and mediation practices during the installation of underground services.
- Phase 1B: Rough-in of systems and light gauge steel stud framed partitions which typically result in significant dust and debris being generated such as completion of taping, filling and sanding of gypsum wallboard panel joints. This phase is complete when the partitions and ceilings receive final preparation and application of assigned primer sealers.
- Phase 2: Installation of local systems and branch line distribution and installation of primary architectural woodwork/millwork and the commencement of interior painting applications. At this stage, significantly less dust and debris is being generated compared to Phases 1A and 1B. Any dust or debris that is generated is typically localized and far easier to control. Uses of pressurized vestibules between areas are instituted to limit dust migration. Walk-off mats at entrances to these areas, as well as shoe or boot cleaners are also introduced as a means of limiting dust migration. Use of dust inhibitors such as granular "dust bain" are also utilized to extract dust particulates from horizontal floor surfaces. This phase is complete once complete acoustic ceiling tile installations are in place.
- Phase 3: Installation of final interior architectural finishes, specialities, accessories and equipment. Access by sub-trade contractors into these areas is limited and controlled through permanent secure door installations in place. Electronic hardware and proximity access control devices are utilized to control access and record contractor activity.
- Phase 4: At this stage the facility is no longer considered a construction site, but rather a hospital / health care

facility, though as of yet not fully occupied and not servicing patients. Access to patient care areas by trades is restricted. Any construction work performed must use full hospital infection control protocols and procedures including temporary hoardings and negative above filtered work areas and negative air units ducted to the exterior of the building. Installation and calibration of owner's equipment is typically being conducted during this phase. Limited final finishing work is restricted to installation of final furnishings, fittings and equipment in conjunction with IAQ protocols under LEED and execution of final facility staff training and commissioning. This final phase concludes at substantial performance and operational turn-over of the facility.

As noted, Phases 3 and 4 had limited or restricted access, which affected various portions of the hospital that were not at the same phase at the same time. In fact, there were significant delays between certain areas such as the Health Services quadrant and Diagnostic and Treatment quadrant in the central area of the facility.

At the completion of each phase detailed site reviews were performed prior to releasing these areas to the next stage, therefore ensuring that the measures put in place were followed.

As an example, Phase 2 was not complete until above ceiling spaces were reviewed in detail by the IFC Team and not just the contractor and related consultants.

All site reviews were documented with deficiencies identified and the areas were not released to subsequent phases until follow-up reviews were conducted to ensure that all deficiencies had been corrected.

This graphic illustration indicates the various control mechanisms in place as outlined in the Infection Control / Indoor Air Quality Management Plan. The various controls were incorporated in all or some of the phases depending on the impact on IC/IAQ as identified by the IFC Project Team.

Limit controls on construction personnel during the four phases of the IC/IAQ Management Plan included the following:

- No smoking.
- No food or drinks except controlled bottled water.
- Daily cleaning with dust bain sweeping compound and HEPA filter vacuum systems.
- Walk-off mats at entrance to controlled areas.
- Monitor and control of temperature and humidity.
- Negative HEPA filtered work area vented to the outside.
- All duct work sealed at the stages of daily completion.
- Pressurized vestibules separating construction areas.
- Before walls were enclosed all interior services spaces were vacuumed and inspected to ensure that all stud tracks and electrical boxes were clear and free of any construction or waste debris.

All areas were maintained in the clean conduction during all phases.

The IFC Plan identified the level of cleanness expected. Dust and debris were not allowed to built-up, even during Phase 1 activities. Dust bain sweeping compound were specified, vacuums with HEPA filters where required and clean-up was a daily requirement. All above ceiling installations were vacuumed and dry wiped down, duct work was sealed and pressurized. Cutting rooms were established once the semi-clean (Phase 3) stage was reached to restrict dust.

Cutting rooms were further segregated with double mil-poly and vented with HEPA filtered systems to the exterior. Floor scrubbers were used to collect and control dust.

Before walls were enclosed, all stud tracks, electrical boxes were vacuumed to remove dust and debris and inspected prior to close-in. Food and drink (other than water) was not allowed within the building. Smoking was not allowed onsite.

