gama healthcare | ACIPC Australasian College for Infection Prevention and Control

Welcome to the **IPC Tour 2024!**

Dr Jon Otter

Surface disinfectants in healthcare: when to use them and how to choose them and their contribution to AMR

Surface disinfectants in healthcare: when to use them, how to choose them, and their contribution to AMR

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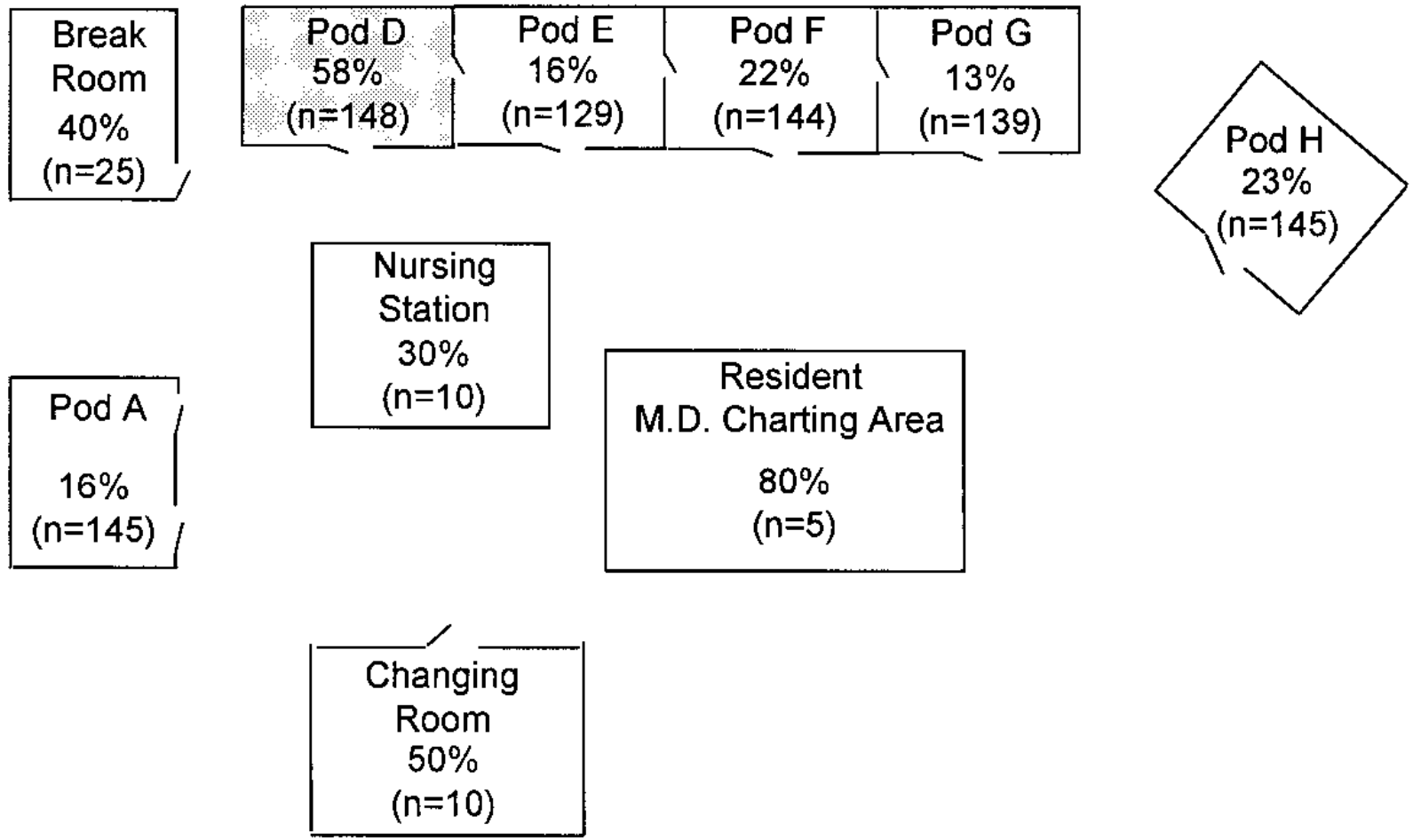
NHS
Guy's
Hospital
Main Entrance and Urgent Care Centre


St Thomas' Hospital
Guy's and St Thomas'
NHS
St Thomas' Hospital
KING'S HEALTH PARTNERS


Welcome to
Royal Brompton
Hospital

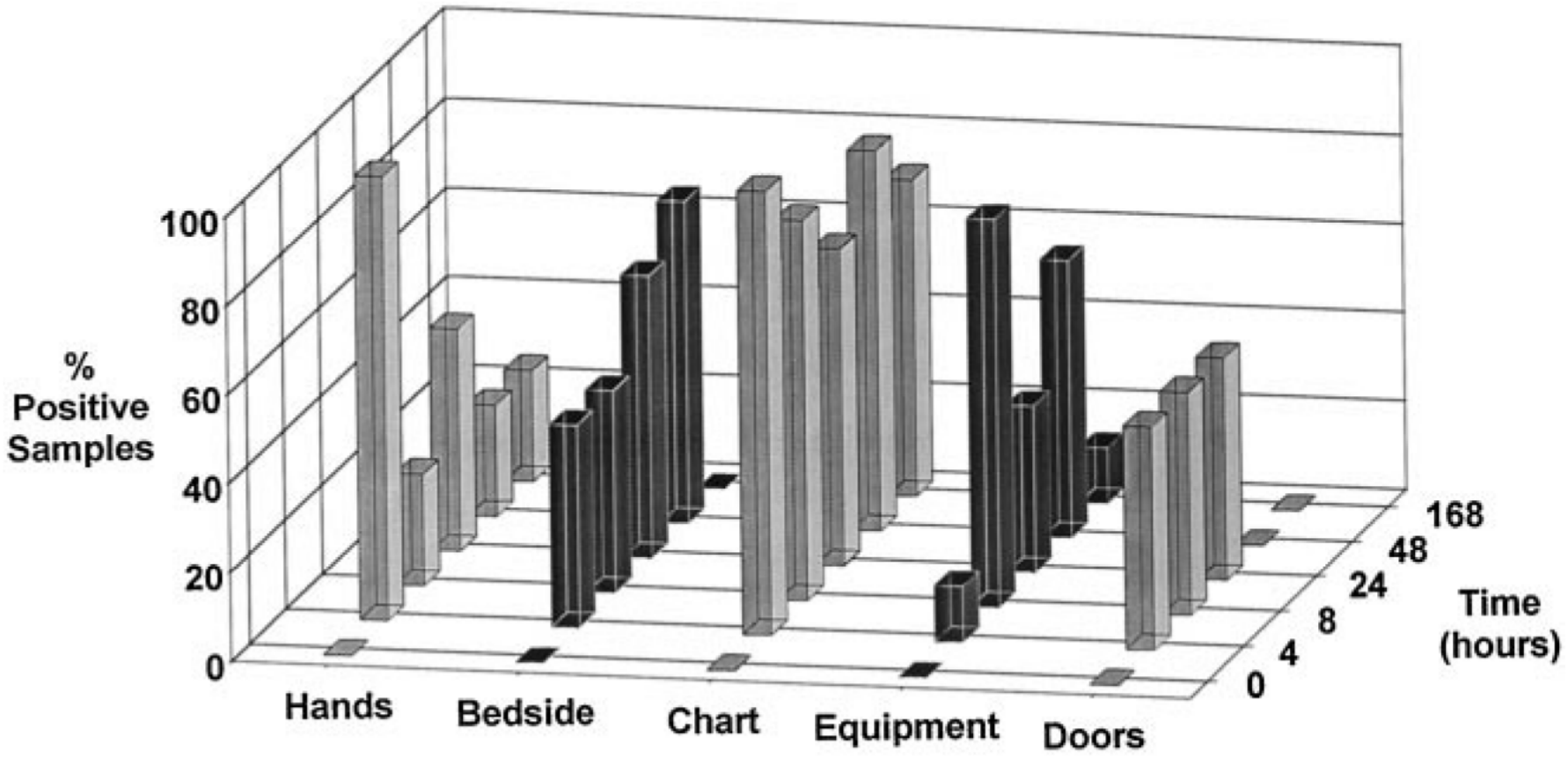

Harefield Hospital

Transfer of a surrogate marker in a NICU

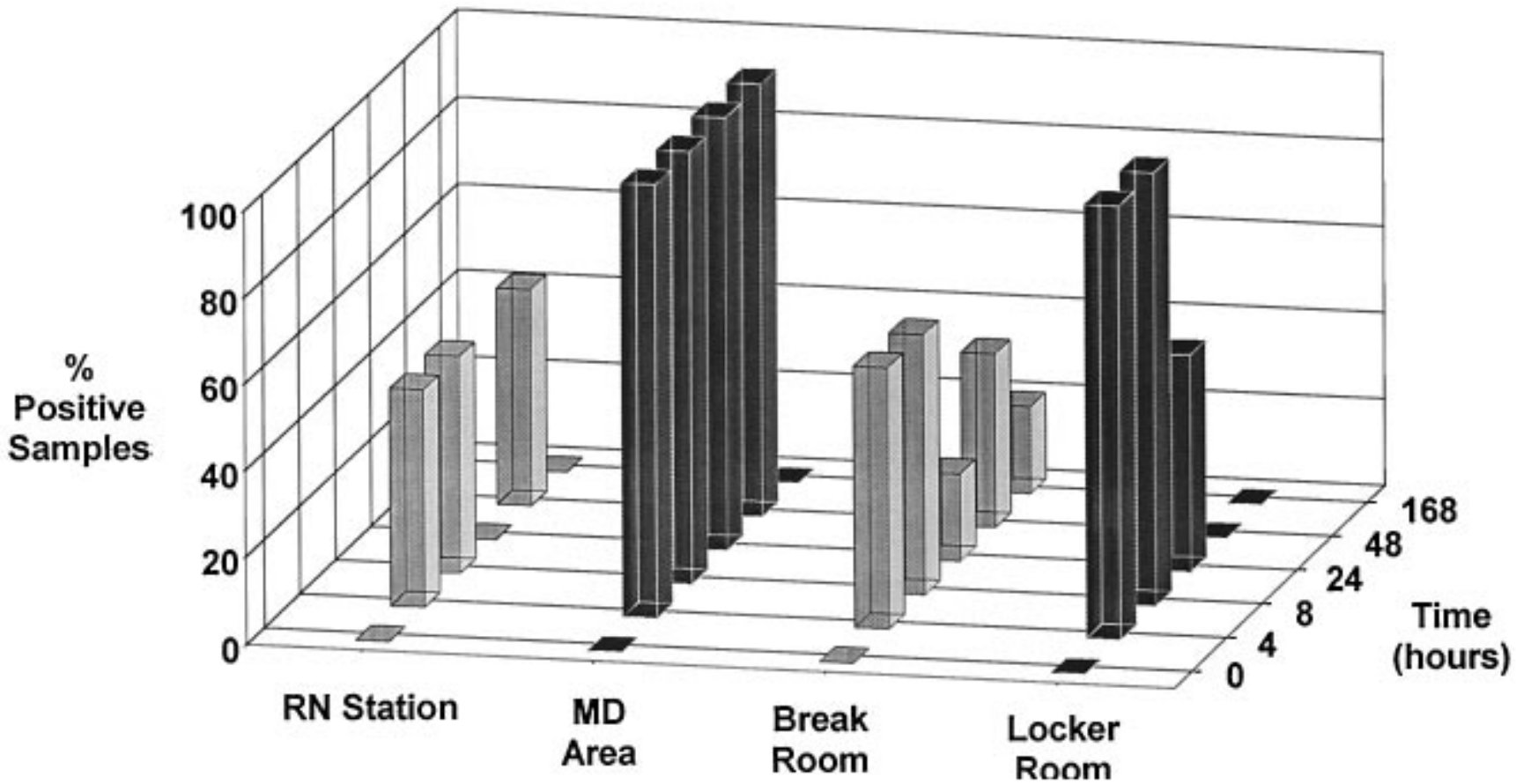


Oelberg *et al*. *Pediatrics* 2000;105:311-315.

Transfer over time: inoculated pod



Contamination over time by location



- Importance of surface contamination for HCAI and AMR
- Current approaches to cleaning and disinfection
- Surface disinfectant overview
- Possible contribution of surface disinfectants to AMR

Importance of surface contamination for HCAI and AMR

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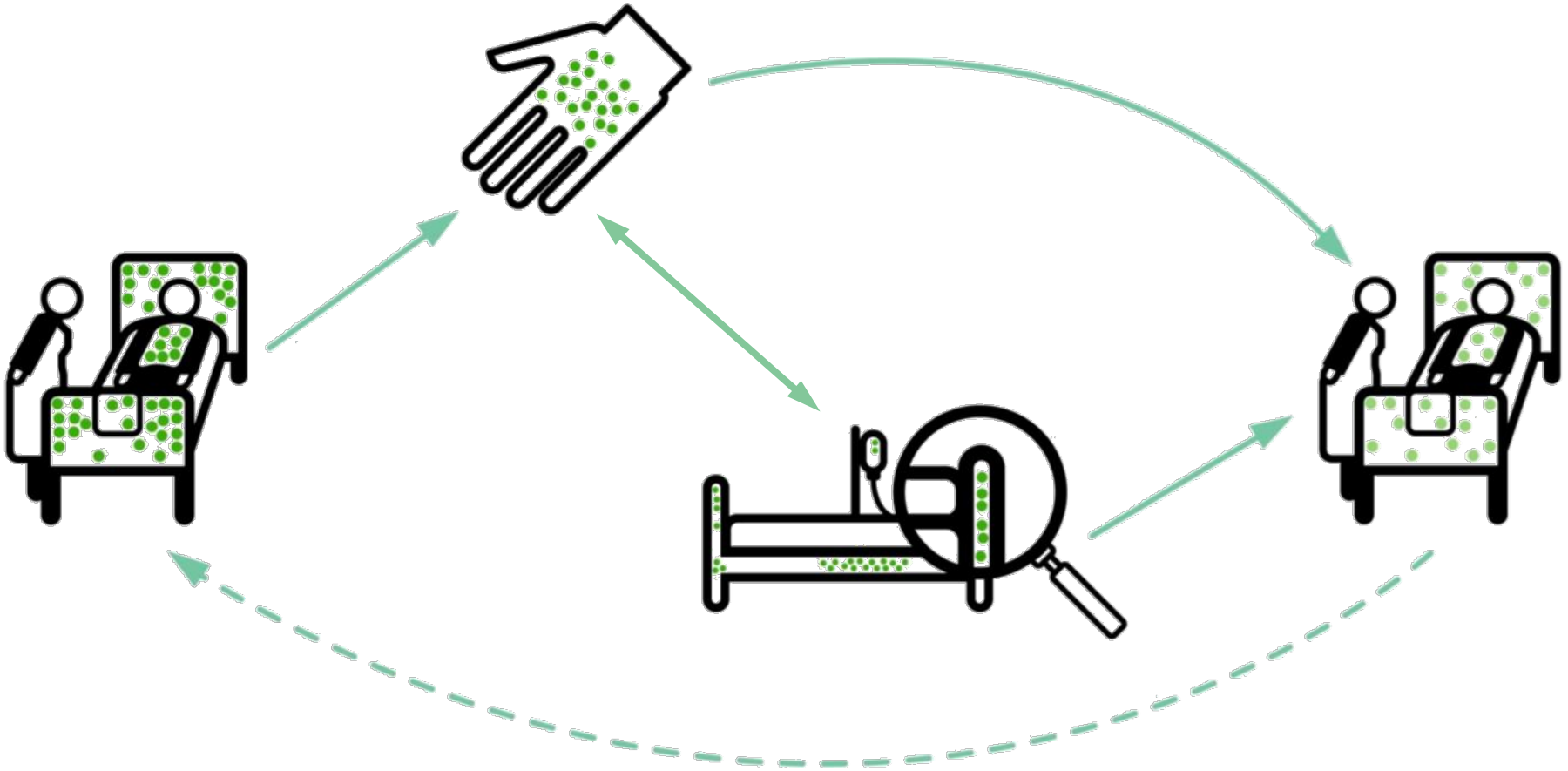
Transmission routes



Otter *et al. Infect Control Hosp Epidemiol* 2011;32:687-699.

French *et al. J Hosp Infect* 2004;57:31-37.

Surface <> Hand <> Patient

Pathogens can be transferred from surfaces to HCW hands without direct patient contact[1-2]

52% of 23 HCW acquired VRE on their hands[3]	Contact with patient **or** surface = ~10% risk of acquiring VRE[3]
45% of 50 HCW acquired MRSA on their hands[4]	**40%** of 50 HCW acquired MRSA on their hands[4]
50% of 30 HCW acquired *C. difficile* on their hands[5]	**50%** of 30 HCW acquired *C. difficile* on their hands[5]
Compliance with hand hygiene: **50%**[6]	Compliance with hand hygiene: **80%**[6]

1. Boyce *et al. Infect Control Hosp Epidemiol* 1997;18:622-627.
2. Bhalla *et al. Infect Cont Hosp Epidemiol* 2004;25:164-167.
3. Hayden *et al. Infect Control Hosp Epidemiol* 2008;29:149-154.
4. Stiefel *et al. Infect Control Hosp Epidemiol* 2011;32:185-187.
5. Guerrero *et al. Am J Infect Control* 2012;40:556-558.
6. Randle *et al. J Hosp Infect* 2010;76:252-255.

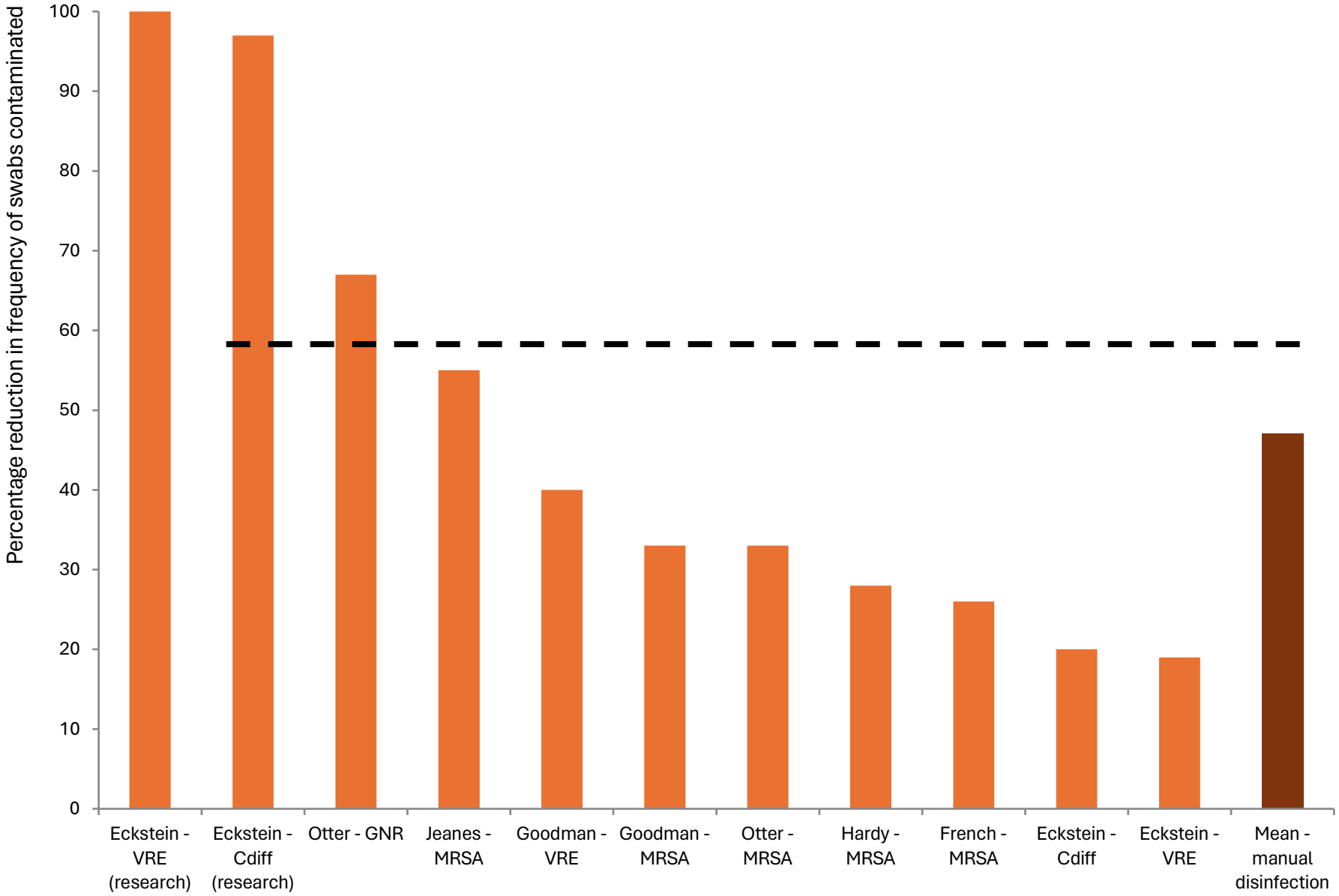
Surface survival

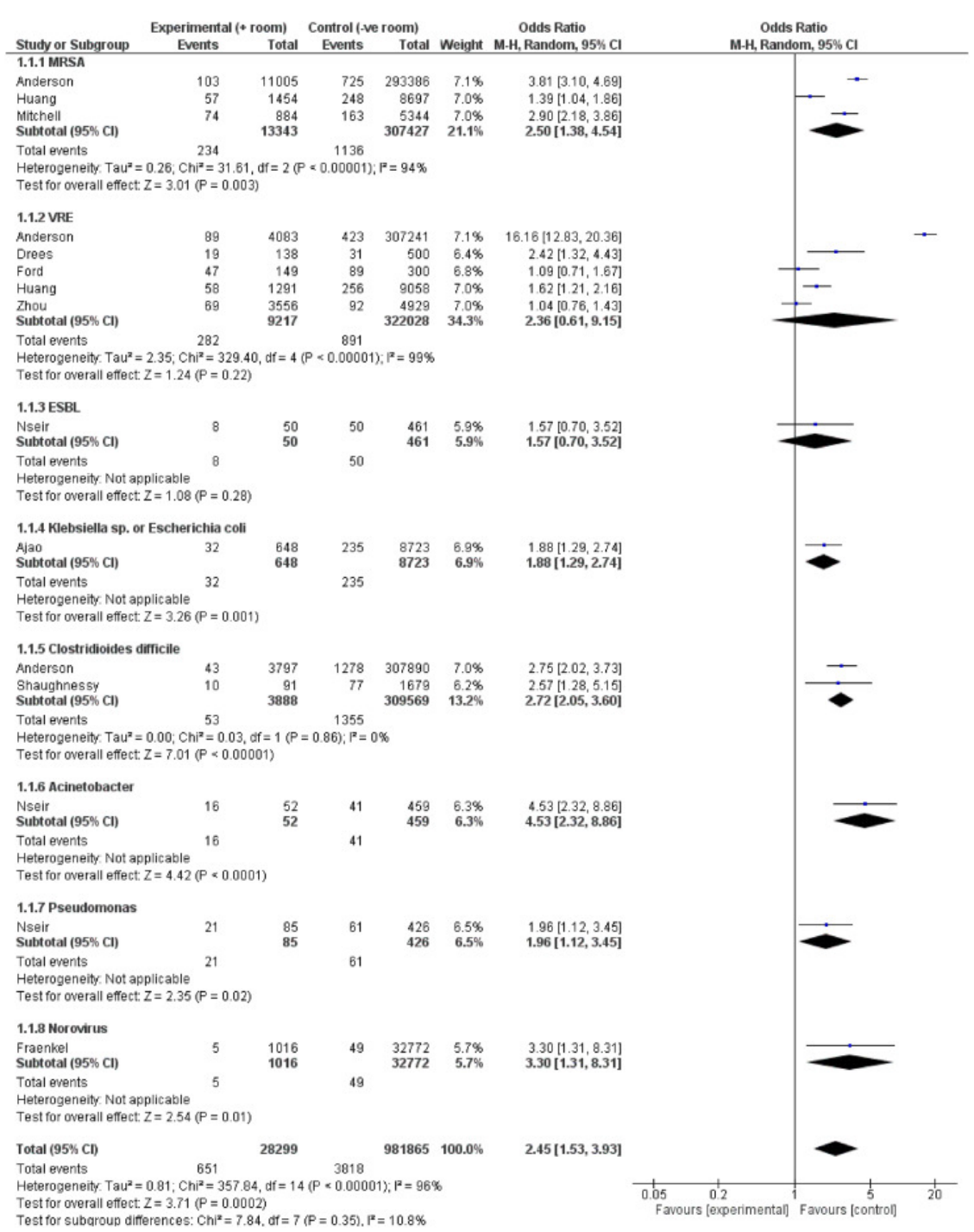
Organism	Survival time
Clostridium difficile (spores)	5 months
Acinetobacter spp.	3 days to 5 months
Enterococcus spp. including VRE	5 days – 4 years (!)[1]
Pseudomonas aeruginosa	6 hours – 16 months
Klebsiella spp.	2 hours to > 30 months
Staphylococcus aureus, inc. MRSA	7 days – 7 months
Norovirus (and feline calicivirus)	8 hours to > 2 weeks[2]
SARS Coronavirus	72 hours to >28 days[3]
Influenza	Hours to several days[4]

Adapted from Kramer *et al. BMC Infect Dis* 2006;6:130.

1. Wagenvoort et al. J Hosp Infect 2011;77:282-283.
2. Doultree *et al. J Hosp Infect* 1999;41:51-57.
3. Rabenau *et al. Med Microbiol Immunol* 2005;194:1-6.
4. Bean *et al. J Infect Dis* 1982;146:47-51.

Conventional terminal decontamination





The MDRO status of the prior room occupant influences acquisition risk

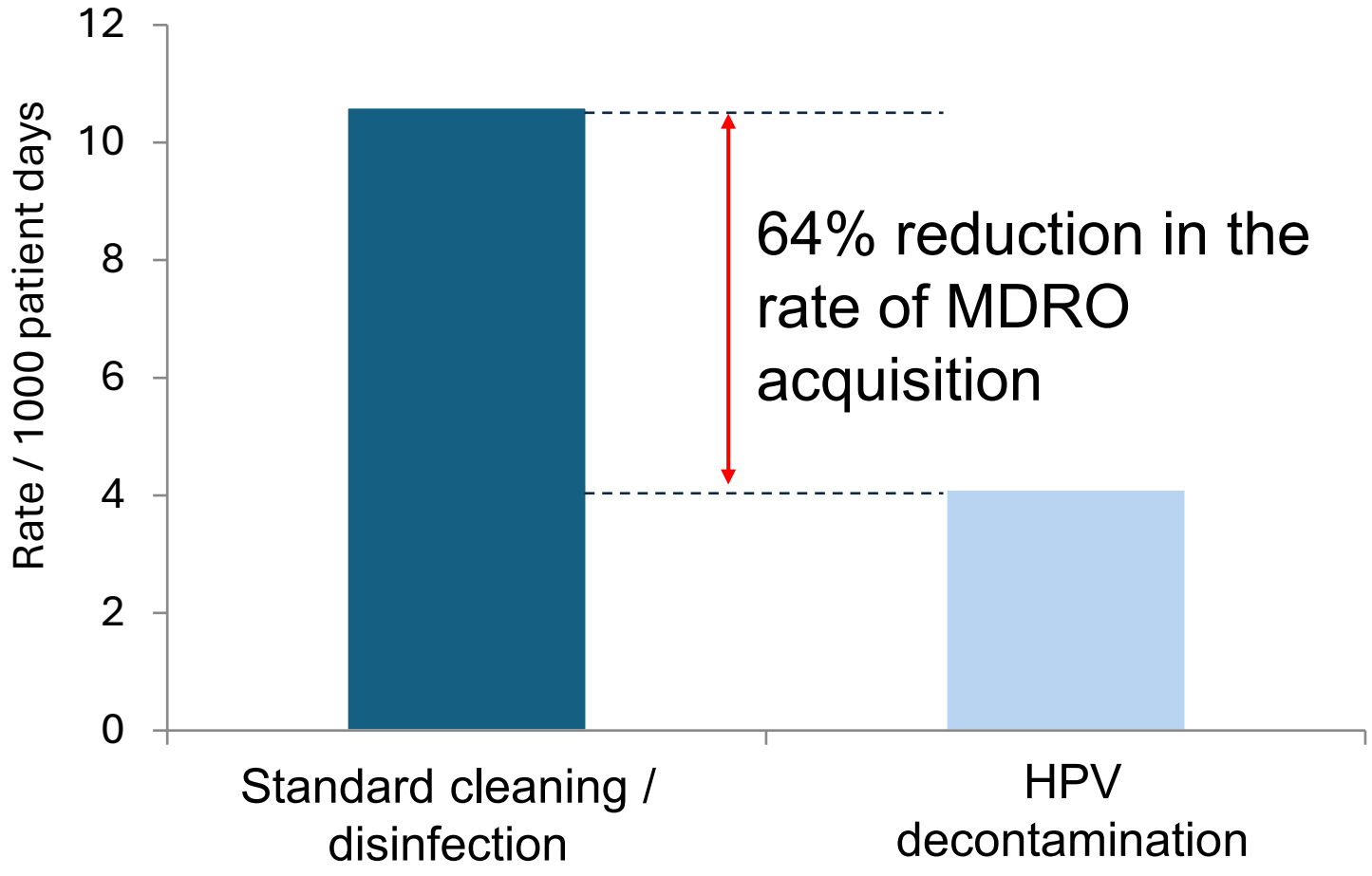
Meta-analysis of studies evaluating the risk of MDRO acquisition for the incoming occupant based on the status of the prior room occupant.

	OR	95% CI
Acinetobacter	4.5	2.3-8.9
Norovirus	3.3	1.3-8.3
C. difficile	2.7	2.0-3.6
MRSA	2.5	1.4-4.5
VRE	2.4	0.6-9.1
Pseudomonas	2.0	1.1-3.4
Klebsiella or *E. coli*	1.9	1.3-2.7
ESBL	1.6	0.7-3.5
Total	2.5	1.5-3.9

Mitchell et al. Infect Dis Health 2023.

Hydrogen peroxide vapour: clinical impact

30-month prospective cohort intervention study performed on 6 high-risk units (5 ICUs) including 8813 patients at Johns Hopkins Hospital.



Passaretti *et al. Clin Infect Dis* 2013;56:27-35.

Hospital cleaning and disinfection works

Key studies illustrating the impact of improved cleaning and disinfection

Author/year	Design	Result
Dancer et al. 2009	Cross-over study of extra ward cleaner	27% reduction in MRSA infection
Datta et al. 2011	Cohort intervention study of enhanced disinfection	Significant reduction in VRE acquisition from the prior room occupant
Anderson et al. 2017	Cluster RCT of UVC room disinfection	Significant reduction in MDRO acquisition from the prior room occupant
Mitchell et al. 2019	Cluster RCT of cleaning bundle	Improved rate of cleaning high touch items and reduced incidence of VRE
Dadon et al. 2023	Cross-over study of switching from chlorine “bucket” method to disinfectant wipes	Significant reduction in surface contamination, MDRO acquisition, and in-hospital mortality

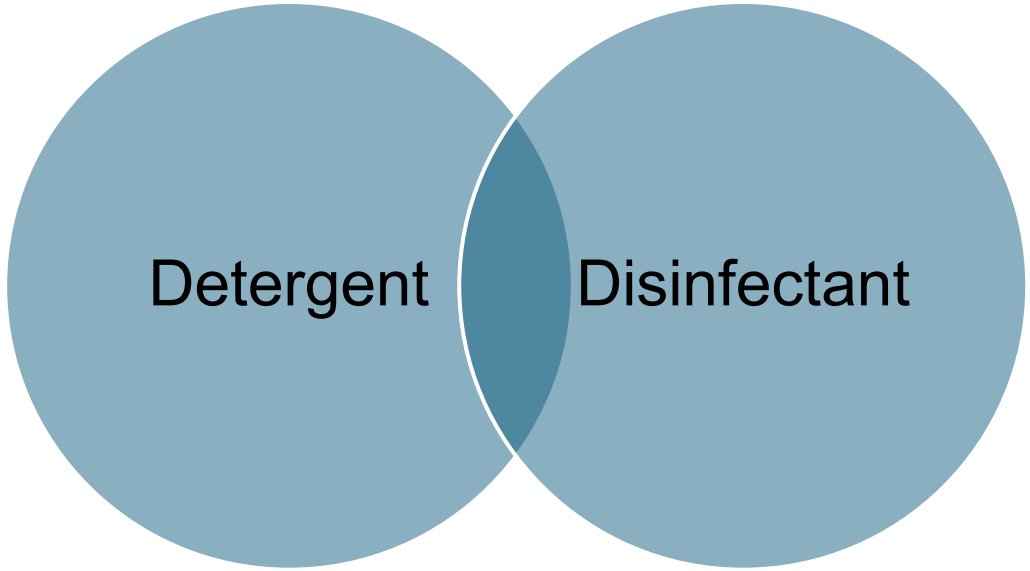
Importance of surface contamination for HCAI and AMR

Current approaches to cleaning and disinfection

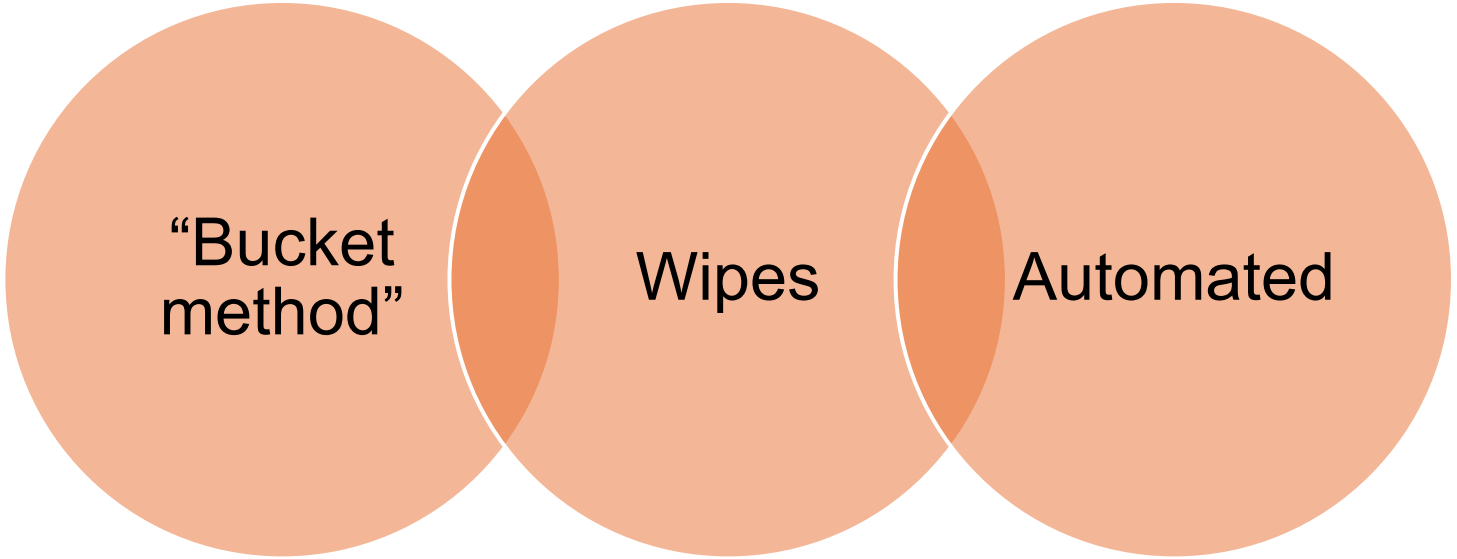
Surface disinfectant overview

Possible contribution of surface disinfectants to AMR

PRODUCT



PROCEDURE



What is the protocol for surface cleaning and disinfection in your hospital?

