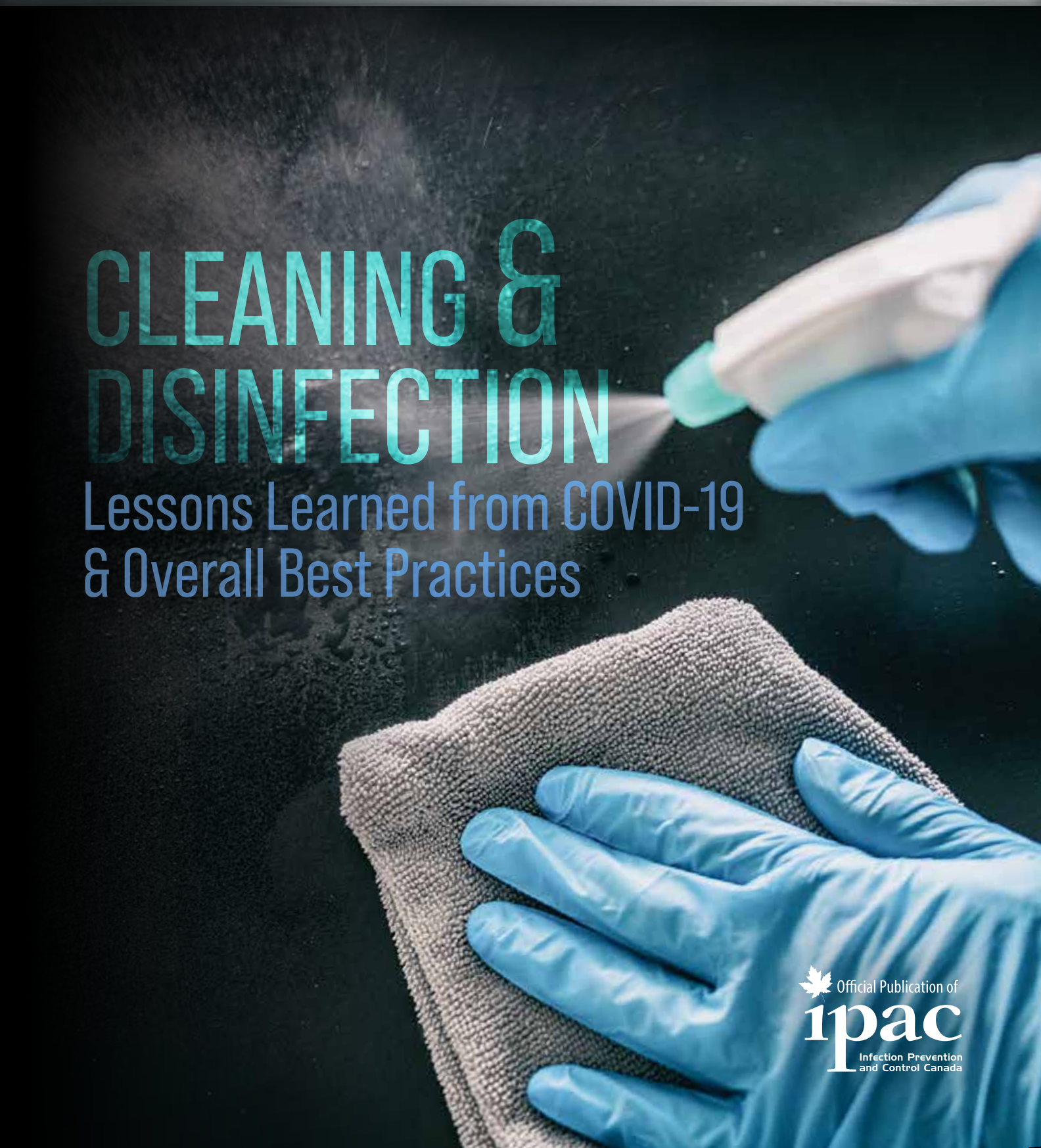
INDUSTRY INNOVATIONS

Where Product Innovation Meets Best Practice

Volume 3, Number 2, Winter 2021



CLEANING & DISINFECTION

Lessons Learned from COVID-19 & Overall Best Practices

Official Publication of ipac Infection Prevention and Control Canada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VOLUME 3, NUMBER 2, WINTER 2021

INDUSTRY INNOVATIONS

IPAC CANADA – THE SMART WAY TO ADVANCE INFECTION PREVENTION AND CONTROL.

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IPAC Canada – We inspire, nurture and advance a culture committed to infection prevention and control.

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Contents

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Foreword

"Let us keep in mind that during this entire pandemic, **EVS professionals have demonstrated high levels of courage and confidence to get the job done**, and they are counting on innovation to do it with even more confidence next time around!"

If we have learned anything from the current pandemic, it is that all the experience Environmental Services (EVS) professionals have garnered from managing past outbreaks has been key to their success, but nothing could have fully prepared them for the magnitude of this crisis. While worldwide panic set in, EVS teams applied existing protocols to curb the spread of infection through environmental surfaces, and played a big role in all healthcare settings, including hot zones. However, much like other healthcare workers, they did face their own share of challenges, such as supply chain issues, staff shortages and increased demand for services to be rendered. As a result, managers turned to innovation, more than ever, to achieve greater efficacy and efficiency in an attempt to keep up with demand while maintaining or improving current practices. Examples include the use of electrostatic technology to apply disinfectants on surfaces more efficiently without having to add more personnel, antimicrobial curtains to reduce the number of time-consuming curtain changes needed in between patients, while maintaining safety, training tools to streamline the learning process to ensure that the latest information reaches all staff in an effective and timely manner, auditing tools to speed up quality inspections, etc.

The current pandemic has certainly shined the spotlight on EVS departments in every healthcare institution across the country and that attention has brought forward an openness to embrace cutting edge products and services like never before. Industry decision makers will look for ways to offer patients and fellow healthcare workers peace of mind when it comes to sanitized environmental surfaces, through great efficacy and high levels of efficiency to achieve that goal, while providing increased traceability to stakeholders.

This issue of *Industry Innovations* showcases leading edge technologies which are focused on these critical factors and, as guest editors, we are excited to share them with our readers in the Canadian infection and control community. On that note, let us keep in mind that during this entire pandemic, EVS professionals have demonstrated high levels of courage and confidence to get the job done, and they are counting on innovation to do it with even more confidence next time around!

Anthony Turi, BCom
Monica Stanton, RD, HBSc.

Wahkotowin

and How Simplifying Surface Disinfection Helped Support an Entire Community During the Pandemic

Abstract

Throughout the pandemic, infection control – specifically surface disinfection – has become relevant to the day-to-day operations of non-acute healthcare situations. Ambulances, long-term care, residences, pharmacies, clinics, and makeshift triage centres have all been forced to embrace standards that were reserved for hospitals prior to this pandemic. But now they must do so with the same or less people, tools, and time. The question now is how?

The pandemic forced thousands of entities to confront this question. One of these groups was the Maskwacis Ambulance Authority (MAA). Maskwacis is a proud First Nation community in Treaty No. 6 Territory. Maskwacis is comprised of four First Nations communities: the Ermineskin Cree Nation, Samson Cree Nation, Louis Bull Tribe, and the Montana First Nation. MAA provides in-home, community and emergent care for the approximately 18,000 residents in the area. Among their services, they offer 24/7 mental healthcare, medical assessment, urgent pre-hospital treatment, and transport to definitive care. They receive over 10,000 calls (from both divisions EMS and Mental Health) for service per year. During the pandemic, the community reported 2,568 cases of SARS-CoV-2.

As the pandemic continued, the services offered by MAA became even more central to the health of the communities they serve. The organization experienced an increase in call volume, but a decrease in transports. The needs of the community remained the same, but they were augmented by the cases of COVID-19 and the anxiety surrounding the pandemic. The nature of the requested help also changed. Some cases, which would otherwise involve transport for treatment to a healthcare centre now had to be addressed on site in the home, or at the location of the patient. It was clear that while members of the community had maintained their trust in the treatment services and care providers, they were afraid of going into buses or to the hospital for fear of contracting SARS-CoV-2.

To help, staff met the challenges and maintained the service levels that the community had come to rely on by examining and implementing the Nocospray System to augment the level of disinfection in their ambulances, schools, transport vehicles, local businesses, and various public spaces.

The Nocospray Disinfection System allowed MAA to share a strategy that enhanced disinfection beyond the silo of one company, but with the community and allied partners in kinship. It embodied wahkotowin, which is the Cree word that denotes the interconnectedness of all things, and our responsibilities to those with whom we share the world.

The System

The Nocospray and Nocomax systems are both mobile, self-contained machines. They disinfect all hard surfaces in a space through the ready-to-use liquid disinfectant, Nocolyse, which is released in gas form. After an initial cleaning step to remove dirt and debris, one staff member can set up the system based on the total volume of the enclosed space to be disinfected. The staff member then activates it with the touch of a button and leaves the space to allow the disinfection to take place.

After the necessary period defined by the volume of the space, staff can re-enter, and the area can be put back into service. There is no rinsing or wiping required for non-food contact surfaces.

Nocolyse is a hydrogen-peroxide-based liquid disinfectant which has been approved by Health Canada when used as part of the Nocospray system. It is approved as a disinfectant that has demonstrated efficacy against a variety of pathogens, including spores such as those produced by *Clostridioides difficile* bacteria. The Nocospray and the Nocomax systems can disinfect closed spaces with volumes as small as 1.5 cubic metres (53 ft^3) to more than 1,400 m^3 (50,000 ft^3).

Both the Nocospray and larger capacity Nocomax are mobile and easy to use so that staff can confidently engage the system and leave it to disinfect while they complete other activities.

The Nocospray and the Nocomax systems can disinfect closed spaces with volumes as small as 1.5 cubic meters (53 ft^3) to more than 1,400 m^3 (50,000 ft^3).

Nocospray – Disinfection simplified

Impact

MAA provides in-home, community and emergent care for the approximately 18,000 residents of area. Among their services, they offer 24/7 mental healthcare with access to mobile units, virtual medicine, medical assessment, urgent pre-hospital treatment and stabilization for serious illness and injuries, and transport to definitive care. They receive over 10,000 calls (from both divisions EMS and Mental Health) for service per year. During the pandemic, the community reported 2,568 cases of SARS-CoV-2.

Throughout the pandemic, there were shifts in the services that MAA provided. This was due to an increase in overall need due to the pandemic itself – an increase in hesitation among clients to leave the safety of their homes for treatment due to fear of exposure to the virus, and an increase in perceived risk to staff of being exposed to the virus while providing care or being in a closed environment, such as an ambulance or other transport vehicle. Together, this resulted in an increase in requests for other options besides transport to the local emergency rooms.

Staff used appropriate personal protective equipment (PPE) to protect themselves and clients from airborne transmission of the disease. However, the very nature of the ambulance presented a particular challenge. Ambulances are small, confined spaces filled with complicated equipment and supplies that are touched frequently and difficult, if not impossible, to decontaminate.

MAA followed their established protocol wiping down high-touch surfaces between clients and verified contamination levels using handheld ATP (or Adenosine Triphosphate detection) technology. As the extent of the crisis became evident, the direction of the MAA sought to augment their existing practices with a technology that would more completely disinfect the ambulance. This could offer additional protection from a highly contagious pathogen and provide reassurance to the community and staff that the MAA was doing everything possible to protect them. Doing so also served to reinforce the philosophy that the Maskwacis community and surrounding areas would make it through the pandemic together by continuing to support and care for each other.

Having purchased the system, the team embarked on an implementation process that included three phases:

Validation – Using the ATP system previously adopted to verify contamination results, the ability of the Nocospray to disinfect locations that were difficult to access and to consistently decontaminate was demonstrated internally. This served two purposes:

1. To validate that the machine was being used appropriately; and,
2. To provide in-house reassurance to team members and the community that the system brought in to help protect them was doing so.

Training – MAA includes 75 full-time employees, all of whom work with equipment, vehicles and in offices that would need to be decontaminated. The goal was for all targets to be able to be treated with the Nocospray System. "As roll out expanded, all full-time employees were trained on the system. Because the system is easy to use, requires no mixing, and settings could be established ahead of time, staff were onboarded quickly, and protocols remained consistent."

Roll out – As the pandemic progressed, the demands of the community for disinfection advanced as well. More calls of various types meant the Nocospray System was required more frequently and in different locations. Coordinating decontaminations and disinfections became more complicated as the value of the system was realized by various teams, stakeholders, and community members. With one machine, it became a challenge to ensure that transports were not delayed because the system was in use in residence homes, schools, offices, or in other vehicles. After reviewing the need, two additional machines were purchased. The additional Nocospray Systems allowed an expansion of service offerings to schools, buses, transport vehicles, local business, and various public spaces.

Current Practices

MAA continues to use the system in ambulances and various offices and training spaces despite the arrival of the vaccine and the decline in COVID-19 cases.

NOCOSPRAY HELPS YOU PROTECT AND SUPPORT PEOPLE EVEN WHEN THE THREAT IS INVISIBLE.

Disinfecting surfaces is a cornerstone of infection control in hospitals since research demonstrates that the environment can act as a fomite for pathogens that cause hospital-acquired infections. The need to disinfect surfaces is matched by the difficulty to do so consistently. Disinfection requires:

- Choosing chemicals that are compatible with surfaces and effective against the pathogens suspected;
- Building protocols and procedures that allow the products to be applied and the correct wet contact time to elapse;
- Making sure that all surfaces are completely covered by the relevant disinfectant; and,
- Allowing enough time and staff to do this while balancing other needs and the patient flow in the institution.

The Nocospray Disinfection System allows you to disinfect all the hard surfaces in a space – including the ones that are hard to see, hard to reach, or sometimes forgotten – completely and consistently. Nocospray and the larger-capacity Nocomax, act in the space without staff present so they are free to do other tasks while still meeting their disinfection targets.

- The machine options are compact enough for an ambulance or a small bathroom, but have the capacity to disinfect an operating theatre, classroom, or dormitory. The sporicidal disinfectant is ready to use so no time is spent mixing, and there is no risk of a mixing error.
- The System is easy to use and integrates easily into existing maintenance protocols.
- The protocol reduces the amount to time staff spend in a contaminated room, which reduces staff stress and anxiety. This was especially true during the height of the pandemic.

These benefits are realized whenever the system is deployed in an ambulance, a hospital, a long-term care facility, or a school. There is a clear quantitative advantage to using the system when looking at the science of killing germs. To MAA, however, and the clients it serves, using the system provided more than that when facing the pandemic. It allowed users to care for their communities and reassure them that they are doing the best possible job to prevent the SARS-CoV-2 from impacting their loved ones.

As a matter of policy, the A.M.G. Medical team prior to initiating all major projects, partnerships, and endeavours, asks a fundamental and simple question – Why do this? The answer is vetted by relevant teams and stakeholders. It is then kept as an anchor throughout the project. The same was true of this paper.

In this case, the principal stakeholder driving the development of this paper was the Maskwacis Ambulance Authority led by Stew Schmidt, General Manager.

The question comes down to why did the adoption of the Nocospray System help you and your community?

> "The answer lies in the Cree word "wahkotowin", which denotes the interconnectedness of all things, and our responsibilities to those with whom we share the world. This system allowed us to share a strategy towards enhanced disinfection beyond the silo of one company, but with the community and allied partners in kinship.
>
> In the wake of heightened health concerns from the coronavirus and other pathogens, it's never been more important to protect the health and safety of our team and the people we serve. The uncertainty of the virus was a stress felt upon many. This Nocospray solution allowed our team to feel supported and also to support other teams. Our frontline paramedics felt supported with this system to enhance cleaning strategies that traditional methods may have missed. The patients had an increased confidence that surface areas were clean and disinfected. Moreover, the MAA team was able to share that strategy within Maskwaics."

