



# Sinks and drains - their role in hospital associated infection

Weinbren Walker Waste Water Workshop

Tuesday 28<sup>th</sup> November 2023

Oslo, Norway

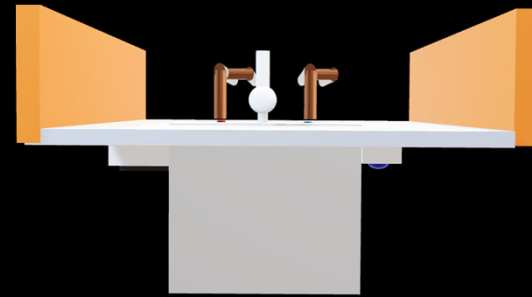
1620-1650

Nice to see you to see you nice.....

The Derek and Clive of water microbiology



Which is the most **dangerous**?



Which is the most **dangerous**?



A GUN IN THE UK

OR



A CLINICAL HAND  
WASH STATION



**WATER SERVICES FOR  
A CRITICAL CARE UNIT?**



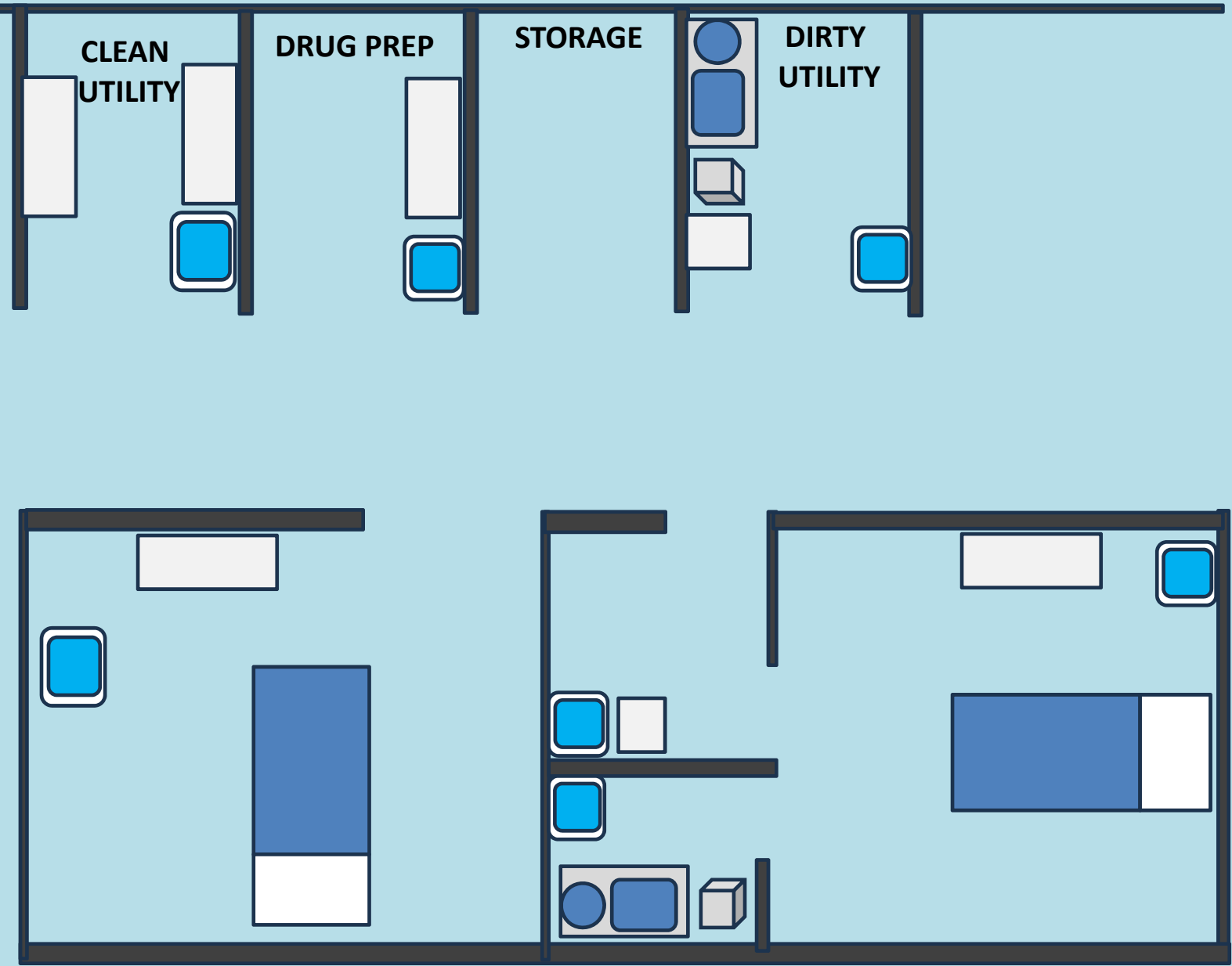
**WATER SERVICES FOR  
A CRITICAL CARE UNIT?**

**NEW CRITICAL  
CARE UNIT  
DESIGN**

**HBN HTM  
COMPLIANT**

**NO  
DERROGATIONS**

**PASSED AS  
MEETING  
STANDARDS**



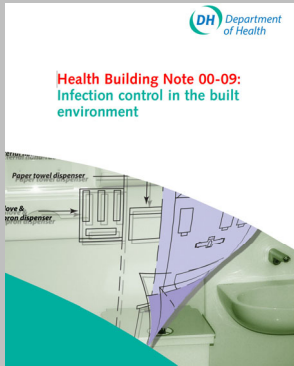


THE  
PERIPHERY  
OF THE

LAST 2 M PIPEWORK

USED AS A  
IT REQUIRE





**Does not replace training**

**Out of date by time released**

**Does not cover every scenario or risk**

3.8.9		Does the scheme comply with Health Building Note (HBN) requirements?	<p><u>HBNs</u> give 'best practice' guidance on the design and planning of new healthcare buildings and on the adaptation/extension of existing facilities. They provide information to support the briefing and design processes for individual projects in the NHS building programme. They should be complied with; however, where they are not, the deviation from guidance should be included in the derogations.</p>
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# Discussion

- **Positive water samples for *P. aeruginosa*?**
- **Remediation measures implemented**
- **Is 6 monthly appropriate?**
- **Do we just follow the guidance or do we assess the risk?**

**Audience question –  
is 6 monthly testing of water outlets for  
*Pseudomonas aeruginosa* appropriate**

- **Yes**
- **No**



**IMPACT ON PATIENT SAFETY**

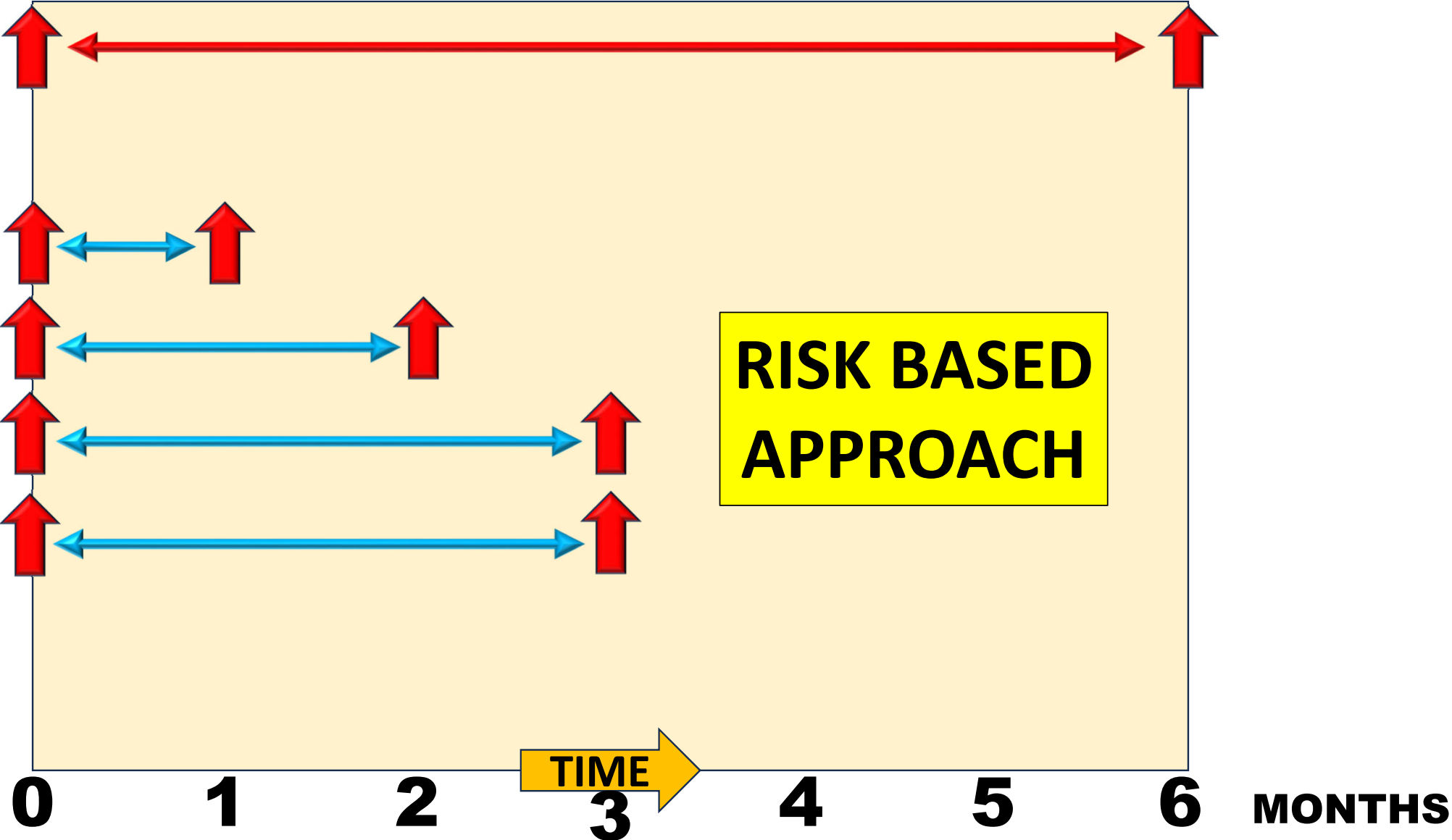








# WATER TESTING STRATEGIES



# The periphery of the system is fragile

- Contamination may be easily introduced.
- With 6 monthly testing patients could have been exposed to contaminated water for up to 6 months

**‘the greatest crimes in the world are not committed by people breaking the rules but by people following the rules (blindly / thoughtlessly)’**



A person wearing blue scrubs is shown from the side, cleaning a stainless steel sink with a pink cloth. The sink has a chrome faucet and handles. In the background, there are two colorful charts on the wall, one purple and one orange, each with a grid of small images. The scene is set in a clinical or hospital environment.

