
 Healthcare Infection Society

Risks and Competing Priorities in Water Management

Karren Staniforth, Clinical Scientist
Nottingham University Hospitals, UK

www.his.org.uk
@HIS_infection




Overview, Aims and Conflicts of Interest

The presenter: a Clinical Scientist working within the Infection Prevention and Control Team of a large teaching hospital in the UK

The Approach and aim of this presentation is to demonstrate, through various examples, evidence that:

- Potentially infectious organisms are present wherever there is water (unless this is sterile, which in most cases it is not)
- Eradication of these risks may not be possible or may depend on actions which produce undesirable consequences
- Decisions around water management may not be easy or clear-cut; forcing us to balance conflicting risks
- Whilst general principles are discussed every situation will be different

The presenter has no conflicts of interest to declare





Nottingham University Hospitals



Queen's Medical Centre **Nottingham City Campus**



Healthcare Infection Society

Nottingham University Hospitals


<https://www.nuh.nhs.uk> says

- Serves 2.5 million residents
- ~15,000 staff
- ~ 90 Wards
- ~ 1,700 beds
- ~ 50 Operating Theatres
- 3 sites, City Campus, QMC Campus, Rope Walk
- Annual income of £824million (NHS Choices 2017)

- Plus 3-4 million for regional specialist units:

- Stoke, Renal, Neurology, Cancer Services, Major Trauma, Burns and Plastics, Orthopaedics, Cardiac Surgery, Haematology and BMT, Obstetrics and two neonatal units
- QMC incorporates the Nottingham Children's Hospital


www.his.org.uk
@HIS_infection



Jimma University Hospital, Ethiopia

NUH has had a partnership with The Jimma University Hospital, since 1993 and many staff have visited to share ideas

This is Christine (NUH Infection Prevention & Control Nurse) learning about water management at the Jimma University Hospital

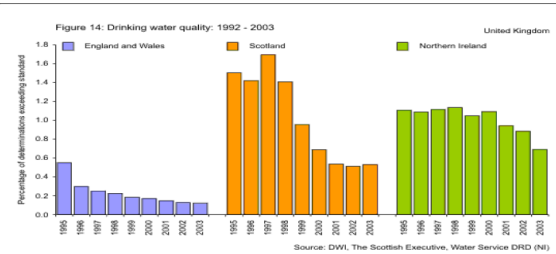


Healthcare Infection Society

Healthcare Infection Society

"Safe to Drink" – Not Sterile!

Figure 14: Drinking water quality: 1992 - 2003



| Year | England and Wales (%) | Scotland (%) | Northern Ireland (%) |
|------|-----------------------|--------------|----------------------|
| 1992 | 0.5 | 1.4 | 1.1 |
| 1993 | 0.3 | 1.5 | 1.1 |
| 1994 | 0.3 | 1.4 | 1.1 |
| 1995 | 0.3 | 1.4 | 1.1 |
| 1996 | 0.3 | 1.4 | 1.1 |
| 1997 | 0.3 | 1.4 | 1.1 |
| 1998 | 0.3 | 1.4 | 1.1 |
| 1999 | 0.3 | 1.4 | 1.1 |
| 2000 | 0.3 | 1.4 | 1.1 |
| 2001 | 0.3 | 1.4 | 1.1 |
| 2002 | 0.3 | 1.4 | 1.1 |
| 2003 | 0.3 | 1.4 | 1.1 |

Source: DWI, The Scottish Executive, Water Service DRD (NI)

www.his.org.uk
@HIS_infection

Healthcare Infection Society

Prolonged Outbreak of *Mycobacterium chimaera* Infection After Open-Chest Heart Surgery

Hugo Sax,^{1,2} Guido Ehrenborg,^{1,2} Barbara Neume,^{1,2} Rami Sommerstein,¹ Philipp Kohler,¹ Yvonne Achermann,¹ Matthias Nitsch,¹ Volkeren Park,¹ Stefan P. Keller,¹ Erik C. Schlegel,^{1,2} and Rainer Weber,^{1,2}

¹Unit of Infectious Diseases and Hospital Epidemiology, University Hospital Zurich, ²Institute of Medical Microbiology, National Centre for Mycobacteria, University of Zurich, ³Division of Surgical Pathology, and ⁴Division of Cardiac Surgery, University Hospital Zurich, Switzerland

Background: Recurrent *Mycobacterium chimaera* infections were diagnosed in 2012 in 2 heart surgery patients on bypass circulation. We launched an outbreak investigation to identify the source and extent of the potential nosocomial transmission.