Learn More about the Nocospray System

For more information regarding the Nocospray or Nocomax systems contact your A.M.G. Medical representative or visit our website at *www.nocospray.ca* ■

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†† Kills SARS-CoV-2 Virus on hard, non-porous surfaces when used according to directions for use for disinfection.
[1] When used as directed, this product is effective for 24 hours against Enterobacter aerogenes, Staphylococcus aureus, and Community-associated Methicillin-Resistant Staphylococcus Aureus bacteria

Advanced Clean – How Continuously Active Antimicrobials Can Elevate Hygiene in Healthcare Settings

Abstract

While there are a wide variety of products available to sanitize and disinfect surfaces, one major limitation of these products is that they fail to protect surfaces from subsequent contaminations throughout the day. Residual antimicrobials fill this gap. Scott® 24-Hour Sanitizing Wipes[1] were the first pre-saturated wipes registered by the Natural and Non-prescription Health Products Directorate at Health Canada, and the first to pass the United States Environmental Protection Agency's allowed residual self-sanitization protocol (1). This protocol requires that coatings withstand a series of both wet and dry abrasions, as well as inoculation with bacteria to ensure the ability to kill 99.9% of bacteria over a 24-hour period, even with multiple touches[2]. The wipes are truly a ground-breaking innovation and are ideal for easily wiping down and continuously protecting high-touch, non-porous surfaces against bacteria, including door handles, elevator buttons, keypads, keyboards, countertops, desks, tables, washroom fixtures, pens, clipboards, lanyards, and many other surfaces of relevance in healthcare settings. Wipes offer a convenience and ease of use that make them an ideal way to quickly and easily deliver a long-lasting antimicrobial formulation to a wide variety of surfaces. Scott® 24-Hour Sanitizing Wipes not only kill bacteria for 24 hours,[2] they also provide an efficient way to clean a variety of surfaces found in healthcare settings. The product also offers traditional disinfection benefits such as killing of SARS-CoV-2, the virus that causes COVID-19, influenza viruses, as well as MRSA, *S. aureus*, E. coli, and other bacteria and viruses.[3] Scott® 24-Hour Sanitizing Wipes also provide the added benefit of residual sanitization so that bacteria are continually being killed throughout the day, offering peace of mind and confidence in addition to an excellent cleaning, sanitizing, and disinfecting wipe experience.

Specification

It's often a simple, yet provocative question that leads to innovative breakthroughs. In the case of Scott® 24-Hour Sanitizing Wipes, the innovation was sparked when one of Kimberly-Clark Professionals directors posed a provocative question to a scientist in the hallway.

[1] EPA Registration # 9402-17, Health Canada DIN # 02431475
[2] When used as directed, this product is effective for 24 hours against *Enterobacter aerogenes*, *Staphylococcus aureus*, and Community-associated Methicillin-Resistant *Staphylococcus aureus* bacteria.
[3] Killing viruses SARS-CoV-2, Respiratory syncytial virus (RSV), Coronavirus, and Influenza A (H1N1) and bacteria *Salmonella enterica*, *Streptococcus pyogenes*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, and *Escherichia coli* 0157:H7.

In the span of 12 hours an **adult touches surfaces up to 3,600 times** and **their face 180 times**.[3, 5]

One study found that **bacteria** transferred to **laminated menus persisted for six or more hours**, posing a serious risk of cross-contamination.[4]

[3] Zhang, N., Li, Y. and Huang, H., 2018. Surface touch and its network growth in a graduate student office. Indoor Air, 28 (6), pp.963-972.
[4] Stephens, B., Azimi, P., Thoemmes, M.S., Heidarinejad, M., Allen, J.G. and Gilbert, J.A., 2019. Microbial exchange via fomites and implications for human health. Current Pollution Reports, 5(4), pp.198-213
[5] Nicas, M. and Best, D., 2008. A study quantifying the hand-to-face contact rate and its potential application to predicting respiratory tract infection. Journal of occupational and environmental hygiene, 5(6), pp.347-352.

Survival on dry sufaces

Pathogen	Survival on dry inanimate surfaces
Clostridium difficile (spores)	5 months
Norovirus	Months or longer
Aspergillus (spores)	Months or longer
Pseudomonas aeruginosa	6 hrs. to 16 months; 5 weeks on dry floors
Acinetobacter sp.	3 days to 5 months
Staphylococcus aureus (including MRSA)	7 days to 7 months
Coronavirus	3-28 days
Influenza virus	1-2 days

"What if there was a technology that kept killing germs on surfaces past the initial application?" he asked.

This conversation led to the formation of an innovation effort incorporating long-lasting antimicrobial coatings in an easy-to-use cleaning product. A team combined of formulation scientists, microbiologists, and chemists was established to tackle this formidable problem, leading to the creation of the Scott® 24-Hour Sanitizing Wipes product. This is the first-ever pre-saturated wipe to pass the EPA's approved residual self-sanitization protocol (1) and make a claim of killing 99.9% of bacteria, in spite of multiple touches.[2] This product demonstrates the creativity unleashed by a "what-if" spirit of scientific inquiry.

The novelty of the Scott® 24-Hour Sanitizing Wipes approach is best conveyed through the granting of United States patent US 9,949,477 B2 in 2018 (inventors Cunningham, *et al.*) (2). As the first pre-saturated wipe to address the need for a durable antimicrobial coating, Scott® 24-Hour is effective against a broad range of microorganisms. On a surface, the sanitizing coating is stable, gentle to materials, and has excellent touch, sight, and smell aesthetics. Other residual sanitizers typically employ a spray format for delivery, sometimes necessitating the use of an independent wipe to dry or clean surfaces. Kimberly-Clark chose to leverage the convenience and hygienic nature of single-use, pre-saturated wipes that differentiates them and make for the best application of this patented and unique chemistry.

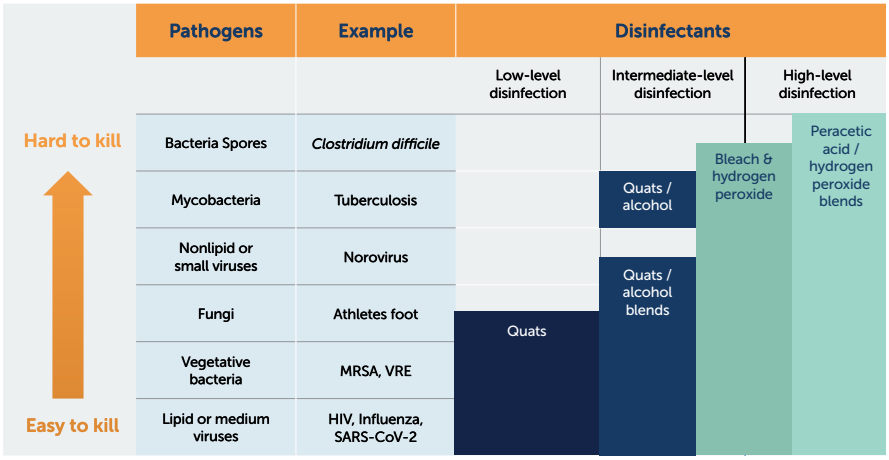
The Scott® 24-Hour Sanitizing Wipe's innovation comes not just from its patent-protected formulation, but also Kimberly-Clark's extensive materials science expertise. While the obvious strength of the invention is in the chemistry, much care was taken in the development of a vehicle to deliver it. The solution is delivered via a melt-blown wipe treated with its own proprietary blend of chemistry, which minimizes quaternary ammonium compounds or quat binding. Kimberly-Clark's melt-blown process delivers a structure that combines optimized fibrous surface areas and a unique bond pattern to ensure that the formulation is absorbed and distributed throughout the entire pore structure of the material. Optimized fluid distribution in the wipe leads to excellent metered-release properties, which then helps maximize the number of passes over a surface before the chemical is exhausted. Finally, the fibre composition and orientation combined with the unique bond pattern creates a surface topography that provides users with an exceptional cleaning experience. Kimberly-Clark Professional understands the importance of raising awareness at the site location for the advanced cleaning efforts being undertaken by EVS and health professionals. That's why Scott® 24-Hour Sanitizing Wipes also offer a host of customizable materials such as mirror and window clings, table tent cards and posters to ensure that visitors, patients, and even staff are fully aware of how Scott® 24 is being used to elevate hygiene to a new level. Each item

contains a QR code that links directly to a short, informative video about how Scott® 24 works to protect surfaces and how it differs from other products people may be used to seeing. This combination of 24-hour product efficacy[2] along with tools to promote awareness of product benefits not only help provide enhanced protection, but also assurance to all those who enter the healthcare setting of the daily effort being made on their behalf.

Metrics

Scott® 24-Hour Sanitizing Wipes passed the rigorous EPA Residual Self-Sanitizer (RSS) protocol (1), which is recommended by Health Canada in support of efficacy of residual self-sanitizing on hard, non-porous, non-food contact surfaces.The importance of meeting the performance recommendations outlined in the RSS method is that this method tests the residual product with conditions that try to remove it from the treated surface. For a product to be truly residual, it must be able to kill repeatedly for at least 24 hours while being resistant to attempted removal by wet and dry abrasions (1). The EPA RSS protocol utilizes wear cycles (wet and dry abrasions) and microbial loading to demonstrate a product's ability to remain on a surface and continue to kill bacteria to 99.9% for 24 hours (1). This protocol demonstrates the product's durability and efficacy, while simulating real-world wear and soiling. To assure broad-spectrum activity, the EPA currently requires the RSS test to be conducted with a representative Gram-positive (*Staphylococcus aureus*) and Gram-negative (*Enterobacter aerogenes* or *Klebsiella pneumoniae*) strain. The EPA recently defined the endpoints required to residually disinfect bacteria on a surface. The abrasion sequence is the same as for the RSS, but the endpoints require 5-log kill in at least 10 minutes, rather than the 3-log required for an RSS endpoint (1, 3). The primary advantage of residual sanitizers or disinfectants is that the surface can kill for an extended period of time, allowing for continuous protection from fomite transfer. Several studies have been done to demonstrate the benefits in actual use scenarios (4,5).

Pathogen hierarchy and disinfectant chemistries



A study published in the *American Journal of Infection Control* demonstrates how both a hand and surface hygiene intervention significantly impacted virus transmission in a long-term care facility (6). The study found that education combined with the right solutions in the right locations greatly reduced the spread of viruses. As a result of the hygiene intervention, the number of viruses on surfaces was reduced by 99.9% and the presence of viruses on hands was reduced by 99%.

What this and the other studies cited in this paper demonstrate is that building a comprehensive hygiene and disinfection program which includes residual antimicrobials and, ideally, residual cidal wipes can make a significant difference in helping to reduce the spread of pathogens. Antimicrobials are commonly applied to a surface by two divergent methods – spraying or wiping. Users who apply spray products tend to combine wiping after spraying, adding some complexity to the process. Disinfection wipe products come in two forms – either a solution is added to a wipe, or a wipe is pre-saturated with an antimicrobial solution. Regardless of the product form or method of application, for a residual product to be most effective, a uniform coating should be applied to the entire surface. Therefore, it is important to understand how the disinfectant is applied. The remainder of this section focuses on the role a wipe plays in disinfecting surfaces (7, 8, 9).

When it comes to wiping to deliver the antimicrobial, there are several options to choose from:

- Paper towels, which contain wood pulp
- Non-woven wipes
- Polymer-based towels
- Melt-blown
- Spun-bond
- Microfibre
- Mixed-fibre wipes, which contain wood pulp and polymer
- Hydro-knit
- Co-form
- Woven towels, which contain cotton

When using a disinfectant system that adds the disinfectant to the wipe, it's essential to make sure the right wiping material is chosen – one that is compatible with the disinfectants. Research has shown that the wiping material used can dramatically affect the amount of disinfecting agent that reaches the surface being cleaned. A prime example: quaternary ammonium compounds (quats). Quats are attracted to and absorbed into fabrics, such as cotton towels.

A 2013 study in the *American Journal of Infection Control* found that cotton towels may reduce the effectiveness or even inactivate the ability of quats to disinfect surfaces (10). The study found that laundered cotton towels soak up and hold disinfectant so that it doesn't reach the surface at the recommended concentration level. As a result, cotton

towels were found to reduce the disinfection strength of quat-based disinfectants by up to 85%.

The use of pre-saturated wipes ensures that the wipe material is compatible with the "killing active" used in the disinfectant product. The most common antimicrobial actives used in residual products are quats, which means that the wipes used to deliver this active must not contain cellulose or other negatively charged materials (10). In addition, pre-saturated wipes ensure the necessary volume of disinfectant is added to a surface to permit effective kill.

Wiping is also the best way to help ensure that the entire surface is treated. Wipes help reduce the risk of incomplete coverage as compared to sprays.

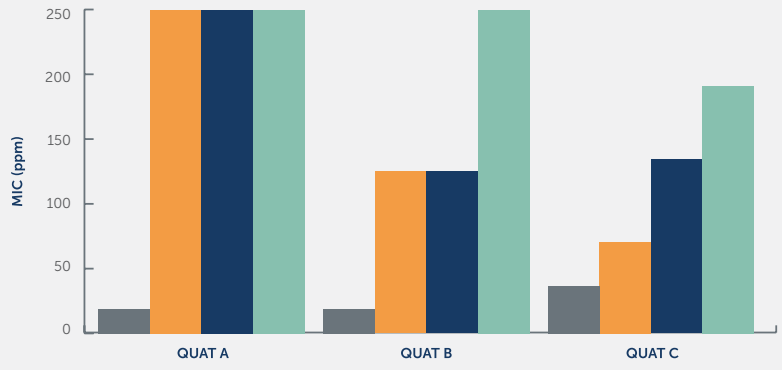
Implementation

When selecting solutions for a facility, it's important to distinguish between static solutions, which inhibit the growth of microorganisms, and cidal solutions, which destroy microorganisms. For the best possible results, solutions need to offer long-lasting residual protection and continue to protect surfaces even after multiple touches. In addition, consider the method for applying residual solutions. It is preferable not to use a cotton towel or a wipe that contains cellulose, or other negatively charged fibres (10). A pre-saturated wipe with the appropriate base sheet technology will help ensure that the necessary volume of disinfectant is added to the surface to enable an effective kill. Wiping is also an optimal way for the entire surface to be treated because it allows for complete coverage of complex surfaces and can reach areas that sprays may miss.

Scott® 24-Hour Sanitizing Wipes is an excellent product to use as a "bridge" between more routine cleanings in non-critical care settings. Waiting rooms, desks, public washrooms, elevator buttons, TV remotes, chair rails, door handles, and many other high-touch surfaces could benefit from the use of residual antimicrobials to offer continual sanitization over 24 hours. [2]

It is also beneficial to raise awareness of the advanced cleaning and hygiene efforts being undertaken by staff; thus, it is best to make tent cards, mirror and door clings, and other informational materials clearly visible to help drive understanding from staff, patients, families, and visitors about the innovative technology being leveraged to enhance protection.