**Our cleaners are trained to clean the drain last!**

**Anyway, this is besides the point, a clinical hand wash station is for only one purpose, hand decontamination so what can be the risk?**

## **Audience question**

**What % of visits to the clinical hand wash station are for the incorrect purpose?**

- **100%**
- **75%**
- **60%**
- **35%**
- **4%**

**Video  
camera**

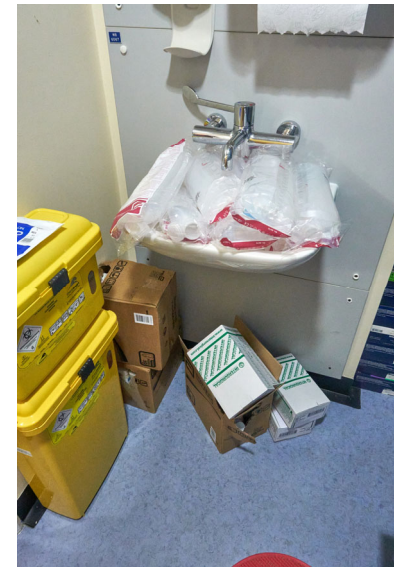


# Characterisations of hand washing sink activities in a single hospital medical intensive care unit.

Marika Grabowski,; Jennifer M. Lobo, Brian Gunnell, Kyle Enfield, Rick Carpenter, Laura Barnes, Amy Mathers, *Journal of Hospital Infection* in Press

- Of the 2,973 videos with analysed behaviours there were 5,614 observed behaviours which were assessed as; 37.4% medical care, 29.2% additional behaviours, 17.0% hand hygiene, 7.2% patient nutrition, 5.0% environmental care, 4.2% non-medical care.
- Hand washing was only 4% (224/5,614) of total behaviours. Subanalysis of 2,748 of the later videos further categorised 56 activities where a variety of nutrients, which could promote microbial growth, were disposed of in the sink.

**96% visits for incorrect purpose**







**Audience question-**  
**Is it practical for a hand wash station to only be for hand decontamination?**

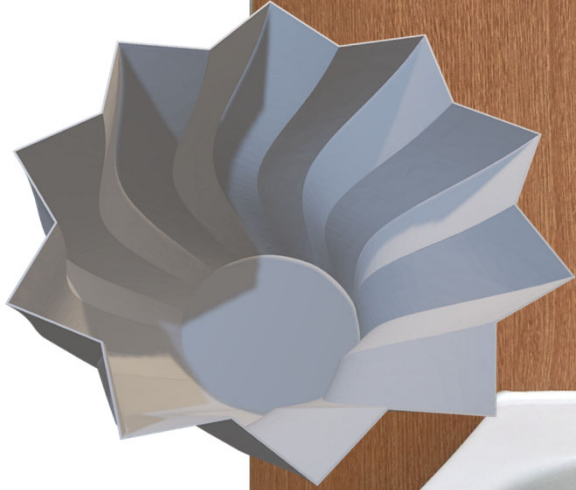
- 1. Yes**
- 2. No**


Rinse for a minimum of 8 seconds ensuring all areas are free from residue.  
Dry hands thoroughly using 1-2 paper towels.

Thank You

have in hand  
Hand hygiene

**B BRAUN**  
ZIHANG KEFETISE



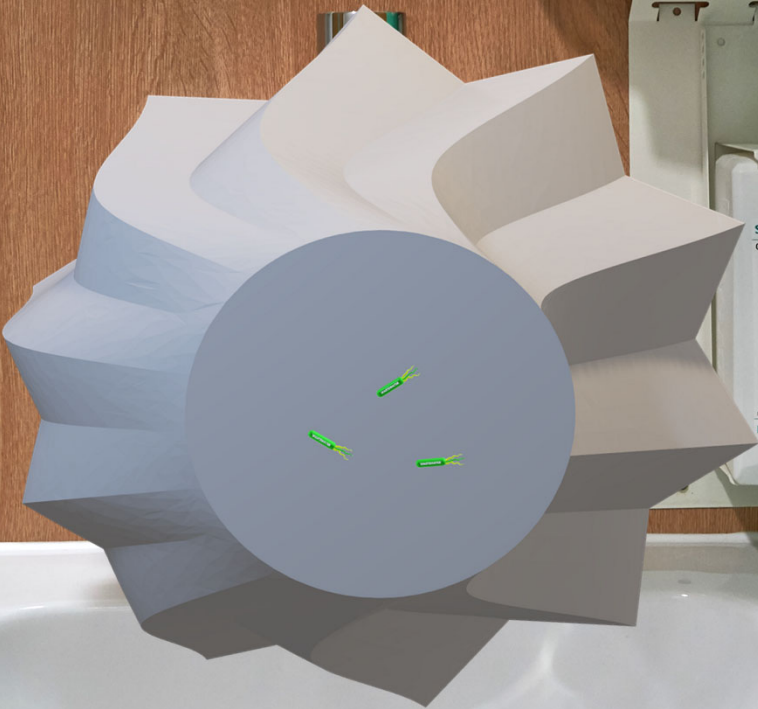
  
Rinse for a minimum of 8 seconds ensuring all areas are free from residue.  
Dry hands thoroughly using 1-2 paper towels.  
**Thank You**  
**have in hand**  
Hand hygiene  
01 2014  
01 2014  
**B BRAUN**  
ZIHANDE KÖRPERLICHE

