T-safe Talks

Dennis Kelly
Authorising Engineer (Water)

Water safety in healthcare, an AE's perspective

Tsafe

Welcome to T-safe Talks

In this edition of T-safe Talks, we cover water safety in healthcare with Dennis Kelly, a leading Authorising Engineer (Water) for the NHS. Interviewed by our own Nick Barsby, National Sales Manager and Legionella Control Association Chair, the pair discuss the challenges of managing safe water systems in healthcare including trends in competency levels, Legionella result trigger points and the role of an AE in pre-construction design.

Meet the Interview Panel

Dennis Kelly Authorising Engineer, Pro LP Consulting Ltd

Dennis Kelly is a leading water treatment professional who has had more than 42 years' experience in dealing with all aspects of Legionella related issues in industrial and institutional marketplaces in many countries across the globe. A graduate of the University of Glasgow, Dennis is a Chartered Biologist who has held several senior management and operational roles for some of the world's largest water treatment and environmental hygiene companies.

Today Dennis fulfils the role of Authorising Engineer (Water) on behalf of 11 NHS Boards in Scotland and several others throughout England and Ireland. Dennis has also acted as the external expert in several situations where there have been both outbreaks and individual cases of Legionnaires' Disease recorded. This work has included delivering expert witness reports in complex litigation processes.

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. He has a vast knowledge of analytical test methods and procedures and played a pivotal role in the introduction of MALDI-ToF confirmations in the UK market. Nick is currently National Sales Manager for T-safe and heads up our water hygiene service provider partner initiative. Nick is also the sitting Chairman and a Director of the Legionella Control Association and was heavily involved in the re-writing of the Service Standards and the subsequent roll out to its membership. Nick has also written and co-written numerous published articles on a range of subjects covering Microbiology and Laboratory methods.

Q1 What trends have you observed regarding competency levels within the sector?

Some years ago, there seemed to be a race to the bottom from the Water Hygiene sector that drove prices down in terms of Legionella risk assessment and tank cleans and other water hygiene services. The result of this was poor quality services being delivered and impacting negatively on the end users. This situation was especially concerning on healthcare sites. There is a sense that this appears to now be turning a corner. I get the impression that quality is becoming increasingly important possibly driven by the oversight and scrutiny provided by Authorising Engineers as well as the subsequent levels of litigation that are now being seen. The increase in quality is also being driven by better levels of understanding and increased levels of competency that can be seen in the end users.

As the healthcare sector evolves and considers other water borne pathogens in addition to Legionella, people are spending increasing amounts of time ensuring that work is completed correctly. Competency of contractors, from plumbers to water hygiene suppliers is improving, although there is still room for improvement for some.

Traditionally, the cost of entry to this market has been low, and this has not helped the quality levels of the work supplied. In the early days of the developing water hygiene market people could turn up with a bucket of Chlorine and do a disinfection job. That's not what we are seeing now but there was a stage where the competency levels were not as stringently checked and verified before the delivery of site work by end users. This has unquestionably improved significantly over the past decade or so.

Some Health Boards in Scotland will no longer use Plumbing Contractors who do not understand the impact of their work on the risk levels of water borne pathogens. Contractors need to be able to suitably evidence the required level of competence and understanding to take on healthcare related work. It is unquestionably making a difference in the quality of work that is being delivered in healthcare premises.

Q2 I was surprised to learn that the Plumbing Apprenticeship doesn't cover much content on Legionella control. Do you have a view on this?

I have previously been asked to provide some support on apprenticeship schemes in Scotland and water borne pathogens are mentioned, but not in any great detail. What I am seeing however, is an increase in demand from plumbing contractors for training courses, to enable them to bid for work on healthcare premises. There is now an increased focus on keeping the risk of water borne pathogens to a minimum.

In my early days I went through a lot of training and competency checks, both theoretical and practical. I then became the Houseman trainer on Microbiology and Cooling systems before Legionella became the issue it now is in the UK. I have found that some of the courses available online are generic and they don't dig into the required level of detail. Ultimately there is no substitute for old age and experience.

Q3 Is Legionella the major waterborne pathogen of concern, in your experience as an AE?

The data from PHE for 2019 states that there were 11 nosocomial cases of Legionnaires disease. In the same period, there were 5,000 Pseudomonas infections, this information is available on the PHE website. There is no mention as to how many of the Pseudomonas infections were water related, but it is expected that a significant number of them would have been. My gut feeling is that a fair amount of them would have been. Even if only 1% of these 5000 cases is water related that would still have many more cases than those caused by Legionella.