GOV.UK

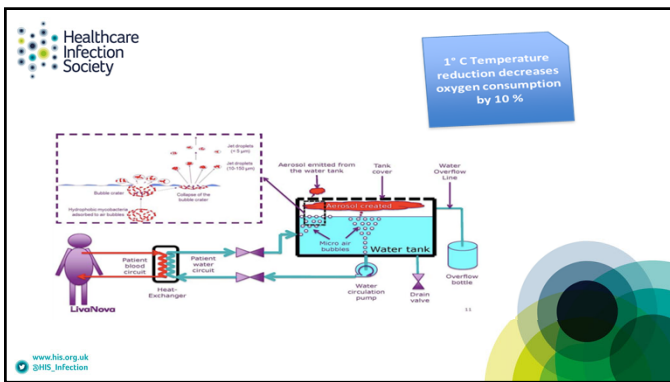
Health and social care Health collection Infectious diseases

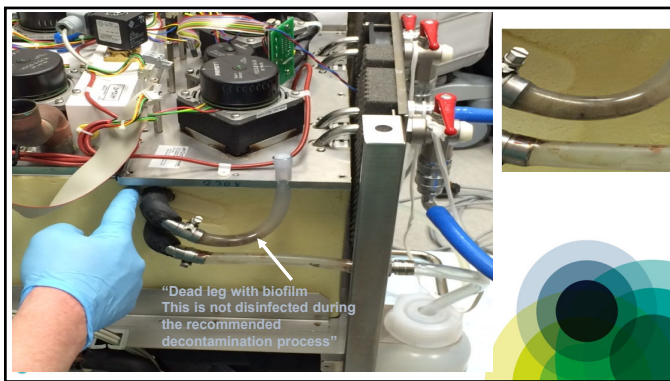
Collection

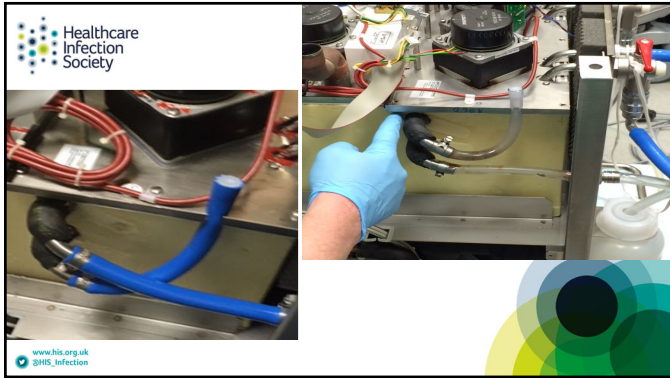
Mycobacterium chimaera: Infections linked to heater cooler units

Guidance for healthcare professionals on infection control and clinical aspects of *M. chimaera* infection associated with cardiopulmonary bypass.

www.his.org.uk
BHSI_infection







Healthcare Infection Society

Biofilm is a risk in all water based heating and cooling systems

"Surgery is not risk free" And "Life will find a way"

But failure to modulate temperature during surgery is also a risk...

www.his.org.uk
@HIS_infection

Healthcare Infection Society

Should cardiac Surgery stop? Risk based approach

Cardiac Surgery commenced in Nottingham in 1995

www.his.org.uk
@HIS_infection

Healthcare Infection Society

NEWS BRISTOL

9 October 2012 Last updated at 20:41

Baby dies in Southmead Hospital pseudomonas outbreak

A premature baby died and 12 others were given treatment after an outbreak of a water-borne bacterium at a Bristol neonatal unit, it has been confirmed.

Southmead Hospital said it had found traces of pseudomonas aeruginosa in the water system for its neonatal intensive care unit.

The hospital said the baby died in August after contracting the bacterium.

Filters have been fitted to the unit's water system

Four babies died after contracting the bug in hospitals in Northern Ireland in December and January.