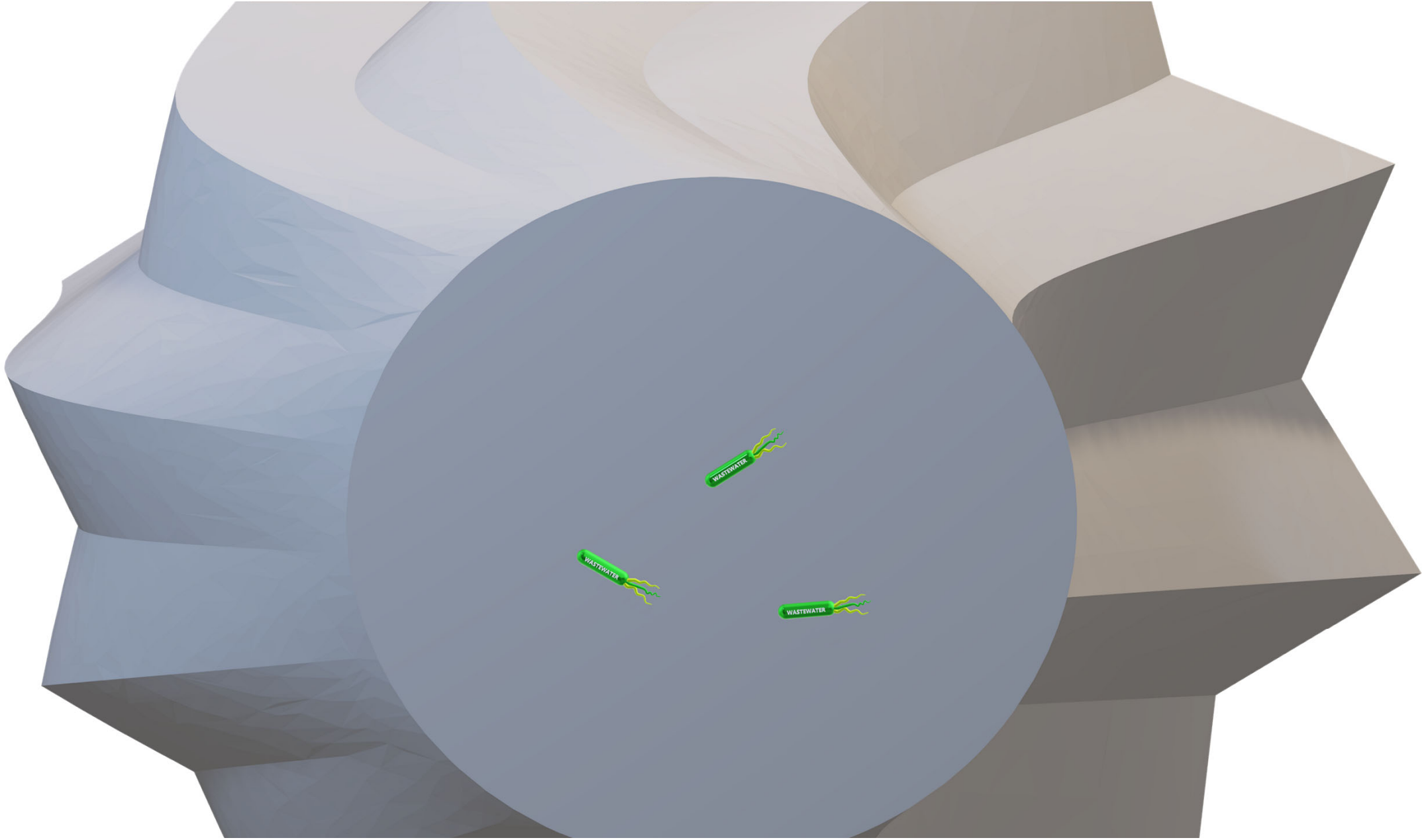


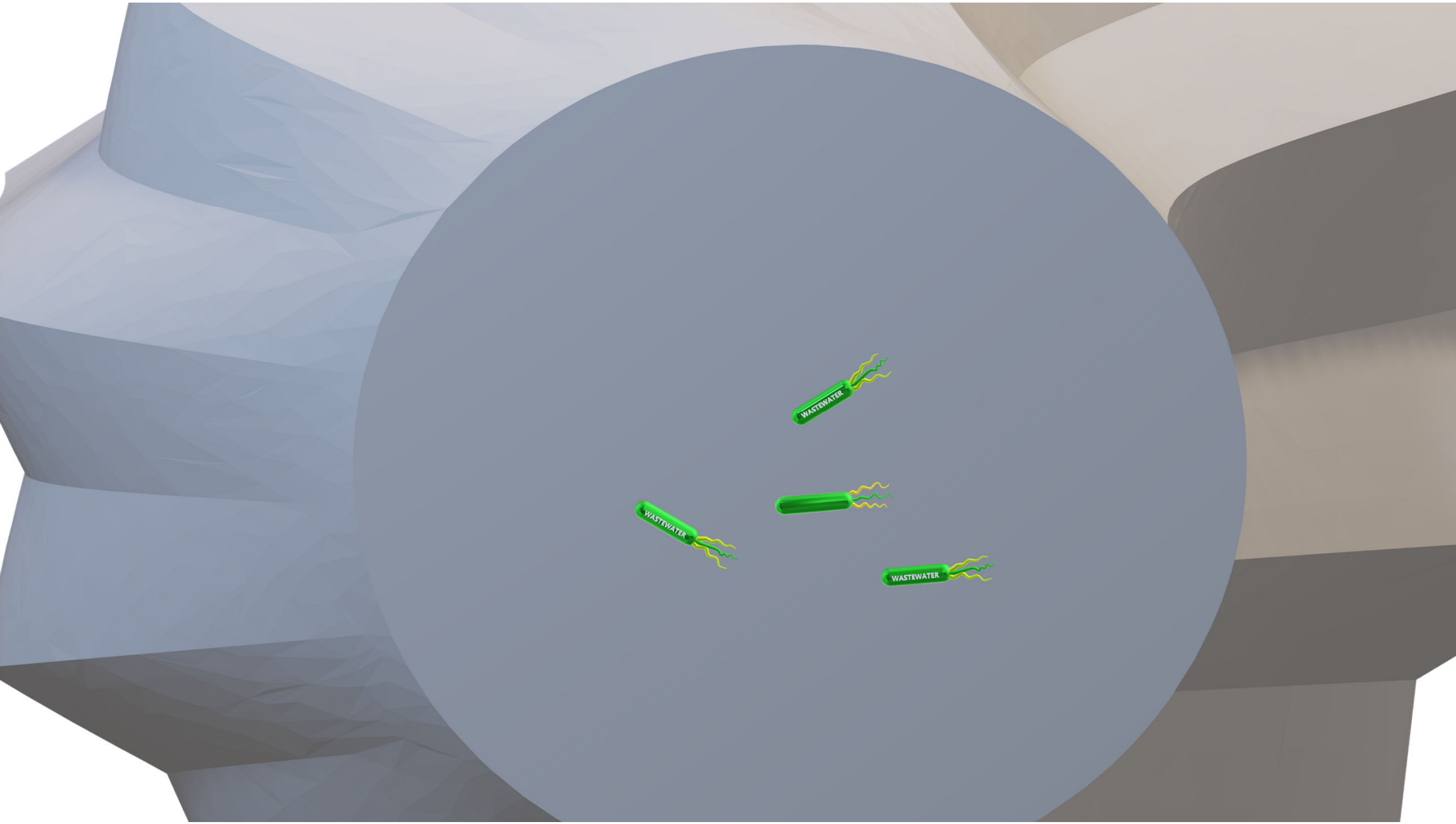
Rinse for a minimum of 8 seconds ensuring all areas are free from residue.  
Dry hands thoroughly using 1-2 paper towels.

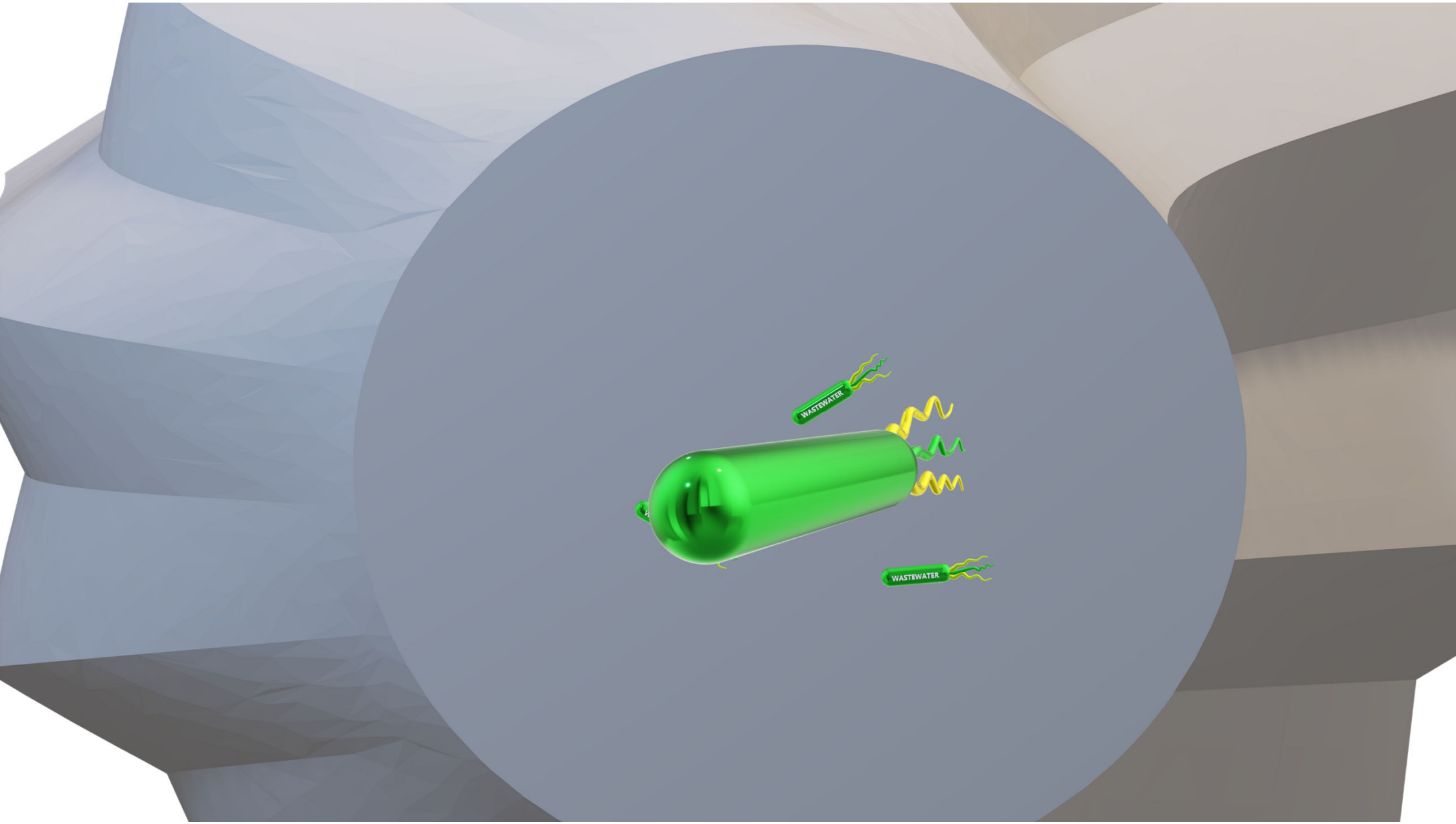
Thank You

have in hand  
B BRAUN  
SHANGHAI EXPERTISE









## Outbreak of *Klebsiella pneumoniae* CPE (OXA-48)

### Aim

There was a prolonged outbreak of *Klebsiella pneumoniae* CPE (OXA-48) at King's College Hospital, between September 2020 and November 2021. The cases were linked epidemiologically to an Elderly Care ward. The outbreak coincided with the SARS-CoV-2 pandemic.

