A new study has revealed that old-fashioned, manual faucets work better than new hands-free faucets.

The latest electronic-eye sensors to automatically detect hands and dispense pre-set amounts of water have been installed in the USA based Johns Hopkins Hospital, however a study has shown that they were more likely to be contaminated with one of the most common and hazardous bacteria in hospitals compared to old-style fixtures with separate handles for hot and cold water.

"Newer is not necessarily better when it comes to infection control in hospitals, especially when it comes to warding off potential hazards from water-borne bacteria, such as Legionella species," Lisa Maragakis, MD, M.P.H. senior study investigator and infectious disease specialist, was quoted. "New devices, even faucets, however well-intentioned in their make-up and purpose, have the potential for unintended consequences, which is why constant surveillance is needed," says Maragakis, director of hospital epidemiology and infection control at Johns Hopkins Hospital and an assistant professor at the Johns Hopkins University School of Medicine.

Although the new style high-tech faucets cut daily water consumption by well over half, Johns Hopkins researchers identified Legionella growing in 50 per cent of cultured water samples, which were collected from 20 electronic-eye faucets. In comparison, the bacteria were found in only 15 per cent of water cultures from 20 traditional, manual faucets. Reports even stated that weekly water culture results also showed half the amount of bacterial growth of any kind in the manual faucets than in the electronic models.

The precise reason as to why there is a higher percentage in bacterial growth on the hands-free taps is still unknown; however, researchers have suggested that the valves offer additional surfaces for bacteria to become trapped and grow.

The Johns Hopkins researchers presented their findings at the annual meeting of the Society for Health Care Epidemiology (SHEA) in Dallas in April.

Infection control experts behind the latest study say that the electronic devices were widely introduced in patient care and public areas of hospitals across the United States, where the idea was to prevent bacterial spread from people touching the faucet’s water handles with their dirty hands.

Reports have stated that as a result of the study, which was conducted over a seven-week period from December 2008 to January 2009, Johns Hopkins facilities engineers removed all 20 newer faucets from patient care areas and replaced them with manual types. A hundred similar electronic faucets are also being replaced throughout the hospital, and hospital leadership elected to use traditional fixtures - some 1,080 of them – in all patient care areas in the new clinical buildings currently under construction at Johns Hopkins’ East Baltimore campus. The new buildings are set to open in 2012.

Lead study investigator Emily Sydnor, MD, a fellow in infectious diseases at Johns Hopkins, says Legionella bacteria, commonly found in water supplied from public utilities, rarely cause illness in people with healthy immune systems, but pose a real risk of infection in hospital patients whose immune systems are weakened from cancer chemotherapy, anti-rejection drugs after organ transplant, or from diseases such as HIV/AIDS.

Hands-free electronic water faucets found to be hindrance
Infection prevention

Richard Mugrave discusses cleaning and disinfection

Substandard hygiene procedures used in the medical profession should never be tolerated. It not only puts your patients in danger, it can also put you and your team at risk. It is necessary, therefore, to enlist the use of the most efficient methods of infection prevention in your surgery. To this end, it is essential that your dental team are fully trained in all methods of decontamination and informed as to the different types of harmful bacteria that can lead to diseases, such as MRSA and C.diff. Furthermore, relevant inoculations should be taken by all staff and recorded.

Before any decontamination regimes can proceed, it is important to remove and replace all disposable equipment in the surgery after each patient. Then, all areas and instruments should be ‘zoned’ into ‘clean’ and ‘dirty’ sections. It is worth noting that you should always clean from the cleanest to the dirtiest areas when decontaminating any surface.

Decontamination can be used as an umbrella term to incorporate cleaning, disinfection and sterilisation procedures. In the dental profession, this is necessary for maintaining the hygiene of surfaces and the reprocessing of instruments.

Cleaning

This removes foreign particles, such as dirt, from surfaces. It is also the preliminary step in reprocessing instruments, and should be done as soon as possible after their use. It is vital for the successful sterilisation of equipment as debris can shield microbes from the steam of the autoclave.

Disinfection

This process aims to kill pathogens or render them inert. It is most often achieved using bactericidal cleaning agents that are effective against a wide range of microorganisms.

Sterilisation

The ultimate stage in instrument reprocessing, sterilisation destroys all forms of microbial life, including bacterial spores. It is a process crucial for those ‘critical risk’
Cleaning removes foreign particles such as dirt from surfaces with the surface. This is enough mum of one or two minutes only be in contact for a maxi-

least fifteen minutes. However, alcohol-based solution for at appliance is in contact with an here as this only occurs if the biofilm. Clarification is needed bind blood and fix protein and as alcohol has been shown to especially on stainless steel, recommend caution when us-

ing alcohol based products, section 6.57 of the Department of Health's HTM 01-05 regulations contain alcohol and yet, sec-

infection products frequently in the surgery, such as leather and soft PVC are vulnerable to strong alcoholic chemicals, so gentle, alcohol-free solutions would be advisable. Tougher materials, such as glass, ceramics and laminate work surfaces can be cleaned and disinfected with alcohol-based products; however it would be prudent to use aldehyde-free solutions.

The largest area in the sur-

gery is the floor and, as such, it is a potential field for pathogens to thrive. Look into using a pow-

erful disinfectant with strong particle loosening properties. In addition, floors vary greatly in material, so when purchasing a cleaner and disinfectant, it is worth making sure it has high material compatibility.