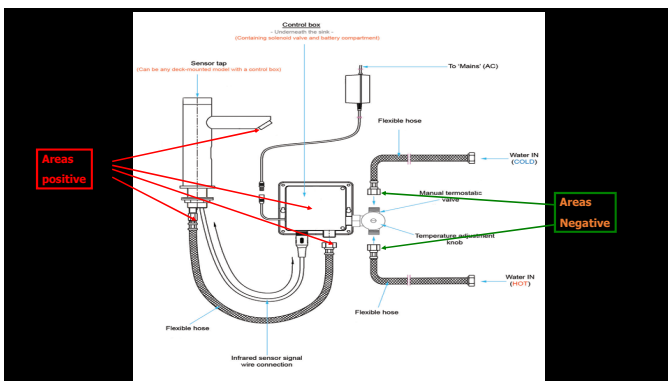
It was also found at the Norfolk and Norwich University Hospital in March.

www.his.org.uk
@HIS_infection

Legionella 1976
Mycobacteria 2012
Pseudomonas 2012

Healthcare Infection Society

www.his.org.uk
@HIS_infection



Healthcare Infection Society

Is it just "Older hospitals?"

Garvey et al., J Hosp Infect 2018

www.his.org.uk
@HIS_infection

Healthcare Infection Society

The "Hand-Wash Only" WHB

Pseudomonas aeruginosa POSITIVE

But it is not just about engineering - out the problems

www.his.org.uk
@HIS_infection

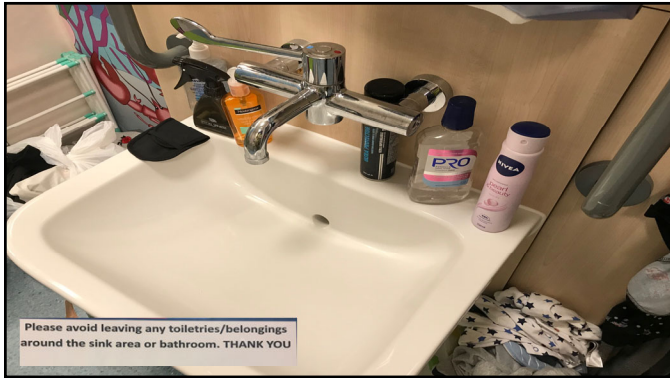
Healthcare Infection Society

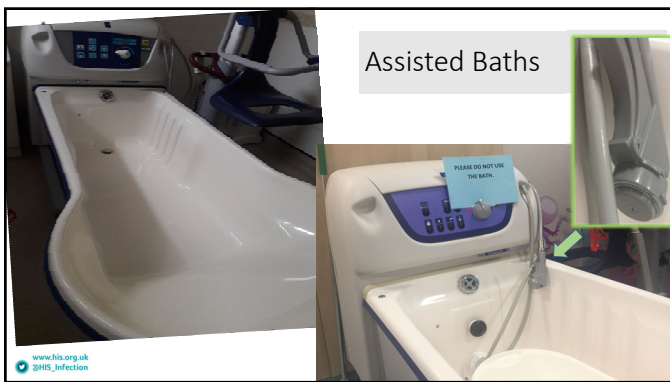
SINK FOR HAND WASHING ONLY

Please avoid leaving any toiletries/belongings around the sink area or bathroom. THANK YOU

Teeth cleaning and mouth care

DO NOT USE TAP WATER FOR RINSING TOOTHBRUSH DO NOT SPIT INTO BATHROOM SINKS





Healthcare Infection Society

Burns Hydrotherapy

"Our burns patients are contaminated with dirty water before they are admitted"

www.his.org.uk
@HIS_infection

Healthcare Infection Society

What about the waste pipes?

Garvey Ml et al., J Hosp Infect 2017; De Geyter et al., Antimicrobial Resist Infect Control 2017

www.his.org.uk
@HIS_infection

Healthcare Infection Society

Are there places where sinks add more risk?