- Combined cleaner/disinfectant for all cleaning and disinfection
- Routine detergent cleaning; cleaner/disinfectant when known infection risks
- Detergent cleaning only

English cleaning / disinfection recommendations

- Under *Standard Infection Control Precautions*, routine disinfection of the environment is not routinely recommended in the manual, aside from routine disinfection of sanitary fittings using chlorine.
- Under *Transmission Based Precautions*, disinfection of hospital surfaces during the stay of the patient and at the time of their transfer or discharge is recommended.
  - The manual makes a specific recommendation that chlorine should be used for daily and discharge surface disinfection.

National Infection Control Policy Manual

Limitations of a “detergent only” approach

- Patients with unidentified infection risks
- Challenges of cleaning complex and intricate environment
- Dry surface biofilms
- Limited reduction in pre-post studies
- Evidence that they spread contamination around
- Emerging evidence of detergent-related surface damage
- Evidence that moving to routine disinfection reduces transmission risk

Kiernan et al. J Hosp Infect 2024 (accepted)

Limitations of a chlorine-based disinfectants

- Many are not sporicidal when tested correctly
- Inactivation when exposed to soiling
- Poor environmental profile
- Material compatibility
- Staff exposure
- Majority of patients on TBPs don’t require chlorine

Kiernan et al. J Hosp Infect 2024 (accepted)

Chlorine may not be as effective as you think..

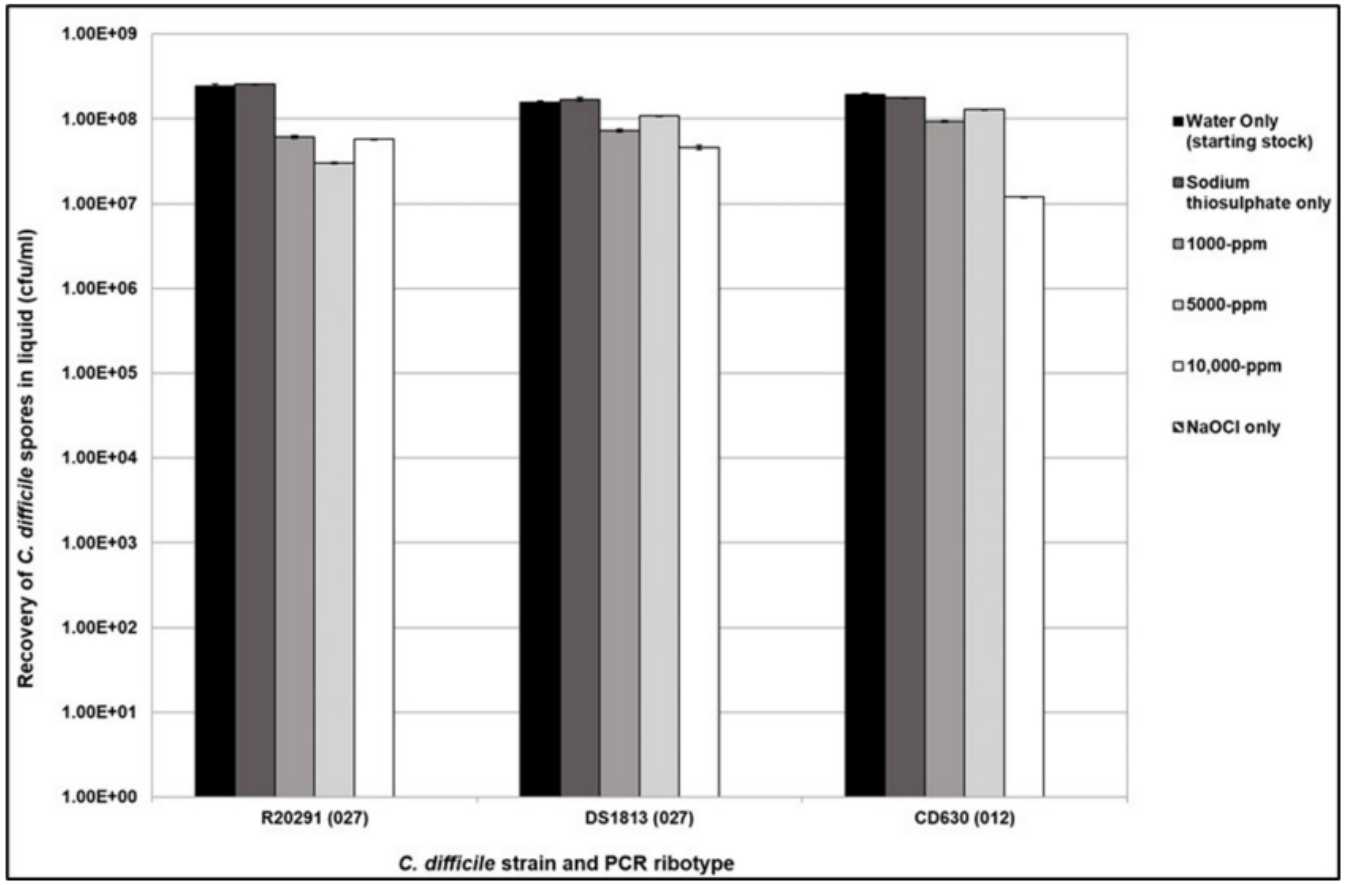
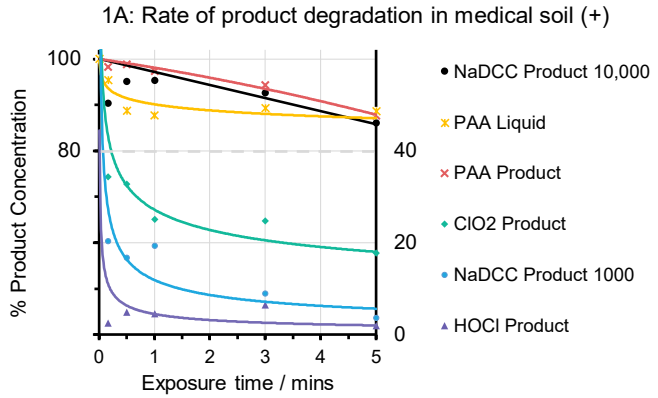
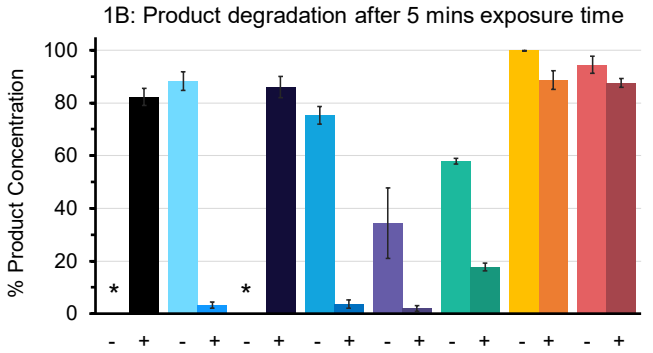


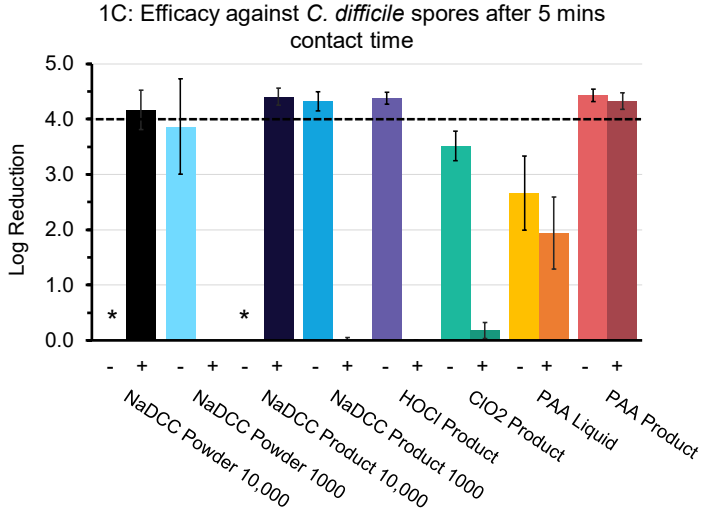
Fig. 1. Recovery of purified *C. difficile* spores following exposure to NaOCl at 1000, 5000 and 10 000 p.p.m. in liquid for 10 min. The spore inoculum was at 10^8 c.f.u. ml^{-1}. The inoculum was used as the positive control (water only) and was also suspended in sodium thiosulphate to ensure no cross-reactivity. Plots represent means±SEM (n=3).

Ahmed & Joshi. Microbiology 2023.

Impact of soiling







Brown et al. J Hosp Infect 2024 (accepted)

* = not tested

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Types	Mechanism of action	Examples of chemistry	Application and areas of use
Highly reactive biocides — strong interactions through chemical or ionic binding			
Alkylating agents	Reacts with amino acids to form crosslinks and fix proteins	Glutaraldehyde, formaldehyde, ortho-phthalaldehyde	Disinfection of surfaces, materials, equipment Disinfection of materials and surfaces associated with the housing or transportation of animals
Oxidizing agents	Oxidation of macromolecules (proteins, lipids and nucleotides), while causing nonspecific damage to the cytoplasmic membrane	Sodium hypochlorite, peracetic acid, hydrogen peroxide, ethylene oxide	Disinfection of surfaces, materials, equipment Disinfection of materials and surfaces associated with the housing or transportation of animals Disinfection of drinking water
		Povidone–iodine	Disinfection of skin, scalps, surfaces, materials and equipment
Less-reactive biocides — weak physical interaction			
Cationics	Positively charged, hydrophilic region interacts with negatively charged cell surface. Hydrophobic region partitions into membrane, disrupting intermolecular bonds and leading to loss of intracellular contents	Quaternary ammonium compounds (for example, benzalkonium chloride)	Disinfection of skin and scalps Disinfection of surfaces, materials and equipment Incorporated in textiles, tissues, mask, producing treated articles with self-disinfecting properties
		Biguanides (for example, chlorhexidine, polyhexamethylene biguanide)	Antisepsis of skin and scalps Disinfection of surfaces, materials, equipment and swimming pools
		Diamines and amine oxides	Disinfection of surfaces, materials and equipment
Phenolics	Protonophore that targets the cytoplasmic membrane, causing loss of membrane potential. At low concentrations, triclosan inhibits fatty acid synthesis	Triclosan	Disinfection of surfaces, materials and equipment Incorporated in textiles, tissues, mask, producing treated articles with disinfecting properties
Alcohols	Permeabilization of the cytoplasmic membrane, denaturation of proteins and dehydration of exposed bacteria	Ethyl alcohol (ethanol) and isopropyl alcohol	Disinfection of skin and scalps Disinfection of surfaces, materials and equipment
Weak organic acids	Uncoupling of proton motive force; acidification of bacterial cytoplasm, leading to inhibition of enzyme activity and biosynthesis while exerting osmotic stress	Citric acid and benzoic acid	Disinfection of skin and scalps Disinfection of surfaces, materials and equipment
Metal ions	Redox active. Interacts with thiol groups and generates reactive oxygen species that damage macromolecules	Silver and copper	Antimicrobial surfaces, textiles and wound dressings
Antimicrobial dyes	Intercalation with DNA. Production of singlet oxygen (photosensitizers)	Methylene blue, toluidine blue and crystal violet	Wound dressings, photodynamic therapy (photosensitizers)

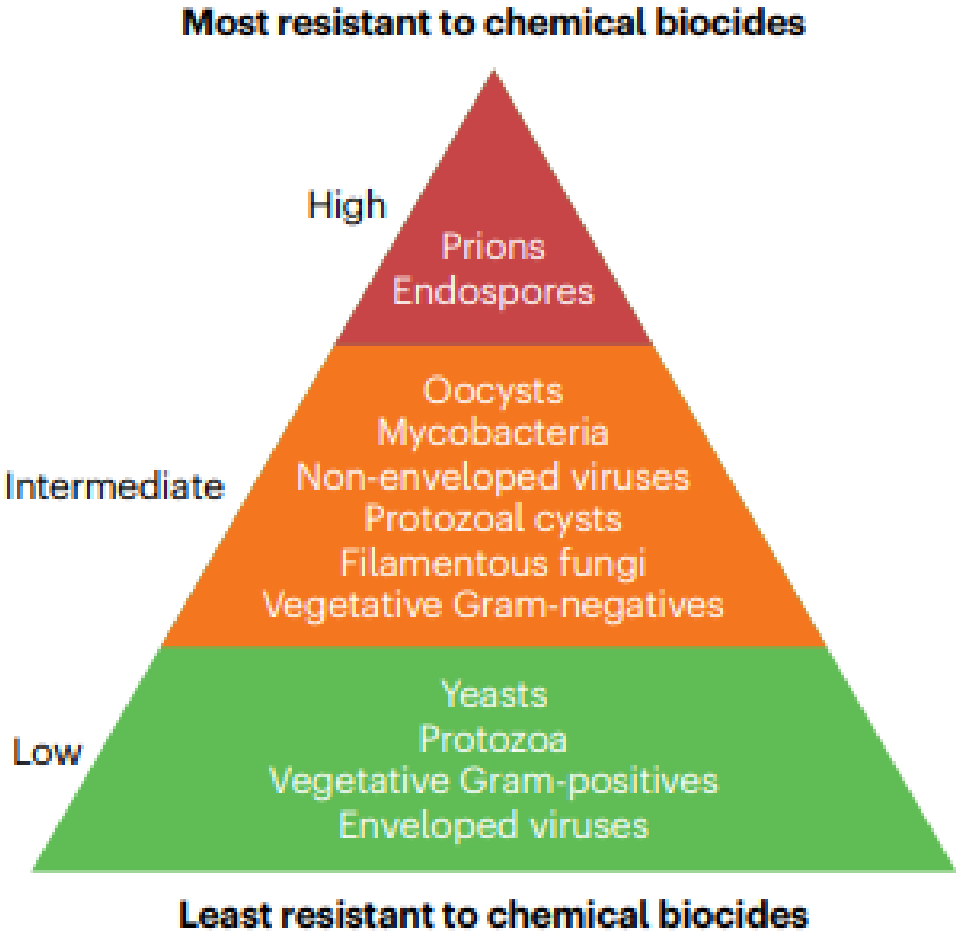
Maillard & Pascoe. Nature Rev Microbiol 2024.

Examples of bacteria

- *Bacillus subtilis* spores
- *Clostridioides difficile* spores
- *Mycobacterium chelonae* environmental isolates
- *Mycobacterium massiliense* environmental isolates

- *M. chelonae* standard culture collection
- *Pseudomonas aeruginosa*
- *Staphylococcus aureus* environmental isolates

- *B. subtilis* (vegetative)
- *S. aureus* standard culture collection



Examples of biocides

- Ethylene oxide (sterilant)
- Peracetic acid
- ClO_2
- Hydrogen peroxide
- Aldehydes
- Sodium hypochlorite

- Povidone–iodine
- Phenolics
- Complex QAC formulations
- Biguanides-based formulations

- 70% IPA/ethanol
- Simple QAC solutions
- Simple biguanide solutions
- Antimicrobial dyes

Maillard & Pascoe. Nature Rev Microbiol 2024.

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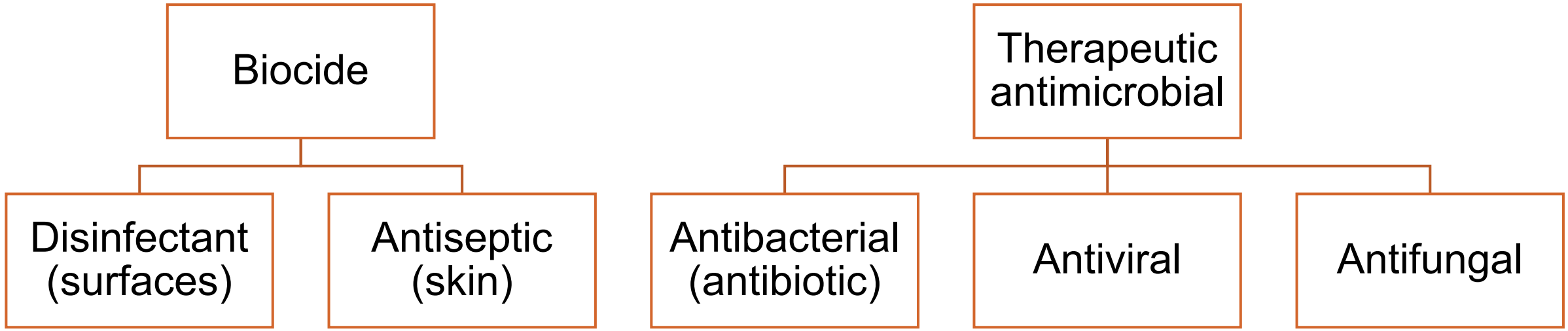
Biocide
Disinfectant (surfaces)
Antiseptic (skin)
Therapeutic antimicrobial
Antibacterial (antibiotic)
Antiviral
Antifungal

Biocides vs. therapeutic antimicrobials

Feature	Biocide	Therapeutic antimicrobial
Mechanism of action	Multiple cellular targets	Single process or structure
“Resistance”	Tolerance or reduced susceptibility	Resistance halts therapy
Measurement of “resistance”	No agreed methodology or breakpoints	Defined methodology and breakpoints
Mechanism of “resistance”	Intrinsic or acquired	Intrinsic or acquired

Factors affecting biocide effectiveness

Biocide

- Type / mechanism of action
- Concentration
- Formulation

Application

- Dilution
- Delivery method
- Contact time
- Soiling
- Surface type
- Interactions

Microbe

- Structure (e.g. spores)
- Reduced susceptibility
- Metabolic state (e.g. VNC)
- Community (e.g. biofilm)

Maillard & Pascoe. Nature Rev Microbiol 2024.

The importance of formulation

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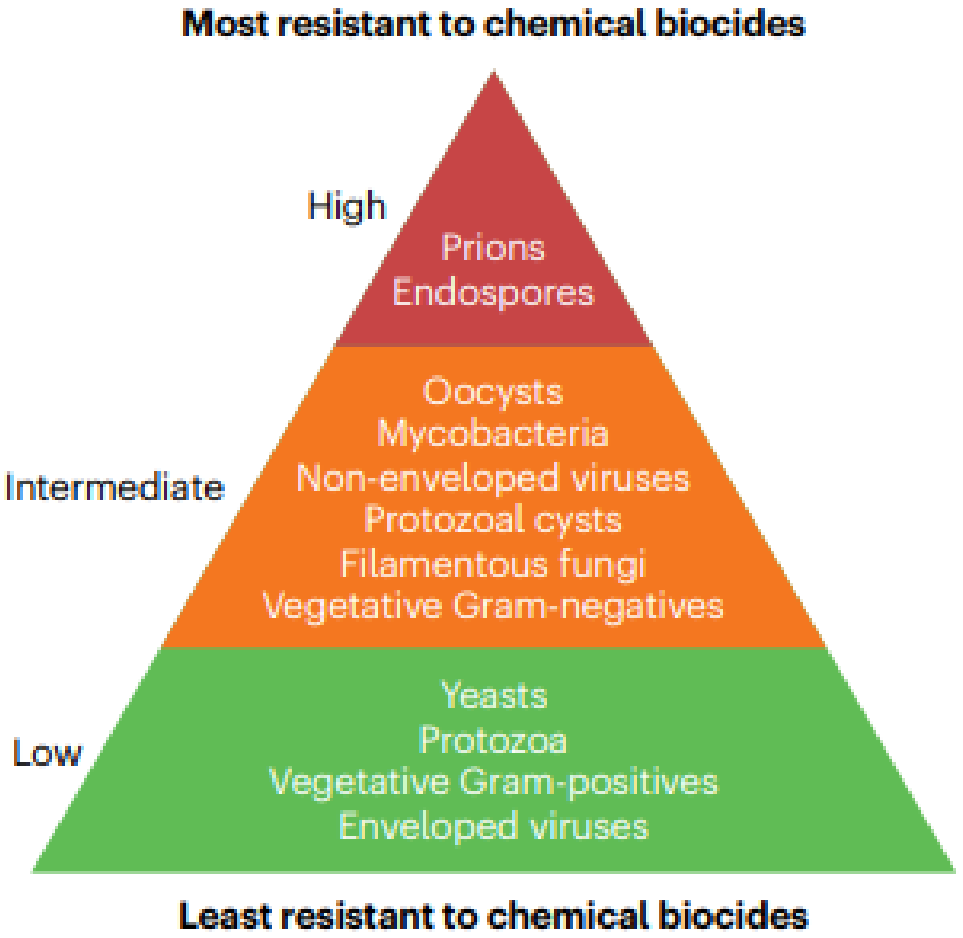

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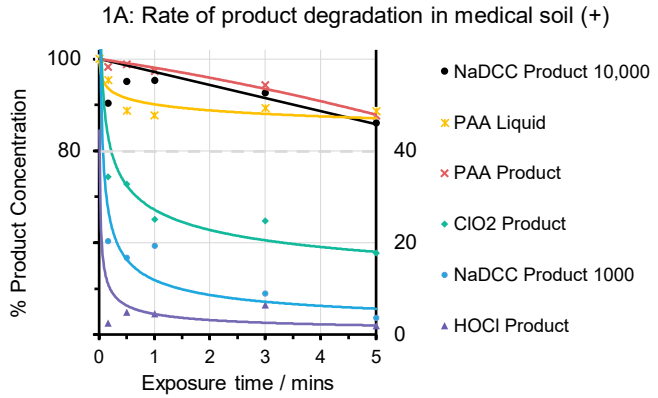
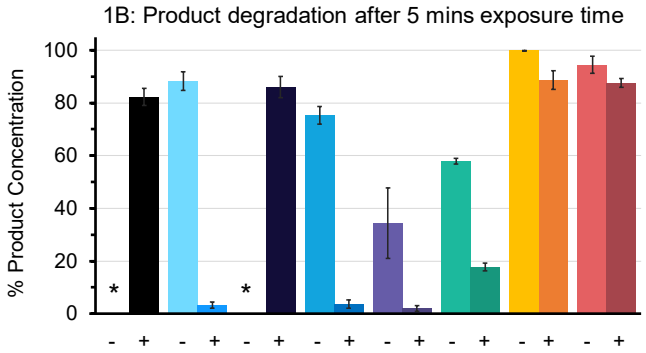
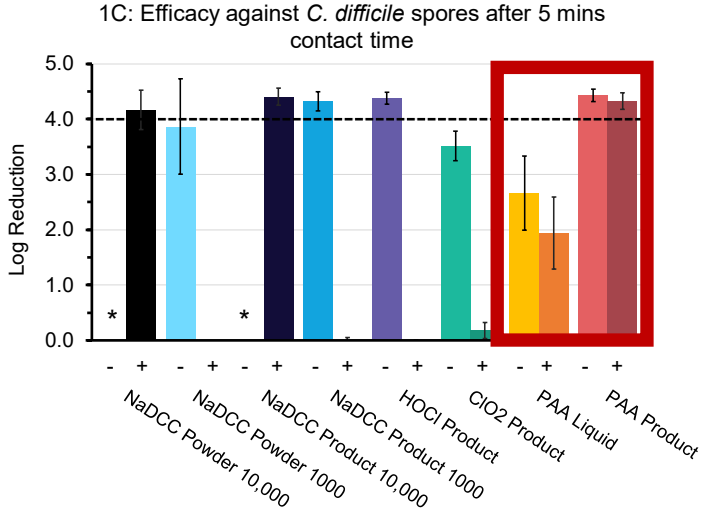
- Antimicrobial dyes

Maillard & Pascoe. Nature Rev Microbiol 2024.

Importance of formulation



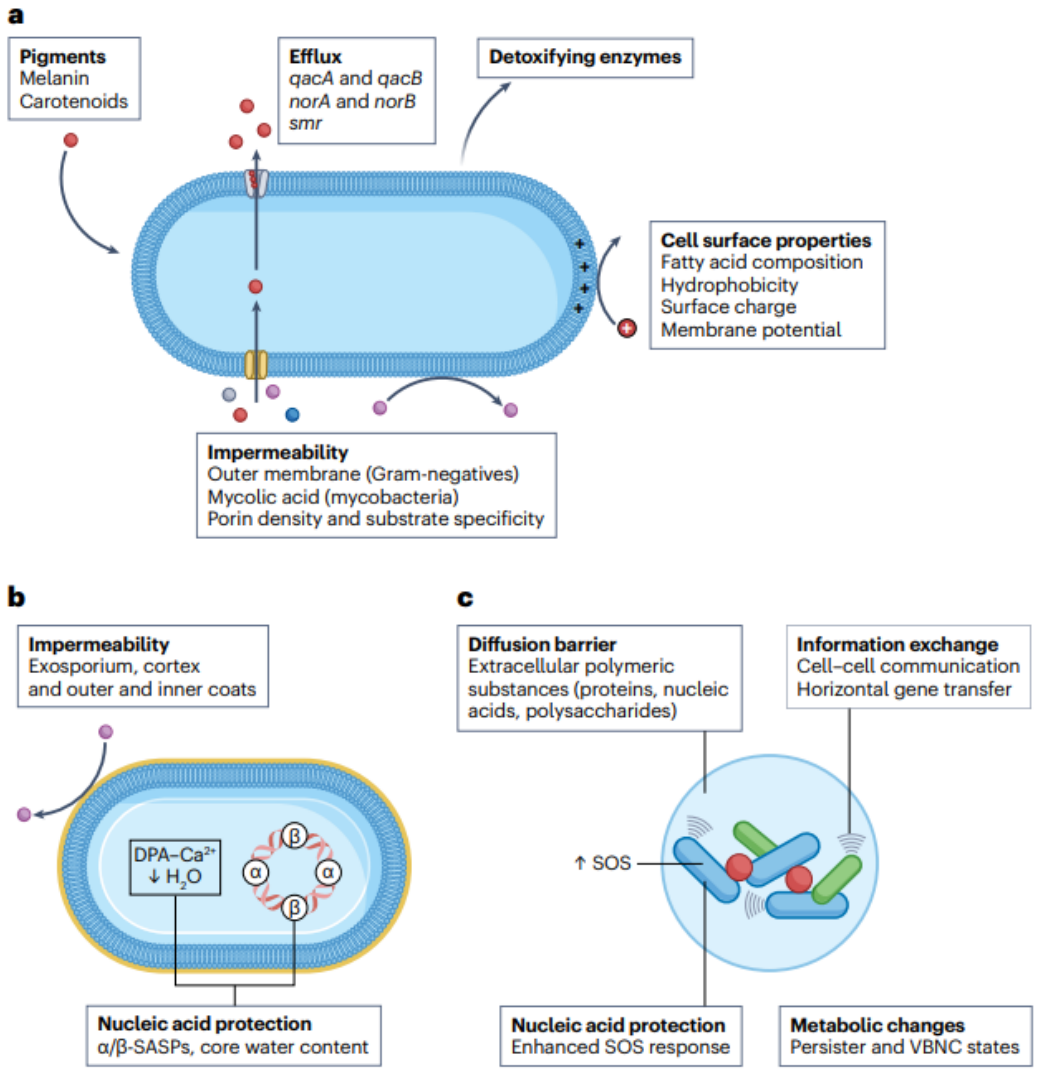




Brown et al. J Hosp Infect 2024 (accepted)

* = not tested

Intrinsic reduced susceptibility to biocides



Maillard & Pascoe. Nature Rev Microbiol 2024.

Acquired reduced susceptibility to biocides

General mechanism	Organism	Biocide (test concentration)	Change in biocide susceptibility	Antibiotic resistance	Specific mechanism	Ref.
Efflux	Mixed waterborne community	Copper (8–500 mg l^{-1})	NA (environmental isolates only)	Clarithromycin; tetracycline	CusA, CusB CusS, CutE	163
	Acinetobacter baumannii	Triclosan (128 mg l^{-1})	2–32-fold increase in MIC	Trimethoprim	FabI, AdeIJK	164
	Pseudomonas aeruginosa	BZC (12.5 mg l^{-1})	12-fold increase in MIC	Ampicillin; cefotaxime; ceftazidime	MexAB–OprM; MecCD–OprJ	165
	Campylobacter spp.	BZC; chlorhexidine; cetylpyridinium chloride	Twofold to fourfold increase in MIC	Erythromycin; ciprofloxacin	Not established (confirmed with efflux inhibitors)	166
	P. aeruginosa	Sodium hypochlorite (100 mg l^{-1})	Approximately 2.5-fold increase in MIC	Ampicillin; tetracycline; chloramphenicol kanamycin	MuxABC–OpmB[a]	134
Porins	*Mycobacterium chelonae*	Glutaraldehyde (0.2–2%)	>6 $\log_{10}$ survival of resistant strain in 2% glutaraldehyde	Rifampicin, vancomycin, clarithromycin, erythromycin	Msp	80
	Escherichia coli	Chlorophene (0.5–2.49 mM) Povidone-iodine (67–111 µg ml^{-1})	Increased growth in twofold to fivefold higher concentrations of biocide after 500 generations	Ampicillin; chloramphenicol; norfloxacin	OmpR; EnvZ	82
Metabolic changes	*E. coli*	Hydrogen peroxide (200 µM)	Increased growth in approximately twofold higher concentration after 500 generations	Ampicillin; chloramphenicol	RNA polymerase (*rpo*)	82
	Mycobacterium smegmatis	Triclosan (0.8–1.6 mg ml^{-1})	Fourfold to sixfold increase in MIC	Isoniazid	Lipid metabolism (InhA)	112
	Listeria monocytogenes	Triclosan (1–4 µg ml^{-1})	No change in MIC	Aminoglycosides	Heme metabolism (*hemH*, *hemA*)	111
Modifications of surface change	*P. aeruginosa*	BZC (50–1600 mg l^{-1})	7–25-fold increase in MIC	Polymyxin B	*pmrB*	67
Extracellular metal-binding protein	*Klebsiella pneumoniae*	Silver (≤64 µM)	NA (clinical isolates only); resistance to silver based on literature values	β-Lactams, fluoroquinolones, aminoglycosides (plasmid-encoded)	SilE	167

BZC, benzalkonium chloride; MIC, minimum inhibitory concentration; NA, not applicable. [a]Induction of SOS response and antioxidant enzymes also noted.

Maillard & Pascoe. Nature Rev Microbiol 2024.