All these measures helped to lead to a clean site, even given the high degree of construction activity onsite. Furthermore, the following cleaning and control processes and procedures outlined in the IC/IAQ Plan for implementation during assigned phases of interior fit-out included:

- Phase 1B – Dust collection system utilized when finishing gypsum wallboard partitions.
- Daily cleaning with dust bain sweeping compound and HEPA filtered vacuums.
- Phases 2 – 4 – walk-off mats with boot cleaners at primary entrances and exits to all controlled zones.
- Capsulation of duct work during onsite installation.
- Negative air intake outlets for outside air relief which incorporated merv 8 filters.
- Visual evidence of construction dust on ceiling grid support

structure and facility infrastructure in place was determined during ceiling plenum reviews. After deficiency correction and thorough cleaning a second review of the same ceiling, space was conducted to ensure that all residual dust and debris had been removed.

- Negative air units inside the pressurized zoned control corridor were utilized to maintain pressure between zones.
- Air lock vestibules separating areas and different phases of construction were utilized to minimize transmission of dust and debris into controlled air and humidity between control zones.
- Final review of all concealed spaces during the final stages of Phase 4 were conducted to ensure that all outstanding deficiencies identified in previous site reviews had been subsequently corrected and that effected pressure between ceiling plenum and the occupied zone was being maintained.

MEASURING SUCCESS

Improvements to health and safety were measured and quantifiable. These were outlined by the following:

- By controlling or preventing dust and debris build-up.
- Minimizing future sources of nutrients for spores and bacteria.
- Ensuring the site was better organized and therefore safer.
- Reducing the risk created by spillage and left over food stuffs were realized.

Improvements to productivity and profitability measured were also measured. The following are quantified results of this implementation effort summarized by:

- Fewer issues with casework and millwork being rejected from site.
- Mitigating shrinkage problems for gypsum wallboard partition and finish flooring installations.
- The site was cleaner and the trades enjoyed working in this controlled environment.
- Turn-over was achieved quicker, with less issues particularly in regard to duct work cleanness.
- Allowed for improved serviceability due to the ability for site management shut-downs for maintenance.

SUSTAINABLE SUCCESS

This approach was so successful that the experiences realized at the Fort Saskatchewan Community Hospital has a significant influence in the current updating to the CAN-CSA-Z317.13-12 Infection Control During Construction Renovation and Maintenance of Health Care Facilities Standard.

A TEAM-BASED RESULT

None of the procedures or practices implemented as part of the IC / IAQ Implementation Plan for this project could have been realized without the efforts expanded by the project IFC Team.

Managing a hospital's interior environment during construction may result in the reduction of risk for future patient infections. The procedures noted in this article will hopefully benefit future project teams being able to determine a methodology for use of construction air handling equipment and show how these innovations are changing the future of health care facility construction as it relates to ongoing monitoring and management of indoor air quality and infection control procedures during the various stages of construction and/or renovation of health care facilities.

These processes are reflected in contract documentation utilized for the implementation of these temporary facilities procedures demonstrate how this experience and implementation of these processes translates into an increased ability and awareness of how care during new hospital construction or ongoing facility renovation can result in a lasting impact on improved patient safety through the life cycle of a building. ■

Peter Semchuk is a senior associate with IBI Group. For more information, contact him at psemchuk@ibigroup.com, or visit www.ibigroup.com.

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AUDIO THERAPY

Lecterns and sound systems for healthcare settings

By Don Roth

Hospitals are unique institutions. Far more than just buildings where doctors treat patients, hospitals and other health care facilities are microcosm communities with sectors dedicated to education, business, entertainment, and even spiritual functions. In these contexts, hospital spaces frequently become presentation venues for groups of various sizes and purposes. The right presentation equipment, including appropriate lecterns, sound systems, and other presentation tools, provides the foundation for effective communication in any of these settings.

AmpliVox SW720 iPad/iPhone/iPod Wireless PA System.

