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Tips for electrostatic sprayer system success

Electrostatic technology in healthcare

Electrostatic spray technology is an exciting new application in surface disinfection.[1,2] Particularly given the COVID-19 pandemic, this is now a quickly growing area, and there is a lot of information out there, it may seem challenging to adopt this new technology as part of your disinfection protocol. But we're here to help. Here are some tips to help you make sure that the electrostatic sprayer system (ESS) is a success in your healthcare facility.

Education is key

ESS are available in a range of formats, including carts, backpacks, and handheld systems, which can be corded or cordless.[3,4] The type of space you will be disinfecting with the ESS can help you decide on which format is best for your facility – or if you require more than one type of ESS. For example, if you have a large space to disinfect, and ergonomics is a factor, you might choose a cart format. If you need to navigate a crowded space, and would enjoy hands-free mobility, you could consider a backpack format ESS. If you are disinfecting smaller areas and need mobility, the convenience of a handheld system may be right for you.

Once you have selected a system, you can also access online training or educational materials to help train operators in the proper use of the ESS. Many manufacturers of ESS systems or manufacturers of disinfectants designed for use with ESS offer these resources- do check them out!

Ensure that you are using a disinfectant that is Health Canada-approved for electrostatic use

When deciding on a disinfectant cleaner to use with your electrostatic sprayer, it is important to choose disinfecting products that are Health Canada-approved for use through electrostatic sprayers.[5,6]

The latest information from Health Canada regarding Disinfectants applied via Electrostatic Sprayers indicates that the products used must be approved by Health Canada (i.e., have a DIN), and the Direction for Use (DFU) on the label must state "Electrostatic Sprayer" (ES) as a method of disinfection.[5,6] Moreover, on Health Canada's list of disinfectants with evidence for use against COVID-19, please check that the disinfecting product is approved for product form "electrostatic spray".[6]

Select your disinfectant based on area type

In healthcare settings there are a number of different areas where you can use an electrostatic sprayer, including patient rooms, lobbies and waiting rooms, and the cafeteria and kitchen.[1] Once you have identified the list of disinfectants that are Health Canada-approved for use with an ESS, consider using more than one product based on the disinfection needs of each of these areas. For example, a sporicidal product can be used where *C. difficile* spore is a concern, a product designed to be safe on food contact surfaces in the cafeteria, or a more general disinfectant for the lobby or waiting rooms.[1]

Develop a protocol for ESS

A clear and easy-to-understand protocol can help ensure that ESS is successful in your facility. When setting up your protocol, consider the following:

- Ensure that you have an adequate supply of the appropriate personal protective equipment (PPE) for your ESS operators. You can check the PPE requirements based on the product label, safety data sheet (SDS) and WHMIS label of the disinfectant.[1]
- It is not recommended to use the ESS while room occupants are present. Check the contact time and reentry time requirements to protect bystanders.[1]

Always remove visible soil before disinfecting a surface using your ESS. If there is no visible soil, the ESS can be used for one-step disinfection.

For best results: Follow a spraying strategy

- Electrostatic spray is attracted to surfaces and objects, but for best results direct the spray at your target surfaces, not just the air.[1]
- Check the instructions on your ESS to identify how far away you should stand from the surface you are spraying for best results – this is different for every type of sprayer. You want surfaces to be visibly wet for the appropriate contact time for your disinfectant.[3]
- Follow a pattern when you spray the room so you don't miss spots on the surface.
  - Spray slowly in a side-to-side motion and work from top to bottom to ensure complete coverage.[3]
  - Start in a spot farthest from the door and work back to the door in the room you are spraying.
- Check for surface compatibility before spraying.[1] You may want to wipe down surfaces such as glass or electronics after the contact time has been achieved to remove visible residue.

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References: 1. Velez K. Electrostatic technology: A new method for surface disinfection. CloroxPro Canada, December 7, 2020. **2.** Velez K. Evaluating Electrostatic Sprayers for Surface Disinfection. CloroxPro Canada. 2020. **3.** CloroxPro Canada. Clorox Total 360® System. https://www.cloroxpro.ca/products/clorox/total-360/. Accessed July 7, 2021. **4.** CloroxPro Canada. Clorox TurboPro™ Handheld Electrostatic Sprayer. https://www.cloroxpro.ca/products/clorox/turbopro/. Accessed July 7, 2021. **5.** CloroxPro Canada. Data on file. Dec 18, 2020. [Health Canada response to S. Coombs]. **6.** Government of Canada. Hard-surface disinfectants and hand sanitizers (COVID-19): List of disinfectants with evidence for use against COVID-19. Canada https://www.canada.ca/en/health-canada/services/drugs-health-products/disinfectants/covid-19/list.html. Accessed April 22, 2021.

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Discordant COVID-19 PCR test results and the implications in long-term care

James Ayukekbong, BMLS, MSc, PhD, CIC
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SARS-CoV-2, the causative agent of Coronavirus Disease 2019 (COVID-19) has infected over 247 million people worldwide, and is responsible for over 5 million deaths (as of November 2, 2021) [1]. The brunt of the disease has been felt more among the elderly, especially those living in long-term care homes. As public health authorities battle with outbreak management, a clear definition of what constitutes an outbreak is essential. Often, outbreak declarations are triggered by two or more laboratory-confirmed COVID-19 cases with an epidemiological link within a 14-day period where both cases could have reasonably acquired their infection in the same setting [2, 3]. Although this definition seems scientifically appealing, outbreak management and the care of residents may be affected if laboratory test results are not indeed confirmed, or if results appear to be discordant. An example of a discordant result is when a specimen from an individual tests positive, and a subsequent specimen or repeat tests from the same person within the same timeframe using the same or a different assay gives negative results [4, 5].

To understand the concept of discordant results, that is false-positive or false-negative Polymerase Chain Reaction (PCR) tests, it is important to understand the principle behind PCR. Basically, the COVID-19 PCR test is meant to detect the genetic material (ribonucleic acid or RNA) of SARS-CoV-2 virus in a specimen [6]. The test starts with RNA extraction from a respiratory specimen followed by reverse transcription to complementary deoxyribonucleic acid (cDNA), which is then amplified using oligonucleotide primers and fluorescently labelled probe(s) specific to region(s) of the SARS-CoV-2 genome [7, 8]. If SARS-CoV-2 RNA is present in the sample, these oligonucleotide primers attach themselves to target sections of the cDNA. Through a thermocycling reaction, identical copies of the target sections of cDNA are created. It should be noted that PCR assays have cut-off points (the number of cycles it runs), and different laboratories may set different cut-off values. Typically, a standard real time PCR set-up usually goes through about 40 cycles.

As new copies of the viral DNA sections are built, the fluorescent probes attach to the DNA strands and then release a fluorescent signal, which is measured in real time. The number of amplification cycles required to create enough copies of the viral RNA to be detected is called the cycle threshold or Ct value. The more RNA that is present in the specimen, the fewer cycles are required for the signal to reach the detection threshold (low Ct value, e.g., Ct<30). The less RNA present in the specimen, the more cycles are required. So, a low Ct value corresponds to a high viral load, while a high Ct value corresponds to a low viral load. For example, the cut-off point for a positive result for public health Ontario laboratories is 38 cycles. This means that if the virus is detected at or before 38 cycles are completed, then the test is considered positive. The cut-off point for a negative result is 40 cycles. If the virus is detected between 38 and 40 cycles, then it is considered as indeterminate or inconclusive [9]. Also, because the test does not detect live virus (only viral nucleic acid), the test could detect RNA, not just from an individual who has an active infection, but also in persons who may be shedding the viral particles from a recent infection and may no longer be infectious [8].

With the understanding of the principle behind PCR testing, it is important to mention that false-positive PCR results could occur due to human or analytical errors. From a human error perspective, samples can get mixed up, software glitches can produce erroneous interpretations of test results, and mistakes can be made when entering or communicating results [10]. From an analytical standpoint, cross-contamination of samples during collection, pipetting, or processing may generate false-positive results [11]. The propensity of false-positive results has also been linked to increased frequency of asymptomatic testing in settings of low SARS-CoV-2 incidence, or low pre-test probability [12].

On the other hand, false-negative results can occur for numerous reasons, including inappropriate specimen type, suboptimal specimen collection, testing too early in the disease process (low viral load), or low analytic sensitivity [13, 14]. Other factors such as the quality of the RNA extracted from the swabs, degradation of purified RNA, the presence of RT-PCR inhibitors, or genomic mutations may cause false-negative results [15]. As discussed above, considering the fact that PCR diagnostic

Conflicts of Interest: None to disclose.

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performance, including analytical sensitivity and specificity may vary, it is essential that laboratory results are verified before confirmed outbreak declarations are made.

In this Editorial, I would like to focus on false-positive results as every false-positive test has direct negative consequences on outbreak management and the care of residents in long-term care facilities. Staff with false-positive test results and their close contacts are excluded from work, and this can lead to staffing shortages. False-positive results may also lead to unnecessary testing of residents and placement on additional precautions (droplet/contact precautions) for up to 14 days due to the perceived exposure. Unnecessary isolation can worsen loneliness, psychological distress and overall mental health of residents [16]. Misdiagnosis can also result in stigmatization and the fear of infecting others, as well as unnecessary restriction of visitation to the home, and leave of absence of residents.

Besides causing an increase in operational cost to implement outbreak control measures, false-positive results may also lead to overestimating COVID-19 true incidence and the overall burden of the disease. Recently in Saskatchewan, Canada, 255 COVID-19 test results were deemed to be invalid after a testing error was identified at a provincial laboratory. After retesting, 206 results were found to be false positive [17]. Prior to this verification, outbreaks or suspected outbreaks were already declared in several long-term care homes across the region. Also, my team conducted a survey in Ontario, Canada from August 2020 to March 2021, and found that out of 64 suspect or confirmed COVID-19 outbreaks in some long-term care homes, 23 (36%) were deemed to be pseudo-outbreaks (no clinical or epidemiological correlation) with discordant results that were subsequently determined to be false positive (negative). In most of the cases, outbreaks were declared and then called off when further testing of specimens gave negative results (false positive). In other situations, local health units treated the events as true outbreaks even though the results of repeat testing were negative or discordant. These data and those from other sources suggest how errors in laboratory tests may result in outbreak declaration?. Besides the psychological distress of residents due to prolonged confinement, each of these outbreaks require considerable human resource capacity mobilization, outbreak management initiatives, and significant personal protective equipment supply and use.

From an epidemiological standpoint, one of the key steps in outbreak response is verifying the diagnosis, or establishing the existence of an outbreak [18]. Verifying the diagnosis is important to:

(a) ensure that the causative agent has been properly identified, since control measures are often disease-specific;
(b) rule out the possibility of laboratory errors or pseudo-outbreaks; and,
(c) to interpret laboratory findings in line with the clinical and epidemiologic findings [18].

Currently, most surveillance systems exclude persons who have been recently infected with COVID-19 (i.e., within 90 days) from routine surveillance testing. Therefore, persons who were deemed as positive when probably they were not (false positive) are excluded from the surveillance testing and this could create an opportunity of risks as these persons could indeed become infected and spread the virus as they are not included in routine asymptomatic surveillance testing [19].

Together, prior to outbreak declaration, diagnostic verification has often not been fully investigated and facilities have been plunged into outbreak status without a thorough investigation or due diligence on the part of some health units. The need to apply the precautionary principle during uncertainty is understood, but this should not obviate the requirement to definitively establish the existence of an outbreak using epidemiologic, clinical and scientific principles. In fact, declaring a COVID-19 outbreak should not be made solely on the basis of a single positive PCR result, even involving more than two cases, but should include an assessment of signs or symptoms, epidemiologic links and then confirmed by additional PCR tests or other types of tests. Public health authorities must strengthen their diagnostic algorithms in order to guide outbreak declarations and downstream public health interventions.

REFERENCES

1. WHO Coronavirus (COVID-19) dashboard. (2 November, 2021) https://covid19.who.int/.
2. Ontario Ministry of Health COVID-19 Guidance: Workplace Outbreaks. July 2020.
3. Ontario Agency for Health Protection and Promotion (Public Health Ontario). COVID-19 Outbreaks and Cases in Ontario, by Setting: February 16, 2020 to June 12, 2021. Toronto, ON: Queen's Printer for Ontario; 2021.
4. Healy, B., Khan, A., Metezai, H., Blyth, I., & Asad, H. (2021). The impact of false positive COVID-19 results in an area of low prevalence. *Clinical medicine (London, England), 21*(1), e54–e56. https://doi.org/10.7861/clinmed.2020-0839.
5. Fox-Lewis, S., Muttaiyah, S., Rahnama, F., McAuliffe, G., Roberts, S. (2020). An understanding of discordant SARS-CoV-2 test results: an examination of the data from a central. *New Zealand Medical Journal*, 133:81-88.
6. Michael, J., Mina, M.J., Parker, R., and Larremore D.B. (2020). Rethinking Covid-19 Test Sensitivity — A Strategy for Containment. *N Engl J Med*; 383:e120 DOI: 10.1056/NEJMp2025631.
7. Ayukekbong, J., Andersson, M., Vansarla, G., Tah, F., Nkuo-Akenji, T., Lindh, M., Bergström, T. (2014). Monitoring of seasonality of norovirus and other enteric viruses in Cameroon by real-time PCR: an exploratory study. *Epidemiol Infect*, 142(7):1393-402. doi: 10.1017/S095026881300232X. Epub 2013 Sep 19. PMID: 24047516.
8. Ching, L., Chang, S. P., & Nerurkar, V. R. (2020). COVID-19 Special Column: Principles Behind the Technology for Detecting SARS-CoV-2, the Cause of COVID-19.