### Methods

A number of factors were identified as contributing to the outbreak:

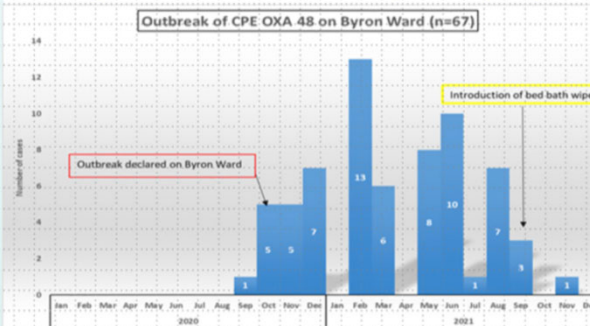
- Overuse of gloves and inappropriate glove use, which impacted on hand hygiene compliance
- Variability in infection control practice
- Cleanliness of equipment and the environment
- Fabric of the Estate

Interventions to control the outbreak included ward closure, replacement of the hand wash basins, environmental swabbing, enhanced cleaning, repair of the damaged environment, daily surveillance, increased patient screening, ward based audit and education. Clinell bed bath wipes and chlorhexidine wash cloths were introduced in September 2021, to replace the use of disposable wash bowls, soap and water. A short questionnaire was used to evaluate staff and patient feedback.

### Results

Following the introduction of the Clinell products, (see Figure 1), there was only one further Trust apportioned CPE OXA-48 case in November 2021, with no subsequent cases to date. This was a significant drop in the number of cases, which peaked in February 2021. 75% of patients said would recommend the wipes to other patients, and 84% of staff would recommend the use of wipes to other healthcare providers.

Figure 1: Outbreak of CPE OXA 48 Byron ward (n=67)



### Conclusion

Despite implementation of the recommended actions in the 'PHF Framework of Actions to Contain CPE', case ascertainment

chlorhexidine wash cloths were successful in bringing the outbreak under control. It is hypothesised that this intervention interrupted the chain of transmission associated with the use of sinks, wash bowls and associated equipment. Use of CHG washcloths may have reduced any potential reservoir of microorganisms on patients' skin.

ASHLEY FLORES DIPC  
KING'S COLLEGE HOSPITAL





# RANGE OF WATER / WASTEWATER ORGANISMS

## OPPPS

*Legionella pneumophila*  
*Pseudomonas aeruginosa*  
*Stenotrophomonas maltophilia*  
*Mycobacterium* spp.  
*Legionella* sp

*Burkholderia cepacia*  
*Cupriavidis* spp.  
*Methylobacterium* spp.  
*Sphingomonas* spp.  
*Acinetobacter baumannii*

*Amoebae, fungi*

*Ralstonia* spp.  
*Alcaligenes,*  
*Aeromonas*  
*Elizabethkingia*

## ENTEROBACTERIACEAE

*Escherichia coli*  
*Klebsiella*  
*Enterobacter*  
*Citrobacter*  
*Serratia*  
*Hafnia*  
*Proteus*  
*Morganella*  
*Providencia*  
*Yersinia*  
*Erwinia*

**Audience question-**  
**How many items make contact with a drain daily?**

**A. none**

**B.1**

**C.2**

**D.3**

**E.6**



- **So testing the water, even if it is done correctly and tests negative does not mean that the clinical hand wash station is safe as it will not exclude the risk from the wastewater system.**
- **are there other risks?**

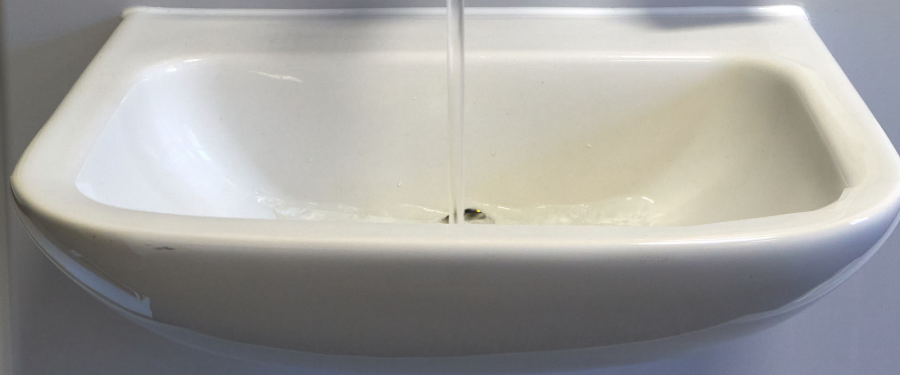


Rinse for a minimum of 5 seconds ensuring all areas are free from residue.  
Dry hands thoroughly using 1-2 paper towels.

Thank You

hand in hand  
Hand hygiene expert  
since 1906

**B BRAUN**  
SARASU DEFENSE



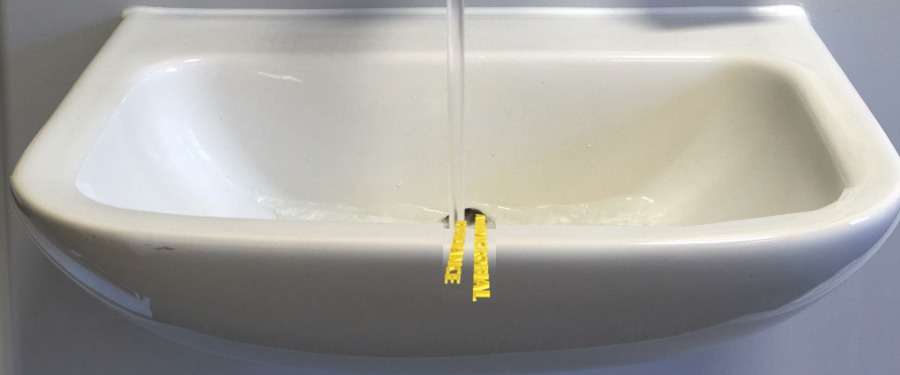


Rinse for a minimum of 5 seconds ensuring all areas are free from residue.  
Dry hands thoroughly using 1-2 paper towels.

Thank You

hand in hand  
Hand hygiene expert  
since 1906

**B BRAUN**  
SANAHEALTH DEFENSE



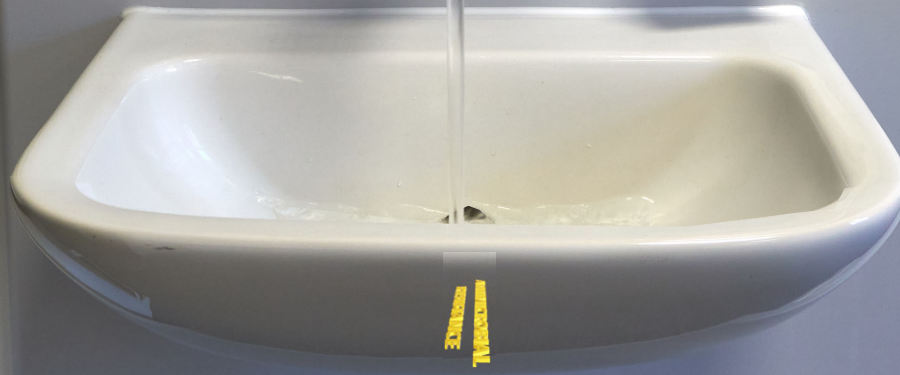


Rinse for a minimum of 5 seconds ensuring all areas are free from residue.  
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Thank You

