

GUIDE TO WATER SAFETY FOR HEALTHCARE ORGANISATIONS

(REVISED 2022)

What are the risks associated with waterborne pathogens and how do we manage them effectively

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ABOUT THE WATER HYGIENE CENTRE

The Water Hygiene Centre was established in 2009 to address the lack of independent consultancy within the industry. Since then, we have established ourselves as a market leader and have grown steadily, helping our clients identify and minimise the risk of waterborne contamination and disease, whilst improving compliance performance.

We have regional offices in Nottingham and Newcastle upon Tyne with our head office based in West Oxfordshire.

Our client portfolio includes many NHS Trusts, Local Authorities, Housing Associations, Universities and Facilities Management Organisations throughout the UK and British Isles and we have helped them meet the compliance requirements needed to control Legionella and other bacteria in accordance with the HSE's Approved Code of Practice (L8), HSG 274 and HTM 04-01.

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INTRODUCTION

Do you know your WSG from your WSP? Do you know your LD from your Lp or your Psa? Surely water safety relates to lifeguards providing protection for swimming pool users?

The objective of this guide is to outline what water safety means and broadly what it may include. The context we can then start to explore details how someone who has responsibility for water safety can proactively manage water safety, and what could happen should things go wrong. The starting point for this guide will be, as they say 'at the beginning...'. For those who are more experienced in understanding and implementing water safety approaches, this will serve as a useful refresher for you.

As the guide progresses, it will broaden to cover relevant guidance documents and how they can assist you with the management of water safety.



AT THE BEGINNING...

For many years 'Legionella' has been the primary focus when managing risks associated with water. In fact, the HSE's ACoP L8 guidance is titled 'Legionnaires' Disease'. The control of 'legionella' bacteria in water systems.

In 2006, the Department of Health [DoH] issued an update to the previous guidance 'HTM2040 - The control of legionellae in healthcare premises: a code of practice' [initially issued in 1993]. You'll note this title also indicates it relates only to Legionella risks. It's subsequent revised guidance in 2006, was 'HTM04-01 - the control of legionella, hygiene, 'safe' hot water and drinking water systems and within this newer guidance, the title focus has been expanded to include a greater breadth of water systems concerns.

In 2014, the DoH issued an addendum to the HTM04-01 '*Pseudomonas aeruginosa*' - advice for augmented care units'. This additional guidance came about as a result of the [death of three babies that occurred at the Neo Natal Unit of Belfast Royal Hospital, January 2012](#). This addendum covered '*Pseudomonas aeruginosa*', a waterborne pathogen, similar to Legionella, by virtue that it proliferates in a warm, moist environment and is associated with water systems.

This addendum introduced the concept of 'water safety groups' [WSG] and 'water safety plans' [WSP].

The current HTM04-01 [2016] Parts A – C have the intention of moving users towards a holistic management of water systems via WSGs, WSPs and other initiatives, and are written to promote good practice for those responsible for the design, installation, commissioning, operation and maintenance of water systems in healthcare premises.

For those of you who are 'experienced' in water safety, the concept of a WSG may have not been new. In the days of HTM2040 some healthcare organisations termed them 'Legionella management team' or '*Legionella risk group*', which essentially included the estate's representatives '*Responsible Person [Legionella]*' and their '*Deputy Responsible Person [Legionella]*'.

'WSG' as defined in the HTM04-01: 'multidisciplinary group formed to undertake the commissioning and development and ongoing management of the water safety plan (WSP). It also advises on the remedial action required when water systems or outlets are found to be contaminated and the risk to susceptible patients is increased'.

The WSG model presented in HTM04-01 shows the group to include a spectrum of individuals that you can find on the next page.