Hawai'i Journal of Health & Social Welfare, 79(5), 136–142.
9. Public Health Ontario. Explained: COVID-19 PCR Testing and Cycle Thresholds. Feb 2021. https://www.publichealthontario.ca/en/about/blog/2021/explained-covid19-pcr-testing-and-cycle-thresholds.
10. Roy S. (2021). Physicians' Dilemma of False-Positive RT-PCR for COVID-19: a Case Report. *SN comprehensive clinical medicine*, 1–4. https://doi.org/10.1007/s42399-020-00655-9.
11. Surkova, E., Nikolayevskyy, V., and Drobniewski, F (2020). False-positive COVID-19 results: hidden problems and costs. *The Lancet*; 8:1167-1168.
12. Kain, D., Stall, NM., Allen, V., et al. Routine asymptomatic SARS-CoV-2 screen testing of Ontario long-term care staff after COVID-19 vaccination. *Science Briefs of the Ontario* COVID-19 *Science Advisory Table*. 2021;2(15). https://doi.org/10.47326/ocsat.2021.02.15.1.0.
13. Kinloch, N., Ritchie, G., Brumme, J., Dong, W., Dong, W., Lawson, T., et al. (2020). Suboptimal biological sampling as a probable cause of false-negative COVID-19 diagnostic test results. *J Infect Dis*, 222(6):899–902.
14. Pan, Y., Long, L., Zhang, D., Yuan, T., Cui, S., Yang, P., et al. (2020). Potential false-negative nucleic acid testing results for severe acute respiratory syndrome coronavirus 2 from thermal inactivation of samples with low viral loads. *Clin Chem*, 66(6):794–801.
15. Afzal, A. (2020). Molecular diagnostic technologies for COVID-19: Limitations and challenges. *J Adv Res.* 26: 149–159.
16. Simard, J., and Volicer, L. (2020). Loneliness and Isolation in Long-term Care and the COVID-19 Pandemic. *JAMDA* 21:966 – 967.
17. Smith, Alanna. Saskatchewan long-term care residents receive false positives from COVID-19 lab tests. *The Canadian Press*. August 24, 2021.
18. Principles of Epidemiology in Public Health Practice. 3rd Edition. Lesson Six: Investigating an Outbreak. Update May 2012.
19. Ontario Ministry of health. COVID-19 Quick Reference Public Health Guidance on Testing and Clearance. Version 15, August 2021.

POSITION STATEMENT: Infection prevention and control program components for long-term care homes

This position statement was developed by IPAC Canada Long-Term Care Interest Group.
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BACKGROUND

Residents of long-term care homes (LTCHs) are a vulnerable population. As a result, there have been many outbreaks with significant morbidity and mortality caused by a plethora of different micro-organisms (influenza A, SARS-CoV-2, Group A Streptococcus, methicillin-resistant *Staphylococcus aureus* [MRSA], Carbapenemase-producing Enterobacteriaceae [CPE], norovirus, *Clostridioides difficile*, extended spectrum beta-lactamase-producing organisms [ESBL], hepatitis B and C) amongst others [1-5]. There are currently no national IPAC recommendations specifically for an IPAC program in LTCHs, although there have been publications recommending IPAC programs and resources [6-10]. LTC and retirement homes have been disproportionately affected by COVID-19 in Canada with 10% of all Canadian COVID-19 cases (about 80,000), resulting in more than 66% of the national deaths (over 14,000 deaths in residents and close to 30 staff) as of February 2021. More than 2,500 homes experienced an outbreak, and the proportion of COVID-19 deaths in Canadian LTC and retirement home residents (69%) exceeds the international average (41%)" [5]. As per federal and provincial/territorial legislation, employers shall ensure that the LTC setting is a safe work environment which protects residents and staff [6].

POSITION STATEMENT

The goals of an IPAC program are to protect residents from healthcare-associated infections and to prevent the spread of infections among residents, healthcare providers, staff, visitors, and others in the healthcare environment [6]. Active, evidence-based IPAC programs that are continuously supported by senior leadership and evaluated on a yearly basis have been demonstrated to decrease the morbidity, mortality and financial burden of outbreaks in LTCH [1,2,6,7]. The IPAC program should include, as a minimum, the following elements:

Human Resources

- One dedicated full-time equivalent (FTE) Infection Prevention and Control Professional (ICP) per 150-200 occupied beds [6-10].
  - Where an increase in acuity and complexity of resident care exists (e.g., chronic ventilation, dialysis, and specialized programs for spinal cord injuries, psychiatry and cognitive impairment), one FTE ICP per 150 occupied beds is recommended [7,8].
  - For homes with fewer than 150 beds, where possible, a dedicated FTE ICP is preferred, especially if combined with a related role (e.g., clinical education). The ICP staffing level should be sufficient to ensure that all the components of the IPAC programs are met as outlined in this position statement.

New ICPs are enrolled in an IPAC-Canada-endorsed training program, which includes the core competencies as described in the document *IPAC Canada Core Competencies for Infection Control Professionals* [11]. Training should commence within the first six months of entering the profession. New ICPs are ideally mentored by an experienced, CIC® certified ICP after hire [7,8]. IPAC Canada endorses certification in Infection Prevention and Control through the Certification Board of Infection Control (CBIC) [12].

- The expected number of hours per week that are devoted to infection prevention and control must be clearly stated and protected [8].
- Access to a physician with the expertise of IPAC [7,8] whose professional development in IPAC includes:

- surveillance and epidemiology
- microbiology and infectious diseases
- outbreak management
- ability to critically review the IPAC literature [7].

Laboratory

LTCHs should have a collaborative relationship with a licensed and accredited microbiology laboratory. There should be a system to alert the IPAC program when targeted microorganisms are isolated or detected and provide laboratory reports in a timely manner [7,8,10].

IPAC Policies/Procedures

Policies and procedures should be developed from current, evidence-based federal, provincial, territorial and Accreditation Canada guidance/recommendations and legislation, and include as a minimum:

- A hand hygiene program, which includes hand skin care, reflecting the IPAC Canada Practice Recommendation on Hand Hygiene [8,13-16].
- Point-of-Care Risk Assessment, Routine Practices and Additional Precautions [6,8,16-18].
- Outbreak management [6,10,19,20]. In the event of a pandemic, LTCHs will abide by the provincial and federal directives.
- Cleaning of the environment shall be as per national and provincial/territorial guidance [6-8,21].
- Cleaning and disinfection of reusable and shared medical equipment shall be as per national and provincial/territorial guidance [6-8,17,18,21-23].

Education and Training

- All healthcare providers (HCPs) and other staff, including contract staff, are to have IPAC training upon hire, on a regular basis, at least annually, and as needed (e.g., based on audit results, during an outbreak or identification of significant organism, or as directed by provincial/territorial legislation) [6-10,20].
- Education/training is to include as a minimum: hand hygiene, point-of-care/personal risk assessment, routine practices, additional precautions, correct donning and doffing of personal protective equipment (PPE), healthy workplace policy, safe management of sharps, immunization, work restrictions due to infectious diseases, equipment cleaning and disinfection, and environmental cleaning [6-9,19].
- IPAC education is also to be provided to residents, families, visitors, sitters/companions and volunteers as indicated, and includes hand-hygiene, Capitals on Routine Practices and Additional Precautions, correct donning and doffing of PPE, and healthy workplace policy [7-9,19].
- The LTCH ICP should be a member of IPAC Canada and their local chapter to support ongoing education and networking [10].

Occupational Health Program

- IPAC collaborates with this program, which includes, at a minimum, a healthy workplace policy, a sharps safety program, review of immunizations, TB screening, a hand skin care program, and a process for monitoring trends for any communicable infections, such as acute respiratory infection and gastroenteritis, in HCPs and other staff [7,8,18-20].
- A Resident Immunization Program (e.g., influenza, pneumococcal vaccine, pandemic vaccines), which follows the National Advisory Committee on Immunization (NACI) recommendations [7,20,24].

Surveillance Program

Process and outcome surveillance is required to ensure data is systematically collected, collated, analyzed, and disseminated to those who require it to take action [6,25]. The surveillance program has a written process, which is evidence-based and is aligned with provincial/territorial legislation requirements for surveillance and reporting, and takes into account local epidemiology [6-8,25-28]. As a minimum surveillance shall include:

- Admission screening, active syndromic surveillance (e.g., respiratory infection and gastroenteritis), and identification of sentinel events (e.g., invasive group A Streptococcus, SARS-CoV-2);
- Process audits (e.g., compliance with Routine Practices and Additional Precautions, including hand hygiene, PPE use, environmental cleaning, shared equipment cleaning);
- Antimicrobial stewardship (e.g., asymptomatic bacteriuria/urinary tract infections, *Clostridioides difficile*)

Facility Design, Renovation and Maintenance

The ICP is included as part of the multidisciplinary team/project team. The ICP has an important role in the prevention of infections throughout any construction/renovation/maintenance or facility design project [29-34]. For any renovations or redevelopment, the Canadian Standards Association's (CSA) document, Z8000 *Canadian healthcare facilities*, should be followed with respect to design with the goal to eliminate multi-bed rooms (i.e., ensuring single rooms with a single resident dedicated bathroom and sink). Studies have shown a clear relationship between use of single rooms and the reduction in infection transmission [18,29,32-34]. The CSA Z317-13 document, *Infection control during construction, renovation, and maintenance of healthcare facilities*, should be followed for IPAC measures needed during construction/renovation/maintenance of a facility [29,31].

GLOSSARY/DEFINITIONS

As per the Canadian Standard Association (CSA):

"SHALL" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard.
"SHOULD" is used to express a recommendation, or that which is advised but not required; and
"MAY" is used to express an option, or that which is permissible within the limits of the standard, an advisory or optional statement.

Healthcare provider: Any person delivering care to a client/patient/resident. This includes, but is not limited to, the following: emergency service workers, physicians, dentists, nurses, respiratory therapists and other health professionals, personal support workers, clinical instructors, students and home healthcare workers. In some non-acute settings, volunteers might provide care and would be included as a healthcare provider. See also, Staff [7].

Long-term care home: A long-term care home (LTCH) provides care and services for people who are no longer able to live independently, or who require onsite nursing care, 24-hour supervision, or personal support.

Staff: Anyone conducting activities in settings where healthcare is provided, including healthcare providers. See also, Healthcare providers [7].

Stakeholders: LTCH management and healthcare providers, residents, families and visitors and the community at large.

REFERENCES

1. Lee MH, Lee GA, Lee SH, Park Y-H. A systematic review on the causes of the transmission and control measures of outbreaks in long-term care facilities: Back to basics of infection control [Internet]. 2020 Mar [cited 2021 Jul 28]. Available from: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0229911.
2. Capitano B, Leshem OA, Nightingale CH, Nicolau DP. Cost effect of managing methicillin-resistant *Staphylococcus aureus* in a long-term care facility. *J Am Geriatr Soc.* [Internet]. 2003 Jan [cited 2021 Jul 28];51(1):10-6. Available from: https://pubmed.ncbi.nlm.nih.gov/12534839/.
3. Nicolas-Chanoine MH, Jarlier V. Extended-spectrum beta-lactamases in long-term-care facilities. *Clin Microbiol Infect.* [Internet]. 2008 Jan [cited 2021 Jul 28];14 Suppl 1:111-116. Available from: https://pubmed.ncbi.nlm.nih.gov/18154534/.
4. Rajagopalan S, Yoshikawa TT. Norovirus infections in long-term care facilities *J Am Geriatr Soc.* [Internet]. 2016 May [cited 2021 Jul 28];64:1097–1103, 2016. Available from https://pubmed.ncbi.nlm.nih.gov/27225361/ doi: 10.1111/jgs.14085.
5. Canadian Institute for Health Information. The impact of COVID-19 on long-term care in Canada: Focus on the first 6 months. Ottawa, ON: CIHI [Internet]; 2021 [cited 2021 Jul 28]. Available from: https://www.cihi.ca/sites/default/files/document/impact-covid-19-long-term-care-canada-first-6-months-report-en.pdf.
6. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Infection prevention and control for long-term care homes: summary of key principles and best practices. Toronto, ON: Queen's Printer for Ontario; 2020 [cited 2021 Jul 28]. Available from: https://www.publichealthontario.ca/-/media/documents/i/2021/ipac-ltch-principlesbest-practices.pdf?la=en.
7. Ontario Agency for Health Protection and Promotion. Provincial Infectious Diseases Advisory Committee. Best practices for infection prevention and control programs in all health care settings, 3rd edition. Toronto, ON: Queen's Printer for Ontario; May 2012 [cited 2021 Jul 28]. Available from: https://www.publichealthontario.ca/-/media/documents/b/2012/bp-ipac-hc-settings.pdf?la=en.
8. IPAC Canada. Infection prevention and control (IPAC) program standard (2016). Available from: https://ipac-canada.org/photos/custom/pdf/IPAC_PROGRAM_STANDARD_2016.pdf.
9. Provincial Infection Control Network British Columbia: Framework for staffing and core competencies training designed for infection control programs. 2007 Mar [cited 2021 Jul 28]. Available from: https://www.picnet.ca/wpcontent/uploads/Part_Two_Needs_Assessement_Document.pdf.
10. Health Canada, Nosocomial and Occupational Infections Section. Development of a resource model for infection prevention and control programs in acute, long term, and home care settings: Conference proceedings of the Infection Prevention and Control 6 Alliance. *Am J Infect Control* [Internet]. 2004 [cited 2021 Jul 28];32:2-6. Available from: https://pubmed.ncbi.nlm.nih.gov/14755227/.
11. IPAC Canada. IPAC Canada core competencies for infection control professionals. 2016 Oct [cited 2021 Jul 28]. Available from https://ipaccanada.org/photos/custom/pdf/2016_IPAC_Canada_CoreCompetenciesforICPs.pdf.
12. Certification Board of Infection Control and Epidemiology (CBIC). Eligibility requirements. [cited 2021 Jul 28]. Available from: https://www.cbic.org/CBIC.htm.
13. IPAC Canada: Practice recommendations for hand hygiene in healthcare settings 2017 Jun 19. Available from: https://ipaccanada.org/photos/custom/Members/pdf/17JulHand%20Hygiene%20Practice%20Recommendations_final.pdf.
14. Public Health Agency of Canada: Hand hygiene practices in healthcare settings. 2012 [cited 2021 Jul 28]. Available from: http://publications.gc.ca/collections/collection_2012/aspcphac/HP40-74-2012-eng.pdf.
15. Ontario Agency for Health Protection and Promotion (PHO). Provincial Infectious Diseases Advisory Committee. Best practices for hand hygiene in all health care settings, 4th edition, Toronto, ON: Queen's Printer for Ontario; April 2014 [cited 2021 Jul 28]. Available from https://www.publichealthontario.ca/-/media/documents/b/2014/bp-handhygiene.pdf?la=en.
16. Ontario Agency for Health Protection and Promotion (PHO). Provincial Infectious Diseases Advisory Committee recommendations for prevention, detection and

