

**CLOROX**PRO

#### **IPAC Canada National Conference**

Vancouver BC | May 28-31, 2023

North Central Region IPAC Hub & CloroxPro Lunch and Learn



## PROGRAM



PRO

•	Welcome Remarks	Lisa/Noel
•	Simcoe Muskoka District Health Unit Status and Updates	
•	Public Health Ontario Status and Updates	
•	Aerosols vs Droplets: Challenging IPAC Dogma	Mustansir
•	Candida auris: what it is, concerns, how to test	Tavia
•	Infection Control in Construction	Jessie
•	CPE review and considerations	Ashley
•	Biofilms	Ashley
•	Change Management	Michael
•	CDS vs RTU Wipes	
•	Clorox Product Audit	
•	Discussions	
		CLORO
<b>R</b> V∕H	Royal Victoria Regional Health Centre	

## **Event Overview**

The 2023 IPAC Canada conference was held at the Vancouver Convention Centre. There were approximately 450 in person attendees and an additional 200~ virtual participants.







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#### Simcoe Muskoka District Health Unit Status and Updates





#### Public Health Ontario Status and Updates



## AEROSOLS VS DROPLETS: CHALLENGING IPAC DOGMA RVH IPAC HUB | NOVEMBER 23, 2023

Mustansir Diwan MSc, CIC, LTC-CIP





#### \*All following content is from Dr. Michael Klompas' presentation at the IPAC Canada 2023 National Conference on May 30<sup>th</sup>, 2023.







Majority of respiratory viruses spread between people via droplets.



- Size cutoff between aerosols/small droplets and large droplets.
- Binary distinction vs a spectrum between airborne and droplet transmission. ٠
- Infections at close range erroneously equated with droplet transmission since the early ٠ 20<sup>th</sup> century.
- Neglecting aerosol transmission at close range of < 2 meters. ٠







Slide Courtesy of Dr. Michael Klompas





#### **People Produce Respiratory Particles in a Range of Sizes**



Slide Courtesy of Dr. Michael Klompas | Source: Chen et al., Building and Environment 2020; 176:106859





Source: Leung, Nature Reviews Microbiology 2021;19:528-545



#### **Aerosol Transmission in Humans: Quarantine Hotels**



- Multiple case reports of transmission between unrelated travelers staying in quarantine hotels in Hong Kong, Singapore, New Zealand...
- Quarantine hotels have very strict rules in hotels requiring guests to stay in their own room at all times (video monitoring)
- Transmission presumed due to
  - Prolonged dwell time in poorly ventilated room leading to high concentration of virus in the air
  - Escape of virus laden air into stagnant corridors when room door is opened
  - Entry of virus laden air into nearby rooms when their residents subsequently open their doors

Slide Courtesy of Dr. Michael Klompas | Source: Wong, Lancet Regional Health - Western Pacific 2022;18:100360



#### Influenza Transmission Has Many Similarities

1,116 participants from 225 households in South Africa, tested 2x/week by PCR, 2017-2018



Slide Courtesy of Dr. Michael Klompas | Source: Cohen et al., Lancet Glob Health 2021; 9:e863-874





#### Variation in Aerosol Production by Activity



Slide Courtesy of Dr. Michael Klompas | Source: Wilson et al., Anaesthesia 2021; 76:1465-1474



#### Viral Emissions Vary by Person





Slide Courtesy of Dr. Michael Klompas

## Conclusion



- Aerosols are generated by many human activities, and appear to be implicated in many respiratory viral infections, not just SARS-CoV-2.
- Asymptomatic spread supports aerosol theory of transmission.
- Risk of spread is dependent on many factors, including air quality, time of exposure, and distance between individuals (**diffusion/dilution**).







Surgical masks provide adequate protection against most respiratory viruses under most conditions.







## Medical Masks are Good! ... But Not Perfect

Transmission study using Golden Syrian Hamsters in adjacent cages with and without tightly fixed surgical masks between cages



Slide Courtesy of Dr. Michael Klompas | Source: Chan et al., Clin Infect Dis 2020;71(16):2139-2149





## **Masking Effectiveness in Practice**

Transmission rates amongst 969 close contacts of 431 people with Covid-19, Johnson County Public Health, Iowa



Slide Courtesy of Dr. Michael Klompas | Source: Riley et al., Emerging Infectious Disease 2021;28(1):69-75



## **Mask Filtration Efficiency in Practice**





Slide Courtesy of Dr. Michael Klompas | Source: Clapp et al., JAMA Intern Med 2021;181(4):463-469





#### We Have the Solution!



Slide Courtesy of Dr. Michael Klompas | Source: Sickbert-Bennett et al., Jama Intern Med 2020:180(12):1607-1612





People who reported always wearing a mask in indoor public settings were less likely to test positive for COVID-19 than people who didn't\*

#### WEARING A MASK LOWERED THE ODDS OF TESTING POSITIVE





## Conclusion



Surgical masks are good but not perfect.