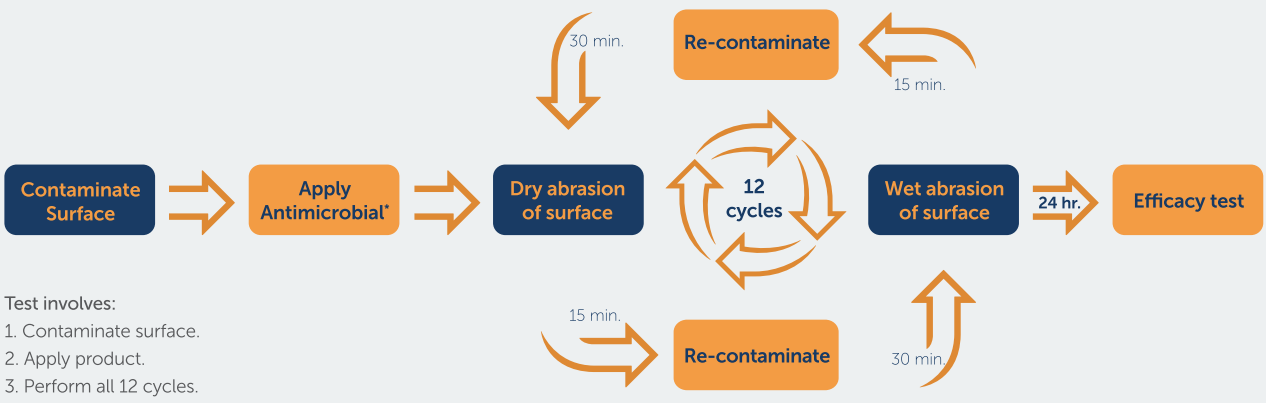
Cotton decreases Quat effectiveness



Cotton towels caused a decrease in effectiveness for all three Quat disinfectants, as measured by a modified MIC with *E. aerogenes*.

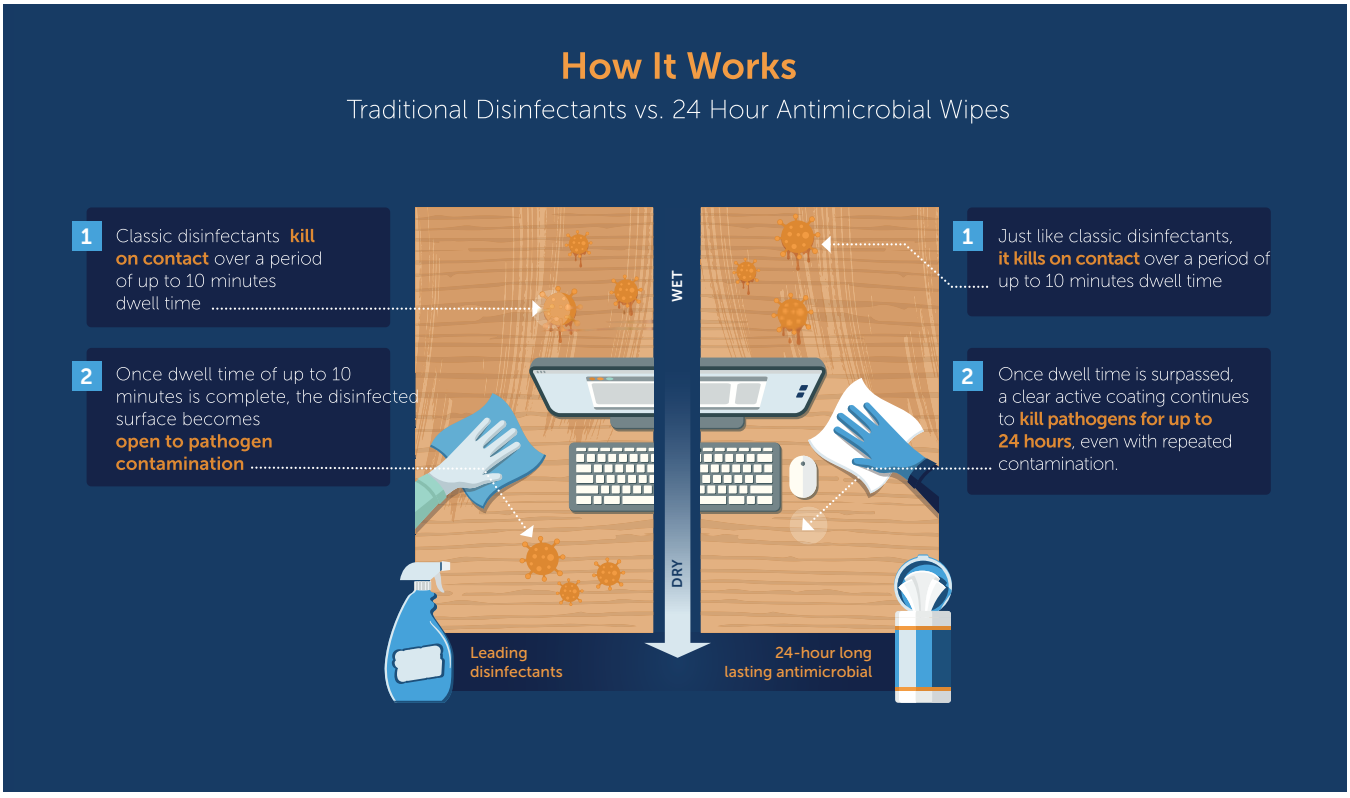
Engelbrecht, K., Ambrose, D., Sifuentes, L., Gerba, C., Weart, I. and Koenig, D., 2013. Decreased activity of commercially available disinfectants containing quaternary ammonium compounds when exposed to cotton towels. American Journal of Infection Control, 41(10), pp.908-911.

Residual Antimicrobials - Test Protocol Process



Test involves:
1. Contaminate surface.
2. Apply product.
3. Perform all 12 cycles.
4. Conduct efficacy test.

* Test protocol is inclusive of all antimicrobial formats (e.g. spray, wipe).



Narrative

Imagine an EVS team comprised of Mari, John, and Carla. Mari is responsible for waiting rooms and washrooms. John is responsible for the information desk and front entrance. Carla is responsible for the common areas within the treatment areas, such as nurse stations, patient rooms, and washrooms.

Each team member follows strict protocols as defined by their EVS management in cooperation with the hospital's infection control team. Mari carefully disinfects and cleans the washrooms and waiting rooms according to the schedule outlined, making sure that paper products such as single-use paper towels and toilet paper are plentiful and washrooms are tidy. She wipes down and disinfects all surfaces, including chair rails, remote controls, and tables every few hours. Similarly, John ensures desktops and tables in the main entrance are clean and sanitized, wipes down elevator buttons and door handles, and ensures that the front entrance and visitor gathering areas look clean and tidy in addition to being hygienic. Carla patrols the staff areas in the patient areas, being careful to wipe down desks, handrails, door knobs, and patient room surfaces such as washrooms, common area sink handles, doorknobs, TV remotes, and table tops with disinfectant.

Taking care of the washrooms is very time consuming and Mari would like to spend more time keeping them up to standard. There are frequent complaints when the washroom is untidy or out of paper products, but Mari must divert her time to the waiting rooms and guest areas because there is a heightened expectation from visitors that cleaning be frequent and visible. Similarly, John feels that a lot of his cleaning feels performative and that he is constantly wiping down the same areas over and over again to help demonstrate the hospital's cleaning efforts. Carla must do the same in-patient areas so that family members and visitors feel reassured their loved ones are being well taken care of within their rooms. Carla's favourite thing about her job is getting to chat with patients and making them feel at ease because she is one of the only non-medical interactions they might have in a day. But all of the extra cleaning and wiping of surfaces is stretching her time and limiting getting to know her patients and their families.

However, now each of these dedicated workers have a new weapon in the fight for good hygiene. They can now choose to use Scott® 24-Hour Sanitizing Wipes as a finishing step to their hard work, helping to continue to sanitize long after they have finished their work and can have peace of mind that bacteria are being killed on high-touch surfaces even when they are not cleaning.
The signs and tent cards help visitors, guests, and staff understand that the hospital is using a very innovative and powerful technology. Mari can rest assured that the waiting area surfaces are being continually sanitized, freeing up more time to manage washrooms. John can better distribute his time among all of the common areas and tabletops versus just sanitizing the same surfaces over and over again for the sake of appearances, and Carla can get back to bonding with her patients and putting a smile on their faces. She has even showed some of the patients and their visitors the Scott® 24-Hour Sanitizing video and how to pull it up using the QR code on the tent card with their phones. Mari, John, and Carla feel very proud to work for a hospital that is using such innovative technology to help them do their jobs with excellence and promote a higher standard of hygiene.

Cost Estimate

This is a consumable product sourced through distribution whereby pricing varies by distributor and by contract. Please see contact information below for pricing estimates for your end use locations.

Contact Info

If you would like to learn more, please reach out to our Customer Service Team at 1-800-437-8979.

If you would like more information on Scott® 24, please visit our website: *https://www.kcprofessional.ca/en-ca/products/wiping-and-cleaning/specialty-wipes/disinfecting-and-sanitizing-wipes/scott-24-hour-sanitizing-wipes-canister/53686*.

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Do Your Disinfecting Protocols Cover all the Bases?

Disinfection of surfaces is a key element in any infection control program, get it wrong and the results can quite literally be deadly for your patients. [1] Healthcare establishments spend significant sums of money every year on cleaning and disinfection, yet often do not attain the required results. [2,3] This paper will look at some of the frequently overlooked aspects of cleaning and disinfection programs used in healthcare settings, and how those gaps can be closed. Cleaning and disinfection are not the same thing, however, without adequate cleaning, disinfection cannot be reasonably accomplished. To both clean and disinfect requires a well-managed program and clearly defined responsibilities. [4]

The Basics

To clean and disinfect surfaces, you need an integrated program that includes disinfectants, wipes, mops, trained personnel, monitoring, and an assortment of additional components. More importantly, all of these components need to work together to firstly collect and remove soil (dirt) then to disinfect all the required surfaces on a consistent basis. Ask some basic questions, is my disinfectant compatible with the wipe used to apply the disinfectant, or will it bind to the cloth? Has the staff applying the product been properly trained in the required method of application? Will any of the chemicals selected have a negative impact on surfaces to which they are applied?

There are many products on the market, selecting the correct ones in an integrated program where each component is compatible then training your people on how to correctly apply the products are the keys to reducing infection rates and providing a safer environment for both patients and staff.

Does Your Disinfectant Kill Everything?

Health Canada and the Environmental Protection Agency (EPA) register disinfectants based on their ability to kill specific pathogens. [5] The registration is based on laboratory-generated data indicating to a high degree of certainty that when applied at the specified concentration and contact time, the disinfectant will kill the specified pathogen. Not all the things a product kills can possibly be listed on the label, but as a general guide, look for types of organisms and apply the Spaulding scale. [6] A good disinfectant should kill both gram-negative and gram-positive bacteria, large enveloped and small unenveloped viruses, plus fungi – both filamentous and yeasts. It is better, of course, if the disinfectant is also effective against mycobacteria and endospore forming bacteria. Spauling places organisms in a hierarchy of easy to more difficult to kill though there are some quirks in

the rankings depending on chemistry; alcohol, though less effective against small unenveloped viruses such as norovirus, is more effective than most things against mycobacteria, hydrogen peroxide is very effective against bacteria, however, heavy catalase producers do appear to have some inherent protection from peroxides.

Most commercial disinfectants meet the requirements for a hospital-grade product (i.e., kills both gram-negative and gram-positive bacteria) and meets the blood-borne pathogen standard (i.e., kills HIV and HBV), and have a basic fungal claim typically based on *trichophyton interdigitale*. The better ones also include small unenveloped viruses (i.e., norovirus or a surrogate) and mycobacteria (i.e., *mycobacterium bovis* or surrogate) the best disinfectants also cover endospore-forming bacteria (i.e., *Clostridioides difficile*). The ability to kill endospore-forming bacteria is typically regarded as sufficient indication that a product is effective against other challenging organisms such as *Candida auris*.[7] Our recent experiences with the SARS-CoV-2 pandemic have also shed light on the use of the Spaulding process in the emerging viral pathogens claim espoused by the EPA,[8] where, with a product shown to be effective against more difficult-to-kill viruses we can assume it kills newly emerging viruses.

A significant portion of the population is known to be asymptomatic carriers of *C. difficile* who are likely to shed into any room they occupy, therefore increasing the risk of infection for subsequent occupants. Because of this, many hospitals chose to disinfect all rooms with sporicidal products regardless of the patient status. One must also consider the impact of pathogens migrating from isolation rooms, in the work published by Donskey on the impact of pathogens on floors. It is clear that pathogens in a patient room will migrate not just to other surfaces in the patient room, but to other surfaces in the same unit.[9] It is therefore vital to ensure that all pathogens are addressed in a cleaning program.

The primary argument against the use of disinfectants effective against endospore-forming bacteria on a daily basis is that these tend to be more aggressive chemistries – either bleach-based or peroxyacetic-acid-based. The concern is the level of damage those products cause to the building fabrics and medical equipment in addition to the elevated health risks to employees from these products. The recent introduction of NaDCC-based products has presented an alternative option allowing for a *C. difficile* product that does not have many of the disadvantages of typical sporicidal products.

Biofilm

In the real world, unlike the standard tests used to register disinfectants, bacteria grow and survive in biofilms, including on normally dry surfaces.[10] The biofilms are a complex matrix, which can include bacteria, viruses and fungi. Within that matrix, these microorganisms are protected from the impact of chemical disinfectants and UV light.[11] Within the biofilm matrix, bacteria can swap plasmids, including those that code for antibiotic resistance, increasing the risk of infection from MDROs. What is in biofilm does not stay there, with studies showing both gloved and ungloved hands can pick up bacteria from biofilm even through a sheet.[12]

Disinfectants that are not effective against bacteria in biofilms, cannot truly protect patient populations.[13] Check the label and ask your supplier to demonstrate their product efficacy against biofilm-bound bacteria and viruses. It should be noted that a recent paper showed that as with other viruses, SARS-CoV-2 can both populate and survive within biofilm.[14]

Dilution and Preparation

It is possible to purchase ready-to-use disinfectants, these come with a significant cost penalty at roughly 10-15 times the cost per gallon of concentrated disinfectants, they also take up to 40 times the volume and weight for shipping, generating 40 times the amount of plastic and cardboard waste. The more cost-effective and more sustainable option is to use concentrates and add water on site. Typically accomplished through the use of auto diluters, unfortunately these are often inaccurate and require both routine maintenance and testing to assure the correct product concentration is delivered. One study showed that only 18% of auto diluters tested produced the correct concentration of disinfectant.[15] An alternative approach is to use disinfectant in the form of a pre-weighed tablet that can simply be dropped into a fixed volume of water producing a known concentration of disinfectant.

Means of Application

Make sure that the means used to apply the product is compatible with the chemistry used and that the method used matches the application instructions. There are reasons that a product label has instructions for use, follow them. The biggest challenges are with quaternary (quat) ammonium-based products that chemically bind to the fabric of the cloth or mop used to apply the product,[16] resulting in a solution with less than the minimum concentration required to be effective as a disinfectant. There are specially treated disposable wipes on the market that prevent quat binding, but all launderable microfiber is subject to this effect.

One way to avoid the issues of quat binding is to apply products using a spray method rather than a cloth. This increases the number of steps required in the process and when using a typical trigger spray requires a lot of pulls of the trigger for each room. A better alternative would be the use of an electrostatic sprayer though again the user is cautioned to ensure that the product they are using is registered for use with an electrostatic sprayer, and that the manufacturer's instructions for personal protective equipment (PPE) and hold times before reoccupying a room are followed. Some products may require up to 20-minute hold time before a room can be reoccupied after application with an electrostatic spray. Due to the increased health risk associated with the spraying of disinfectants, many institutions do not allow this practice in an occupied room, but it does present an option for terminal cleans.

