Achieving safe, compliant water services in healthcare new builds and refurbishments – easier said than done!

Mary Ashcroft
Consultant Microbiologist
Worcester Acute NHS Trust
Water, sanitation and hygiene in health care facilities
Status in low- and middle-income countries and way forward
Water, Sanitation and Hygiene

• 2015 – first multi-country audit of WASH provision in 54 countries

• Data from 54 countries, representing 66,101 facilities show that:
  – 38% of health care facilities do not have an improved water source
  – 19% do not have improved sanitation
  – 35% do not have water and soap for handwashing.

• Director General of the World Health Organization (WHO) has declared that improving WASH in health care facilities is an urgent priority

• A proposed target of universal basic coverage of WASH in health care facilities by 2030 has been recommended for inclusion in post-2015 UN Sustainable Development Goals
Death toll from Legionnaires' disease in Lisbon hospital up at 4

LISBON (Reuters) - The death toll from an outbreak of Legionnaires’ disease in a large Lisbon hospital doubled to four on Friday, Portugal’s health authority DGS said, but the number of new cases being discovered appeared to subside.

The severe form of pneumonia has made another 40 people sick since it was detected on Oct. 31 at the Sào Francisco Xavier hospital in Lisbon’s western Restelo area and six were in intensive care.

The peak of the outbreak was last Saturday when 13 new cases were discovered, while in the past few days new cases amounted to 3-4 a day and so far just one on Friday, DGS data showed.
Basildon Hospital fined over Legionnaires' disease deaths

4 September 2013

Basildon Hospital said it had spent £3m trying to control the legionella bacteria.

A hospital where two patients died from Legionnaires' disease has been ordered to pay £360,000 in fines and costs.

Chelmsford Crown Court heard the patients died in 2012 and 2013 after contracting Legionnaires' disease from water systems.
Timeline: Pseudomonas outbreak in Londonderry and Belfast

5 April 2012

Four babies have died from an outbreak of pseudomonas aeruginosa in Northern Ireland.

One died at a Londonderry hospital, three others in Belfast.

Here is a chronology of events, according to the Regulation and Quality Improvement Authority which has carried out a review.

Altnagelvin Hospital, Londonderry
Easier said than done?

- Achieving safe compliant water services within healthcare new builds and refurbishments remains extremely challenging.
- The role of the microbiologist/infection control team is pivotal in this often protracted process
- Continued communication from design to handover is key.
- Opportunity to make a difference and avoid mistakes still being made today
- Know the relevant guidance
- Get it right first time!
Main aim of any design and subsequent new build or refurbishment:

- Have systems in place to ensure no increase in the potential of bacterial growth and proliferation

- Minimise risk to patients and staff from water related pathogens
Seven key areas:

- Design
- Pre-construction
- Construction
- Installation
- Commissioning
- Handover
- On-going operational
Legionnaires’ disease
The control of legionella bacteria in water systems

Approved Code of Practice and guidance on regulations
L8 ACoP: 4th edition 2013

• This book is aimed at dutyholders, including employers, those in control of premises and those with health and safety responsibilities for others.

• To help them comply with their legal duties in relation to legionella.

• Designers, manufacturers, importers, suppliers and installers of water systems that may create a risk of exposure to legionella bacteria, must:

• Ensure, so far as is reasonably practicable, that the water system is so designed and constructed that it will be safe and without risks to health when used at work;
There are a number of factors that create a risk of someone acquiring legionellosis:

- the presence of legionella bacteria;
- conditions suitable for growth of the organisms, eg suitable water temperature (20 °C–45 °C) and deposits that are a source of nutrients for the organism, such as sludge, scale, rust, algae, other organic matter and biofilms;
- a means of creating and spreading breathable droplets, eg the aerosol generated by cooling towers, showers or spa pools;
- the presence (and numbers) of people who may be exposed, especially in premises where occupants are particularly vulnerable, eg healthcare, residential and nursing homes.
Legionnaires Disease: Technical Guidance HSG 274. Parts 1-3 2014

• Part 1: The control of legionella bacteria in evaporative cooling systems
• Part 2: The control of legionella bacteria in hot and cold water systems
• Part 3: The control of legionella bacteria in other risk systems
• Types and application of hot and cold water systems
• Water system design and commissioning
• Operation and inspection of hot and cold water systems
• Water treatment and control programmes for hot and cold water systems
• Microbiological monitoring
• Cleaning and disinfection
• Shared premises and residential accommodation: Landlords
• Special considerations for healthcare and care homes
Keep the hot water hot

Keep the cold water cold

Keep the water moving
Part 3: The control of legionella bacteria in other risk systems

There are other risk systems that may produce aerosols, thus posing a foreseeable risk of exposure to legionella.

