Flushing compliance enhanced at St George's

The estates team at St George's Hospital in south London say the deployment of a web-based software system which verifies that 'responsible' staff across the site have regularly flushed low-use water outlets to maintain flow, and thus prevent potentially dangerous waterborne bacteria building up in pipework, has 'very substantially' increased compliance with approved flushing practice – as set out in the HSE's L8 Approved Code of Practice on controlling *Legionella* bacteria in water systems, and the new HTM 04-01, *Safe Water in Healthcare Premises*. As *HEJ* editor, Jonathan Baillie, reports, the hospital's use of Digital Missives' L8guard software system has also saved considerable staff time, eliminated the need to manually input data from thousands of paper flushing return forms, and enabled the Estates team to easily identify departments not undertaking regular flushing.

St George's Hospital in Tooting (pictured) is one of England's principal teaching hospitals, serving around 1.3 m people living across south-west London. A large number of its services – including cardiothoracic medicine and surgery, neurosciences, and renal transplantation – are also provided to significant populations in Surrey and Sussex. The hospital's operator, St George's University Hospitals NHS Foundation Trust, also provides care for patients from a large catchment area in south-east England for specialities such as pelvic trauma, while other services – such as HIV care, and bone marrow transplantation for non-cancer diseases – are offered to patients from across the country. The hospital shares its campus with medical school, St George's, University of London.

Like many large acute hospitals, the buildings vary considerably in age; maintaining them is the job of the Trust's 60-strong Estates Team, led by head of Estates and Facilities, Peter Alesbury, who took up the role in late 2013, having immediately previously been head of Group Facilities at private healthcare provider, Circle Partnership. When I met up with him, and L8guard's founder and director, Tim Moore, at the hospital recently, Peter Alesbury explained that since he joined the Trust, the Estates team had put an ever stronger emphasis on managing the hospital's water system safely and cost-effectively. Ensuring that water outlets – and particularly those less used – are regularly flushed to maintain flow, and thus prevent harmful bacteria such as *Legionella* and *Pseudomonas* building up in stagnant water and deadlegs, is among the key elements.

© St George's University Hospitals NHS Foundation Trust

A cumbersome arrangement

Prior to the Trust's adoption in late 2013 of Digital Missives' L8guard web-based software system – which it has used successfully since – the process of ensuring that some 300 'responsible persons' flushed what the staff themselves identified as the low-use outlets in both clinical and non-clinical locations, was entirely dependent on these individuals – anyone from ward managers to healthcare assistants – not only regularly flushing low-use taps, showers, and birthing pools, but also then promptly completing and signing a paper form before returning it to the Estates Department as 'evidence'. Once the forms reached the Estates team – Peter Alesbury reckons the department

holds over 30,000 *Legionella* flushing records – staff had to review each form and input the data into an Excel spreadsheet, manually checking and collating the information. This was both time-consuming and laborious, and in many instances handwriting was illegible, or staff had forgotten to sign the returns – effectively rendering them useless should the Estates team ever be asked to provide 'evidence' of flushing to, say, a CQC or HSE inspector.

Simple email system

Tim Moore said: "Equally, the paper-based records did little to facilitate chasing up of non-compliers, while the Estates team was left with reams of paper records – from

which it could be difficult to quickly find a particular form to check whether flushing had taken place. Now, following the installation of our L8guard web-based software in the Estates and Facilities office, the 300 or so staff responsible for flushing low-use water outlets receive an email twice a week in all but augmented care facilities, which receive one daily. By clicking on the link they are taken to an online page where they can fill in information to verify that particular outlets have been flushed, the time and date, and any obvious 'faults' identified.

"Should any of the automatically generated emails not be responded to within 24 hours, an escalation email and link are sent. Should this not elicit a response, the system notes this as a 'missed' return, and compliance measurements are automatically lowered. Departments regularly performing badly can easily be identified by the reports in the system. This can then be taken up directly with, say, a senior matron or department head, to ensure that flushing takes place."

'Cloud-based' system

Digital Missives holds all the data for the client Trust on a 'cloud'-based storage system. In a model shared by many of the other '25 or so' UK NHS Trusts currently using L8guard, the Estates team at St George's Hospital shares the task of managing of the system, monitoring responses, and taking any necessary follow-up action, with Digital Missives staff based in offices in York. Tim Moore explained that the staff responsible for flushing identify the outlets either simply via a room/location number, or by using the EAN barcodes that feature on stickers on the walls in many locations.