hand in hand  
Hand hygiene expert  
since 1906

**B BRAUN**  
SARASU DEFENSE





**Audience  
Question**  
**Are any  
other  
risks  
shown  
in  
this image?**

**ANTIMICROBIAL  
RESISTANCE**

**A. yes  
B. no**



**Audience  
Question**  
**Are any  
other  
risks  
shown  
in  
this image?**

**ANTIMICROBIAL  
RESISTANCE**

**A. yes**  
**B. no**



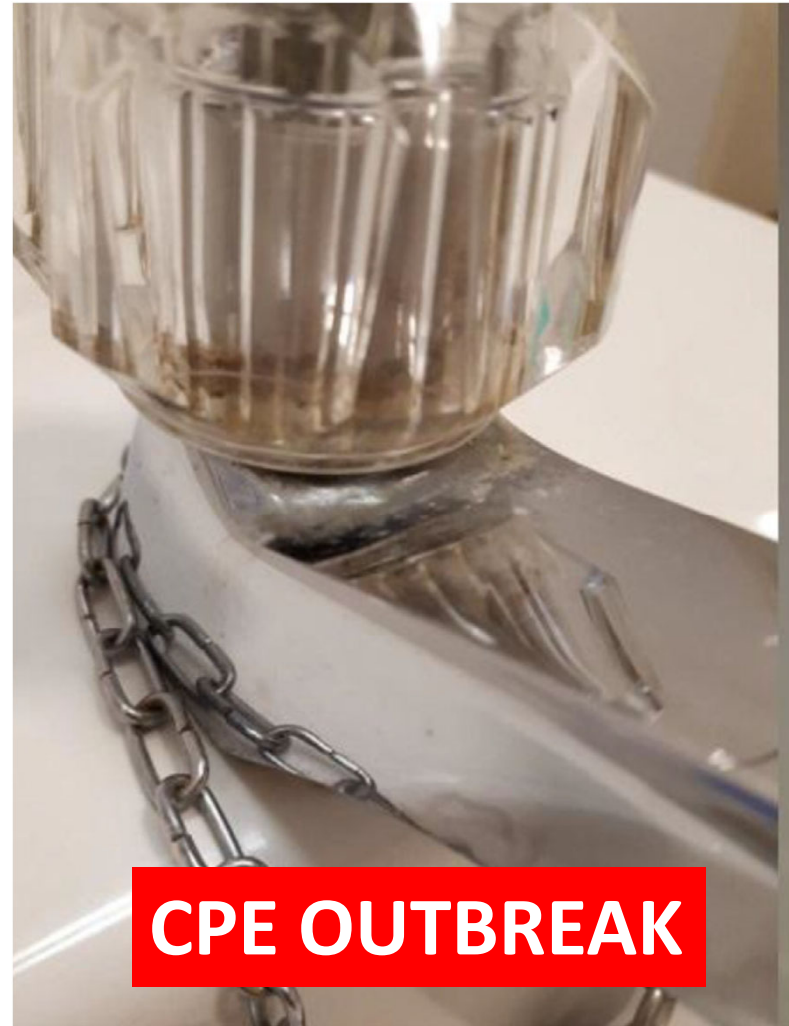




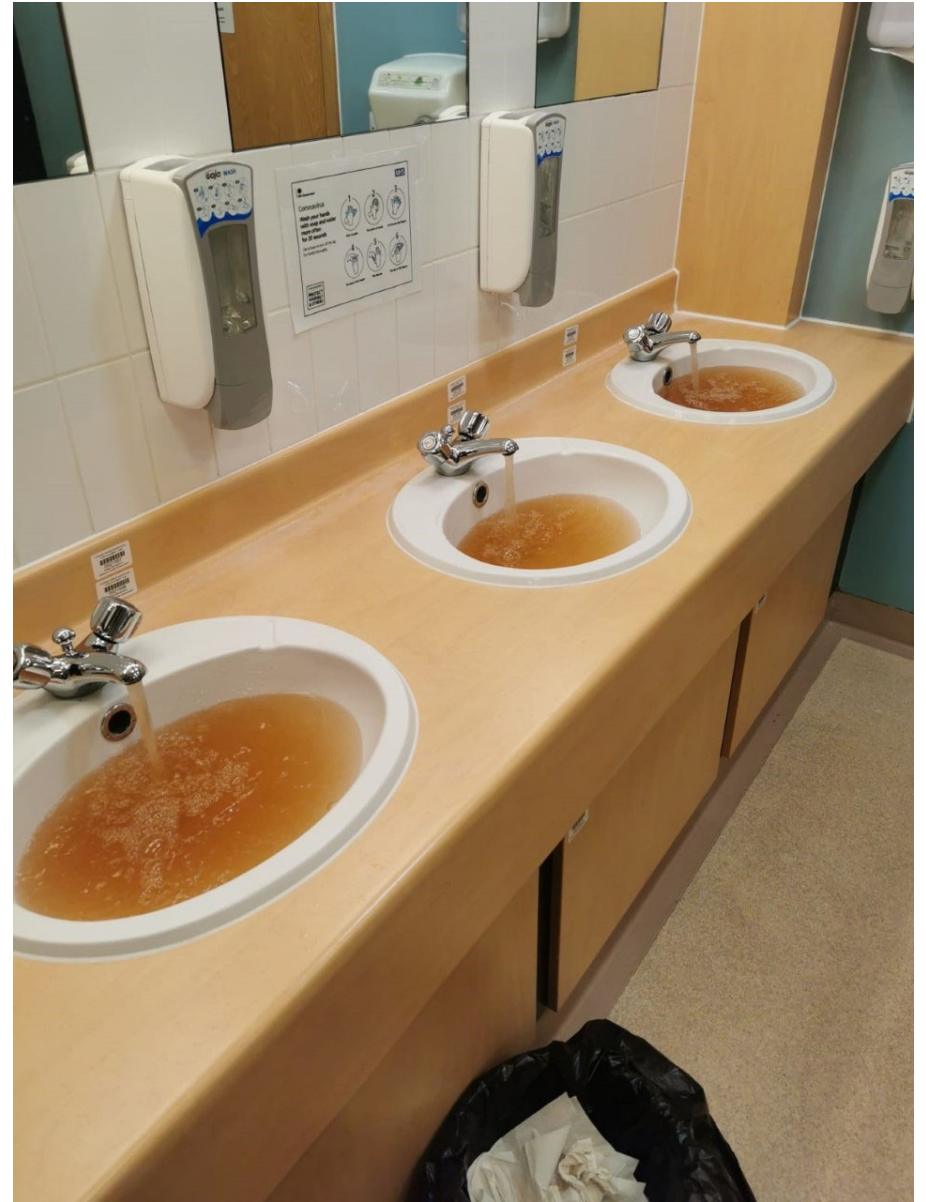
**98% staff  
used hands  
to  
turn on  
outlets**

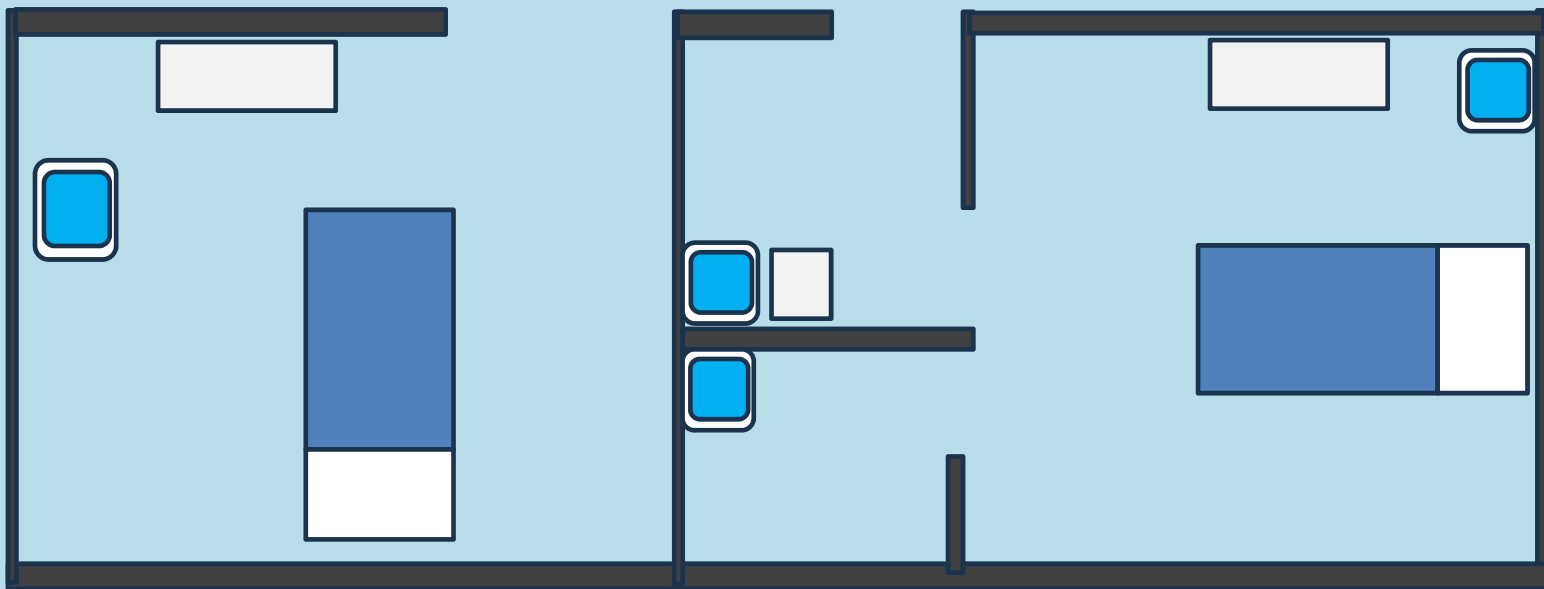
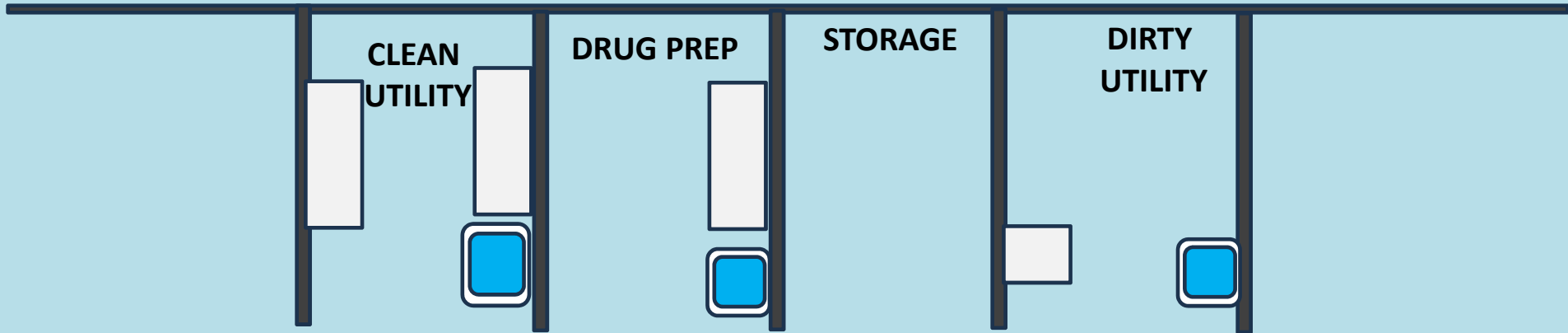