Biocide and therapeutic antimicrobial cross-resistance

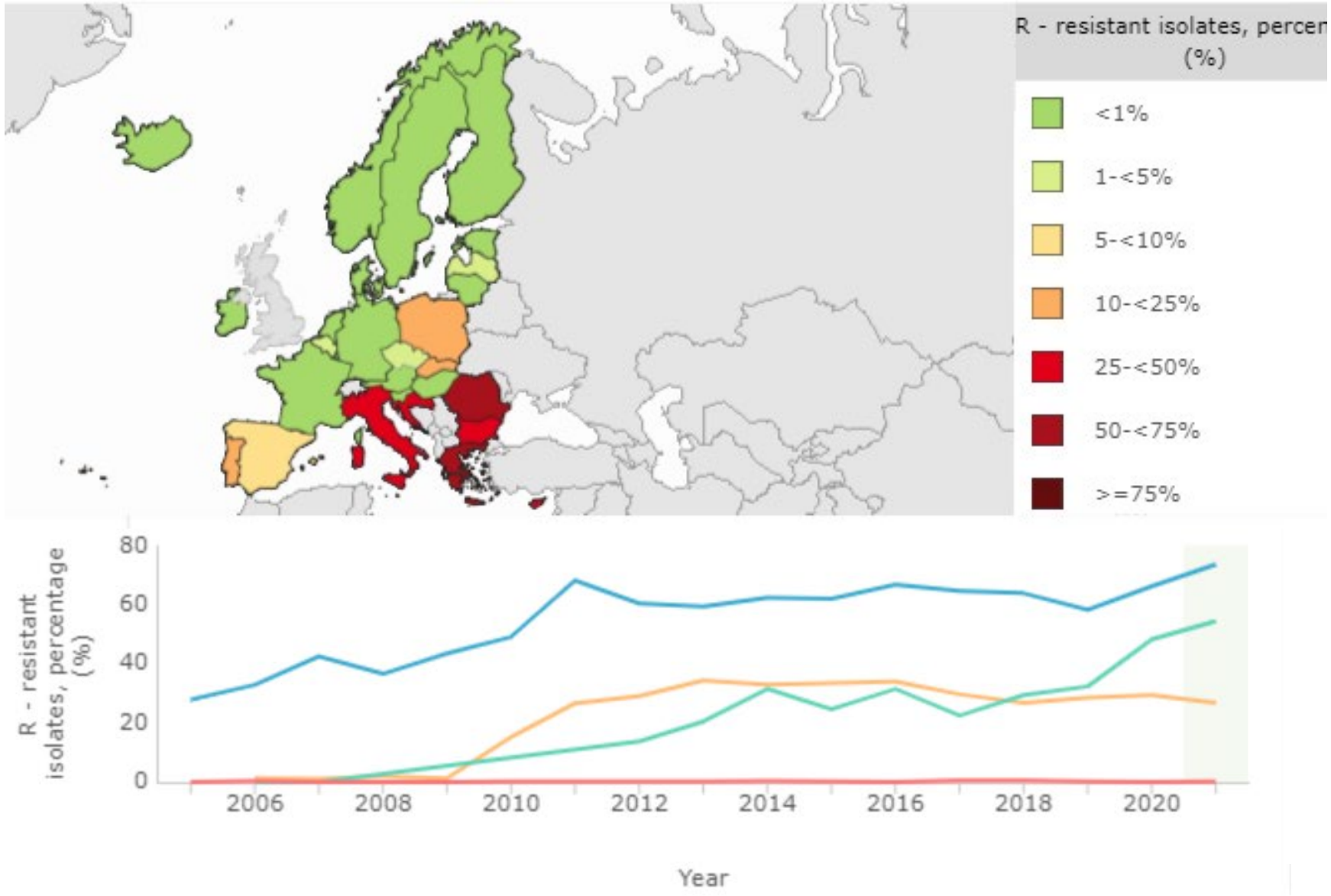
- Direct – shared mechanism for reduced susceptibility to biocides and resistance to therapeutic antimicrobials
- Indirect
  - Exposure to biocides can “switch on” AMR
  - Co-selection of resistance genes on the same mobile genetic element
- Cross-resistance to other biocides can occur
- Risk of cross-resistance varies by biocide
  - Oxidising agents less prone to cross-resistance
- Limited evidence of “real world” impact

Why I’m not too worried about reduced susceptibility to biocides

Biocide reduced susceptibility	Therapeutic antimicrobial resistance (AMR)
Subtle and difficult to measure	Barn door
Few examples of clinically significant issues	We are running out
Have been using for decades without “failures”	New therapeutic antimicrobials don’t last long
We can “formulate our way out”	Formulation isn’t a way out

Why I'm <u>really</u> worried about resistance to therapeutic antimicrobials (aka AMR)

% invasive K. pneumoniae isolates resistant to carbapenems (CRE)



ECDC 2023.

Surface disinfectants in healthcare: when to use them, how to choose them, and their contribution to AMR

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Slides: www.jonotter.net

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Fiona De Sousa

Emerging Pathogen: Candida auris

Candida auris … Coming to a Hospital near you!

Fiona De Sousa, NM, Infection Prevention and Control Unit, Hospitals North – Tasmanian Health Service

fiona.de.sousa@ths.tas.gov.au

Conflict of Interest

- Flights and Accommodation paid for by Gama Healthcare

Acknowledgement of Country

I begin today by acknowledging the Wurundjeri Woi-wurrung and Bunurong Boon Wurrung Peoples of the Eastern Kulin, Traditional Custodians of the Greater Melbourne area on which we gather today and pay my respects to their Elders past and present.

I extend that respect to Aboriginal and Torres Strait Islander peoples here today.

Outline

- What is Candida auris
- Epidemiology
- Identification
- Treatment
- IPC Measures
- Screening
- One Health

What is Candida auris ?

- Uncommon / emerging fungal pathogen
- Colonisation
  - skin / mucosal surfaces
- Infection
  - Candidaemia (BSI)
  - Urinary tract
  - Pulmonary
  - Surgical site / Wound
  - Meningitis
  - Osteomyelitis
  - Pericarditis

What is Candida auris ?

- Thermotolerant (37 – 42^{O}C)
- Salt tolerant
- Frequently drug resistant to one or more class of antifungals
- Attributable Mortality 30 – 72%

Risk Factors

International Risk Factor - Invasive Infection

- Prolonged hospital stay
- Serious comorbidities (haematological malignancy, immunosuppression, ? COVID-19)
- Broad spectrum antibiotic and antifungal treatment
- Invasive devices – CVC, intubation (COVID-19)
- Recent Surgery

Australian Risk Factor - Acquisition

- Overseas hospitalization associated with prolonged admission / ICU

Epidemiology - International

2009 Japan – ear discharge from a hospitalised patient, Otitis media

Epidemiology - International

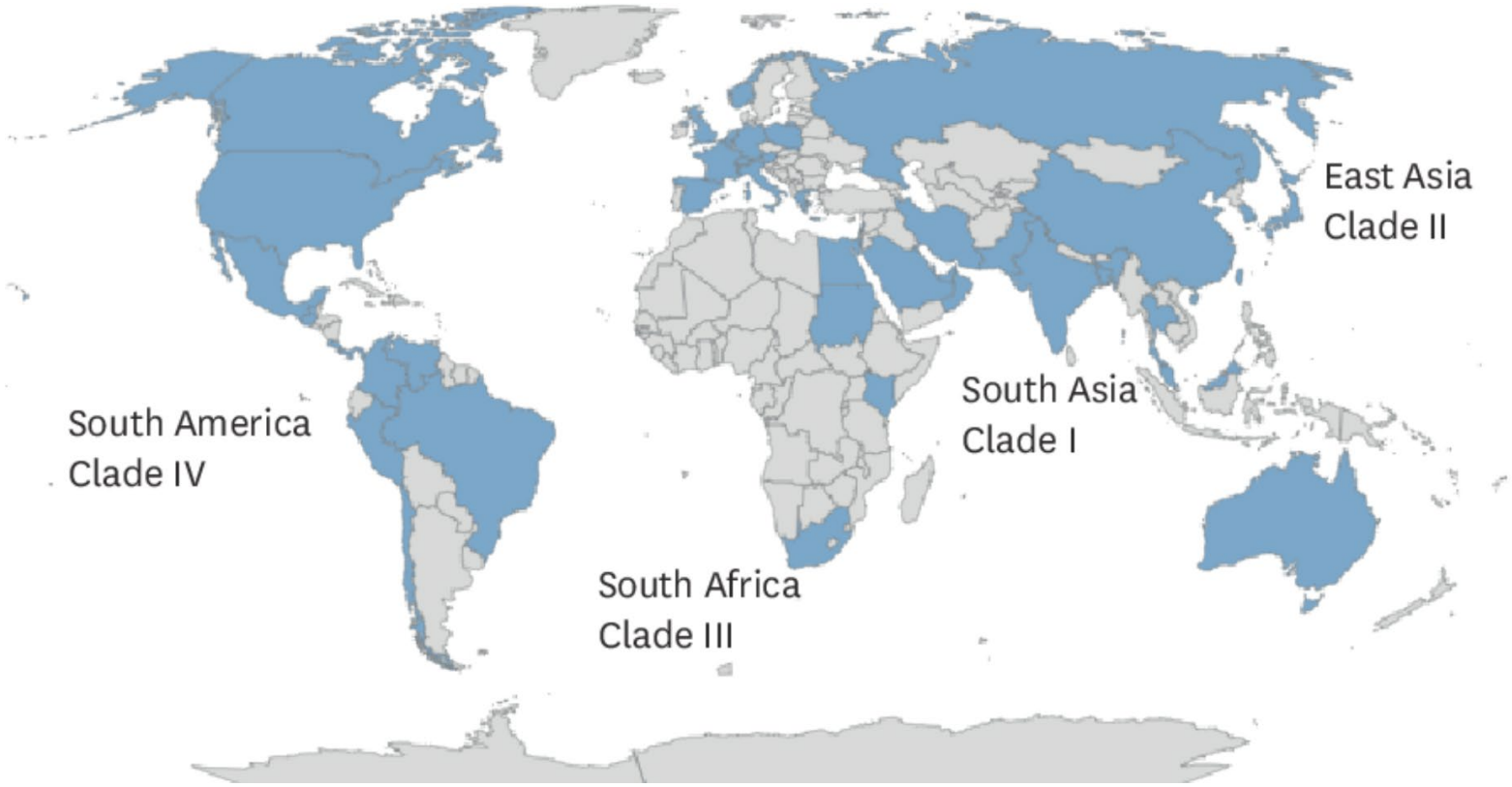
2009 Japan – ear discharge from a hospitalised patient

2011 South Korea – first bloodstream infection

South Korea - retrospective review identified a previous isolate from 1996

Epidemiology - International

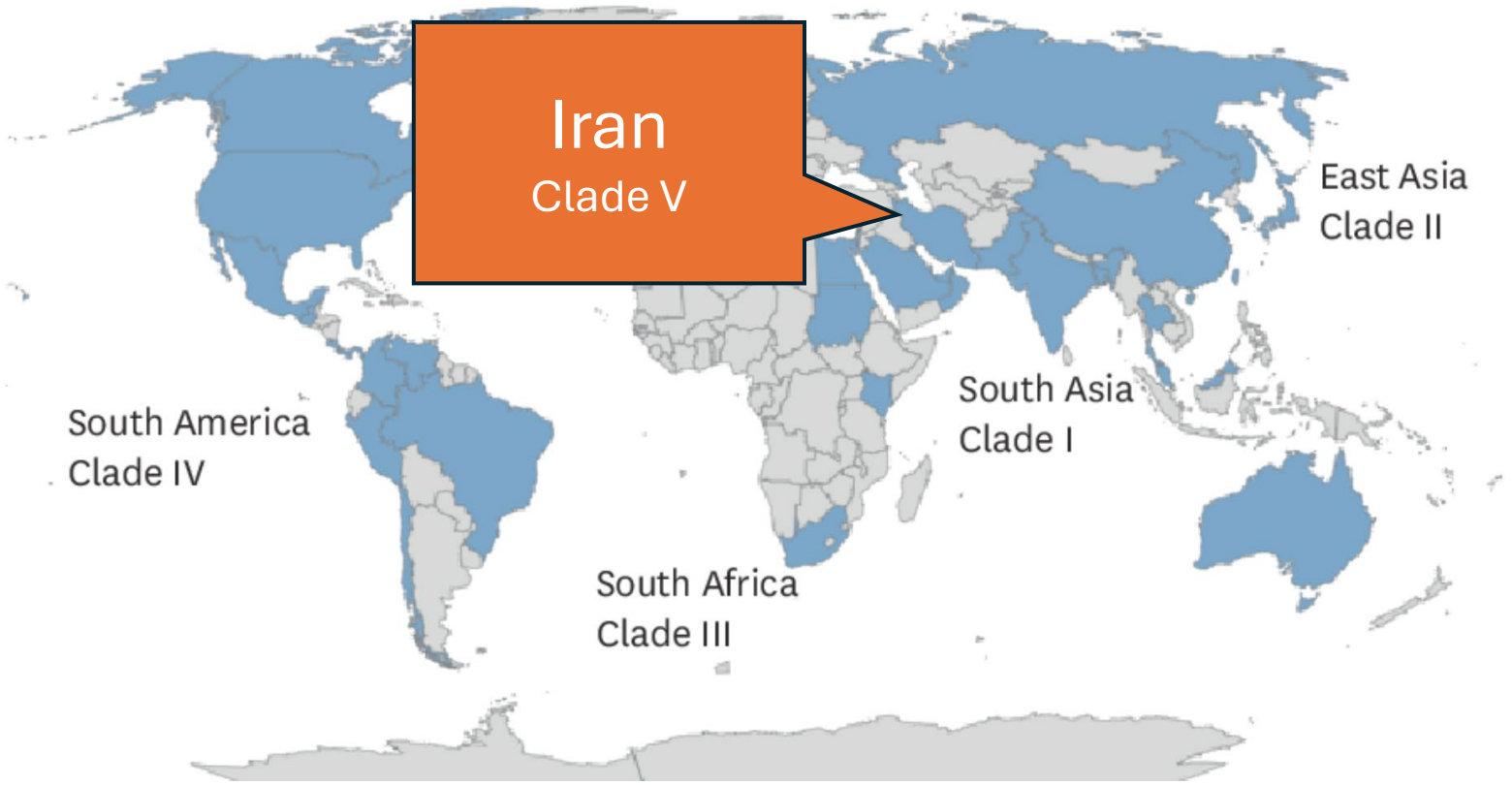
- Independent clonal emergence with geographic specific clades and local spread
  - South Asia
  - South Africa
  - South America
  - East Asia



(Sanyaolu, A and Okorie, C et al 2022)

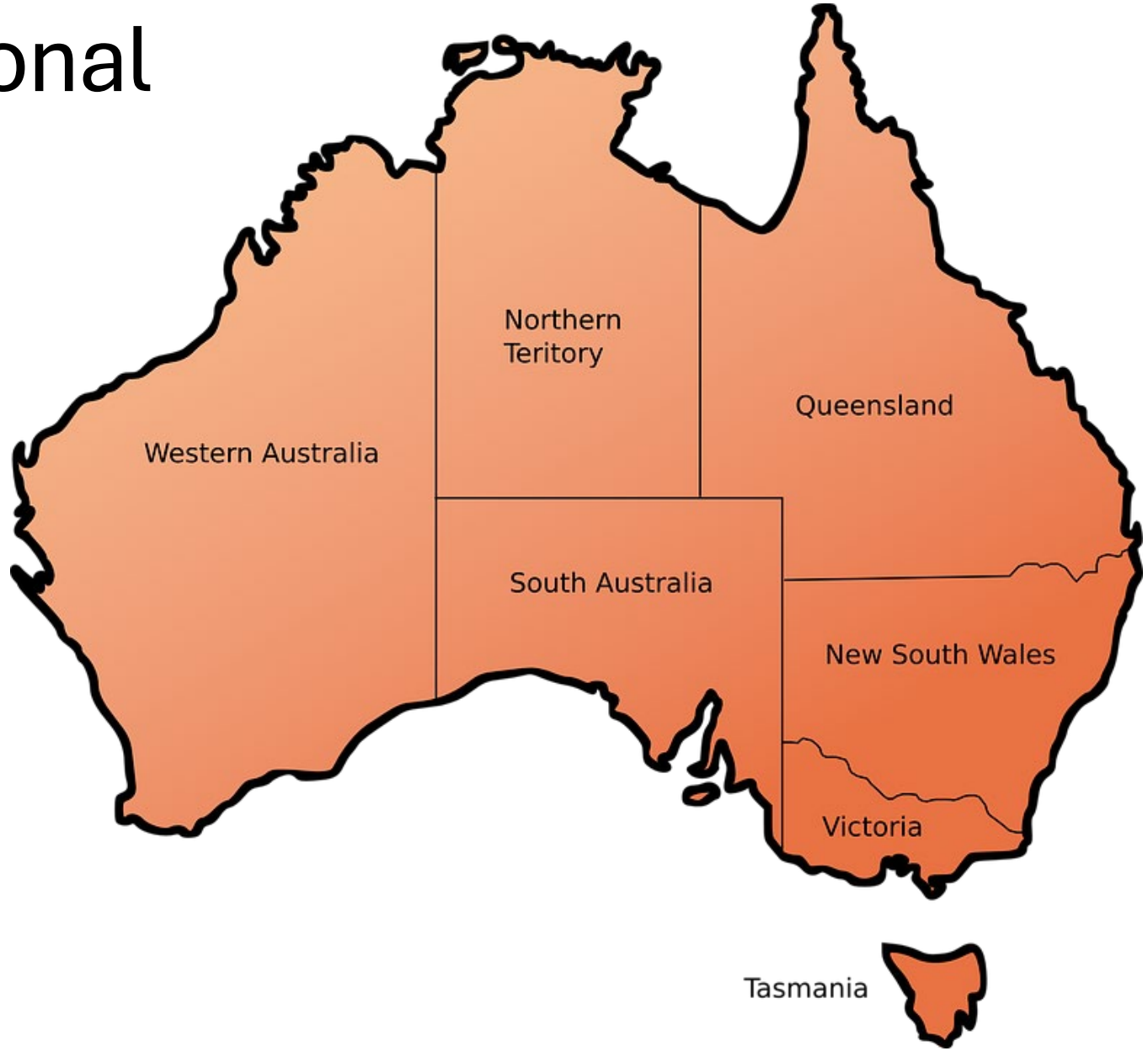
Epidemiology - International

- Independent clonal emergence with geographic specific clades and local spread
  - South Asia
  - South Africa
  - South America
  - East Asia
- New Clade
  - Iran



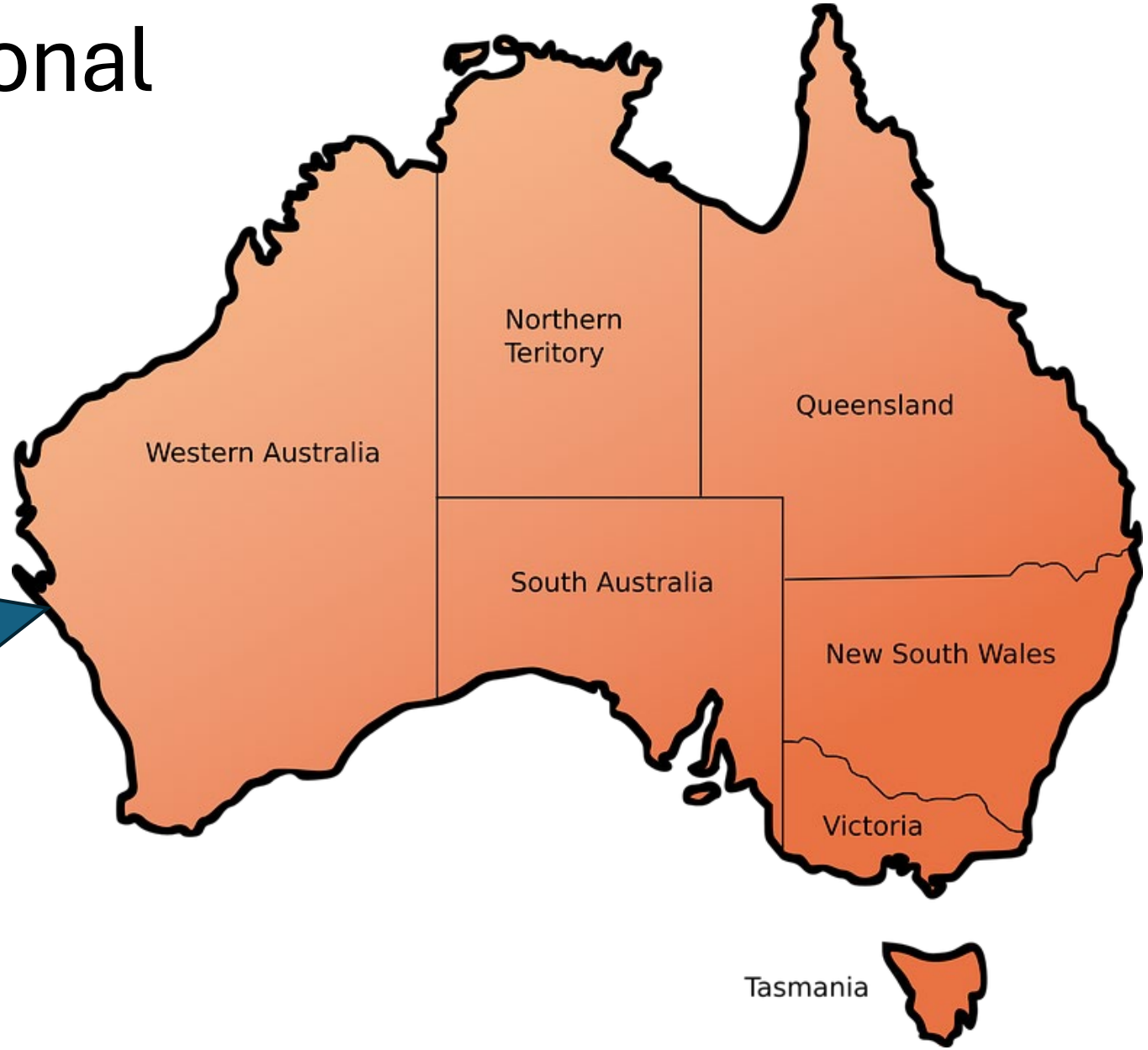
(Sanyaolu, A and Okorie, C et al 2022)

Epidemiology - National

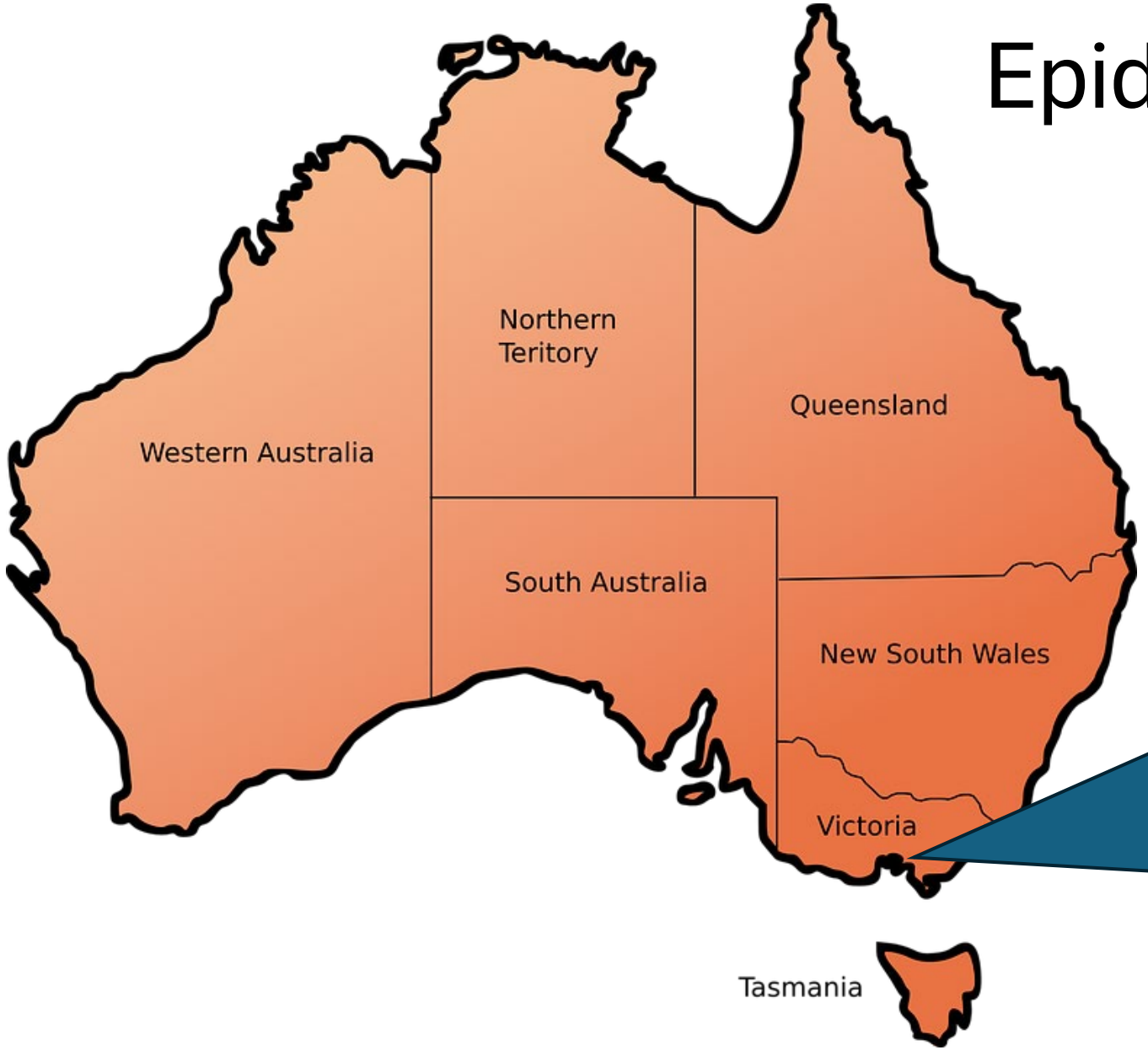


Epidemiology - National

2015 Western Australia
- First Australian case - Perth
- South African Clade

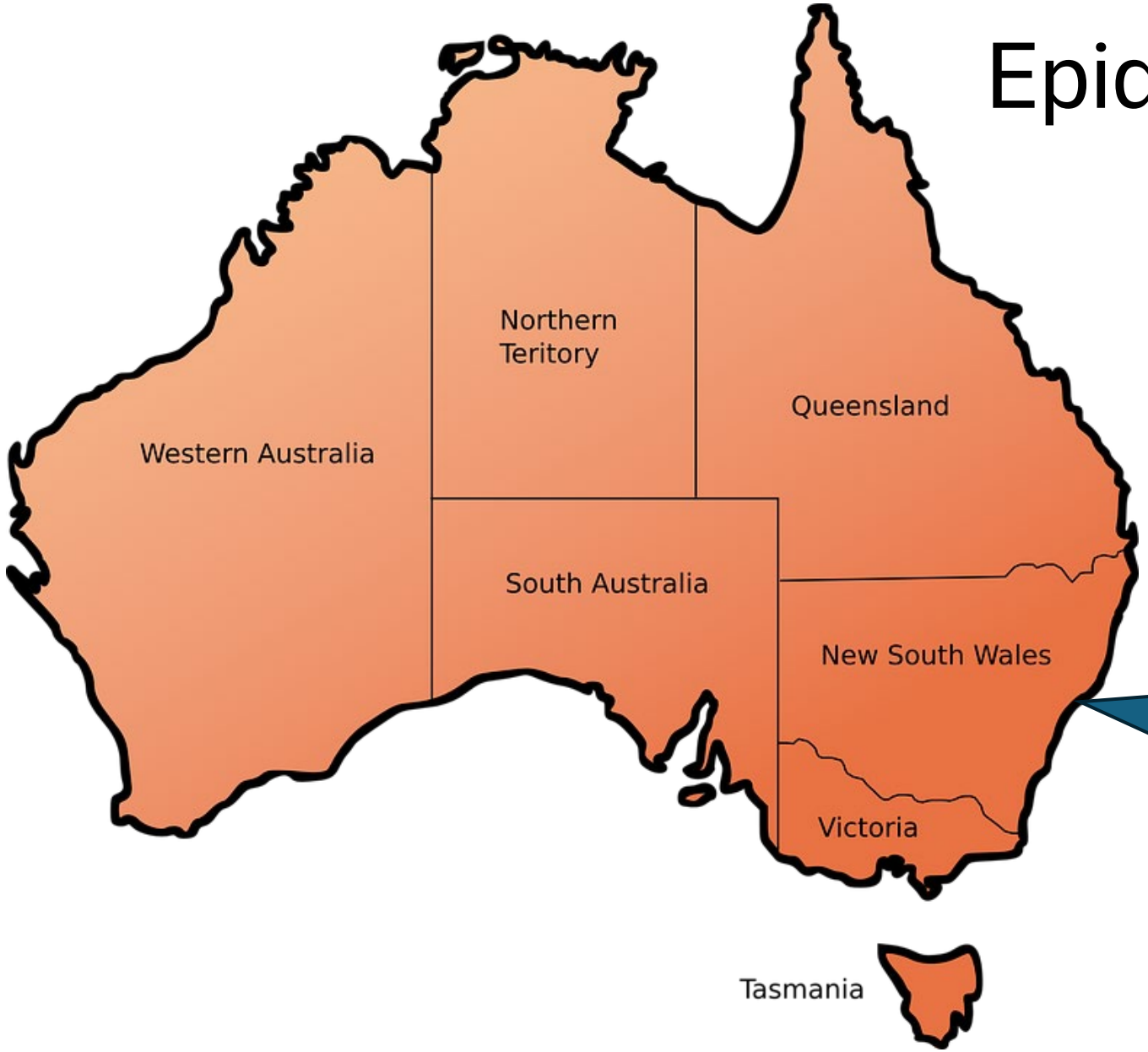


Epidemiology - National



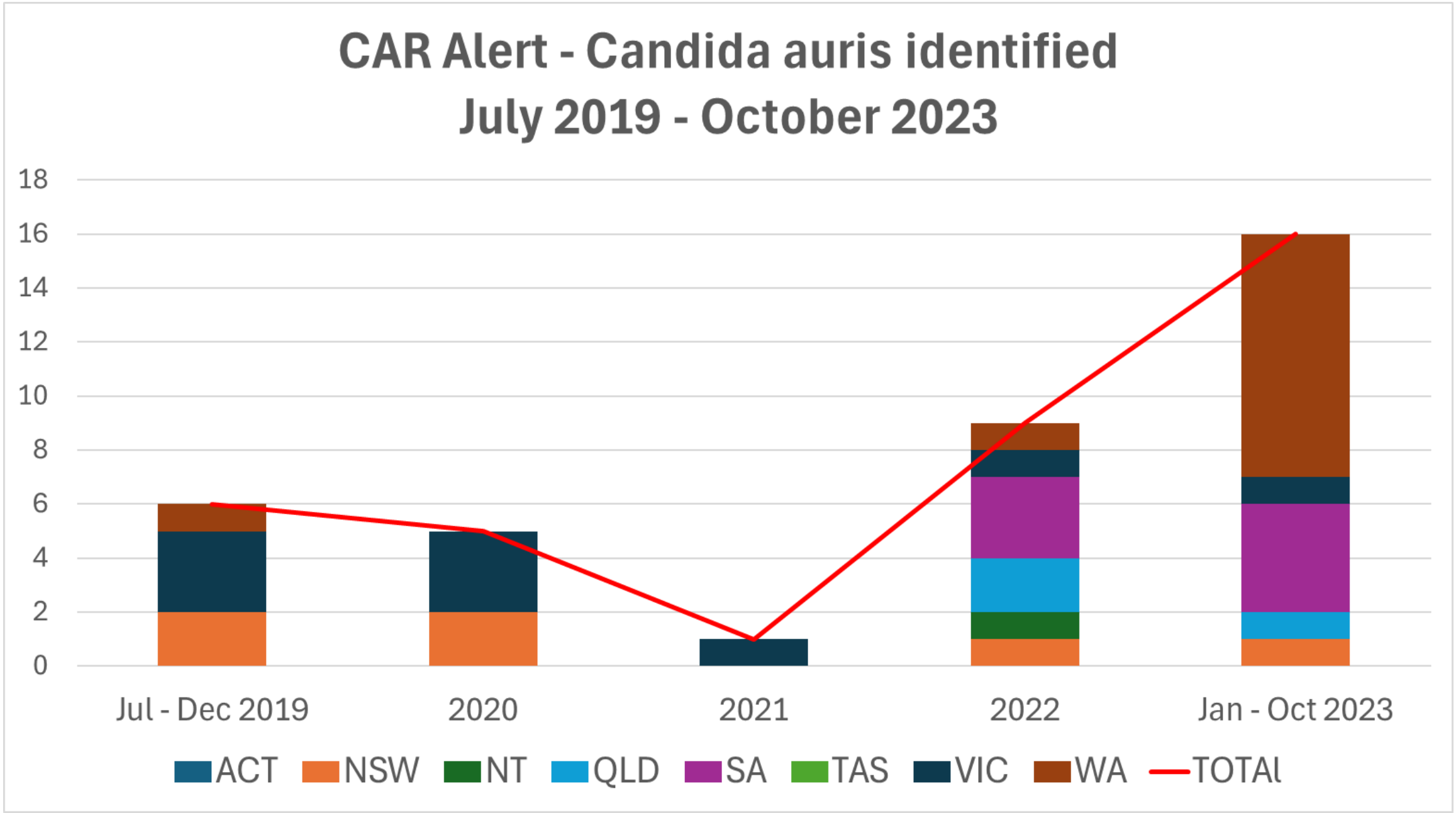
2018 Victoria
- 4 cases
- All with overseas hospitalisations
- 3 linked to OS and 1 local transmission event

