T-safe Talks

Nigel Richardson
Authorising Engineer (Water)

BS 8580-2: An overview from a contributing author

Welcome to T-safe Talks

In this edition of T-safe Talks, we cover the recent publication of BS 8580-2 with Nigel Richardson, Authorsing Engineer (Water) and Expert Witness. Interviewed by our own Nick Barsby, National Sales Manager and Legionella Control Association Chair, the pair discuss the challenges of controlling *P. aeruginosa,* how its Risk Assessment differs from Legionella and how the standard should be implemented from Nigels unique perspective, as a member of the working group that contributed to the publication of BS 8580-2.

Meet the Interview Panel

Nigel Richardson Authorising Engineer (Water), Expert Witness & owner of Collation Consultancy

Starting out at Houseman in 1980 Nigel has over 40 years of experience in Water Treatment. Initially working in the field undertaking monitoring he joined the manufacturing team and subsequently ran the Houseman manufacturing facility. When acquired by Degremont, Nigel coordinated the group's procurement and manufacturing, before heading to Brazil to undertake an acquisition. He spent two years at Nalco as the head of European Logistics before setting up two companies, one that sold chemicals, the other a Legionella consultancy, before selling up. Most recently Nigel has set up Collaton Consultancy where he undertakes Authorising Engineering (Water), Training, Expert Witness, and consultancy work. Throughout his career, Nigel has worked with a multitude of NHS Trusts all over the UK, providing specialist water safety control and consultancy services.

Nick Barsby, MWMSoc, Chairman of the LCA and National Sales Lead – Water Hygiene for T-safe

Nick has over 15 years' experience in Legionella control. Having worked for some of the UK's leading testing laboratories as a BDM, Sales Manager and Commercial Manager Nick has a vast knowledge of analytical test methods and procedures. Nick is currently National Sales Manager for T-safe and heads up our water hygiene service provider partner initiative.

Playing a pivotal role in the introduction of MALDI-ToF confirmations in the UK market, Nick has a proud track record of innovation and driving positive changes in every organisation he has worked with.

Nick is the Chairman and Director of LCA and was heavily involved in the re-writing of the Service Standards, he also presented and chaired the webinar series introducing these standards to LCA members. Having written and co-written numerous published articles on a range of subjects covering Microbiology and Laboratory methods, Nick is a well-known and respected individual within the sector.

Q1 What role did you play in the creation of BS 8580-2?

Writing British Standards is a team effort and over 20 people were involved in the writing of this document. I was part of this larger team chaired by Dr Suzanne Lee. I was invited to be involved as I have been creating Pseudomonas Risks Assessments since the HTM04-01 addendum came out in 2012, so it seemed natural to get involved in the development of this document and share my experiences with the wider world.

Q2 What is BS 8580-2?

To give it the full title BS 8580-2 is called *"Water Quality Part 2: Risk Assessments for Pseudomonas aeruginosa and other Water Borne Pathogens - Code of Practice".* While it is heavily based on *P. aeruginosa* it's not just Pseudomonas we look at. Likewise, it is not just focussed on healthcare premises, despite a heavy focus, it also relates to other relevant premises like Leisure, Gyms, Nail Bars, Foot Spas, and Swimming Pools as well.

BS 8580-2 is heavily focused on healthcare as that is where most illnesses caused by Pseudomonas infections are seen and treated. The bacteria thrive in immunocompromised hosts, such as those with skin lesions, burns victims and those in ICU. The Standard provides a means of creating a Risk Assessment for *P. aeruginosa* and using the knowledge and information gained by that to include the risks for other waterborne pathogens (covered in Annex A of the Standard).

Q3 Why is the standard required and what were the drivers in creating the standard?

There are probably ten times the incidence of Pseudomonas infections compared to Legionella infections in the UK. I checked some data from Public Health England before this interview and in 2020 there were 3,500 cases of bacteraemia, Pseudomonas bacteraemia, infections in hospitals in the UK compared with 500 or so cases of Legionella. That's quite a significant number of *P. aeruginosa* cases in the UK. The only UK guidance for Pseudomonas was in HTM04-01, it was superficial in the first instance and there was a recognised need to create a risk assessment that was similar to the British Standard document for Legionella. As this developed it was recognised that other waterborne pathogens would fall under the same banner as *P. aeruginosa*, in terms of looking out for them, and then in terms of doing something about them to prevent illnesses.

Q4 What are the similarities and differences between Pseudomonas & Legionella?

Both Legionella and *P. aeruginosa* are human pathogens and infection from either can be fatal. Although there is an overlap in susceptibility, *P. aeruginosa* has a different cohort of patients; this tends to be a wider spectrum of people than Legionella.