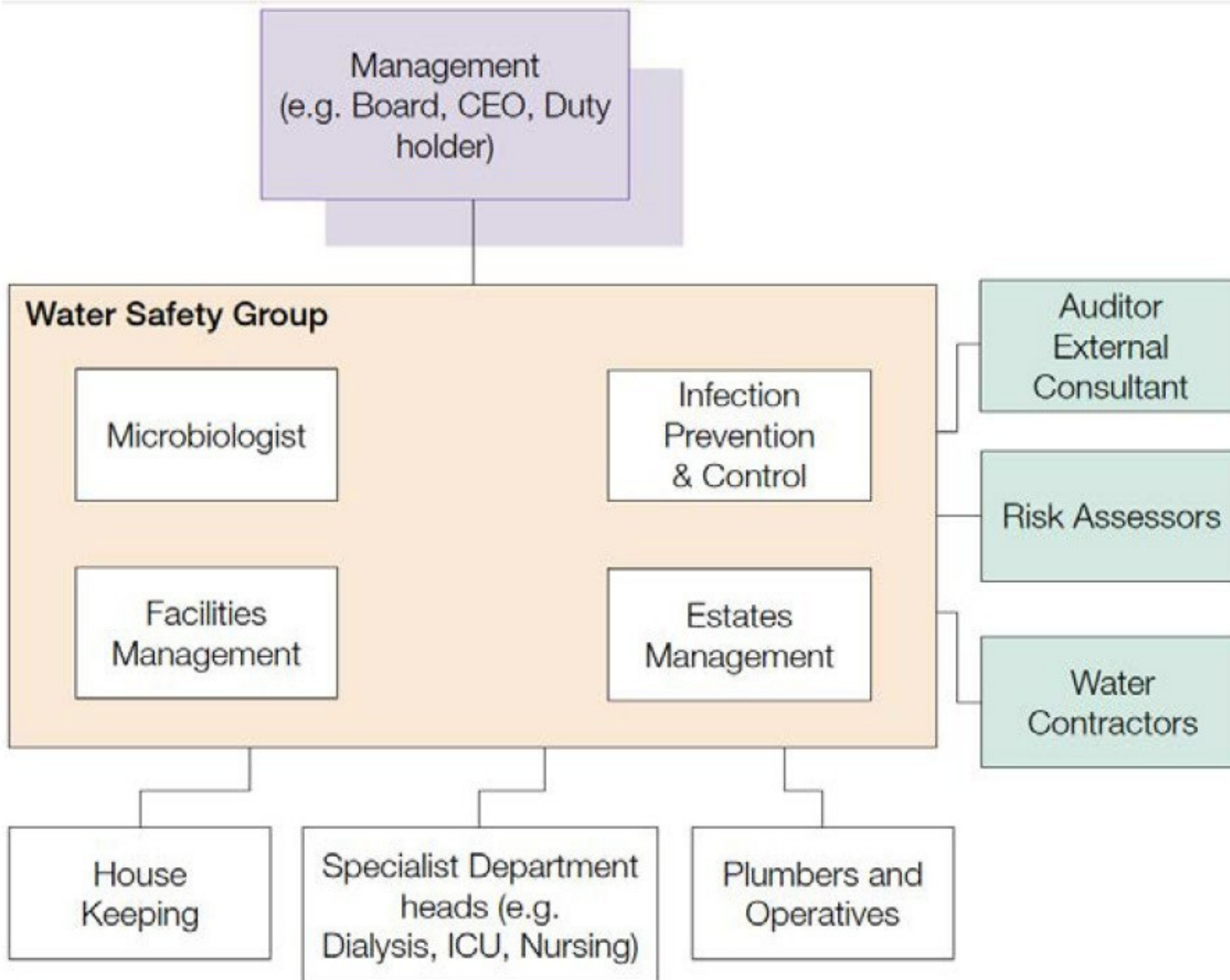


Figure 2 Example WSG structure

Source: HTM04-01, Part B, Operational Management.



WHAT ARE 'WATERBORNE PATHOGENS' AND WHERE IS THE EVIDENCE THEY ARE A CONCERN?

LEGIONELLA

Legionella are gram-negative bacterium, ubiquitous in both the natural and built aquatic environments and widespread in freshwater [lakes, rivers, streams and ponds], as well as within damp soil. There are more than 60 species and in excess of 70 serogroups [SG].

Legionella pneumophila [Lp] SG 1 is the most common cause of Legionnaires' Disease [LD] accounting for 85% of cases within the EU. With rapid testing for legionella becoming more available *Legionella anisa* is appearing a lot more than previously experienced.

The principle means of transmission is through the inhalation of atomised water that contains the *Legionella* bacteria. Aspiration of contaminated drinking water is another mode of transmission particularly for certain vulnerable groups.

Means of controlling Legionella:

- A temperature control regime is the traditional means of minimising the risk of Legionella in domestic hot and cold water systems;
- However, it may not always be possible to maintain temperature control in complex and / or ageing buildings or water systems, therefore supplementary control strategies should be considered for controlling microbial colonisation and growth may also be used.