- water softeners;
- emergency showers, eyebaths and face wash fountains;
- sprinkler and hose reel systems;
- vehicle washers including automatic washers for cars, buses, lorries and railway rolling stock;
- powered dental equipment;
- fountains and decorative water features including those on display for sale;
- non-disposable nebulisers used for respiratory therapy;
- irrigation systems;
- fire, dust and odour suppression systems;
- tunnel pasteurisers and similar equipment
HTM 04-01 Safe Water in healthcare premises

- Part A: Design, installation and commissioning
- Part B: Operational Management
- Part C: Pseudomonas aeruginosa – advice for augmented care units
- Supplement: Performance specification D 08 – thermostatic mixing valves healthcare premises
Keep the hot water hot

Keep the cold water cold

Keep the water moving
Health Technical Memorandum 04-01: Safe water in healthcare premises

Part C: Pseudomonas aeruginosa – advice for augmented care units
This document identifies methodologies to \textit{control} and \textit{minimise} the risks of morbidity and mortality due to \textit{P. aeruginosa} associated with water outlets.

It provides guidance on:

- considerations for water outlets and hot and cold water services in augmented care settings;
- protecting augmented care patients and ensuring a safe environment;
- methods of cleaning wash-hand basins and other good hygiene practices to minimise the risk of \textit{P. aeruginosa} contamination
• But more important than reading all this.........
Multi-disciplinary team working!
Understand the structure of the organisation

- **PFI**
  - SPC/V
  - Hard and Soft Service Providers
  - Trust Estates
  - Infection Prevention

- **Non-PFI**
  - Trust Capital Estates
  - Trust Operational Estates
  - Trust Infection Prevention
Design

• What is the purpose of the building?
• What services will it house?
• What patient group?
• Will this be augmented care?
• Will there be an RO plant?
• Meet the architects … do not make assumptions …
• Engineer out potential problems – not create them!
• In the design spec state what microbiological water parameters you require
• Will additional water treatment be needed
• Has the number of outlets been considered
• Relevant stakeholders involved
• Must be governed by Trust Water Safety Plan
Worcestershire Acute Hospitals NHS Trust

TRUST WIDE - WATER SAFETY GROUP

Agenda

28th November 2017
10.30am – 12.30pm

Claires/Northwick Meeting Room, 1st Floor, Kings Court

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Future Meetings
13th December 2017 – 10am – 12noon
Design Primary Considerations

• To ensure the primary supply is as good as possible
• To provide adequate treatment if supply is not good
• To ensure that all fittings and material do not increase the potential for microbial proliferation and growth
• Ensure easy access for maintenance and testing
Type of water outlets
HTM 04-01 part C

• There is some evidence that the more complex the design of the outlet assembly (for example, some sensor-operated taps), the more prone to *P. aeruginosa* colonisation the outlet may be.

• This choice should be based on a risk assessment of infection-control and scalding issues.

• TMVs should be fitted where risk assessment has shown vulnerable patients are at risk of scalding.
A TMV that is integral to the body of the tap/shower is preferred, as it is designed to always draw cold water through every time the outlet is used, thus helping to minimise the risk of stagnation.
• Owing to their high surface-area-to-volume ratio and location at the tap outlet ......present a greater surface area for colonisation and support the growth of organisms ......where possible flow straighteners and aerators should be avoided
Pre-construction:

• Advice for contractors – get the basics right
• Have all relevant parties received, read and understood the necessary sections of the Trust Water Safety Plan
• Advise when RA needed
• Fittings – are they appropriate, WRAS accredited, watch out for any alerts
WRAS Product and Materials Approvals

In this section you can search for existing Product and Material approvals and download resources for existing and secondary applications. Please choose from the options on the left hand side of this page.
### Estates & Facilities Alert

**Ref. DH (2010) 03**

**Gateway Ref. 14265**

**Immediate Action**

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**Issued:** 05/05/2010  
**Action underway by:** 24/05/2010  
**Action completed by:** 30/11/2010

#### Equipment: Flexible Water Supply Hoses

**Problem:**
When used for the supply of potable water, flexible hoses may have an enhanced risk of harbouring Legionella bacteria and other potentially harmful microorganisms.

**Action:**
Flexible hoses used in potable water supply systems should be identified and risk assessed for the possibility of contamination with harmful microorganisms.

**Action by:**
Chief Executive/Board Member with special responsibility for health and safety. In accordance with local procedures, should ensure that this alert is brought to the attention of appropriate staff which may include:
- Liaison Officers
- Risk Managers
- Health & Safety Officers/Advisors
- Critical Governance Leads
- Estates Managers
- Director of Mental Health

**Contacts:**
Questions should quote reference number DH (2010) 03 and be addressed to:

Department of Health
Estates & Facilities Division 3N12
Cullerly House
Cullerly Hill
JAERS
L32 7UE

Email: projects.east@cymru.dh.gov.uk

This Alert is on our web site: http://www.dh.gov.uk
Advice for contractors:

• Only installers with the appropriate qualifications, regulatory knowledge and competence should be used to install and maintain water installations
• Separate clothing and tools should be used for non-wholesome systems/ domestic H&C water systems
• Tools must be kept clean at all times
• All new pipework and fittings must be disinfected prior to use
• All pipework must be stored off the floor with ends covered
• Use of gloves & hand gel
• Use of WRAS approved jointing compounds
Construction

