

# Risk Management of Hygiene In Hospitals and LTC Facilities

According to the Public Health Agency of Canada “more than 200,000 patients get infections every year while receiving healthcare in Canada; more than 8,000 of these patients die as a result. Mortality rates attributable to *Clostridium difficile* infection (CDI) have more than tripled in Canada since 1997.”<sup>(1)</sup> Although the incidence of CDI has remained fairly steady in recent years, the severity seems to be increasing. The mortality rate attributable to CDI in Canadian hospitals more than tripled over the last decade and a half, from 1.5% of deaths among CDI patients in 1997 to 5.4% in 2010.<sup>(21,22)</sup>

Healthcare facilities are faced with what seems to be ever increasing levels of HAI’s. This is despite new and improved cleaners and sanitizers, new technologies and an ever increasing focus on staff training. Up to 40% of these HAI’s are attributed to poor hand washing and hygiene and therefore it makes sense to focus on hand hygiene. Or does it? According to Dancer (2010) hand hygiene alone is not enough. “Even exceptional hand hygiene is rendered invalid if the first object handled transfers pathogens to the patient via fingertips”.<sup>(2)</sup> We must be sure not to allow our focus on hand hygiene to override the other 60% and the need for rigorous environmental cleaning coupled with other infection control methods.

Studies repeatedly show that hand washing and other similar training programs are effective only for a limited time, so that while infections drop initially they rise again within a few months. Weber, et al. (2010) points out that hand contamination can result from direct patient contact or from indirect contaminated environmental surfaces. A patient can become colonized with a nosocomial pathogen by direct contact with a contaminated environmental surface. In some cases, the extent of patient-to-patient transmission has been found to be directly proportional to the level of environmental contamination.<sup>(3)</sup>

Countless studies verify this:

In 2012 K. Martin stated that “While we all know that hand hygiene is the No. 1 way to prevent infections; it’s not a complete solution. As long as hospitals are inadequately cleaned, doctors’ and nurses’ hands will become contaminated seconds after they are washed.”<sup>(4)</sup>

A study at Johns Hopkins Hospital found that 26 percent of supply cabinets were contaminated with MRSA and 21 percent with vancomycin-resistant *Enterococcus* (VRE).<sup>(4)</sup>

## **A simple focus on cleaning would seriously reduce this problem.**

Even back in 2006 Kramer stated: “Infection can easily spread from patient to patient through the hands of healthcare workers during treatment or personal care or by touching contaminated shared surfaces, such as bathrooms, toilets or equipment. While direct person-to-person touch is the primary pathway, the healthcare environment itself can be a route of transmission. Bacteria can exist on many objects in the patient environment (e.g. bedrails, telephones, call buttons, taps, door handles, mattresses, chairs). Some of those bacteria can survive for a long time<sup>(5)</sup> this same message keeps getting repeated through the ages.

In many hospital visits I have sat in the lobby and watched as visitors and staff passed by clearly visible hand sanitizer dispensers. Not a single one of them used the sanitizers. Based on this observation alone it is quite amazing HAI’s are not higher. The Pennsylvania Department of Health

agree that getting an infection is higher in public, especially in healthcare facilities where patients are exposed to hands on care and medical interventions. <sup>6)</sup>

Quite simply we must take a holistic approach to reducing HAI's. This means going back to basics and then quantitatively measuring the effectiveness of each program or solution. Only then can we objectively evaluate the success of our methods and programs. And only then can we act using best methods to reduce HAI's. Far too often we hear there is not the money available to implement such programs. Yet each single HAI will run a facility over \$30,000 and an outbreak could cost millions. Parts of these costs are patient treatment, staff overtime (Doctors, Nurses, Infection Control, Housekeeping), increased testing, increased cleaning practices (more frequently and more thoroughly), the cost of lawyers and legal settlements, and of course the unnecessary sicknesses and deaths. The public expect to get better when they enter our hospitals, but this is not always the case. Without pointing fingers we all have to accept some of the blame and then we need to work together to find solutions that work.

Mamoon et al 2009 showed that *"Higher-level cleaning can be effective in removing MRSA from a range of environmental sites that are high risk of patient and/or healthcare worker hand contact in critical areas, such as ICUs. However, in the absence of any residual cleaning and/or disinfectant effects, the clear beneficial effects of such decontamination interventions are transient and rapidly negated by subsequent failures in infection control practice."* <sup>(7)</sup> The key to this statement is "HIGHER LEVEL" and yet terms such as "hotel clean" are frequently used to describe levels of hospital cleaning.

