# 'Simple' software system boosts flushing compliance

**The L8guard software system from Digital Missives has highly impressed the Estates Maintenance team at Bedford Hospital, where it has significantly increased flushing compliance. It highlights around 1,600 sinks, showers, and washbasins hospital-wide assessed as 'low-use', identifies whether they have been regularly flushed in line with HTM recommendations and hospital guidance, and, where necessary, prompts staff to perform flushing activity. Should the reminders fail, it then alerts senior Infection Control personnel. The system has eliminated the laborious task of inputting data from hundreds of paper returns each week, and with automated prompts and subsequent reminders, compliance levels in respect of flushing to prevent growth and proliferation of *Legionella* and *Pseudomonas aeruginosa* have risen from around 50% to 87%, and from 60% to 95%, respectively.**

Bedford Hospital NHS Trust, which operates Bedford Hospital, serves approximately 270,000 people across Bedfordshire and surrounding areas. The Trust has over 2,500 staff, and a current turnover of some £180 m. A 425-bedded district general hospital, Bedford Hospital provides a full range of acute services, and has a full Level 2 Accident & Emergency Department, with a recently opened Ambulatory Emergency Care Unit. Its Critical Care Complex provides both high dependency and intensive care. Other clinical services provided include cardiology, dermatology, and plastic surgery. The hospital has nine operating theatres, including a vascular/interventional suite, complemented by a full anaesthetic service and a consultant-led pain service. Oral and maxillofacial surgery and endoscopy patients are treated in their own specialist units, while the Trust's Ophthalmology service is now managed within the hospital's facilities by Moorfields Eye Hospital NHS Foundation Trust.

## Hard FM services

Hard FM at Bedford Hospital is the task of the Trust's 25-strong Estates Maintenance team, which has overall responsibility for ensuring that the water supplied to the 67 departments is maintained in a safe, hygienic condition. To find out more about the positive impact that the use of the L8guard monitoring software has had on low-use outlet flushing at the hospital since its installation there two years ago, I recently met at the Estates Maintenance office with Brian Randall, Engineering officer, Statutory Compliance, and his colleague, senior Estates manager, Kevin Stephenson.

## Simpler compliance management online

The system that I had met up with them to hear about – L8guard – is a web-based software system that the supplier, Digital Missives, says enables a hospital's Estates team 'to fully manage low-use water outlet flushing regimes across their entire estate'. Once set up – a hospital typically purchases an annual licence covering a defined number of users – the software generates risk assessment forms to an agreed schedule, and automatically emails them to designated departmental contacts to complete and return electronically. The information thus provided is automatically added to a central record, which can be accessed quickly and easily, and provides data on flushing compliance down to a granular level. The forms include 'tick boxes' for every low-use outlet, or, depending on the configuration – a box to manually add outlets of, say, 4-5 adjacent outlets. Having been sent the reminder to undertake the assessment and flush any low-use outlets as required, the staff member then ticks the relevant boxes to confirm this, or, if they have no low-use outlets, ticks a different box. Faults or lack of access can be reported at the same time.

## A quick and easy process

Once the form is completed (which users surveys say takes, on average, under a minute), the system automatically transmits the data to a central database. Estates and other relevant personnel, such as 'Infection Control', thus have a regularly updated, immediately viewable snapshot, of which outlets have been flushed, and which have not, across the entire estate. The forms include space to record inability to access a particular outlet for flushing, and the reasons for this, while a 'user-friendly' interface allows designated users to update key data, for example when a new outlet is installed. L8guard can generate data for scrutiny by a Water Safety Group or director of Infection Control, for instance detailing compliance history down to individual outlet level. At Bedford Hospital, designated staff are expected to flush all low-use water outlets every two days to minimise *Legionella* risk, and to then
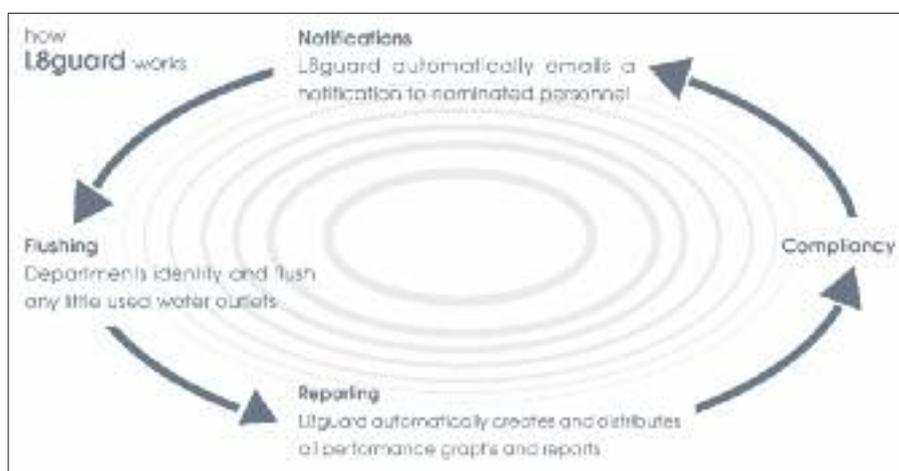