AmpliVox 3430 Multimedia Smart Podium mahogany lectern with built-in sound system

THE LECTERN, EVOLVED

Public speakers have used lecterns for centuries. In years past, an imposing lectern enhanced any speaker's image as a voice of authority, along with providing a place to set down a printed speech and a glass of water. Today, however, the descendants of the traditional lectern deliver a host of options that greatly expand the range of esthetic and practical possibility. There's no need to settle for "one size fits all"; with so many choices available, hospital administrators can select specific lecterns that perfectly fit the diverse functions within the institution. In addition, lecterns come in an expansive range of design styles to enhance any décor with a high degree of customization.

Consider these potential settings for lecterns in your facility:

- **Lecture halls:** In hospitals devoted to teaching along with treatment, a well-chosen lectern is an essential classroom tool. For large auditorium settings, the best lecterns will incorporate multi-media connectivity to give the speaker easy access to video and audio control. Multimedia features do not have to drive style choices, however. High-tech options can be included in a wide range of furniture styles, from traditionally formal to sleekly modern. Choose a lectern that complements the style of the lecture hall while providing comfort and convenience to the speakers who will be using it.
- **Conference rooms:** Small-room presentations frequently require the same level of media support as a lecture hall speech, but the speaker needs to manage different types of equipment to keep the information flowing. Space constraints play a pivotal role in the selection of lecterns for

Environment of Excellence: The Patient Perspective

The CHES 2014 National Trade Show & Education Forum will be held in Saint John NB at the Saint John Trade & Convention Centre, September 28-30, 2014. Registration will be open soon!

The Education Program is shaping up quickly and is comprised of sessions covering topics such as:

- Reduction of Hospital Acquired Infections
- Water Management
- Disaster Response
- Advancement in Room Environmental Controls for Patients
- Managing Air Quality
- Shaping Our Buildings to Improve Patient Experience
- Case Studies and much more!

This promises to be an exciting and jam-packed program. Please check the website (www.ches.org) in the coming weeks as the full education program will be posted and the online registration will open soon!

The 2014 Program will kick off with **Keynote Speaker** Helene Campbell, Double Lung Transplant Recipient, Founder of the Online Campaign "Be An Organ Donor", and Queen Elizabeth II Diamond Jubilee Medal Recipient.

Other Conference Highlights Include:

- The Great CHES Golf Game will take place at the beautiful Hampton Golf Course
- The Companion Program offered will feature whale watching, a trip to picturesque St. Andrews By-The-Sea, a City Tour of Saint John, and more!
- A great kick-off event with the Opening Ceremony taking place at the Marco Polo Cruise Terminal
- A gala banquet honoring CHES' award winners, fine dining, and great entertainment!

Join us in Saint John! We look forward to seeing you!

For additional conference information, please visit: http://www.ches.org/conferences-and-events/2014-national-conference.html

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conference rooms. When projectors and other devices are needed, a mobile computer cart/lectern combination is an efficient choice that can easily move from room to room. Many models include lockable cabinets, so they can double as secure device storage units.

Tabletop lecterns also play a versatile role, serving the functions of space-efficiency and mobility. Some tabletop units include full-featured sound systems for great presentation delivery in a portable package. For occasional use, some tabletop lecterns can even be folded, collapsed, and stored flat.

- **Concierge/Valet stands:** An attractive, weatherproof lectern provides a secure point of contact for arriving patients and guests. Highly durable lecterns in polyethylene are available in a limitless range of colors, combining an attractive appearance with great practicality. Lockable storage, easy mobility, and customized logos are all valuable assets to consider for a concierge desk or valet stand.

- **Chapels:** An appealing lectern enhances the quiet dignity of your facility's sanctuary while providing presentation support for services. As a focal point of the chapel, the lectern should match the overall décor of the space. Elegant lecterns are available in many varied materials, from solid wood to crystal-clear acrylic. If the chapel activities require sound amplification, look for lecterns with discreet built-in speakers or with connectivity to established house systems.