management of occupational dermatitis for health care workers, Toronto, ON: Queen's Printer for Ontario; October 2019 [cited 2021 Jul 28]. Available from https://www.publichealthontario.ca/-/media/documents/g/2019/guide-occupational-dermatitis.pdf?la=en.
17. Public Health Agency of Canada (PHAC). Routine Practices and Additional Precautions for preventing the transmission of infection in health care settings. 2016 [cited 2021 Jul 28]. Available from https://www.canada.ca/content/dam/phacaspc/documents/services/publications/diseases-conditions/routine-practices-precautionshealthcare-associated-infections/routine-practices-precautions-healthcare-associatedinfections-2016-FINAL-eng.pdf.
18. Ontario Agency for Health Protection and Promotion, Provincial Infectious Diseases Advisory Committee. Routine Practices and Additional Precautions in all health care settings. 3rd edition. Toronto, ON: Queen's Printer for Ontario; November 2012 [cited 2021 Jul 28]. Available from https://www.publichealthontario.ca/-/media/documents/b/2012/bp-rpap-healthcare-settings.pdf?la=en.
19. Public Health Agency of Canada (PHAC). Essential resources for effective infection prevention and control programs: A matter of patient safety. A discussion paper. 2015 [cited 2021 Jul 28]. Available from: http://aceco.ca/wp-content/uploads/2015/03/ps-speng.pdf.
20. Accreditation Canada. Qmentum Program: Infection prevention and control standards. 2021 [cited 2021 Jul 28]. Available from: http://www.accreditation.ca/qmentum.
21. Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Best practices for environment cleaning for prevention and control of infections in all health care settings 3rd edition, Toronto, ON: Queen's Printer for Ontario; April 2018 [cited 2021 Jul 28]. Available from: https://www.publichealthontario.ca/-/media/documents/B/2018/bp-environmentalcleaning.pdf.
22. CSA Group. CSA Z314-18: Canadian Medical Reprocessing. Toronto, ON. CSA Group; 2018.
23. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Provincial Infectious Diseases Advisory Committee. Best practices for cleaning, disinfection and sterilization of medical equipment/devices. 3rd ed. Toronto, ON: Queen's Printer for Ontario; May 2013 [cited 2021 Jul 28]. Available from: https://www.publichealthontario.ca/-/media/documents/b/2013/bp-cleaning-disinfectionsterilization-hcs.pdf?la=en.
24. National Advisory Committee on Immunization (NACI): Statements and publications. Available from: https://www.canada.ca/en/public-health/services/canadian-immunizationguide.html.
25. Ontario Agency for Health Protection and Promotion (PHO). Provincial Infectious Diseases Advisory Committee. Best Practices for Surveillance in all Health Care Infections in patient and resident populations, Toronto, ON: Queen's Printer for Ontario; July 2014 [cited 2021 Jul 28]. Available from: https://www.publichealthontario.ca/-/media/documents/b/2014/bp-hai-surveillance.pdf?la=en.
26. Stone ND, Ashraf MS, Calder J, et al. Surveillance definitions of infections in long-term care facilities: revisiting the McGeer criteria. *Infect Control Hosp Epidemiol*. [Internet]. 2012 [cited 2021 Jul 28];33(10):965-977 doi:10.1086/667743. Available from: https://pubmed.ncbi.nlm.nih.gov/22961014/.
27. Happe J, Stoll F, Biluk L, Cargill K, Cuff A, Cerkowniak G, et al. Surveillance definitions of infections in Canadian long-term care facilities. IPAC News. Fall 2017 [cited 2021 Jul 28]. Available from: https://www.patientsafetyinstitute.ca/en/About/PatientSafetyForwardWith4/Documents/Canadian%20LTC%20Surveillance%20Definitions.pdf.
28. IPAC Canada Position Statement: Surveillance in Long-Term Care Settings. Sept 2019 [cited 2021 Jul 28]. Available from: https://ipaccanada.org/photos/custom/Members/pdf/IPAC_LTC_Surveillance_Position_Statement_June2019_FINAL.pdf.
29. IPAC Canada. Position Statement: Health care design and construction. March 2016 [internet]. Available from https://ipaccanada.org/photos/custom/Members/pdf/Heath_Care_Facility_Design_Construction_March2016_English_Disclaimer.pdf.
30. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Construction, renovation, maintenance and design (CRMD). 2021 [cited 2021 Jul 28]. Available from: https://www.publichealthontario.ca/en/health-topics/infection-prevention-control/crmd.
31. CSA Group. Z317.13: Infection control during construction, renovation, and maintenance of health care facilities. Toronto, ON. CSA Group. 2013.
32. CSA Group. Z8000-18: Canadian health care facilities. Toronto, ON. CSA Group. 2018.
33. Wrublowsky R. Design guide for long term care homes. [Internet]. 2018.01 [cited 2021 Jul 28]. Available from: https://www.fgiguidelines.org/wpcontent/uploads/2018/03/MMP_DesignGuideLongTermCareHomes_2018.01.pdf.
34. Ulrich, RP, Quan X, Zimring CP, Joseph A, Choudhary R. The role of the physical environment in the hospital of the 21st century: A once-in-a-lifetime opportunity. The Center for Health Design. 2004 Sept [cited 2021 Jul 28]. Available from: https://www.healthdesign.org/knowledge-repository/role-physical-environment-hospital-21st-century-once-lifetime-opportunity.

ORIGINAL ARTICLE

A review of infection prevention and control guidelines for dental offices during the COVID-19 pandemic in mid-2020

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ABSTRACT

Background: The COVID-19 pandemic was a challenge for all dental professionals who had to rapidly update infection prevention and control (IPAC) guidelines and protocols due to increased risk of SARS-CoV-2 transmission during common aerosol-generating procedures (AGPs), and a lack of consensus on how best to mitigate the risk of transmission in a dental office. Thus, the purpose of this descriptive study was to compare the variance in IPAC guidelines for dental offices that emerged, and to assess practice consistency from early to mid-2020.

Methods: A comprehensive literature search was conducted from May 26 to July 8, 2020 for IPAC documentation specific to the dental office during the COVID-19 pandemic. Documents that met the inclusion criteria were independently reviewed. Data was extracted using a framework based on the following IPAC domains: pre-appointment, waiting room, personal protective equipment (PPE) selection, treatment room, and post-dismissal.

Results: A total of 67 IPAC documents specific to dental offices were reviewed in this study. Included documents originated from 22 dental associations, 17 peer-reviewed articles, 13 dental regulators, 11 government bodies, two public health units, and two dental corporations. There was a great degree of variance with IPAC guidelines from the pre-appointment stage, during treatment, and post-treatment. Recommendations that emerged with some level of consistency involved pre-screening patients for COVID-19 symptoms (97%), staggering appointments (84%), social distancing, minimizing occupants in the waiting room, wearing a face shield over protective eyewear for AGPs (92%), and preprocedural rinses (84%). There was less consistency with recommendations for consolidating multiple appointments (36%), waiting room ventilation (46%), N95 masks (47%) versus FFP2/FFP3 masks (30%) use for AGPs, fit-testing respirators (37%), enclosing open operatories for AGPs (28%), prioritizing minimally invasive procedures (30%), and using third-party laundry companies (32%).

Conclusions: The risk of SARS-CoV-2 transmission, lack of consensus on mode of spread, and need for rapid action resulted in a significant variation in most downstream IPAC interventions in the hierarchy of controls, including choice of PPE, treatment room, and post-dismissal domains. Upstream interventions, including pre-appointment and waiting room domains, were relatively consistent in practices in early to mid-2020.

KEYWORDS: aerosols, COVID-19, dentistry, guideline, infection control

INTRODUCTION

The coronavirus disease (COVID-19) was first identified in Wuhan, China in December, 2019 after a group of patients presented to the hospital with atypical pneumonia [1]. Evolving transmission patterns of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and elusive variants have challenged public health strategies and prolonged the pandemic [2]. SARS-CoV-2 can be transmitted by direct contact with contaminated surfaces, contact with discharge from nose or mouth, and most commonly via droplet dispersion when an infected person coughs, sneezes, or undergoes an aerosol-generating procedure (AGP) [3]. Most dental procedures generate aerosols that are contaminated with a patient's saliva, blood, secretions, or tissue particles [4]. Due to increased transmission risks during dental AGPs, dental treatment in most countries across the world was paused and limited to emergency care in the early stages of the pandemic [3]. Dental clinics gradually re-opened in phases under strict infection prevention and control (IPAC) guidelines mandated by public health authorities and dental regulators. Each authority responsible for creating guidelines had to review new information as it became available and update their guidelines.

Considering the proximity of dental care providers (DCPs) to patients during treatment and the contamination and spread of aerosols, dental offices were considered to be a high-risk setting for COVID-19 transmission [5]. The disease can readily

Conflicts of Interest: The authors declare that they have no conflict of interest.

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spread from infected patients to the DCPs, to other patients and vice versa without appropriate IPAC protocols. Longstanding measures include personal protective equipment (PPE), hand hygiene, proper equipment handling and sterilization, procedural risk reduction, and disinfection and sterilization protocols [6]. Considering the risk of transmission of COVID-19 in dental settings, dental professionals had to re-evaluate the entire dental continuum of care, including tracking patients through the entire array of dental services from pre-appointment, waiting room, PPE selection, treatment room, and post-dismissal. Guidelines demanded that offices were redesigned to accommodate social distancing, minimize contact points, and conform with overarching public health mandates.

Since it is imperative that dental offices adapt strategies to mitigate the spread of COVID-19 aerosols, in this study, we reviewed interventions for consistency. In the dental setting, droplets from AGPs can reach the DCP's eyes and nose, which could increase the likelihood of SARS-CoV-2 transmission [7,8]. Particulate respirators filter out 0.1 to 0.3 micron particles during AGPs [9]. Protective eyewear and face shields may prevent infectious droplets from contaminating conjunctival epithelium [10]. Hydrogen peroxide (HP), chlorhexidine (CHX), and povidone iodine (PI) preprocedural rinses (PPRs) may reduce viral loads of SARS-CoV-2 in saliva and oropharyngeal tissues, and consequently in aerosols [11–13]. Aerosol transmission can be mitigated at the source via rubber dam isolation, high-volume evacuation and allowing a "fallow time" for air circulation and droplet settling [14].

As information on the transmission and epidemiology of COVID-19 continues to evolve, policymakers interpret scarce scientific evidence and changing advice from international health agencies to develop guidelines for safe delivery of oral healthcare services. A rapidly evolving understanding of the infectiousness and transmissibility of COVID-19, scarce evidence supporting novel IPAC measures in dental offices, and unique risk of acquiring COVID-19 via aerosol created the "perfect storm" for inconsistent recommendations. Thus, the aim of this study was to identify variance in IPAC guidelines specific to dental offices in early to mid-2020 of the COVID-19 pandemic, from pre-appointment, waiting room, PPE selection, treatment room, and post-dismissal.