Primarily a lung-based illness, you catch Legionella from breathing in contaminated droplets. We all know that Legionella bacteria pose the biggest risk when they are aerosolised, usually associated with showers and cooling towers. When it comes to *P. aeruginosa* there are 4 transmission pathways

1) Water
2) (Cleanliness of) outlets
3) (Cleanliness of) people
4) (Cleanliness of) any medical devices used

If we refer to Legionella as being ubiquitous then *P. aeruginosa* could be considered omnipotent. Legionella is primarily related to water, whereas Pseudomonas is on our skin all the time. Therefore, it is easy to accidentally contaminate an area with Pseudomonas, either through poor cleaning or hygiene practices or via contaminated water droplets or splashes. Controlling the water system will impact all 4 pathways but it is not the only route to success.

One main difference between the two risk assessments is that Pseudomonas Risk Assessments tend to be driven, to a degree, by a case (someone falling ill), rather than Legionella Risk Assessments that are more preventative.

Q5 So, can sampling technique impact on analytical results for Pseudomonas & Legionella?

It is more likely for the individual collecting the sample to cross-contaminate a water sample for *P. aeruginosa* than Legionella, and I provide training on sampling activity for this exact reason. It is vitally important for all samples, and even more so for Pseudomonas, that aseptic sampling techniques are undertaken. Basic, good hygiene practices and frequent hand washing are vital to this process.

I have a recent example of a Hospital I was involved with, where the Trust spent over £80k on an engineering solution for a Pseudomonas issue. The expense included additional cleaning, disinfection, filtration, and removal of pipework. Despite this work, they kept receiving positive Pseudomonas results for a prolonged period. Throughout this process, I had been trying to explain to the client that the results were due to poor sampling practices, but this advice was not utilised. After a significant investigation and root cause analysis, the poor hand hygiene of the technician taking the sample was deemed to be the root cause. Poor handwashing practices had cost this trust tens of thousands of pounds trying to fix an issue that wasn't an issue at all.

Q6 What is the difference in undertaking a Legionella Risk Assessment vs a *P. aeruginosa* Risk Assessment?

The biggest difference is the three additional infection pathways that Pseudomonas can pose as opposed to Legionella. You could argue that a Legionella Risk Assessment can inform a *P. aeruginosa* Risk Assessment. BS 8580-2 states that the Legionella Risk Assessment can be used as a starting point for the *P. aeruginosa* Risk Assessment.

It is common for a Legionella Risk Assessment to be undertaken by a single person, a Risk Assessor from an external company, whereas the *P. aeruginosa* Risk Assessment, covering medical issues, cleaning issues and human behavioural issues, as well as water issues, requires a team of people to undertake a true assessment of the total risk.

In a healthcare setting, it's a team undertaking the *P. aeruginosa* Risk Assessment as it goes into a lot more depth as to how water is used and how we can prevent *P. aeruginosa* more than just water treatment, temperature, and chemicals.

People are historically used to undertaking Legionella Risk Assessments every two years; I know this has been updated and there are now the six drivers for change, but it is still not always done as frequently as desired due to the considered reduced benefit. The Pseudomonas Risk Assessment is much more of a "live" document and its frequency is a lot more regular. There is an argument for a dynamic risk assessment where things are changing quickly as you try to remove risk from certain areas. Improving cleaning procedures might need a dynamic risk assessment as the change can be implemented so quickly.

Q7 What are the challenges of producing a *P. aeruginosa* Risk Assessment?

There are two key parts to a *P. aeruginosa* Risk Assessment – Engineering and Clinical. The Engineering Risk Assessment is system led and stable, to an extent, it's as static as the water system. The Clinical element of the Risk Assessment is driven by the patient, which may demand a different risk assessment for every patient that enters or stays in an area.

The speed of infection of *P. aeruginosa* can be rapid, so you must always look at infection pathways. The reality is the pathways are affected by several factors, some (relatively) static and some dynamic. From Human behaviours to the backs of drains being cleaned to items being stored in sinks – all these factors impact the *P. aeruginosa* Risk Assessment.

As an example, earlier in my career, we were filming a good practice cleaning guide for a NHS Trust. The cleaner did a tremendous job and followed the protocol almost perfectly. Except for one small problem... they were cleaning the taps and then accidentally dropped the cloth and it sat in the plug hole for a second or so. Now the cleaner, not realising the issue, simply picked up the cloth and continued with the clean. Neither the cleaner nor the person filming realised the issue. It shows how the slightest little error can spread bacteria from a drain to an outlet. The video enabled me to highlight the issue to the cleaner and ensure best practice was undertaken going forwards.