May never have a definitive answer to the question of surgical mask vs N95 for HCWs.

- Would have to have a sample of immense size
- Would have to somehow remove all potential for community exposure







Selected procedures increase aerosol generation and merit higher level of respiratory protection.





#### ...but how many aerosols does intubation generate?

Continuous aerosol monitoring using an optical particle sizer in an operating room



Slide Courtesy of Dr. Michael Klompas | Source: Brown et al., Anaesthesia 2021;76:174-181



#### Most "Aerosol Generating Procedures" Generate Very Few Aerosols



Slide Courtesy of Dr. Michael Klompas

## Conclusion



- Aerosol generation is dependant on the patient, not the procedure.
- Patients who require these procedures are likely to be symptomatic and severely ill.
- Such patients may have high viral loads.
- Some of these procedures (like intubation) require the HCW to be adjacent to the patient/patient's mouth for potentially long periods of time.













#### References



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Randall et al. How did we get here: what are droplets and aerosols and how far do they go? A historical perspective on the transmission of respiratory infectious diseases. *Interface Focus* 2021;**11**(6). Available at: <u>https://doi.org/10.1098/rsfs.2021.0049</u>.

Wong et al. Transmission of Omicron (B.1.1.529) - SARS-CoV-2 Variant of Concern in a designated quarantine hotel for travelers: a challenge of elimination strategy of COVID-19. *The Lancet* 2021;**18**(100360). Available at: <u>https://doi.org/10.1016/j.lanwpc.2021.100360</u>.



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Cohen et al. Asymptomatic transmission and high community burden of seasonal influenza in an urban and a rural community in South Africa, 2017–18 (PHIRST): a population cohort study. *Lancet Glob Health* 2021;**9**(6):e863-e874. Available at: <u>https://doi.org/10.1016/s2214-109x(21)00141-8</u>.

Wilson et al. The effect of respiratory activity, non-invasive respiratory support and facemasks on aerosol generation and its relevance to COVID-19. *Anaesthesia* 2021;**76**(11):1465-1474. Available at: <a href="https://doi.org/10.1111/anae.15475">https://doi.org/10.1111/anae.15475</a>.

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Fennelly KP. Particle sizes of infectious aerosols: implications for infection control. *Lancet Respir Med* 2020;**8**(9):914-924. Available at: <u>https://doi.org/10.1016/S2213-2600(20)30323-4</u>.

Doggett et al. Characterization of experimental and clinical bioaerosol generation during potential aerosolgenerating procedures. *Chest* 2020;**158**(6):2467-2473. Available at: <u>https://doi.org/10.1016/j.chest.2020.07.026</u>.

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# Candida auris

Tavia Caplan, MSc Nov <u>23, 2023</u>

# Meet the fungus

Emerging fungal pathogen Related to other known Candida spp. First described in Japan in 2009 where isolated from ear First US case 2013 First Canada case 2017 Table 1: Differences between Candida auris and classicalpathogenic Candida species

Feature	Candida auris	Classical Candida speciesª
Habitat	Commensal of the skin	Commensals of the gastrointestinal tract <sup>b</sup>
Pathogenesis of infection	Exogenous	Endogenous
Healthcare–associated infections	Common	Uncommon
Environmental contamination	Common	Uncommon
Multidrug resistance	Common	Uncommon

<sup>a</sup> Other Candida species most commonly encountered clinically include *C. albicans, C. glabrata, C. parapsilosis, C. krusei* and *C. tropicalis* 

<sup>b</sup> With exception of C. parapsilosis, which is a commensal of skin

Source: IS Schwartz1 \*, SW Smith1 , TC Dingle, Canadian Communicable Disease Report, 2018



# Why do we care about *C. auris*?

- 1. Ability to cause clinical infection
  - Invasive disease
  - Immunocompromised/critically-ill patients at greatest risk
  - Mortality rates >40%



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Source: Garcia-Bustos V et al., Microorganisms 2021
## Why do we care about *C. auris*?

- 1. Ability to cause clinical disease
- 2. Multidrug resistance

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- Intrinsic resistance to most antifungals (azoles, polyenes)
- Some pan-resistant (echinocandins)
- Resulting in limited/no treatment options



Robbins N, Caplan T, Cowen LE., Annu Rev Microbiol,

# Why do we care about *C. auris*?

- 1. Ability to cause clinical disease
- 2. Multidrug resistance
- 3. Widespread associated with prolonged outbreaks in hospitals/LTC
  - Difficult to control outbreaks
  - Large case numbers



Image: Sanyaolu et al., Infect Chemother, 2022



#### C. auris outbreak NYC

Epidemiologic links between healthcare facilities affected by Candida auris, New York, USA, 2013–2017



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Source: Adams et al., Emerging Infectious Diseases, 2018

#### Current epidemiology

#### Figure 1. Incidence of *C. auris* Colonization and Infection in the U.S. (2017–2022)



#### Figure 3. Number of C. auris Cases in Canada, 2012-2022 (n=43)



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Source: National Microbiology Laboratory, Public Health Agency of Canada