- **Portable sound systems:** Taking communication anywhere
A simple, portable sound system will be put into service on a regular basis all over your facility. These units can support formal presentations in lecture halls, enhance audience interaction at social events, and deliver vital information to large groups of people during emergencies. Operating on battery power, they can be used indoors and out, and carried easily from place to place. As with lecterns, a variety of products are available to serve specific functions, including:

- **Personal PA systems:** Wireless technology makes it easy to set up personal public address systems. Amplifiers can be set anywhere in the presentation space while the speaker uses a lectern or walks around the room using a cordless handheld, lapel, or headset mic. Top quality choices offer a 16-channel frequency selection to reduce interference and ensure crystal clear sound.

- **Megaphones and hailers:** For outdoor or emergency use, megaphones and hailers deliver powerful sound amplification in a simple one-piece package. The distinctive bullhorn style of these units can project sound as far as a half mile. The most versatile systems include extra attention-grabbing features, such as sirens and signal lights, to maximize effectiveness in crowds. For maximum emergency preparedness, a radio hailer system allows response to teams to deliver instructions to groups of people from a remote base up to a mile away.

SMALL INVESTMENT, BIG IMPACT

For a small expenditure compared to the medical equipment needed for your hospital, the products described here deliver an outstanding return on investment. Lecterns and sound systems have the potential to be used by your staff for years to come in areas all over your facility. Take the time to explore the many options available, or contact a dealer specializing in sound and presentation equipment to discuss your institution's needs.

Presentation clarity and effectiveness are always the key to a winning strategy. The right selections will deliver a long-term payoff, improving the appearance, effectiveness, and safety of your facility every day. ■

Don Roth is CEO of AmpliVox Sound Systems, a designer, manufacturer, and distributor of top-quality sound systems, lecterns, and other presentation equipment. To learn more, visit www.ampli.com.

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Speaker: Michael Halpin, BSc., Certified HACCP Manager, Nalco, An Ecolab Company – Environmental Hygiene Services Division

Wednesday April 30, 2014

Advancing Infection Prevention during Construction and Renovation of Health Care Buildings

Speaker: Gordon Buriill, P.Eng., FASHE, CHFM, CHC, President, Teegor Consulting Inc.

Wednesday October 29, 2014

Effects of Climate Change on Healthcare

Speaker: David S. Burson, ALA, Senior Project Manager, Partners HealthCare

Resiliency and Climate Change Adaptation Measures: The New Spaulding Rehabilitation Hospital, Boston Massachusetts (Mr. David S. Burson, AIA; Senior Project Manager, Partners HealthCare, Boston, MA, USA)

Wednesday November 26, 2014

Fire Code Requirements for the Use of Flammable and Combustible Liquids in Hospitals

Speaker: Melinda Hurd, P.Eng., Associate, LRI Fire Protection & Code Consulting Engineers

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Professional Development

MANAGING WATER

Water escape and drain backup in your facility ... now what?

By Michael Flatt

You don't have to be a facility management expert to manage a water issue. Clear thinking, calling in the experts, and a few good tools can minimize the damage. However, if you're thinking ahead, having an Emergency Response Plan is a good first step.

Just when you think your day hasn't been chaotic enough, a pipe ruptures and you find your patient treatment area flooded with water. Everyone is turning to you to manage the task at hand ... are you up to it?

STEP ONE: RELAX.

Realize that panic, while a common immediate response to a destructive event of this nature, is completely unproductive. Making those first few critical decisions means staying calm. There are experts out there to help you during this crisis, so call them in. Contact your facility management team and insurance company for immediate advisory support and to help manage the process as it unfolds.

In an ideal scenario, you will have a roster of trades people and contractors on hand who can help resolve water issues in the case of catastrophe. If you don't have that list already, now is a good idea to make one.

IDENTIFY THE SOURCE

Think of yourself as a water detective. Ask yourself: Where is the water coming from? How does the water smell? Finding the source will help you identify what kind of water has been released and establish a plan for cleanup.

It's important to pinpoint the primary site and make sure it is secured as soon as possible. Water can be classified into three types: clean, grey and black. Clean water is safe for consumption; grey water is generated from activities such as health care, laundering, washing, and bathing; and black water is a high risk contaminant that contains human waste or pathogens. Each type requires a different approach with a different set of costly protocols, with clean water being the least expensive and black water the most.

As healthcare managers, you all know something about managing risk. In this case, acting fast can save you time and money.