Legionella is the pathogen for which much of the legislation and guidance documentation has been written. I think if this were to be re-written today, there would be a definite healthcare focus around Pseudomonas. The AE for Water role in the NHS really started about 10 years ago and AE's, along with NHS Estates teams, went up a significant learning curve. Pseudomonas was part of this learning curve. Additionally, at the start of this learning curve Infection Control teams were not always involved with the AE and Estates teams, but they along with all other involved parties, now must be fully engaged with the risk reduction processes.

The delivery of the water from the tap to the patient is an Infection Control responsibility. However, the process of getting the water around the building has a range of stakeholders involved including estates, contractors, water hygiene companies, domestic cleaning teams and clinical staff etc. As a consequence of having so many people involved, it is critical to have good governance of the involved parties. It is concerning that experience shows that at times, not all the involved people have a clear understanding of their roles and responsibilities.

Q4 So awareness of water safety risk amongst clinical staff is an issue, how can this be improved?

The AE role has morphed; I now spend 3-4 times more with Infection Control and doctors. One piece of training that I undertake with these people is to give clinical staff experience of a plant room. Too often the clinical teams just think they turn a tap on and get safe water; once they see the plant room and get a basic understanding of plumbing, they have an insight of the complexities involved. This helps them understand the root cause of issues and some of the challenges and work behind the scenes that Estates must put in to deliver that water safely. This has made a huge difference in both understanding and appreciation of the Estates team's role. Giving clinical teams a better understanding of TMVs, calorifiers and dead legs makes a big difference in terms of helping everyone communicate clearly.

Q5 Do you have an example of when a lack of knowledge amongst clinical staff affected water safety?

I have been involved in some sites in the past where clinical teams were responsible for flushing and it was common to get as little as 20% of the records completed and reported back. This could have been for numerous factors and the pandemic won't have helped making this a priority for clinical staff. The reasons we were given for this ultimately came down to a lack of understanding from those being tasked with a job. They didn't understand the importance of flushing, and how it contributes to keeping the water system safe for patients. Once this was rectified with training and toolbox talks the compliance records were completed and returned at a significantly improved rate.

Q6 Challenges with flushing is a recurring theme in healthcare, how can this be resolved?

I have seen this resolved in several ways as poor flushing records and compliance is a common challenge faced by AE's. In one scenario the flushing was outsourced to a water hygiene company. Now this took the pressure off the clinical teams; but it came at a cost and this cost burden may have been too much for some Health Boards/ NHS Trusts to take on.

On other sites they have taken on additional staff with the primary responsibility to undertake the flushing. This is not the most efficient way, but it does give a solid response and is a close out for any non-conformances that may have been found. It means that the job is completed as it's a task given to a specific team and the records tend to be well kept.

Q7 How did the COVID pandemic affect flushing in hospitals?

I was part of the build team for the Louisa Jordan Nightingale site in Scotland – turning an exhibition centre into a 1,000-bed hospital was the busiest and most rewarding 15 days of my career. The thing to note is that COVID has driven our thought processes and improved our understanding of water.

For example, I have one Board that is fanatical about recording data and evidencing that they have done the right thing. This Board had unused wards (due to COVID) and started flushing twice a week and could evidence it. Some of these wards were left empty for a period before being turned into COVID wards at 7 days stand down notice. The Board contacted me and asked what microbiological testing we could do to re-open these wards quickly. I explained that the lab tests take 14 days. What we found was that the twice weekly flushing didn't simulate regular use. Once we moved this to daily flushing, we saw the legionella issues clear quite quickly; we were able to evidence this by using rapid onsite test kits to get the Wards open quickly and demonstrate no Legionella pneumophila Sero Group 1 risk.

Q8 ‘Simulating regular use’ with flushing, what does that mean?

As a worked example, if you take a ward with 80 outlets and only flush them all twice a week you won’t simulate “regular” use under “normal” conditions. If you do them all once daily, then you’re getting closer to “normal” use.

It begs the question is following the guidance enough; or do you need to take each scenario on its own merits? This is a prime example of our COVID learning. Take flushing an expansion vessel monthly to six monthly; where did this guidance come from – I’m not sure what, if any, scientific evidence is out there for this. Have we learnt more in COVID times than the last 40 years of water borne pathogen control?

Q9 Should we be going beyond the guidance given this scenario Dennis?

If you need to go beyond the guidance to maintain a safe water system, then you should do it; it’s really that simple. Guidance is just that; there to guide you. With older sites you tend to find more dead legs and under normal use the flow of water helps reduce the legionella impact of dead legs. When systems are not used regularly and flushed only twice a week; it allows Legionella to proliferate in these dead legs. Give the system a few weeks of reduced usage and the legionella in the system will quickly take hold; especially when systems are not operating as “normal”.