www.his.org.uk
@HIS_infection

Healthcare Infection Society

Shower Drains

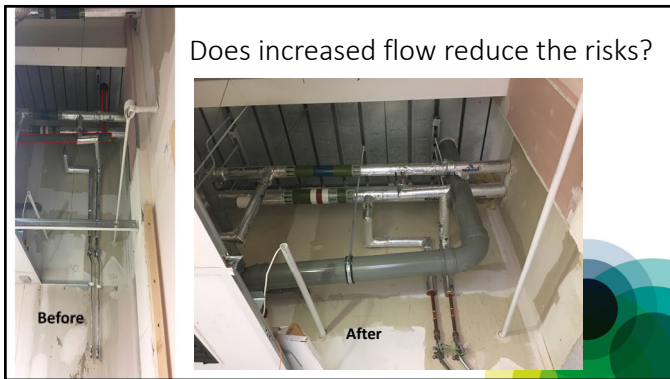
| Results | |
|---------|----------------------|
| 1) | Enterobacter cloacae |
| | Amikacin (R) |
| | Ampicillin (R) |
| | Co-amoxiclav (R) |
| | Cefazidime (R) |
| | Cefuroxime (R) |
| | Ceftazidime (R) |
| | Ciprofloxacin (R) |
| | Ertapenem (R) |
| | Gentamicin (R) |
| | Meropenem (R) |
| | Piptazobactam (R) |
| | Trimethoprim (R) |

New Delhi Metallo-beta-lactamase (NDM) enzyme detected.

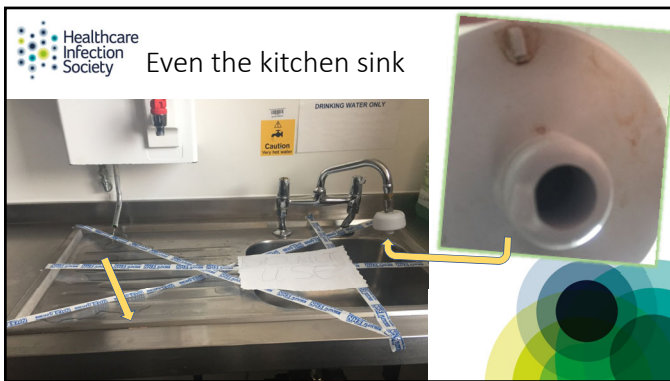
IMPORTANT
Please let a member of staff know if your shower is not draining

Legionella 1976
Mycobacteria 2012
Pseudomonas 2012
CRE / CPE 2016

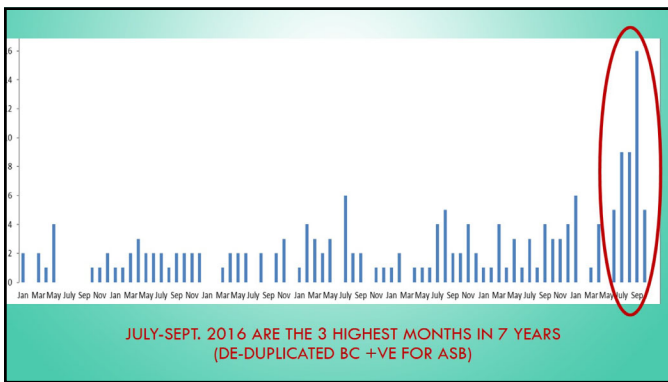
www.his.org.uk
@HIS_infection














Healthcare Infection Society **Balancing our risks** 



Life saving surgery **with** an increased risk of infection (and patient consent)


Patient safety **or** pain relief (baths and bubble tubes)

Automated cleaning **versus** labour intensive mopping

Clean sheets **or** clean looking sheets and heating etc.


www.his.org.uk
@HIS_infection





Healthcare Infection Society **Basic Principles** 

- People need clean safe water, bacteria are less exacting and will contaminate anything which contains water
- Water which is safe to drink is not usually sterile
- Keep things simple
- Keep things clean
- Consider hygienic design and maintenance requirements
- Do not buy, borrow, accept or install anything which you can't keep clean and in good working order
- Know your most vulnerable patients?

www.his.org.uk
@HIS_infection





Healthcare Infection Society **Summary** 

- However rapidly we adapt our environment the microbes will easily keep up
- Antimicrobial resistance makes water management (and cleaning) more important then ever but...
 - Resistant organisms could be the key
 - Highlighting** routes of transmission which historically went unnoticed

If the water is not safe then stick to alcohol:-
Can we design-out our non-essential water risks...


www.his.org.uk
@HIS_infection



 **Acknowledgements**

- Healthcare Infection Society
- Team NUH, Nottingham University Hospitals, UK
 - John Campbell, Chief Percussionist
 - Natalie Vaughan & The Infection Prevention & Control Team
 - Estate & Facilities Staff
- Mark Garvey – Queen Elizabeth Hospital, Birmingham, UK

www.his.org.uk
@HIS_infection



Thank you