# Canadian surveillance 2019/20



Screened 488 patients 2 cases identified Both traveled to India, received healthcare outside Canada and were colonized with CPO

Source: Felipe Garcia-Jeldes et al., Antimicrobial Resistance and Infection Control 2020

#### Screening

PHO Interim Guide for Infection Prevention and Control of *Candida auris* – released 2019

"Consider testing patients or residents admitted to a health care facility outside of Canada within the previous 12 months"

Sites to swab: nasal swab plus a combined bilateral axillary and groin swab

Subsequently, many acute-care hospitals have initiated risk-based screening





# Mode of transmission

Recall: colonizes skin

Colonized patients can test positive for several months

Colonization enables transmission

Contact

- Inanimate objects
- HANDS

Significant environmental contamination

· Isolated from most surfaces

Think MRSA

Think VRE



#### **Control measures**

**Routine Practices and Contact Precautions** 

- Private room with dedicated toileting Cohorting of close contacts
   Screen close contacts for 4 weeks
  - Rapid transmission ~4h
- Investigation for source
  - Unit point prevalence if identified >24h post admission

Challenging to control

Outbreak = 2 cases (even if different units and months apart





## **Environmental cleaning**

C. auris forms biofilms

Bleach and accelerated hydrogen peroxide effective against C. auris

• BUT Quaternary ammonium compounds are not effective

Documented persistent environmental contamination after routine cleaning/disinfection – for >4 weeks

Minimum daily and discharge cleaning

Facilities doing double daily and discharge

Cleaning of shared equipment

Rigorous attention to cleaning detail is key



# The future of *C. auris*

From 2022-23, 8 positives identified in Ontario

• Many health care facilities not screening

Expect updates to best practice recommendations as we learn more

- How long to isolate
- Screening strategies

All healthcare facility types can expect to receive and manage patients with *C. auris* as prevalence continues to increase





#### **Reference documents**

PHO: Focus on *Candida auris*: <u>https://www.publichealthontario.ca/-/media/Documents/C/2023/candida-auris.pdf?rev=3a17570b77db4d6497da4c6a98ac4081&la=fr</u>

PHO: Interim Guide for Infection Prevention and Control of *Candida auris* <u>https://www.publichealthontario.ca/-/media/Documents/P/2019/pidac-ipac-candida-auris.pdf?rev=7f655451d9144044b38ca13c77649ee3&sc\_lang=en</u>

PHAC: <u>https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2018-44/issue-11-november-1-2018/article-1-candida-auris-management.html</u>





#### Questions?



# IPAC in Construction, Renovation, Maintenance in Healthcare Facilities

Jessie Must RVH IPAC Practitioner - November 2023





**Objectives** 



Constructionassociated pathogens CSA Standards Your IPAC responsibilities







#### **Healthcare Associated Infections (HAI)**



- Infections that occur while in hospital or a healthcare facility.
- HAIs have been attributed to construction, renovation, and maintenance of health care facilities.
- In Canada, 250 000 patients a year experience HAI, which results in 8,000-12,000 deaths. Approx 7-8% of these deaths are due to construction, renovation and maintenance projects (translating to 500-1000 deaths in Canadian hospitals per year).
- Extra care must be given during all stages of construction, renovation and maintenance projects in healthcare settings to promote a safe environment for residents, visitors and staff.





# What's so harmful about dust?

- A little dust never hurt anyone, right? WRONG!
- Dust can contain fungal spores and bacteria
- Immunocompromised patients at high risk of infection
- Contaminated mould or dust particles have been reported to come from above false ceilings, fibrous insulating material, rollerblind casings, and fire proofing material





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#### **Construction-Associated Infections**



- Soil, water and dust contaminated with fungal spores or bacteria present as sources of infection in healthcare facilities (HCF).
- Common examples of construction-related infections are Aspergillus and Legionella.





#### Legionella

- Aerobic gram-negative bacillus
- Most common bacteria related to construction, renovation and maintenance projects.
- Commonly found in water, dust and soil.
- Legionella is contracted by inhaling aerosolized water droplets containing the bacteria. Less commonly, by aspiration of contaminated drinking water.
- Can cause serious respiratory infections and commonly associated with Legionnaires disease (severe form of pneumonia).
- Environmental sources in HCF include cooling towers, evaporative condensers, heated potable water systems (showers), plumbing systems of large buildings, aerators on faucets, and heating and air conditioning systems.







#### Aspergillus

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- Most common fungi related to construction, renovation and maintenance projects in HCF.
- Found in soil, water, decaying vegetation and damp materials.
- Can grow in a variety of places including walls, ceilings, crawlspaces, sub flooring, and HVAC systems.
- Can be carried on dusty clothes, shoes, tools or carts.
- When disrupted, it can remain suspended in the air for prolonged periods of time.