Those most susceptible to Legionnaires' disease include:

- Neonates;
- Individuals of Increasing age [particularly over 50 years old], especially males [see 'table 2' below];
- Those with existing respiratory disease whose lungs are more vulnerable to infections, including smokers;
- Those with underlying health conditions [see 'table 6' below];
- Immunocompromised patients as a result of illness or treatment.

Table 2: Number and proportion (%) of confirmed cases of Legionnaires' disease by gender and age group, 2014 to 2016

	2014		2015		2016		Total	
	Females	Males	Females	Males	Females	Males	Females	Males
< 50 years	11 (22.0)	39 (78.0)	13 (18.8)	56 (81.2)	12 (24.5)	37 (75.5)	36 (21.4)	132 (78.6)
50-59 years	27 (32.5)	56 (67.5)	25 (25.5)	73 (74.5)	23 (25.6)	67 (74.4)	75 (27.7)	196 (72.3)
60-69 years	31 (31.3)	68 (68.7)	32 (29.1)	78 (70.9)	29 (25.4)	85 (74.6)	92 (28.5)	231 (71.5)
70+ years	32 (32.3)	67 (67.7)	25 (23.4)	82 (76.6)	41 (40.2)	61 (59.8)	98 (31.8)	210 (68.2)
All Ages	101 (30.5)	230 (69.5)	95 (24.7)	289 (75.3)	105 (29.6)	250 (70.4)	301 (28.1)	769 (71.9)

Table 6: Underlying medical conditions and risk factors reported in confirmed cases of Legionnaires' disease, 2014 to 2016

	2014 (%)	2015 (%)	2016 (%)
Any underlying condition	242 (73.1)	286 (74.5)	265 (74.6)
Diabetes	50 (15.1)	67 (17.4)	46 (13.0)
Heart conditions	96 (29.0)	122 (31.8)	101 (28.5)
Immunosuppression[^]	40 (12.1)	45 (11.7)	46 (13.0)
Liver conditions	12 (3.6)	15 (3.9)	16 (4.5)
Neoplasms	26 (7.9)	28 (7.3)	25 (7.0)
Renal disorders	12 (3.6)	19 (4.9)	13 (3.7)
Respiratory conditions	26 (7.9)	52 (13.5)	43 (12.1)
Smoking	109 (32.9)	110 (28.6)	115 (32.4)

[^] immunosuppression due to other conditions or clinical treatments

NB: Individual cases may have reported more than one underlying condition/risk factor

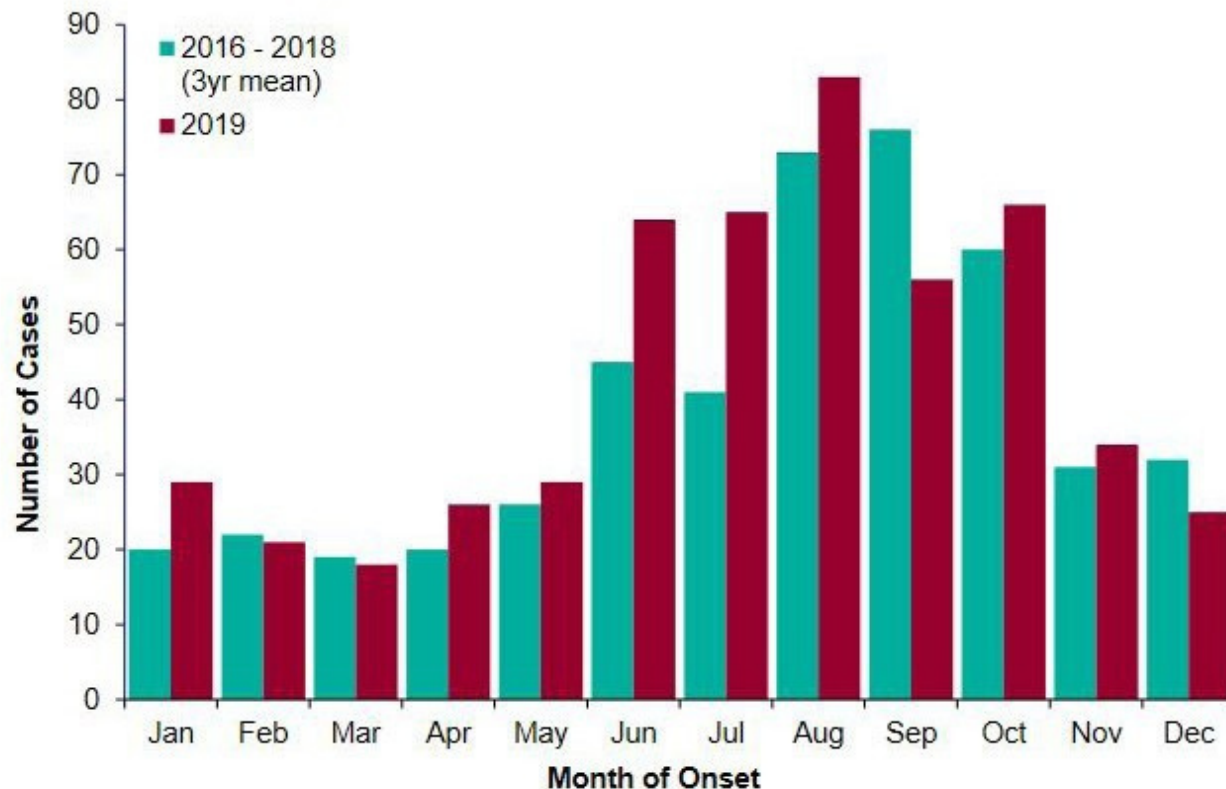
Source: PHE report: [Legionnaires' disease in Residents of England and Wales – 2016](#)