Since the Trust began using L8guard in late 2013 following a three-month trial, Peter Alesbury said compliance with the low-use outlet flushing regime – which he acknowledged had previously been 'pretty poor' – had 'very substantially increased' hospital-wide, giving he and his team

Digital Missives holds all the data for the client Trust on a 'cloud'-based storage system

reassurance that many more low-use water outlets were being regularly and properly flushed in accordance with HTM and HSE guidance, and that, in the process, the risk of build-up of waterborne bacteria such as *Pseudomonas* and *Legionella* in the hospital water system was being minimised.

Spotlight on water safety

He explained: "When I joined the Trust, the Estates team was already putting a strong emphasis on effective water system management. However, particularly in the light of the growing public, regulatory, and media focus on safe hospital water, and incidents such as the death of a number of babies following a *Pseudomonas* outbreak in Northern Irish neonatal units, we have further strengthened that focus." Actions taken have included the establishment by clinical staff of a Water Safety Technical Committee alongside the existing Water Safety Group, and the setting up of a Water Operational Committee, focusing on areas such as the importance of regular flushing of low-use water outlets, and effective maintenance.

Peter Alesbury said: "When I started here at St George's, it was clear that Estates team members were spending inordinate time going through low-use water outlet flushing returns, struggling to read them, and inputting the data, while using a paper-based system also made it difficult to ensure compliance. Since adopting L8guard, our administrative workload around flushing compliance has substantially decreased, in that instances of flushing are collated online in 'real time'. The software can generate and automatically email reports in a number

of ways, as often as we wish, down to individual departmental or ward performance. In my early days here compliance was poor, but L8guard's use has seen a marked change. Pleasingly, via proactive water system management – including our deployment of L8guard – we have reduced the number of positive *Legionella* samples from 20-30 a year or two ago, to zero today."

Chlorine dosing

The head of Estates and Facilities explained that the St George's team used uses 'fairly conventional' chlorine and chlorine dioxide dosing to treat the hospital's water, all of which is now sourced from a sizeable aquifer-fed borehole on site. Peter Alesbury said: "Using the borehole – which we spent over £45,000 on last year enhancing and upgrading – saves us about £10,000 per month in water charges, although we do have an emergency back-up supply."

The borehole is monitored '24/7'. Estates personnel are automatically notified via email or text should the control system identify any fall in performance, for instance from the pump. As part of the upgrade, the Estates team, and engineers from supplier, Clearwater, installed a new chemical treatment plant for water from the borehole, to afford additional protection for the supply against waterborne bacteria and other potential contamination. A borehole risk assessment by the Estates team had deemed the existing control equipment for the borehole 'dated', and, alongside the 'bespoke' chemical treatment plant, control system, and an associated temperature-controlled plant room, Clearwater provided 'full future-proof' system integration, remote access, and data logging and alarm systems.

A sizeable task

Returning to the magnitude of the 'task' of keeping the hospital's water safe and compliant, Peter Alesbury said: "Around 5,000 Trust staff work here, and there are probably about 15,000 people, including staff, patients, visitors, contractors, and staff and students from St George's, University of London, using the the facilities daily. The hospital has 103 clinical and non-clinical departments, and we are thus responsible for a water system with many thousands of outlets. Using L8guard, we are now monitoring flushing of over 900 low-use outlets via the simple but effective system of automatically generated emails and responses, and can escalate the process should we not receive a prompt response. Low-use outlets could be in a host of different locations – from laboratories, kitchens, bathrooms, and patient rooms, to many other clinical and non-clinical spaces. L8guard can produce detailed reports to

© St George's University Hospitals NHS Foundation Trust.

identify – and then illustrate – via tables, charts, or graphs, compliance levels department by department, or ward by ward, whenever we need them. One of the other things it enables us to do is to circulate a list of the 10 'worst offenders' in terms of non-compliance each month; among the recipients is the Trust's Director of Infection Prevention and Control, who then writes to those identified to emphasise the importance of improving their flushing compliance."

He added: "One of the elements I believe is vital in maintaining a safe, compliant hospital water system is educating staff on their role, and on some of the absolute necessities – such as flushing low-use outlets, and correct cleaning of taps and showers. I conduct regular water system safety and hygiene training for a wide range of clinical and non-clinical staff. When we introduced L8guard, there were some initial misgivings among those used to a paper-based system, but overall I feel there is now considerably greater buy-in on the use of the system and its benefits, particularly given the media coverage of high profile incidents related to the impact of waterborne bacteria in hospitals."

Tim Moore added: "L8guard frees up significant amount of staff time; users simply click on the L8guard email link they receive two or three times weekly, which takes them to a page where they can fill in the required details, immediately capturing the flushing information. New users are automatically emailed a 'manual' explaining how the system works when they first use it."