**We must do better but in order to do better we must be able to analyze our cleaning results in a quantitative manner.**

But when budget time arrives, it seems that housekeeping and infection control, are the first to get the budget axe. This is ironic as the actual cost of running all departments multiplies due to higher HAI rates that result from budget cuts in the infection control and housekeeping departments. Yet nothing is done to correct this glaring imbalance.

WHY? It's actually quite simple; budgets are about numbers and statistics. I would guess that very few of infection control managers have given their hospital director a set of budget numbers showing the actual savings for overtime and expenses in other departments that you would generate, if were able to buy some of the equipment or increase the time your staff were allocated to clean each room. That in turn would allow you to improve cleaning sanitation and infection control. The compartmentalization of your department budgets is actually working against the hospital as a whole, unless someone does a holistic analysis. This is not generally deemed to be easy so it does not get done.

On the other hand, the reason management are not supporting infection prevention & control (IPC) managers is due to the lack of supportive data to back up your statements that you need more, not less. We all know that the correct measures will reduce HAI's, but proving this to upper management is difficult. IPC managers will be asked to tie fiscal numbers to infection rates (HAI's).

Since IPC managers cannot prove HAI's are even the result of good or bad cleaning practices they end up on the fiscal merry go round.

Dancer (2009) observed that until cleaning becomes an evidence-based science, with established methods for assessment, the importance of a clean environment is likely to remain speculative. She also suggested that creating standards for hospital hygiene could provide evidence that cleaning is a cost-effective intervention for controlling healthcare-associated infection.<sup>(8)</sup> Using a metric based measurement system to give repeatable qualitative results on a regular basis as part of your program using a system such as the Ensure and Supersnaps will give you those results.

It is critical that all healthcare workers become aware of the important differences between cleaning and sanitation. While they are frequently part of the same process understanding the major differences will allow us to analyze our procedures and determine what steps might need to be modified in each instance. Otter, et al. (2011) clearly defines cleaning as the removal of soil and microorganisms from surfaces, whereas disinfecting is the inactivation of microorganisms.<sup>(9)</sup> It is the IPC staff's duty to determine which disinfectant is ideal for their healthcare facility and for what applications, since microorganisms, particularly *C. difficile* spores vary in resistance to disinfecting products.<sup>(9)</sup>

Giving easy to read and understand reports to workers is very important here. Providing housekeepers with continuing education and feedback is necessary to achieve compliance with recommended daily cleaning practices. But training is not enough and ongoing studies using ATP bioluminescence assays for monitoring hospital cleanliness are warranted.<sup>(10)</sup> Based on the reports generated from ATP testing there are significant opportunities in hospitals to improve the cleaning of frequently touched objects in the patient's immediate environment.<sup>(11)</sup>

*The Canadian Committee on Antibiotic Resistance noted that "Preventing HAIs involves the right engineering and the right equipment; attention to hygiene; training of healthcare providers and staff; and the cooperation and help of patients and their families and friends. Washing hands, cleaning environments and sterilizing instruments are the best ways to prevent HAIs.<sup>(12)</sup> All of this should come as no surprise to anyone and yet the same theme comes up in study after study. Proper practices are not being followed in a consistent manner. Why? It is because no one is checking using quantifiable methods. In food processors they use [ATP systems](#) routinely to check cleaning processes. Failures lead to re-cleaning, retraining or reevaluations of the procedures used. In hospitals we see a variety of methods used for cleaning and sanitation, that if they were being implemented correctly would lead to huge drops in HAI rates.*

While we all hate putting a value on life, a base value is needed to justify the funding that is provided to buy equipment and make other changes that will reduce HAI's and in turn lead to further savings! The money delegated for cleaning and sanitation has equally demanding requirements to save

lives via medical means and equipment. Hospital administrators have a tough job because every penny they spend is needed many times over. So you need to help them to make educated decisions. Each HAI costs in the region of \$30,000 and up and if deaths are a result, that cost is much higher. To show the relative decrease in HAI's as a result of using regular ATP testing you simply need to compare decreased infection rates from your own Hospital records and public health records.