Q8 What does the standard cover in respect of drains?

There is a whole section on drains in BS 8580-2, Section 17, originating from work primarily out of Scotland; suggesting drains are a significant source of bacteria in healthcare. At the end of the day, the clean ward is connected to a foul sewer via a little bit of pipework called a U Bend. If that fails, we have a direct infection pathway. Drains breathe, in terms of outside air pressure can push the water level in a drain which can cause bacteria to be blown out of the drain and sink into the environment. It's not just water, understanding drains and the need for water is key. If we can remove water from a ward, we can break that infection pathway and that is some of the concepts of BS 8580-2.

Sinks can also be misused. If a hand-washing sink has coffee poured down the drain it adds a nutrient source for bacteria. There have been some great talks about the dangers of drains. Biofilm can grow in a sink between the water level and the U bend in a sink drain at around 1mm/hour. In other words, it doesn't take long for biofilms to coat the inside of a drain above the water level. I think drain cleanliness is a factor that we need to consider and develop going forwards. It won't just be bleach down the drain, due to limited contact time, or scrubbing brushes, pulling bacteria into the environment. I'm aware of a company that are developing a product that is a foaming biocide with a contact time generated between the foam and biocide to counteract this issue.

Q9 What are the challenges of controlling *P. aeruginosa*?

The omnipotence of *P. aeruginosa* makes it a challenge. Using the same controls (temperature and chemicals) as Legionella control will help in the water system. Although part of the challenge of temperature control is that *P. aeruginosa* tends to be in the outlet and the last few metres of pipework in the system; quite often behind a TMV. This clearly nullifies the impact of temperature as a control in these settings for *P. aeruginosa*. If you have a Healthcare site that doesn't have a secondary biocide, they may have a challenge with controlling *P. aeruginosa*. It's not always the case but it's a factor.

P. aeruginosa can be on any surface so we need to make sure that surfaces are cleaned regularly and effectively. Ensuring that the sink is being cleaned in the right way is pivotal. Getting the cleaning teams to clean the tap then the plug hole is a critical part of this process. I have a hospital that has broken the cleaning process down to around a dozen steps and each step can be monitored and scored to allow checks to be performed. It is unfortunate how often people forget to do the tap first and go from dirty to clean; these sorts of mistakes can have catastrophic consequences for *P. aeruginosa* control.

Another major challenge in healthcare settings is hand washing. If clinical staff washed and gelled their hands as much as we want them to, they would have no hands left. But it is wider than staff handwashing, it is patients and visitors too. An example I have is a NICU Ward, where the patients are premature babies, and the new parents are the main visitors. This site had a case of Pseudomonas infection. It was identified that it was brought in from home by the parents, clearly unintentionally. It is important to manage the service users, over and above the staff. Their practices can, unintentionally, have a major impact on patient safety and the Pseudomonas risk in an area.

A further infection pathway is the drinks containers for patients. If these are allowed to rest in the sink or touch the sink this can form a new pathway for bacteria in the drain to be taken directly to the patient area and thus increase the risk of infection. Furthermore, keeping splash

zones, of around one meter around the sink, clear of medical devices is also a factor that can add additional challenges and should form part of the risk assessment.

For these reasons, *P. aeruginosa* Risk Assessments are not a single person event. It must be a team effort. One person alone would struggle to have the expertise in such a multitude of areas to be truly successful in creating this risk assessment. Very few, if any, people have this. Therefore, it needs a team approach to cover all components such as cleaning, infection control, engineering, water risks etc.

Q10 What are the key differences between BS 8580 Part 1 and Part 2?

Fundamentally it's the bacteria of concern. Part 1 has a full focus on Legionella; it does note other pathogens but not in detail. Part 2 is focused on *P. aeruginosa* and other waterborne pathogens with little reference to Legionella. Furthermore, BS 8580 Part 2 covers more than Healthcare; it is about other facilities as well. The document is split into three sections: General - Risk Assessment for all premises, Healthcare and non-Healthcare. Part one interweaves between the two scenarios.

Due to the increased number of infection pathways (four for *P. aeruginosa* and only one for Legionella) there are additional aspects in Part 2. BS 8580-1 was predominantly based on water and aerosolisation as the infection pathway; Part 2 has a wider sphere of vision due to the increased risks and transmission routes.

One key visible difference between Part 1 and Part 2 is the inclusion of colour photographs in Part 2. This has been done to aid clarity and help readers understand the risks better, such as the drain grid around the outside of a swimming pool, making sure that gets lifted, checked, and cleaned is part of reducing the risk of *P. aeruginosa*.