Some products require a two-step action – a preclean followed by a disinfectant step, others claim to be single-action cleaning disinfectants. In either case, all surfaces that are to be disinfected must be visibly clean and free from dirt or debris before the application of disinfectant. There are a pair of areas where a preclean is an absolute requirement. One is any *C. difficile* isolation room, where a preclean is always required prior to disinfection. The second is the cleaning for blood-borne pathogens or other potentially infectious materials, in this instance, the preclean is meant to remove all visible blood and bodily fluids.

Precleaning can be performed with the same product that will be used as a disinfectant, it is better if the disinfecting product has some surfactants to assist in removal of the soil. It is important that the cloth used in the precleaning process is disposed of then replaced with a fresh cloth to apply the disinfectant. If a separate cleaning product and disinfectant is chosen for this process, it is vital to ensure the cleaning agent and disinfectant are compatible.

It is important that the cloths used for the cleaning and application of disinfectants are a high-quality microfiber. Dirt and pathogens should be collected from the surface and held in the fabric, not simply moved from one point to another. Cloths and mops can be either disposable or launderable, whichever is used, it is important that they are compatible with the chemistry used, and that there are sufficient supplies available to allow frequent changes after use.

Launderable microfiber has a finite life, and if not laundered correctly, loses many of the valuable properties associated with its design before its normal expiration date. A regular process of rotating older used cloths out of circulation and inspecting for damage after each use is required to maintain function. The other challenge when using a contract laundry service is ensuring that the reprocessing is performed correctly and that the cloths delivered back to you are the ones that came from your establishment. Ensuring an adequate supply of cloths for all shifts often requires an excess to cover the laundry and shipping process. We encourage frequent changes of cloths and mops. We never want to see a cloth or mop recharged with disinfectant (double dipped) during a disinfection process.

The alternative to reusable cloths is the use of disposable mops and cloths, these can be as effective, though typically more disposable cloths per room are required compared to launderable microfiber. Single-use disposable cloths add to the waste coming from the hospital and in many instances, are not biodegradable. Of course, there are many different blends of materials used and different qualities of fabric used in disposable wipes, how much liquid a cloth takes up then releases requires careful consideration.

One note of caution for those who chose a program of routine disinfection with a quat-based chemical that switches to a bleach-based product for *C. difficile* rooms, a separate set of wipes will be required for the two chemistries. Quat that has bound to the fabric of the wipe will not be entirely removed in the laundry process. Residual quats on wipes will react with bleach-based products producing a noxious odour.

Compatibility

Are the materials you are using compatible with each other and the surfaces you expect to clean and disinfect? We discussed above the challenge associated with quat binding, but there are also challenges with other cleaning products, quite often there are products in use specifically for floor finishing and cleaning, glass cleaning, tile and grout cleaning, bathroom cleaners, as well specialty products representing a wide range of acids, alkalis, oxidizers and reducing agents. The accidental mixing of incompatible products can have a disastrous impact, with careful thought required over the use and separation of different chemistries.

As we see the need to increase disinfection of surfaces not previously covered in a typical disinfection program, we also find that many of the commonly used products are simply not compatible with the surfaces they must disinfect. As an example, the disinfection of floors was not previously considered a priority, since the publication of papers showing that floors can be a source of contamination of many surfaces in the patient space,[17] indicating that floor disinfection should now be part of the daily clean. Unfortunately, there are few products that are suitable for disinfecting floors. The CDC recommends against alcohol or phenolics, quats are likely to bind to the mop, bleach-based products will destroy most floor finishes, and hydrogen peroxide or PAA-based products will react with calcium carbonate in the VCT if the floor finish is not 100% intact. NaDCC does provide an option, but this must be applied using high-quality microfiber and the application should be done to minimize the quantity of product used to reduce visible residue.

Safety

The potential for employee exposure to disinfecting chemicals and the potential health effect both long-term and short-term are a consideration in any chemical program. Many of the products used on a daily basis, and especially many of the sporicidal products present an immediate health risk to the person applying the disinfectant. While appropriate PPE can help to reduce the health risks from a known hazard, it is better to select a product with less health risks assuming a comparable performance. Look at the HMIS rating of your chosen disinfectant in both the concentrated form and the in-use dilution. The lower those numbers, the lesser the risk associated with the product.

Remembering that all disinfectant products are designed to kill bacteria and viruses and hence have an inherent risk, there are products with neutral pH that will do less damage to the skin and the respiratory tract that should be considered over more aggressive acidic or caustic products.

Protocol or Product

While it is vital to provide the right tools for the people tasked with performing cleaning and disinfection, it is as important to note that those individuals

must be provided with the appropriate training and time to perform their critical work. Not the least part of the training is how to clean and the sequence or order of cleaning, as well as the correct application of the products in use.

The training should include the basics: top to bottom, outside to inside, clean to dirty, changing cloths often, changing gloves as needed, wiping in a straight line, using a figure-eight motion to clean the floor, applying sufficient disinfectant to attain the required contact time, but not too much to over saturate. This must all be taught and monitored, including a clear demarcation as to who cleans what.

This is not a quick operation and requires that people are given training time, then time to actually accomplish the required tasks. This probably means not judging our efficiency on how fast a room is turned over, but more on how few infections are transmitted. If we are going to invest that much time to train personnel, we should probably also invest in retaining them. Perhaps the least popular opinion is that rather than housekeepers, we refer to staff as infection control technicians and pay them accordingly. Employing sufficient personnel, training them and paying them is likely to cost more than all the improved tools we provide.

One of the benefits to consider when looking at a disinfectant is how few products one can use in a facility, if a general disinfectant is first used, and then switched to a different product for specific pathogens such as *C. difficile* or *Candida auris*. This would double the training requirements and increase the chances for errors. Perhaps one more reason to standardize with one disinfecting product to cover general and specific disinfection is that well-founded and well-thought-out programs which minimize the potential for error or cross-contamination with well trained personnel will always net better results.

What Can Go Wrong?

Perhaps the single biggest failure in a cleaning program are those things that simply get missed, often that is a failing in training or expectation. Multiple studies have shown that it is common for up to 60% of surfaces that are scheduled to be cleaned and disinfected to be missed during either daily or terminal cleaning. [17, 18] Even when extensive training and monitoring is applied, it is often challenging to get much above 80% compliance. [18]

One of the major driving forces for surfaces not being properly cleaned is a simple time constraint though one also hears concerns over not wishing to disturb a patient, not wanting to disturb medical equipment, and basic issues regarding not having clearly defined responsibilities for things such as head wall fixtures.

A common solution to the issue of missed surfaces is the introduction of no-touch disinfection systems such as portable UV lights. These systems do have some ability to deactivate organisms though probably not to the level claimed by some manufacturers; remember these units are not regulated under the *Federal Insecticide, Fungicide, and Rodenticide Act* and their efficacy claims are not registered by the EPA. The single biggest obstacle to their use is that like electrostatic sprayers, they may only be used in unoccupied spaces. No-touch systems can supplement the disinfection of a room during a terminal cleaning, though it cannot replace the physical removal and disinfection process. The other consideration when looking at UV systems is the operating costs, not just the initial capital costs. To be truly effective, portable UV systems need dedicated personnel to operate them, people who can get them to the correct room at the correct time, set up the lamps and the rooms correctly, too many facilities that purchase units do not budget for the extra staff needed to get the most from the system.

In addition to the potential for missed surfaces, many of the points outlined above regarding binding and wipes can apply, however, the biggest failure is often contact time. Does the surface remain wet for a sufficient period of time to allow the disinfectant to do its work? Many commonly used disinfectants require contact times of up to 10 minutes in order to attain the required disinfection. Certifying organizations will monitor the time taken for a disinfectant to dry. If the contact time is not attained, the action will be recorded as a one of non-compliance. The simplest solution is to select a product with an attainable contact time, and preferably one that attains the desired result in less than five minutes, but ideally in less than four.

Monitoring and Efficacy

For a management team, the ability to train to a protocol must be supplemented by regular monitoring and re-education. One thing that is apparent is that without constant correction, programs have a habit or wandering off course. One of the most basic aspects is the ability to assess performance and basic compliance.

There are many tools available to the management team to ensure that the process is being followed correctly, and that all the surfaces specified for cleaning and disinfection are treated. Everything from basic visual inspection, use of invisible markers, ATP swabs, and of course culture tests of surfaces can all help to determine if a room has been properly cleaned. One of the newer options is the multi-channel UVA lamp which shows the presence of dust, bacterial colonies and biofilm on a surface that may have been missed during the cleaning process. This provides immediate opportunities for staff education. It is important that monitoring is done for teaching purposes rather than as a scolding. Monitoring of routine work activity by a supervisor or manager requires a significant level of time and commitment, which will translate into additional costs.

Conclusions

From the above, the hope is that practitioners realize that a professionally predicated and managed cleaning and disinfection program can help reduce infection rates, this requires adequate resources and commitment. A short list of the requirements can be summed up as:

- Clearly defined protocols and responsibilities;
- Well-trained personnel provided with the correct tools in an integrated program of compatible products;

- A disinfectant that covers all the required pathogens in a reasonable contact time and includes biofilm and endospore-forming bacteria;
- A disinfectant that is safe to use and will not damage surfaces;
- Wipers and mops that collect dirt and pathogens; and,
- A monitoring program that allows rapid assessment of the surfaces in the room and immediate instruction on corrective actions.

As stated earlier, perhaps thinking about the cleaning and disinfection process being performed by infection prevention technicians may give a better perspective.

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Case Study: Electrostatic Disinfection with the Clorox® Total 360® Electrostatic System in Acute and Long-term Care Facilities

Facility Information

Providence Health Care, Vancouver, BC, https://www.providencehealthcare.org/.

Study Overview

Two facilities in the Providence Health Care system in Vancouver, BC incorporated the Clorox Total 360® Electrostatic System into their disinfection protocols in acute care and longterm care settings. They paired the electrostatic sprayer with a novel sporicidal disinfectant called Clorox Healthcare® Spore Defense™ Cleaner Disinfectant. During the course of one month, facility staff used the system to disinfect patient and resident areas, common and public spaces, and shared equipment. They collected data on the time it took to apply disinfectant using the electrostatic sprayer as compared to manual disinfectant application, disinfectant used per square foot, and disinfectant surface coverage. No additional labour was required to incorporate the electrostatic sprayer into their protocols. Although exact cost savings were not calculated during the study, they noted that electrostatic spraying could save on costs via reduction in microfiber cloth usage and replacement, laundry cost reduction, labor savings due to a simplified process, and reduced waste.

Key Findings

- The Clorox Total 360® Electrostatic System enabled added disinfection services, with no additional labour required.
- Compared to manual disinfection methods, the Clorox Total 360® Electrostatic System was more efficient, including:
  - Disinfected restrooms up to 120 square meters in size in 2 minutes
  - Disinfected wheelchairs in 5 seconds
  - Disinfected stretchers in 15 seconds
  - Facility staff reported that the electrostatic sprayer was safe, and easy to use and transport.

Methods

Each facility received two Clorox Total 360® Electrostatic Systems to use during the study. The system was used as an adjunct to existing disinfection protocols rather than replacing daily manual disinfection processes. However, no additional labour was required to incorporate the system into their protocols. In the acute care facility, the electrostatic system was used to apply a sporicidal in patient care areas, physical therapy areas, public and common spaces, and on shared equipment. Similarly, the long term care facility used the system to apply sporicidal in resident rooms, common areas, and on shared equipment. Disinfection with the Clorox Total 360® Electrostatic Systems was done after each patient use, daily, biweekly, or weekly depending on availability and how often items and rooms were used. Disinfection was done only when spaces were empty.

Restrooms were electrostatically disinfected in one to two minutes depending on the size of the room. Stretchers were electrostatically disinfected in 15 seconds, and wheelchairs took only 5 seconds to disinfect. Restrooms were out of commission for less time when the Clorox Total 360® Electrostatic Systems was used (about 1–2 minutes) instead of manual disinfection (about 12–30 minutes). Each facility also estimated the number of gallons of disinfectant used per square foot, and found that 9,000 square feet of surfaces were covered with each gallon of disinfectant when applied electrostatically. Although both manual and electrostatic disinfection effectively reduced bioburden on surfaces in testing, electrostatic disinfection covered more surfaces. Specifically, they reported >90% surface coverage when using the Clorox Total 360® Electrostatic Systems, as compared to 35–85% coverage when disinfecting manually. They also noted that because the Clorox Healthcare® Spore Defense™ Cleaner Disinfectant is ready to use, no disinfectant was wasted or discarded.

Results

The Clorox Healthcare® Spore Defense™ Cleaner Disinfectant could be applied to restrooms using the Clorox Total 360® Electrostatic Systems in 1-2 minutes.

Conclusion

This study demonstrated that patient care areas, portable equipment, and shared spaces in both acute and long-term care facilities can be efficiently disinfected using electrostatic technology. The facilities expressed that as with any new technology, training and education are important for successful implementation. Personnel increasingly requested the Clorox Total 360® Electrostatic Systems during the study, as staff and stakeholders became aware of the capabilities of the system. Both facilities reported a potential time and cost savings with the use of electrostatic disinfection, and noted that no additional labour was required to implement electrostatic technology.

Learn more about Clorox® Total 360® System at CloroxPro.ca or by contacting CloroxProCanada@clorox.com.

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Environmental Services Lead Quality Improvement Initiatives and Innovate In the Face of the Pandemic

When we talk about innovation, we tend to think of state-of-the-art technology or breakthrough ideas, which result in revolutionary changes in the way we do our business. This often occurs as a result of strategic planning, relentless research, and discipline. However, this is not always the case. In the face of the pandemic, many in healthcare, including environmental service departments (EVS) were forced to address countless challenges in the absence of additional resources, and without compromising best practice and patient safety.

EVS are vital in the prevention of healthcare-associated infections and communicable diseases, including COVID-19. During the first wave of the COVID-19 pandemic, supply chain disruption was one of the greatest threats to EVS effectively completing their necessary work. Simply being able to access disinfectants was very difficult, and in some cases impossible. Jenn Worboy, EVS Manager at Peterborough Health Centre, Ontario, recalls that at the beginning, they were not able to access any hospital disinfectants from their supplier.

"We needed to be very creative," said Worboy. "One of the large national office supply stores ended up supplying us with disinfectant, so we were one of the lucky ones; we never had to go without."

Thinking outside the box to obtain disinfectant was the norm during the first wave. Some EVS recycled disinfectant containers, refilled them with available product, and sourced replacement wipes to ensure that disinfectants were readily available for use by frontline staff. Some needed to quickly redistribute product to meet equipment manufacturers' instructions for use (MFUs). Radiology equipment and hemodialysis machines, e.g., have very specific MFU requirements, and simply using any disinfectant would not only jeopardize the integrity of the equipment, but would negate the warranty of such important and expensive medical equipment. At one hospital, an expedited review of all disinfectants was conducted, supply was monitored very closely, and products were sorted and redistributed. Not only were they able to successfully follow MFUs and best practice, but they found opportunities for efficiencies that they may not have found otherwise.

Staffing shortages on top of the already increased workload continues to be an immense challenge for EVS. The very basic pandemic necessities of increased isolation rooms and increased use of alcohol-based hand rub have resulted in exponential workload for EVS.

Chris Fougere, EVS Supervisor at Lakeridge Health in Ontario, said, "It has been very challenging and we are running as lean as possible without sacrificing excellent service, but the team is fatigued. The silver lining through all of this is the great teamwork and collaboration, despite the added workload on the team. Some days what is accomplished is just short of a miracle."