**Figure 1: L8guard is a web-based software system that Digital Missives says enables a hospital's Estates team 'to fully manage low-use water outlet flushing regimes across their entire estate'.**

promptly submit the required form electronically to confirm this.

### Effective within months

"Within the L8guard software's first three months in use," Brian Randall explained, "it was clear how effective the system was as a simple, convenient means of monitoring flushing compliance to reduce *Legionella* risk. Like many large hospitals, we also have occasional issues with *Pseudomonas aeruginosa*, and, following the success we had with L8guard for monitoring flushing compliance in respect of *Legionella*, we chose to adopt the *Pseudomonas* module to verify once-daily low-use outlet flushing in three augmented care areas – Oncology, Intensive Care, and Neonatal. These all house patients particularly vulnerable to infection, where flushing at least once a day is considered essential to reduce the risk of *Pseudomonas aeruginosa*."

Within three months of the software's installation for *Legionella* prevention, thrice-weekly low-use outlet flushing compliance hospital-wide rose from 45-50% to around 70%, and today stands at 'about 85%'. In the augmented care areas, meanwhile, compliance with the daily flushing regime is at around 95%. "In total, "Brian Randall explained, "our L8guard system is used to monitor low-use outlet flushing to reduce *Legionella* across about 1,600 outlets, while the *Pseudomonas* compliance module is currently being used to monitor daily flushing of all washbasins in augmented care units where bacterial growth could be a significant risk to immunosuppressed patients."

### AE's recommendation

His colleague, Kevin Stephenson, explained: "We first heard about L8guard in late 2016 from our Authorising Engineer, Neil Edmonds of Tetra Consulting, who has considerable water hygiene and safety expertise. "He had seen, and been impressed by, the system at other large acute hospitals."

I asked how significant an issue high *Legionella* counts had historically been at the hospital, and indeed how much of a challenge they are for the Estates Maintenance team on an ongoing basis. Brian Randall said: "Like many large healthcare facilities, we have an ongoing issue with some outlets, but the real impetus behind purchasing our L8guard software was the need for a more efficient, automated means of monitoring low-use outlet flushing, that would eliminate the need to circulate paper forms, chase up their prompt return, and then manually input all the data.

"With the paper-based system, all departments were emailed to remind them to undertake low-use outlet flushing. Departments that didn't respond were emailed further reminders, with the Infection Control Department getting



**Conscious of the need to both reduce unnecessary 'admin', and to increase low-use outlet flushing in line with HTM guidance, the team initially looked at a number of potential systems before settling on L8guard, principally favouring it for its simplicity.**

involved in the case of repeat offenders. As still occurs with the L8guard system, departments not returning their forms are eventually reported to the director and associate director of Infection Prevention and Control."

### Required to explain instances of no flushing

With the paper-based monitoring system, returns were required to be sent back weekly. The forms – as with their digital counterparts – were configured so that users could either simply confirm that they have no low-use outlets, or tick individual boxes to signify that flushing of each named such outlet had been completed. Designated individuals had to sign their form three times each week to verify the actions taken. As today, the forms also provide space to concisely explain the reason for any inability to flush a particular outlet, for instance if it is out of commission, or disconnected for maintenance.