Q11 What steps should service providers take to implement the standard?

First and foremost, read the document; and that's great advice for everyone that may need to utilise this standard or any other British Standard that is out there.

This standard is not written for the service provider alone to create a risk assessment, although they can and do play a part in the process. BS 8580-2 is a team approach. The service provider needs to understand that they can form part of the team. They also need to understand the four main areas of Pseudomonas contamination. Water: they can manage that; however, they may struggle to have a significant impact on cleaning practices, Clinical Staff and Sterile Services. In non-healthcare settings such as leisure for instance, the Service Provider may be the sole person doing the *P. aeruginosa* Risk Assessment. In those circumstances, they need a greater level of training, knowledge, and competency.

There is an argument for being a higher level of risk assessment for Pseudomonas as the infection pathways are greater and transmission is more widespread. It requires much more experience and an in-depth understanding. I was lucky enough to attend the pre-launch of BS 8580-1 in 2010 with a colleague who was a microbiologist, we both had over 30 years of experience at this point. I was able to ask a question of what the panel thought regarding the skills required that made a competent risk assessor. *"Are you saying the 4 key skills, knowledge and competence criteria for Risk Assessing are Water Treatment, Health & Safety, Engineering and Microbiology".* The panel agreed. Maybe we need to be mindful of that when considering

our team approach for Water Safety Groups and in appointing individuals to undertake Risk Assessments.

What we are ultimately saying is that we only want very experienced and competent people undertaking *P. aeruginosa* Risk Assessments. There is no better training than experience; you can't be competent after a one-day course on Pseudomonas Risk Assessment.

Q12 What should Responsible Persons look for when procuring a *P. aeruginosa* Risk Assessment? How can they assess competency of the supplier, considering the LCA does not cover other waterborne pathogens?

While the LCA doesn't necessarily cover Pseudomonas they do promote the requirement of training, competence, procedures, and processes. All these steps should help provide confidence in the next steps.

Sometimes asking for proof of competency can be a challenge, especially for those of us of a certain vintage. I undertook a 6-week training course 40 years ago as an introduction to the industry; I don't have the certificates for this now and I am sure I can't be the only one. Does this mean my training is null and void? Does it make me incompetent in this area? Looking just for training courses isn't broad enough; look at past examples of work, CVs, and references. Does my being invited and sitting on the panel for BS 8580-2 and BS 7592 demonstrate competency? How do you put that down on a training certificate or piece of paper other than a professional CV?

Q13 What steps should Water Safety Groups take in response to the standard?

Read it. There are 85 pages, so it is heavy; but it is split around 50/50 between healthcare and non-healthcare. It may sound tongue in cheek but somebody on the Water Safety Group needs to read it and interpret it to pull the team together.

The document talks about independence; how do you have internal independence? It can be time-consuming to produce this Risk Assessment. How do you know the questions to ask? Annex C it gives you an example of a Healthcare risks assessment and Annex D gives an example of a risk assessment for an interactive Water Feature. It is not the only way, but it will help.

Once it is produced you need to create the set of actions – be that a Water Safety Plan or a Written Scheme. Then you need to get the actions done and the capital expenditure signed off for the tasks, from training to physical system changes. Once the changes are made you need to periodically review and then interactively review if there is a clinical case of Pseudomonas identified. This will need a swift response and keeping the Risk Assessment dynamic would be critical. You need the processes and procedures in place to react quickly.

Do you have any final thoughts or tips for our readers Nigel?

One thing I have learned from Expert Witness cases, in BS 8580-1 there is a phrase that amounts to producing a set of "what if" scenarios that are reasonably foreseeable to "normal" operation. If you can foresee a risk, then you can create a set of "what ifs" around the scenarios. In one case I was involved in the HSE highlighted a lack of forward planning. Some of this is based on training and being prepared. Having a set of "what-ifs" is a useful go-to to resolve some questions. It may not be written down in the standard but having a bunch of "what-ifs" is crucial. Failing to prepare is preparing to fail.

Another consideration is being dynamic in your response. If a remedial approach has failed several times; try something different; you clearly haven't resolved the root cause of the issue. Doing the same thing and expecting a different outcome is the definition of insanity. Yet it happens so regularly. A site I am dealing with currently keeps getting high Pseudomonas and TVC levels; unbeknownst to me they had undertaken 5 disinfections using the same chemical. I suggested changing things up and the counts have gone down. It shows the change in process can have a positive impact and help resolve issues.

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