What is missing in most infection control programs is a quantifiable method of validating the various measures being used and their effectiveness. Current methods of evaluations are not quantitative or practical, and thus make it difficult to easily correlate the reduced number of HAI's with the associated costs of the solutions being suggested. What is needed is a METRIC or quantifiable way of measuring whether each chemical, process or training program has actually had the affect you anticipated and whether this is a temporary or a permanent solution. This METRIC will to tell you if reinforcement is needed for training programs, new equipment or something else. Thrall, (2013) stated "Using the right cleaners and disinfectants to decontaminate surfaces can help to reduce the risk of health care-associated infections, but employing systems to monitor cleaning thoroughness and proper training are also vital."<sup>(13)</sup>

### **What are these Metrics?**

- 1) Visual audits** are severely limited when verifying cleanliness. It can be used to enforce handwashing and identify clearly soiled surfaces but microbial testing and Adenosine Triphosphate (ATP) studies have clearly shown visual cleanliness audits to be very insufficient. "Looks clean" just does not cut it. Malik, R. E et al (2003) stated "visual assessments are not enough" and researchers in the United Kingdom found that 90% of the wards that looked clean still contained unacceptable numbers of micro-organisms.<sup>(14)</sup> Strangely enough despite the overwhelming evidence visual clean is still the predominant method of evaluation. According to Provincial Infectious Diseases Advisory Committee (PIDAC) *"After cleaning and disinfection of the environments in healthcare settings is carried out, there are no national standards in Canada to measure how clean things are. Instead, the level of cleanliness is assessed by how clean things look."*<sup>(17)</sup> *This single statement alone might explain the rise of HAI's in Canada.*
- 2) MICROBIAL ANALYSIS** is great for identifying the species during suspected outbreaks, as well as the degree of their spread. It also helps in verifying their elimination; however it is not time and cost effective enough to be used on a daily basis. To verify cleaning procedures instant results are needed. Cleaning should remove all residues and not just bacteria to prevent regrowth of bacteria. Spore formers such as *C. Difficile* may survive cleaning and disinfection but if there are no organic residues, then there are fewer resources for them to survive, grow and spread.
- 3) U.V. GELS** were developed primarily as a tool for hand wash training. Over time they have come to be used as a primary method for sanitation validation. It's cheap and easy to apply. Yet in discussions with healthcare professionals and in leading studies it has been shown to be marginally useful.

- The main issue is that it requires precision coordination of managers and infection control specialists, who must visit the room before cleaners arrive and then again before patients which slows patient turnover rates.
  - Many surfaces actually absorb the fluorescent gels making it difficult or impossible to remove while at the same time many cleaners and sanitizers interfere with the fluorescence. This leads to erratic inconsistent results. This confusion leads to many failed studies.
  - It is also easy to cheat this system since cheap portable U.V lights can easily identify where the gel was applied. This can backfire, since cleaners then focus on the glow zones only, and ignore the rest of the room, leading to higher HAI's.
  - Organic residues may interfere with these systems. Otter et al. (2011) stated The presence of organic matter reduces the efficacy of far-UV radiation, possibly explaining the more modest results observed on surfaces in hospital rooms that were not pre-cleaned and suggests the use of adenosine triphosphate (ATP) analysis for the assessment of surface hygiene. <sup>(9)</sup>
- 4) ATP HYGIENE METERS:** are not new and are the standard in the food industry for cleaning validation. They detect residual ATP, which means, that not only do they detect bacteria but they also detect organic residues (that can support microbial growth and even protect microbes from sanitizers). For **cleaning** validation, this is actually superior to microbial testing. ATP hygiene meters log the data specific to test locations and can be downloaded onto a computer for easy analysis and report generation. This allows easy monitoring of various areas and surfaces. This will allow comparison between surfaces enabling you to revise cleaning practices or to determine if certain surfaces and methods need to be replaced or if different methods need to be used. IPC managers will be able to implement new equipment procedures and practices and get actual quantifiable numbers to prove whether the new system has provided the expected advantages.