**68% staff  
used hands  
to  
turn off  
outlets**



**CPE OUTBREAK**





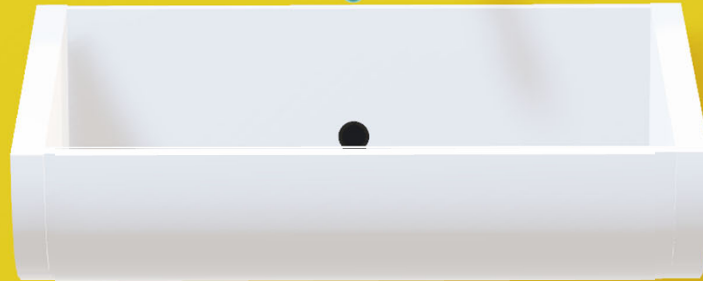
## **Audience question**

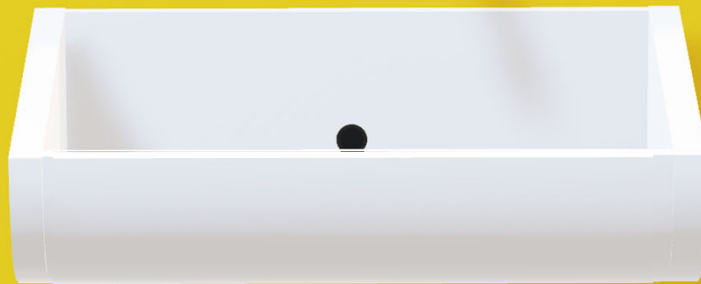
**How far can a splash droplet travel?**

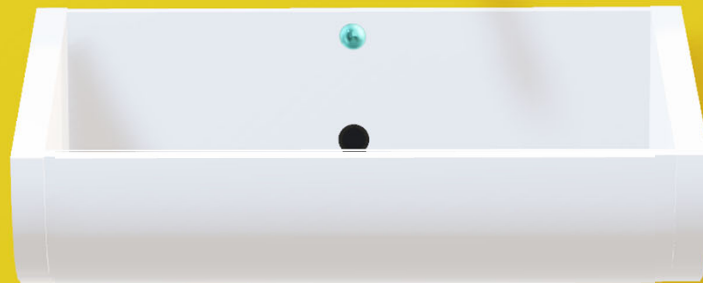
- A. No further than edge of sink**
- B. 0.5 M**
- C. 1.0 M**
- D. 1.5M**
- E.  $\geq 2$  M**

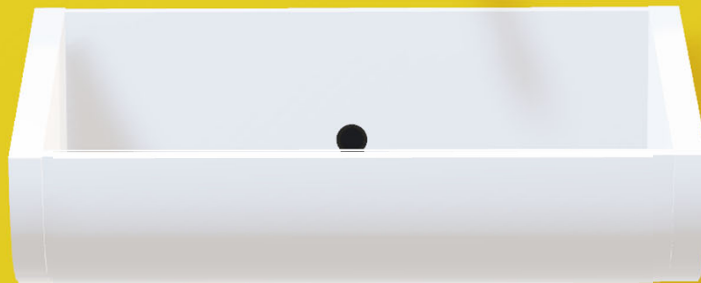
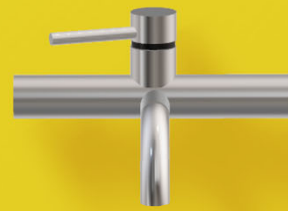