MAP THE TIME AND FLOW

As you continue your detective work, try to determine how much time has elapsed since the water first escaped. The greater the amount of time, the greater likelihood that water has been contaminated from passing through dirty building elements or materials. As you remove the water, be sure to map the "path of flow". Ask yourself: Where did the water travel and which parts of the building have been affected? Is there an impact to any asbestos, lead paint, or sensitive patient areas?

While it feels nice in a hot shower, excess moisture can be hazardous to buildings. If moisture is removed and the building dried quickly, you can avoid problems of mould growth.

For the technologically minded, moisture probes and thermal imaging cameras should be used to determine the moisture content of impacted materials and the relative humidity of the air in adjacent areas and floors. Properly trained trades people can then assess the extent of impact and generate handy moisture maps of their readings, which can then be used to determine the amount of structural drying equipment needed to get things done right.

AIR MOVERS AND DEHUMIDIFIERS: THE WATER DETECTIVE'S MOST EFFECTIVE TOOLS

Dehumidifiers operate in conjunction with the air movers to extract moisture from the building, while the air movers draw moisture from deep within wet materials, just like a ceiling fan.

Next, you need to think about the contents, which can include diagnostic equipment, computers, beds, office furniture, documents or anything else that got caught in the water's path. Cleaning and drying can do a lot to restore damaged goods, but you will need to hire an expert to support this process and make sure everything is done properly.

In the healthcare industry, special protocols must be followed for all aspects of the project. Equipment installation and restorative operations must be carried out behind protective enclosures. The environment must be monitored on an ongoing basis to ensure the building is returned to the same condition as before the damage. Monitoring is carried out by recording the changes in moisture content and relative humidity until appropriate levels are reached.

As the saying goes, the proof is in the documentation. Once the damage is stabilized, a scope of the work to repair all

affected areas can be completed, pricing can be obtained, and restoration can begin. With a schedule in place, life at work can (almost) return to normal.

MINIMIZE DAMAGES AND COSTS WITH EMERGENCY PLANNING

Water escape and drain backup are not just devastating to your building and contents; they are also expensive. Of all HIROC's insurance claims, catastrophes leading to property damage, including water escape and drain backup, have the fourth highest associated costs and represent 7 per cent of all claims costs. Water and sewer backup damage causes the most impact on property losses and can cost you well over $1 million to repair or restore.

With all this in mind, it is imperative that you take a proactive approach to manage water escape and drain backup. This means developing an Emergency Response Plan with the appropriate support (see sidebar). Following through on a well-designed plan will reduce your costs, minimize risk, improve the quality of the restoration and -- most importantly -- put your mind at ease. ■

Michael Flatt, P.Eng., M.B.A is CEO of First General North America, an international network of property restoration contractors trained and specialized in the mitigation and restoration of water, fire, wind and impact damage to institutional, industrial, commercial and residential properties and contents. For a more detailed workshop, webinar, or article series discussing this topic, please email Rodel Figueroa, Engineering Liaison Associate, at rfigueroa@hiroc.com.

Steps to Preparing Your Emergency Response Plan:

- Review building drawings and asbestos and lead paint audits.
- Familiarize yourself with the facility, its sensitive areas, and its mechanical and electrical systems.
- Develop relationships with in-house staff and outside vendors including contact data and pricing/response protocols.
- Create a plan of action and chain of command.

Carrying Out the Action Plan:

1. Call in the experts.
2. Find the source of escape and repair it immediately.
3. Determine the type of water.
4. Clean and remove impacted areas as required.
5. Map extent of moisture onto building plans.
6. Develop structural drying plan and build enclosures as needed.
7. Complete ongoing monitoring until equilibrium is reached.
8. Scope, price, and complete repairs.
9. Review the mitigation invoices.

NIAGARA HEALTH SYSTEM SETS NEW TECHNOLOGICAL STANDARD

A case study in modern data management

By Robert Copeland

In Canadian hospitals, there are traditionally a number of isolated, independent systems that move and manage medical data. Instructions and data from such systems as medical imaging, drug plans, treatment procedures, registration, and surgical outcomes are all operated in silos. As such, millions of dollars are wasted each year because information doesn't flow efficiently from system to system. When the right data doesn't get into the right hands at the right times, the result is unnecessary paperwork, diagnostic mistakes, and redundant treatments—all of which can lead to needless spending and increase risk.