Martin explains that ATP is ideal to track if cleaning is done on correct schedules and up to standard quality. It shows whether a high frequency touch point that might look clean is microbiologically clean. <sup>(15)</sup>

Jayanthi at the Einstein Medical Center initiated an ATP testing program in June 2014, when there was a 66 percent compliance rate with the monthly testing. By July, compliance rose to 80 percent. In February and March 2015, there was 100 percent compliance with the testing. What's more, the healthcare-associated *Clostridium difficile* infection rate dropped from 0.42 infections per 1,000 patient days to 0.09 infections per 1,000 patient days. <sup>(16)</sup>

Martin 2014 also stated "Using the evidence the ATP is generating we've been able to undertake a trial where we've put additional cleaners in to take some of the responsibility for cleaning away from nursing to allow them to focus more on actual patient care" and concluded "With this system being scientific, instant and a visual display it provides that reassurance that when an item has been stated as visually clean it is actually clean. It can remove the subjective nature of visual assessment <sup>(15)</sup>

So why have [ATP systems](#) not been adopted wholesale in hospitals?

- a) At \$2000+/meter and ~\$3.00+/test swab they are considered expensive\*
- b) ATP swabs are sensitive to chemical residues\*\*
- c) They report in RLU's which varies by manufacturer and the various makes vary in real sensitivity anywhere between ~1000 (0.1fm of ATP) to ~100,000 (10 fm of ATP) CFU/ 100 cm<sup>2</sup>. Generally around 10,000 CFU/10 cm<sup>2</sup> is considered a good benchmark for good cleaning. Comparing RLU's from various Hygiene meter brands can be confusing for even seasoned professionals.

\* If analysing the material cost per test versus a gel, then it would in fact cost more. However, when doing a cost study and comparing the relative cost of either system, the resulting and lasting reduction in HAIs-cost savings will be quiet significant.

\*\* There are leading studies that have used these non-resistant ATP swabs successfully but careful supervision of when and how the swabs are used is required to avoid chemical interference. The simpler solution here is to use ATP swabs that are highly chemical resistant. The Hygiena SuperSnaps can withstand 1000 ppm of Hypochlorite as well as high levels of other sanitizers. If you want to quantify your numbers, make sure the measurement system is both sensitive enough (some systems actually only detect down to 10 fm of ATP whereas our Supersnaps detect down to 0.1fm allowing for true hygiene improvements and will withstand the chemicals present.

A factor that can lead to decreased cleaning standards is that many healthcare settings now use external cleaning services. The reality is that these companies can provide either better or poorer results. *In these situations, it is also essential that proper policies and procedures are followed. After cleaning and disinfection of the environments in healthcare settings is carried out, there are no national standards in Canada to measure how clean things are. Instead, the level of cleanliness is assessed by how clean things look.*<sup>(17)</sup> In these scenarios it is even more critical that Infection Control and Hospital management as well as the Cleaning companies all have independent means of validating that the outsourced workers are doing their jobs well. Government tendering programs rarely have components to measure and enforce proper training. This can result in a race to the bottom hiring the cheapest contractor instead of hiring those properly qualified. ICT managers can resolve this easily by implementing a quantifiable monitoring program using ATP testing. Anyone doing cleaning in the hospitals whether they be hospital cleaners or outsourced cleaners will then have to meet stringent standards or face fines or contract cancellations for non-compliance.

Another issue is the increasing focus on hand sanitizing while ignoring the other 60% of the problem. Repeated studies show the advantages of handwashing and sanitizing. There is no debating this and it is hard to argue that good handwashing is not a key solution. The real issue is that the ways in which these programs are implemented tend to lead to fluctuating results. We see the success of these handwashing programs but equally we see these numbers increase usually within a short 3 month period. Again the numbers drop as the programs are implemented and then as the focus moves on the numbers rise again. Continued vigilance to find out who is not following the handwashing rule book is needed. The solution is not less focus on hand sanitizing but more focus on hand and surface cleaning.

Possibly the most overlooked issue is the complete misunderstanding of what hand washing is all about. Time and again we see placards stating “Wash your Hands” and right below it is a hand sanitizer dispenser! The average person would likely assume this is how you wash your hands in a hospital. Gerding noted that *Spores are resistant to alcohol, washing hands with soap and water is recommended over alcohol hand rubs in healthcare facilities experiencing outbreaks of C. difficile* <sup>(19)</sup>. We should take this a step farther. All people entering a hospital MUST wash their hands first and those leaving a washroom would also need to be validated as having washed their hands correctly. Hand gels DO NOT clean hands. They do disinfect but they also leave any organic residue on the hands leading to an ideal growth medium for bacteria picked up from the next surface that you touch. This leads to a self-defeating cycle after sanitizing hands, they are re-infected, and pathogens on hands are cultured and then spread throughout the hospital.