With the staffing shortage, EVS leadership teams need to increase training and hiring. Fougere also reported that the continuous recruitment and training in order to ensure that he has the "people power" has been one of the greatest challenges. Some facilities have reviewed their training programs, and have implemented standard work and other strategies to expedite onboarding of new EVS staff without sacrificing the quality of training, while at the same time ensuring staff are feeling comfortable on the frontlines.

Despite the staffing shortages experienced throughout the country, EVS teams are making an unanticipated impact on the care of those suffering from COVID-19.

"We (EVS) are in patients' rooms for a minimum of 15 minutes every day and many patients look forward to our arrival," said Worboy.

Isolation can be a very lonely experience, and the EVS team can make a positive change in the patient's hospital experience.

As the pandemic rages on and the world continues to struggle with COVID-19, our EVS teams across the country continue to find creative solutions to solve the many challenges in maintaining environmental hygiene best practice, and ensuring patient safety. Their ongoing perseverance to improve process and innovate is a fine example which will help us get through the pandemic. Their ability to redefine EVS process during stressful circumstances is an example of how innovation can result from perseverance, dedication and creative thinking, without the need for high-tech or expensive solutions.

Natalie Bruce RN MScN CIC is an Infection Control Consultant in Ottawa, Ontario.

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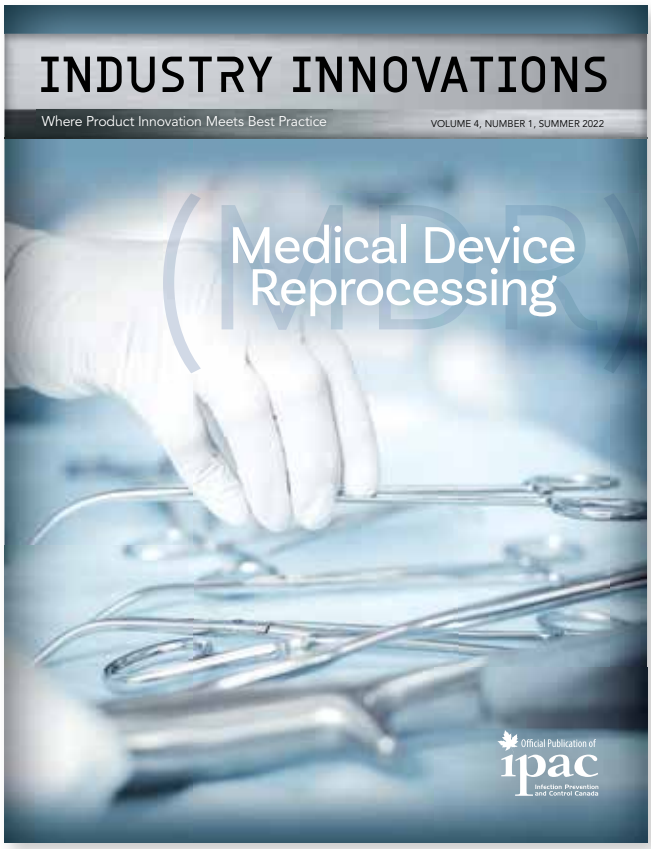

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PCS 1000 Plus Oxidizing Disinfectant Cleaner

Powerful disinfectants that are gentle on staff, surfaces and the environment.

Health Canada list of disinfectants likely to be effective against Covid 19, of the more than 700 products listed only Neutral pH PCS 1000 Plus Oxidizing Disinfectant Cleaner list sodium hypochlorite and hypochlorous acid as the active ingredients. The formulation is a very mild category four disinfectant that does not require caution or warning symbols/statements on the label.

PCS Neutral pH products are a combination of hypochlorous acid and sodium hypochlorite that oxidize organic soils, then decompose upon drying leaving no residual disinfectant on surfaces. PCS Buffered pH products form an equilibrium of hypochlorous acid and sodium hypochlorite. The sodium hypochlorite provides cleaning and stability, the hypochlorous acid provides milder solutions with increased disinfection. Sodium hypochlorite oxidizes bacteria from the outer cell surface. Hypochlorous acid penetrates through the bacterial cell wall allowing for cell oxidation to occur simultaneously from the inside and outside of the cell.

C. difficile Cleaning Process

1. Apply **PCS 1000 Plus Oxidizing Disinfectant Cleaner** to the surface to be decontaminated with a **PCS Four Sided Single Use Wiper** or **PCS Microfibre Cloth** or **PCS Toraysee™ Cloth.**
2. Wipe the surface twice in the same direction. This will remove 99.9% of C. difficile spores.
3. Flip the cloth or wiper to the clean side and re-wipe the surface. This will remove any organic soils that may have been left after step 2.

PCS 1000 Plus Oxidizing Disinfectant Cleaner
This product is a broad-spectrum virucidal hard surface disinfectant that is expected to inactivate the SARS-CoV-2 (the virus that causes COVID-19) Kills 99.99% of bacteria and viruses, Kills 99.99% of germs, Kills Staphylococcus aureus, Pseudomonas aeruginosa, Human Coronavirus, and Adenovirus Type 5 Broad Spectrum Virucide, Bactericide/Virucide PCS 1000 Plus pH – neutral oxidizing disinfectants are available in ready to use or dispense on-demand formats.

Ready-to-use
- DIN 02521431
- Oxidizing cleaner
- Oxidizing hospital grade disinfectant
- Oxidizing broad spectrum virucide
- Active Ingredient
  Sodium Hypochlorite
  0.13% w/w when packed
  Hypochlorous Acid
  0.01% w/w when packed

Concentrate
- DIN 02521504
- Oxidizing cleaner
- Oxidizing hospital grade disinfectant
- Oxidizing broad spectrum virucide
- Active Ingredient
  2% w/w Sodium
  Hypochlorite when packed

PCS patented NPH dispenser is preset to dilute and buffer pH of diluted PCS 1000 Oxidizing Disinfectant Cleaner Concentrate. When diluted this product has 0.13 % Sodium Hypochlorite and 0.01% Hypochlorous Acid.

C. difficile spores inactivating/removing activity using PCS Toraysee™ cloth and HPW.

	CFU/cm2			Percent	
Product	Control	After Wiping	Transfer	Reduction	Transfer
PCS Toraysee™ cloth	**7.67×10^6**	**0**	**0**	**100***	**0***
HPW	**6.67×10^5**	**$\sim 6.67 \times 10^5$**	**2.50×10^5**	**0****	**37.5**

*=No CFU were detected in the eluents tested.
** Almost the same number of CFU was recovered from Contaminated Carriersd

Scientifically validated cleaning process with two separate studies to remove 100% of C. difficile spores and prevent their transfer. Positive control HPW failed to remove C. difficile spores and transferred 37.5% to a previously uncontaminated platform.

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PCS 1000 Plus

Powerful disinfectants that are gentle on staff, surfaces, and the environment

Abstract

Proper cleaning and disinfection are critical in both healthcare and non-healthcare settings, but sometimes, the products that are effective on viruses and bacteria are harmful to the staff, facility surfaces, and equipment. A smarter way to clean and disinfect is to use as mild a chemistry as possible while still removing harmful pathogens.

When the SARS-CoV-2 virus emerged as a pathogen of great concern, facilities that had previously given little thought to disinfection were reaching out to their suppliers for the strongest disinfectant they could get, cleaning anything and everything with the same product. Unfortunately, many discovered that a lot of the strong disinfectants used for difficult-to-kill pathogens like *C. difficile* can also be hard on common surfaces, like tabletops, upholstery, metals, and plastics. Furthermore, these products can be irritants to the skin, eyes, and lungs of the EVS staff using them.

While it is a positive development that non-healthcare institutions have a better understanding of the need for not just cleaning, but also disinfection in their daily routines, there is a need for a more responsible chemistry that is effective against a broad range of bacteria and viruses and bacterial spores, yet is gentle to surfaces, humans, and the environment in both healthcare and non-healthcare settings.

In response to the COVID-19 pandemic, tremendous resources were spent to create new and more innovative disinfecting products. During this time, we saw the commercialization of hypochlorous acid products as Health Canada approved 11 such products on its list of disinfectants, likely to be effective against COVID-19. However, of all the products listed – even those with hypochlorous acid – only one, PCS 1000 Plus, has both sodium hypochlorite and hypochlorous acid as the active ingredient (Figure 1).

The combined effects of both sodium hypochlorite and hypochlorous acid create safer, Category IV disinfectants with very rapid oxidization of organic soils, changing the way we look at environmental decontamination. This paper provides the evidence for safer and more effective decontamination of the healthcare environment starting with the most difficult pathogens.

PCS 1000 Plus Oxidizing Disinfectant Cleaner (DIN: 02521431) and PCS 1000 Plus Oxidizing Disinfectant Concentrate (DIN: 02521504) diluted solutions contain the same concentration of oxidizing disinfecting and cleaning solutions with identical label claims. PCS 1000 Plus products are pH-neutral disinfectants with a chemical composition of 0.13% sodium hypochlorite and 0.01% hypochlorous acid, yet they are so mild that they are listed as a Category IV disinfectants, meaning no caution or warning statements are required on the label. Furthermore, the ready-to-use format is shelf-stable for more than a year, and the on-demand diluted product can be stored for at least 30 days without losing efficacy.

NPH dispenser and process-diluted solution for PCS 1000 Plus offers the economy of a concentrate, the efficacy of hypochlorous acid, and the mildness of a Category IV disinfectant. Facilities can save up to 78% of their chemical costs by switching from the ready-to-use formulation to the dispensed on-demand system, PCS US Patent 11,103,840 B2.

Powerful Disinfecting with Gentle Physical Properties

It is estimated that 500,000 *Clostridioides difficile (C. difficile)* infections each year

in the United States claim about 30,000 lives and account for $5 billion in related healthcare costs.[2] Proper environmental cleaning and decontamination in healthcare settings is the most cost-effective strategy to reduce the spread of *C. difficile*, but *C. difficile* spores are resistant to many hospital disinfectants and alcohol, and are extremely robust, remaining on surfaces for weeks.[2] By contrast, SARS-CoV-2, the virus that causes COVID-19, is very easy to remove from surfaces.[3]

Figure 1: Only one product approved by Health Canada for removing SARS-CoV-2 from surfaces lists both sodium hypochlorite and hypochlorous acid as its active ingredients: PSC 1000 Plus1.

In their guidance for preventing *C. difficile* transmission in acute and long-term healthcare environments, both the Public Health Agency of Canada and the Department of Health in the United Kingdom recommend cleaning all hard, non-porous surfaces in healthcare facilities with a cleaning agent with at least 1,000 parts per million of chlorine.[4,5] Likewise, the CDC recommends that *C. difficile* transmission be controlled with List K disinfectants, many of which are chlorine-based and contain high concentrations of chemicals.[6] Surfaces to be cleaned frequently include reusable equipment like stethoscopes, walkers, and bedpans, and high-touch surfaces, such as bed rails, light switches, furnishings, and bathroom surfaces. Unfortunately, cleaning with many chlorine-based disinfectants can cause damage to some surfaces and can also pose health risks to the end user in the form of eye and skin irritation.

A common chlorine-based disinfectant is sodium hypochlorite (i.e., bleach). Bleach solutions are widely used in public health applications to prevent cross-contamination of infectious agents via surfaces. They have strong oxidizing properties, and are therefore effective bactericides and virucides.[7] However, their high pH is irritating to the skin and eyes at the high concentrations often required for difficult pathogen removal (≥1,000 ppm)[8], and the antimicrobial activity of sodium hypochlorite can rapidly diminish upon contact with organic matter.[7]

Hypochlorous acid, on the other hand, is the most effective chlorine-based disinfectant available in a diluted solution, estimated to have 80 to 120 times the efficacy of sodium hypochlorite.[9] This acid is produced naturally in the human body, and is an essential part of our immune system. As a disinfectant, hypochlorous acid oxidizes and penetrates cell walls by reacting with sulfur- and heme-containing membrane enzymes and structural proteins, thereby leading to cell death.[10] Hypochlorous acid can be formulated to be safe for surfaces and the end-user; it is commonly used as a way to eradicate bacteria around the eyes.[11] Unfortunately, it also has a short shelf life as it reacts rapidly, deteriorating quickly when exposed to light, air, and temperatures above 25°C, making its use in facilities impractical.[10]

PCS has overcome the problem of creating a hypochlorous acid solution that has a longer shelf life.

PCS 1000 Plus Oxidizing Disinfectant Cleaner (DIN: 02521431) has a chemical composition of 0.13% sodium hypochlorite and 0.01% hypochlorous acid, has a stable equilibrium, meets the requirement of EPA Category IV, meaning no caution or warning statements are required on the label, and is stable for more than one year when packaged in a ready-to-use format.

Using the PCS-patented NPH dispenser and process, PCS 1000 Plus Oxidizing Disinfectant Cleaner Concentrate (DIN: 02521504) is diluted with water and acetic acid, resulting in a solution that adjusts the pH from an alkaline value of 11 to a neutral value of 8.5. The chemical composition of the final product is also 0.13% sodium hypochlorite and 0.01% hypochlorous acid.

PCS 1000 Plus products provide a safer alternative to other chlorine-based disinfectants and is registered for use in healthcare facilities, in the community, and even for use at home.

Switching to PCS 1000 Plus products is a smart move for any facility that wants to maintain or improve its disinfection efficacy, while providing a product that is easier on staff, better for the environment, and safer for equipment and furnishings.

Specifications

Dispensing the Product

The PCS 1000 Plus solution consists of the PCS 1000 Plus Dispenser (SP9200-1000NPH-D), PCS 1000 Plus Oxidizing Concentrate supplied in 3.78L closed-loop sealed containers, and PCS 1000 Plus Neutralizing Solution, also supplied in 3.78L closed-loop sealed containers.

The dispenser has a small footprint, and is attached to the wall of a janitorial closet, similar to other chemical-dispensing systems. The unit attaches to a water source through a hose, and hoses are also attached to the bottles of concentrate and neutralizer. The unit comes pre-set to dispense the appropriate mix of the concentrate, neutralizing solution, and water. The dispenser has proven to be very durable not requiring significant maintenance.

The solution can be dispensed into an opaque spray or squeeze bottle for use and storage for at least 30 days, or into a bucket for immediate use. For stored product, it is recommended that the solution be tested regularly with high-level chlorine test strips and pH test strips to ensure product efficacy.

Using the Product

PCS 1000 Plus Oxidizing Disinfectant Cleaner or diluted solutions of the concentrate solution can be used with most currently employed hospital processes. The product can either be applied to surfaces with disposable PCS four-sided, single-use wipes, PCS microfibre cloths, or PCS Toraysee™ cloths, or it can be squirted from a reusable spray bottle, or squirted from a bottle with a flip top lid.

To clean high-touch surfaces, apply PCS 1000 Plus RTU squirt, or PCS 1000 Plus concentrated solution diluted through the NPH dispenser to the surface and wipe dry with a microfibre or other clean, dry, absorbent cloth, or rinse or allow to dry.

To disinfect high-touch surfaces and non-critical medical equipment, apply the product to a pre-cleaned surface in sufficient quantities such that it remains wet for the following dwell times:

Human Coronavirus	2 minutes
Adenovirus Type 5	3 minutes
Staphylococcus aureus (ATCC 6538)	5 minutes
Pseudomonas aeruginosa (ATCC 15442)	5 minutes

This product is a broad-spectrum virucidal hard-surface disinfectant which is expected to inactivate SARS-CoV-2 (the virus that causes COVID-I9).

Following these dwell times, wipe the surface dry, rinse, or allow to air dry.