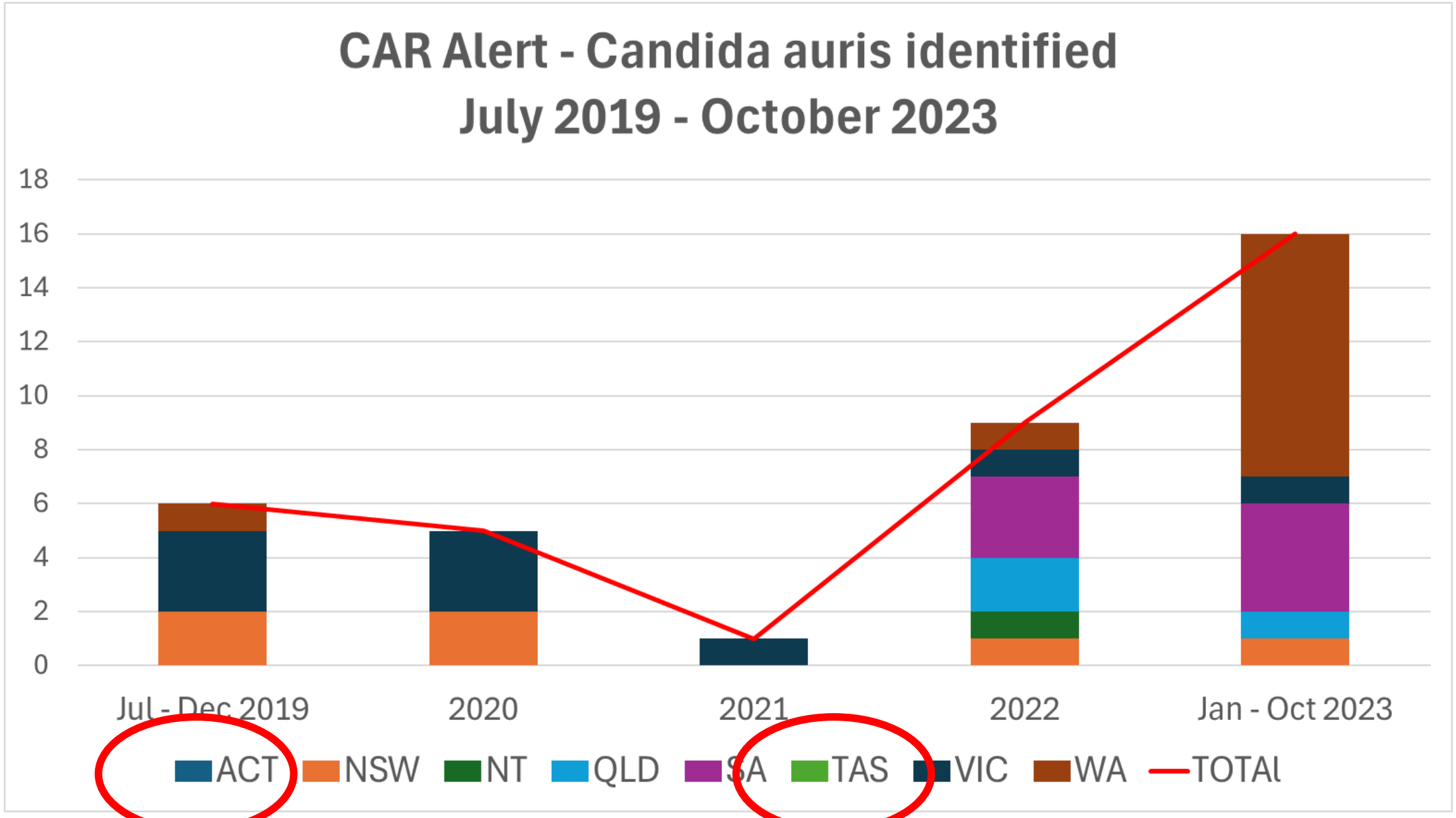
Epidemiology - National



2018 NSW

- 1 case from overseas patient


CAR Alert - Candida auris identified
July 2019 - October 2023
18
16
14
12
10
8
6
4
2
0
Jul - Dec 2019
2020
2021
2022
Jan - Oct 2023
ACT
NSW
NT
QLD
SA
TAS
VIC
WA
TOTAl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QLD
SA
TAS
VIC
WA
TOTAl

Transmission Routes

- Contact
- Surface contamination
  - Environment
  - Medical Equipment
- Biofilm

Transmission Routes

- Contact
- Surface co
  - Environr
  - Medical
- Biofilm
- Airborne

Journal of Hospital Infection 142 (2023) 105–114

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevier.com/locate/jhin

Long-range air dispersion of *Candida auris* in a cardiothoracic unit outbreak in Hong Kong

T. Didik [a,b], A.P-Y. Yau [c], H.L. Cheung [d], S-Y. Lee [e], N-H. Chan [e], Y-T. Wah [f], H.K-H. Luk [a], G.K-Y. Choi [b], N.H-Y. Cheng [a], H. Tse [g], Y. Li [h], S.C.Y Wong [a,b], D.C. Lung [a,b,*]

Identification

- Difficult
- Easily miss-diagnosed
- Fungal susceptibility testing
- CAR Alert / Notification

Treatment

- Frequently drug resistant
  - Azoles (~90% resistant)
  - Amphoterican
  - Echinocandins
- Bedside ID Physician review – all cases
- Targeted treatment based upon susceptibility pattern
- If clinically unresponsive to echinocandins after 5 days , consider alternate treatment
- Colonisation – antifungal treatment is not recommended

IPC Measures

- Single room, ensuite
- Standard / Contact precautions
- Single use medical equipment
- Single patient equipment
- Replace disposable curtains

IPC Measures

- Limited movement in facility (review for RACF)
- Medical Record Alert
- Communication between procedural sites / facilities
- Patient education

IPC Measures

- Cleaning and disinfection
  - Shared equipment
  - Daily room and discharge
  - Twice daily frequent touch points
- Product options (sporicidal)
  - ✓ Sodium hypochlorite
  - ✓ Peracetic Acid
  - ? Hydrogen Peroxide
  - ? UV light
  - X Quaternary ammonium (Quat)

IPC Measures

- 1 case = Outbreak
- Close contact = 24 hours or more in a shared hospital room
  - Some evidence of transmission within 4 hours (Ong et al 2019)
- Nil clearance
  - Evidence of community cases in NY sequentially negative small cohort (Bergeron et al 2020)

Swab for Candida auris

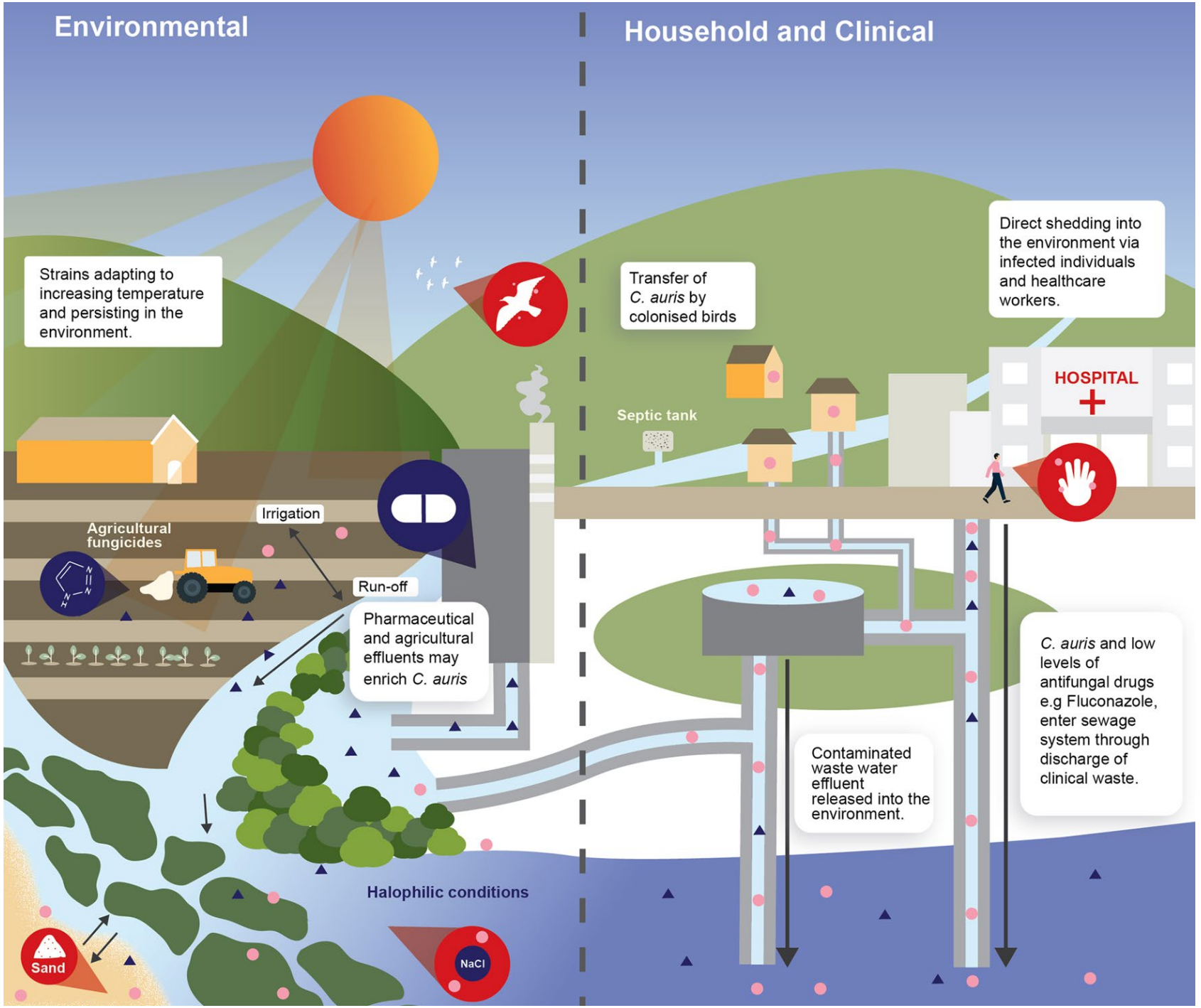
- ✓ Close contacts
- ✓ Transfer / admission form facility with known spread
- ✓ Transfer from overseas HCF
- ? Healthcare worker screening
- ? Environmental screening

Area	Notifiable		Guideline / Advice	Screening					Site	
	PH	CAR		T/fer OS	12/12 OS Hosp	Contacts	T/fer known detection	T/fer Transmission risk area	Bilateral Groin	Bilateral Axilla
NSW	Yes	Yes	Yes	Y	Y RACF	Y			Y	Y
QLD	No	Yes	Yes	Y	Y	Y	Y		Y	Y
				3 consecutive negative swabs required						
SA	Yes	Yes	Yes			Y			Y	Y
VIC	Yes	Yes	Yes	Y	Y	Y		Y	Y	Y
				x2 neg	x1 neg	x2 neg		x1 neg	? Nose, throat, device	
WA	Yes	Yes	Yes	Y	Y	Y			Y	Y
				3 consecutive negative swabs required						
ACT	No	Yes	No	Unknown						
NT	No	Yes	No	Unknown						
TAS	No	Yes	No	Facility dependent						

One Health is the idea that the health of people is connected to the health of animals and our shared environment.

When we protect **one**,
we help protect **all**.

www.cdc.gov/onehealth



Akinbobola et al 2023

One Health – Candida auris

- Environmental isolation wild Candida auris
  - Sandy beach – Andaman islands (Indian Ocean)
  - Estuary water – Colombia
  - Air dust – Kuwait
  - Activated sludge – South Korea
  - Peanut fields – Florida, USA
  - Ear canal dog – Spain
  - Skin of a newt – United Kingdom
- Antifungal use in agriculture
  - Stored apples – India

(Chowdhary et al 2023)

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Morning Tea

Dr Jon Otter

What's next for IPC? Winter 2024 and beyond

What's next for IPC? Winter 2024 and beyond: setting priorities and scanning the horizon

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Blog: www.reflectionsIPC.com
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Priorities

What’s hot in IPC

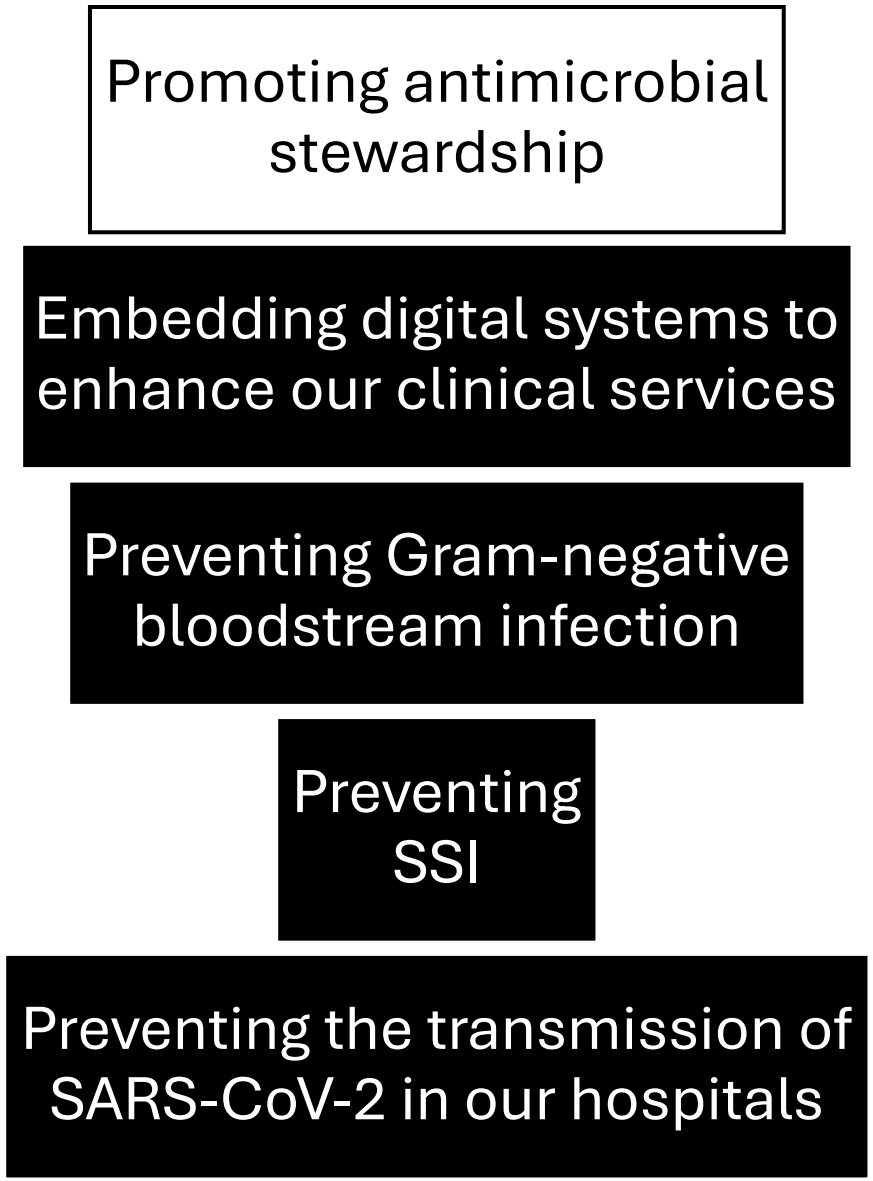
Promoting antimicrobial stewardship

Embedding digital systems to enhance our clinical services

Preventing Gram-negative bloodstream infection

Preventing SSI

Preventing the transmission of SARS-CoV-2 in our hospitals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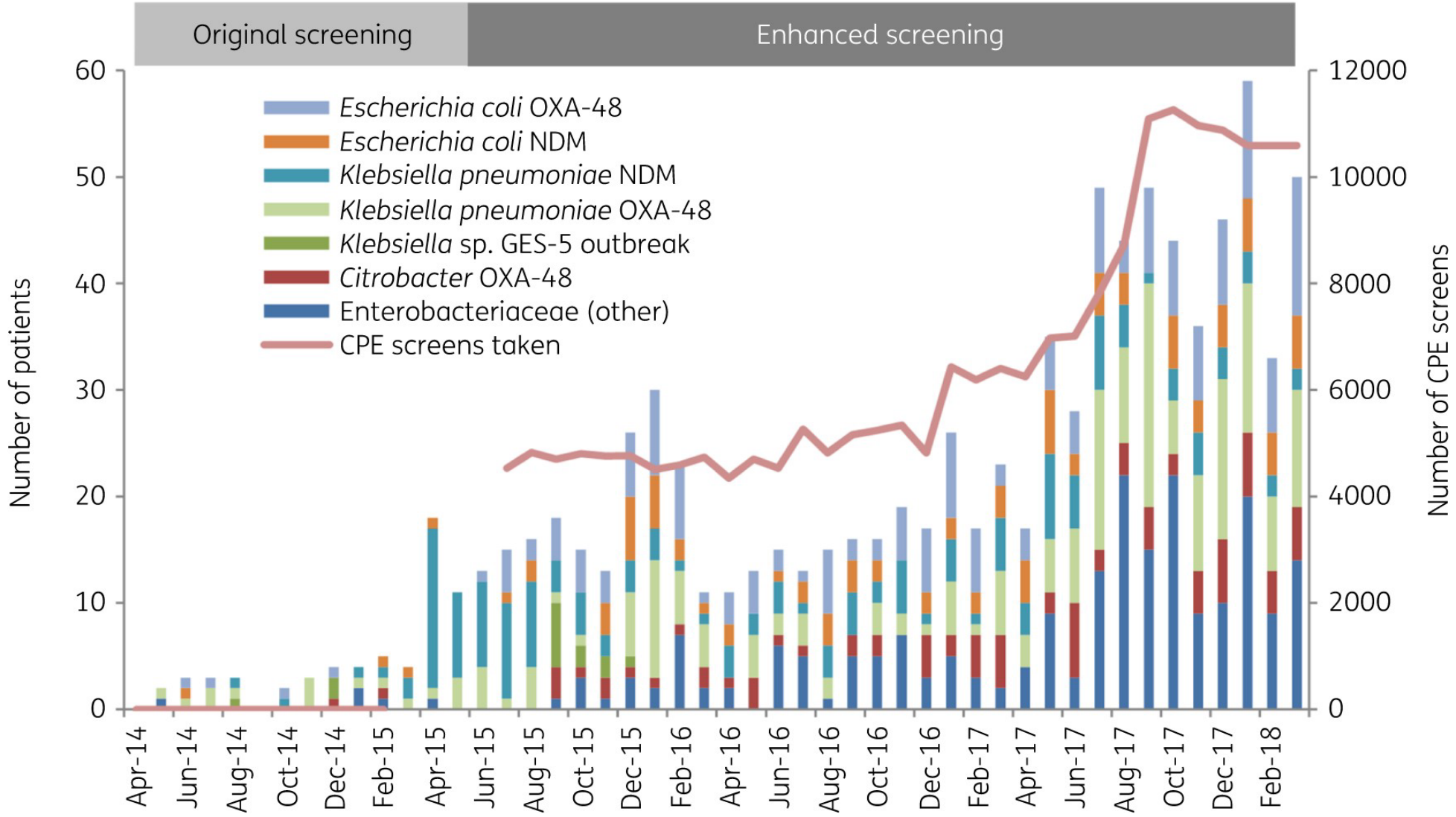
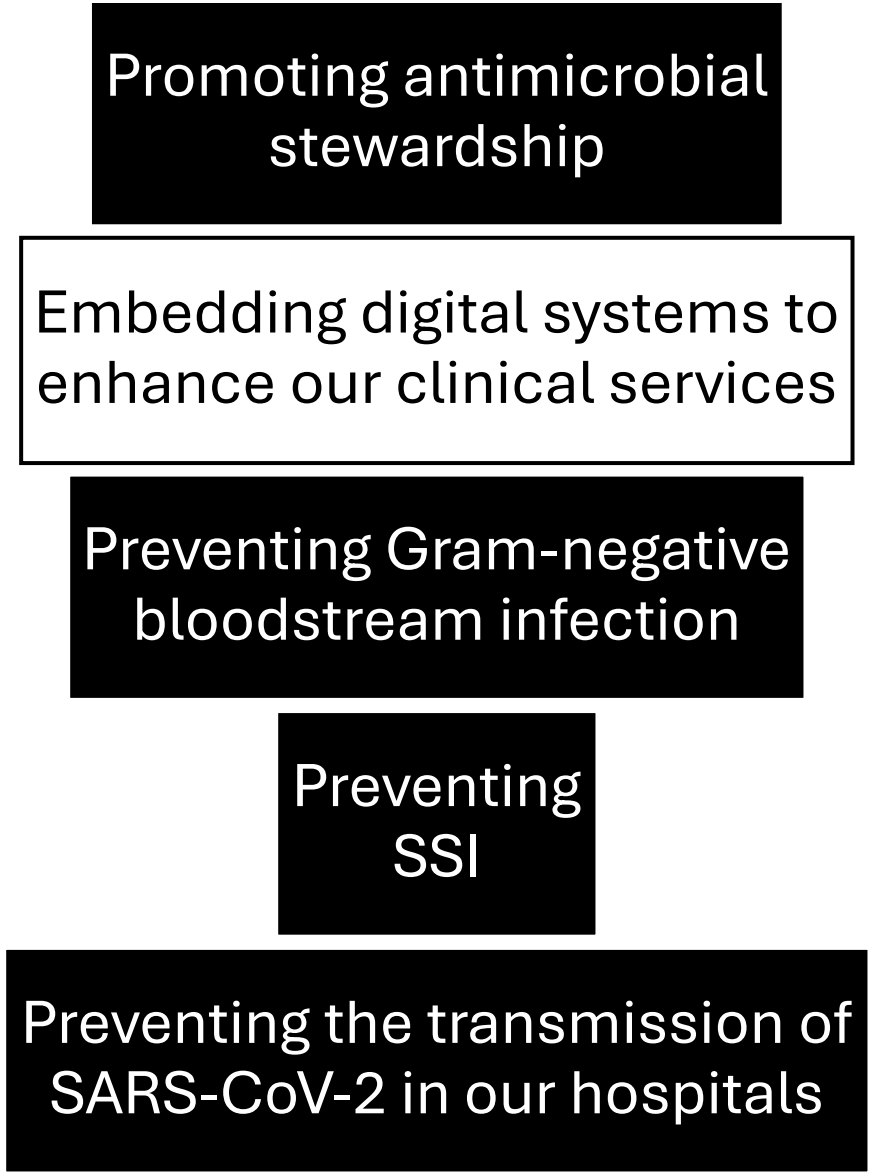
Preventing the transmission of SARS-CoV-2 in our hospitals

CPE: seek and ye shall find?

Overall trend in CPE detected at Imperial, by bacterial species and mechanisms, deduplicated by patient



Otter et al. J Antimicrob Chemother 2020.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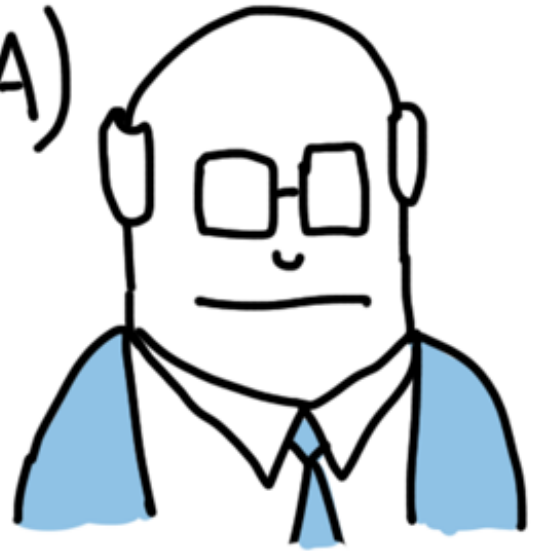
WHO LED THE DIGITAL TRANSFORMATION OF YOUR COMPANY ?

A)

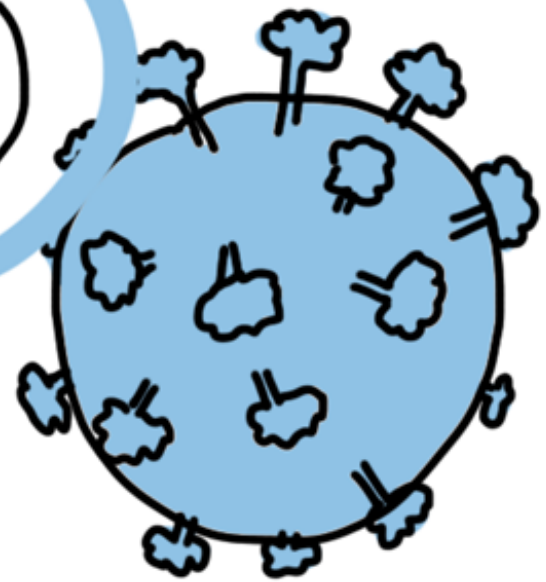


THE CEO

B)

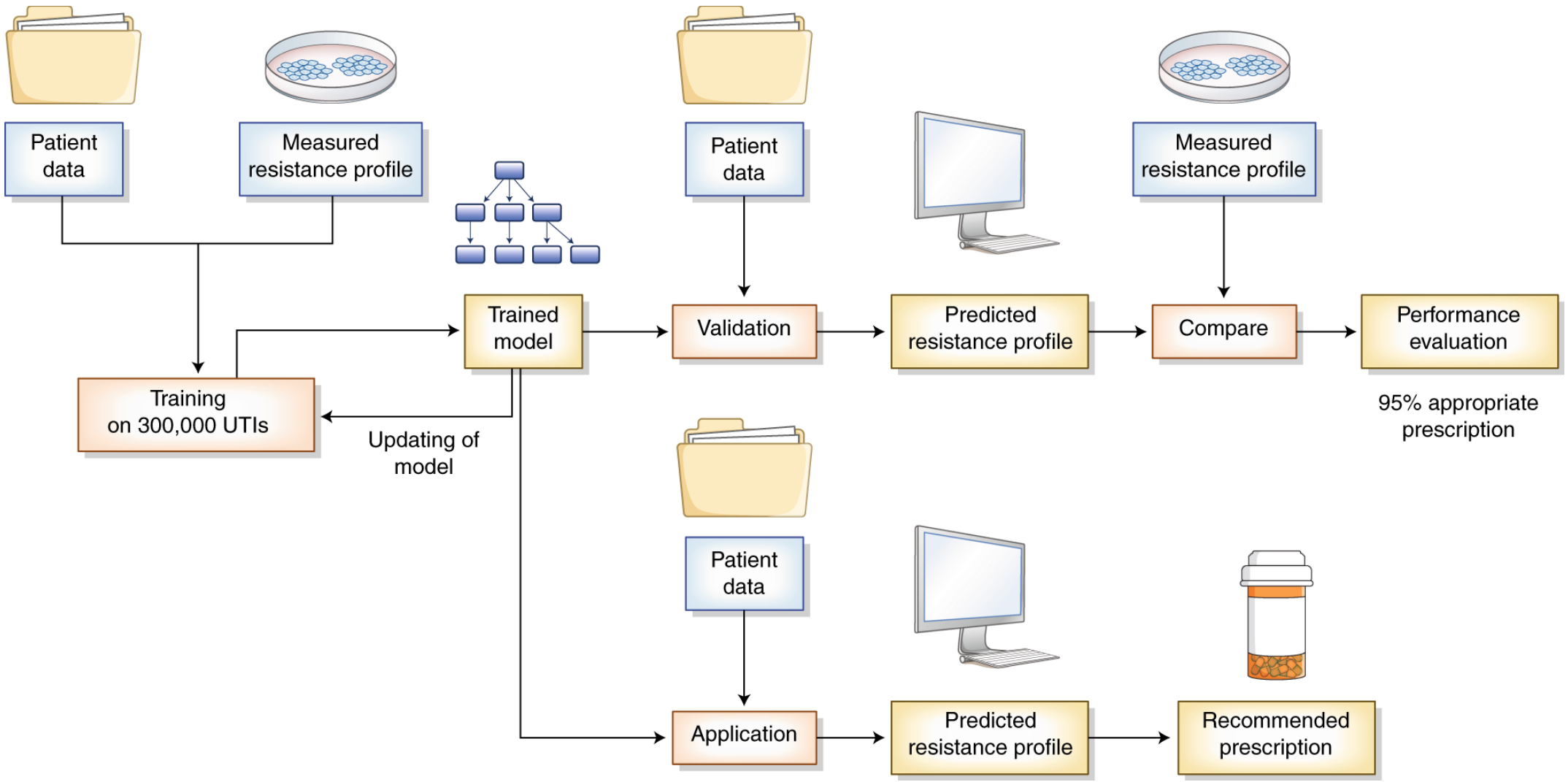
THE CTO

C)



COVID-19

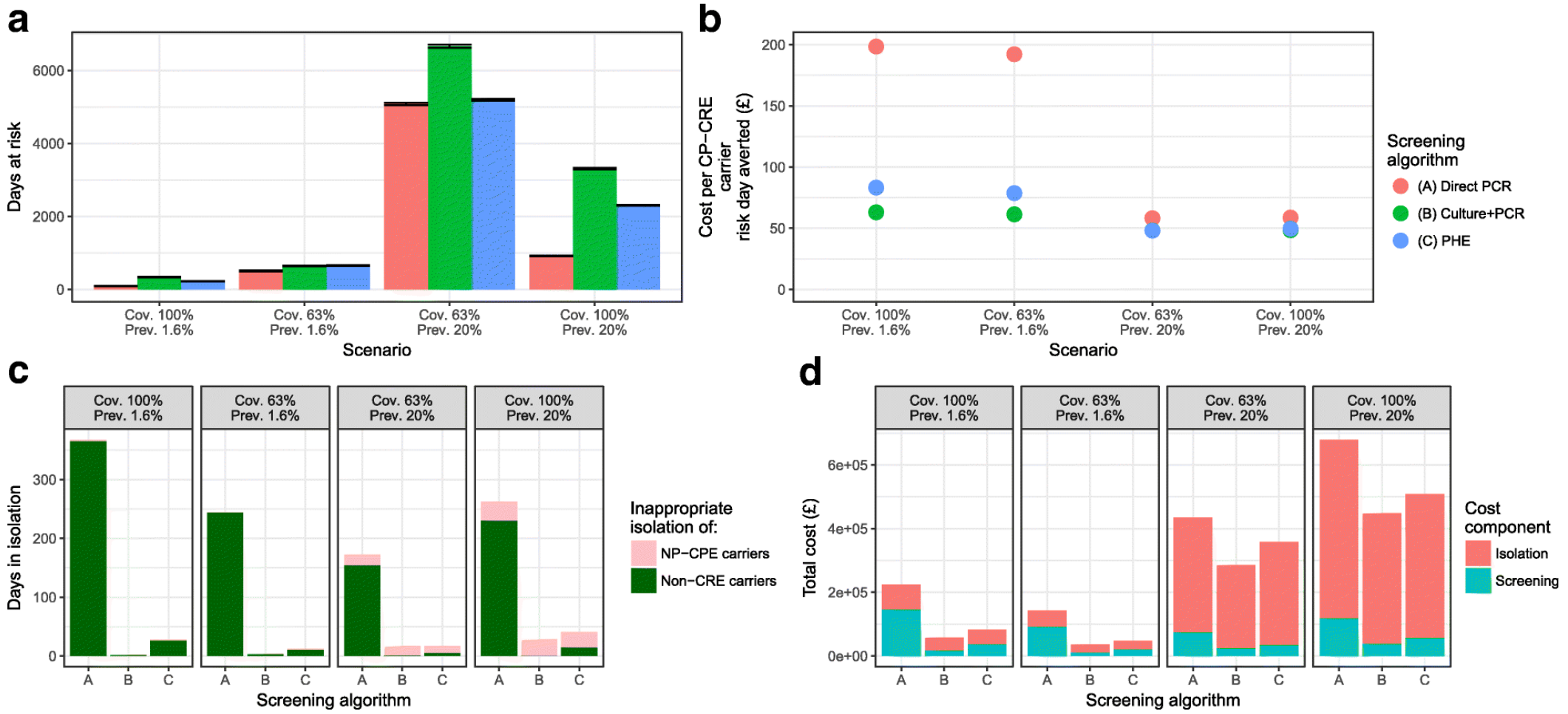
Machine learning / AI: antimicrobial prescribing decision support



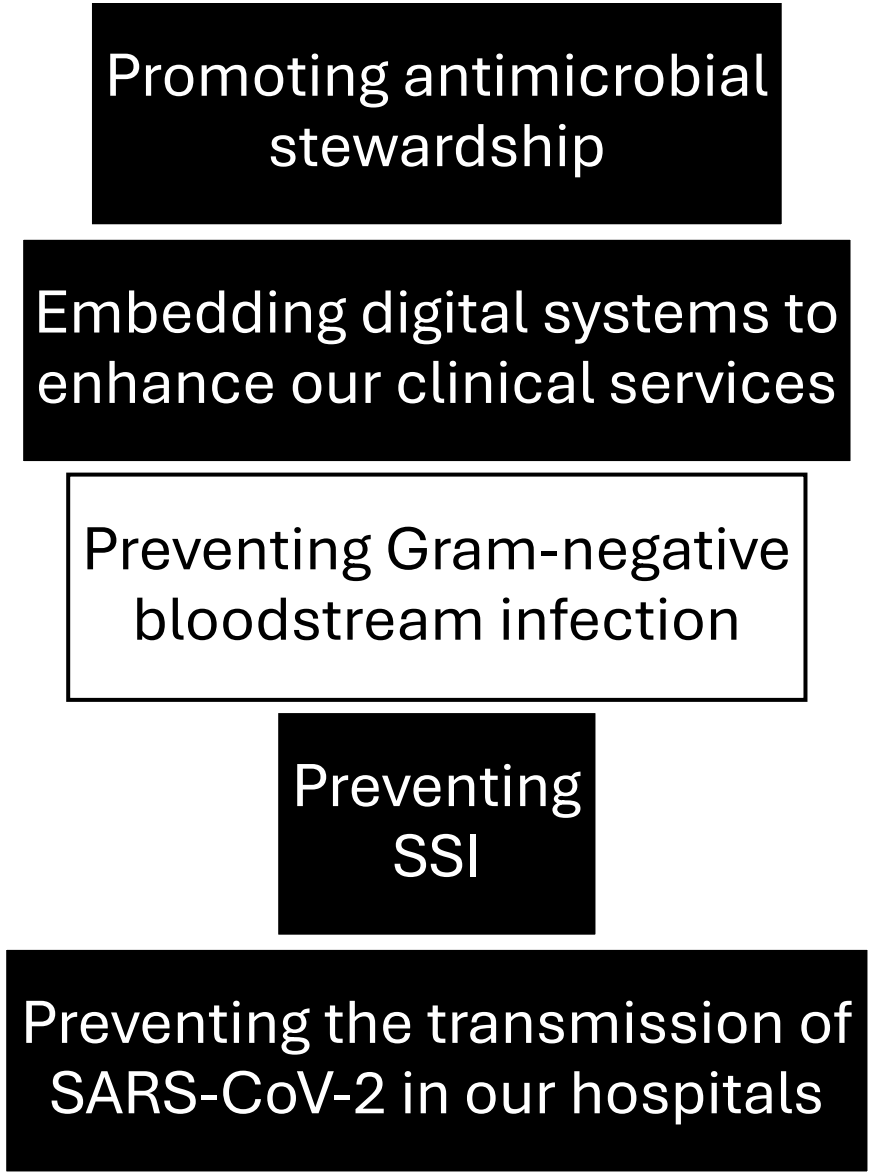
Didelot et al. Nature Medicine 2019.