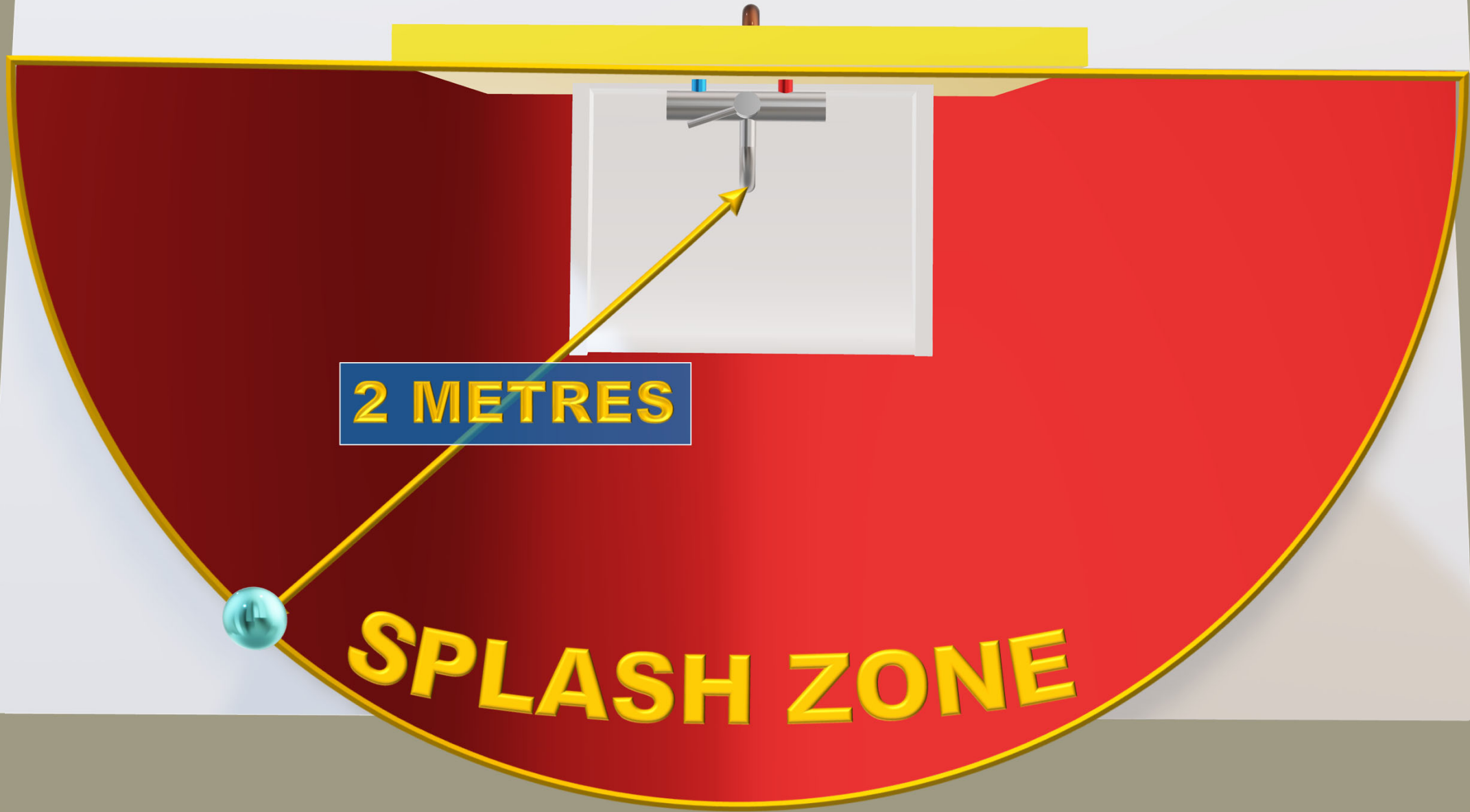






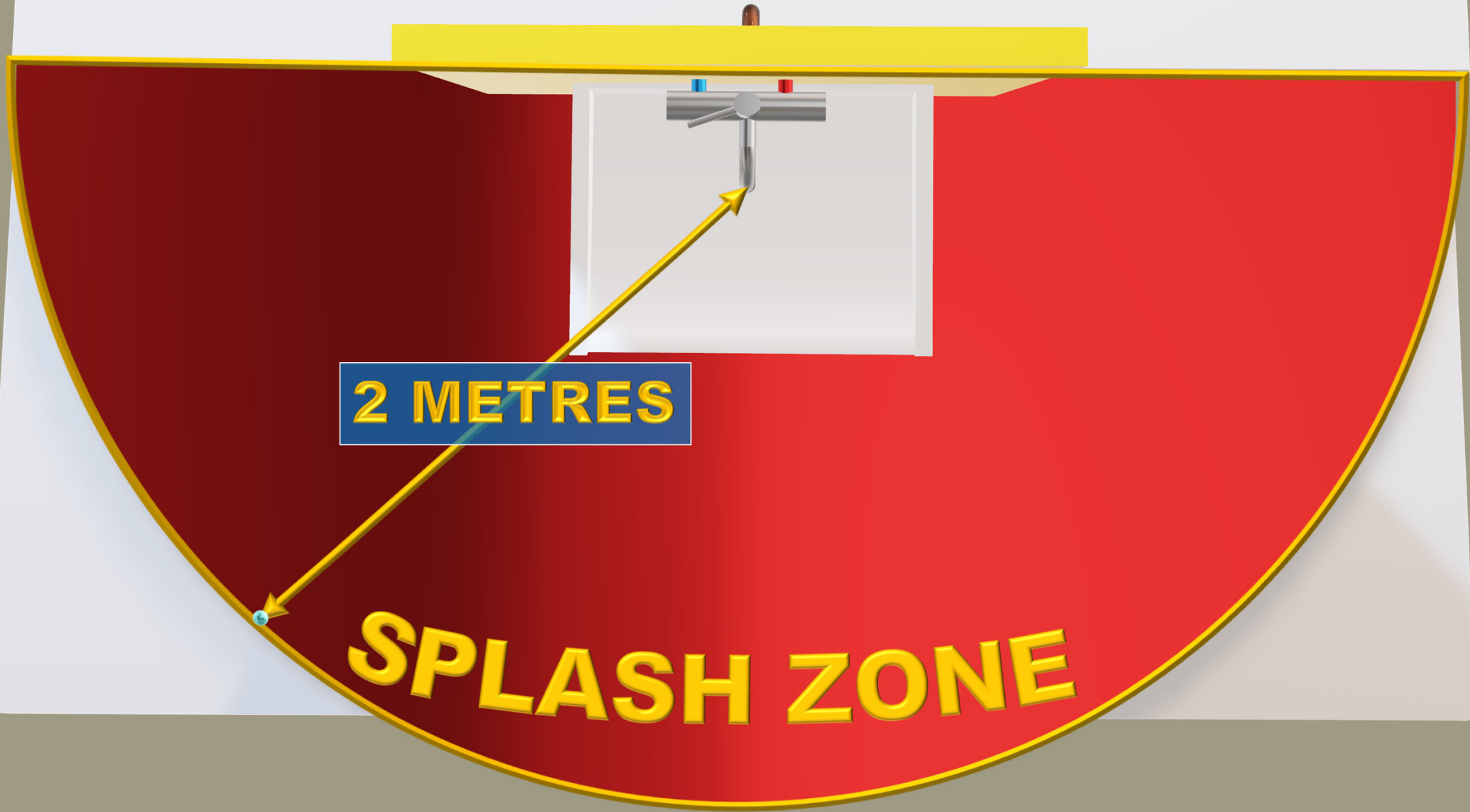






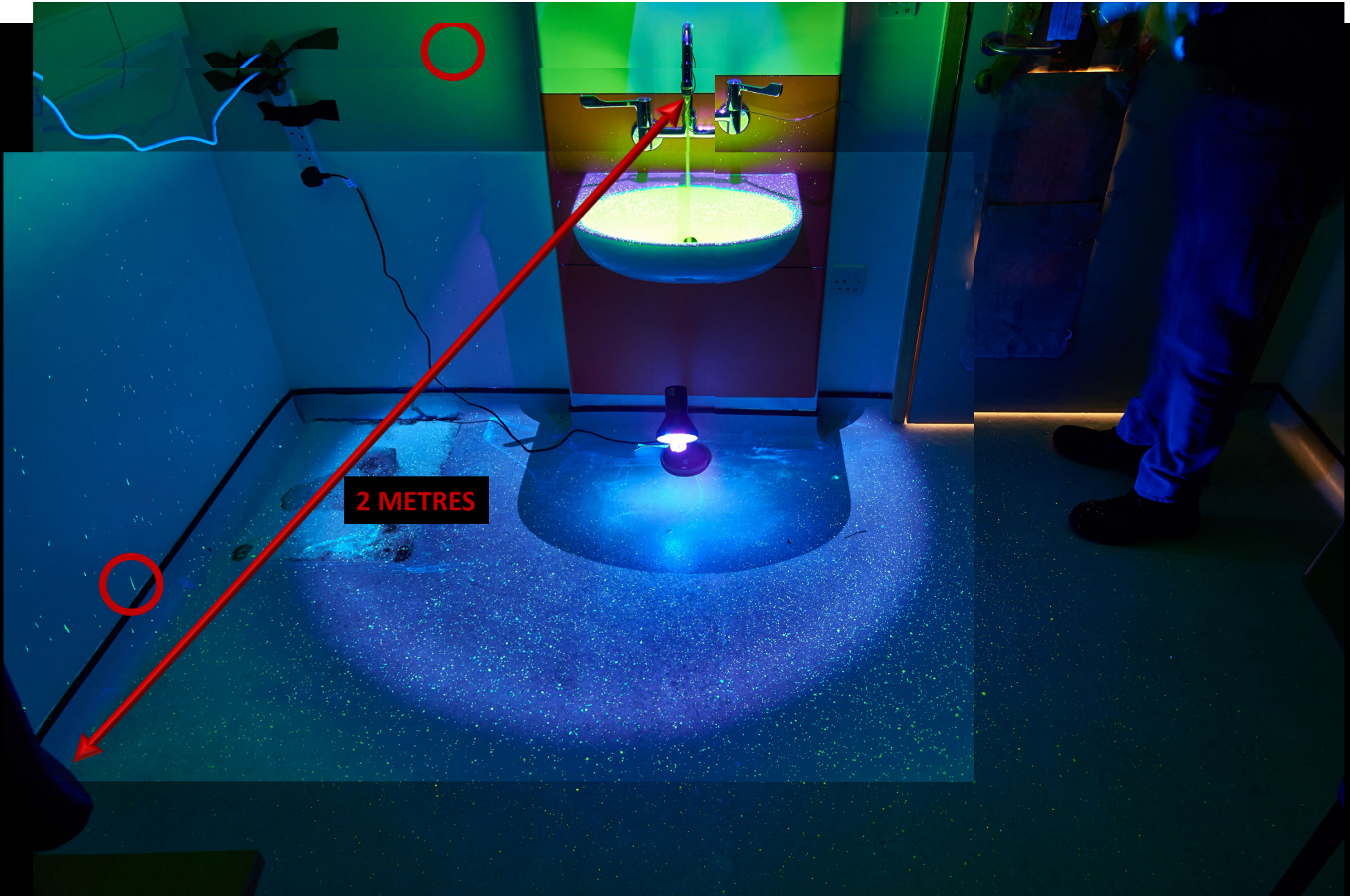
**2 METRES**

**SPLASH ZONE**



**2 METRES**

**SPLASH ZONE**



2 METRES

**Interesting? Relevant?**

**Lack of detection of any patients acquiring infections from water / wastewater.**





**Audience Question-**  
**How good is surveillance at identifying transmission events from water / wastewater?**

**1.EXCELLENT**

**2.GOOD**

**3.MODERATELY GOOD**

**4.POOR**

# *Pseudomonas aeruginosa* infection in augmented care: the molecular ecology and transmission dynamics in four large UK hospitals

F.D. Halstead<sup>a,b,1</sup>, J. Quick<sup>a,c,1</sup>, M. Niebel<sup>a,b</sup>, M. Garvey<sup>a,b</sup>, N. Cumley<sup>a,b</sup>, R. Smith<sup>d</sup>, T. Neal<sup>e</sup>, P. Roberts<sup>e</sup>, K. Hardy<sup>f</sup>, S. Shabir<sup>f</sup>, J.T. Walker<sup>g</sup>, P. Hawkey<sup>b,c,\*</sup>, N.J. Loman<sup>c</sup>

<sup>a</sup>NIHR Surgical Reconstruction and Microbiology Research Centre, Queen Elizabeth Hospital, Birmingham, UK

<sup>b</sup>Department of Clinical Microbiology, Queen Elizabeth Hospital, University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK

<sup>c</sup>Institute of Microbiology and Infection, School of Biosciences, University of Birmingham, Birmingham, UK

<sup>d</sup>Royal Free London NHS Foundation Trust, Hampstead, London, UK

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## ARTICLE INFO

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*P. aeruginosa*

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Transmission

Molecular-ecology

Infections

Augmented-care



## SUMMARY

**Background:** *Pseudomonas aeruginosa* is a common opportunistic pathogen and molecular typing in outbreaks has linked patient acquisition to contaminated hospital water systems.

**Aim:** To elucidate the role of *P. aeruginosa* transmission rates in non-outbreak augmented care settings in the UK.

**Methods:** Over a 16-week period, all water outlets in augmented care units of four hospitals were sampled for *P. aeruginosa* and clinical isolates were collected. Outlet and clinical *P. aeruginosa* isolates underwent whole-genome sequencing (WGS), which with epidemiological data identified acquisition from water as definite (level 1), probable (level 2), possible (level 3), and no evidence (level 4).

**Findings:** Outlets were positive in each hospital on all three occasions: W (16%), X (2.5%), Y (0.9%) and Z (2%); and there were 51 persistently positive outlets in total. WGS identified likely transmission (at levels 1, 2 and 3) from outlets to patients in three hospitals for *P. aeruginosa* positive patients: W (63%), X (54.5%) and Z (26%). According to the criteria (intimate epidemiological link and no phylogenetic distance), approximately 5% of patients in the study 'definitely' acquired their *P. aeruginosa* from their water outlets in the intensive care unit. This study found extensive evidence of transmission from the outlet to the patients particularly in the newest hospital (W), which had the highest rate of positive outlets.

Journal Pre-proof

Sinks in patient rooms in the ICU are associated with higher rates of hospital-acquired infections. A retrospective analysis of 552 ICUs.

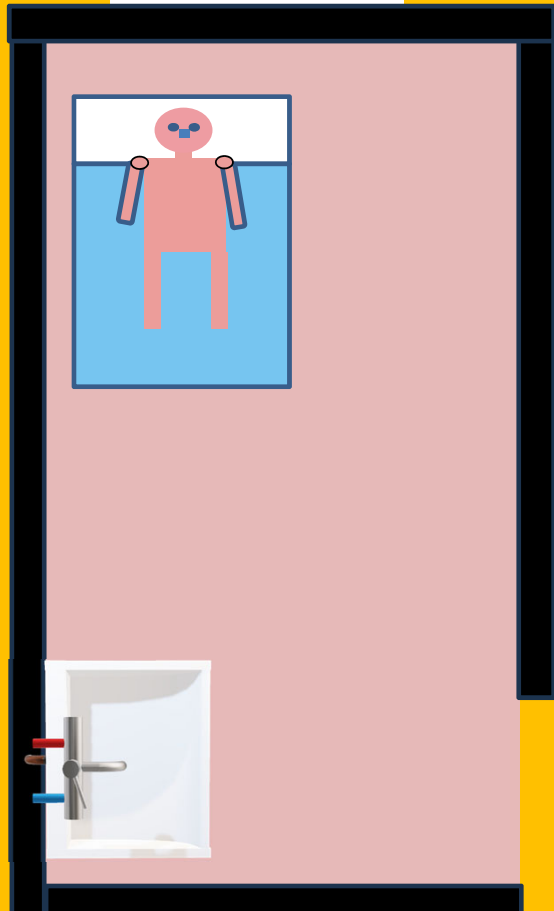
**Authors:** Giovanni-Battista FUCINI<sup>1,2</sup>; Christine GEFERS<sup>1,2</sup>; Frank SCHWAB<sup>1,2</sup>; Michael BEHNKE<sup>1,2</sup>; Wolfgang SUNDER<sup>3</sup>; Julia MOELLMANN<sup>3</sup>; Petra GASTMEIER<sup>1,2</sup>

factor for HAI (aIRR 1.21, 95%CI 1.01-1.45). **Conclusions:** Sinks in patient rooms are