#### **CSA Standard**



The **CSA-Z317.13:22** standard, published by the Canadian Standards Association, establishes recommendations and requirements for infection control in health care facilities during construction, renovation and

maintenance in Canada.









**Population Risk Group** 



#### Type of Construction/Renovation Activity



Preventative Measures (PM) required



#### **Construction Activity Type**



TYPE A TYPE B		TYPE C	TYPE D				
<ul> <li>Inspection &amp; non- invasive activities</li> <li>Single controlled opening in a wall or ceiling</li> <li>In a single defined space</li> <li>Visual inspection</li> <li>Minor plumbing</li> </ul>	<ul> <li>Short duration that creates minimal dust</li> <li>Cutting of walls or ceiling for installation or repairs</li> <li>Sanding of walls (small patches)</li> <li>Plumbing work interrupting water supply for up to 3 fixtures for &gt;1 hour or one fixture for &gt; 1 hour</li> </ul>	<ul> <li>Activities that generate a moderate to high level of dust regarding demolition</li> <li>Removal of floor coverings, ceilings, casework</li> <li>New wall construction</li> <li>Minor ductwork</li> <li>Electrical work above ceilings</li> <li>Plumbing work that requires disruption for 30 mins to 1 hour</li> </ul>	<ul> <li>Activities that generate high levels of dust</li> <li>Heavy demolition</li> <li>New construction that requires consecutive work shifts to complete</li> <li>Plumbing work that disrupts water supply for more than 3 fixtures for 1 hour or more.</li> </ul>				

#### **Population Risk Group**



GROUP 1	GROUP 2	GROUP 3	GROUP 4			
(Lowest Risk)	(Medium risk)	(Medium to high risk)	(Highest risk)			
<ul> <li>Non-clinical office areas</li> <li>Decanted patient care units (shelled or decommissioned spaces)</li> <li>Transient public areas</li> <li>House keeping closets</li> <li>Physical plant workshops</li> </ul>	<ul> <li>Other patient areas not stated in groups 3 &amp; 4</li> <li>Outpatient clinics (except oncology &amp; surgery)</li> <li>Admission/discharge areas</li> <li>Occupational/Physiotherapy remote from patient areas</li> </ul>	<ul> <li>Emergency room</li> <li>Radiology/MRI/Nuclear medicine</li> <li>Labour and delivery</li> <li>Day surgery</li> <li>Labs (specimens present)</li> <li>Pediatrics/Geriatrics</li> <li>Long term care</li> <li>Surgical units</li> </ul>	<ul> <li>ICU/CCU</li> <li>Operating rooms</li> <li>Post anesthesia care unit (PACU)</li> <li>Oncology units/cancer outpatient areas</li> <li>Transplant units/outpatient areas</li> <li>Endoscopy areas</li> <li>Medical device reprocessing</li> </ul>			



#### **Preventative Measures Analysis**

![](_page_59_Picture_1.jpeg)

Table 1

Preventive measures analysis - Minimum values

(See Clauses 3.1, 6.5.1, 6.5.2, 7.1, 7.2.1, and 7.2.4.2.)

Population risk group	Construction activity type (from Table <u>3</u> )											
(from Table <u>2</u> )	Type A	Type B	Type C	Type D								
Group 1	E.	11*	Ш	Ш								
Group 2	11	11	111	IV								
Group 3	11	III*	III	IV								
Group 4	11	<b>III</b> *	IV	IV								

\* Denotes where a lower level might be used in accordance with Clause 7.5.

Note: Instructions for this Table:

- a) Refer to Table 2 to determine the population risk group.
- b) Refer to Table <u>3</u> to determine the construction activity type.
- c) The intersection between the row (risk group) and column (activity type) shows the minimum preventive measure level that applies. A higher level of preventive measures may be used at the discretion of the MDT.
- clause <u>7.5</u> offers practical exceptions for short-term projects involving only ceiling access for investigation or minor work, provided that appropriate precautions are used.

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![](_page_60_Picture_0.jpeg)

IPAC professionals play a key role in and must be involved in ALL phases of the construction process (preconstruction, construction and post construction).

![](_page_60_Picture_3.jpeg)

IPAC professional is a part of the Multidisciplinary Team (MDT).