Pre covid Public Health England used to issue a monthly report '[PHE monthly surveillance report on legionnaires' disease](#)'. This report detailed the differing areas from where cases have originated i.e. community and travel related cases from around the UK, travel abroad or nosocomial [Healthcare], and if from within the UK, then which specific region.

In the last report of 2019, it compared the data with the last 3 year average.

On average there are 500 approx. reported cases of LD, for 2019 the total number of cases being 503.

Figure 2: Confirmed* cases of LD by month of onset (December 2019 against monthly mean for previous three years)



* cases confirmed to have pneumonia and laboratory confirmation of Legionella infection; includes some with incomplete data.

Source: [PHE: Monthly Legionella Report December 2019](#)

PSEUDOMONAS AERUGINOSA [PSA]

Serious infections from this bacterium usually occur in people within a hospital environment typically those with weakened immune systems, due to underlying disease, increasing age, other immune deficiencies or whose defenses have been breached by medical devices or burns.

Direct transmission of this bacteria can be through:

- Ingestion of water and bathing;
- Contact with mucous membrane or surgical site;
- Splashing from water outlets or basins [where water causes splash back];
- Inhalation of aerosols from respiratory equipment, devices that produce an aerosol or opening suction of wound irrigations;
- Medical devices / equipment rinsed with contaminated water;

Indirect transmission can be through indirect contact with healthcare workers hands following washing with water from surfaces contaminated with either water or contaminated equipment e.g. reusable bowls.

The severity and type of the illness it causes, depends on its route into the body:

- If it enters lung tissue, for example in a cystic fibrosis patient, it can cause a form of pneumonia;
- Infection of a skin wound or burn can lead to extensive tissue damage or even septic shock;
- If the bacterium infects the gastro-intestinal system of a vulnerable patient it may cause severe tissue damage. This is the form of infection most associated with premature babies.