To tackle this problem within its own network, Niagara Health System (NHS) decided to replace two aging and costly facilities with a new, modern building that would use state-of-the-art technology to make information move faster, smarter, and more accurately. Along with Infrastructure Ontario, Plenary Health Niagara, PCL and JCLP, NHS tasked Plan Group to design and deliver an infrastructure for the new building that would reduce operational costs, meet environmental standards, and be adaptable to technological advancements.

A GAME-CHANGING SOLUTION

It was critical for NHS to have an infrastructure that would deliver operational efficiencies in the short term and allow easy integration of new technologies in the future, while always keeping cost and patient experience top of mind. This new hospital facility would take four years to build, which meant Plan Group had to design a system with technology that was not released to the public yet.

"In order to implement relevant technology solutions, we had to understand what our vendor partners would be releasing three years from now," says Dwayne Howden, Director of Intelligent Building Infrastructure at Plan Group. "As an on-going best practice when building large state of the art facilities, we take a hard look at the specific goals for a new facility, the technologies available, and the long-term technological and industry trends around the world."

"We are always looking three to four years ahead in order to continuously evolve technology innovations of today," Howden adds.

Ultimately, the proposed solution was innovative and game-changing: A converged communications network. Based on a wireless distributed antenna system, this network is designed to seamlessly handle all of the hospital's data and communication needs via a single system. From medical records and data retrieval, to safety and telecommunications, the new system (the first of its kind in the country) would take advantage of interconnectivity and digital intelligence to make sure the right people would receive the right information at the right time.

Putting the "quality" back in "air quality."

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The goal of the new system was maximum efficiency at minimum cost. And when technology changed – as it always does – it could be incorporated into the infrastructure as seamlessly as possible.

"This solution changed the perception on how to construct medical facilities for many people involved," noted Glen Landry, Director of Technology Innovation at Plan Group. "The traditional approach to construction is to wire facility systems and have them completely isolated from the business and clinical systems. All data at NHS was going to flow over one converged network. This was also converged with the wireless and cellular networks as well. Therefore whatever retrieval device you are using, computer, tablet, or smartphone, the one converged network will deliver that information."

CALCULATED RESULTS

When NHS commenced operations in Spring 2013, the new, million-square-foot complex became a truly advanced, modern healthcare facility that completely transformed how information is shared. The ground-breaking converged communications network continues to drive operational costs down, help patients get what they need when they need it, and provides a scalable platform for technological change. The network will ensure information flows more efficiently, allowing caregivers to make fast, informed healthcare decisions.

"Working with Plan Group means that you have access to infrastructure architects who have a profound understanding of healthcare technology, and all the new advancements, not to mention, they can translate them very easily into how the system can best be built, on the ground. Together with Plan Group, we are a team, building a modern healthcare complex," said Jeff Wilson, Regional Manager for ICT, Niagara Health System.

The new hospital facility in St. Catherine's has been operating for one full year with great success and very tangible operational efficiencies. Based on the successful implementation at NHS, this technology based approach to healthcare construction is quickly becoming the industry standard.

TECHNICAL INNOVATION – THE NEW HEALTH CARE STANDARD

Today, the requirement for our medical system to be more efficient and scalable to the demands of the public and the practitioners has never been higher. Building on the technology innovations deployed at NHS, we are now architecting unprecedented levels of digital self-awareness for new hospital systems through the development of analytics and automated work flows.

These continuing innovations will promote Canadian Healthcare as one of the most efficient and advanced systems in the world. ■

Robert Copeland is Business Development Manager at Plan Group. For more information, visit www.plan-group.com.

The Niagara Health System (NHS) was formed in 2000 and is Ontario's biggest and most intricate multi-site hospital network and Canada's leading joint healthcare facility. With seven sites throughout the Niagara region, NHS provides a wide range of inpatient and outpatient services to nearly half a million residents across a dozen municipalities. NHS includes over 4,000 employees, 600 physicians and 1,000 volunteers.