The focus MUST change to “WASH YOUR HANDS PROPERLY” Again an ATP system is ideal here since it will detect bacteria or organic residues and if the person has open sores (dangerous to healthcare workers and patients) these will be detected also and the person can be told to glove up during their time there.

Again we need to remember “*More than 200,000 patients get infections every year while receiving healthcare in Canada; more than 8,000 of these patients die as a result.*” <sup>(1)</sup>

- Mortality rates attributable to *Clostridium difficile* infection have more than tripled in Canada since 1997.
- The healthcare-associated methicillin-resistant *Staphylococcus aureus* infection rate increased more than 1,000% from 1995 to 2009.
- Best practices in preventing infection can reduce the risk of some infections to close to zero. <sup>(1)</sup>

**We can do better and we must do better.** We must also look, think and act outside of the box and make the needed changes. From the evidence presented, it is very clear the path we are on is not working. Preventing HAIs involves the right engineering and the right equipment; attention to hygiene; training of healthcare providers, staff and the cooperation and help of patients and their families and friends. Washing hands, cleaning environments and sterilizing instruments are the best ways to prevent HAIs. <sup>(12,17,20)</sup>

Increasing awareness in a complex environment, educating and encouraging healthcare workers, patients and visitors to wash their hands at the right time and consistently perform other hygiene practices is one challenge. Others include the ever-changing characteristics of infectious agents and the increasing risk of infection associated with advances in medical care and increasingly vulnerable patients. <sup>(18)</sup>

Infection can easily spread from patient to patient through the hands of healthcare workers during treatment or personal care or by touching contaminated shared surfaces, such as bathrooms, toilets or equipment. While direct person-to-person touch is the primary pathway, the healthcare environment itself can be a route of transmission. Bacteria can exist on many objects in the patient environment

(e.g. bedrails, telephones, call buttons, taps, door handles, mattresses, chairs).<sup>17</sup> Some of those bacteria can survive for a long time—in some cases for many weeks and even months. Research on object contamination shows that as levels of environmental contamination increase, so does the prevalence of *C. difficile* transmitted between healthcare workers and from them to patients.<sup>(19)</sup>

*Addressing infection prevention in healthcare settings involves multiple tactics. Some of those are:*

- *educating everyone about how infections occur and how to prevent them;*
- *reminding everyone, including visitors, to carefully clean their hands with soap and water or alcohol-based hand rubs before and after interacting with patients;*
- *detecting and identifying outbreaks of infection with careful and continuous monitoring and surveillance<sup>(17)</sup>*

The key here is **CONTINUOUS MONITORING AND SURVEILLANCE**. A case in point was that during the SARS outbreak “intensive care patients were more than twice as likely to develop an HAI in the pre-SARS period as in the SARS period”<sup>(23)</sup>. While part of this was the obvious increased amount of cleaning it was also the increased monitoring that made awareness of what areas needed better cleaning that allowed for improved cleaning and HAI reductions.

In conclusion we must look beyond the methods we use to validate cleaning practices currently and implement ATP validation systems that will work with the range of cleaners in use. Collect the results and log them based on the various high touch surfaces to be cleaned using our [Ensure meters](#) and sanitizer resistant [SuperSnap ATP swabs](#) and use the advanced yet easy to use SystemSure software to analyze the results.

From there you can:

- a) Pass or fail each test point instantly.
- b) Collect the data for analysis using easy to use graphs and charts.
- c) Use the analysis to determine what programs are working and which need improvement.
- d) Use the renewed focus on HAI reduction programs and if results begin to rise, be able to take immediate action based on real quantitative results.
- e) Use the savings generated from the reduced HAI’s to in turn pay in part for the increased monitoring, but more importantly use these savings for further improvements that in turn will lead to even lower HAI’s.
- f) Instead of battling to keep the status quo, we are finally able to drastically reduce HAI’s and continue doing so on a year to year basis while at the same time saving the health system money.

So contact us today and let us help you win the war on HAI’s!

Sincerely

**Douglas Wright B.Sc. C.T. Microbiology**

President



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