Although PCS 1000 Plus products are not rated to kill *C. difficile* spores, independent testing has shown that using PCS 1000 Plus with PCS Toraysee™

Cleaning Cloths removes 100% of *C. difficile* spores with no transfer to other surfaces (Figure 2). Where the disinfecting specifications in a facility require *C. difficile* kill claims, such as rooms housing *C. difficile* patients, we recommend PCS 5000 or PCS 7000 Oxidizing Disinfectant Cleaner.

Storing the product

The RTU formulation is shelf-stable for more than a year. Diluted solutions can be stored in opaque bottles for at least 30 days, but product dispensed into an open bucket should be disposed of after 8 hours.

DISPOSAL: Rinse the emptied container thoroughly prior to disposal. Dispose of the empty container in accordance with municipal/provincial/territorial requirements. Offer for recycling, if available.

Metrics

Spores are among the most resistant microorganisms to disinfectants and studies have shown that sodium hypochlorite with a decreased pH due to the addition of acetic acid has a much greater sporicidal effect than sodium hypochlorite alone.[12] Sodium hypochlorite has an alkaline pH of around 11. Adding the acetic acid brings the pH down to a neutral range of 8.5, where hypochlorous acid is produced. At that pH level, the hypochlorous acid and sodium hypochlorite exist in equilibrium, maintaining optimal antimicrobial properties, while creating a formulation that is more shelf-stable than other hypochlorous acid solutions.

It should be pointed out that hypochlorous acid in equilibrium with sodium hypochlorite efficacy is formula-dependent. For example, adjusting the pH of sodium hypochlorite with either citric or lactic acid demonstrated zero sporicidal activity, while reducing the pH with acetic acid, as we do with PCS 1000 Plus, produces superior sporicidal effects.[13] At a pH of 7.5, 50% of the solution is in the form of hypochlorous acid and 50% is in the form of sodium hypochlorite.

Diluted sodium hypochlorite with 5% acetic acid was used to decontaminate public buildings in the United States following the anthrax attacks in 2001. Efficacy testing has shown that 0.1% sodium hypochlorite acetic acid pH-adjusted solutions are effective in killing the spores of Bacillus atrophies in just 30 seconds compared to 30 minutes for non-pH-adjusted 0.1 % sodium hypochlorite solutions.[14] This finding is significant, as shorter dwell times for disinfection are much more practical in any clinical setting.

The case for a milder disinfectant is made by the need for products that are safer not only for the environment and staff, but also for equipment. One 700-bed facility in the United States discovered that harsh disinfectants had degraded some of their equipment, resulting in almost $5 million in unanticipated expenses.[15]

PCS 1000 Plus registered active ingredients on the ready-to-use and the concentrated diluted solution labels are sodium hypochlorite 0.13 % and hypochlorous acid 0.01%. Although it seems that the low concentration of hypochlorous acid would have little impact, the pH adjustment with acetic acid and creation of even 0.01 % hypochlorous acid has produced a formulation with the ability to kill bacteria and viruses while remaining mild enough to meet the requirements of an EPA category four disinfectant that is shelf-stable for at least one year and possibly two or three. Studies have shown that hypochlorous acid at very low concentrations is still very effective.[16]

CREMCO Quantitative Carrier test #3 validated that the PCS 1000 Plus Oxidizing Disinfectant Cleaner cleaning process can remove 100% of *C. difficile* spores and prevent their transfer to adjacent areas (Figure 2). In a second study, a hydrogen peroxide wipe was used as the control on a mixture of staphylococcus, Serratia, and *C. difficile* spores; this test also confirmed 100% removal of the spores with zero transfer (Figure 3). These studies validate the superior ability of PCS 1000 Plus Oxidizing Disinfectant Cleaner when used with the recommended wiping process to remove harmful pathogens from the environment.

Practice Changes

Using less chemistry when cleaning and disinfecting is safer for staff, the environment, and facility equipment. At PCS, we believe in cleaning to a scientifically validated standard, where using the minimum amount of chemical and focusing on the physical removal of pathogens protects public health, EVS staff, and the environment.

PCS 1000 Plus can replace more caustic disinfecting chemistries in a variety of healthcare and community settings. Larger institutions will be familiar with dispense-on-demand systems, and the NPH Dispensing and mixing apparatus will install and function in a similar way, requiring only access to a water source.

PCS 1000 Plus products can be used facility wide as both a cleaner and disinfectant, simplifying the

Study No.: PCS210901-01

Assessment of Activity of PCS Toraysee™ Cleaning Cloths for Decontaminating Hard, Non-Porous Environmental Surfaces: Testing with *Clostrioides difficile* spores (ATCC 43598) as representative Healthcare-Associated Pathogens

Table 1: *C. difficile* spores inactivating/removing activity using PCS Toraysee™ cloth.

	CFU on Platform			Percent	
	Control	Contaminated	Tranfer	Reduction	Transfer
Test #1 (wiping once)	1.70×10^7	16,568	473	99.902	0.0028
Test #2 (wiping twice)	4.23×10^7	0	0	100*	0*

*=No CFU were detected in the eluents tested.

The results of this study showed that, under the test conditions specified, PCS Toraysee™ cloth with PCS 1000 could efficiently decontaminate the contaminated platform and also prevent the transfer to the clean platform of *C. difficile* spores when the wipe was folded again and the wiping process was repeated with the clean side.

Figure 2: PCS 1000 Plus wiped twice with PCS Toraysee™ Cleaning Cloths removes 100% of *C. difficile* spores and results in zero transfer to other surfaces.

training and orientation process. As a disinfectant, EVS staff will benefit from training on appropriate wiping methods to remove or kill pathogens. PCS has a variety of evidence-based, validated cleaning processes.

Surfaces contaminated with *C. difficile* spores should be meticulously cleaned and the reality is that *C. difficile* is everywhere, not just healthcare settings.[17] Most institutions purchase and use Health Canada DIN approved disinfectants with a label claim to kill *C. difficile* spores. PCS has two such disinfectants: PCS 5000 (DIN: 02314851) and PCS 7000 (DIN: 02314878). PCS believes institutions should consider facility-wide cleaning protocols that control the spread of *C. difficile* by effectively removing them from the environment. Both killing and removing *C. difficile* have the same effect on the environment – the pathogen is no longer there to spread and infect – but removal can be done with chemistry that is kinder to the staff and equipment.

The PCS *C. difficile* cleaning process (Figure 4) with PCS 1000 Plus removes 100% of *C. difficile* spores and prevents any transfer to adjacent areas (Figures 2 and 3).

With a variety of application methods (spraying, squirting, premoistened cloths in a bucket, etc.) and drying methods (wiping, rinsing, air drying), EVS staff will experience little change to their current routines. However, the staff will appreciate the mild formulations that are not irritating to the skin, eyes, or lungs. As a Category 4 disinfectant, there are no special warning or caution labels, and no PPE is required when either dispensing or using the products. PCS recommends all staff follow the policies and procedures set out by the institution for use of PPE. Unused product can be safely poured down the drain.

Sodium Hypochlorite Fate

The route of environmental release of sodium hypochlorite from use in cleaning products is down-the-drain, with the product and/or its by-products being treated by on-site or municipal waste treatment systems. Studies conducted with bleached laundry wash water suggest that approximately 12% of the chlorinated organic compounds. Formed are volatile and that the majority of these volatile compounds, greater than 70%, remain in solution during the wash cycle (Ong, DeGraeve, Silva-Wilkinson, McCabe and Smith, 1996). The fate of sodium hypochlorite during use and discharge to sewer systems has been investigated (FIFE-AIS, 1993; Consultative Expert Group Detergents Environment, 1989). These studies reveal that hypochlorite is rapidly consumed, predominantly through oxidation reactions, with inorganic compounds and organic substances found in wash water and wastewater, and is converted to chloride. The rapid reactivity of sodium hypochlorite with the high concentrations

Study No.: PCS212001-01

Assessment of Activity of PCS Toraysee™ Cleaning Cloths for Decontaminating Hard, Non-Porous Environmental Surfaces: Testing with *Clostridium difficile* spores *(ATCC 43598), Staphylococcus aureus (ATCC 6538) and Serratia marcescens (ATCC 13880)* as representative Healthcare-Associated Pathogens

TEST RESULTS

Table 1-3 summarize the result of efficacy tests.

Table 1: *C. difficile* spores inactivating/removing activity using PCS Toraysee™ cloth and HPW.

	CFU on Platform			Percent	
	Control	Contaminated	Tranfer	Reduction	Transfer
PCS Toraysee™ cloth	7.67×10^5	0	0	100*	0*
HPW	6.67×10^5	~6.67×10^5	2.50×10^5	0**	37.5

*=No CFU were detected in the eluents tested.

**Almost the same number of CFU was recovered from Contaminated Carriers.

Table 2: *Staphylococcus aureus (ATCC 6538)* inactivating/removing activity using PCS Toraysee™ cloth and HPW.

	CFU on Platform			Percent	
	Control	Contaminated	Tranfer	Reduction	Transfer
PCS Toraysee™ cloth	2.07×10^7	0	0	100*	0*
HPW	1.40×10^5	0	0	100*	0*

*=No CFU were detected in the eluents tested.

Table 3: *Serratia marcescens (ATCC 13880)* spores inactivating/removing activity using PCS Toraysee™ cloth and HPW.

	CFU on Platform			Percent	
	Control	Contaminated	Tranfer	Reduction	Transfer
PCS Toraysee™ cloth	1.78×10^7	0	0	100*	0*
HPW	1.23×10^5	0	0	100*	0*

*=No CFU were detected in the eluents tested.

Conclusions

The results of this study showed that, under the test conditions specified, PCS Toraysee™ cloth with PCS 1000 could efficiently decontaminate the contaminated platform and prevent the transfer to the clean platform of *C. difficile* spores, *Staphylococcus aureus (ATCC 6538) and Serratia mercescens (ATCC 13880).* HPW could efficiently decontaminate vegetive bacteria but was not able to remove *C. difficile* spores from the contaminated platform and also tranferred 37.5% of the *C. difficile* spores contaminations to the transfer platforms.

Figure 3: PCS 1000 Plus wiped twice with PCS Toraysee™ Cleaning Cloths removes 100% of *C. difficile* spores and results in zero transfer to other surfaces, compared to a hydrogen peroxide wipe, which showed no reduction in *C. difficile* spores and transfer to other surfaces.

Figure 4: The PCS *C. difficile* Cleaning Process has been proven to remove 100% of *C. difficile* spores from surfaces.

of inorganic and organic materials already present in wastewater makes sodium hypochlorite safe for biological treatment plants. Unused consumer quantities of hypochlorite-containing cleaning products can be safely disposed of down the drain. Sodium hypochlorite will have reacted completely before reaching the treatment plant.

Switching to PCS 1000 Plus products throughout the facility makes sense both economically and for the health and safety of the EVS staff and the environment.

Implementation

PCS 1000 Plus products and the NPH dispensing on demand system are distributed and supported throughout Canada by distribution partners who will provide dispenser installation, and staff training and orientation to the physical properties and optimal cleaning techniques using PCS 1000 Plus Oxidizing Disinfectant Cleaner.

EVS will welcome the switch to PCS 1000 Plus products, as they are easy to use and much less caustic than other commonly used disinfecting products. With one product and one formulation, the entire facility can be cleaned and disinfected to a scientifically validated standard.

PCS offers some excellent products that act synergistically with PCS 1000 Plus:

PCS microfibre cloths, used to immediately dry a surface after application of PCS 1000 Plus, have been proven to remove greater numbers of pathogens and prevent the transfer of pathogens to previously uncontaminated surfaces.

PCS Toraysee™ cloths are used in more than 1,000 healthcare facilities, mostly to clean medical equipment. Toraysee™ cloth is an ultra-fine microfibre cloth that traps and removes dirt particles very effectively. They are very absorbent, making it easy to remove excess liquid. To clean equipment, all that is required is Toraysee™ cloth lightly dampened with product, reducing damage to sensitive equipment from wiping with saturated cloths.

PCS is also introducing a new four-sided, single use cloth that encourages users to flip the wiper to clean sides to reduce the transfer of pathogens when using single use disposable wipes. PCS Four Sided Wipes can de dispensed dry and moistened at point of use, or entire bucket of wipes can be charged with addition of 1 quart of PCS solution.

Cost Estimate

PCS 1000 Plus RTU is packaged in 946ml bottles, 3.78L jugs, or 4.73L containers with a dispensing tap, at prices comparable to other RTU disinfection products.

Although many facilities prefer the convenience of purchasing ready-to-use products, installing and using the PCS 1000 Plus dispensing system is a cost-effective way to obtain the same effective product on demand. Using this system will give a cost savings of 78% per 946ml bottle over the ready to use price. When an entire year of use is calculated, the cost savings are significant. PCS 1000 Plus Oxidizing Cleaner Concentrate and PCS 1000 Plus Neutralizing Solutions are supplied in closed loop, sealed 3.78L jugs.

Conclusion

Surfaces contaminated with *C. difficile* spores should be meticulously cleaned to ensure that the pathogen is no longer around to spread to other surfaces and infect people. Because *C. difficile* is everywhere and not just in healthcare settings, it is important that all public facilities are cleaned to a standard that meets this goal.

Unfortunately, the products available to kill *C. difficile* spores are also irritants to eyes and skin and can damage surfaces and equipment. Fortunately, killing *C. difficile* is not necessary if it can be effectively removed from the environment. PCS 1000 Plus products, when used with the PCS *C. difficile* cleaning process, have been proven to remove 100% of *C. difficile* spores from surfaces.

The formulation of PCS 1000 Plus, with sodium hypochlorite and hypochlorous acid in equilibrium, provides the perfect solution to removing harmful pathogens while protecting EVS staff and the facility's furniture and equipment. By using the PCS NPH dispensing system with PCS 1000 Plus Concentrated Cleaner, facilities can have the cleaning and disinfecting power they need at a reasonable price.

The COVID-19 pandemic has been an eye-opener for many facility managers, particularly in non-healthcare settings, about the need to remove viruses and other harmful pathogens from surfaces. PCS 1000 Plus products provide everything a facility needs to keep its staff and the general public safe from dangerous microorganisms on surfaces, even those that are difficult to remove like *C. difficile*, and yet it is better for the environment, easier on finishes and equipment, and gentle to the EVS staff.