With the paper-based system, flushing compliance for *Legionella* had 'peaked' at around 50 per cent. Brian Randall explained: "We did encounter significant issues with some departments not promptly completing and returning their forms, or indeed at all, and spent considerable time chasing up people and with extra administration, on top of the already time-consuming manual inputting of the data. The paper-based monitoring was pretty inefficient; we had to process all the data, and every few weeks to update the spreadsheets so that we could feed back to the Hospital Infection Prevention and Control Committee (HIUPCC) on return levels."

### Some initial leeway

Where a particular department showed signs of non-compliance, the Estates Maintenance team would generally wait

around a week – since some departments would habitually email through a month's returns at a time – before initiating the escalation process. Brian Randall explained: "With some departments the initial chasing prompted them to return their paper forms, but with others, there was still no response."

Conscious of the need to both reduce unnecessary 'admin', and to increase low-use outlet flushing in line with HTM guidance, the team initially looked at a number of potential systems before settling on L8guard, principally favouring the software product for its simplicity. One system that was seriously considered offered wide-ranging functionality, Brain Randall explained, but proved 'extremely complicated' to operate. "When we first heard about L8guard, and Digital Missives demonstrated it here," he said, "it was immediately clear how simple the software was to set up and use. It required little initial input, apart from set up by Digital Missives. The system and the support offered looked very attractive from the outset."

### Single licence, multiple users

The Estates Maintenance team thus purchased a single annual licence, which covers users in all 67 departments at Bedford Hospital. "The way it works, Brian Randall explained, "is that we identify a primary contact in each department – usually somebody reasonably senior, and give departments the option of an unlimited number of secondary contacts. Having the latter means that if the primary contact is away for any reason, a secondary contact will see the email and ensure that the online returns are sent back."

Emails requesting a completed low-use outlet flushing form in respect of *Legionella* go out automatically to all designated contacts three times a week,

and for *Pseudomonas*, to a much smaller number of designated contacts within the augmented care areas daily. Brian Randall explained: "If neither the primary or secondary contacts respond within 24 hours, another reminder is emailed to an 'escalation' contact. Provided that a member of the department then completes and returns the form within the following 24 hours, this counts as 'completed', but with the annotation 'Escalation required'. After 24 hours with no response, the system records a 'failure'. With augmented care areas the timescales are tighter, with a 'failure' if no response is recorded in 24 hours."

### Monthly report

A single failure, Brian Randall explained, would not necessarily require, say, a visit by a senior Estates officer to the department, office, or ward. He said: "A monthly report on low-use outlet flushing goes to the HIPCC, which meets monthly, and reviews the data. Individuals consistently 'failing' have this noted as a 'poor score' on a ward or department-level chart which details compliance with a wide range of infection control-related measures."

The Estates Maintenance Team also produces flushing compliance reports for the Trust's Water Safety Group, which meets quarterly. Core members of the 'WSG' at Bedford Hospital include Estates and Infection Control personnel, a consultant microbiologist, and a number of divisional managers. Brian Randall said: "The L8guard software has now been in use for just over two years, and compliance with the thrice-weekly *Legionella* flushing regime is currently about 85%, 'very significantly better' than it was. I wondered, though, how realistic it would be to achieve 100% compliance. Brian Randall said: "I think this would almost certainly require a greater management push. Interestingly, I know that L8guard has an optional feature



The software enables meaningful comparisons between the flushing compliance levels of different hospital departments.

called 'super escalation' – which we haven't yet implemented here – which emails to a named senior individual following repeated failures. Some Trusts have even pushed this as far as the CEO."

### Informing staff

I asked how all the relevant staff, across multiple departments, were appraised of the system being installed, and their responsibilities. Brian Randall said: "We initially reported that we were about to install the software at a Water Safety Group meeting and then emailed all staff. L8guard was first deployed to promote flushing to combat *Legionella* in our augmented care units. All the other hospital departments were then set up to receive emails and send back their forms every other day in respect of flushing to reduce *Legionella* risk. The Critical Care Unit, 'Oncology', and the Neonatal Unit, are required to flush and complete a return for all their outlets daily, and to get it back to us by lunchtime. Escalation to the next level happens the same day in these departments. I am delighted to say that flushing compliance in these areas

now stands at about 95 per cent."