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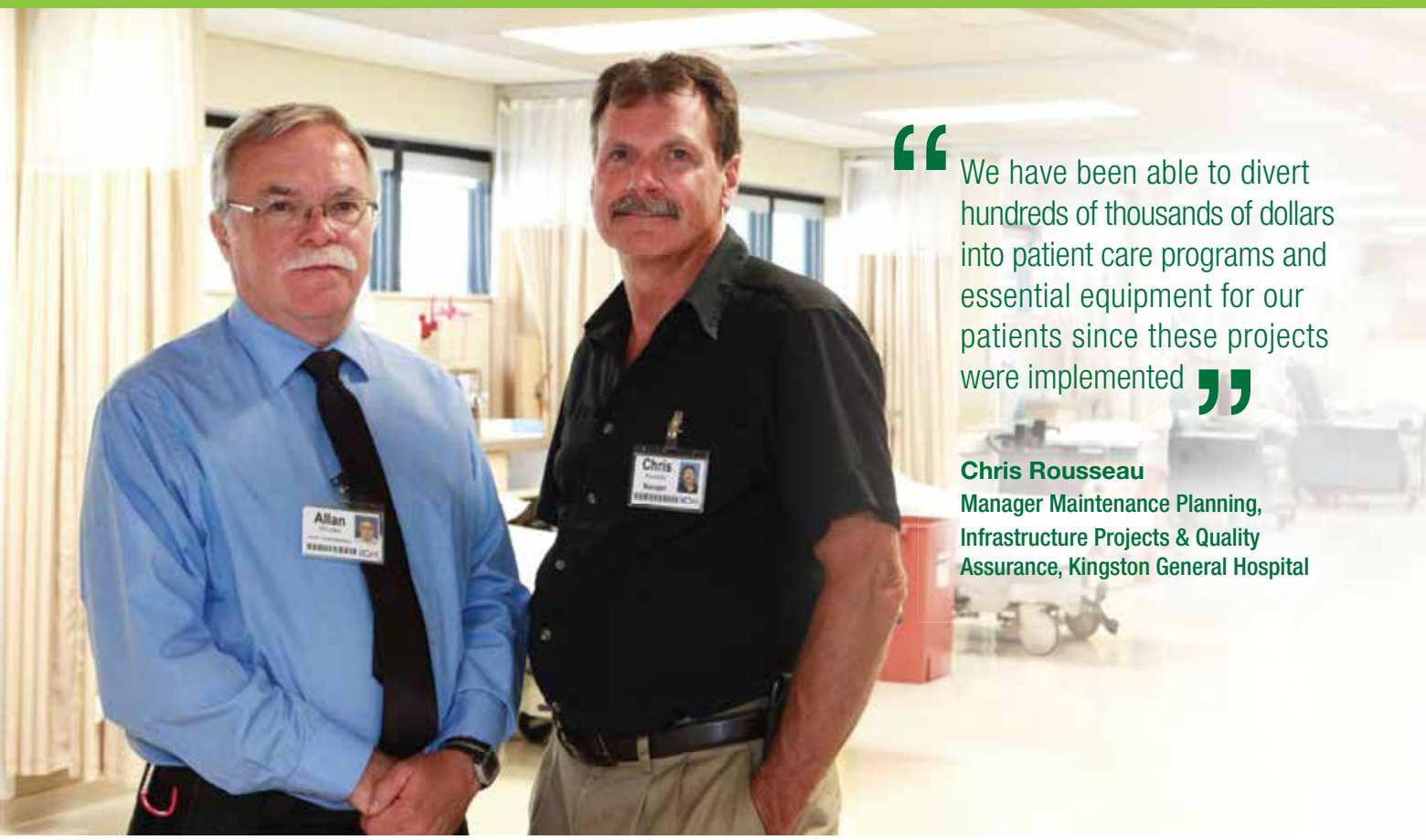

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Manager Maintenance Planning, Infrastructure Projects & Quality Assurance, Kingston General Hospital

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