Modelling

Fast and expensive (PCR) or cheap and slow (culture)? A mathematical modelling study to explore screening for carbapenem resistance in UK hospitals



Knight BMC Medicine 2018.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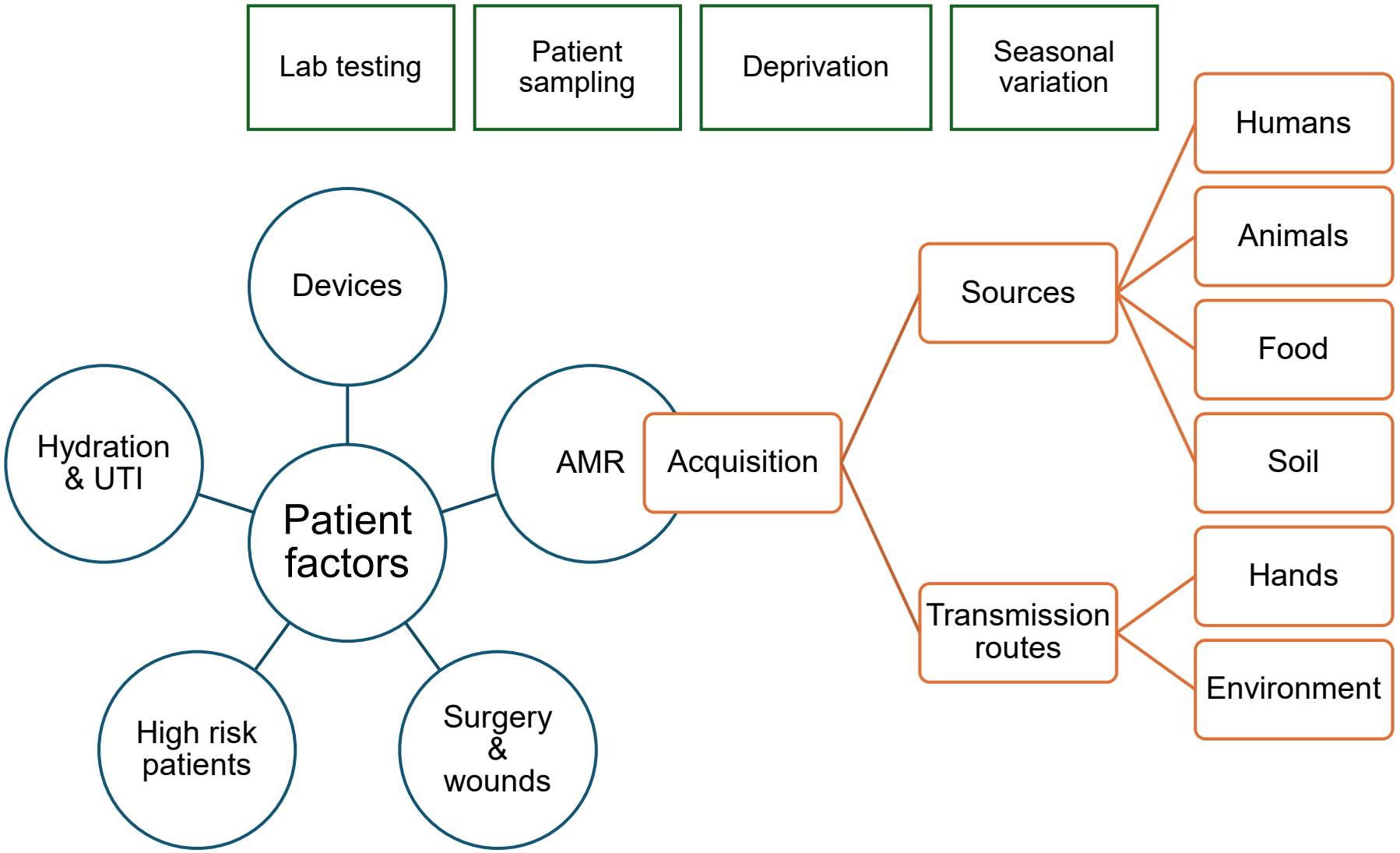
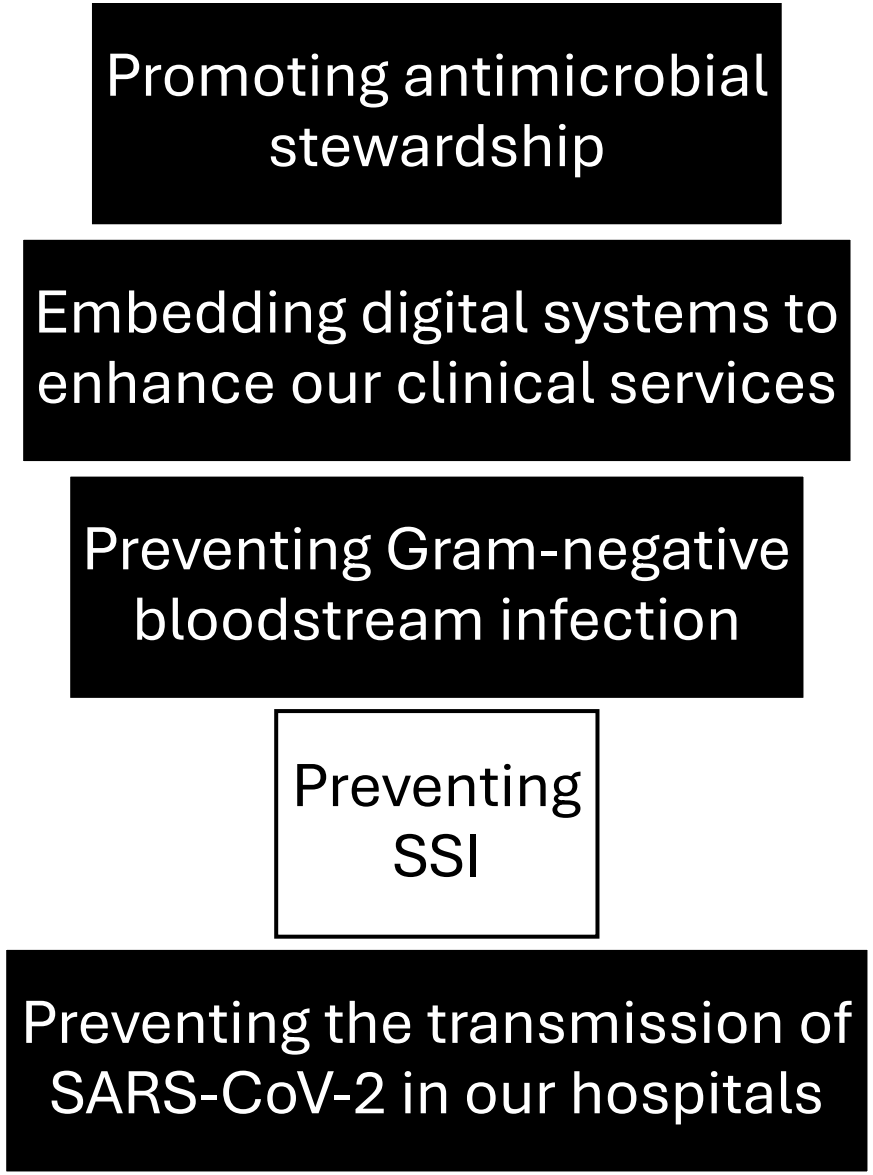
Drivers of Gram-negative BSI

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Patient experience

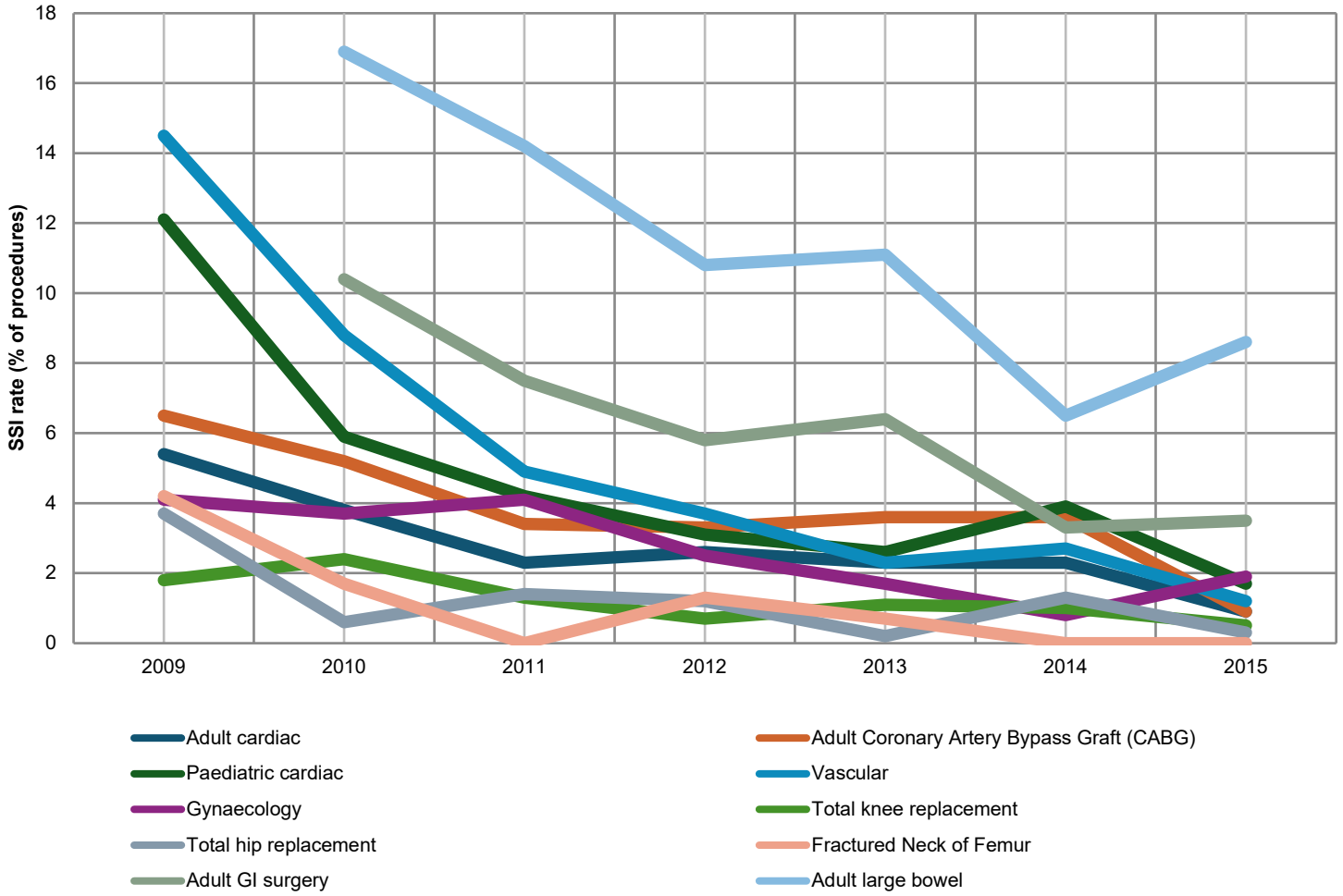
17 patients who had suffered an SSI were enrolled into a semi-structured interview

‘I was crying, I was just not well at all. I couldn’t keep a drink down. The GP came and said what do you expect, you’ve had major surgery. I started to think I was going mad, perhaps you are supposed to feel like this. My husband was at his wits end, he didn’t know what to do. He called the NHS helpline and they said to buy some anti-sickness tablets from the chemist but they didn’t work. He rang the hospital and they weren’t very helpful, he rang the ward and they said she has been discharged so there is nothing we can do. Then after three or four days I was getting terrific pains in my stomach and I felt like I had wet myself, there was a lot of blood just gushing out of me.’

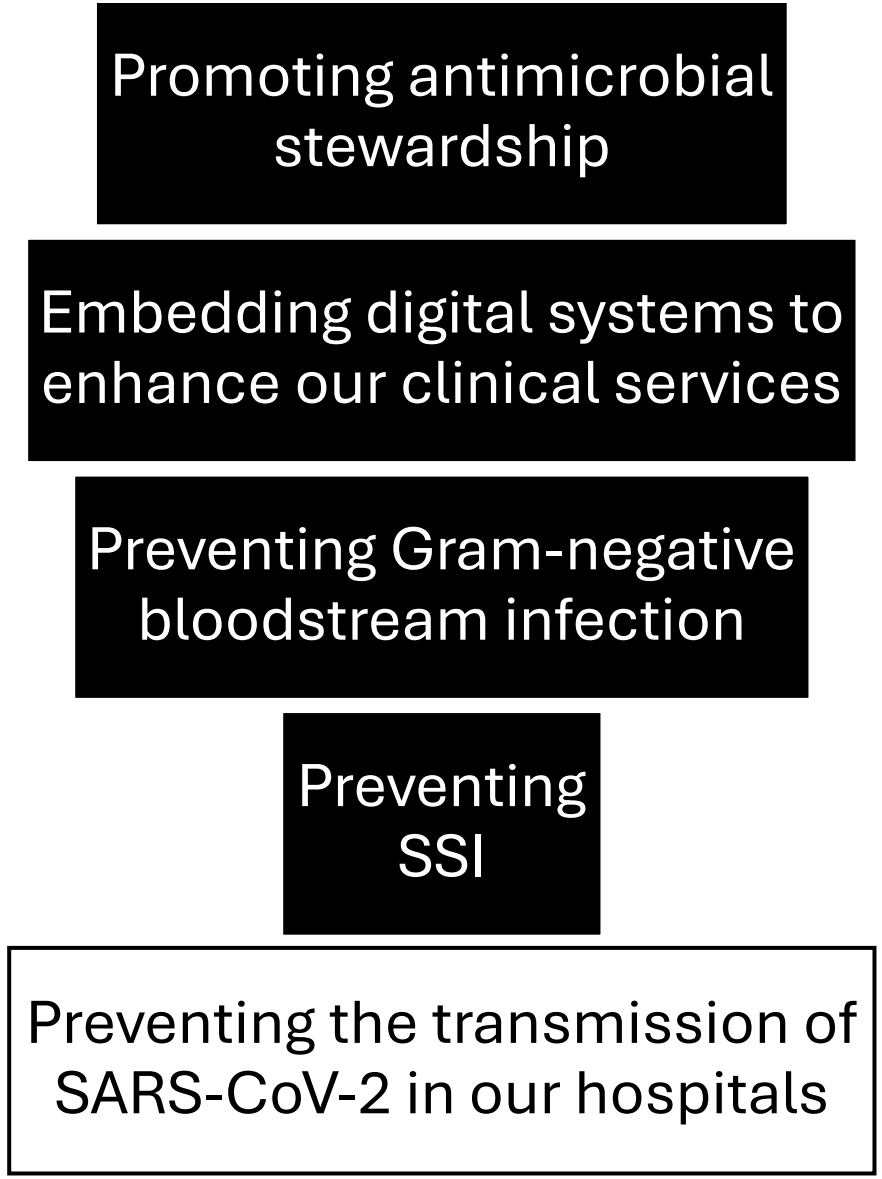
Tanner et al. J Infect Prevent 2012

SSI prevention: a success story

SSI surveillance at GSTT began to be enhanced in January 2009. The Trust now performs SSI surveillance in 12 surgical specialties. Assuming that the latest and lowest rate of SSI was achievable from the start of the programme, the reductions achieved suggest that 774 SSIs have been prevented. Assuming each SSI costs £5,239, this has resulted in savings of £4,056,443 over 6 years.



Unpublished data, with permission from GSTT.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PPE	Transmission routes	Testing and laboratory factors	Vaccination
Organizational transformation	Guidelines and policy development	Regulatory framework	Outbreaks
Non-COVID pathogens	Antimicrobial stewardship	Digital transformation	Applied research

Promoting antimicrobial stewardship

Embedding digital systems to enhance our clinical services

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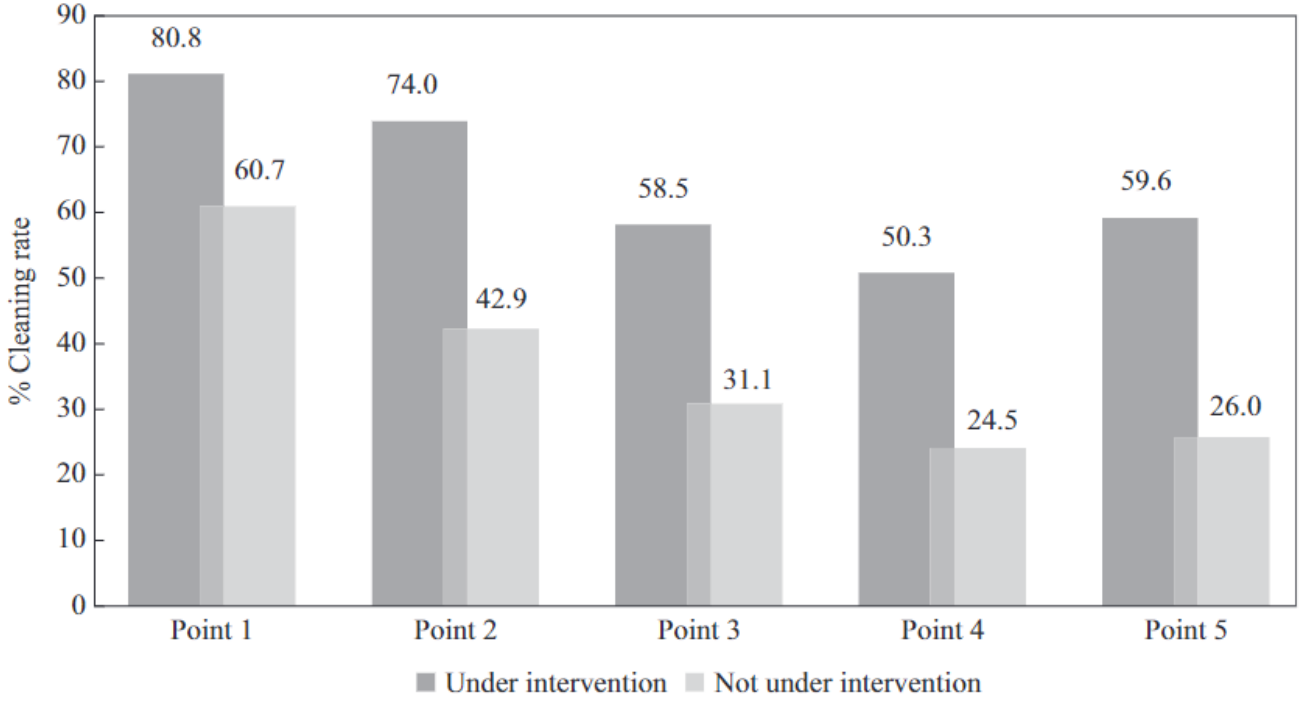
Priorities

What’s hot in IPC

More effective surface disinfection improves patient outcomes

- Prospective intervention cluster cross-over study in Israel.
- Performed over 15 months, including 7,725 patients.
- Intervention was a switch from “bucket-based” chlorine disinfection to routine use of QAC-based wipes.

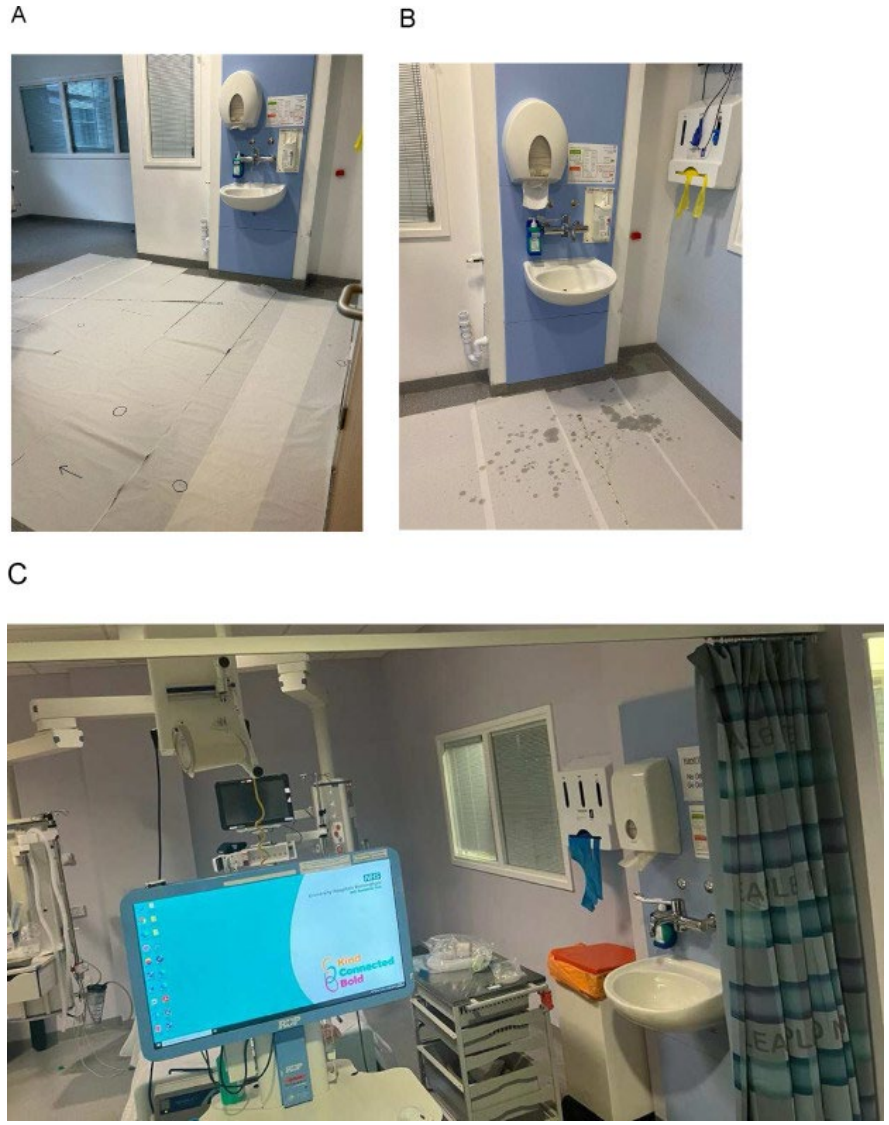


Outcome	Effect (95% CI)	*P*-value
CLABSI/CAUTI[a]		
IRR	1.6 (0.7, 3.5)	0.3
IRD	12.2/100,000 person-days (−9.7, 34.2)	0.3
CLABSI[a]		
IRR	2.0 (0.5, 8.0)	0.3
IRD	5.2/10,000 person-days (−5.4, 15.7)	0.3
CAUTI[b]		
IRR	1.4 (0.8, 2.4)	0.2
IRD	6.7/10,000 person-days (−4.2, 17.7)	0.2
MDRO contamination[c]		
OR	0.7 (0.5, 1.0)	0.06
Predicted probability difference	−7.0% (−13.6%, −0.5%)	0.04
MDRO acquisition[d]		
HR	0.4 (0.2, 1.0)	0.04
Risk difference	−7.6% (−7.7%, −7.4%)	NA
In-hospital mortality[e]		
IRR	0.8 (0.7−1.0)	0.03
IRD	−19.8/10,000 person-days (−37.9, −1.6)	NA

Dadon et al. J Hosp Infect 2023.

“Gonna take you right in to the sink splash zone” (duh duh duh)

Category	Examples	Prevalence
A	Vascular access equipment	65%
Bi	Ventilator equipment	18%
Bii	Respiratory equipment	27%
C	Haemofiltration / dialysis	12%
D	Personal care items	68%
E	Nutrition / enteral care	33%
F	Alcohol gel / PPE	57%
G	Housekeeping / cleaning	5%
H	Patient skin contact items	43%
I	Medicines / infusion pumps	32%
J	Negatinve pressure wound care	5%
K	Patients with IV devices	12%
L	Patinets with urinary catheters	18%
M	Invasive monitoring equipment	5%
N	Patinet admission packs	5%

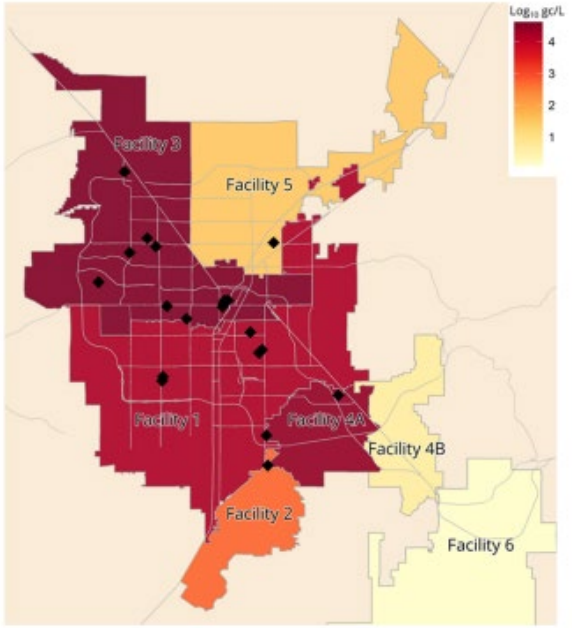


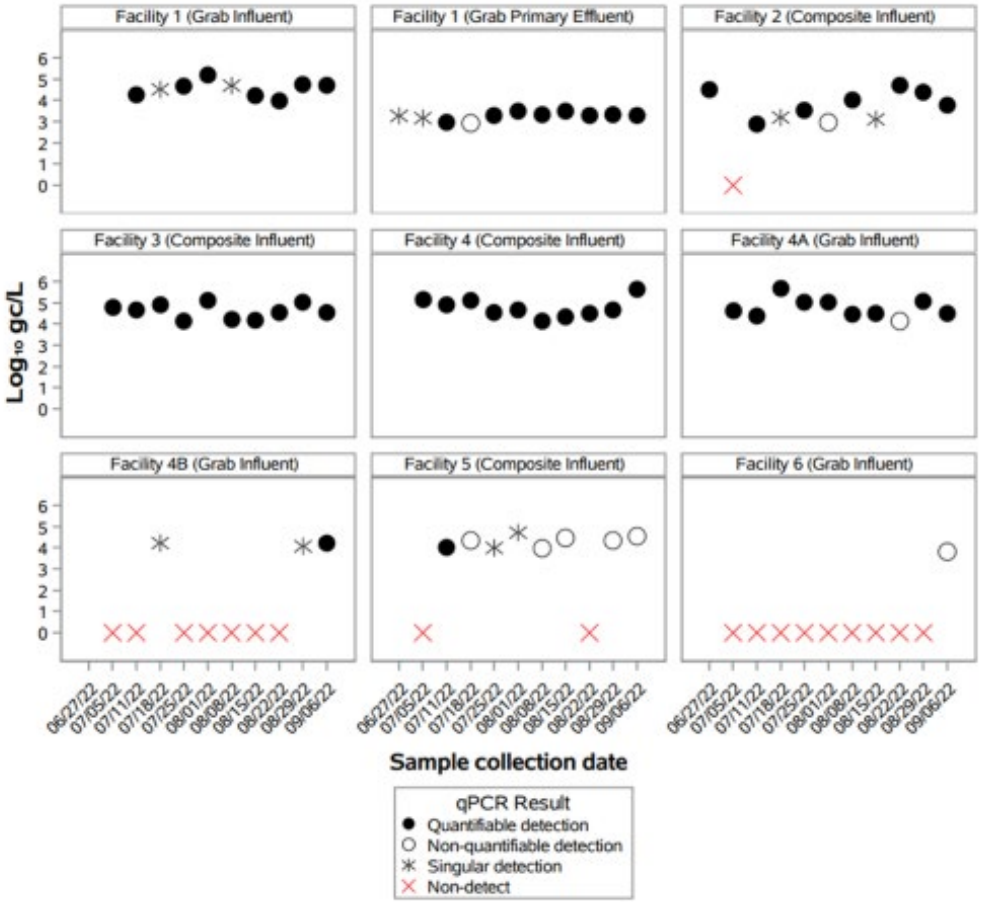
The sink splash zone. Panel A: after running the tap. Panel B: after hand hygiene. Panel C: equipment in the sink splash zone.

Candida auris: coming to a hospital near you…(& wastewater surveillance is pretty cool)

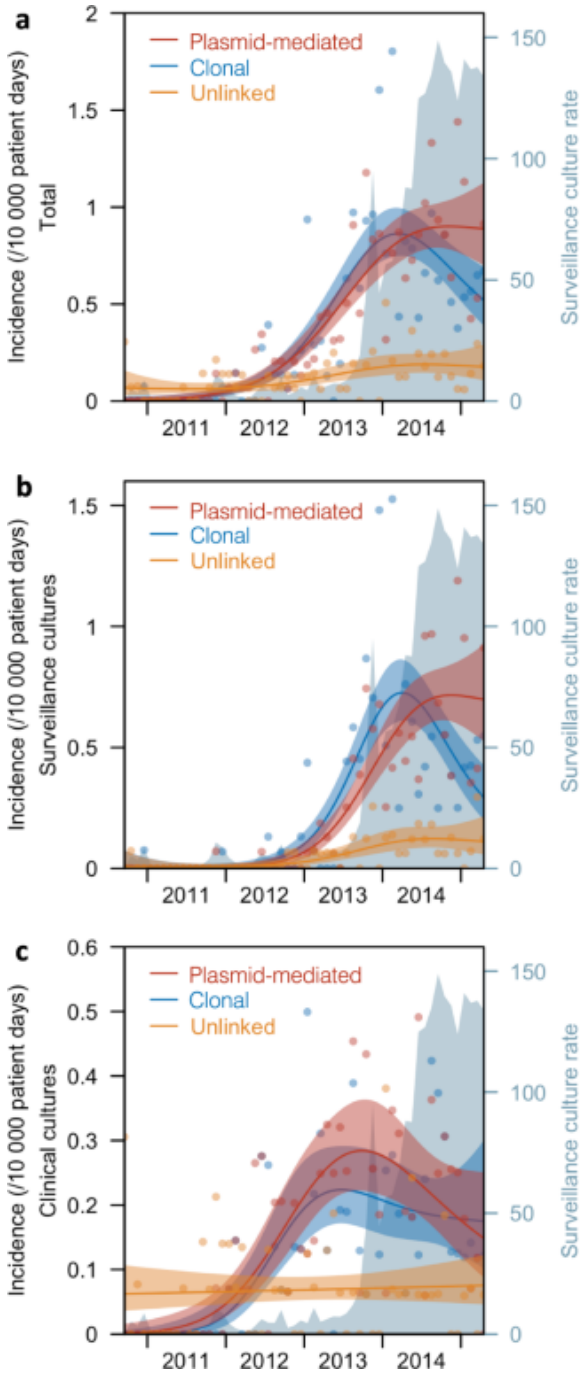
Positive detection 72 of 91 samples (79%); higher detection frequencies in sewersheds serving healthcare facilities involved in the outbreak (94 vs 20% sample positivity)

	number of state-licensed healthcare facilities, Las Vegas metropolitan area[a]		
facility/sewershed	hospitals[b]	skilled nursing facilities	number of hospitals or skilled nursing facilities with reported *auris* clinical or colonization cas
1	17	12	7
2	4	2	2
3	13	17	11
4A	2	3	1
4B	0	1	0
5	2	2	1
6	1[c]	2	0
total	39	39	22





Barber et al. Env Sci Tech 2023.



Horizontal plasmid transfer is a key driver of CPE transmission

Genomic analysis of 1312 CPEs submitted to government ref lab in Singapore between 2010 and 2015.

Significant risk factors for clonal spread of CPE:

- direct or indirect ward-level contact;
- direct or indirect hospital-level contact;
- bacterial species (*Klebsiella* and *Enterobacter* a higher risk of spread than *E. coli;*
- carbapenemase type (NDM and OXA-type a higher risk of spread than KPC)

Significant risk factors for plasmid-mediated spread of CPE:

- **none**

Marimuthu et al. Nat Comm 2022.

Water-free care demands our attention

Retrospective cohort study including 552 German ICUs, comparing HCAI prevalence in patients cared for in rooms with or without sinks.