Brian Randall and Kevin Stephenson are clearly delighted with the L8guard system's effectiveness in significantly increasing low-use outlet flushing compliance. Brian Randall said: "The system is extremely easy to operate, was simple to get up and running, and certainly not expensive when one considers the very significant monitoring capabilities, and the greatly reduced administrative burden, it gives us.

### Graphs and analysis

He continued: "L8guard can not only produce graphs, but also template reports and history of flushing compliance in a particular department or room, right down to individual outlet level. The ability to drill down can be very useful. For instance, if we get a positive sample for *Legionella*, we can go back to the Estates office and look back at the outlet's flushing history."

While *Legionella* proliferation had not been 'a major issue' for Bedford Hospital, there were some parts of the estate where it was a problem. Kevin Stephenson elaborated: "We tend to see positive samples in older parts of the pipework, where circulation is less good. We have to keep a close eye on outlets in some offices and day clinics, because – by their nature – they are only occupied during working hours on weekdays, so there is a risk of water not circulating at weekends."

Brian Randall added: "Completing the online flushing compliance forms is extremely easy, and, with the software's logging features, it is now much harder for anybody to say they didn't receive their email, or that they have sent the form and we haven't received it. The system logs every action, and, once set up, issues all the emails automatically." While L8guard can, if the customer requires, populate the software with all outlets, the Estates Maintenance team at Bedford Hospital
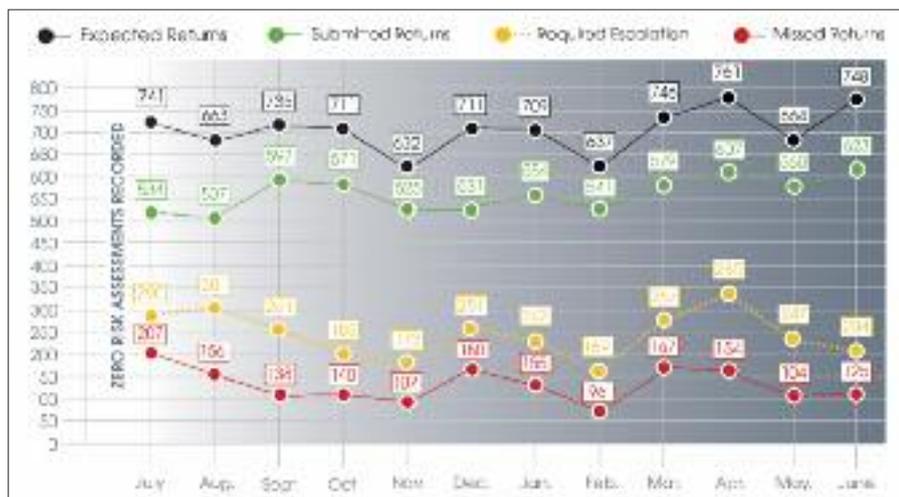


Comparative *Legionella* flushing performance at Bedford Hospital over a set period detailed.

leaves it to staff in each department to determine which outlets are 'low use'. Brain Randall said: "The 'dropdown' menu also allows each outlet to be categorised by type.

## A favourable reception

"Generally, he added, "once we let every hospital department know about the L8guard software's installation, and reinforced the message about the importance of regular flushing, we found the system was pretty well received. There were initially some staff 'used' to the paper system, and thus a little circumspect about switching to an electronic one, but the majority very quickly recognised the benefits."

To ensure that outlets are correctly identified, the Estates Maintenance Team generally advises users to designate each outlet and ensure that it is listed on the system by building, floor, and room number. There is no question that installation of the L8guard system has given the Estates Maintenance team considerable added reassurance that flushing is being carried out in a timely and regular way, with the higher compliance levels testament to the fact that it works. Brian Randall added:

"*Pseudomonas* is a microorganism that one always has to keep on top of, but I'm delighted to say we only have one augmented care area where we get regular positive samples with a number of clinical washbasins. We have tried various solutions – from replacing the taps with a different type, to replacing pipework and increasing water temperatures. One thing we have done which seems to have worked is to change the tap in one augmented care location to a non-TMV pressure-balanced tap, Delabie's Securitherm EP. The advantage of this tap is that you can remove the temperature limiter; thus when staff do the daily flush they can turn the temperature right up to the maximum line temperature of around 60 degs C to undertake the daily flush. With a TMV tap you would tend to be limited to a maximum temperature of between 40-45˚C. Where we have done this, the flushing seems to have cleared the *Pseudomonas*.