I had a recent project that had 19 different system disinfections; they kept doing the same thing. Their response was *“we’ve always done it this way”* and *“it followed the guidance”*; however, doing the same thing and expecting a different result is the definition of insanity. It’s a prime example of following the guidance but not understanding the guidance. The key word is ‘guide’ in guidance; it’s not the rule book; and some people miss that. The big risk here is that these actions could have helped the legionella build up a tolerance to the chemical that was used in these 19 disinfections over a prolonged period.

Q10 The SHTM and HTM guidance differs in both Scotland and England respectively, do you envisage these becoming aligned?

In Scotland we have been working on reviewing and upgrading our SHTM guidance, using HTM 04:01 as a model but its yet to be released. HTM 04:01 removed the standardized two-year risk assessment review and followed the model set out in ACoP L8. I’d be speculating if I said we are going to do this in Scotland, but we might. If we do, then it gives an opportunity for say small Primary Care Centre’s within NHS estates that are under demonstratable and evidenced control to adjust the frequency of risk assessment review.

If you then compare that to an Acute Hospital with ICU and Oncology etc. then I think the risk assessment you need to undertake is challenging as it’s not just about Legionella anymore. I have one board that is considering reviewing risk assessments annually. When some of these sites take around 6 months to review in the first place that’s a monumental task; but this reflects the critical role the risk assessment plays.

Q11 Should there be more guidance on water systems in elderly care?

One of the biggest gaps I think we have, in terms of water system guidance, is in care for the elderly; should we work to NHS guidance or non-NHS guidance? Nobody has said and there is no clear guidance. At what point does a Care Home fall under NHS guidance. For me, the starting point is about patient susceptibility, and these are highly susceptible people. Its as clear as that. Now that comes with challenges in the Private Sector when it comes to running your hot water hotter and additional TMV servicing etc. so there is a lot of push-back and anything that threatens margins may be challenged. I think at present it's a grey area, its wooly and consequently its dangerous. It's the same with some of the guidance, such as TMVs, that are worded it in such a way that it says something, but it is not clear. Too many factors can impact on the service schedules based on manufacturers guidance. Ultimately, I tend to fall back on the safest approach and the best care for the most susceptible people.

Q12 What are your views on the guidance for Legionella positive actionable trigger points?

It's an area that I think could be improved. Telling someone to resample after a positive result(s) of between 100 and 1,000 CFU/L, that takes 2 weeks to be analyzed and reported; and now you wait a further 2 weeks for the second set of results to be reported. Some hospitals have just copied this into their standard operating procedures and that is dangerous. It exposes people unnecessarily, for a further 2-week window to a known human pathogen that can be fatal, especially in nosocomial settings. I lobbied to have the above removed from the HSE document for that exact reason.

I have heard of some Trusts who don't react to presumptive results; that's the polar opposite of my opinion and response protocol. I have undertaken expert witness work and seen how courts and lawyers respond to presumptive results and it's not something I would recommend. If you have a presumptive and someone acquires legionnaires disease in the "stand still" period, then your position is indefensible. The advent of MALDI-ToF confirmations is helping to stop this however, by giving further data and earlier identification of the confirmed presence of Legionella. I specifically ask for labs that use MALDI-ToF, in order to remove the presumptive results issue.

I have never had anyone complain about reacting to a presumptive that didn't confirm. That's because the conditions were right for growth; control had been lost and the opportunity for proliferation was present. Therefore, it is conducive to treat the system as though it was positive and undertake the appropriate remedial actions.

One of the questions in my exams asked the question what does an "Not Detected" means on a lab report. One of the choices is Legionella wasn't detected and it's the only answer you can give; but you would be surprised how many people think it means no legionella is in the system.

I have a situation now where the lab we are using has a limit of detection of 100CFU/L. Now I prefer to be able to see as low as possible and most labs now offer 20CFU/L. If I can see some low growth and early changes then I can react quicker and ultimately help keep patients safe.

Q13 When you get a positive result in a non-immunocompromised ward, how would you respond?

The SHTM says to take Post Flush samples for Legionella. Sites that I look after do the opposite; we want to know pre flush, what is in the system that the end user is being exposed to. If we get a positive, we then re-sample both pre and post flush.

A typical scenario, regardless of location, is to re-sample. In a low risk setting we would re-sample in a geographical spread around the positive – North, South, East and West of the result. It is not unusual to get numerous positives come back at this point, and this helps drive the remedial actions and approach taken. Wherever we have positives we would consider deploying Point of Use Filters to protect the end users while we undertake further investigations, to identify root cause and until control is restored. This helps keep everyone safe and is a fundamental secondary control measure we deploy.