METHODS

A comprehensive search for IPAC documents specific to dental offices during the COVID-19 pandemic was conducted by an independent reviewer (DW) between May 26, 2020, and July 8, 2020. Both authors (KD and DW) independently reviewed documents to create a mutually agreed upon inclusion list. Inclusion criteria included English language guidance documents by professional bodies for dentists, guidance from national or subnational (i.e., province or state) bodies, peer-reviewed scientific publications, guidance for resuming or maintaining dental practice during the COVID-19 pandemic, guidance for the entire continuum of dental care from pre-appointment, waiting room, treatment room, and post-dismissal. Consensus statements, guidance for dental auxiliaries, local (i.e., town, city, or county) guidance and sources exclusively focusing on select recommendations, or not specific to dentistry were excluded.

A search for IPAC documents and publications was conducted using the following databases: MEDLINE, EMBASE, Scopus, Cochrane Library, and Google Scholar. The following terms and Boolean operators were used in MeSH and free-text searches: *OR infection OR prevention and OR control, OR emergency, OR urgent, OR non-urgent, AND dental OR settings, OR oral OR health OR services, OR IPAC, OR interim, OR phase 1, OR phase 2, OR phase 3, OR plan, OR procedure, OR guidance, OR guideline, OR return, OR recovery, OR practice, OR dentistry, OR covid-19, and OR return to work*. Additionally, a search of the grey literature was conducted to identify IPAC documents produced directly by dental associations, regulatory bodies, and governing health authorities.

Eligible IPAC documents were reviewed and the following document elements were first extracted: country/region of publisher, organization name, type of organization (i.e., health authority, dental association, dental regulator), document title, language, document URL, date published, date updated, and whether or not it was a live document (Supplementary Table 1). A framework for extracting IPAC content was developed in advance based on the following stages of patient flow through an office: pre-appointment, waiting room, treatment room, and post-dismissal. The collected data was organized according to theme, and descriptive data is reported. The proportion (%) of each individual recommendation category was calculated by relating frequency to total number of guidelines.

RESULTS

Recommendations were summarized according to frequency of recommendation variations and proportion of sources represented for patient flow categories. The initial search identified 127 documents; 100 documents were fully reviewed, and 67 guidance documents were selected after exclusions. The full review of search process is described in Figure 1.

Pre-Appointment

A summary of pre-appointment recommendations is presented in Table 1. Almost all (97%) guidelines recommended pre-screening patients and temporally scheduling according to COVID-19 risk. Interestingly, only 10% of the guidelines reviewed recommended implementing a COVID-19 staff informed consent form prior to returning to work after the initial COVID-19 shutdown. The purpose of the form was to make staff aware of the risks involved upon returning and working during the COVID-19 pandemic. The majority (81%) of guidelines recommended staggering appointments to minimize patient-to-patient contact and 36% recommended combining appointments when possible.

Waiting Room

A description of recommendations specific to dental office waiting rooms is presented in Table 2. Most guidelines (88%) adopted local public health recommendations for the waiting room such as social distancing, hand hygiene, and minimizing contact points. A total of 83% of sources recommended

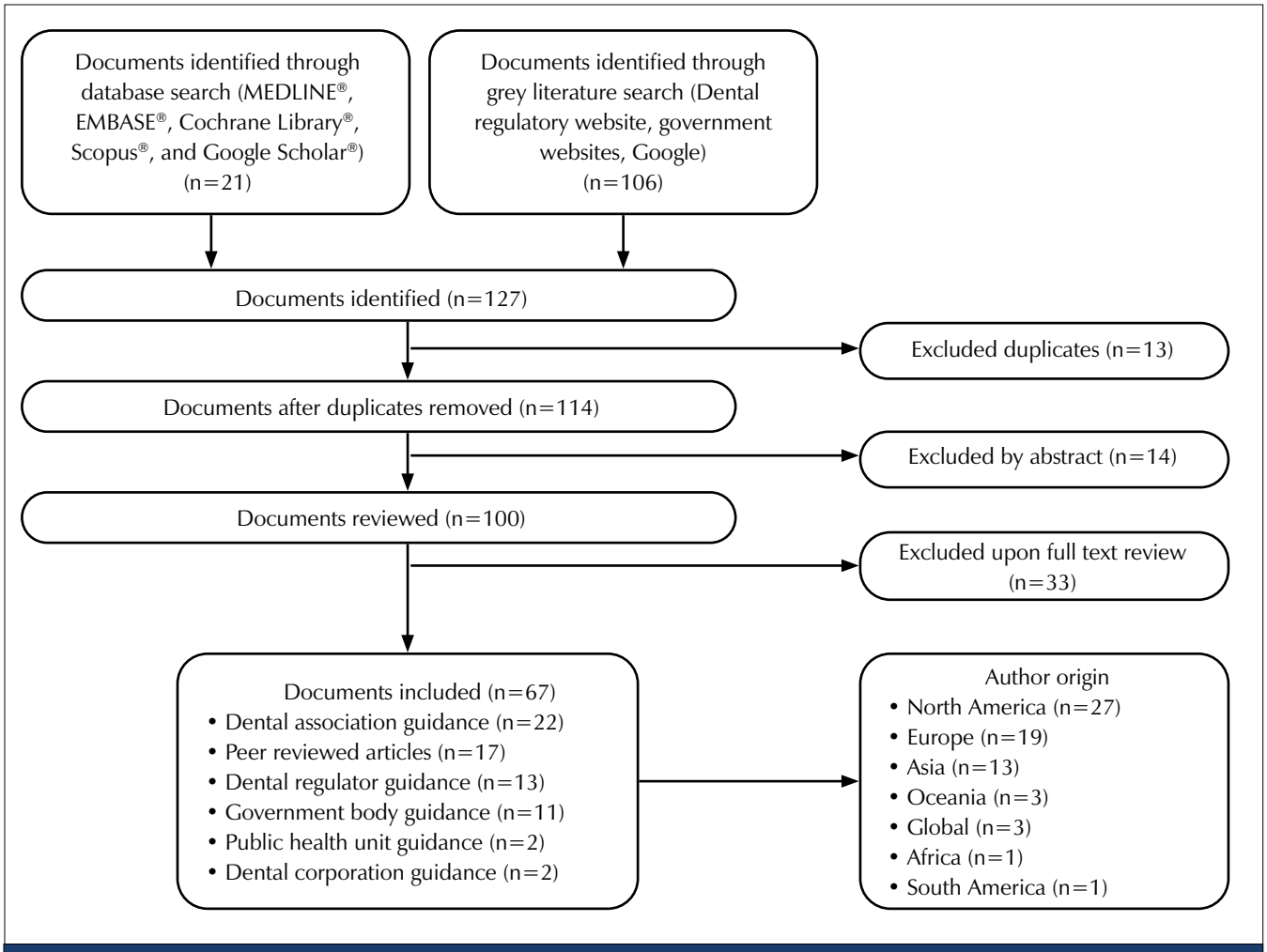

Figure 1: Flowchart description of dental COVID-19 IPAC document search and selection process

Table 1: Proportion of dental COVID-19 IPAC pre-appointment recommendation variations

Pre-Screening	Staff Advice and Screening	Patient Scheduling
97% pre-screening patients for COVID-19 symptoms via telephone and in-person, then grouping according to risk assessment of potential COVID-19 status	10% implementation of staff COVID-19 informed consent form before returning to work after initial COVID-19 shutdown	36% consolidating appointments when possible
		81% staggering appointments to minimize patient-to-patient contact

Abbreviations: IPAC, infection prevention and control; COVID-19, coronavirus disease 2019

installation of a clear plastic barrier at the reception desk. Ninety-two percent of sources recommended minimizing occupants to allow for social distancing – most of these sources recommended social distancing of at least two metre (72%), while others recommended one metre (22%). Less than half (46%) of the guidelines recommended improving airflow in the waiting room, either by opening windows or using air-filtration systems. Almost all guidelines promoted passive screening, including requirements for patient hygiene (92%), and placement of COVID-19 information posters (81%).

Personal Protective Equipment

A summary of relevant PPE recommendations is presented in Table 3. PPE recommendations were stratified based on COVID-19 infection status of patients and type of procedure (AGP or non-AGP). Only 62% of sources recommended wearing an additional face shield over protective eyewear for non-AGPs on unsuspected COVID-19 patients. Conversely, for AGPs, the large majority (92%) of sources recommended wearing a face shield over protective eyewear for all patients. Very few (3%) sources considered an American Society for Testing and Materials

TABLE 2: Proportion of dental COVID-19 IPAC waiting room recommendation variations						
General Precautions	**Reception Desk**	**Social Distancing**		**Air Quality**	**Patient Hygiene**	**Posters**
88% general public health measures in the office	83% placing a clear plastic barrier at the reception desk	92% minimizing occupants	72% social distancing of at least 2m	46% keeping the waiting room well-ventilated by opening windows or other methods	92% providing tissues, no-touch lined receptacles, alcohol-based hand rub, and masks for patients	81% placing COVID-19 infection information posters around the clinic
			22% social distancing of at least 1m			
		71% social-distanced seating				

Abbreviations: COVID-19, coronavirus disease 2019; m, metre

TABLE 3: Proportion of dental COVID-19 IPAC PPE recommendation variations		
Patient Infection Status	**COVID-19 not suspected**	**COVID-19 suspected**
Eyewear	62% wearing a face shield over protective eyewear for non-AGPs	75% wearing a face shield over protective eyewear for non-AGPs
	92% wearing a face shield over protective eyewear for AGPs	
	55% wearing goggles for AGPs	
Mask	47% wearing an N95 respirator for AGPs	51% wearing an N95 respirator for AGPs
	30% wearing an FFP2/FPP3 respirator for AGPs	33% wearing an FFP2/FPP3 respirator AGPs
	37% fit-testing your respirator	
	3% ASTM level 3 mask and face shield can be worn as an alternative to an N95 or FFP2/FFP3 respirator for AGPs	
	24% wearing a PAPR if you are unable to wear a respirator mask or for added safety	
Bodily Protection	76% wearing a disposable or reusable, protective gown	

Abbreviations: IPAC, infection prevention and control; COVID-19, coronavirus disease 2019; PPE, personal protective equipment; AGPs, aerosol generating procedures; ASTM, American Society for Testing and Materials; N95, National Institute of Occupational Safety and Health N95 classification of air filtration filtering facepiece respirator; FFP2/FFP3, filtering face piece score EN standard 149:2001 and EN 143 standard P2/P3 rating from European Committee for Standardization.

(ASTM) level 3 mask and face shield as an alternative to a 95% filtration efficiency respirator (N95) or filtering facepiece class 2 or 3 (FFP2/FFP3) for AGPs. Only 37% of sources required that respirators are fit-tested prior to use. Over half (51%) of sources recommended wearing an N95 respirator and only a third (33%) of the guidelines recommended wearing an FFP2 or FFP3 respirator for AGPs on suspected COVID-19 patients. More than three-quarters (76%) of sources recommended wearing a protective gown for bodily protection during all procedures.

Treatment room

IPAC recommendations for treatment rooms and during procedures are presented in Table 4. Select sources (28%) mandated separation of operatories with plastic barriers (from floor-to-ceiling) for AGPs for suspected or confirmed patients with COVID-19. Very limited sources (16%) required AGPs on COVID-19 patients to be completed in airborne infection isolations rooms (AIIRs). Sixty-one percent of sources addressed fallow time after AGPs. Of these sources, about half recommended (49%) a fallow time of less than 60 minutes, some (20%) recommended a fallow time of 1–3 hours, and others (22%) specifically stated that a fallow time was not required. There was widespread (84%) agreement for PPRs, most commonly (63%) recommending an HP rinse, followed by PI (45%). About two thirds (66%) of sources recommended practicing with an assistant at all times for constant use of high-volume suction, often denoted as "four-handed dentistry". Most (93%) guidelines emphasized the importance of utilizing a rubber dam and other isolation techniques such as PVS-based isolation pastes, cotton rolls and gauze, and cheek retraction suction devices. Only 30% of sources recommended prioritizing minimally invasive operative procedures such as chemo-mechanical caries removal, Hall technique, atraumatic restorative technique (ART), or silver diamine fluoride. Very few (7.5%) sources recommended avoiding prescription of ibuprofen due to potential aggravation of COVID-19 infection.

Post-Dismissal

A summary of post-dismissal recommendations of interest is listed in Table 5. About one-third (32%) of sources recommended daily collection of reusable gowns and scrubs by a third-party laundering service. About half (49%) of

Table 4: Proportion of dental COVID-19 IPAC treatment room recommendation variations

<table>
<tr><th>Operatory Management & Equipment</th><th colspan="2">Air Quality</th><th colspan="2">Aerosol Reduction Interventions</th><th>COVID-19-Positive Patient Considerations</th></tr>
<tr><td>28% floor-to-ceiling isolation of open operatories with plastic barriers for AGPs and non-AGP treatment of COVID-19 suspect or confirmed patients</td><td>16% performing AGPs on COVID-19 suspect or confirmed patients in AIIRs</td><td></td><td rowspan="3">84% use of a PPR</td><td>63% hydrogen peroxide PPR</td><td rowspan="6">7.5% avoiding prescription of ibuprofen due to potential aggravation of COVID-19 infection</td></tr>
<tr><td>31% disposable materials and items where possible</td><td rowspan="4">61% addressed fallow time after AGPs</td><td rowspan="2">20% 1–3 hours</td><td>21% chlorhexidine PPR</td></tr>
<tr><td rowspan="3">48% only essential staff may enter the operatory, minimizing number of individuals and opening and closing of door</td><td>45% povidone iodine PPR</td></tr>
<tr><td rowspan="2">49% <60 minutes</td><td colspan="2">66% practising four-handed dentistry when possible</td></tr>
<tr><td colspan="2">93% use of rubber dam and other isolation techniques to minimize aerosols during AGPs</td></tr>
<tr><td></td><td>22% no fallow time</td><td colspan="2">30% prioritizing minimally invasive procedures*</td></tr>
<tr><td></td><td></td><td colspan="2">73% use of extraoral radiographs over intraoral radiographs to avoid aerosol generation</td></tr>
</table>

Abbreviations: IPAC, infection prevention and control; COVID-19, coronavirus disease 2019; AGPs, aerosol generating procedures; PPR, pre-procedural rinse; AIIR, airborne infection isolation room; ART, atraumatic restorative technique.
*Minimally invasive procedures include chemo-mechanical caries removal, Hall technique, ART, silver diamine fluoride.