## Limitations with a switch to non-TMV taps

"Of course, he added, "these modified non-TMV taps are only suitable in areas where vulnerable patients don't have access to them, due to a heightened scalding risk, but in this particular augmented care location, only staff have access. There also seems to be increasing evidence that internal design of some TMVs makes biofilm accumulation more likely. Following the success we have had with the Delabie tap, we will be looking to do a re-test, and if the results are similarly positive, at extending its use to other augmented care



Brian Randall, Engineering officer, Statutory Compliance, at the Bedford Hospital NHS Trust.

outlets with *Pseudomonas* is an issue. We have found Delabie to be one of the few large tap producers to really listen to us about the water hygiene and safety challenges we face, and to respond with tailored products."

## Hospital pattern taps

Brain Randall added that the Estates Maintenance team at Bedford Hospital strives only to select taps for clinical areas that meet the criteria set for 'Hospital Pattern taps', initially in the now superseded HTM64, *Sanitary assemblies*, and latterly in HBN 00-10, *Design for flooring, walls, ceilings, sanitary ware and windows* (2013). He explained: "The Hospital Pattern design stipulates that taps should ideally be single lever operation, have a smooth, non-splash flow, and have a shape that facilitates cleaning. It also suggests that the tap body should prevent scalding when used in patient areas. To my knowledge, all taps meting these criteria for healthcare – apart from the Delabie tap we have discussed – incorporate thermostatic mixing valves. Removing the temperature limiter was quite straightforward, and seems to have effectively addressed the *Pseudomonas* issue we have had with a few units."

## A sizeable surface area

Brian Randall elaborated on the reasons for potential bacterial build-up in some TMV taps. He said: "They generally have a sizeable surface area, where biofilm can take hold, and thus some microorganisms flourish. The lower operating temperature of these taps can also potentially exacerbate bacterial growth. The latest TMV taps are better designed, but they can still present problems with bacterial build-up, depending on the internal design."

To afford more general protection, the three main water systems at Bedford Hospital are all dosed with chlorine dioxide at 0.5 parts per million. "Chlorine dioxide

undoubtedly has some preventative effect, but is not a cure-all," Kevin Stephenson explained. "It is supposed to strip biofilm out of the pipe, but tends to be less effective with *Pseudomonas*, since the bacteria are spread 'from outside in', rather than the other way around."

## Legislative and guidance requirements

'The regular identification and flushing of low-use (or infrequently used) water outlets is a key part of achieving compliance with national regulations and guidance, including the Health and Safety at Work Act 1974, ACOP L8, HSG 274 and, in healthcare HTM 04-01, for the prevention of Legionnaire's Disease', Digital Missives points out. The company adds: "To be effective and legally compliant, your organisation should undertake and document a low-use water outlet risk assessment at least once a week (more frequently in healthcare areas). This risk assessment should identify any water outlets which might not have been used for several days, and confirm that they have been flushed through to prevent the build-up of biofilm and bacteria such as *Legionella pneumophila* and *Pseudomonas aeruginosa*. Documenting the process is a key part of achieving compliance even if no low-use water outlets have been identified.

"Risk assessments documented and managed through the use of paper-based returns can introduce risk, as data has to be collected, collated, and (frequently) chased for completion. L8guard fully automates the process for requesting, receiving, and analysing low-use water outlet flushing risk-assessment returns – reducing risk, saving time, improving control, and raising compliance levels."

## Conclusion

"Based on our very positive experience with L8guard here so far," Brian Randall concluded, " I would highly recommend the system to other Trusts seeking a simple, low-cost, easily deployed, and easy-to-use means of monitoring compliance with low-use outlet flushing regimes. We have found it a highly effective tool for monitoring flushing compliance across an estate where the buildings range in age from Victorian, to a new HTM 03-01-compliant modular ultraclean theatre, commissioned last year. Most users are now firmly on board with L8guard, and recognise the system's value. To familiarise new users with the software we have our produced own simple guide, and published advice on which outlets should be considered 'low-use'. We owe a considerable debt to our AE for introducing us to such a well-designed and simple-to-use software solution which we feel has proven a very sound investment."