An example I can give you is of a Renal Washer Disinfectors and Infectious Diseases Ward in a large Acute Hospital. On routine quarterly sampling we found a couple of positives. We undertook a wider spread of samples and filtered the wards as we had patients in. We sampled Pre and Post Flush on a wider area and found even more. It's a fairly discrete water system with its own tanks and water heaters in the hospital. We also sampled other areas not served by this water system to give ourselves confidence that the rest of the hospital was clear. We didn't have evidence that the system was clear; we had some positives – if we hadn't sampled them and someone contracted legionnaires disease in the other areas of the hospital then its hard to defend this in court.

When we got the Head of Estates involved, we marked up the schematics with different coloured highlighters to track where the positives started; those found on the second round of sampling and the impact of any chlorination we undertook.

We would also undertake a vast dead leg survey using the HAI-Scribe *(Hospital Acquired Inspections Systems for Controlling Risk in the Built Environment)* system. This is unique to Scotland and whenever it raised across other parts of the UK, I get funny looks. It involves a specialist risk assessment to remove wall and ceiling panels to review the pipework behind the walls that may involve moving the patient from the area. We would do that as a standard operating procedure; we would strip out any dead legs we find and based on three clear sample results; we would then remove the filters.

Q14 You mention 3 clear results as a trigger to remove a filter, what is the basis of your view on this?

I don't agree on one clear result means that a filter can be removed. The issue I have is based on my expert witness view; if a lawyer found that you had employed different approaches in different areas of the building then they would have a field day.

I have used the three clear approach for around 10 years and its now in Part C of the SHTM04-01 (see below):

5.8) *Where the results of three consecutive weekly water system samples remained below 100 CFUs/Litre, the Authorised Person (Water) and Consultant Microbiologist would be informed and sampling would revert to a monthly sampling frequency.*

5.9) *Where the results of three consecutive monthly Water System samples remained below 100 CFUs/Litre, the Authorised Person (Water) and Consultant Microbiologist would be informed and sampling would revert to a 3-monthly sampling frequency.*

Once you have three clear results you revert to monthly sampling and then eventually back to a quarterly sampling regime. It's an approach that I like and favor. I tend to do this sampling fortnightly as opposed to weekly; only because the timeline in analyzing and reporting legionella results, which as we know takes 10 calendar days.

The other issue with weekly samples is that if you have taken 5 weeks of samples (to mitigate a random positive result) and have 3 clear results back – can you proceed on the 3 clear results or do you need the final 2 of the 5 to come back clear to trigger the removal of filters? Again, in court it would be an interesting discussion if you had 3 clear results but one of the last results returned a local positive. We find the fortnightly approach is a clean process, from which decisions can be made without awaiting further results.

Q15 What role does an AE play in the pre-construction design phase?

As an AE my time is being spent more and more on the design phase. If we design the water system right, then the challenges are redirected. I probably spend a bigger percentage of my time than ever before at design meetings. We are being asked to comment and support these at the very early stages. I had a drawing sent to me recently that included a dead leg that had a note saying, ''cap as close to the end of pipework''. We get examples of that all the time.

During the construction of a 250-bed hospital, I was asked to create a construction-based Water Safety Group, this may have been one of the first examples of this in the UK. This was all prior to putting water into the system. We trained the contractors, plumbers, and sub-contractors; we risk assessed the system before any water was in it as the panels were off the walls and ceiling tiles were down; this resulted in a few changes before water was added to the system. We pressure tested it and leachate tested it. We met fortnightly during construction and were able to hand the water system over as sweet as a nut. It's the extreme from having a system that had lots of positives on handover to a clear system, barring one sporadic positive.

We found some of the contractors and consultants challenge us as to why we were being so strict on RAMS, processes, and procedures. Once we trained the site teams, they understood our objectives and why we were taking this approach, and it made a significant difference. As a result, the NHS took receipt of a water system that was clear as opposed to one that was colonized on handover.

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

A top tip of mine is communication, get the basics clear to the teams involved in managing and delivering water safety; ensure everyone knows why they are doing a task; even as simple as flushing; to help aid compliance and risk mitigation.

I would also urge caution around adopting new technologies or products. Consider if there has been enough research conducted, consult with your AE, and evaluate whether there is likely to be an inadvertent impact on water safety.

For example, some of the new ideas on water systems such as circulated cold water are potentially creating more problems. I have seen this deployed in several buildings; the challenge is that the cold system was running at 28°C due to thermal heat gain from the pumps, and this was in Scotland in the summer months. There is also talk of shower heads that use 20% of the original water supply; and that's great; but it impacts on my planned water usage. It just needs to be considered before being deployed.

Finally, if water was a forethought rather than an afterthought in building design for healthcare, it could save the NHS millions over the life cycle of a building and would have an impact on reducing the number of positive results and associated nosocomial infections.

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