Table 5: Proportion of dental COVID-19 IPAC post-dismissal recommendation variations

<table>
<tr><th>Disposal</th><th>PPE During Disinfection</th><th colspan="2">Surface Disinfection Agents</th><th colspan="2">Contact Tracing</th></tr>
<tr><td rowspan="4">32% recommended that reusable cloth gowns and scrubs be collected from the clinic after each day by a 3rd party laundry company for high-heat laundering and disinfecting</td><td rowspan="4">49% staff should wear eye protection, gloves and mask when performing decontamination/ disinfection procedures</td><td rowspan="3">25% alcohol-based surface disinfection products</td><td>24% recommended >60% alcohol-based surface disinfection solution</td><td rowspan="4">22% request that patient informs dental clinic if they develop symptoms or are diagnosed with COVID-19 for a period of time after treatment for contact tracing</td><td>53% within 2 days</td></tr>
<tr><td>41% recommended 62-71% alcohol-based surface disinfection solution</td><td rowspan="2">33% within 14 days</td></tr>
<tr><td>35% recommended >70% alcohol-based surface disinfection solution</td></tr>
<tr><td colspan="2">31% chlorine-based surface disinfection products*</td></tr>
</table>

Abbreviations: IPAC, infection prevention and control; COVID-19, coronavirus disease 2019; personal protective equipment.
* 0.1% sodium hypochlorite

sources recommended that staff wear standard PPE during disinfection/decontamination procedures, including eyewear, gloves, and mask. Of sources that recommend alcohol-based surface disinfection products (25%), a 62-71% alcohol-based surface solution was most frequently recommended (41%).

Some guidelines (22%) asked that patients inform the clinic if they develop symptoms, or are diagnosed with COVID-19 after treatment for contact tracing and isolation of close contacts. Of these, 53% required follow-up after two days, and 33% for 14 days.

Discussion

This study compares and contrasts the different IPAC guidelines that emerged specific for dental offices during the COVID-19 pandemic for pre-appointment, waiting room, PPE use, treatment room, and post-dismissal domains. Among 67 guidelines included, various recommendations were homogeneous in each category. This includes pre-appointment recommendations such as pre-screening and staggering appointments and waiting room recommendations such as social distanced seating, hand hygiene, and COVID-19 information posters. Most pre-appointment and waiting room recommendations were not specific to the dental environment and matched overarching public health guidelines that were relatively consistent internationally. There was agreement in PPE choice, treatment room, and post-dismissal measures supported by evidence available at the onset of the pandemic. Both cost-effective and reusable, face shields were uniformly recommended for AGPs. Face shields have been shown to reduce immediate viral exposure by 68-96% during AGPs [15]. Wearing a disposable or reusable protective gown was also widely recommended, and shown to be effective in reducing infection rate [16,17]. Treatment room guidelines were most alike in recommending a fallow time of less than 60 minutes, which preliminary evidence supports, including the use of PPRs [18,19]. Similarities existed in post-dismissal recommendations for the use of 62-71% ethanol disinfectant, that has been shown to rapidly inactivate human coronaviruses in experimental studies, and intuitive use of eye protection, gloves, and mask during disinfection [13].

Widespread agreement in recommending PPRs can be accounted for by the pre-existing body of literature available demonstrating their effectiveness in significantly reducing microbes in dental aerosols [20]. Three of the most recommended rinses include HP, PI, and CHX. However, the majority of studies referenced evaluated microbial loads using colony-forming units, which excludes viruses [11,21–25]. Hypothetical inferences were made from the available research demonstrating that these PPRs reduced aerosol loads of other enveloped viruses in different capacities, depending on concentration and duration of use [20,26]. More recently, PI was shown to completely deactivate SARS-CoV-2 after 15 seconds in-vitro and reduced salivary viral load up to six hours after use in COVID-19 positive patients [27,28]. PI may not be most commonly recommended because of infrequent adverse events reported such as burning sensation, itching, and local irritation [29]. CHX was least frequently recommended by sources, reflected by sparing evidence showing conflicting efficacy – further studies are needed to support its use [20]. HP is supported by few studies showing its ability to inactivate microbes at low, non-toxic concentrations (0.5-3%) after 30-60 seconds of use [13]. A recent in-vitro study demonstrated some success in inactivating SARS-CoV-2, but a pilot study of ten COVID-19 positive patients did not find a significant reduction [13,30]. Differences in cost may have also impacted rinse recommendations. Randomized controlled trials with large sample sizes are required to evaluate effectiveness of PPRs against SARS-CoV-2. The potential of PPRs to significantly reduce risk of aerosol transmission, and ease of implementation suggests that PPRs should remain within standard operating procedures (SOPs) going forward.

Guideline recommendations unique to dentistry differed in abundance. While the majority of sources adopted a social distance measure of two metres, there were still some recommendations for a shorter distance of one metre, which is likely explained by local differences in public health orders. Evidence suggests SARS-CoV-2 may travel more than 2m through coughing and shouting [31]. Stark differences in PPE recommendations were noted for respiratory hygiene; N95 respirators during AGPs versus FFP2/FFP3 respirators despite similar filtration efficiency [9]. This can be explained by geographic standardization of N95s in North America and FFP2/FFP3s in Europe [9]. Only few advocated for fit-testing respirators as this may have been included in general healthcare service guidelines that encompassed DCPs, as it has been established that fit-testing increases protective factors offered by respirators [32].

Lack of consensus surrounding aerosol transmission of COVID-19 and limited research on dental AGP's resulted in significant variance in suggestions for air control in operatories. Fallow time also depends on each unique facility's air circulation variables, complicating recommendations [14]. Only 22% of guidelines stated that a fallow time was not required after AGPs. The effectiveness of fallow time may have been overstated early in the pandemic. A recent study suggested that intraoral high-volume suction alone or in combination with other air-cleaning methods reduced particle concentrations to baseline on completion of AGPs and may negate need for fallow time [4]. Those responsible for drafting guidelines likely looked to professional agencies like the CDC and/or WHO for early IPAC guidance because of insufficient experimental evidence about COVID-19. CDC guidelines recommended that practices determine fallow times using NIOSH's mathematical relationship for rate of decline in concentration of airborne contaminant [33]. This hypothetical model assumes the aerosolized environment is an empty room with ideal mixing of room air after the contaminant source is removed [14].

Minimally invasive restorative procedures, which would not generate aerosols, were not frequently endorsed. However, most guidelines did recommend avoiding AGPs when possible. Beyond the benefit of conserving tooth structure, clinicians may opt for evidence-based, minimally invasive procedures more frequently for the management of caries because they reduce or eliminate aerosol transmission [34]. Only five sources recommended avoiding the prescription of ibuprofen after a letter published in the Lancet on March 11, 2020 hypothesized that ibuprofen may aggravate COVID-19 symptoms [35]. Shortly after, a retrospective cohort study by Rinott *et al*. showed that ibuprofen was not associated with worse clinical outcomes [36]. Most sources did not recommend professional out-of-house laundering potentially due to controversy in the literature on whether soiled linen risks disease transmission. The CDC stated that it presents a negligible risk for infection and

normal 'hot' and 'cold' washing-drying cycles are adequate for patient safety." While the Association of Surgical Technologists recommended professional laundering due to the extent of contamination [37]. This is an opportunity for practice leaders to review dress code policies to ensure safety for patients and providers. Introducing research opportunities for how different aspects of scrubs may impact contamination (i.e., material and duration of use). The dichotomous difference in contact tracing recommendations between two and 14 days can be explained by national differences in public health protocols post-confirmation and ambiguity in the virus' infectious period [38].

The potential airborne nature of COVID-19 and ability to rapidly disseminate demanded that decision-makers revamp protocols to include overriding public health measures. Simultaneously, guideline creators had to address dental-specific concerns of COVID-19, namely AGPs. The need to define dental AGPs in guidelines created ambiguity, however, the use of high-speed handpieces, air-water syringes, and ultrasonic scalers were consistently considered AGPs [39]. Virdi *et al*. found that risk stratification of COVID-19 transmission associated with different AGPs was inconsistent among early guidelines, but guidelines released later were more descriptive [39]. During initial reopening, it may have been rational to expect inconsistent guidelines for a novel viral pathogen; evidence consulted was likely based on rapid reviews and mixed findings from published data. To fill this gap, current research has focused on many of these uncertainties resulting in rapid production of a large volume of literature [40]. Bibliometric analysis by Jacimovic *et al*. analyzing 296 dental COVID-19 studies identified a low overall level of scientific evidence [40]. The authors concluded that current literature does not provide sufficient data for the evidence-based decision-making process required for guiding clinical practice [40]. It will be important to thoroughly analyze the vast COVID-19 scientific evidence available to corroborate new findings specific to dentistry.

Robust IPAC protocols existed in dentistry prior to the pandemic but the uncertainty with regards to infectivity and transmissibility of the virus challenged norms. Importance placed on IPAC in dental settings can be appreciated by the lack of super-spreader events involving dental practices in the literature [33]. Following the precautionary principle, in the absence of definitive scientific evidence on how to prevent transmission in a dental office, policymakers and dental regulators had to err on the side of caution to protect the public. The level of caution dental authorities took to account for growing uncertainty and complexity reflects itself in the variety of different guidelines observed. Current guidelines have not changed significantly, but have only become more lenient. Identifying variations in guidelines emphasizes where high-quality evidence is needed to determine efficacy of cross-infection interventions for delivery of safe oral health care in a post-pandemic world. Clinical studies are needed to elucidate which new measures accurately reduce infection risk without trade-offs of time spent with patients and expense, facilitating creation of uniform, practical IPAC guidelines.

The findings of this study are strengthened by a broad search criteria used to capture guidelines and recommendations published outside academic literature. With a data collection period over three months, updated guidelines were captured in real-time as new information became available. However, it is important to consider the limitations of this research. Only guidelines in English language were considered. Although translated documents were accessible for various European and Asian countries, this was not always the case. Frequency of certain recommendations may have been understated if they were only captured in multidisciplinary or broad public health orders that offices adhered to. There have been considerable developments since initial search in early to mid-2020, such as ventilation and engineering controls, vaccinations, and variants of concern that are not reflected in this study.

CONCLUSION

Due to the transmissibility of the SARS-CoV-2 virus, limited evidence, and short time period to act, our study demonstrates a considerable variation in downstream IPAC recommendations specific to dental offices in the domains related to PPE choice, treatment room, and post-dismissal recommendations. Upstream interventions that focused on eliminating exposure through pre-appointments and precautions in the waiting room were fairly consistent across guidelines. While pre-COVID-19 IPAC guidelines for dental offices were once considered robust, this pandemic revealed areas that need to be addressed in the post-pandemic world. Moving forward, a greater emphasis needs to be placed on developing evidence-based IPAC guidelines that will allow dental professionals to provide safe and effective treatment.

REFERENCES

(1) Allam, Z. (2020). The First 50 days of COVID-19: A Detailed Chronological Timeline and Extensive Review of Literature Documenting the Pandemic. *Surveying the Covid-19 Pandemic and Its Implications*, 1–7. https://doi.org/10.1016/B978-0-12-824313-8.00001-2.

(2) Kaur, N., Singh, R., Dar, Z., Bijarnia, R. K., Dhingra, N., & Kaur, T. (2021). Genetic comparison among various coronavirus strains for the identification of potential vaccine targets of SARS-CoV2. *Infection, Genetics and Evolution, 89*, 104490. https://doi.org/10.1016/j.meegid.2020.104490.

(3) Peng, X., Xu, X., Li, Y., Cheng, L., Zhou, X., & Ren, B. (2020). Transmission routes of 2019-nCoV and controls in dental practice. *International Journal of Oral Science, 12*(1), 1–6. https://doi.org/10.1038/s41368-020-0075-9.

(4) Ehtezazi, T., Evans, D. G., Jenkinson, I. D., Evans, P. A., Vadgama, V. J., Vadgama, J., Jarad, F., Grey, N., & Chilcott, R. P. (2021). SARS-CoV-2: Characterisation and mitigation of risks associated with aerosol generating procedures in dental practices. *British Dental Journal*, 1–7. https://doi.org/10.1038/s41415-020-2504-8.