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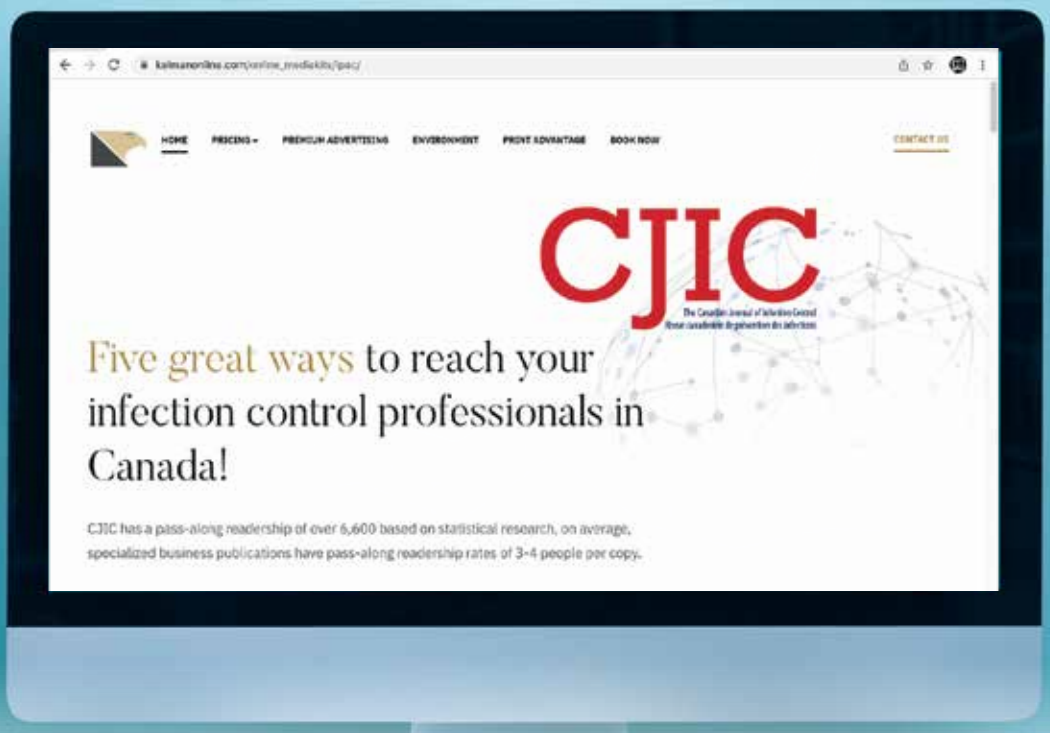

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Disinfectants 101 – Read the Label

What you do not know or cannot see can hurt you...and it's all about time

Do you spend more time reading food labels than the label of the disinfectant you use in your workplace? If the answer is yes, you are like many who believe there are no major differences between disinfectants. Unfortunately, this is a common misconception! Education is necessary to ensure that essential cleaning and disinfection is being carried out correctly. If your staff does not have a basic understanding of product claims and contact times required, the risk increases to all.

Microorganisms are diverse and vary in their resistance to disinfection. Health Canada has provided all you need to know to ensure that the disinfectant is safe for use. The label also clearly indicates what organisms will be killed within the specified contact time. Follow the manufacturer's instructions for use (MIFU) to ensure contact time is achieved. You cannot determine what micro-organisms are on the surfaces to be cleaned and disinfected every time you use a disinfectant. If contact times vary, then you must keep the surface wet for the longest time noted on the product label.

Our journey over the last several months taught us many things with a major focus on breaking the chain of transmission – daily we adapted – hand hygiene, wearing a mask and frequent cleaning and disinfection of high-touch surfaces following the MIFU.

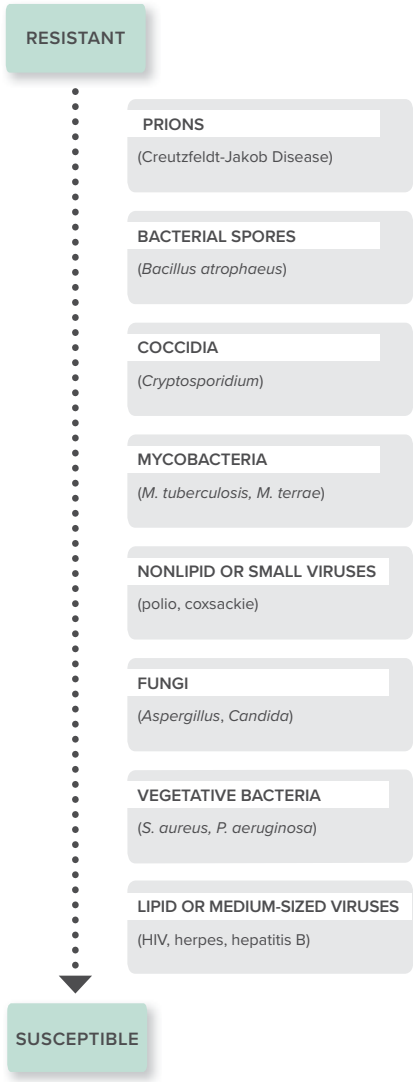
According to Health Canada, "Chemical products used as disinfectants on environmental surfaces and inanimate objects, or for use on non-critical medical devices are regulated under the *Food and Drugs Act* and *Regulations*."[1] Prior to sale in Canada, they require a pre-market assessment and a drug identification number (DIN) based on safety, efficacy and quality evidence that the product performs as indicated by the label.[2]

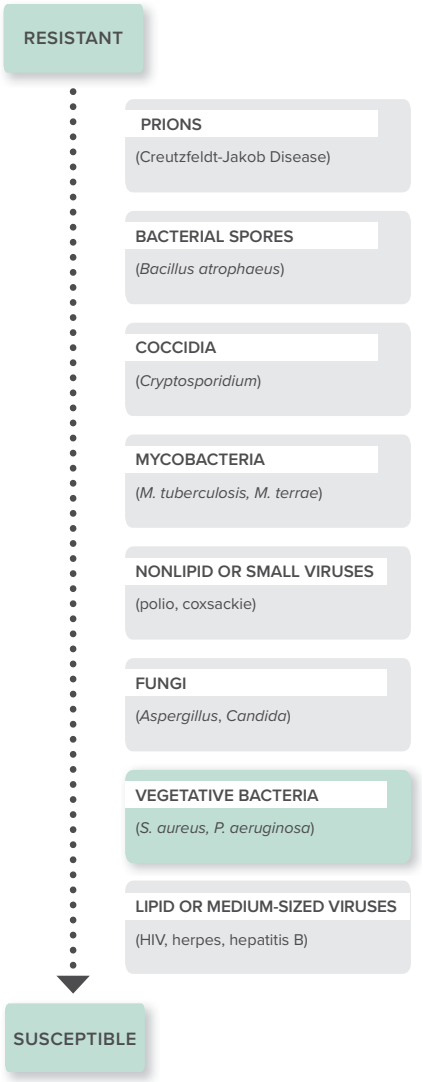
A DIN lets you know that the product has undergone and passed a review of its formulation, labelling and instructions for use. A drug product sold in Canada without a DIN does not comply with Canadian law. Each DIN is unique and serves as a tool to help in the follow-up of products on the market, recall of products, inspections and quality monitoring.

The Safety and Efficacy Requirements for Surface Disinfectant Drugs guidance document outlines the information to support the safety and efficacy of chemical products that meet the regulatory definition of "antimicrobial agent". These are disinfectants represented for use on non-critical medical devices, and on environmental surfaces and inanimate objects. (*https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/applications-submissions/guidance-documents/disinfectants/summary.html#s2*).

Using this chart from the Centers for Disease Control, you can see the classification of organisms based on their susceptibility to chemical disinfectants.[5] For hard-surface disinfection within a healthcare setting, ideally four claims should appear on the front panel of the product label – mycobactericidal (tuberculocidal), virucidal, fungicidal and bactericidal.

Interestingly, what might be perceived as "most effective", a hospital/healthcare disinfectant, the efficacy data required is only against pseudomonas aeruginosa (ATCC 15442) and *Staphylococcus aureus* (ATCC 6538).[6] Disinfectants with efficacy as a general/broad-spectrum disinfectant or a hospital/healthcare disinfectant can be registered with the label claim "germicide" or "kills germs".

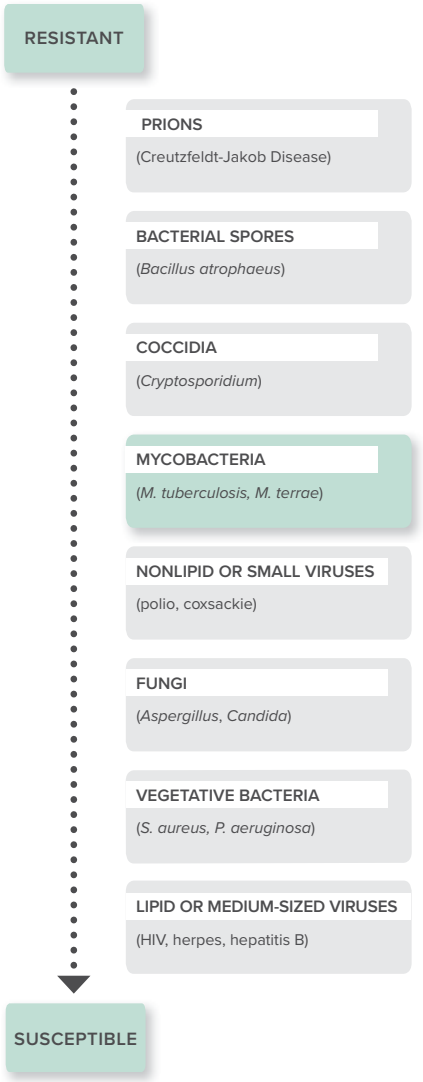




Understanding Label Claims: Mycobactericidal (Tuberculocidal) Claim

To make label claims against mycobacteria, a product's efficacy as a general/broad-spectrum or hospital/healthcare disinfectant must first be demonstrated.[7]

Labels that claim "mycobactericide", "mycobactericidal", "tuberculocide" and "tuberculocidal" require efficacy data against a representative Mycobacterium species (e.g., M. bovis BCG, ATCC 35473, M. terrae). Note that M. terrae (ATCC 15755) has only been validated with the ASTM quantitative carrier methods (ASTM E2111 and E2197), as well as the OECD quantitative method.[8]



Virucidal

The focus over the past several months has been on SARS-CoV-2, which is a lipid virus. It is a relatively easy-to-kill virus when compared to non-lipid or small viruses such as poliovirus type 1. A broad-spectrum virucide is represented as having efficacy against a representative hard to kill non-enveloped virus, and which is expected to inactivate other non-enveloped and enveloped viruses (i.e., the product has demonstrated "broad-spectrum virucidal" efficacy). Efficacy data is considered necessary against poliovirus type 1, Chat strain (ATCC VR1562) or human adenovirus type 5 (ATCC VR-5) or bovine parvovirus (ATCC VR-767) or canine parvovirus (ATCC VR-2017).[9] Rhinovirus and Norovirus are non-enveloped viruses and difficult to kill.

Many disinfectants used in healthcare settings are not registered as a broad-spectrum virucide. Lipid or enveloped viruses such as hepatitis B, HIV, SARS-CoV-2, and herpes simplex are relatively easy to kill. Read the product label to know the efficacy of the disinfectant you are using as both cold and flu season are just around the corner. Is the product a broad-spectrum virucide or a specific virucide?[10] Specific virucidal claims that list virucidal with an Asterix after the claim, e.g., Virucidal*.

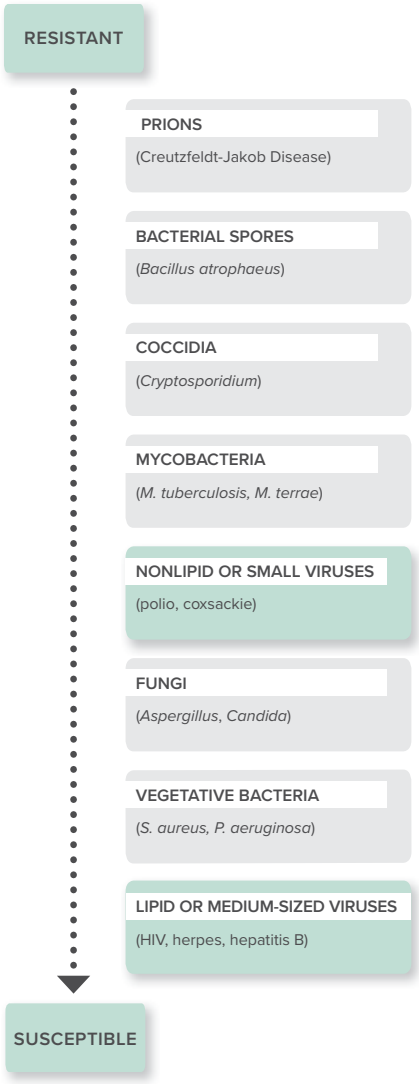
When the Public Health Agency of Canada has issued a public notice that an emerging viral pathogen poses a significant risk to Canadians or has been declared by the World Health Organization (WHO) as a public health emergency of international concern, manufacturers can immediately provide communications containing qualifying language like "expected to be effective" and "likely to be effective" to the public regarding the expected efficacy of certain market authorized disinfectant drugs against the emerging pathogen: this includes communications through their web sites, toll free consumer information services, and similar media.[11]

Health Canada's guidance document disinfectants that have received market authorization for either of the following claims will be permitted to make indirect efficacy claims against emerging viral pathogens: "Broad-spectrum virucide", supported by an efficacy claim against any of:

Adenovirus type 5 (ATCC VR-5)
Bovine Parvovirus (ATCC VR-767)
Canine Parvovirus (ATCC VR-2017)
Poliovirus type 1 (ATCC VR-1562)

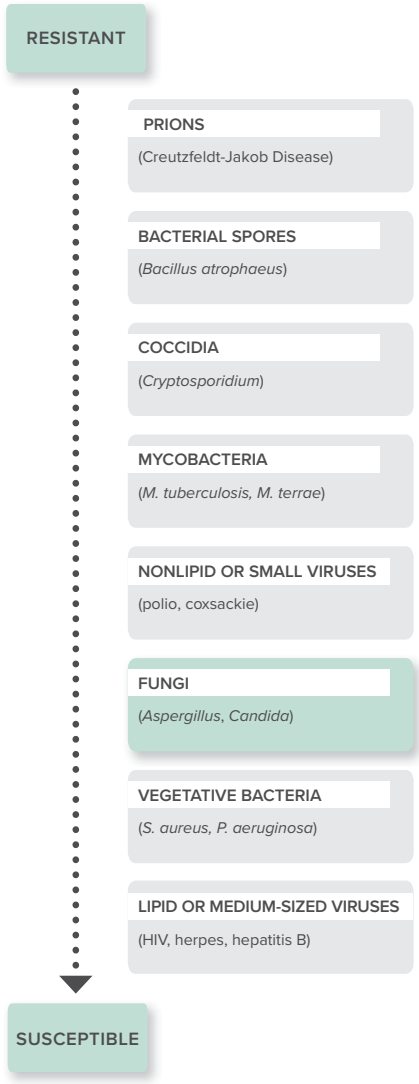
OR

For emerging viral pathogens for which the taxonomic genus of the virus has been identified, efficacy data against other viruses within that genus may be considered acceptable (e.g., any Influenza A virus for a claim against Influenza A H1N1).[12]



Fungicidal

The label claims "fungicide" and "fungicidal" require efficacy data against Trichophyton interdigitale (formerly Trichophyton mentagrophytes) (ATCC 9533). Efficacy data may be submitted to support any specific pathogenic fungus claimed on the label (e.g., Aspergillus brasiliensis). However, in the absence of efficacy data to support the "fungicide" claim for a product, only specific claims attesting to the efficacy of the product against specific fungi should be indicated on the product label (i.e., "effective against Aspergillus brasiliensis", or "kills Aspergillus brasiliensis").[13]



Bactericidal

The label claims "bactericide" and "bactericidal" require data to support any of the following levels of efficacy:

1. **Limited disinfectant:** Efficacy data is required against *Salmonella enterica* (ATCC 10708) (Gram-negative) or *Staphylococcus aureus* (ATCC 6538) (Gram-positive).
2. **General disinfectant:** Efficacy data is required against *Salmonella enterica* (ATCC 10708) and *Staphylococcus aureus* (ATCC 6538).
3. **Hospital disinfectant:** Efficacy data is required against *Pseudomonas aeruginosa* (ATCC 15442) and *Staphylococcus aureus* (ATCC 6538).

Disinfectants represented for use in both general and hospital settings require efficacy data against all three of the specified bacteria (i.e., *S. enterica, S. aureus and P. aeruginosa*).

Disinfectants with efficacy as a general disinfectant or a hospital disinfectant can be registered with the label claims "germicide" or "kills germs".