Software house

Tim Moore explained that he established Digital Missives as a software house and consultancy in 1995 after working for 10 years for CAFM software provider, Planet FM. He said: "In 2007-2008 I was dealing regularly with estates personnel at hospitals including London's Royal Free, and those run by Imperial College Healthcare, as well as St George's Hospital in Tooting. Senior estates
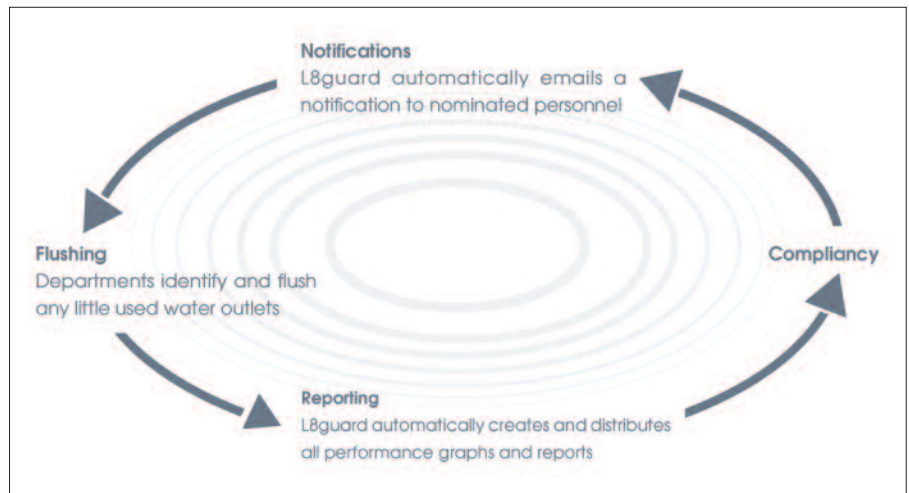

Figure 1: How the L8guard system works.

personnel at the Royal Free asked if Digital Missives could develop a more efficient alternative to paper-based records for low-use water outlet flushing. I initially developed some fairly basic logging software, which was integrated into the 'estates@online' system we'd already put together for them, but we subsequently re-worked the idea, and developed L8guard as an entirely proactive system – removing the need for a busy member of staff to have to remember to perform flushing activities. We have improved and refined the system ever since based on customer feedback and our own ideas on how to keep things simple for our users. We are currently developing iOS and Android-based L8guard 'apps', which estates and clinical personnel will be able to install on tablets, PDAs, or desktop computers. Currently some of the Estates team at St George's Hopsital, and indeed other hospitals using L8guard, can send flushing data back to the system wirelessly via PDAs or phones, but generally the straightforward emailing and web form system works extremely well.

Rapid payback

"Over time," Tim Moore continued, "we have refined and enhanced the software's capabilities. I am an experienced systems

analyst and software engineer, and we are generally believers in system enhancements at no extra cost whenever possible. Most hospitals begin with a free trial implementation to explore the benefits and, if they like the system and wish to deploy it, we then charge them a fee based on the number of separate departments to be included. The system is low-cost, and – as St George's Hospital's experience has shown – typically pays for itself within a few months."

Digital Missives is close to launching an additional L8guard software module which will allow estates and facilities and clinical staff to measure water temperature at sentinel points at outlets using a probe, and then record the readings in the system – a further valuable potential ally in the battle against proliferation of waterborne bacteria. Tim Moore added: "Peter Alesbury and his team currently use the ZetaSafe cloud-based software system to manage many elements of estates compliance. Currently the system is mostly used for water safety and *Legionella* compliance, but ZetaSafe can support compliance monitoring in many different fields – from asbestos to fire safety. L8guard can feed ZetaSafe's compliance monitoring by providing the detailed, accurate recording and analysis of low-use

water outlet flushing activities. Using the two software systems together provides the Estates team with an excellent way to ensure that water supplied for use throughout the hospital is maintained in safe, compliant condition.

"The data captured by L8guard is held 'in the cloud' by us, with only a small number of authorised Trust users able to access the full functionality. We and the St George's Estates team jointly manage administrative tasks such as updating the system with new staff names and contact details as personnel change."

Dependent on staff

I put to it to the pair that, while clearly an effective and easy-to-use system, the success of L8guard in use still largely depended on the efficiency of the staff responsible for flushing low-use water outlets in both regularly flushing them, and then completing and returning the online flushing form. Peter Alesbury said: "Via 'education' by us, and staff such as senior nurses, clinical leads, and the infection control team, we believe the system's benefits in ensuring compliance, and in turn keeping our water system safe, are now widely recognised.