(5) Zhang, M. (2021). Estimation of differential occupational risk of COVID-19 by comparing risk factors with case

data by occupational group. *American Journal of Industrial Medicine*, 64(1), 39–47. https://doi.org/10.1002/ajim.23199.

(6) Brondani, M., Cua, D., Maragha, T., Shayanfar, M., Mathu-Muju, K., Bergmann, H. von, Almeida, F., Villanueva, J., Alvarado, A. A. V., Learey, S., & Donnelly, L. (2020). A Pan-Canadian narrative review on the protocols for reopening dental services during the COVID-19 pandemic. *BMC Oral Health*, 20(1), 1–13. https://doi.org/10.1186/s12903-020-01340-y.

(7) Nejatidanesh, F., Khosravi, Z., Goroohi, H., Badrian, H., & Savabi, O. (2013). Risk of Contamination of Different Areas of Dentist's Face During Dental Practices. *International Journal of Preventive Medicine*, 4(5), 611–615.

(8) Bentley, C. D.; Burkhart, N. W.; Crawford, J. J. Evaluating Spatter and Aerosol Contamination during Dental Procedures. *J Am Dent Assoc* 1994, *125* (5), 579–584. https://doi.org/10.14219/jada.archive.1994.0093.

(9) Rengasamy, S., Eimer, B. C., & Shaffer, R. E. (2009). Comparison of Nanoparticle Filtration Performance of NIOSH-approved and CE-Marked Particulate Filtering Facepiece Respirators. *The Annals of Occupational Hygiene, 53*(2), 117–128. https://doi.org/10.1093/annhyg/men086.

(10) Lu, C., Liu, X., & Jia, Z. (2020). 2019-nCoV transmission through the ocular surface must not be ignored. *The Lancet, 395*(10224), e39. https://doi.org/10.1016/S0140-6736(20)30313-5.

(11) Reddy, S., Prasad, M. G. S., Kaul, S., Satish, K., Kakarala, S., & Bhowmik, N. (2012). Efficacy of 0.2% tempered chlorhexidine as a pre-procedural mouth rinse: A clinical study. *Journal of Indian Society of Periodontology, 16*(2), 213–217. Scopus. https://doi.org/10.4103/0972-124X.99264.

(12) Eggers, M., Koburger-Janssen, T., Eickmann, M., & Zorn, J. (2018). In Vitro Bactericidal and Virucidal Efficacy of Povidone-Iodine Gargle/Mouthwash Against Respiratory and Oral Tract Pathogens. *Infectious Diseases and Therapy, 7*(2), 249–259. https://doi.org/10.1007/s40121-018-0200-7.

(13) Kampf, G., Todt, D., Pfaender, S., & Steinmann, E. (2020). Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. *The Journal of Hospital Infection, 104*(3), 246–251. https://doi.org/10.1016/j.jhin.2020.01.022.

(14) Singhal, S., Farmer, J., Aggarwal, A., Kim, J., & Quiñonez, C. (2021). A Review of "Optimal Fallow Period" Guidance Across Canadian Jurisdictions. International Dental Journal. https://doi.org/10.1016/j.identj.2021.03.003.

(15) Lindsley, W. G., Noti, J. D., Blachere, F. M., Szalajda, J. V., & Beezhold, D. H. (2014). Efficacy of face shields against cough aerosol droplets from a cough simulator. *Journal of Occupational and Environmental Hygiene, 11*(8), 509–518. https://doi.org/10.1080/15459624.2013.877591.

(16) Madge, P., Paton, J. Y., McColl, J. H., & Mackie, P. L. (1992). Prospective controlled study of four infection-control procedures to prevent nosocomial infection with respiratory syncytial virus. *Lancet (London, England), 340*(8827), 1079–1083. https://doi.org/10.1016/0140-6736(92)93088-5.

(17) Srinivasan, A., Song, X., Ross, T., Merz, W., Brower, R., & Perl, T. M. (2002). A prospective study to determine whether cover gowns in addition to gloves decrease nosocomial transmission of vancomycin-resistant enterococci in an intensive care unit. *Infection Control and Hospital Epidemiology, 23*(8), 424–428. https://doi.org/10.1086/502079.

(18) Bates, A. J., & Bates, D. R. (2020). Analysing air particle quantity in a dental primary care setting. *MedRxiv*, 2020.08.12.20173450. https://doi.org/10.1101/2020.08.12.20173450.

(19) Haigh, A., Vasant, R., & O'Hooley, D. (2020). Quantitative evaluation of dental bio-aerosols using particle count values. Part 1: The effect of high-volume aspiration and natural ventilation. [Preprint]. *Research Square*. https://doi.org/10.21203/rs.3.rs-55265/v1.

(20) Marui, V. C., Souto, M. L. S., Rovai, E. S., Romito, G. A., Chambrone, L., & Pannuti, C. M. (2019). Efficacy of preprocedural mouthrinses in the reduction of microorganisms in aerosol: A systematic review. *The Journal of the American Dental Association, 150*(12), 1015-1026.e1. https://doi.org/10.1016/j.adaj.2019.06.024.

(21) Feres, M., Figueiredo, L. C., Faveri, M., Stewart, B., & de Vizio, W. (2010). The Effectiveness of a Preprocedural Mouthrinse Containing Cetylpyridinium Chloride in Reducing Bacteria in the Dental Office. *The Journal of the American Dental Association, 141*(4), 415–422. https://doi.org/10.14219/jada.archive.2010.0193.

(22) Gupta, G., Mitra, D., Ashok, K. P., Gupta, A., Soni, S., Ahmed, S., & Arya, A. (2014). Efficacy of Preprocedural Mouth Rinsing in Reducing Aerosol Contamination Produced by Ultrasonic Scaler: A Pilot Study. *Journal of Periodontology, 85*(4), 562–568. https://doi.org/10.1902/jop.2013.120616.

(23) Shetty, S. K., Sharath, K., Shenoy, S., Sreekumar, C., Shetty, R. N., & Biju, T. (2013). Compare the Efficacy of Two Commercially Available Mouthrinses in reducing Viable Bacterial Count in Dental Aerosol produced during Ultrasonic Scaling when used as a Preprocedural Rinse. *The Journal of Contemporary Dental Practice, 14*(5), 848–851. https://doi.org/10.5005/jp-journals-10024-1414.

(24) Dawson, M., Soro, V., Dymock, D., Price, R., Griffiths, H., Dudding, T., Sandy, J. R., & Ireland, A. J. (2016). Microbiological assessment of aerosol generated during debond of fixed orthodontic appliances. *American Journal of Orthodontics and Dentofacial Orthopedics, 150*(5), 831–838. https://doi.org/10.1016/j.ajodo.2016.04.022.

(25) Retamal-Valdes, B., Soares, G. M., Stewart, B., Figueiredo, L. C., Faveri, M., Miller, S., Zhang, Y. P., & Feres, M. (2017). Effectiveness of a pre-procedural mouthwash in reducing bacteria in dental aerosols: Randomized clinical trial. *Brazilian Oral Research, 31*, e21. Scopus.

https://doi.org/10.1590/1807-3107BOR-2017.vol31.0021.
(26) Reis, I. N. R., do Amaral, G. C. L. S., Mendoza, A. A. H., das Graças, Y. T., Mendes-Correa, M. C., Romito, G. A., & Pannuti, C. M. (2021). Can preprocedural mouthrinses reduce SARS-CoV-2 load in dental aerosols? *Medical Hypotheses, 146*, 110436. https://doi.org/10.1016/j.mehy.2020.110436.
(27) Bidra, A. S., Pelletier, J. S., Westover, J. B., Frank, S., Brown, S. M., & Tessema, B. (2020). Rapid In-Vitro Inactivation of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Using Povidone-Iodine Oral Antiseptic Rinse. Journal of Prosthodontics: Official *Journal of the American College of Prosthodontists, 29*(6), 529–533. https://doi.org/10.1111/jopr.13209.
(28) Singh, G. P., Vivekananda, L., & Roy, P. (2021). Effect of preprocedural oral rinses with active ingredients like chlorhexidine, povidone-iodine and cetylpyridinium chloride in neutralizing SARS-COV-2 concentration in aerosol. *GSC Advanced Research and Reviews, 6*(3), 132–135. https://doi.org/10.30574/gscarr.2021.6.3.0048.
(29) Olson, A. S., Rosenblatt, L., Salerno, N., Odette, J., Ren, R., Emanuel, T., Michalek, J., Liu, Q., Du, L., Jahangir, K., & Schmitz, G. R. (2019). Pilot Study to Evaluate the Adjunct Use of a Povidone-Iodine Topical Antiseptic in Patients with Soft Tissue Abscesses. *The Journal of Emergency Medicine, 56*(4), 405–412. https://doi.org/10.1016/j.jemermed.2018.12.026.
(30) Gottsauner, M. J., Michaelides, I., Schmidt, B., Scholz, K. J., Buchalla, W., Widbiller, M., Hitzenbichler, F., Ettl, T., Reichert, T. E., Bohr, C., Vielsmeier, V., & Cieplik, F. (2020). A prospective clinical pilot study on the effects of a hydrogen peroxide mouthrinse on the intraoral viral load of SARS-CoV-2. *Clinical Oral Investigations, 24*(10), 3707–3713. https://doi.org/10.1007/s00784-020-03549-1.
(31) Jones, N. R., Qureshi, Z. U., Temple, R. J., Larwood, J. P. J., Greenhalgh, T., & Bourouiba, L. (2020). Two metres or one: What is the evidence for physical distancing in Covid-19? *BMJ, 370*, m3223. https://doi.org/10.1136/bmj.m3223.
(32) Reponen, T., Lee, S.-A., Grinshpun, S. A., Johnson, E., & McKay, R. (2011). Effect of fit testing on the protection offered by n95 filtering facepiece respirators against fine particles in a laboratory setting. *The Annals of Occupational Hygiene, 55*(3), 264–271. https://doi.org/10.1093/annhyg/meq085.
(33) Howe, M.-S. (2020). The world is its own best model: Modelling and future pandemic planning in dentistry. *British Dental Journal, 229*(11), 716–720. https://doi.org/10.1038/s41415-020-2403-z.
(34) Eden, E., Frencken, J., Gao, S., Horst, J. A., & Innes, N. (2020). Managing dental caries against the backdrop of COVID-19: Approaches to reduce aerosol generation. *British Dental Journal, 229*(7), 411–416. https://doi.org/10.1038/s41415-020-2153-y.
(35) Fang, L., Karakiulakis, G., & Roth, M. (2020). Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection? *The Lancet Respiratory Medicine, 8*(4), e21. https://doi.org/10.1016/S2213-2600(20)30116-8.
(36) Rinott, E., Kozer, E., Shapira, Y., Bar-Haim, A., & Youngster, I. (2020). Ibuprofen use and clinical outcomes in COVID-19 patients. *Clinical Microbiology and Infection, 26*(9), 1259.e5-1259.e7. https://doi.org/10.1016/j.cmi.2020.06.003.
(37) Joseph, R., Highton, M., & Goodrich, C. (2021). Let's talk about scrubs: A reflection during COVID-19. *Nursing Management, 52*(3), 26–32. https://doi.org/10.1097/01.NUMA.0000733624.74420.43.
(38) Bar-On, Y. M., Flamholz, A., Phillips, R., & Milo, R. (2020). SARS-CoV-2 (COVID-19) by the numbers. *ELife, 9*, e57309. https://doi.org/10.7554/eLife.57309.
(39) Virdi, M. K., Durman, K., & Deacon, S. (2021). The Debate: What Are Aerosol-Generating Procedures in Dentistry? A Rapid Review. *JDR Clinical and Translational Research, 6*(2), 115–127. https://doi.org/10.1177/2380084421989946.
(40) Jacimovic, J., Jakovljevic, A., Nagendrababu, V., Duncan, H. F., & Dummer, P. M. H. (2021). A bibliometric analysis of the dental scientific literature on COVID-19. *Clinical Oral Investigations*. https://doi.org/10.1007/s00784-021-03916-6.

ORIGINAL ARTICLE

The PPE spotter role: Supporting best practice in acute and long-term care

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ABSTRACT

Healthcare workers are at high risk of contracting infections including COVID-19 due to close and frequent contact with patients. To promote appropriate use of personal protective equipment (PPE) and to enhance protection of healthcare workers during the COVID-19 pandemic, we trained a team of registered nurses to serve as "PPE Spotters". This team offered in-person observation, support, feedback, and on-the-spot teaching about proper PPE use and hand hygiene practices. Evaluation showed staff and leaders felt the Spotters effectively promoted best practices for PPE and hand hygiene, and 86% recommended the program continue. PPE Spotters now serve a formal role in the organization, supporting both acute and long-term care.