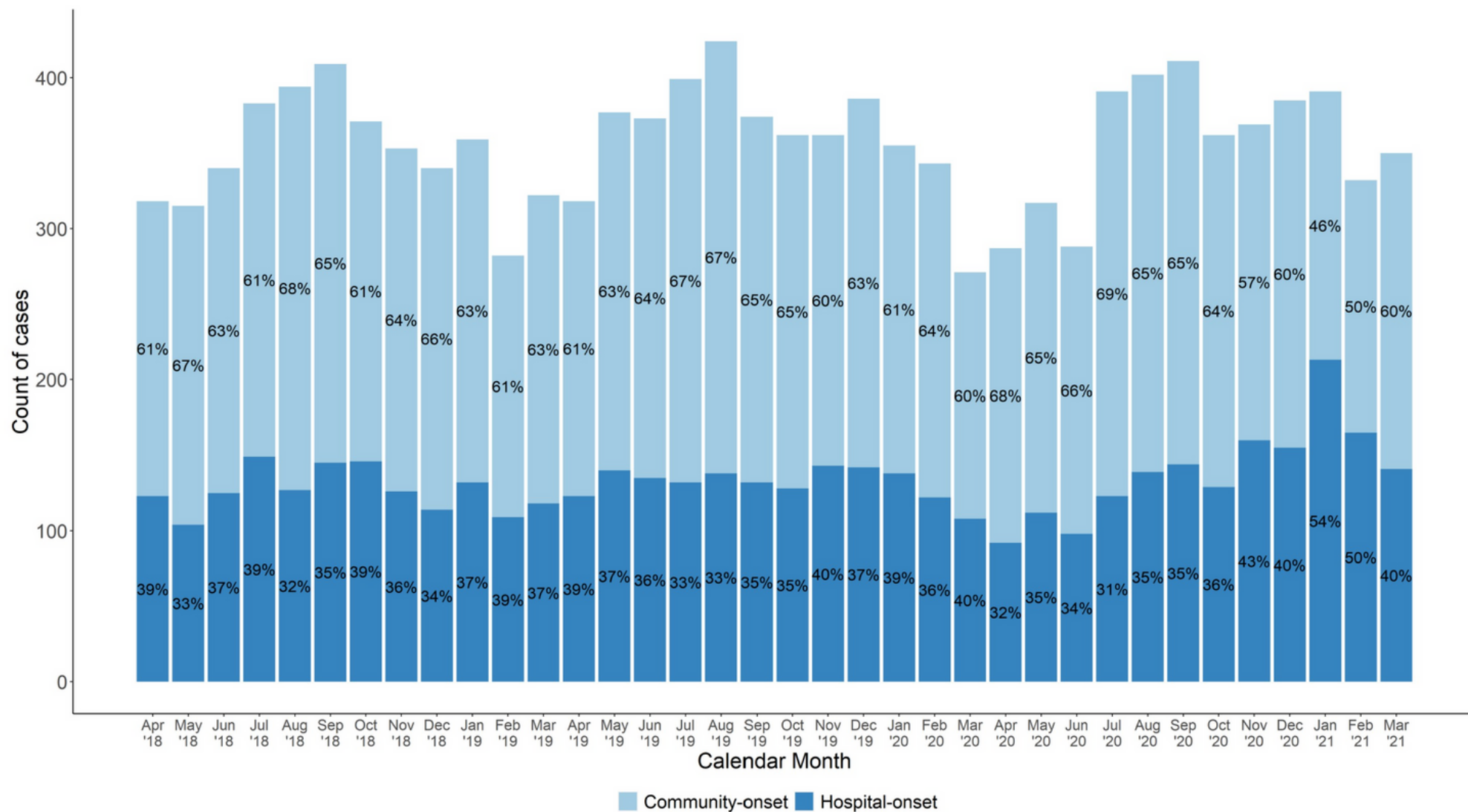
Healthy people can also develop mild illnesses from *Pseudomonas aeruginosa*, especially after exposure to similarly contaminated water or facilities, such as ear infections [especially in children] and more generalised skin rashes which may occur after exposure to inadequately chlorinated spa pools or swimming pools. Eye infections have occasionally been reported in persons using extended-wear contact lenses. Infections of the blood, pneumonia, and infections following surgery can lead to severe illness and potentially death.

PHE issued an update in September 2021 on the laboratory surveillance of *Pseudomonas* spp. and *Stenotrophomonas* spp. bacteraemia in England, Wales and Northern Ireland.

[PHE : Health Protection Report](#)

The key facts from the report were:

- Between 1 April 2020 and 31 March 2021 a total of 4,285 cases of *Pseudomonas aeruginosa* bacteraemia were reported by NHS Trusts in England, of which 1,671 (39.0%) were hospital-onset cases.
- Hospital-onset cases was relatively stable April 2017 to March 2018 and April 2020 to March 2021 ranging from 4.4 to 4.6 (cases per 100,000 bed-days). However, this increased to 6.0 in April 2020 to March 2021.
- Cases in ICUs have increased year on year (April 2017 to March 2018 and April 2020 to March 2021). A steep rise was seen from April 2019 to March 2020 to April 2020 to March 2021, with the rate rising from 0.20 to 0.29 cases per 1,000 ICU bed days greater than 2 days.
- Most cases occur in adults aged 45 and over.
- Cases being greater in males of all age groups compared to their female.