Note that Salmonella enterica was formerly designated as Salmonella choleraesuis. Applicants are encouraged to use the current nomenclature for this bacterium in their product labelling.

Disinfectants used in any healthcare setting, also need a bactericidal claim, with test organisms of Staph, Salmonella and Pseudomonas.[14]

One-Step Disinfectants

Are you using a one-step disinfectant cleaner? Keep in mind that a one-step cleaner/disinfectant, or one-step cleaner/sanitizer is defined by Health Canada as a substance, or mixture of substances which have been tested and found to be effective in the presence of light-to-moderate amounts of soil (e.g., a 5% organic soil load), and therefore may be used without a pre-cleaning.[15]

Note: Always use a two-step procedure when performing environmental cleaning for *C. difficile* and spills of blood or bodily fluids.

Combined detergent-disinfectants

Combined (one-step) detergent-disinfectant products can generally be used in place of a two-step (separate detergent and disinfectant product) process when disinfection is indicated for specific enviromental cleaning procedures. Do not use a combined (one-step) detergent-disinfectant product (instead use a two-step process) when performing environmental cleaning for *C. difficile* and spills of blood or bodily fluid.

It is recommended to periodically use a rinse step to remove residues from surfaces when using a combined product for environmental cleaning. Additional care should be taken to ensure that the combined product stays wetted on the

surface for the required contact time. Always consult the product label to get the correct contact time.

Factors to look for on labels: It's all about time

As required by Health Canada, adequate directions for all intended uses of the disinfectant drug must be indicated on the label to ensure the safety and efficacy of the product when used in accordance with the label directions.[16]

Simply stated, the surface must remain wet for the amount of time stated on the product label to complete the disinfection process. Times may vary from disinfectant to disinfectant, from organism to organism, and from label claim to label claim. Over the years, contact time has been dramatically reduced in disinfectants, from 10 minutes down to 1 minute in some formulations. Whatever disinfectant is being used, it is not effective if contact time is not achieved and consequently is a waste of product, cost, time, patient and healthcare worker safety.

1. Intended Use and Surface Compatibility

Disinfectant drug labels should clearly and prominently indicate their intended uses or purposes on the primary panel of their labelling (e.g., disinfectant, sanitizer, sterilant).

It will also state the intended drug use areas (i.e., premises for disinfection) for which the product is recommended. These are to ensure that the end user is using the correct product for the correct job.

Product labels relevant for healthcare will state:

- For use in healthcare (or hospital/ healthcare) facilities.

These product labels can also indicate specifically:

- For use on non-critical medical devices
- Environmental surfaces and inanimate objects in healthcare facilities
- For areas such as hospitals, dental clinics, nursing homes

Product labels will also state what surfaces are compatible with this product. Examples of terminology used for this:

- Hard non-porous surface disinfectant wipes
- Surface disinfectant cleaner

Information regarding any known surface incompatibility for a disinfectant should be indicated on the label (e.g., the potential for sodium hypochlorite to cause damage to aluminum surfaces).

Product labels will also state compatibility with surfaces. This is extremely important to understand for each product being used, as this can cause damage to surfaces and medical devices. In turn, this financially impacts a healthcare facility.

Examples of warnings included on disinfectant labels:

- Surfaces that are composed of brass or copper, or other ferrous metals may show signs of discoloration or pitting with prolonged exposure.
- Anodized aluminum (often used on hand-pieces) and carbon tipped instruments should be avoided (i.e., burrs). Material impact can be reduced with rinsing or damp wiping.
- Keep out of reach of children.
- Causes mild eye irritation.

2. Regulator info (DIN)

As discussed previously, a **DIN** is an 8-digit number given by Health Canada that confirms the **disinfectant** product is approved and safe for use in Canada.

3. Active Ingredient(s)

The identity and percent nominal concentration of each active ingredient, expressed as a percentage on a weight-per-weight basis (% w/w), in a disinfectant drug must be indicated on the label. This labelling requirement permits the calculation of the concentration of the active ingredients, expressed as parts-per-million (ppm), in the product when used in accordance with the label directions.

For disinfectant drugs marketed as single-use, pre-saturated, or impregnated towelettes, the percent nominal concentration of each active ingredient declared on the label is the amount of the active ingredients present in the liquid that can be expressed from the towelette.

4. Safety/First Aid and Precautions

First aid statements should be indicated on disinfectant drug labels, as appropriate for the potential acute toxicity hazards of the product (e.g., for accidental ingestion, inhalation, eye contact, skin contact, and for accidental injuries requiring medical attention). Additionally, a statement to the effect of the following is recommended:

Take the container label or product name and DIN with you when seeking medical attention.

5. Storage

Storage instructions appropriate for the level of hazard and packaging of a disinfectant should be indicated on the label, and should address the factors that might alter the shelf life of the product (e.g., temperature extremes, excessive moisture, heat or humidity, sunlight). Storage statements should be relevant for the intended uses of the product (e.g., domestic uses only, or any combination of commercial uses), the product's container type, and the product characteristics.

6. Disposal

Disposal instructions for both the product and the container should be indicated on a label.

7. Lot #

The indication of a lot number is required on the label, or alternatively stamped onto the marketed container or packaging, of a disinfectant drug to permit the tracing and identification of a production batch through its manufacture and distribution.

8. Expiration Date

The indication of an expiration date is required on the label, or alternatively stamped onto the marketed container or packaging, of a disinfectant drug to communicate the shelf-life stability of the product (i.e., the maintenance of the

product's labelled potency, purity and physical characteristics) when stored in accordance with the labelled directions, and represents the date after which the manufacturer recommends that the product not be used.

9. Dilution rates (if applicable)

Product labels will state what dilution rates are necessary for a product, if it is to be diluted. It will also state what type of water or solution is used to do the dilution. Some examples of this would be: tap water or distilled water.

It would also state the life span of a diluted product as diluting a product will often change the expiry date from the original concentrated product expiry date.

Summary

The market has been inundated with disinfectants in the last two years. Along with these options, we are able to access unlimited information regarding efficacy of disinfectants. It's important to remember that the most significant information regarding disinfectants is the label. The only information a healthcare provider needs to know about a disinfectant is included on this label. They are designed to help you. Let Health Canada do the leg-work for you! This keeps your patients, you, and ultimately your family, safe.

Read your labels!

Use your labels!

Understand your labels!

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1-2. Guidance Document Disinfectant Drugs (2020) Health Canada Page 4

3. Drug Identification Number (DIN) Health Canada https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/fact-sheets/drug-identification-number.html

4. Guidance Document Safety and Efficacy Requirements for Surface Disinfectant Drugs (2020) Health Canada Page 1

5. https://www.cdc.gov/infectioncontrol/guidelines/disinfection/tables/figure1.html Decreasing order of resistance of microorganisms to disinfection and sterilization and the level of disinfection or sterilization

6. Guidance Document Safety and Efficacy Requirements for Surface Disinfectant Drugs (2020) Health Canada Page 4

7. Guidance Document Safety and Efficacy Requirements for Surface Disinfectant Drugs (2020) Health Canada Page 12

8. Guidance Document Safety and Efficacy Requirements for Surface Disinfectant Drugs (2020) Health Canada Page 12

9. Guidance Document Safety and Efficacy Requirements for Surface Disinfectant Drugs (2020) Health Canada Page 9

10. Guidance Document Safety and Efficacy Requirements for Surface Disinfectant Drugs (2020) Health Canada Page 9

11. Guidance Document Safety and Efficacy Requirements for Surface Disinfectant Drugs (2020) Health Canada Page 56

12. Guidance Document Safety and Efficacy Requirements for Surface Disinfectant Drugs (2020) Health Canada Page 56

13. Guidance Document Safety and Efficacy Requirements for Surface Disinfectant Drugs (2020) Health Canada Page 7

14. Guidance Document Safety and Efficacy Requirements for Surface Disinfectant Drugs (2020) Health Canada Pages 4,5

15. Guidance Document Disinfectant Drugs (2020) Health Canada, Page 9, 10

16. Guidance Document Disinfectant Drugs (2020) Health Canada, Page 23

17. Drug Identification Number (DIN) Health Canada *https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/fact-sheets/drug-identification-number.html*

Linda McLarty
Straightforward and down-to-earth, Linda McLarty has over 25 years of experience in dealing with dental personnel regarding infection prevention and control and compliance. As Education and Support Manager at Germiphene Corporation, a division of Young Innovations, she is committed to providing you with up-to-date, evidence-based, scientifically sound information based on current infection prevention and control guidelines as well as best practices. Linda is able to bridge the gap between guidelines to practical solutions for you in your practice. Discussion generating and problem solving are an integral part of her presentations.

A long-standing member of OSAP, Dentistry's Resource for Infection Control and Safety, Linda has traveled and lectured extensively both in Canada and around the world sharing her knowledge with dentists, dental hygienists, dental assistants and dental support staff. With both emerging and re-emerging diseases making the headlines daily along with breakdowns in infection prevention and control procedures, Linda provides relevant and timely information to break the chain of infection to protect your patients, co-workers and you.

Kathy Purves B.A., B.Sc.
Kathy spent 17 years in the dental field as a dental assistant, working in different provinces. She obtained a B.A. from the University of Manitoba, and a B.Sc. from the University of Winnipeg. Kathy has been with Germiphene for more than 25 years. Germiphene is an infection control company based out of Brantford, ON. Kathy has used her dental and science background to her advantage, speaking on relevant information regarding IPAC around the world. She has lectured to dental professionals in Africa, Southeast Asia, South Pacific and Europe.

- District Manager, Winnipeg and Brandon Region, 25 years Germiphene Corporation, a Young Innovations company
- B.A., B.Sc.
- Former dental assistant – 17 years
- Member – OSAP – 2019 to present
- OSAP Boot Camp – January 2020, January 2021
- Member – MDA IPAC Committee – 2018 to present
- Member – IPAC Canada, 2019 to present
- Member – IPAC Manitoba, 2019 to present
- WHMIS Trainer – April 2021 ■

Medical Device Reprocessing (MDR)

TO BE FEATURED IN THE NEXT
INDUSTRY INNOVATIONS

Industry Innovations for Summer 2022 will showcase innovative product offerings supporting medical device reprocessing in all healthcare settings; whether acute/ long term care, community clinics or independent entrepreneurs.

The last two years may have been particularly daunting for those working in MDR departments as well as in community and private clinics. Infection Prevention and Control and MDR personnel were suddenly engaged in following or implementing new guidelines for reprocessing of government directed single use personal protective equipment (PPE) -N95 respirators, all the while MDR keeping to the main standards for reprocessing of medical devices.

Medical device reprocessing standards do not change! Qualified MDR personnel continue to provide the same high level of quality of reprocessing each day. Cleaning, disinfecting and sterilization of reusable medical devices is critical to preventing healthcare associated infections (HAI's). Cleaning of medical devices begins at the point of use, then transported to decontamination, inspected, prepared, and packed, high level disinfected, sterilized and stored. Medical Device Reprocessing is the link of any center where procedures are performed. Medical devices are more complex today and much more innovation is on the horizon! Quality management systems continue to evolve in areas including cleaning verification of devices. It has never been more critical for MDR to keep abreast and be aware of innovative improvements in this field.

IPAC teams works closely with MDR to provide education and ensuring connectivity both as learning and ensuring quality. Advances in all aspects of MDR technology from our industry partners that aids to ensure or improve quality, safe patient care is welcomed for submission in the upcoming *Industry Innovations* Summer 2022 Edition – Medical Device Reprocessing (MDR).

GUIDELINES:

The role of the Editor, *Industry Innovations* is to ensure this publication is a high quality, structured, and comparative resource for Infection Prevention and Control Canada's (IPAC Canada) core membership. All submissions to *Industry Innovations* are subject to curatorial review. Relevance to IPAC Canada membership and integrity of claims will be assessed prior to approval or denial of publication partnership. For whitepapers accepted for publication, the editor and publisher will coordinate with the submitting industry partner prior to publication with applicable technical editing requests. The editor and publisher will also ensure that the curation and publishing process of whitepapers and advertisements accepted for publication are managed transparently in consultation with authoring industry partners.

Preferred whitepapers for publication in *Industry Innovations* will refrain from subjective and unverifiable claims. They will use a mixture of industry voice, technical specification, and use-case logistics with significant attention to the immediate organizational impact of implementation. The numbered guideline sections below are sequentially ordered to provide a comparable reading flow throughout *Industry Innovations* volumes and must be adhered to during whitepaper development. The suggested word count is included for the whitepaper author's reference to ensure sufficient content is incorporated into each section without exceeding the suggested submission length of 4500 words.

GENERAL GUIDELINES:

- Core Focus: *Industry Innovations'* guidelines are structured to provide a comparable summary of considerations to enable IPAC Canada readership to assess their organization's implementation readiness and the immediate use cases of an industry product
- Please refrain from comparing your product's solution to competing solutions
- Where clinical or industry research is referenced; ensure summary description of the research is included rather than generalizations
- For in-text citations, use parenthetical numbers (Vancouver style) and append references to end of whitepaper using the same order of numbers appearing in-text

1. ABSTRACT
~500 Words:

- What makes this product stand out as an innovative contribution for reprocessing of reusable medical devices in health care settings?
  - Please refrain from comparative analysis to other innovations regarding reprocessing of medical devices, but common standardized processes may be referenced.

2. SPECIFICATIONS
~600 Words:

- Describe the technology/engineering design of the medical device reprocessing and any compatibilities with regard to accessories, or equipment innovation including cleaning verification.
- If there are electronic components to the technology innovation, please describe their utility (sensor, tracking, cleaning, connectivity, etc).
- Describe any additional resources used peripherally to your product innovation if applicable and what ongoing resources a healthcare setting implementing your solution will need to have in place to support the innovation you describe (e.g., storage/wall/floor space, engineering controls, embedded into infrastructure, etc.).

3. METRICS
~600 Words:

- Describe any tracking ability for use with the innovation, as applicable (e.g., recommended number of uses prior to discard, etc.).
- Previous quantitative research in effectiveness of the innovation may be described and referenced here.

4. PRACTICE CHANGES
~600 Words:

- Please describe the frontline practice changes involved in implementing your company's solution (not the overall impact but rather the impact of your medical device reprocessing (accessory use, cleaning verification) innovation).
  - For example, will your solution add additional steps to reprocessing personnel's daily workload? Is it reusable or single use? What type of training would the reprocessing personnel require to use your new product or innovation?

5. IMPLEMENTATION
~600 Words:

- Please describe the steps involved in implementation of the device reprocessing innovation.
- What stakeholders are needed (Infection Control, Biomed, Health Educator, Peri-operative, Physicians, Environmental Services, Facilities/ Maintenance, etc.…)?
- What activities involved in initial implementation/ongoing maintenance of this innovation will be managed by your company?
- What initial/ongoing maintenance steps will be required to be managed by the healthcare setting hosting your innovation?
- What maintenance steps (if any) are required to ensure the innovation is operating effectively on a continuous basis?

6. NARRATIVE
~700 words:

- Please provide in narrative format the post-implementation use-management process using the product by healthcare personnel and any new processes involved with use of the product.

Contact Info – Please provide detailed contact info (phone, email, webpage, etc.) to ensure interested readers are able to reach out for further information and estimates.

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1. DIN 02469529 is supported by evidence following drug review demonstrating that it is likely to be effective and may be used against SARS-CoV-2, the coronavirus that causes COVID-19. Refer to Health Canada list of disinfectants with evidence for use against COVID-19: https://www.canada.ca/en/health-canada/services/drugs-health-products/disinfectants/covid-19/list.html (accessed 2/2/21).

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