![](_page_60_Picture_5.jpeg)

![](_page_61_Figure_0.jpeg)

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#### **Dust Control Considerations**

![](_page_62_Picture_1.jpeg)

![](_page_62_Picture_2.jpeg)

![](_page_62_Picture_3.jpeg)

![](_page_62_Picture_4.jpeg)

![](_page_62_Picture_5.jpeg)

#### **Additional Resources**

![](_page_63_Picture_1.jpeg)

Public Health Ontario Automatical Sante publique Ontario	Infection	CRMD Checklist: control risk assessment	Pu	ublic He Onta	alth río Dublique Ontario	(	RM	D Ch	ecklis	t: ICP responsibility	Public Hea Ontari	Ith o Ontario		CR	MD Checklist: <b>Hoard</b>
When to use this checklist: Plenning phase his checklist identifies one infection prevention and control fection control ink assessment (ICRA) and when you provid the ICRA considers the facility's platent/controller/netsidet popul umber of elements in the design. Use the checklist to identif countent the level of prevention measures required to preve- functional programs are the planning documents that provide the assest on its intended use and the population it serves.	(PAC) elements input into the lation served w y critical plannin at the spread of required specifica	to consider when you perform the facility's functional programs. Inter determining the type and g and design features and to microorganisms. stons within the allotted space. They are	As ( in t can AR) CON	part of the pre- re facilit TE:	se this checklist:  Renning phase W the multidisciplinary team (MDT)/project team writion of Infections throughout a construction y, Use this checklist to help identify key roles :  T	ork pla n, the ir n/renov and tasi	se fection ation, i is that f	n contro mainter the ICP	i profess nance /fa	Commissioning phase lional (ICP) has an important role liftly design project in a health support, complete or monitor.	When to use Hoarding refi renovation fr barriers acco document in DATE: AREA/UNIT:	t this checklist: "anning phase Work pl ters to the construction of temporary availed, use to mo other areas of the beath care facility. Use the modeling process to contractors. and	hase ght barrid is checkli to the col	ers to sepo st to asse instruction	Commissioning phase rate areas under construction ar s the placement and maintenand (renovation project and as a refe
REA/UNIT:						_					 comrette				
OMPLETED BY:			P	hase		Date	Yes	No	N/A	Comments	Preventive	Task	Yes	No N	A Comments
ICRA Elements	Required	Areas Required Comments			Establish working relationship with appropriate facility project or program lead prior to the beginning of the project						level	Measures identified to minimize dispersed dus	τ.		Type of measures:
Building Design					Establish membership on project planning team and functional planning groups										
Numbers, location, and types of airborne isolation (AIR) and protective environment (PE) rooms					Complete patient / client / resident risk							Patient-care equipment protected			
Location of special ventilation and filtration by HVAC systems (e.g., in operating rooms, and emergency department triage, waition: and intake areas)					assessment in collaboration with care team and facilities lead and or contractor							All Level I requirements must be implemented	and the f	ollowing	neasures put in place:
Air handling and ventilation needs in surgical services, AIR an PE rooms, laboratories, etc.	d			SNIN	Provide and document ongoing input into functional program							Windows, doors, shafts, access panels, electrical outlets, intakes, grilles, vents,	Τ		
Nater systems to limit Legionella spp. and other waterborne opportunistic pathogens				PLAN	Establish dedicated time on IPAC Committee agenda to report progress on							plumbing drains and all other penetrations in the floors, walls and ceilings: Sealed with duct tape			
Appropriate finishes, furnishings and surfaces (i.e., do not encourage growth of microorganisms and are capable of withstanding repeated exposure to a healthcare-grade cleaner/disinfectant)					and ootain input into key IPAC decisions and activities Review and understand current applicable standards (e.g., Canadian Standards Association, MOHLTC LTCH. Faciliti-ac							Entrance and exit doors: Double-flap polyethylene sheeting of a minimum 0.15mm (6 mil) true thickness weighted at the bottom over doors. Each sheet covers the entire cross- rection of the entrance to work are and encounted			
Placement of personal protective equipment for use in delivery of care					Guidelines Institute).							in both directions Construction area entrance and exit :	°		
Sufficient space, number and types of rooms to allow for th appropriate placement of patients	e				Review all plan and technical drawing(s) and bring issues forward to							Placement of walk-off mats			

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Construction, Renovation, Maintenance and Design (CRMD) | Public Health Ontario

#### Questions

![](_page_64_Picture_1.jpeg)

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![](_page_65_Picture_1.jpeg)

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![](_page_65_Picture_9.jpeg)

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![](_page_66_Picture_1.jpeg)

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![](_page_66_Picture_7.jpeg)

![](_page_67_Picture_0.jpeg)

# Carbapenemase-producing Enterobacteriaceae (CPE)

![](_page_67_Picture_2.jpeg)

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#### **Antibiotic Resistant Organisms (AROs)**

![](_page_68_Picture_1.jpeg)

- Human bodies are home to trillions of microorganisms that make up our normal microbiome (also called normal flora). These microorganisms live on our skin, mucous membranes, GI tracts, respiratory tracts etc.
- These microorganisms do not normally cause disease and actually benefit the human body.
- Some of the organisms on or in our body can become resistant to antibiotics. Antimicrobial resistance occurs when these organisms defeat the drugs designed to kill them (e.g., antibiotics and antifungals).
- Antibiotics are the most common treatment for bacterial infections. However, misuse and overuse of antibiotics is a significant contributor to development of antimicrobial resistance.
- AROs that are commonly screened for in health care include MRSA, ESBL, VRE, and CPE.