Figure 18. Monthly counts of *P. aeruginosa* bacteraemia by onset of infection, April 2018 to March 2019 to April 2020 to March 2021

Source: *PHE: Annual epidemiological commentary: Gram-negative bacteraemia, MRSA bacteraemia, MSSA bacteraemia and C. difficile infections, up to and including financial year April 2020 to March 2021*

STENOTROPHOMONAS MALTOPHILIA

Stenotrophomonas has more recently emerged as an opportunistic pathogen of concern [and identified in HTM04-01].

It's an aerobic gram-negative bacillus that is found in aquatic environments and there are at least fourteen distinct species of *Stenotrophomonas*.

The most important of these is *Stenotrophomonas maltophilia*. It must usually bypass normal host defences to cause human infection e.g. if an irrigation solution becomes colonised with this organism, irrigating an open wound may cause colonisation or infection of the wound.

It also colonises humid surfaces, such as the tubes used in mechanical ventilation and indwelling urinary catheters, as well as medical devices such as suction catheters and endoscopes.

Infections can occur in a range of organs and tissues, but the organism is commonly recovered in respiratory tracts of cystic fibrosis patients with *Pseudomonas aeruginosa* infection. That said, it is relatively more sensitive to heat and will not grow above 40°C.

TUBERCULOUS MYCOBACTERIA

This is yet another addition to the 2016 HTM04- 01. Mycobacteria are environmental micro-organisms that are widespread in nature – within wet soil, marshland, streams, rivers.

Mycobacteria outbreaks in hospital settings usually involve:

- Sternal wound infections;
- Plastic-surgery wound infections;
- Post-injection abscesses;
- Those patients undergoing dialysis treatment;
- Other infections have been attributed to the transmission of Mycobacteria chimera from [contaminated heater cooler units](#) used in theatre during cardiothoracic surgery.



WHEN THINGS GO WRONG...

Earlier in the guide, we posed the question When was the last time you heard/saw about LD in the media? Let's remind ourselves of some of these 'rare' moments.

In 2002, the largest outbreak of LD in the UK occurred in Barrow in Furness with 190 confirmed cases and 7 deaths. The cause was an inadequately maintained cooling tower owned by the local council and operated by a contractor.

The [HSE investigation report](#) identified six key failures that contributed to the outbreak of LD in Barrow in Furness.

Since 2002 there have been many other outbreaks and individual cases of LD. [Basildon and Thurrock Hospitals Trust](#) have been prosecuted due to a death in 2002 and again for deaths in 2007 and 2010.

[Brighton & Sussex University Hospitals NHS FT](#) was fined for the death of a susceptible patient in 2011. This was due to serious control failures and a lack of sufficient instruction, training and supervision in order to make an informed decision for appropriate action to be taken.

In November 2020 healthcare organisations once again have appeared in the headlines when a care home company was fined £150,000 after one of its residents unfortunately died from Legionnaires' disease - [Sentinel Healthcare Legionnaires death care home fined](#).

And it's not just healthcare organisations that have featured:

- [Bournemouth health spa probed after Legionella outbreak](#)
- [Outbreak of Legionnaires' disease in West Bromwich](#)

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GUIDANCE ON WATER SAFETY

Both the HSE and DoH have produced guidance specifically for 'Legionella' and more broadly for 'water safety'.

The ACoP L8 document is approved by the HSE with the consent of the Secretary of State. It provides advice on how to comply with the Health and Safety at Work etc.

Act 1974 [HSWA] and Control of Substances Hazardous to Health Regulations 2002 [COSHH] with respect to the risk from exposure to Legionella bacteria.

The HTM04-01, in common with ACoP L8 and the HSG274 supporting documents are not mandatory. However, by closely following the aforementioned DoH and or HSE documents you will normally be doing enough to comply with the law.

Compliance principles related to the safety of healthcare organisation estates and facilities are 'enshrined' in the Health & Social Care Act which details that registered healthcare providers must assess the risk of infections, and prevent, detect and control the spread of infections, including those that are healthcare associated.

HTM04-01 was updated in 2016. The main changes with the 2016 edition were:

- Providing comprehensive guidance on measures to control waterborne pathogens;
- Alignment with the HSE ACoP L8 4th ed. and supporting HSG274 guidance documents;
- Superseding the 'addendum' and creation of HTM04:01 Part C. With HTM04-01 Part B now outlining the remit and aims of a WSG and WSP;
- New guidance on water hygiene storage and the installation of fittings and components, plus further clarification regarding the competency of those working on water systems.