- Visit the site!
- Clark-of works
- Is the construction the same as the plans
- Are the pipes being lagged, are they co-located
- Are the pipes in an area that although meets design spec may increase thermal gain
- Are contractors following Trust policy on practices
Design
Pre-construction
Construction
Installation
Commissioning
Handover
On-going operational
Installation

- Each stage of installation needs verifying and ratifying that it is compliant with all stipulated requirements
- Have appropriate fittings and material been used
- Have all strainers, filters and taps been cleaned correctly
- Are the fitting easily accessible for maintenance/testing
- Are there sufficient access points for testing
- Is there an accurate schematic – match reality - not just plans!
- Risk assessments for Legionella (all areas) and Pseudomonas aeruginosa (augmented care) required before the system is filled with water from any source
- How has the system been pressure tested?
- If wetted – need to plan immediate flushing and records
UHCW
8000 outlets
3 main towers
Installation

- How have the fittings been tested by the manufacturers?
- How have they been stored?
- Have fittings been dip-tested prior to fitting?
- Are they then bagged post fitting and chlorination to ensure clean?
On-going operational
Handover
Commissioning
Installation
Construction
Pre-construction
Design
Commissioning

• Correct commissioning is vitally important for the satisfactory operation of the hot and cold water system

• The designer should have prepared a commissioning brief with clearly specified objectives
Commissioning

• Have all water temperatures been set correctly and are they being achieved as specified
• Have all water treatment chemical levels been set correctly and are they being achieved as specified?
• Have all BMS system criteria been set correctly and are they being achieved as specified?
• Has system clean and disinfection been carried out as specified and as close to hand over as possible?
• Have adequate number of biological samples been collected correctly and pass/fail parameters agreed?
• Current guidance – take biological samples ≥ 48 hrs after disinfection
Microbiological testing!
Handover

• Often a very time critical period, generally under huge pressure to deliver on time
• Are all commissioning data, disinfection certificates, biological analysis results available?
• Have all measured criteria shown to be within specification?
• Have appropriate monitoring programmes been devised to ensure continuing ‘safe-system’ conditions?
• Has ‘Permit for Handover and occupation’ been completed?
### Water Quality Management And Control PPM Programme

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<td>Task</td>
<td>Permit for Hand-over and occupation of new builds</td>
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<th>Facility/Phase to be handed-over in the future</th>
<th>Date</th>
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**Are the works in the Section/Area complete?**
- [ ] Yes
- [ ] No
- [ ] N/A

**Is the domestic water installation complete?**
- [ ] Yes
- [ ] No
- [ ] N/A

**Have all the commissioning and test data been submitted in accordance with BS 8558:2011 and HTM 04-01 Sections 16 and 18 been received?**
- [ ] Yes
- [ ] No
- [ ] N/A

**Has all material and fittings WRAS certificates been received?**
- [ ] Yes
- [ ] No
- [ ] N/A

**Are all water borne bacterial control measures employed operating within recommended and agreed parameters?**
- [ ] Yes
- [ ] No
- [ ] N/A

**If Yes, have the pertinent logbooks been received?**
- [ ] Yes
- [ ] No
- [ ] N/A

**Has the installation been surveyed and Risk Assessed prior to hand-over?**
- [ ] Yes
- [ ] No
- [ ] N/A

**If Yes, have any faults/short-falls been identified?**
- [ ] Yes
- [ ] No
- [ ] N/A

**If Yes, have all these faults been rectified?**
- [ ] Yes
- [ ] No
- [ ] N/A

**Has the system been disinfected in accordance with BS 8558:2011?**
- [ ] Yes
- [ ] No
- [ ] N/A

**If Yes, When? Date:***

**If Yes, have the disinfection certificates been received?**
- [ ] Yes
- [ ] No
- [ ] N/A

**Have bacteriological samples been taken following disinfection?**
- [ ] Yes
- [ ] No
- [ ] N/A

**If Yes, When? Date:***

**Are all results within acceptable parameters?**
- [ ] Yes
- [ ] No
- [ ] N/A

**Has Trust Consultant Microbiologist reviewed the results?**
- [ ] Yes
- [ ] No
- [ ] N/A

**Has the system been flushed at daily since disinfection?**
- [ ] Yes
- [ ] No
- [ ] N/A

**If Yes, have flushing records been received?**
- [ ] Yes
- [ ] No
- [ ] N/A

**Have sentinel and representative outlets had temperatures recorded within?**
- [ ] Yes
- [ ] No
- [ ] N/A

**If Yes, have temperature records been received?**
- [ ] Yes
- [ ] No
- [ ] N/A

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On-going operational

• Need assurance that on-going monitoring with BMS will be reviewed and acted upon if required – don’t make assumptions!
• Need written scheme (in line with WSP) for on-going biological sampling
• Risk assessment must be reviewed when system has been operating normally for several weeks or months
Achieving safe, compliant water services in healthcare new builds and refurbishments ......

Be involved from start to finish

Great opportunity to make a difference

Get the basics right

Multi-disciplinary team working essential

Ask questions, ask questions, ask questions ......

Record everything!
Thanks

- Mike Weinbren
- Simon Noon
- John Foxall
- Ray Cochrane
- Mike Koumi