![](_page_68_Picture_7.jpeg)

#### **Antibiotic Resistance**

![](_page_69_Picture_1.jpeg)

Source: www.canada.ca

![](_page_69_Picture_3.jpeg)

Our body is **home to countless microbes**. Some may be resistant to antibiotics

#### Antibiotics kill the bacteria causing the infections as well as the good bacteria

![](_page_69_Picture_7.jpeg)

![](_page_69_Picture_8.jpeg)

The antibiotic-**resistant** bacteria are now able to grow and take over

Some bacteria may give their antibiotic resistance to other bacteria

Normal bacterium

![](_page_69_Picture_12.jpeg)

Resistant bacterium

Dead bacterium

![](_page_69_Picture_15.jpeg)

#### What is CPE?

![](_page_70_Picture_1.jpeg)

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CPE is a gram-negative bacteria normally found in our gut, and it belongs to the *Enterobactericeae* family. CPE possesses Carbapenemase-encoding genes.

![](_page_70_Picture_4.jpeg)

Carbapenemases are beta-lactamases with ability to hydrolyze (break down) penicillins, cephalosporins, and carbapenems, rendering these antibiotics ineffective.

![](_page_70_Picture_6.jpeg)

As a result, there are limited antibiotic treatment options for patients with infection due to CPE and mortality is substantially increased.

![](_page_70_Picture_8.jpeg)

#### **CPE Clinical Presentation**

![](_page_71_Picture_1.jpeg)

![](_page_71_Picture_2.jpeg)

Patients with CPE colonization are asymptomatic and can only be identified by active screening; however, CPE can cause infections if they gain access to sterile body sites (e.g., lungs, bladder, bloodstream).

CPE can cause difficult-to-treat infections in any part of the body, including pneumonia, bloodstream infections, intraabdominal infections, urinary tract infections, and central venous catheter infections. **Mortality in patients with CPE bacteremia may be up to 50%.** 

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# **Modes of Transmission**



Enhanced Contact STOP Precautions **Clean Your Hands Often** For more information please contact the Care Team or Infection Prevention and Control In addition to Routine Practices: Care Team and Visitors (when inside room) Wear Dedicated patient Dedicated medical cloves equipment equipment Cleaning Residents (if necessary to be outside room water for hands cleaning agent Clean hands

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# **Colonization vs Infection**



Colonization: Organisms are present with **no** symptoms or illness but can be transmitted to others.

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Infection: Organisms start invading bodily tissue, show clinical symptoms and cause disease.

# Four Moments for Hand Hygiene







# **Environmental and IPAC Control Measures**



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Rooms: daily cleaning and disinfection (acute care). Consideration should be given for enhanced cleaning (e.g., twice weekly) in LTC, RH, CLS. Pay particular attention to sink cleaning and disinfection as CPE can form biofilms in sink drains that are challenging to remove. Effective cleaning: Appropriate friction, contact time, thoroughness. Consider environmental audits (glow germ).

Consider enhanced cleaning of sinks and showers e.g., twice weekly and on discharge/transfer.

All cleaning tools and equipment must be cleaned and disinfected before being used in another room. **Dedicated** equipment or single use equipment is preferred. ÷

Special attention to sink aerators: should be removed to reduce biofilm formation and bacterial burden.



# Environmental and IPAC Control Measures Continued CLOROX PRO











Residents should be accommodated in a **private room**. Testing sink drains for CPE on discharge & transfer. If sinks are colonized replacement of sinks and/or plumbing may be required. Addition of a CPE flag in patient care system (health information system).

Consider selecting surfaces and equipment that is easily cleanable. Do not store patient care equipment, supplies, food, or medication within 3 feet of a sink.



# Decolonization



- Decolonization is the attempt to remove the antimicrobial-resistant pathogens from a colonized individual. This can be done with certain AROs using chlorhexidine rinses for bathing or showering, a mouthwash to clean the oral cavity, nasal spray, or using antibiotics, antifungals, or antiseptics.
- Decolonization is **not recommended for CPE** as no current guidance to support CPE decolonization is available.



# **IPAC Canada 2023 Conference Recap**





Clusters of *Klebsiella pneumoniae* Carbapenemase (KPC) with Potential Links to Hand Hygiene Sink Drains in an Intensive Care Unit

Dina Badawy, BSc, MSc, PhD, CIC Infection Control Practitioner Trillium Health Partners

> IPAC Canada 2023 National Conference May 28-31, 2023

#### Summary:

- The objective of the study was to investigate sink drains as a possible reservoirs of CPE in an ICU
- The study was part of a pilot to retrospectively review all positive CPE results from January to September 2022. Each patient with a positive CPE result was enrolled in the study. Swabs were collected from hand hygiene and washroom sink drains.
- **Results:** Hand hygiene sinks were found positive for CPEs rather than the anticipated patient sink or shower drain.