British Standards Institute [BSI] have issued BS8680:2020 Water Quality - Water Safety Plans – Code of Practice. This document complements and adds to the existing DoH documentation and guidance on WSPs.

There has also been an update to BS7592:2022 – sampling for legionella bacteria in water systems – a code of practice.

Need a copy of these guidance documents? Click the links below:

[HSE ACOP L8](#)

[HSE HSG274 Guidance Documents](#)

[HSE HSG282](#)

[Guidance on Spa Pools](#)

[DoH HTM04-01 Guidance Documents](#)

[BS 8680:2020 Water Quality .](#)

[Water Safety Plan . Code of Practice](#)

[BS 7592:2022. Sampling for Legionella bacteria in water systems. Code of Practice](#)



IMPLEMENTATION OF GUIDANCE ON WATER SAFETY

We've seen that a WSG should be established with responsibility for the ongoing development of the WSP. So, what is this WSP? The World Health Organisation [WHO], the HSE and the DoH have all defined what is meant by WSP. This is now further defined within BS8680.

The DoH definition is: 'A risk-management approach to the safety of water that establishes good practices in local water distribution and supply. It will identify potential hazards, consider practical aspects, and detail appropriate control measures'.

The WSP is not likely to be a single document, and the size and complexity of the WSP will be specific to the healthcare organisation, its buildings and what the associated water risk assessments reports with respect to individual risk systems.

Intended users of BS8680 include all of those involved in ensuring water is safe and fit for purpose at the point of use, including those responsible for:

- Design and specification;
- Construction and installation;
- Commissioning;
- Maintenance;
- Operation;
- Alteration / refurbishment;
- Deconstruction.



CONCLUSION

There is sufficient guidance on how to manage water safety within healthcare organisations. This guidance needs to be reviewed and adopted [where applicable] for each establishment.

Embedded within this guide, we've provided links to the most current published guidance documents. Ensure you are following the updated documentation. Download them to your reading list or to your technical library, and share them with your colleagues including fellow members of the WSG.

Those healthcare organisations that have existing documentation for water safety management,

such as a policy, risk assessments and operational control procedures and audits will have much of the integral requirements of a WSP. If you are unsure of where to start or where your healthcare organisation is with regard water safety status, then reach out for an independent water safety audit. This audit should be completed by an independent provider, ideally by an Authorised Engineer [Water] who can demonstrate independence along with a wealth of experience. Such an audit will establish the degree of compliance for your organisation with practical recommendations on what is required.

If the WSG needs ongoing support with the development of your WSP, appraisals of key staff, training or an annual compliance audit, consider the appointment of an Authorising Engineer [Water] to support you.

BS8680 has indicated that WSPs are a critical foundation for effective risk management and control for all types of hazards including: biological, chemical, physical and radiological and very useful for those auditing and inspecting premises. It will additionally assist WSGs and others responsible for health and safety to ensure there is a holistic approach to water safety across all types of systems and equipment which use or contain water.

BS8680 applies to all types of organisations and premises and undertakings with water systems that can pose a risk, whether from new buildings, modifications and renovations to existing water systems or retrospective applications to control risks to health from all types of water use.

A starting point for the WSP is to define how risks will be managed, and as such any management policy's should outline:

- Scope & purpose;
- Roles, responsibilities and their communication pathways;
- Training needs & competency for those identified;
- Legionella Risk Assessment need, review and specification;
- Auditing.

The scope and complexity of the WSP and supporting documentation in the form of, procedures / method statements, risk assessments, schemes of control, record keeping, monitoring, training and other relevant documentation should be proportional to the type of water-related activities carried out and the scale and complexity of the organisation.

BS8680 does provide further clarity on examples of specific documents to support the WSP which are further broken down into six main structural sections as follows;

- Governance i.e Policy, Organogram, Allocation of Responsibilities;
- Identification and Assessment;
- Control Measures;
- Validation;
- Verification & Auditing;
- Supporting Programme.

The WSG should also ensure there is an initial high-level assessment of what is already in place to identify any gaps in the robustness of the current water safety governance and management measures, and any need for amendment or development.

To understand more about BS8680 we've prepared a [screen cast, you can watch here..](#)

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