Parameter	Category	aIRR	95% CI	*P*-value (type III)
Presence of sink in patient room	Sink group	1.21	(1.01–1.45)	0.039
	No-sink group	1=reference		
Type of ICU	Interdisciplinary in hospital <400 beds	1.001	(0.83–1.21)	0.004
	Interdisciplinary in hospital ≥400 beds	1.278	(1.04–1.57)	
	General surgical	1.255	(1.00–1.59)	
	Special surgical (neurosurgical, cardiovascular)	1.335	(1.00–1.78)	
	Paediatric	2.133	(1.14–4.01)	
	Weaning	0.952	(0.60–1.53)	
	Others	2.11	(1.44–3.10)	
	Medical/neurological	1=reference		
Length of stay (days)	Risk increase per day	1.01	(1.00–1.02)	0.016
Invasive ventilation use	Risk increase per 1%	1.009	(1.00–1.01)	0.001
Urinary tract catheter use	Risk increase per 1%	1.014	(1.01–1.02)	<0.001

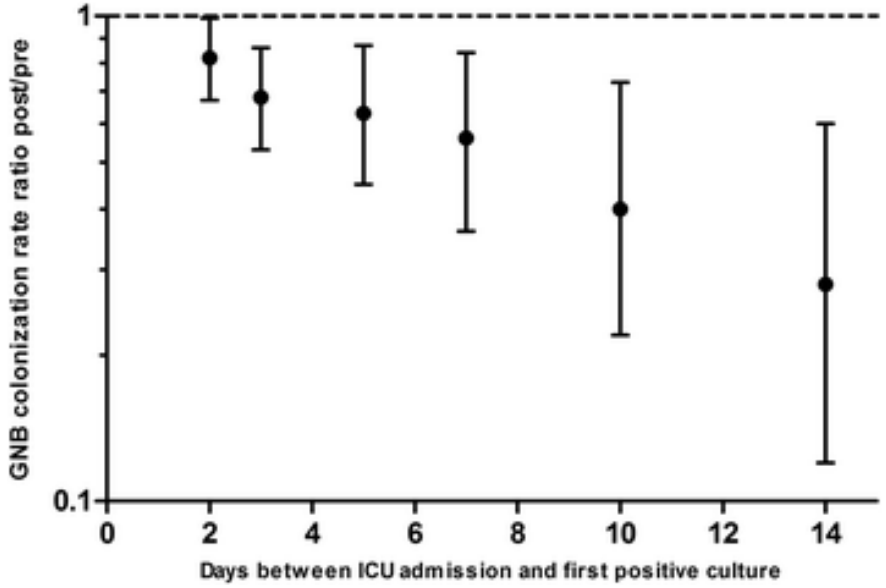
CI, confidence interval.

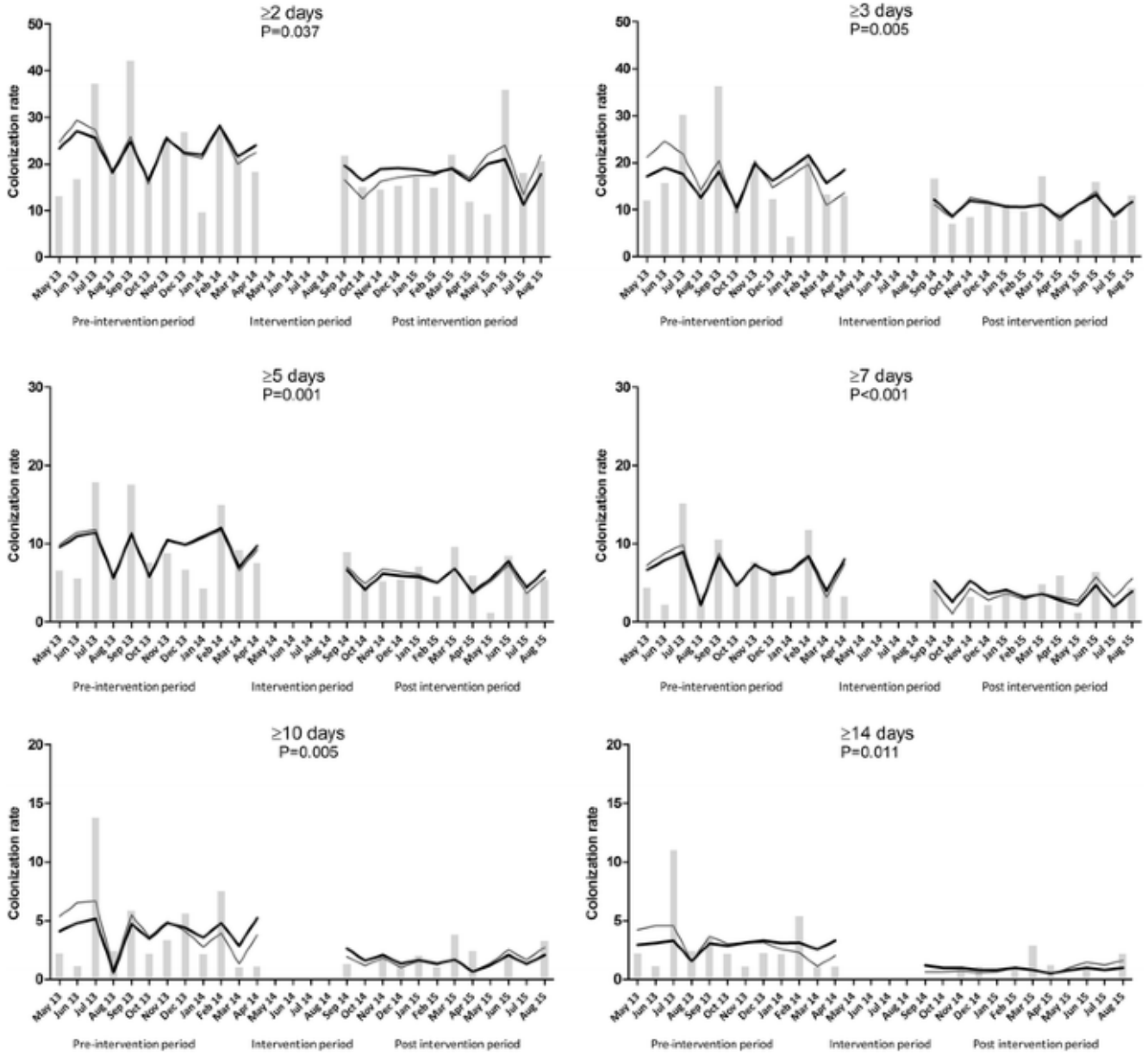
Multivariable analyses identified sinks as a risk factor for BSIs and UTIs

Fucini et al. J Hosp Infect 2023.

Water free critical care

Overall rate of Gram-negative rod colonisation rate: were 26.3 GNB/1000 ICU admission days pre-intervention and 21.6 during the intervention (rate ratio 0.82; 95%CI 0.67–0.99; P = 0.02).





Hopman et al. Antimicrobial Resistance & Infection Control 2017;6:59

What's next for IPC? Winter 2024 and beyond: setting priorities and scanning the horizon

Jon Otter PhD FRCPath
Director of Infection Prevention and Control & Consultant Clinical Scientist
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Blog: www.reflectionsIPC.com
Slides: www.jonotter.net

STAY A STEP AHEAD

of winter infections

gama healthcare | ACIPC Australasian College for Infection Prevention and Control

Scan the QR code to register for the IPC webinar **"Winter Preparedness & the Hidden Threats".**

23rd April 2024 at 7pm AEST

A/Prof Stéphane Bouchoucha

IPC and patient safety: Balancing safe care with compassionate care?

Infection Prevention and Control and Patient Safety: Balancing Safe Care with Compassionate Care

A/Prof Stéphane Bouchoucha

Associate Head of School (International)

President – Australasian College for Infection Prevention and Control (ACIPC)

Deakin University, Melbourne

Manipal College of Nursing – Manipal Academy of Higher Education (MAHE)

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QPS CENTRE FOR QUALITY AND PATIENT SAFETY RESEARCH

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Presentation outline

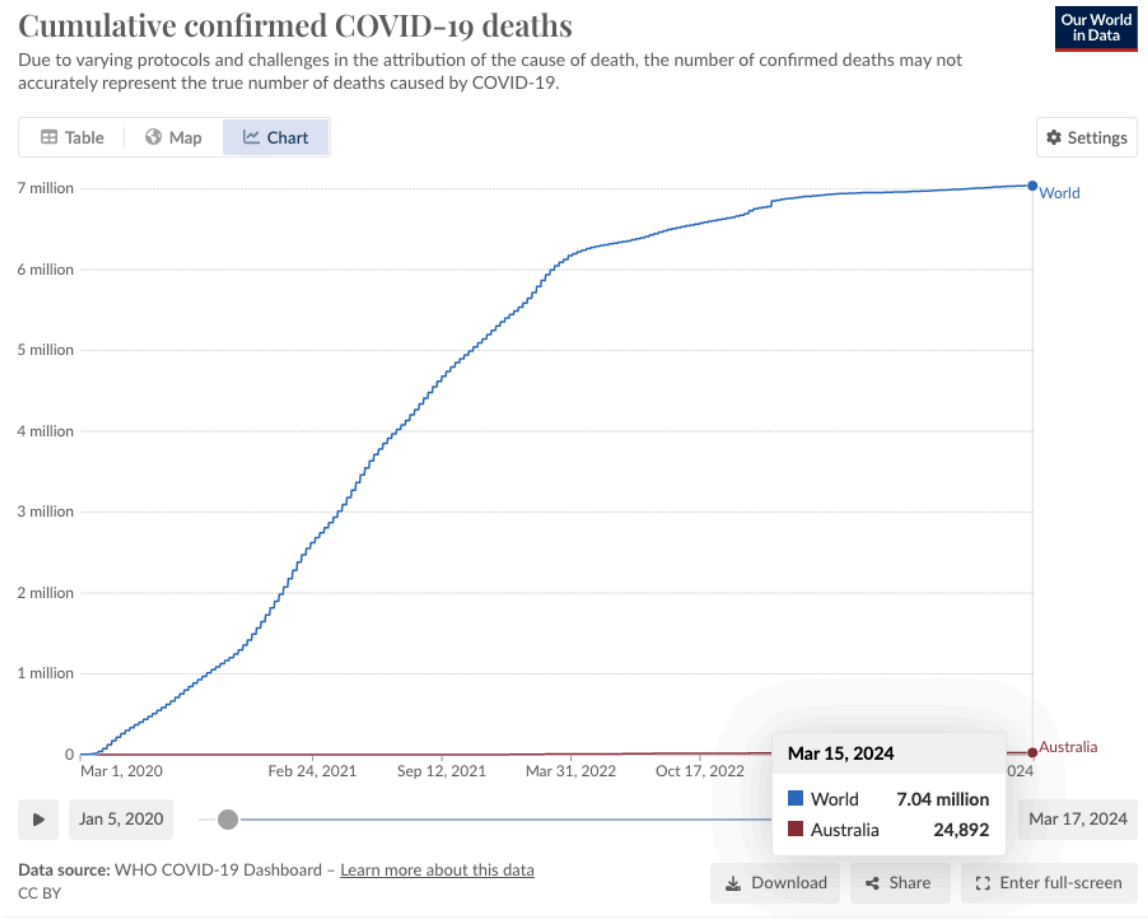
- Infection Prevention and Control (IPC) as key feature in our lives
- Preparation and Paradigm shift in IPC
- Implication of IPC measures and recommendations during the COVID-19 Pandemic
- Lessons learned: how can we increase compassion while keeping people protected?

Context

- What pathogens are we talking about here?
- ”I think isolation is a prudent approach, given that residents in aged care facilities often cannot be relied on to remember not to touch things or each other. So having the infectious patient not roam around the building sounds like a very good idea to me!”

Infection Prevention and Control during COVID

- COVID first reported in December 2019 – To date > 900 million confirmed cases and nearly 9 million million deaths
- High transmissibility
- Changes in healthcare sectors are still around:
- N95 masks and associated PPE became routine wear
- N95 for longer periods of time/full shifts
- In Victoria, some health services still mandate N95
- In Australia, for a long time, less visitors in health settings



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Less liberties for better Infection Prevention and Public Health?

- Virulence and spread of the pandemic has resulted in awareness raising of Infection Prevention and Control in the general population
- Community management strategies implemented that often restricted individual liberties
- Fast evolving recommendations during the pandemic
- Over emphasis on hand hygiene at the detriment of air quality and mask wearing
- **IPC challenged and were we too slow to react or too busy keeping people safe?**

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Recommendations also evolved over time

- COVID-19 has exposed the inadequacies of some recommendations/PPE for healthcare workers and especially nurses
- Nurses have been disproportionately affected, with infections and deaths – probably underreported
- Some IPC guidelines made/make family centred care difficult and have a negative impact on nurses, patients and families
- Were we sufficiently prepared?
- How can we have good **compassionate** IPC measures?

A key prevention measure in Australia: Mandatory Quarantine

- From 2020 to 2022, the New Zealand (NZ) government and the Australian (AU) federal, state, and territory governments used quarantine as a strategic public health transmission control measure while vaccines were being developed and rolled out
- Quarantine programs were rapidly operationalised without a **clear blueprint for managing infection prevention** for thousands of arriving travellers
- Combinations of state government departments and service agencies managed aspects of the quarantine program, including various state health and corrections departments, police services, hospitals and health organisations

ELSEVIER

Journal of Infection and Public Health

Available online 17 October 2023

In Press, Journal Pre-proof What's this?

Original Article

Forecasting pandemic quarantine in New Zealand and Australia: A scoping review of quarantine characteristics and capabilities within preparedness plans and pandemic exercise reports from 2002-2019

Matiu Bush [a], Stéphane L Bouchoucha [b], Ana Hutchinson [b c], Catherine M Bennett [d]

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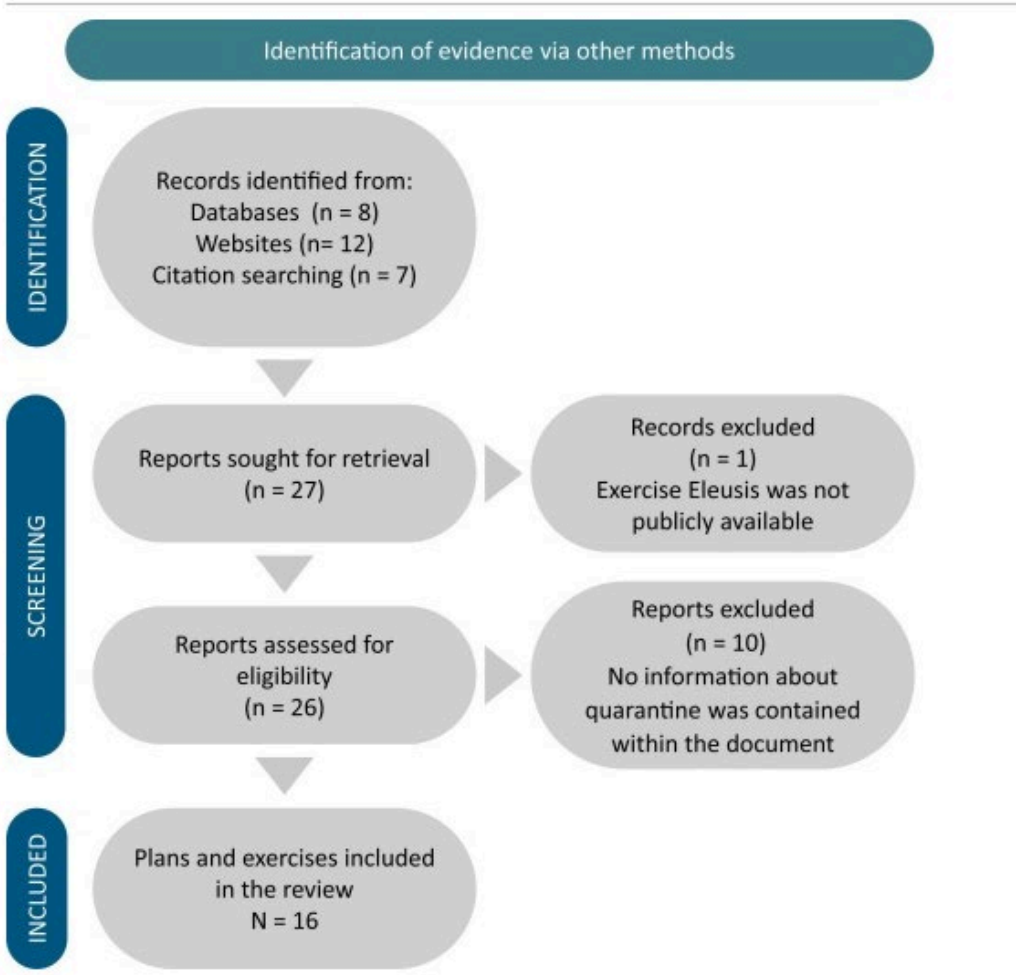
Forecasting Australian and NZ Quarantine



- Aimed to identify preparedness gaps in quarantine capability in the NZ and AU plans and exercises by analysing publicly available pandemic documents that included at least one mention of quarantine

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Forecasting Australian and NZ Quarantine

		New Zealand					Australia (Federal)		
		Exercise Makgill 2006 [23]	Exercise Cruickshank 2007 [24]	Exercise Spring Fever 2008 [25]	**NZ Influenza Pandemic Plan 2017 [22]**	Exercise Pomare 2018 [26]	Exercise Cumpston 2007 [27]	Exercise Sustain 2008 [28]	**AU Influenza Pandemic Plan 2019 [19]**
Quarantine characteristics	Mentions quarantine	●	●	●	●	●	●	●	●
	Voluntary quarantine	●	●	●	●	●	●	●	●
	Involuntary quarantine	●	●	●	●	●	●	●	●
	Home quarantine	●	●	●	●	●	●	●	●
	Hotel quarantine	●	●	●	●	●	●	●	●
	Facility quarantine	●	●	●	●	●	●	●	●
Quarantine capabilities	Workforce	●	●	●	●	●	●	●	●
	Resources	●	●	●	●	●	●	●	●
	Governance	●	●	●	●	●	●	●	●
	Systems	●	●	●	●	●	●	●	●
	Processes	●	●	●	●	●	●	●	●

Information on specific quarantine characteristics and capabilities

● Present

● Absent

Note. NZ Exercise Virex (2002) did not meet the inclusion criteria as it did not mention quarantine.

Analysis of quarantine information in Australian State and Territory plans.

		Australian States and Territories							
		New South Wales Plan 2016 [29]	Northern Territory Plan 2021 [30]	Queensland Plan 2018 [31]	Victorian Plan 2014 [32]	Australian Capital Territory Plan 2007 [33]	Tasmanian Plan 2014 [34]	Western Australian Plan 2014 [35]	South Australian Plan 2018 [36]
Quarantine characteristics	Mentions quarantine	●	●	●	●	●	●	●	●
	Voluntary quarantine	●	●	●	●	●	●	●	●
	Involuntary quarantine	●	●	●	●	●	●	●	●
	Home quarantine	●	●	●	●	●	●	●	●
	Hotel quarantine	●	●	●	●	●	●	●	●
	Facility quarantine	●	●	●	●	●	●	●	●
Quarantine capabilities	Workforce	●	●	●	●	●	●	●	●
	Resources	●	●	●	●	●	●	●	●
	Governance	●	●	●	●	●	●	●	●
	Systems	●	●	●	●	●	●	●	●
	Processes	●	●	●	●	●	●	●	●

Information on specific quarantine characteristics and capabilities

● Present

● Absent

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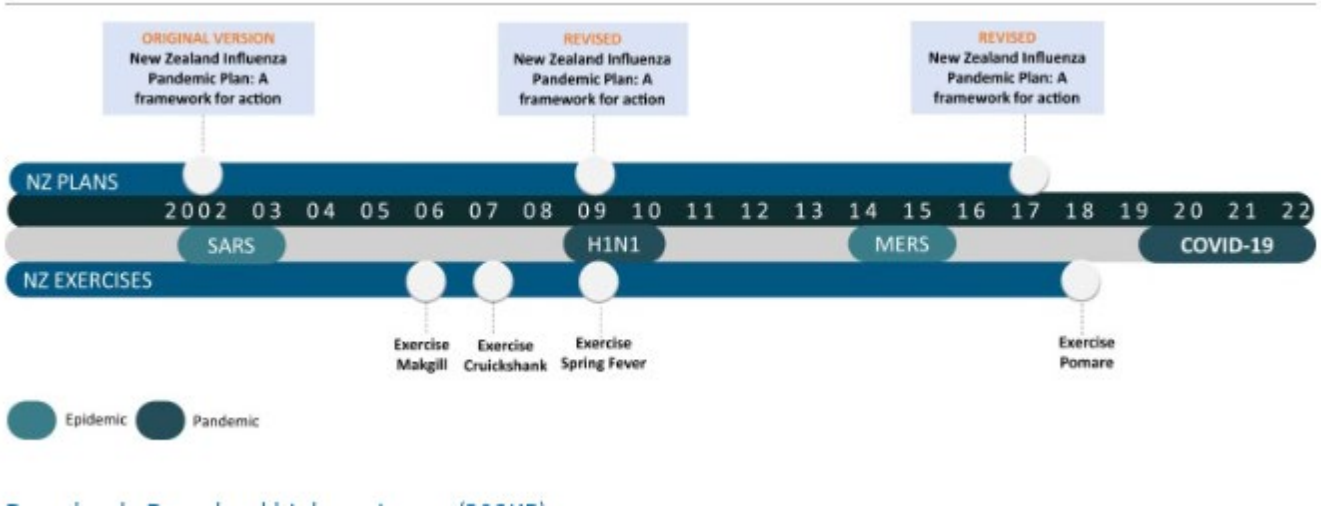
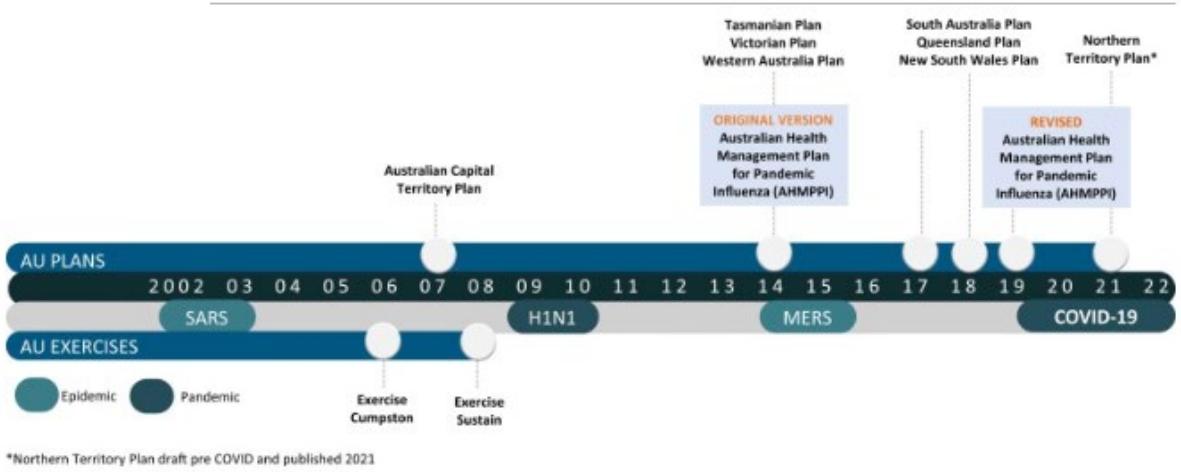
Forecasting Australian and NZ Quarantine





*Northern Territory Plan draft pre COVID and published 2021

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Forecasting Australian and NZ Quarantine

- The AU Influenza pandemic plan (2019) had no dedicated quarantine section.
- In the border measures section, ill travellers advised to undergo voluntary home quarantine
- No detailed consideration was given to the possibility of involuntary quarantine for incoming travellers in locations other than private residences
- Lessons learned from exercises were never incorporated into subsequent plans
- Is preparedness key or can we afford to set up another quarantine system for an unknown pathogen within 36 hours?
- Underlying assumptions proved wrong – Influenza as pandemic agent

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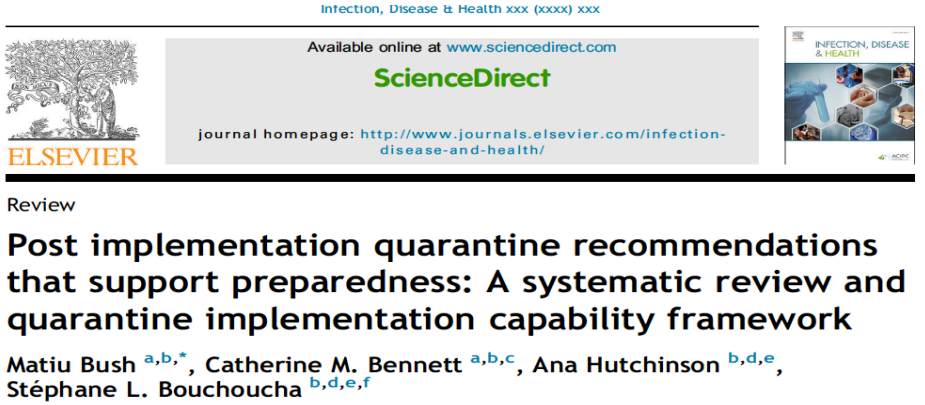
Supporting preparedness

- Reviewed quarantine post implementation recommendations from a whole-of-system perspective
- 449 published articles screened
- 51 articles included
- 156 recommendations extracted.
- Grouped into 15 quarantine capability


Infection, Disease & Health xxx (xxxx) xxx

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ScienceDirect

journal homepage: http://www.journals.elsevier.com/infection-disease-and-health/

Review

Post implementation quarantine recommendations that support preparedness: A systematic review and quarantine implementation capability framework

Matiu Bush [a,b,*], Catherine M. Bennett [a,b,c], Ana Hutchinson [b,d,e], Stéphane L. Bouchoucha [b,d,e,f]

- Further consolidated into:
  - Strategic
  - Structural
  - Operational domains to support the whole-of-system perspective.

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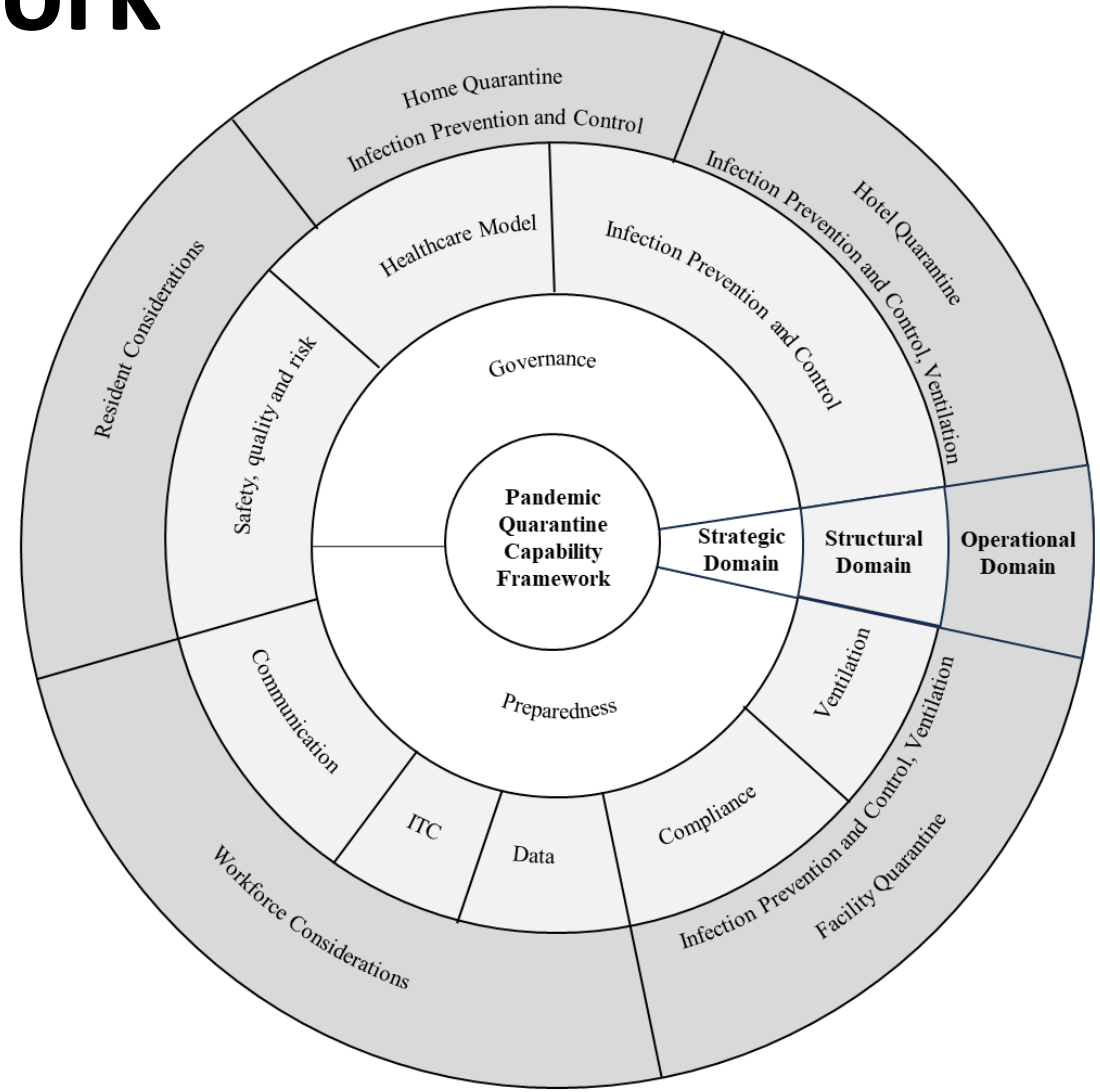
Quarantine implementation capability framework



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Restrictions and care delivery

Nursing & Health Sciences

EDITORIAL | Free Access

Family-centered care during a pandemic: The hidden impact of restricting family visits

Stéphane L. Bouchoucha PhD, MSc, BSc (Hons), Grad Cert (IPC), RN ... See all authors

First published: 13 June 2020 | https://doi.org/10.1111/nhs.12748

- Family-centered approach to care is an important feature of nursing care, grounded in recognition of the family as a social unit connected not just by blood
- COVID-19 IPC measures mean family presence is not possible, opting for other strategies that address family members' need to be close to the dying person should be considered
- Evidence of the adverse impact of working on the COVID-19 frontline are starting to emerge, particularly in relation to the emotional toll of attempting to facilitate family connections to say goodbyes →**in 2023 increased burnout in nurses**
- From what we know about factors that may increase risks of compassion fatigue and burnout, having to limit visits for family members of critical ill and dying patients is likely to also have a negative impact on nurses by **increasing their feelings of providing inadequate family-centered care**.
- We need to use Infection Prevention and Control to facilitate Family visits and take into account all of then patient's thus ensuring **a balance between IPC imperatives and family-centered care**

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Restricting visits

Australian Critical Care 34 (2021) 132–134

Contents lists available at ScienceDirect

Australian Critical Care

journal homepage: www.elsevier.com/locate/aucc

Discussion paper

Australian College of Critical Care Nurses and Australasian College for Infection Prevention and Control position statement on facilitating next-of-kin presence for patients dying from coronavirus disease 2019 (COVID-19) in the intensive care unit

Melissa J. Bloomer, PhD, MN(Hons), MPET, MNP, Crit. Care Cert., BN, RN PhD [a, b, c, d, *]
Stéphane Bouchoucha, PhD, MSc (PH), Grad. Cert. IPC, BSc (Hons), RN PhD [a, b, c, e]

[a] School of Nursing and Midwifery, Deakin University, 1 Gheringhap Street, Geelong, Victoria, 3220, Australia
[b] Centre for Quality and Patient Safety Research, Deakin University, 1 Gheringhap Street, Geelong, Victoria, 3220, Australia
[c] Institute for Health Transformation, Deakin University, 1 Gheringhap Street, Geelong, Victoria, 3220, Australia
[d] Research Advisory Panel, Australian College of Critical Care Nurses, Surrey Hills, Victoria, 3127, Australia
[e] Australasian College for Infection Prevention and Control, 228 Liverpool Street, Hobart, Tasmania, 7000, Australia

- Hospital visits were restricted in many countries
- Impact of these restrictions has still not been determined – on patients/relatives and health workers
- Premise on this Position Statement: How can we facilitate safe visits?