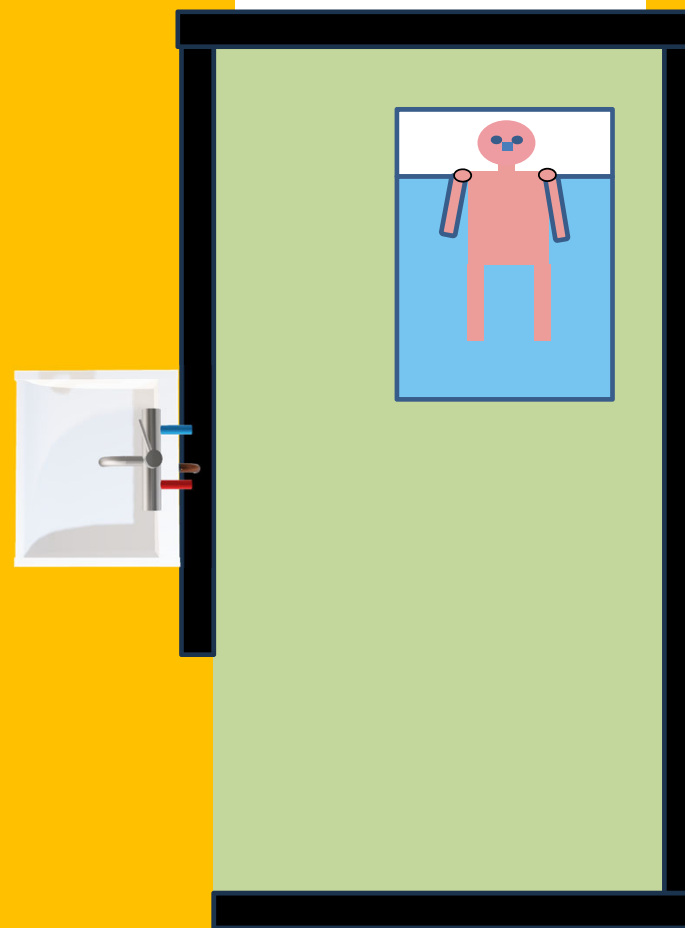
associated with a higher number of hospital-acquired infections per patient day in the ICU.

This should be considered when planning new ICUs or renovating existing ones.

**ITU ROOM A  
SINK IN ROOM**

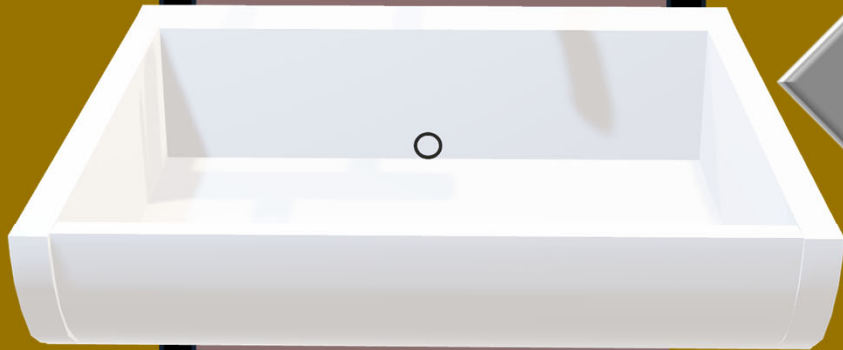
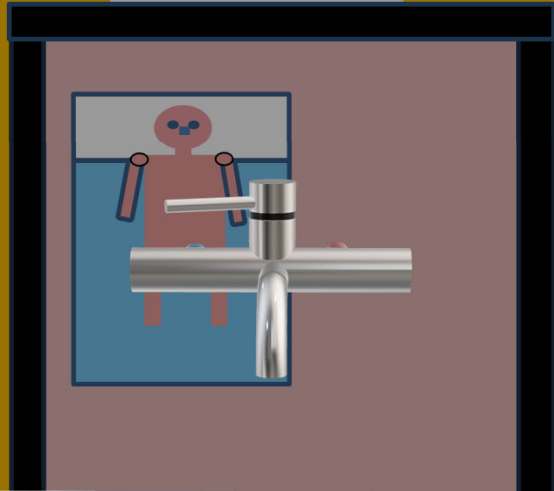


**ITU ROOM B  
SINK OUTSIDE ROOM**



**STATISTICALLY SIGNIFICANT  
INCREASED RATE OF HCAI  
PSEUDOMONAS INFECTION**

ITU ROOM A  
SINK IN ROOM



**STATISTICALLY SIGNIFICANT  
INCREASED RATE OF HCAI  
PSEUDOMONAS INFECTION**

ITU ROOM B  
SINK OUTSIDE ROOM



**THIS  
DEVICE  
HARMS  
KILLS  
PATIENTS**



Hopman *et al. Antimicrobial Resistance and Infection Control* (2017) 6:59  
DOI 10.1186/s13756-017-0213-0

Antimicrobial Resistance  
and Infection Control

RESEARCH

Open Access

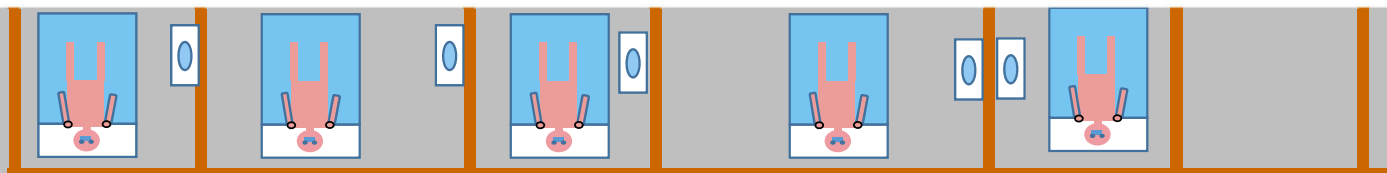


# Reduced rate of intensive care unit acquired gram-negative bacilli after

**Segmented regression analysis showed that the intervention was followed by a statistically significant Immediate reduction in Gram negative bacillus colonization**

## 'water-free' patient care

Joost Hopman<sup>1\*†</sup>, Alma Tostmann<sup>1†</sup>, Heiman Wertheim<sup>1</sup>, Maria Bos<sup>1</sup>, Eva Kolwijck<sup>1</sup>, Reinier Akkermans<sup>3</sup>,  
Patrick Sturm<sup>1,4</sup>, Andreas Voss<sup>1,2</sup>, Peter Pickkers<sup>5</sup> and Hans vd Hoeven<sup>5</sup>



Which is the most **dangerous**?



A GUN IN THE UK

OR



A CLINICAL HAND  
WASH STATION

# Which is the most **dangerous?**



**A GUN IN THE UK**



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Research Briefing

### Firearm Crime Statistics: England & Wales

Published Thursday, 04 August, 2022

Research Briefing Crime

Grohome Allen Matthew Burton

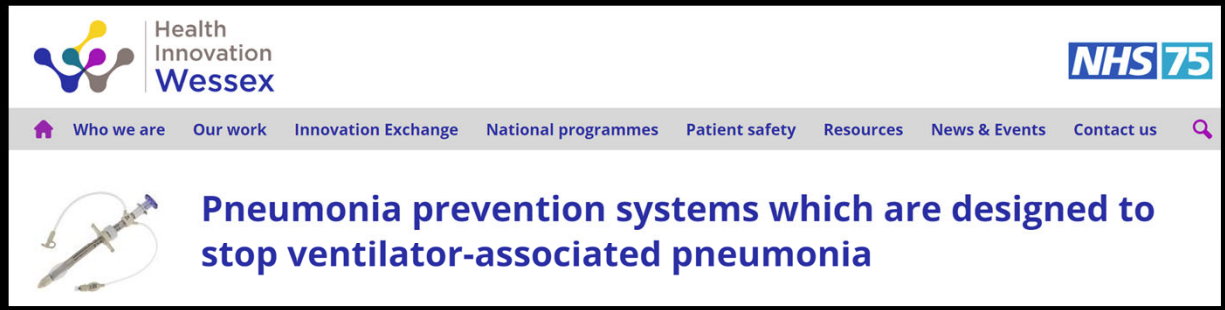
This briefing looks at statistics on gun crime in England and Wales. It uses police data to evaluate trends over time and to compare crime between police force areas, with a focus on gun crime in London. Type of offence and type of weapon used are also analysed, as is the ethnicity of victims.

**Homicide**

The most recent data suggests that there were [35 homicides committed by shooting](#) in the year ending 31 March 2021 – 6% of all homicides. Of these 35 victims, 11% were female and 89% were male.

**OR**

**A CLINICAL HAND WASH STATION**




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### Pneumonia prevention systems which are designed to stop ventilator-associated pneumonia



100,000 patients are admitted for ventilation in the UK critical care units each year and 10-20% will go on to develop ventilator-associated pneumonia (VAP). Between 3,000 and 6,000 people die from this type of pneumonia every year and prevention would save many lives. Treating VAP costs the NHS between £10,000 – £20,000 per patient and conservative estimates for prevention are savings to the NHS of over £100 million.

The most **dangerous** is

THE CLINICAL HAND  
WASH STATION