KEYWORDS: PPE, pandemic, COVID-19, infection control, PPE spotter

BACKGROUND

Healthcare workers are at high risk of contracting infections because of close and prolonged contact with patients. Staff-to-staff transmission of infections, including COVID-19 has also been reported, with crowded staff breakrooms (where staff must remove their masks to eat), presenting the greatest concern [1], while inconsistent PPE use by staff during breaks provides another potential source of transmission [2]. High-touch surfaces and poor ventilation inside breakrooms may also contribute to transmission of infections among staff [3, 4]. Consequently, proper use of PPE, good respiratory etiquette and impeccable hand hygiene are integral to preventing the spread of infectious organisms. Since the start of the COVID-19 pandemic, many healthcare organizations have developed innovative approaches to assist staff with appropriate use of PPE while conserving PPE supplies, and supported the ongoing practice of excellent hand hygiene. In some healthcare organizations, the role of the infection prevention and control (IPAC) team is extended to appropriate PPE use teaching, monitoring, and coaching. In the past year, published literature has offered examples of new supporting roles, such as PPE Spotters: personnel who assist staff with proper donning and doffing of PPE and reduce the misuse of PPE [5, 6].

PPE Spotters in a Chicago hospital educated staff on the types of PPE equipment needed for various tasks, and it was shown that the misuse of N95 respirators (specific for filtering airborne particles) decreased following implementation of the Spotter role [6]. A Pennsylvania hospital noted that their "PPE Subject Matter Experts" effectively provided shoulder-to-shoulder support, which resulted in delivery of optimal PPE training to care providers during the pandemic [5]. The role of the PPE Spotter is also significant in ensuring effective communication among care staff and leadership teams, including IPAC, during uncertain times [5]. Frost et al. further suggest that PPE "donning and doffing is best performed under close observation by a PPE Spotter" who is empowered to intervene if there is a breach in PPE, thus allowing for "focused attention" on the importance of proper PPE use [7]. In April 2020, our IPAC team created a "PPE Spotter" role and trained registered nurses (RNs) for this position. A formal evaluation of this role was conducted four months later. At present, there are no other known published studies on the evaluation of the PPE Spotter role during the COVID-19 pandemic.

METHODS

Our organization includes acute care hospitals, long-term care centres, and community clinics.

In addition to the PPE Spotter program, our organization created "Screeners" who were positioned at each site's public entrances to administer health questionnaires and monitor PPE use by those entering the facility.

Conflicts of Interest: The authors declare that they have no conflict of interest.

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Twenty RNs were trained as PPE Spotters, some of whom filled the role temporarily. PPE education sessions reached close to 1,600 staff across the organization. RNs from disciplines including IPAC and surgical services (available due to temporary shut-down of surgeries), as well as members of the Professional Practice Office were trained as PPE Spotters. Training was conducted by staff from IPAC and the Professional Practice Office, and included a refresher course in IPAC guidance around infection control (including COVID-19) and PPE use, as well as tips on using a coaching approach when offering staff support with PPE use and hand hygiene. PPE Spotters primarily worked day shifts, and initially visited units across acute care to offer support in best practice related to the use of PPE and infection control principles. The Spotters watched for opportunities to assist staff with using PPE, offering in-person observation, feedback and on-the-spot teaching about proper PPE use and hand hygiene.

The Spotters also led PPE education sessions, offered to all staff who provided direct care and those in non-clinical roles including security, food-service staff, and patient transfer personnel. Spotters created and distributed laminated posters to demonstrate proper donning and doffing of masks, gowns, and gloves, as well as signage to denote PPE required in patients' rooms and other care areas. In some medical units, Spotters also led decluttering efforts to facilitate thorough cleaning of the area.

Four months after introducing the PPE Spotters in acute care areas, the program was evaluated in an organization-wide survey offered to all staff, using distribution lists that included approximately 3,000 staff. Survey questions included demographics, Likert-scale perceptions, and an open-ended question to solicit suggestions for improving the program. The survey was advertised in organizational newsletters, and a gift card draw was created to encourage responses. In total, 221 responses were received from a diverse set of staff and clinicians. Results were compiled and shared in the organization's newsletter.

RESULTS

Survey results showed strong support for the PPE Spotter program, with 86% (173/202) of respondents recommending the program continue. Seventy-four percent (163/219) of respondents were aware of the Spotter program and 53% (112/213) reported having had interactions with a PPE Spotter. Overall, 61% (124/203) of respondents agreed that the PPE Spotter program was helpful in supporting best practice for PPE and hand hygiene on the units. Feedback from staff indicated they appreciated PPE Spotters for being "patient yet clear with their approach to correcting PPE practices," and also greatly appreciated clarity about donning PPE for specific indications, especially pertaining to airborne precautions. Additionally, the Spotters' "in-the-moment feedback" was stated to be more valuable than "audits shared later". Respondents also emphasized their appreciation for PPE educators and advocated that this resource "be [offered] in every hospital area". Sixty-one percent (125/204) of respondents agreed that PPE Spotter support was helpful in reducing the potential spread of COVID-19. One senior leader noted, "I believe the support of the Spotters has been instrumental…I believe that when we support each other to don and doff safely, we save lives. Thank you!" (Sandra Barr, MHA, email communication, June 3, 2020). The survey also generated many suggestions to expand and improve the PPE Spotter program, including offering PPE Spotters in long-term care sites, adding evening and weekend shifts, and emphasizing a supportive approach in all interactions.

In August 2020, the PPE Spotter program was expanded to all long-term care sites and the PPE Spotter role has since been formalized with dedicated staff.

DISCUSSION AND CONCLUSION

As the COVID-19 pandemic enters its second year, and with several new variants reported in recent months, healthcare organizations face the prospect of ongoing need for PPE and hand hygiene support for healthcare workers. The nature of the COVID-19 pandemic and associated outbreaks of disease make it difficult to attribute the support offered by roles like the PPE Spotter to a reduction in the number of COVID-19 outbreaks or the duration of these outbreaks. Other new practices adopted since the pandemic, such as the Screeners, may affect this outcome. However, staff and leaders believe that the support and education offered by the PPE Spotters contributed to reducing the transmission of COVID-19 and number of outbreaks across facilities. Addtionally, the expansion of the Spotter program to long-term care sites, where the workforce consists of primarily supportive roles such as care aides who may have less experience of PPE use, has received overwhelming support by site leaders. This evaluation is limited by the low number of responses received, relative to the number of staff employed at our organization. We believe the additional strain placed on staff by working during the pandemic reduced the number who were able to respond to the survey. Future evaluations of the PPE Spotter program could assess staff perceptions of practice change related to PPE Spotter support as well as the effectiveness of the program in long-term care sites. The implementation of a PPE Spotter program is a promising practice for infection prevention and control in both acute and long-term care settings, especially given the Spotter role requires little additional training for practicing RNs and has been well received by staff and leaders.

REFERENCES

1. Sangal RB, Scofi JE, Parwani V, Pickens AT, Ulrich A, Venkatesh AK. Less social emergency departments: Implementation of workplace contact reduction during COVID-19. *Emergency Medicine Journal: EMJ*. (2020);37(8): 463-466.
2. Kim JJ, Coffey KC, Morgan DJ, Roghmann M. Lessons learned – Outbreaks of COVID-19 in nursing homes. *Am J Infection Control*. 2020;48(10): 1279-1280.
3. Marshall DL, Bois F, Jensen SK, et al. Sentinel Coronavirus environmental monitoring can contribute to detecting

asymptomatic SARS-CoV-2 virus spreaders and can verify effectiveness of workplace COVID-19 controls. *Microbial Risk Analysis*. 2020;16: 100137.
4. Canadian Centre for Occupational Health and Safety. Indoor Ventilation: Guidance During The COVID-19 Pandemic. https://www.ccohs.ca/images/products/pandemiccovid19/pdf/indoor-ventilation.pdf. Published February 2, 2021. Accessed March 18, 2021.
5. Moore M. Protection at the Frontlines: Rapid Organization and Delivery of COVID-19 Personal Protective Equipment Training. *J Nurses Prof Dev*. 2020;36(6): 369.
6. Patel AB, O'Donnell A, Bonebrake A, et al. Stewardship of personal protective equipment (PPE): An important pandemic resource for PPE preservation and education. *Infect Control Hosp Epidemiol*. 2020; 1-2.
7. Frost DW, Shah R, Melvin L, et al. Principles for clinical care of patients with COVID-19 on medical units. *CMAJ*. 2020;192(26): E720-E726.

REPRINT

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Desperate times call for evidence-based measures: Prioritizing science during the COVID-19 pandemic

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KEYWORDS: Clinical reasoning, clinical trials, evidence-based medicine, SARS-CoV-2, treatment

The COVID-19 pandemic represents one of the largest acute global health threats in a century, and scientific and public interest in the disease is substantial. Clinicians, infection control practitioners, epidemiologists, policymakers, and concerned citizens worldwide are looking to medical journals, preprint servers, and social media for updates on the prevention and treatment of this disease.

As scientists and clinicians scramble to understand this new infection, there has been a deluge of scientific publications about the epidemiology, pathophysiology, diagnosis, and treatment of COVID-19. There have been some remarkable milestones in phase 3 clinical trials going through design, ethics approval, enrolment, analysis, and publication within the past six months. The first is the randomized controlled trial by Cao et al on the use of lopinavir-ritonavir for severe COVID-19 [1]. The trial began enrolment on January 18, 2020, only weeks after the discovery of SARS-CoV-2, and was published only two months after enrolment. The same group successfully completed a 2:1 randomized controlled trial on remdesivir versus placebo, and although recruitment was hindered by the end of the local outbreak, it still contributed useful findings [2]. The first robust randomized controlled trial to be published on COVID-19 involved the recruitment of over 1,000 individuals from 10 countries to receive remdesivir or placebo, a remarkable achievement in the context of a pandemic with a short time frame [3]. These trials have been paramount in informing practice and generating policy while awaiting larger definitive trials. Trials such as RECOVERY in the United Kingdom, have begun to release results, including the finding of significant mortality benefit with dexamethasone among inpatients requiring oxygen or mechanical ventilation [4].

Despite the high-quality evidence being published to date, there has been a proliferation and publication of studies that have been scientifically inadequate. These studies have had outsized effects by leading to mass confusion and uneven policy development. Shortly after a French group published an uncontrolled study that suffered from major methodologic flaws [5] on the effectiveness of hydroxychloroquine and azithromycin, President Donald Trump touted hydroxychloroquine as a potential "game-changer,"

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the Food and Drug Administration authorized emergency use, and widespread off-label use [6] caused global supply chain shortages, thus exposing individuals to risk and simultaneously threatening the health of people who take these medications for proven indications such as systemic lupus erythematosus. Without evidence of efficacy, the Indian Council of Medical Research recommended pre-exposure prophylactic hydroxychloroquine to the scores of health care workers in that country who may provide care for someone with COVID-19 [7].

Even high-impact medical journals have included studies that do not meet the most basic standards of scientific publishing. The Lancet recently published a large observational study of over 10,000 individuals taking hydroxychloroquine or chloroquine that showed no significant benefit, with an increase in mortality seen in this group compared to over 80,000 patients who did not receive these drugs [8]. The downstream effects of this study included a hold on the hydroxychloroquine arm of the World Health Organization Solidarity Trial, as well as repeals on the use of the drug in France. However, as scientists took a closer look at this publication, it became evident that there were significant concerns about the validity and veracity of the data [9]. In fact, close attention was also turned toward a study using the same registry that had been published in the *New England Journal of Medicine* three weeks earlier. It soon became evident that the data could not be verified, and both articles were retracted [10,11]. *Annals of Internal Medicine* published an experiment in which four COVID-19 patients coughed into a petri dish with and without cotton and surgical masks; the study reported that masks did not effectively reduce SARS-CoV-2 emission [12]. However, the authors failed to appreciate that the quantities in all cases were below the assay's limit of detection, and thus the results were uninterpretable. The study has since been retracted [13]. These articles, despite their low quality of evidence and lack of context to the findings, lead to significant questions surrounding the transmission dynamics, pathophysiology, and management of COVID-19.

Rewinding to a century ago, syphilis was a significant cause of morbidity and mortality across the old and new worlds. The emergence of treatment strategies in syphilis, which were uncontrolled and extremely toxic, holds a unique position in medical history. A study published in *JAMA* in 1903 noted with regard to mercury-based therapy that

> This knowledge, though purely empirical, has been so clearly and conclusively established, by centuries of observation and study, that it has become one of the most evident and acceptable of medical facts […] (14 p1626)

Further research on arsenic-based therapy and therapeutic hyperthermia – achieved by infecting patients with malaria – also became medical standards and even worthy of the Nobel Prize. These therapies were offered to patients of all ages and degrees of infection based on a collection of anecdotes and uncontrolled studies.

Today, we look back on these studies with a sense of incredulity, as the advent and maturation of evidenced-based medicine have reframed the type and quality of studies that should be accepted for changing clinical practice. Yet, over the course of this pandemic, the evidence base upon which recommendations for unproven treatments are predicated is reminiscent of the standards of a century ago. Why are we repeating the mistakes of a century ago? Dealing with a threat with high stakes and no proven treatment is akin to being thrust back into the pre-antibiotic era, where desperation reigns. Long after our medical predecessors resorted to heavy metals or iatrogenic malaria for treating syphilis, we are now disregarding the hard-won principles of evidence-based medicine – at our peril. It is imperative that clinical decisions and public health policy remain grounded in the fundamental hierarchy of scientific evidence with the prioritization of well-designed studies, including appropriate controls.