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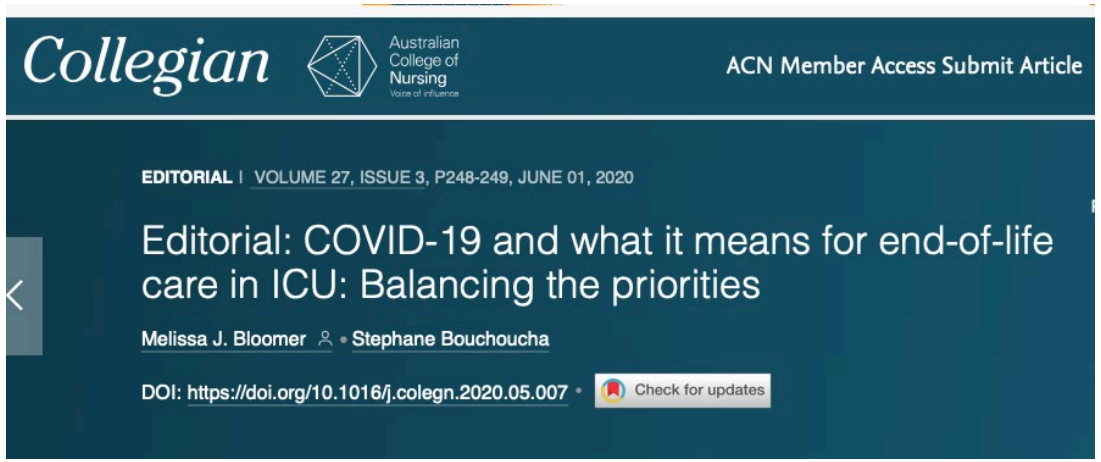

- Need to make sure we include patients on limitations imposed by IPC restrictions in the COVID-19 context
- There is also a need to explore the impact of these restrictions
  - Yes, they might have decreased the risks to health workers and the hospital environment
  - Are they an overreach and we could assist visitors and remain safe?
  - When mapping COVID-19 transmissions to healthcare workers: most were outside the care setting

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Family centred care during COVID

Received: 12 November 2022 | Revised: 25 December 2022 | Accepted: 31 December 2022
DOI: 10.1111/jocn.16627
EMPIRICAL RESEARCH QUALITATIVE
Journal of Clinical Nursing WILEY

Perspectives of family-centred care at the end of life during the COVID-19 pandemic: A qualitative descriptive study

Melissa J. Bloomer PhD, MN(Hons), BN, RN, Professor in Critical Care Nursing[1,2,3,4] | Eva Yuen PhD, MSc, Dean's Health Research Fellow[4,5,6] | Ruth Williams PhD, BA, Research Fellow[4,5,6] | Stephane Bouchoucha PhD, RN, Associate Professor of Nursing[4,5] | Peter Poon MBBS, Palliative Care Physician[7,8] | Fiona Runacres MBBS, Palliative Care Physician[7,8,9] | Christine Mooney GD (Cancer), BHSc (Nursing), Palliative Care Nurse Consultant[7] | Alison M. Hutchinson PhD, RN, Professor of Nursing[4,5,10]

- Qualitative descriptive approach based on naturalistic inquiry
- 15 registered nurses who cared for patients who died during restricted visitation associated with the COVID-19 pandemic
- 21 bereaved family members
- Convenience sampling, bereaved family were contacted via next of kin listed in medical records

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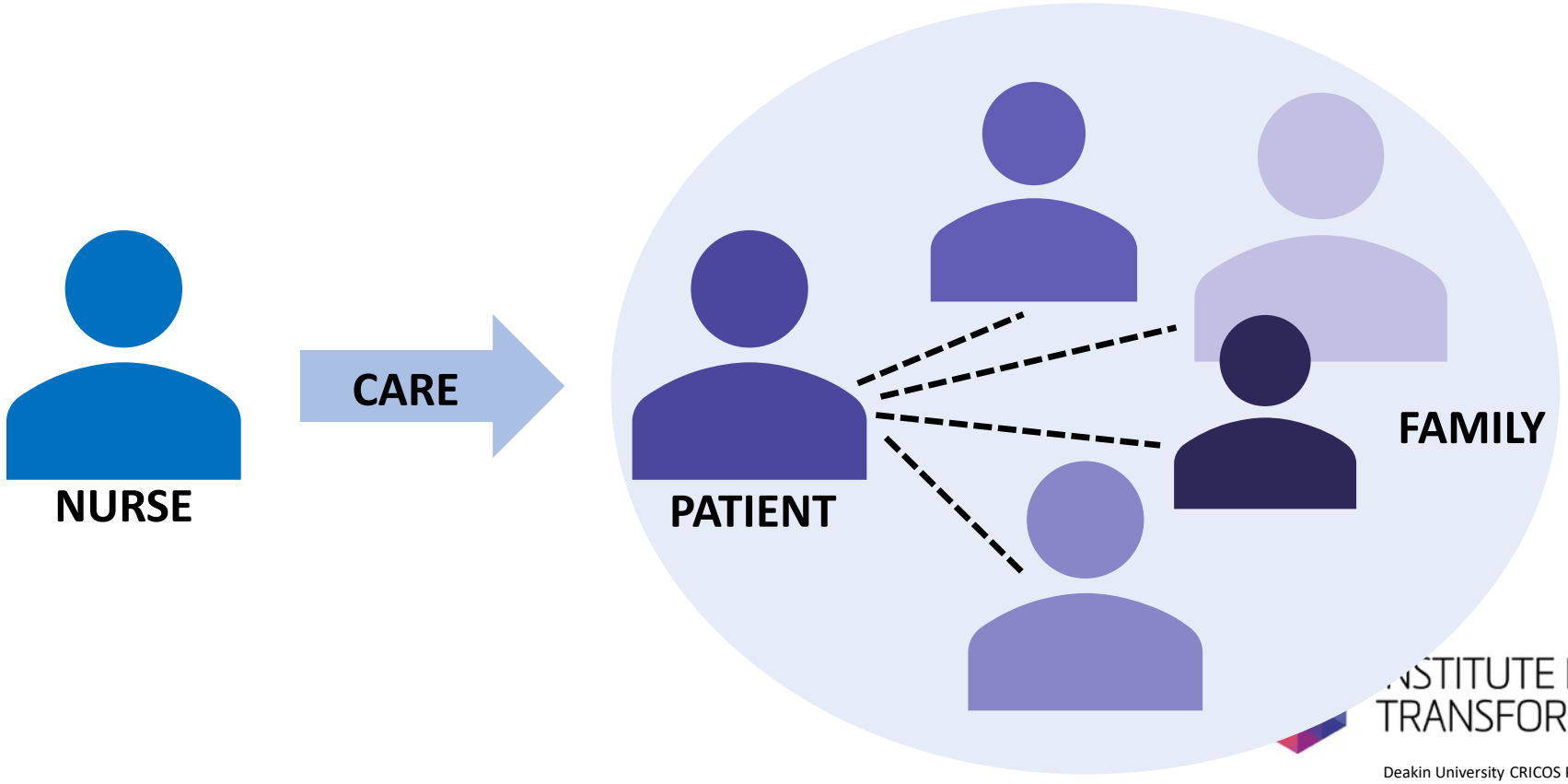
Background

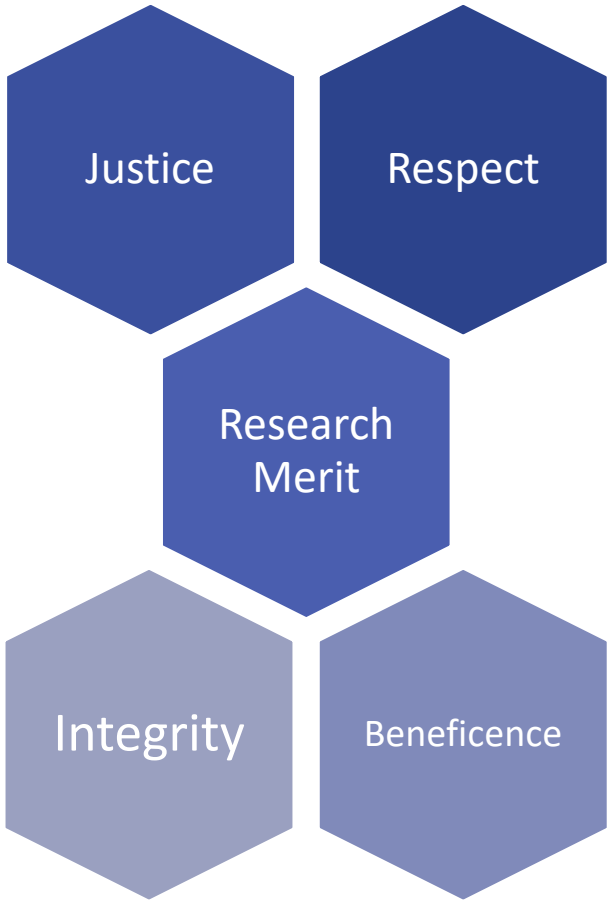
- Visitor restrictions created significant additional challenges for nurses in the provision of family-centred care



Family centred care during COVID

- Nurses: Can you tell me about your experience of providing care to the family of a patient who was critically ill or died during the COVID-19 restrictions?’
- Relative: Can you tell me about your experience when your family member was hospitalised during the COVID-19 pandemic?’

Ethical Considerations



- Timing of the approach to bereaved family (6 months +)
- Hospital's *patient experience team* initiated contact
- Interviewers had expertise in sensitive interviewing with vulnerable people
- Strategies in place to support participants in distress
- Participants were offered a lay summary of the findings
- $40 gift card provided as a gesture of thanks

1. Impact of visitor restrictions on nurses

- Visitor restrictions acknowledged as necessary BUT a source of significant distress

  '…at the start of COVID last year we had three different visitor guidelines in an eight-hour shift' (Nurse 7)

- Variability in how restrictions were interpreted created ambiguity

- Enforcing the rules negatively impacted nurses' interactions with families

  'We became the enemy…even when we knew the families … when we are the ones enforcing the very strict restrictions, we become the enemy' (Nurse 5).

2. Onerous processes, requirements and rules

- Families frustrated with check in processes BUT understood why

'That's the protocols that were in place, and they made perfect sense to me…They ensured the safety of me, the nurses, doctors, other patients of course. I understood that (Family 19).

- Nurses distressed at policing the rules

'we had a lady dying. Her husband was in the room with one daughter, but she had six daughters. The extended family of 30-plus people had to stand outside…they couldn't say their goodbyes together' (Nurse 5)

- Patients died alone

'A lot of us would sacrifice our breaks and go home a little bit later… just to be able to sit with patients so they didn't die alone…we had to just step up…I think we're all a little bit still raw about having people die alone (Nurse 5)

3. Communication

- Visitor restrictions amplified communication needs

'They appreciate honesty…lots of support and reassurance, explanations about what is happening, what could happen and a lot of care' (Nurse14)

- PPE complicated communication

'…they can't see your face, all they can see is your eyes… lends itself to misinterpretation, because you don't have that extra form of communication' (Nurse 9).

- Family frustrations

'Trying to get a hold of the treating doctors was extremely difficult…I'd leave messages with the nursing staff…and they would become irritated because I was calling constantly. They were too busy' (Family 12)

4. Family-centred care

- Nurses reflected on the importance of family

'I think it just highlighted how important [family presence] is' (Nurse 12)

'… the need for involving family a bit more' (Nurse 8)

- Some family members felt cared for

'…they did as much as possible under the circumstances to include us all…They would listen to us, and they were willing to do it, which was lovely' (Family 20).

- *Others felt quite excluded, particularly from decision-making*

They decided, they didn't ask us, they made a decision… and they didn't inform us. That part I'm not happy with at all… we were just getting second-hand information. We couldn't ask questions (Family 18)

5. Interrupted connections

- Missed opportunities to share in-person conversations, to ask questions, receive information, to make a contribution

Janet – Janet and her husband were separated, but she was still his closest relative, and primary support. Their daughter who was 15, was denied visitation because of her age

He's in hospital critically ill…The patient needs connection with family… No one helped me … No one said, 'What would help?… How can we help?' …What's one of the most critical factors to wellbeing and mental health? Connection and relationship. Who's facilitating that? (Family 6)

She could see he was dying. She pleaded with them to focus on what the patient needed, not the rules

I said, 'Should I be bringing my daughter in now?' … I would have liked to be able to myself say goodbye and for my daughter to say goodbye… Nobody listened… (Family 6)

5. Interrupted connections

Diane – Mother of Lenny, a 20 years old man of Māori descent, admitted with headaches, diagnosed with a brain infection and transferred to ICU.

After 7 days in ICU, Diane was notified that her son was brain dead. This was the first time she was granted permission to see her son, but she was unsure if she would be able to physically connect with her son.

'We were met by the nurses there … we weren't questioned at all [about] COVID or if we'd had symptoms. We really wanted to hug him, to rip those masks off and give him a proper kiss and all those things, but we were like, are we doing the right thing?'

They could have put us in a private room … we could have let things spill and really let it out, had we had a bit of privacy… we sit around our sick and we sing songs of praise, a lot of prayer and things like that… we weren't able to do that. My husband – he always says, "If I had been able to give him a blessing," …he kind of feels he failed his son, not being able to do that'

Conclusions

- Participant voices speak for themselves
- Nurses and bereaved family similarly suffered distress and trauma

> *The key is not what we **remember**, but what we **learn***

- We need to
  - promote, support, and protect patient-family connections
  - address logistical challenges through consistent, comprehensive, clear communication

Health care workers’ experience of Personal Protective Equipment (PPE) use during COVID-19 pandemic response in Singapore: adverse-effects, potential exposure to infection, PPE supply and training

- Fazila Aloweni
- Stéphane Bouchoucha
- Ana Hutchinson
- Shin Yuh Ang
- Hui Xian Toh
- Nur 'Azzah BTE Suhari
- Raden Nurheryany BTE Sunari
- Siew Hoon Lim

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ORIGINAL RESEARCH: EMPIRICAL RESEARCH - QUANTITATIVE | Free Access

Health care workers' experience of personal protective equipment use and associated adverse effects during the COVID-19 pandemic response in Singapore

Fazila Aloweni, Stéphane L. Bouchoucha, Ana Hutchinson, Shin Yuh Ang, Hui Xian Toh, Nur' Azzah Bte Suhari, Raden Nurheryany Bte Sunari, Siew Hoon Lim

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Aim

To examine the prevalence of PPE-related pressure-injuries (PI) and side effects experienced by the HCWs in Singapore. Additionally, we also explored HCWs' perceptions of supply and access to PPE and their concerns regarding the potential for exposure to the COVID-19 infection

What did we want to know?

What is the prevalence of PPE-related pressure-injuries (PI) and side-effects experienced by the HCWs during the COVID-19 outbreak in Singapore?

- Usage frequencies
- PPE related pressure injuries
- Patient care interference

What are HCWs perceptions of access to PPE supply and the potential exposure to infection?

Methods

Descriptive cross-sectional survey study design was used to determine the prevalence of self reported PPE-related side-effects and perceptions on the availability of PPE, potential risk of COVID-19 exposure and infection.

No validated tool – developed through rapid review of the literature and expert review

- Demographic data
- Preexisting conditions
- Frequency of related side effects
- Type of side effects
- Impact of PPE on daily work and patient care and access to PPE

Results

592 healthcare workers completed the survey

81.9% female and under 40

45.4% reported preexisting skin issues (dry skin and eczema most commonly)

PPE usage Mean – 6.14 hours/shift

88% used N95

Table 1 Comparison of demographic, clinical characteristics and hours of PPE use between participants with and without PPE and other medical device related side-effects and hours of PPE use (n=592)

	Experience of PPE and other medical device related side-effects, n=319(53.8%)	No experience of PPE and other medical device related side-effects, n=273(46.2%)	Total (n=592)	χ^{2a}	*p* value
Gender					
Male	42 (13.1%)	59 (21.6%)	101 (17.1%)	7.29	0.03*
Female	273 (85.6%)	212 (77.7%)	485 (81.9%)		
Prefer not to say	4 (1.3%)	2 (0.7%)	6 (1.0%)		
Age					
<21	3 (0.9%)	3 (1.5%)	6 (1%)	16.06	0.07
21-30	130 (40.8%)	91 (33.3%)	222 (37.5%)		
31-40	126 (39.5%)	94 (34.4%)	220 (37.2%)		
41-50	32 (10.0%)	35 (12.8%)	67 (11.3%)		
51-60	20 (6.3%)	30 (11.0%)	50 (8.4%)		
≥61	8 (2.5%)	19 (7.0%)	27 (4.6%)		
Occupation					
Doctor	14 (4.4%)	11 (4.0%)	25 (4.2%)	5.84	0.21
Nurse	282 (88.4%)	235 (86.1%)	517 (87.3%)		
Allied health	8 (2.5%)	6 (2.2%)	14 (2.4%)		
Others	15 (4.7%)	21 (7.7%)	36 (6.1%)		
Work Location*					
Isolation ward for COVID	44 (13.8%)	19 (7.0%)	63	8.47	<0.001*
patients	71 (22.3%)	26 (9.5%)	97	17.93	<0.001*
Acute respiratory infection	76 (23.8%)	134 (49.1%)	210	21.31	<0.001*
ward	126 (39.5%)	84 (30.8%)	210	5.07	0.02*
Non-acute respiratory ward	9 (2.8%)	6 (2.2%)	15	0.34	0.56
Emergency Department	22 (6.8%)	19 (7.0%)	41	0.001	0.98
Operating theatre	45 (14.1%)	10 (3.7%)	55	0.07	0.97
Community isolation facilities					
Others					
(Including outpatient clinics)					
Skin Conditions* (Pre-existing)					
None	185 (58.0%)	138 (50.5%)	323	36.77	<0.001*
Yes	134 (42.0%)	135 (49.5%)	269		
Eczema	64 (47.8%)	28 (10.3%)	92		
Atopic Dermatitis	52 (38.8%)	11 (4.0%)	63		
Heat Rash	46 (34.3%)	6 (2.2%)	52		
Dermatosis	4 (3.0%)	3 (1.1%)	7		
Psoriasis	7 (5.2%)	1 (0.4%)	8		
Dry Skin	104 (77.6%)	52 (19.0%)	156		
Others	21 (15.7%)	7 (2.6%)	28		
(Including Acne, Hives and Keloid)					
Hours of PPE use (hours), mean (SD)	6.80 (0.39)	5.37 (4.21)	6.14 (5.85)	-2.99[b]	<0.003*

*Data expressed denotes multiple responses; [a]Chi-square test; [b]Independent two-sample t-test; *Significant value $p < 0.05$.

Results

- Odds of having PPE associated side effects higher in women working in COVID-19 high risk wards and having pre-existing skin condition

	Adjusted OR (95% CI) #	*p* value
Gender		
Male	Ref	0.003*
Female	2.10 (1.29 – 3.42)	
Age		
≤30	Ref	
31 to 50	0.76 (0.51 – 1.12)	0.16
≥51	0.40 (0.22 – 0.72)	0.002*
Occupation		
Doctor	Ref	
Nurse	0.98 (0.39 – 2.49)	0.97
Allied health	0.96 (0.20 – 4.50)	0.95
Others	0.70 (0.23 – 2.20)	0.55
Work location		
Low risk[a]	Ref	
High risk[b]	3.12 (2.17 – 4.60)	<0.001*
Skin Conditions* (Pre-existing)		
No	Ref	
Yes	0.33 (0.23 – 0.47)	<0.001*

Side effects

- Nurses working the ED were more likely to report side effects (82.4%)
- Most reported:
  - Burning/pain
  - Pressure injuries with N95
- Odds of having PPE associated side effects higher in women under 51 and having history of skin issues

Types of PPE (n=319)		Goggles	Face shield	N95 mask	Surgical/ Reusable Mask	$\chi 2$	*p* value
Side-effects n (%)	Burning/Pain	51 (16.0%)	12 (3.8%)	78 (24.5%)	8 (2.5%)	184.58	<0.001 *
	Pressure injuries	103 (32.3%)	16 (5%)	146 (45.8%)	12 (3.8%)		
	Skin tear	14 (4.4%)	2 (0.6%)	45 (14.1%)	5 (1.6%)		
	Blister	15 (4.7%)	3 (0.9%)	28 (8.8%)	2 (0.6%)		
	Eye protection inducted acne	36 (11.3%)	10 (3.1%)	---	---		
	Mask induced acne	1 (0.3%)	1 (0.3%)	129 (40.4%)	81 (25.4%)		
	Abrasion	25 (7.8%)	10 (3.1%)	51 (16%)	6 (1.9%)		
	Eczema	8 (2.5%)	5 (1.6%)	20 (6.3%)	12 (4%)		
	Allergic reaction	3 (0.9%)	2 (0.6%)	24 (7.5%)	18 (5.6%)		
	Others	24 (7.5%)	13 (4.1%)	22 (6.9%)	9 (2.8%)		
	Headache	18 (5.6%)	8 (2.5%)	4 (1.3%)	---		
	Blurred vision	6 (1.9%)	4 (1.3%)	---	---		
	Giddy	4 (1.3%)	---	1 (0.3%)	---		
	Itchy	---	1 (0.3%)	10 (3.1%)	4 (1.2%)		
	Eye pain	1 (0.3%)	---	1	---		
	Difficulty in breathing	---	---	3 (0.9%)	2 (0.6%)		
	Throat irritation	---	---	1 (0.3%)	---		
	Dry skin	---	---	2 (0.6%)	3 (0.9%)		
Location	Nose bridge	88 (27.6%)	10 (3.1%)	176 (55.2%)	30 (9.4%)	257.22	<0.001 *
	Cheeks	63 (19.7%)	8 (2.5%)	170 (53.3%)	70 (21.9%)		
	Forehead	90 (28.2%)	36 (11.3%)	19 (6%)	7 (2.2%)		
	Top of the ear	35 (11.0%)	14 (4.4%)	76 (23.8%)	16 (5.0%)		
	Behind the ear	30 (9.4%)	9 (2.8%)	42 (13.2%)	17 (5.3%)		
	Eyebrow arch (from wearing goggles)	35 (11%)	---	---	---		
	Others	8 (2.5%)	7 (2.2%)	38 (11.9%)	35 (11.0%)		

PPE interference with patient treatment

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
PPE interferes with my ability to provide patient treatment and/or general nursing care	22 (3.7%)	95 (16%)	246 (41.6%)	168 (28.4%)	61 (10.3%)
Long-sleeved gowns interfere with my ability to provide patient treatment and/or general nursing care	18 (3.0%)	66 (11.1%)	232 (39.2%)	205 (34.6%)	71 (12%)
Discomfort during nursing care	**Yes**		**No**		
Do you experience discomfort wearing full PPE in order to provide patient treatment and/or general nursing care?	163 (27.5%)		429 (72.5%)		
Discomfort that was experienced by participants (qualitative data, from the most reported):	• Glasses/goggles fogging causes poor vision • Hot/Warm, & sweaty/perspire • Interferes with care of patient (including difficulty in palpating vein, performing dressing, auscultation, delay in attending to patient, increase time to complete work) • Difficulty in breathing • Itch • Pain from wearing PPE • Heat rash • Restricted movement from wearing PPE				

- 31.3% stated that adverse events had affected their work:
  - Inability to concentrate due to pain
  - Need for frequent adjustments
  - Poor visibility due to fogging
  - Restricted movement due to PPE

Likelihood of exposure to infection

- Only 13.7% of respondents were highly confident of the PPE protection
- 23.3% felt that some procedures may increase risk of exposure:
  - Airway procedures
  - Attending to patients suspected to have COVID-19
  - Cardiopulmonary resuscitation
- 45.4% reported the presence of spotters but only 16% felt that spotters influenced how they used PPE

Discussion

- Prolonged use of PPE is likely to cause some side effects which in turn might have an impact on adherence to PPE use and create entry portal for SARS-CoV-2 and other pathogens
- Hot and Humid climate probably increased the incidence of reported pressure injuries and skin issues although in China 97% reported side effects – less in our study
- Side effects reported more by female participants

Discussion

- Training provided was rated as adequate
  - Essential to mitigate risks
- Yet only a small portion of healthcare workers reported high confidence of protection afforded - ? Confidence increases with mask fitting
- When study performed, N95 only for high-risk areas, surgical masks for other areas – ? Increase in side effects when using N95 routinely

Conclusions

- PPE is essential protection for patient and staff safety
- Essential to acknowledge impact of PPE on healthcare workers
- Need to factor in frequent breaks, use of spotters and tested mitigation strategies for side effects
- Need to move away from adhoc solutions as they might decrease protection afforded by PPE
- Printed step by step instructions alongside spotters and designated donning and doffing areas needed

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Research paper

Australian emergency nurses' experiences of working with personal protective equipment during the COVID-19 pandemic. A qualitative study

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Australian emergency nurses' experiences of work, using personal protective equipment during the COVID-19 pandemic

- **Design:** A qualitative explorative descriptive (QED) design.
- **Sample:** 26 Registered Nurse (RN) participants, consisting of clinical RNs (n=18) and leadership RNs (n=6).
- **Semi-structured, in-depth interviews**, conversational style
  - one on one interviews (n=21) via Zoom
  - one focus group interview,
  - Interviews between Jan to April 2022.
  - experiences 2020, 2021, 2022
- **Thematic analysis:** Braun & Clarkes' Six Steps (2019) as guiding framework.

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Themes Identified from Data

Major themes	Sub-theme 1	Sub-theme 2	Sub-theme 3	Sub-theme 4	Sub-theme 5
1. The shifting ground of the COVID-19 pandemic response	What's the go with PPE today?	In the beginning we were scrambling for masks.	Emergency is the true frontline		
2. Sustainability of the Pandemic response and heightened activity	Facing the fear of exposure	By the end of the shift I'm just absolutely spent.	Discomfort of wearing PPE impacts on compliance		
3. Changed Emergency Department team identity and dynamics	PPE is a barrier to team camaraderie	Outsiders versus Insiders - Ambivalence to PPE spotter role	Personal safety comes first in a pandemic	IPC is a priority over comprehensive patient care	Using PPE depersonalises the whole patient experience
4. This pandemic caught everyone off guard	People outside ED have no understanding of what it has been like.	COVID-19 is here to stay - Permanent changes to care delivery and nursing practice	Tenacity of a true profession	It breaks my heart thinking of the wastage	

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The shifting ground of the COVID-19 pandemic response

In the beginning *….“no-one knew what they were doing”* (LRN1).

Bank nurse speaking about their experience in a major Public ED:

With this isolated patient in the negative pressure room, ***myself and the consultant emergency physician were required to actually look up policies that would best protect us from very contagious respiratory illnesses****…for that we actually had to refer to the US Navy medical bio-safety hazards for managing Anthrax and Measles and the SARS CoV-1 from the prior pandemic in Asia, 2004.* (CRN 4)

- *It would change from day–to-day, so you [would] have to ask someone* ***at the start of the shift so you know, what’s the go with PPE today?*** *(CRN7)*
- *We didn’t have enough PPE in the beginning, we were scrambling for masks. The government won’t give us any because they were just given to public hospitals and although we were streaming, we were already a COVID streaming hospital, we still weren’t getting that many masks. (LRN3)*

Sustainability of the Pandemic Response and Heightened Activity

It was frightening to think about: "**Getting sick while unvaccinated, it was a terrifying time**" (CRN2).

Unless you have experienced it you don't know how exhausting that is. The fatigue, the dehydration and exhaustion, you feel hung over the next day. (CRN9)

Also with the face shield and goggles, ***they fog up and then you actually can't see what you are doing sometimes, which is dangerous****. (CRN13)*

But a lot of the time, the more uncomfortable ones (masks), ***you kind of need to take them off every now and then to give you a nose a bit of a break or just to get a little bit of oxygen in, so that's been a real struggle for me*** *[…] But when they (patients) are being made to wear the N95, a lot of the time they just don't wear it properly because it's just so uncomfortable. (CRN7)*

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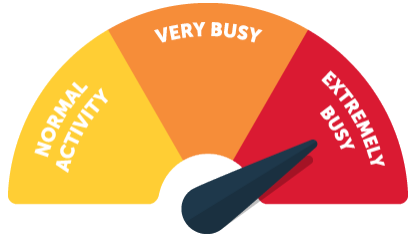
Changed Emergency Department Team Identity and Dynamics

- ***I have heard it said that: 'there is no emergency in a pandemic'.*** (CRN 11)

- *Then the unwell patient goes into the isolation area […] if they deteriorate and need more airway support […] the main aim is to limit the number of persons who look after the patient […] we don't need to rush things because its all about protecting ourselves […]* ***When you initiate intubation during pre-COVID years, everyone can just help and circulate […] but during COVID, you just limit the number of people around the patient…it's not a simple procedure.*** (CRN6).

- *Every now and then I'll see someone outside […] and I realized that I actually didn't know what they look like […].* ***One of the best things about nursing is that camaraderie with your colleagues. I think [PPE use] is a barrier to that****. (CRN5)*



Impact on Person-Centered Care

- ***It has been challenging in regard to communication…with the elderly in particular, due to not being able to use your facial expressions to communicate with them.*** *(CRN9).*

- ***they can't build that rapport with you…. Especially the oldies […]*** *You know when we used to walk in and you smile and they can know who we are. But I feel like* ***when HCWs are in masks and PPE they have no idea if it's a Dr, if its' a nurse, if its' a radiologist taking them for a scan, we all look the same to them so they can't actually familiarise themselves.*** *(CRN14)*

This pandemic caught everyone off guard

*"**A lot of nurses are starting to burnout. There is a large mass exodus of nursing staff,** very highly skilled and highly trained nursing staff are leaving these high acuity areas which does compromise patient safety".* (CRN4)

I remember when AIDS first came out […] So out of that or the whole concept of universal precautions, which was a great thing you know, so you presume everybody has it until proven otherwise, which is what we should have always been doing […].

***And in some ways, this pandemic,** […] **its going to change our practice.** (CRN1)*

It breaks my heart thinking of the wastage

As an organisation [we] don't recycle well at all, and ***this is just a whole other level of non-environmentally friendly products****. (***LRN5**)*

Again, staff are very concerned about the environmental impact of PPE. *Everybody is concerned about it. (***LRN5**)*

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Discussion

Challenges –

- Balancing adverse effects of PPE and being exposed to an unknown pathogen.
- Working in PPE disrupted delivery of person-centred care
- Physical and emotional exhaustion associated with working in PPE

Silver linings –

- ED team worked cohesively to respond to the challenges of the pandemic
- ED nurses demonstrated their adaptability and innovation
- Despite the adversity there was an underlying tone of pride in the nursing profession and their role in their response to the pandemic

CIDIR CENTRE FOR INNOVATION IN INFECTIOUS DISEASE AND IMMUNOLOGY RESEARCH

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Where is Compassion in all that?

- Can we deliver IPC and remain compassionate?
- What does compassion in Infection Prevention and Control look like?
- Do we need compassion in IPC? – Isn't just about protecting people at all costs?

- We need to be able to tailor IPC to facilitate compassionate care – positive impact on patients/residents/clients and healthcare workers – It is probably more difficult than using the most restrictive approach "just in case"
- "I think isolation is a prudent approach, given that residents in aged care facilities often cannot be relied on to remember not to touch things or each other. So having the infectious patient not roam around the building sounds like a very good idea to me!"

Psychosocial Impact - The utility of framing using the Terror Management Theory (TMT)

J-STAR
Journal of Stress, Trauma, Anxiety, and Resilience

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Home / Archives / Vol. 1 No. 2 (2022): Journal of Stress, Trauma, Anxiety, & Resilience / Brief Articles

Using the Terror Management Theory to understand health workers burnout in response to the COVID-19 pandemic

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.pdf

Published
2022-09-29

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- Concerns about impact of COVID-19 on healthcare workers stress levels, burnout and the sustainability of the healthcare workforce
- The TMT posits that controlling death anxiety is a driving force behind many aspects of social behaviour (Solomon et al., 2004)
- According to the TMT, 'mortality salience' is the state in **which awareness of one's own mortality increases anxiety and can cause unbearable terror or internal conflict**
- When facing death, individuals often seek to follow **culturally endorsed worldviews: affords reassurance that the individual is making a social contribution that can have lasting significance and thus gives meaning to life**

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TMT and the COVID-19 Pandemic

- ? exposure to death both clinically and also through constant reports on the pandemic in the media has raised mortality salience and elevated their concerns about exposure and infection
- Especially pertinent when:
  - There was disruption in supply chains and inadequate access to PPE
  - Lack of knowledge about viral transmission and exposure risks.
  - Whether public health actions taken to “flatten the curve” such as widespread lockdowns have also inhibited individual responses to mortality salience such as cultural worldview defence, or affirming close relationships (Pyszczynski et al., 2021) need to be investigated.

Resilience as a “buzz” word – It is not compassion!

- Have we failed to implement meaningful interventions?
- We have come short in the pandemic response planning – exacerbated pre-existing challenges
- Nurses labelled as heroes, applauded in the streets, free food delivered to healthcare settings – the few months later vilified when on strike for pay rise
- Are these just tokens - what are we doing now?
- The pandemic caused very deep changes in health care workers’ experiences of work
- Delivery of care difficult and **causing negative impacts on patients’ outcomes.**
- Interventions to support staff need to focus not just on general well-being measures but also need to provide opportunities for clinical staff to address their core values, and motivators for entering clinical professions.

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What does the future of nursing look like?

- The TMT can be a useful tool to determine how stress and burnout have been exacerbated during the COVID-19 pandemic
- It may be that further than the work pressures widely described, such as overwhelmed intensive care units and emergency departments and increase in death toll, some actions taken by governments have reduced healthcare workers coping abilities.
- Future research is urgently needed to examine the underlying root causes of increased burnout and stress, to enable development of meaningful interventions to support healthcare workers in the workplace.
- Such initiatives are urgently needed to prevent critical workforce shortages that cripple capacity to provide health care services and the ability to respond to future emergencies

Continuing Advocacy for Patient and Community Safety

Vaccination, testing, clean air: COVID hasn't gone away – here's where Australia needs to do better

Published: February 12, 2024 6.05am AEDT

JOEL CARRETT/AAP

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In May 2023 the World Health Organization (WHO) declared COVID was no longer a public health emergency of international concern. For many, this signalled the pandemic was over.

But the virus continues to infect millions of people globally and the WHO recognises COVID as an ongoing pandemic.

In Australia, more than 50,000 infections have been reported so far in 2024. And this is likely to be a significant underestimate, as we are testing much less than we used to. As of February 1 there were 287 outbreaks in residential aged care homes, and people are still dying from the virus.

Although we've come a long way since earlier in the pandemic, as we enter its fifth year, COVID continues to have negative effects on individuals, health services and

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Thank you
Questions?

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Lunch

STAY A STEP AHEAD

of winter infections

gama healthcare | ACIPC Australasian College for Infection Prevention and Control

Scan the QR code to register for the IPC webinar **"Winter Preparedness & the Hidden Threats".**

23rd April 2024 at 7pm AEST

gama healthcare | ACIPC Australasian College for Infection Prevention and Control

Dr Michael Loftus

Achieving greater sustainability in healthcare: what is the role of IPC?

MONASH University

Achieving greater sustainability in healthcare – *what is the role of Infection Prevention?*

Dr Michael Loftus

Research Fellow, Health & Climate Initiative, Monash University

Infectious Diseases Physician, Alfred Health & Mildura Base Hospital

MONASH University

MONASH UNIVERSITY recognises that its Australian campuses are located on the unceded lands of the people of the Kulin Nations, and pays its respects to their Elders, past and present.

An initial confession…

- I’m not an IPC expert (although I know plenty of them!)
- I’m not a climate change or sustainability expert (although I’m working on it!)