#### **Recommendations and Conclusions**

- The study suggests that sinks contaminated with CPE could spread bacteria to patients, as evidenced by KPC producing *C. freundii* found in both patient and sink samples
- To effectively eliminate CPE from hand hygiene sink drains, a collaborative effort is required between various teams, including the infection prevention and control team, microbiology team, environmental team, and facilities team
- Ongoing education and training for ICU staff on proper infection prevention and control measures, with a special focus on safe disposal practices
- Additional research needed to confirm possibility of sink-to-patient transmission through molecular genotyping of CPE-positive isolates



# Biofilms



## **Biofilms in Nature**





# What is a Biofilm and where do they Live?



- Living microorganisms that attach to surfaces. A biofilm is an accumulation of cells (bacteria, yeast, fungi, viruses).
- Biofilms can thrive in wet or dry conditions and can resist environmental cleaning.
- Biofilms may form on a wide variety of surfaces, including living tissues, indwelling medical devices, industrial or potable water system piping, or natural aquatic systems.



# IPAC Canada 2023 conference recap: biofilms

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Talk: Biofilms, Bioflims and more biofilms

Author: Dr. Michelle Alfa

Summary:

- Wet biofilms are known and implicated in HAI with Gram-negative bacteria and despite what we know challenges emerge in drains, medical devices and any places moisture exists.
- Dry Biofilms like spores are hardy and offer many challenges as well little is known although the literature is building

Take-aways:

- Cleaning is a critical intervention fundamental to infection control. Biofilm is significantly more difficult to remove than dried planktonic bacteria. A single wiping action removed >99.9% (>3 log10) of dried planktonic bacteria, whereas only 1.4 log10 of biofilm (96.66%) was removed by 50 wiping actions with a standardized wiping process
- Environmental dry surface biofilms are a new type of biofilm found on dry surfaces, that are not visible to the human eye. Dry surface biofilms harbour multidrug-resistant organisms, are resistant to cleaning and disinfection and cannot be detected by wet or dry swabbing,

# Life cycle of a biofilm







# **Environmental Considerations for Biofilms**



- Biofilms have been shown to be significantly more tolerant to antibiotics and disinfectants.
- There is limited information about product efficacy in removing biofilms. Only a handful of products (i.e., chlorine and monochloramines) are effective in removing biofilms.
- If the entire biofilm is not removed from the surface, biofilms can continue to replicate and thrive.
- Important to ensure biofilm prevention strategies (proper IPAC practices) to reduce the risks of biofilm formation.



# LTC/RH/CLS Considerations

- Pathogens in drain biofilms pose a significant risk for hospital-acquired infection. Cleaning is a critical intervention fundamental to infection control. Appropriate friction, contact time and thoroughness.
- Biofilms are significantly more difficult to remove than normal bacteria.
- Proper IPAC control measure like **safe disposal methods and staff education** (do not dump bodily fluids down hand hygiene/patient sinks).
- **Sink aerators**: If possible, remove to reduce biofilm formation and bacterial burden.

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## Questions



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# Change Management

# You want to engage frontline worker, but how do you do that?



# Change Management – Dr. Gardam You want to engage frontline worker, but how do you do that?



#### **Biggest challenges within his role:**

Getting others to care about IPAC issues

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- Getting support from administration and funding
- Confusion over guidelines
- Burn out



# Change Management – Dr. Gardam

You want to engage frontline worker, but how do you do that?



Why you need to engage staff:

- Generates ideas.
- Ownership rather than "Buy In".
- Sustained change that is driven by ownership.

## 3 Steps Achieving Engagement:

- Realize you need engagement
- Engage the people who want to work with you
- Use specific engagement tools *Liberating Structures*





# Liberating Structures – Dr. Gardam

#### <u>1-2-4-All</u>

- Group Self Generating ideas in a structured manner
- 1 each person is given protective time to generate their idea.
- 2 two people are partnered to discuss their ideas.
- 4 four people are grouped to generate set number of key ideas they can align with.
- All All groups then present their key ideas to whole group



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systematic approach in understanding and solving problems.

TRIZ

- Group produces a list of everything that could go wrong. Ultimately all factors NOT to achieve the goal.
- The idea is to reveal the negative factors of a current process that occur.
- Example: Patient transfers within 45.



# Managing Complex Change



Adapted from Knoster, T., Villa R., & Thousand, J. (2000). A framework for thinking about systems change. In R. villa & J. Thousand (Eds.), Restructuring for caring and effective education: Piecing the puzzle together (pp. 93-128). Baltimore: Paul H. Brookes Publishing Co.



# **Choosing Disinfectants**

# **Controlled Dilution Systems vs. Ready to Use Systems**





### Key Considerations for Selecting the Optimal Disinfectant for Your Facility

Consideration	Question to Ask	Score (1-10)
Kill Claims	Does the product kill the most prevalent healthcare pathogens	
Kill Times and Wet- Contact Times	How quickly does the product kill the prevalent healthcare pathogens	
Safety	Does the product have an acceptable toxicity rating, flammability rating	
Ease-of-Use	Odor acceptable, shelf-life, in convenient forms (wipes, spray), water soluble, works in organic matter, one-step (cleans/disinfects)	
Other factors	Supplier offer comprehensive training/education, 24-7 customer support, overall cost acceptable (product capabilities, cost per compliant use, help standardize disinfectants in facility	

Rutala WA, Weber DJ. Selection of the ideal disinfectant. Infect Control Hosp Epidemiol 2014;35:855-65.