What is the way forward? With an emerging disease, there may be a rush to treat with unproven therapies for the sake of offering patients something rather than just providing supportive care. In some settings, where a treatment is very obviously needed to change morbidity and mortality (such as the use of antimicrobials for bacterial sepsis), it would be unethical to complete a placebo randomized controlled trial. In the case of COVID-19, there is clearly clinical equipoise in a number of treatment modalities. The mandate of research institutions and academic centres should be to encourage the creation and/or synthesis of the best possible evidence. In the context of COVID-19, this should mean prioritization of generating high-quality randomized, controlled evidence wherever possible. Clinicians should provide excellent supportive care rather than prescribing experimental therapies (with unknown benefits and potential harms) outside of clinical trials.

REFERENCES

1. Cao B, Wang Y, Wen D, et al. A trial of lopinavir–ritonavir in adults hospitalized with severe Covid-19. N Engl J Med. 2020;382(19):1787–99. Epub 2020 Mar 18. https://doi.org/10.1056/NEJMoa2001282. Medline:32187464
2. Wang Y, Zhang D, Du G, et al. Remdesivir in adults with severe COVID-19: a randomised, doubleblind, placebo-controlled, multicentre trial. Lancet. 2020;395(10236):1569–78. Epub 2020 Apr 29. https://doi.org/10.1016/S0140-6736(20)31022-9.
3. Beigel JH, Tomashek KM, Dodd LE, et al. Remdesivir for the treatment of Covid-19 – preliminary report. N Engl J Med. 2020; May 22:NEJMoa2007764. Epub 2020 May 22. https://doi.org/10.1056/NEJMoa2007764. Medline:32445440
4. RECOVERY Collaborative Group. Dexamethasone in hospitalized patients with Covid-19 –preliminary report. N Engl J Med. 2020; Jul 17:NEJMoa2021436. Epub 2020 July 17. https://doi.org/10.1056/NEJMoa2021436. Medline:32678530
5. Gautret P, Lagier JC, Parola P, et al. Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial. Int J Antimicrob Agents. 2020; Mar 20:105949. Epub 2020 Mar 20. https://doi.org/10.1016/j.ijantimicag. 2020.105949. Medline:32205204

6. Vaduganathan M, van Meijgaard J, Mehra MR, et al. Prescription fill patterns for commonly used drugs during the COVID-19 pandemic in the United States. JAMA. 2020;323(24):2524–6. Epub 2020 May 28. https://doi.org/10.1001/jama.2020.9184. Medline:32463459
7. Rathi S, Ish P, Kalantri A, Kalantri S. Hydroxychloroquine prophylaxis for COVID-19 contacts in India. Lancet Infect Dis. 2020. Epub 2020 Apr 17. https://doi.org/10.1016/S1473-3099(20)30313-3. Medline:32311324
8. Mehra MR, Desai SS, Ruschitzka F, et al. Hydroxychloroquine or chloroquine with or without a macrolide for treatment of COVID-19: a multinational registry analysis. Lancet. 2020. Epub 2020 May 22. https://doi.org/10.1016/S0140-6736(20)31180-6. Medline:32450107
9. Ledford H. Safety fears over drug hyped to treat the coronavirus spark global confusion. Nature. 2020;582(7810):18–19. Epub 2020 May 29. https://doi.org/10.1038/d41586-020-01599-9. Medline:32488162
10. Mehra MR, Desai SS, Ruschitzka F, et al. Retraction: Hydroxychloroquine or chloroquine with or without a macrolide for treatment of COVID-19: a multinational registry analysis. Lancet. 2020;395(10240):1820. Epub 2020 Jun 5. https://doi.org/10.1016/S0140-6736(20)31324-6. Medline:32511943
11. Mehra MR, Desai SS, Kuy S, et al. Cardiovascular disease, drug therapy, and mortality in Covid-19. N Engl J Med. 2020;382(25):e102. Epub 2020 May 1. https://doi.org/10.1056/NEJMoa2007621. Medline:32356626. Retraction of publication in: N Engl J Med. 2020;382(26):2582. Epub 2020 Jun 4. https://doi.org/10.1056/NEJMc2021225. Medline:32501665
12. Bae S, Kim M-C, Kim JY, et al. Effectiveness of surgical and cotton masks in blocking SARS–CoV-2: a controlled comparison in 4 patients. Ann Intern Med. 2020;173(1):W22–3. Epub 2020 Apr 6. https://doi.org/10.7326/M20-1342. Medline:32251511
13. Bae S, Kim MC, Kim JY, et al. Notice of retraction: effectiveness of surgical and cotton masks in blocking SARS–CoV-2. Ann Intern Med. 2020;173(1):79. Epub 2020 Jun 2. https://doi.org/10.7326/L20-0745. Medline:32479106
14. Heidingsfeld ML. Mercurial treatment of syphilis: a further contribution to the study of mercurial injections. JAMA. 1903 Jun 13;XL(24):1626–9. https://doi.org/10.1001/jama.1903.92490240006002.

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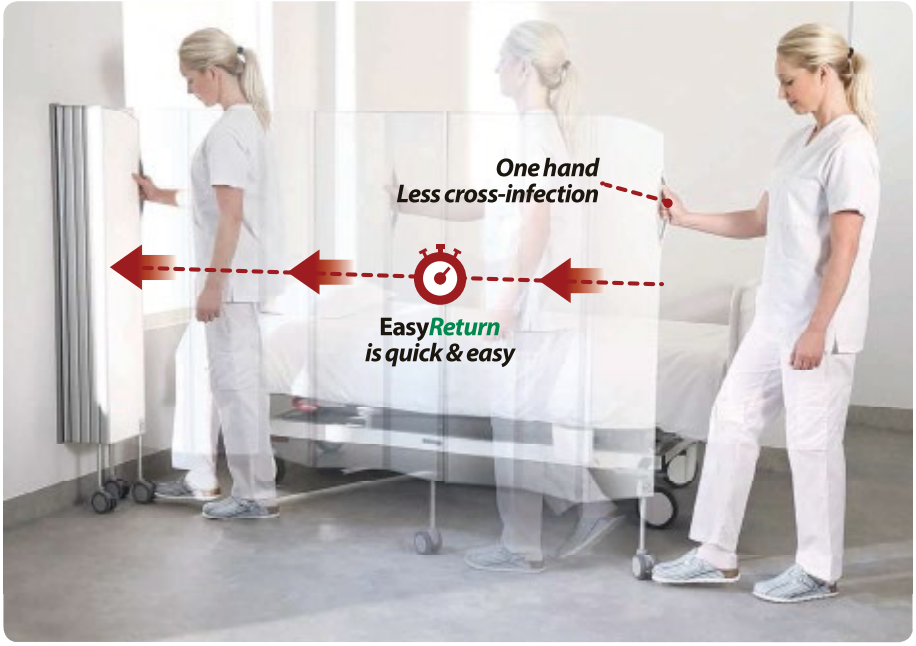
Optimises infection prevention

The Silentia Screen System meets strict hygiene requirements.

- All surfaces are smooth and easy to reach and disinfect
- All surfaces withstand disinfectants used in today's care situations
- The wheels can be removed and machine washed
- Can be cleaned immeadiately unlike curtains. Faster room turnaround.



2. Easy*Return*

Quick and easy to fold back

Lightweight material and a Built-In Memory for an easy and quick return to its original position.

The One Touch Point Handle means:

- No need for hands to touch other surfaces when folding the screen
- Only one hand needs to be used which reduces cross-infection

Contact us for a free demonstration.

Together we will help you find the right solution for your healthcare environment.

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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.

Coming soon

PCS 1000 Plus Oxidizing Disinfectant Cleaner
- Oxidizing cleaner
- Oxidizing hospital grade Disinfectant
- Oxidizing broad spectrum virucide
- Active Ingredient 0.13% w/w Sodium Hypochlorite when packed
- Active Ingredient 0.01% w/w Hypochlorous Acid when packed

PCS 1000 Plus Oxidizing Disinfectant Cleaner for use on hard non-porous environmental surfaces in domestic, health care facilities, institutions, schools and hospitality industries.

To clean and oxidize frequently touched surfaces Apply undiluted to surface wipe dry with microfiber or other clean dry absorbent cloth or rinse or allow to air dry.

To disinfect frequently touched surfaces such as non-critical medical equipment, bed rails, washroom fixtures and surfaces that are potential fomites in health care facilities, long term care, schools, institutions and in domestic settings.

Apply to pre cleaned surfaces allow surface to remain wet for time indicated below. Wipe surface dry, rinse or allow to air dry.

Bacteria/Virus	Contact time
Staphylococcus aureus (ATCC 6538)	5 minutes
Pseudomonas aeruginosa (ATCC 15442)	5 minutes
Human Coronavirus	2 minutes
Adenovirus Type 5	3 minutes

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)

Available in ready to use and concentrate formats.

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The first and only wipe that sanitizes and protects for 24 hours even after dozens of touches[1]

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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

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Our team of chemists, microbiologists and technicians developed SABER® disinfectant and X-PURE™ hand sanitizer in our laboratory. Both products are trusted in Canadian healthcare, and offer easy and accessible procurement.

SABER® is on the list of hard surface disinfectants proven for use against COVID-19 authorized by Health Canada and X-PURE™ is on the list of hand sanitizers (COVID-19) authorized by Health Canada to kill harmful bacteria and germs.

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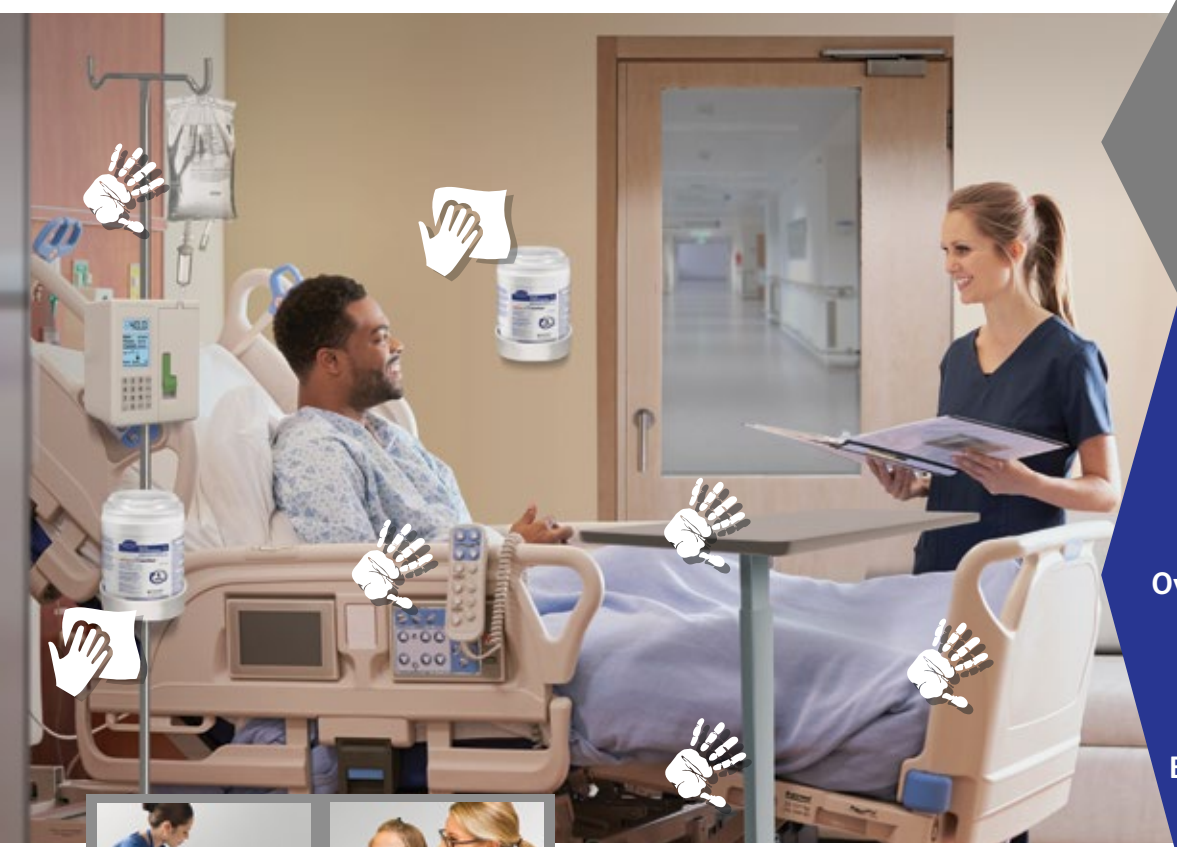
Diversey™

Patient room traffic and frequently-touched surfaces are key vectors for the spread of pathogens.



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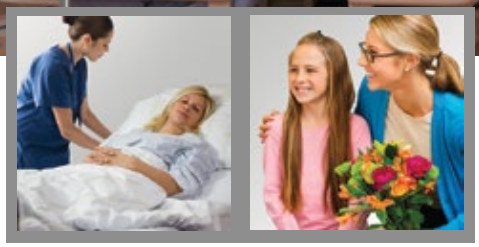
Bedrails 3.1 Touches Per Interaction*

Bed Surfaces 1.3 Touches Per Interaction*



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*Huslage et al.

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References
1 Degala, et al. United States Patent 9,078,934. July 14, 2015.
2 Chang C, Furlong LA. Microbial stowaways in topical antiseptic products. *N Eng J Med.* 2012;367(23):2170-2173.

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