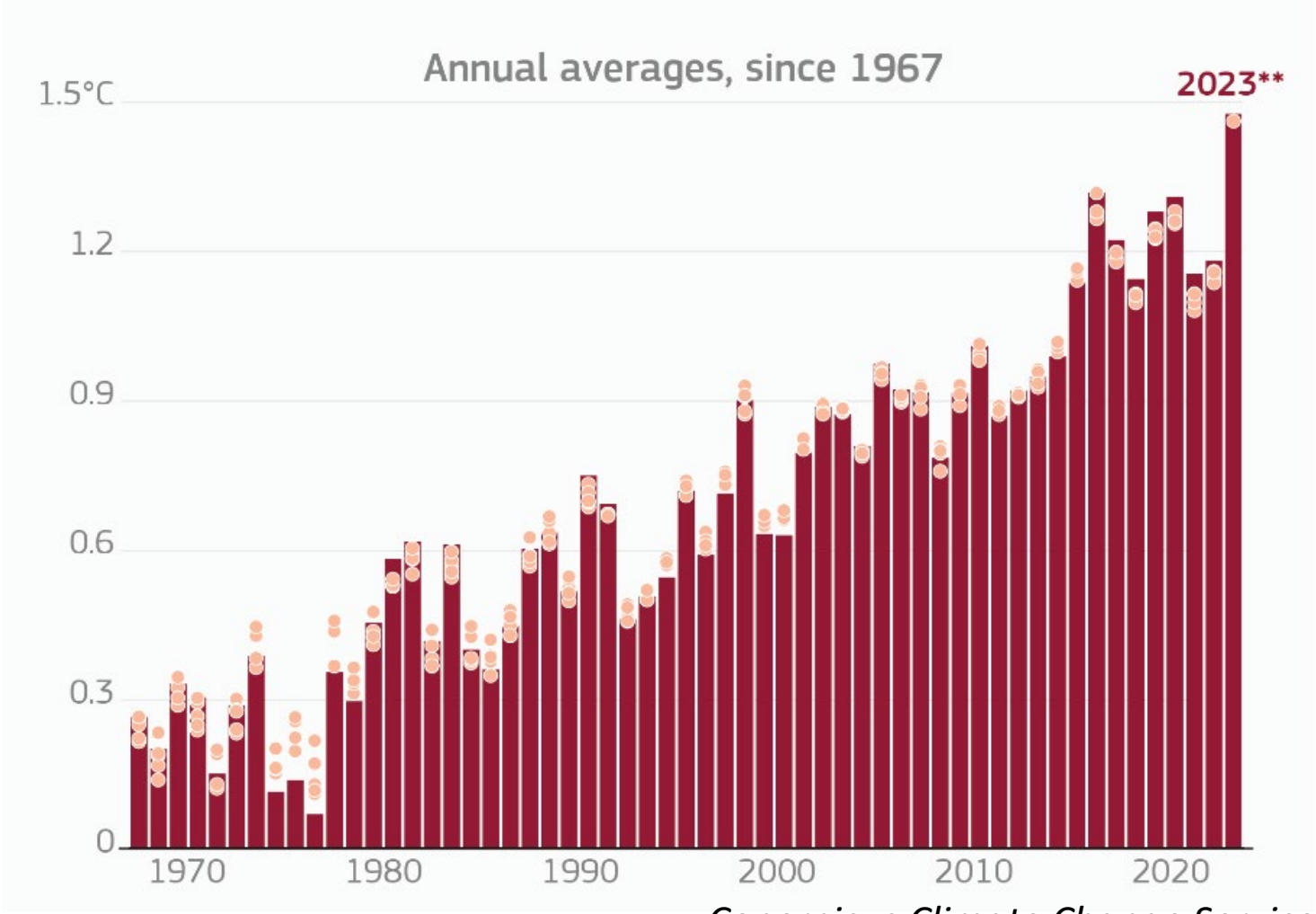
Outline

- Why is sustainability important?
- Why is *healthcare* sustainability important?
- Infection Prevention and sustainability
- Sustainability principles
- Staff perspectives on sustainability and waste (WATCH Study)
- An example of IPC facilitating better sustainability
- My soon-to-be-patented matrix for IPC & Sustainability

Why is sustainability important?

- **2023** was the hottest year on record

- Climate scientists believe the current decade is the warmest such period in the last **125,000 years**

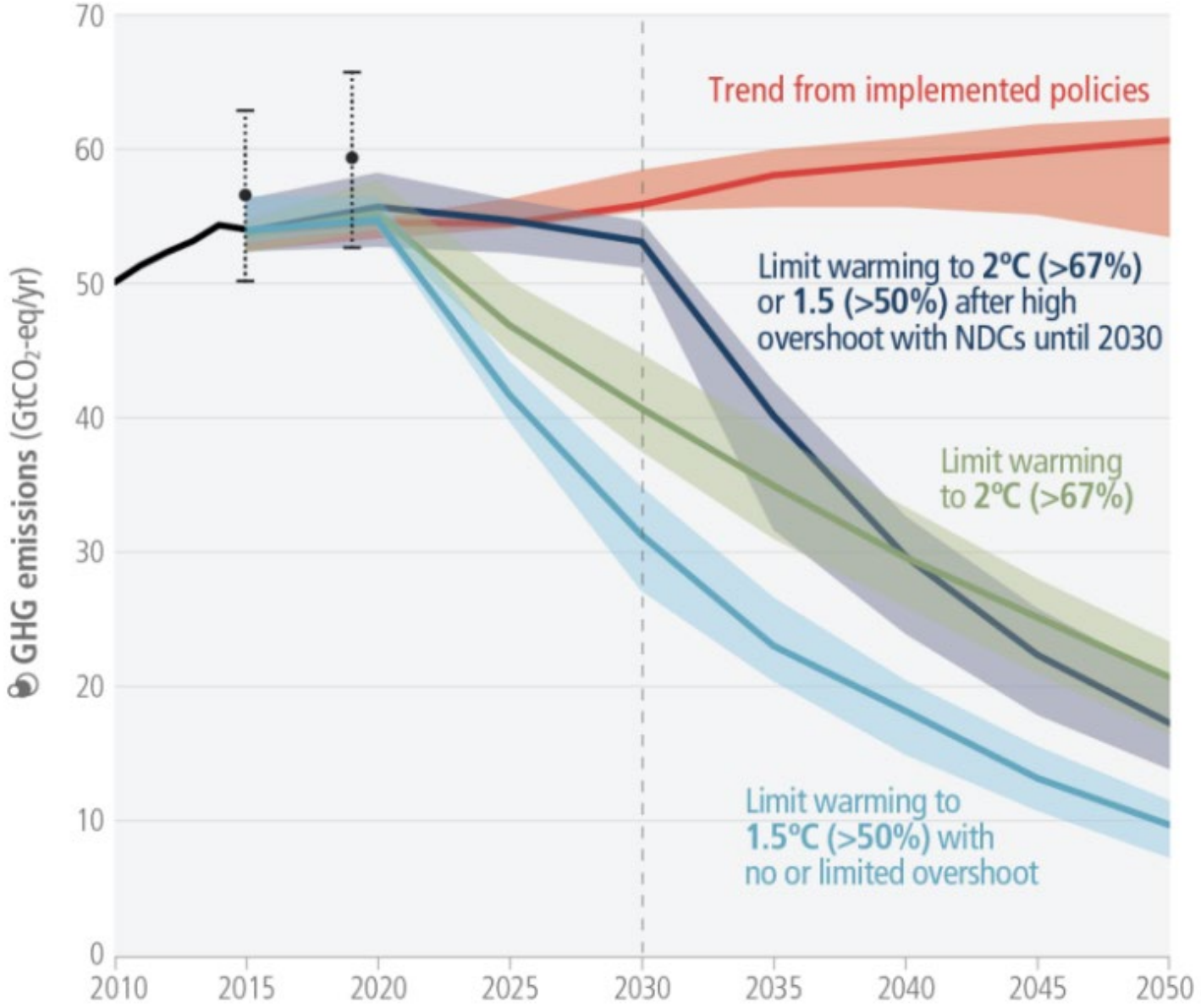


Copernicus Climate Change Service

Why is sustainability important?

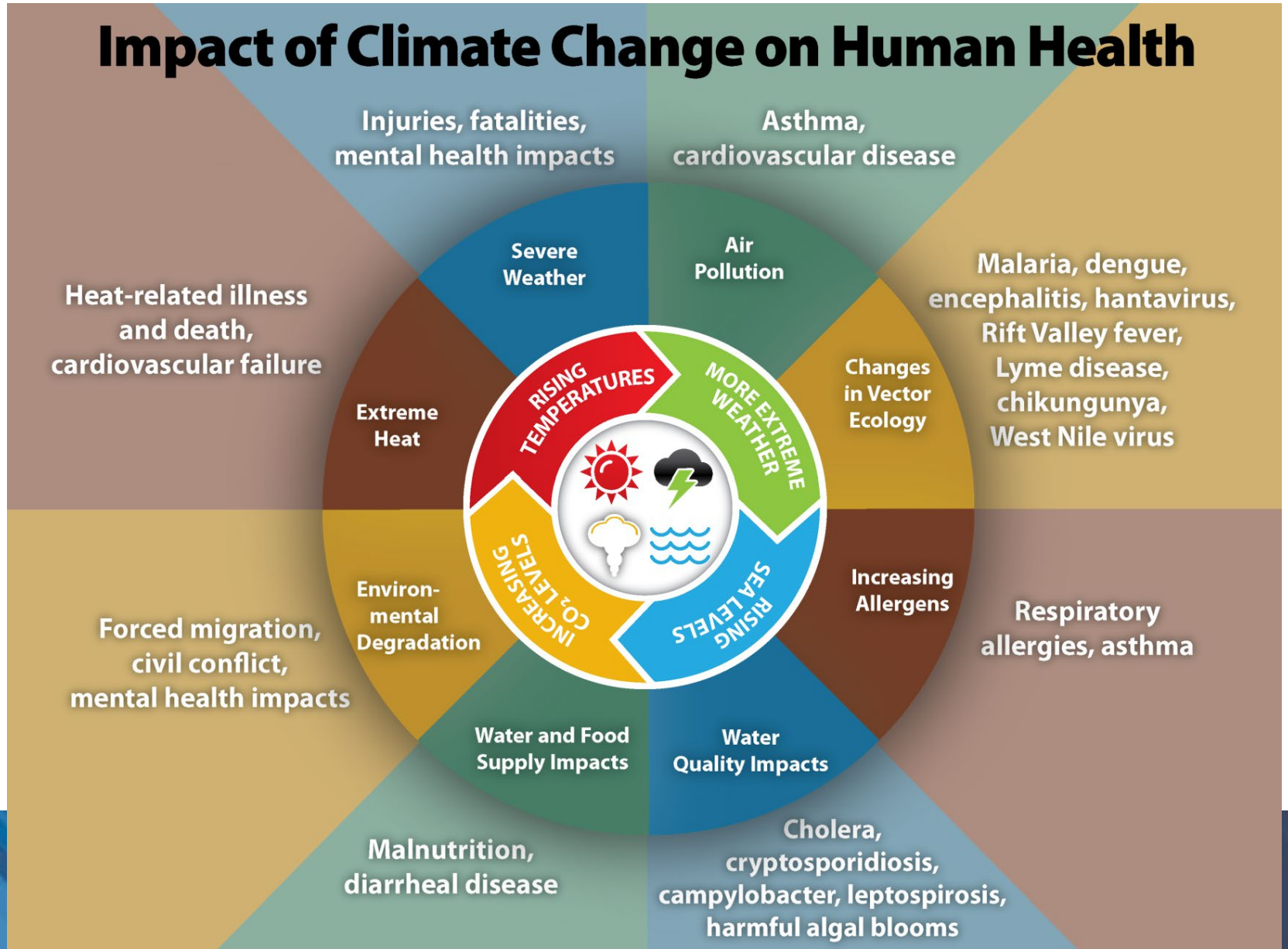
“There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all…The choices and actions implemented in this decade will have impacts now and for thousands of years.”

Climate Change 2023 Report, IPCC



Climate Change 2023 Report, IPCC

Why is sustainability important?



Centers for Disease Control and Prevention, 2022

MONASH University

Why is sustainability important?

When we reach 2100…

My eldest will be **80**

My youngest will be **77**

Why is healthcare sustainability important?

- Healthcare is responsible for **7%** of Australia's greenhouse gas emissions (Malik, 2018)
  - Slightly higher than the global average of **4-5%** (Lenzen, 2020; Pichler 2019)

- Globally, if the healthcare sector was a country, it would be the **fifth-largest** emitter (Boyd, 2019)

- In NSW, healthcare is responsible for 8% of all solid waste (Malik, 2021)

Infection Prevention and Sustainability

‘Positive’ things from IPC:

- Prevention of HAIs
  - With accompanying health benefits, *plus* financial and carbon savings
- Protecting patients and staff

‘Negative’ things (or unintended consequences) from IPC:

- Large volumes of waste
- Increased adverse events and medication errors
- Lower satisfaction with care
- Increased burden on staff time

Infection Prevention and Sustainability

Every day, **0·5 kg of hazardous waste** and **2·8 kg of non-hazardous waste** are produced **per hospital bed** in high-income countries. (Soop, 2021)

*"Numerous infection prevention interventions, while **well-intentioned** and **theoretically sound**, often **lack rigorous testing** for **effectiveness** and **cost-effectiveness**. Recognizing healthcare's significant consumption of global resources and the potential for unintended disruptions, it is essential to **challenge practices** that **consume substantial resources** or **generate significant waste**"* (Rickard, 2023)

Some IPC sustainability principles

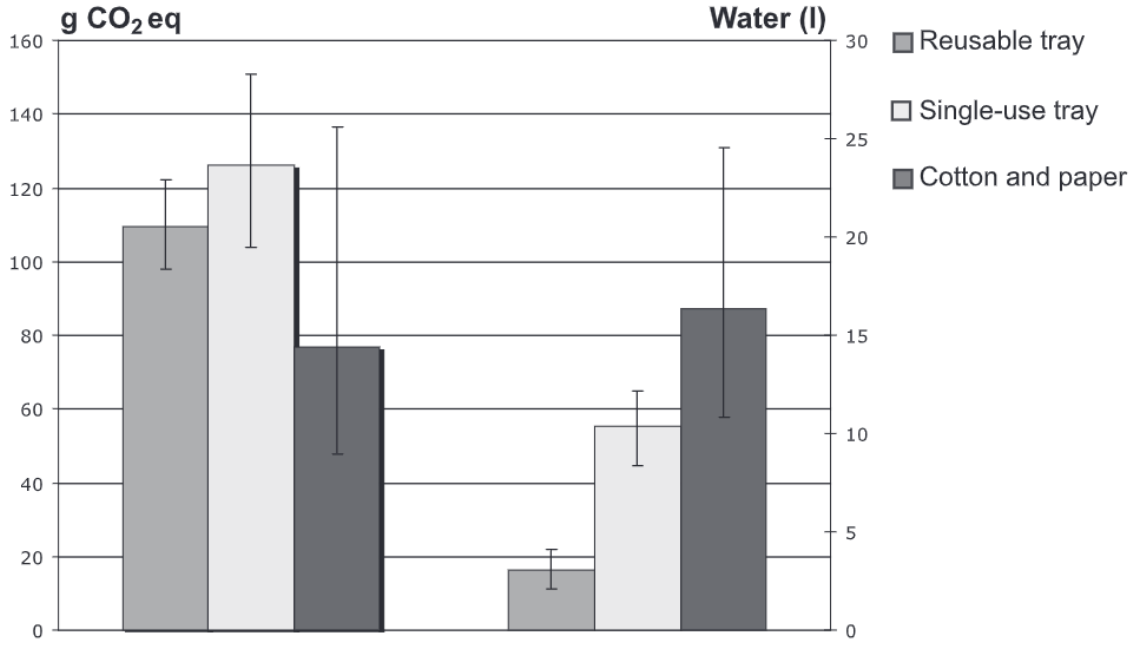
1) Using less is always better

- Everything we use in healthcare is associated with inherent carbon emissions, from **manufacture**, **distribution**, and **disposal**.
- A pile of waste is also a pile of carbon!
- Prioritising *what* to reduce can be harder and requires some knowledge

Some IPC sustainability principles

2) Reuse *is probably* better, but it can be complicated

- Reuse avoids repeated manufacture and disposal, but may introduce reprocessing
  - This requires time, facilities, energy, water, financial outlay…
- Some results can be surprising…



Some IPC sustainability principles

3) Prevention does have carbon benefits… but at what cost?

- IPC prevents the unnecessary use of energy/resources, by preventing avoidable infections/outbreaks
  - How do we weigh up IPC's resource consumption versus avoided use?
  - Is IPC doing ***more*** than is necessary?

Some IPC sustainability principles

4) Comparing alternative products or care pathways can be *challenging*

- Hard to measure and then compare all the relevant factors

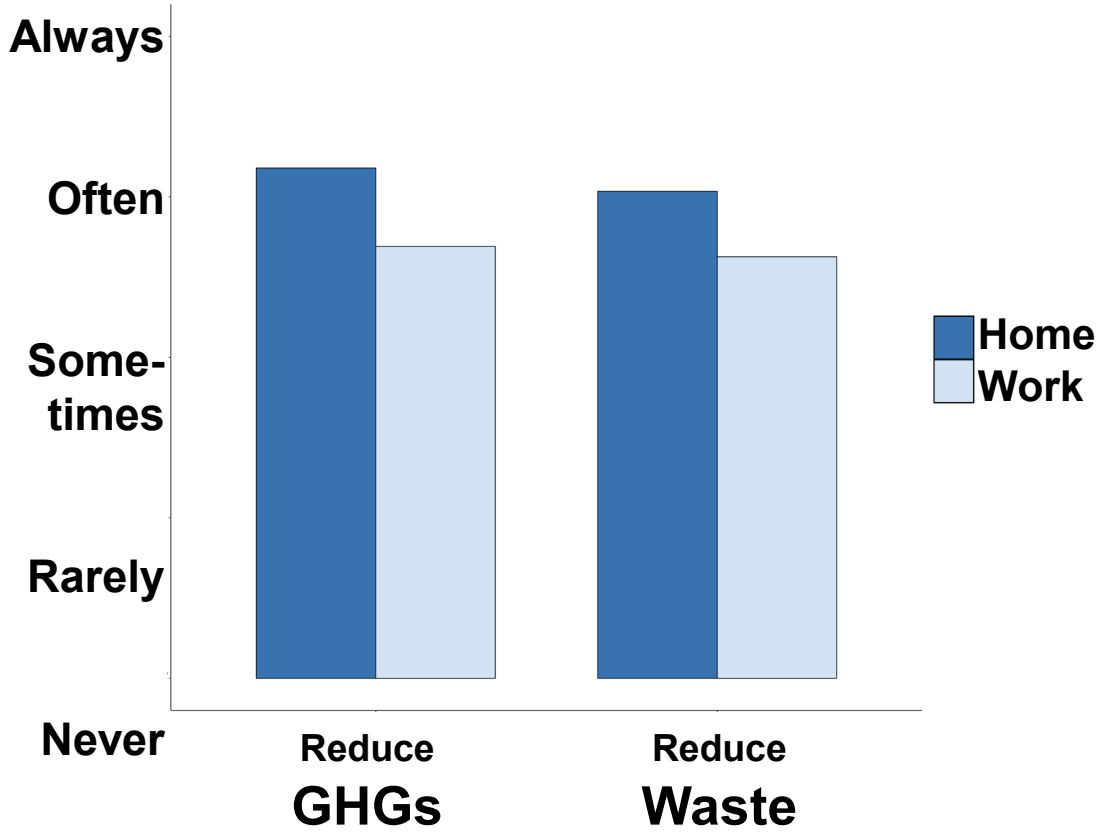
- E.g. – IV versus oral antibiotic therapy
- E.g. – metered dose inhalers versus dry powder inhalers

HCW perspectives on sustainability and waste

- **WATCH Study**
  - Healthcare Worker Attitudes to Climate Change and Health
- >2,000 Victorian HCWs across 12 sites
- **82%** wanted to be doing more in their work role to reduce GHG emissions and waste

HCW perspectives on sustainability and waste

- **Disconnect** between what people are doing in their **home** vs their **work** lives
- **Barriers**
  - "I don't know what to do" far more common for GHG emissions than waste
- **Individual responsibility** much higher for waste compared to GHG emissions



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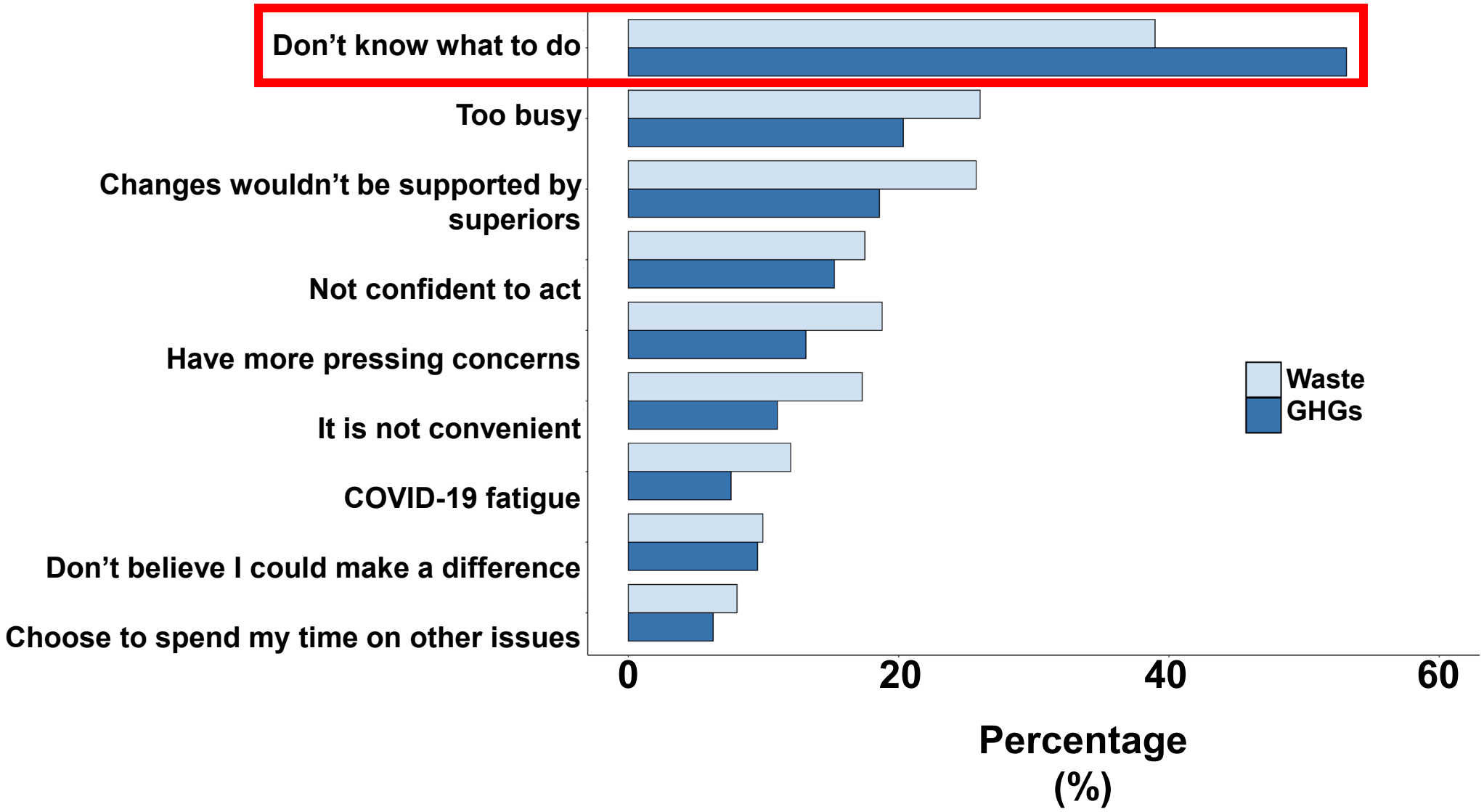
Don’t know what to do
Too busy
Changes wouldn’t be supported by superiors
Not confident to act
Have more pressing concerns
It is not convenient
COVID-19 fatigue
Don’t believe I could make a difference
Choose to spend my time on other issues
Waste
GHGs
0
20
40
60
Percentage (%)

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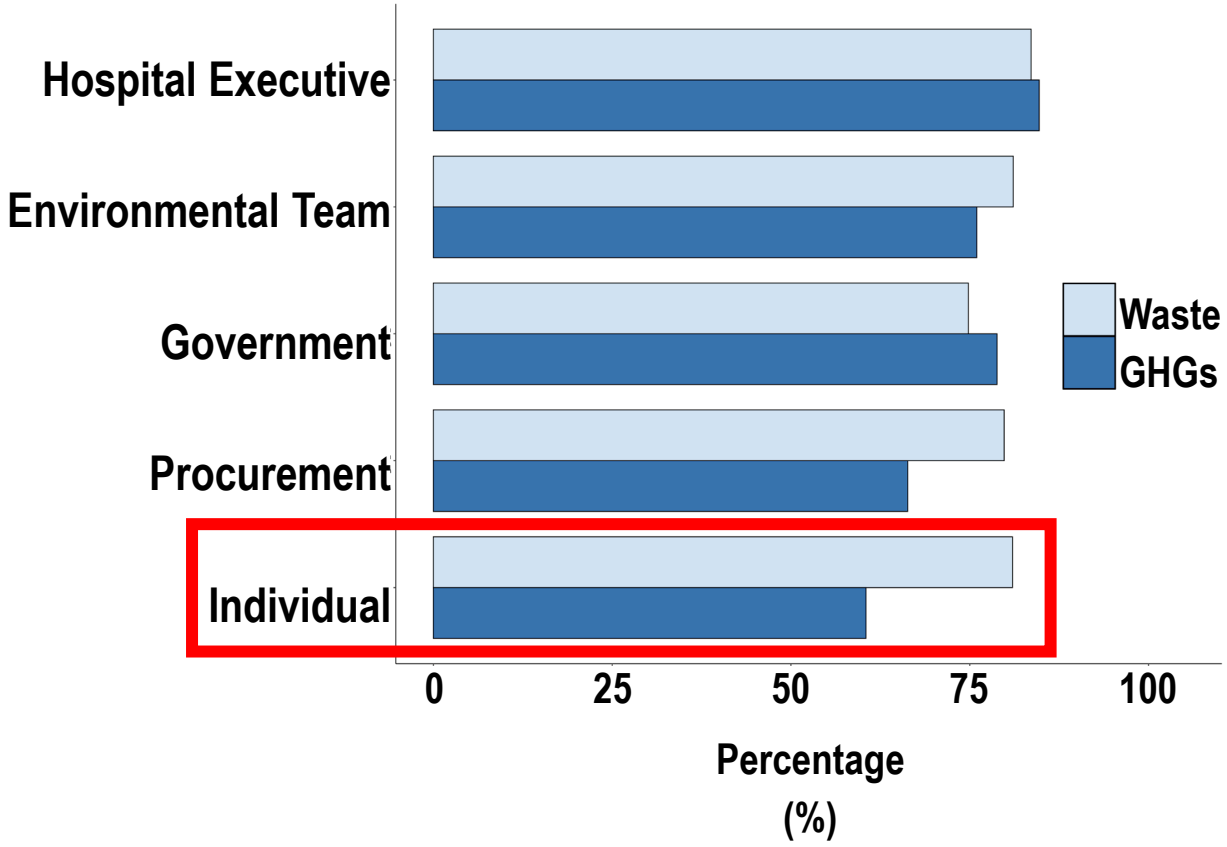
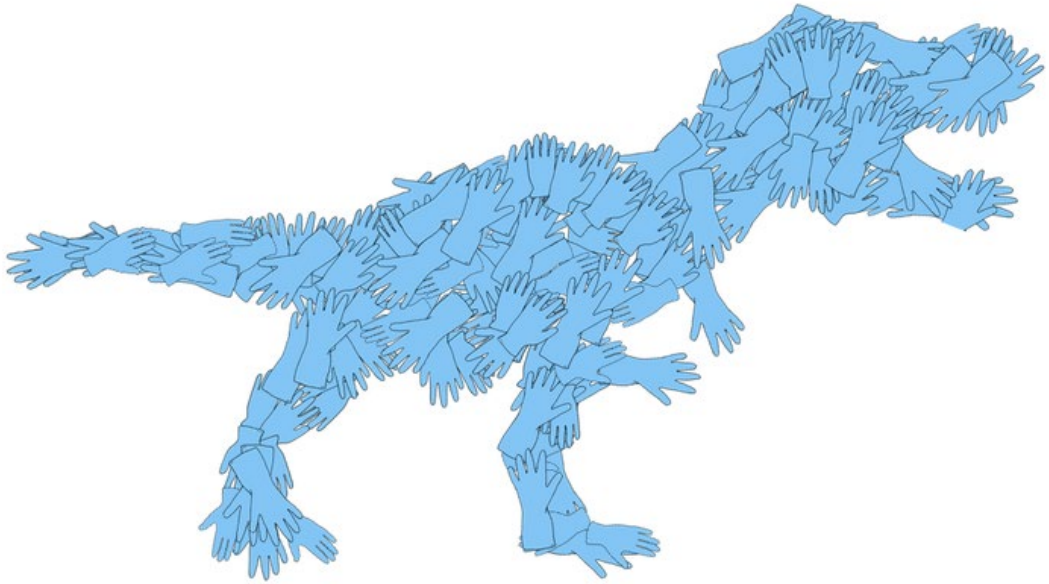


Example of an IPC-*led* sustainability initiative

- **Great Ormond Street Hospital** in the UK reduced unnecessary use of gloves
- Actually began as an initiative to improve hand hygiene
- Saved **21 tonnes** of waste per year and **£90,000**



Example of IPC *facilitating* better sustainability

- Metered dose inhalers (MDIs) contain gas with a high global warming potential
  - 200-dose salbutamol canister = **28kg CO2e** (≈150km in petrol car)

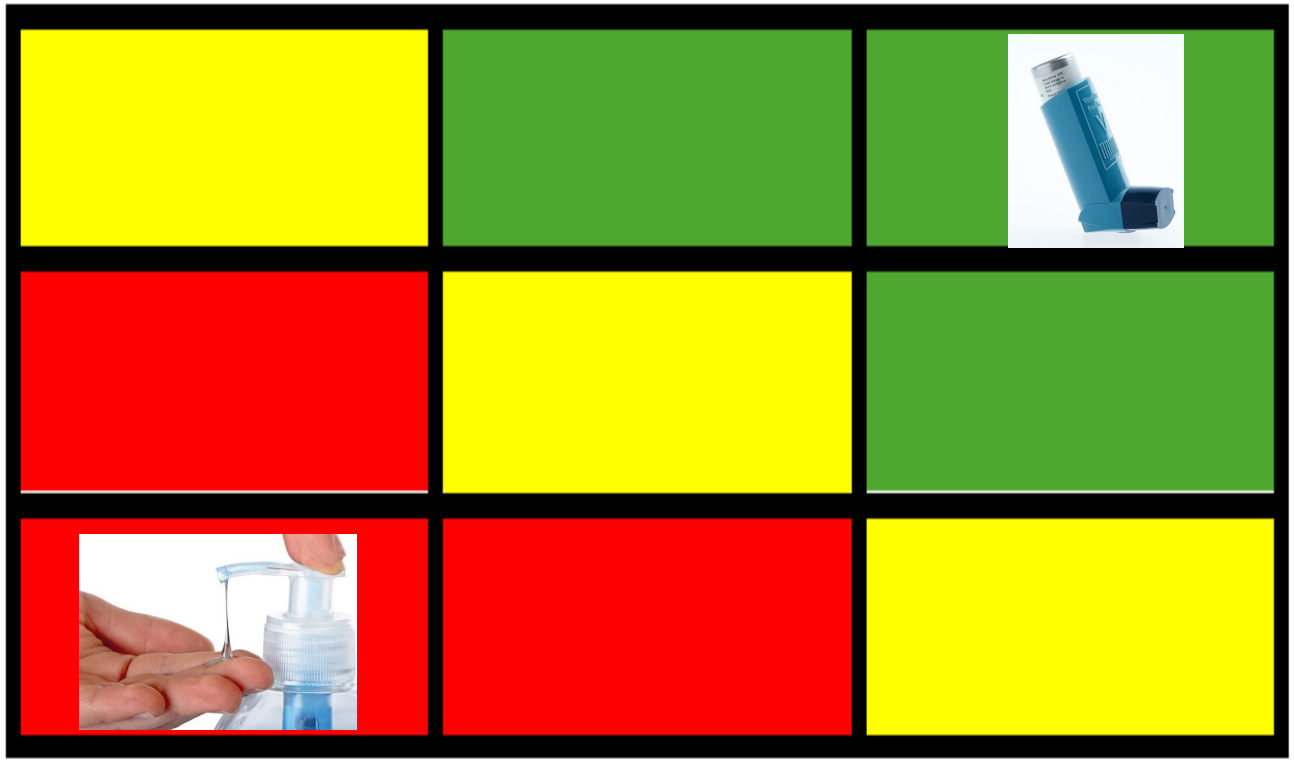
- Lung function lab uses 2-4 puffs of MDI for a particular test

- Discovered that our local lab was throwing out MDI after ***every*** patient!

Example of IPC *facilitating* better sustainability

- Absence of clear evidence on level of risk
- Quick survey of other major Aus laboratories – **3/39 (7.7%)** using MDIs just once
- IPC Committee approved change in practice
  - Low (?negligible) risk to patients
  - High environmental impact
- *Q: what would have happened if most other labs were single-use?*

My soon-to-be-patented matrix…



<u>Other relevant factors:</u>

- Cost?
- Acceptability?
  - To staff?
  - To patients?
- Infrastructure requirements?
  - E.g. reprocessing

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a greener path to safe patient care

Scan the QR code to learn more about GAMA Healthcare's sustainability journey and IPC solutions.

Panel Discussion

STAY A STEP AHEAD

of winter infections

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Thank you for attending the **IPC Tour 2024!**

Scan the QR code to download winter campaign resources.