#### **Controlled Dilution Systems Process**







#### **Ready to Use Wipe Process**



# **Risk Based Disinfectant Programs**





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# **Clorox Bleach Germicidal Wipes**





Item #	Description	Quantity
55894	Clinical Wipes 17.1 cm x 14.8 cm	150 ct. canister, 6/cs.
01308	Multi-Purpose Wipes 17.1 cm x 22.8 cm	70 ct. canister, 6/cs.
01309	Terminal Wipes 30.4 cm x 30.4 cm	110 ct. bucket, 2/cs.
01310	Terminal Wipes 30.4 cm x 30.4 cm	110 ct. refill pouch, 2/cs.

#### Ease of Use

- 1-step cleaning process
- Ready to use wipes

#### **Contact time**

• Pre-saturated wipes to achieved appropriate contact time.

#### Kill Claims

- 66 kill claims on microorganisms in less than 3 min
- Kills C.Diff in 3 mins

#### Wipe Size

Available in canister and bucket

#### Surface compatibility

- compatible with common healthcare surfaces like plastic and stainless steel
- Residue Management required

# **Clorox Healthcare<sup>®</sup> Germicidal Disinfection Cleaner**





- Kills 60 microorganisms, including C. difficile spores, MRSA, SARS-CoV-2 and VRE in 3 minutes or less
- Reduces compliance risks and labour costs
  associated with dilutable disinfectants
- 0.65%

Item #	Description	Quantity
01416	Pull-Top Bottle	6/946 mL

# **Clorox Healthcare® Fuzion® Cleaner Disinfectant**

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ltem #	Description	Quantity
01671	Trigger Spray	9/946 mL

- Active Ingredient: sodium hypochlorite and a neutralizer that, when combined, form hypochlorous acid
- Highly effective disinfectant with broad surface compatibility and little to no residue.
  - Kills 64 microorganisms, including C. difficile spores in <mark>1 min!</mark>



# Clorox Hydrogen Peroxide (CHP) (DIN 02406225)





ltem #	Description	Quantity
01456	Multi-Purpose Wipes 17.1 cm x 22.8 cm	95 ct. canister, 6/cs.
01458	Terminal Wipes 30.4 cm x 27.9 cm	185 ct. bucket, 2/cs.
01459	Terminal Wipes 30.4 cm x 27.9 cm	185 ct. refill pouch, 2/cs.

#### Kill Claims

- Health Canada Approved
- Kill claims on 57 pathogens
- 35 pathogens killed within 30 seconds
- MRSA, VRE, Influenza, RSV, SARS-Cov-2
- Rhino, Rota, Noro, TB killed in 1 minute
- Candida Auris killed in 3 mins

#### Ease of Use

- 1-step cleaning process
- 24 Month Shelf Life
- Ready to use wipes

#### Substrate

- Polyethylene terephthalate (PET)
- · More feel of a microfiber than other wipes
- Bucket and Refill 12x11 wipes (185 count)

#### Surface compatibility

 compatible with common healthcare surfaces like plastic and stainless steel

## Clorox Healthcare<sup>®</sup> Hydrogen Peroxide Cleaner Disinfectant Liquids





- Sanitizes soft surfaces in 30 seconds
- No added fragrances or harsh odours
- 1.4% Hydrogen Peroxide

Item #

01664

# Clorox Healthcare® VersaSure® Alcohol-Free Cleaner Disinfectant Wipes



#### Ease of Use

- 1-step cleaning process
- Ready to use wipes

#### **Contact time**

• Pre-saturated wipes to achieved appropriate contact time.

LORO

#### Kill Claims

- 50 of which are killed within 30 seconds-2 min
- MRSA, VRE, Influenza, SARS-Cov-2

#### Wipe Size

• Available in canister (150 count)

#### Surface compatibility

- compatible with common healthcare surfaces like plastic and stainless steel
- Alcohol-free quat formula offers low odour and low residue

## For more information visit...



## WWW.Cloroxpro.ca – Canadian Website!





# Royal Victoria Hospital Disinfectant Audit

## **RVH Cleaning and Disinfecting Clinical Point of Care Wipe Audit**



#### Clorox Units Sodium Hypochlorite/Bleach



#### Saber Units Hydrogen Peroxide



Quat Based Disinfectant Wipes




## **RVH EVS Cleaning and Disinfectant**



## Clorox Units Daily Disinfectant Sodium Hypochlorite/Bleach



## Saber Units Daily Disinfectants Hydrogen Peroxide