"The system has the backing of senior clinical and non-clinical personnel and the Trust's management and board, who recognise the threat posed by microorganisms such as *Legionella* and *Pseudomonas aeruginosa* if our water system is not properly managed and rigorously monitored. Our positive sample rates for both *Legionella* and *Pseudomonas* are now extremely low – we tend to sample at least 100 times a month in different locations, and are determined, through effective overall water system management, timely and efficient maintenance, and use of innovative technology such as L8guard, to continue to maintain our water supply in a safe, clean, and hygienic condition.

Tailoring the system's capabilities

"Digital Missives has proven excellent to deal with, and indeed Tim Moore and his team have regularly incorporated small 'tweaks' to the software for us to meet particular demands, at either minimal, or often no, additional cost. Users of the system can typically complete a low-use outlet flushing return in under a minute, with minimal interruption to their work, and as an extremely busy Estates team, we now have a considerably reduced burden in collating and analysing the data."

Tim Moore said: "Once a healthcare facility has decided to specify L8guard, we populate the system with all the building, room, and contact details. Our support team then continues to manage the relationship between the users and the system by telephone and email. How much interaction an estates team has

Peter Alesbury (left) and Tim Moore in the Estates and Facilities Department offices at St George's Hospital.

with individual users is very much its choice. We are flexible, but will willingly, for example, share the small administrative task of updating contact details and staff names, and updating department names and locations.

"Administrators – in St George's case the Estates and Facilities team, can access up-to-the-minute information via the central database and automatically receive daily, weekly, and monthly performance reports. By working with departmental contacts, the system automatically generates risk assessment forms, and tracks response through to completion, escalating when necessary, and providing a fully closed loop audit trail. We are not aware of another system currently available that offers the features that L8guard does in terms of managing low-use water outlet flushing compliance so efficiently and simply at such low cost.

"Data security-wise, once set up, the emails take the user straight to a page effectively personalised for them to input their data, so there is no need for individual passwords. Additional data security is ensured through our incorporation of sophisticated encryption into the software."

Low-cost and capable

Tim Moore explained that, to date, around 25 NHS Trusts in England, Wales, and Scotland were using L8guard, which was officially launched in 2011; St George's Hospital was among the first users. He added: "We believe there are around 250 NHS Trusts in England alone, and will be targeting the software strongly at healthcare facilities looking for a low-cost, but efficient and capable way to manage their low-use water outlet flushing compliance regime."

Clinical taps being replaced

As part of the ongoing drive to maintain and further improve water system

management at St George's Hospital, Peter Alesbury explained that he is currently in the process of replacing some 200-300 clinical taps in various locations with Horne's Optitherm thermostatic tap, which was specifically designed for healthcare applications, taking into account both the need to deliver safe hot and cold water, and for stringent infection control. He elaborated: "One of the Optitherm's major selling points is that the thermostatic mechanism is easily accessed in minutes, without having to remove the IPS panel, as one does with some other thermostatic taps. Horne also offers a special flushing kit, which can be used with the Optitherm tap *in situ*, and facilitates periodic flushing of the pipework, at high velocity, to remove debris and biofilm. The kit can also aid water sample collection and temperature measurement. Flushing and thermal disinfection of the tap and pipework is extremely easy, and the system's design makes access for maintenance quick and straightforward. We like working with suppliers that respond to our needs, and indeed Horne's development of the Optitherm, and Digital Missives' launch and subsequent ongoing improvements to its L8guard software, are both clear examples of companies prepared to listen and respond in an innovative way."

Making the job easier

He continued: "While water maintenance is just one element of my team's very varied workload, it is an important one, to which we devote considerable time and effort. It is innovations such as L8guard which not only simplify our task, but also provide added reassurance that we have done all we can to ensure the safety of our water system. In the near future I will be further strengthening our water safety focus by establishing a dedicated five-strong water management team; we are currently recruiting for these roles.

"Maintaining a safe, compliant hospital water system for this extremely large site is a complex, and fairly constant, challenge, but the L8guard software system has had a very positive impact. The fact that it was inexpensive to buy, and is easy and inexpensive to operate, yet gives us a wealth of valuable data at our fingertips, and helps us ensure compliance, is a major bonus. I have nothing but praise for the support we have had from Digital Missives in getting the software installed and running efficiently, and in enabling us to get the maximum benefit from it. It is also good to know that in the event of any future visit by inspectors from, for example, the CQC, or HSE, we have a highly effective, easily accessible means of providing evidence that regular flushing has been carried out." ✛