Successful cleaning and dis-

infection products frequently contain alcohol and yet, section 6.57 of the Department of Health's HTM 01-05 regulations recommend caution when using alcohol based products, especially on stainless steel, as alcohol has been shown to bind blood and fix protein and biofilm. Clarification is needed here as this only occurs if the appliance is in contact with an alcohol-based solution for at least fifteen minutes. However, using such a disinfectant will only be in contact for a maxi-

mum of one or two minutes with the surface. This is enough
time for harmful bacteria and viruses to be destroyed, but no-

where near enough to fix any proteins.

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The assessment will take approximately four hours of your Practice Manager’s time depending on the number of surgeries and we will require access to all areas of your practice. A report will be despatched to you confirming the results of our assessment. If you have an inspection imminent then we suggest that you arrange your DBG assessment at least one month before the inspection to allow you time to carry out any recommendations if required. Following the assessment you may wish to have access to the DBG Clinical Governance Package with on-line compliance manuals.

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• Your premises including access, facilities, security, fire precautions, third parties and business continuity plans.
• Information governance including Freedom of Information Act, manual and computerised records, Data Protection and security.
• Training, documentation and certificates.
• Radiography including IRR99 and IR(ME)R2000 compliance.
• Cross infection and decontamination including HTM 01-05 compliance and surgery audits.
• Medical emergencies including resuscitation, drugs, equipments and protocols.
• Training, documentation and certificates.
• Waste disposal and documentation and storage.
• Practice policies and written procedures.
• Clinical audit and patient outcomes including quality measures.
The increased awareness of decontamination and cross-infection control procedures within dentistry and legislative demands for compliance with HTM 01-05 have made practices consider their obligations in regard to infection control more seriously. Of all the aspects of decontamination mentioned in the guidelines one area that practices may be unaware of is their need to comply with a minimum standard of water quality, both in terms of the water going into their treatment centre and certainly in regard to the output quality of that water i.e. the water that goes into the patient’s mouth.

The problem of biofilm contamination of DUWLs has long been an issue in dentistry, research as early as 1963 first raised concerns and since then numerous studies have concluded that biofilm is prevalent in dental unit water lines (DUWLs). This is mainly due to the fact that in the majority of today’s most commonly used treatment centres, water is delivered via small bore tubing, providing an ideal environment for the development of bacterial biofilms. The biofilm itself gives rise to problems in two key areas: one, the physical restriction of the flow in narrow lumens and two: in significant numbers of planktonic bacteria in the output water.

Biofilm

The term biofilm refers to a collection of microorganisms that adhere to a surface and are surrounded by a protective and adherent slime (known as the extracellular matrix) which is secreted by the bacteria. Biofilms are particularly prevalent in water containing low concentrations of solids and low levels of nutrients. As well as DUWLs, biofilm can be found in streams and rivers, cooling towers and piped water systems etc.

Biofilms form when a few individual bacteria in the free floating (planktonic) state in water adhere to a solid surface such as the wall of a pipe or tube. The initial attraction to the surface is weak, but subsequent bacteria continue to adhere directly to those already attached and the behaviour of the aggregated organisms changes and starts to produce an extracellular matrix. This in turn increases adhesion and enables more planktonic bacteria to adhere easily to the film, and so the process continues, increasing levels of biofilm and causing water quality levels to fall below those required by the guidelines.

Significance of biofilms in the dental practice

Biofilm is difficult to identify, remove or control because the susceptibility of biofilms to external agents such as detergents and disinfectants is quite small when compared with that of individual planktonic organisms and each biofilm bacterium requires only small amounts of nutrients in order to survive and flourish. Furthermore, the design of today’s most commonly used treatment centres makes the dental unit water line the ideal substrate for biofilm growth.

DUWLs provide an ideal environment for the growth of bacterial biofilms for the following reasons:

- They are non-toxic; the materials used for tubing are selected for their non-toxic properties and flexibility to suit the mechanical operation of dental units. Low toxicity to humans also means
low toxicity to bacteria.

Water has a low flow rate: the small bore tubes used in dental units provide water at a typical flow rate of 30ml/min. The behaviour of water flowing through a tube means that the linear flow rate decreases from the centre of the tube to its wall. Low linear flow rates favour bacterial adhesion.

Water flows intermittently: water only flows through the tube when instruments are in use, causing minimal disruption of the growing biofilm.

Regular replacement of supernatant liquid: when instruments are used or the system is flushed, fresh liquid is brought into contact with the film, bringing with it nutrients and new recruits to join the film. The liquid moving downstream towards the distal end of the system carries bacteria released by the maturing film along with excreted matter. The liquid moving in contact or through the film, bringing with it nutrients and new recruits to join the film. The liquid moving downstream towards the distal end of the system carries bacteria released by the maturing film along with excreted matter.

The surgery provides an ideal environment for the growth of biofilm. It is considered good practice to regularly monitor levels of contamination such as poor colour or smell. The scientific community however has long recognised that water can accommodate large numbers of bacteria without any noticeable change in colour or smell and these symptoms are not an accurate indication of whether water lines are contamination free.

The guidelines do clearly state the acceptable maximum level of microbiological contamination in section 6.79: Where monitoring is carried out the microbiological contamination expressed as TVC (total viable count), the number of viable bacteria per millilitre of water (cfu/ml) should be expected to lie in the range 100 to 200 cfu/ml. This is similar to the quality that would be expected for mains supplies or bottled water.

Biofilms form when a few individual bacteria in the free floating (planktonic) state in water adhere to a solid surface such as the wall of a pipe or tube.

Dental unit water lines are a haven for pathogenic bacteria and can act as vehicles for transmission of disease. The scientific community has long been aware of the possibility of aerosolised mist. Research by Reintaler in 1988 found that 50 per cent of dental staff presented with the antibodies for legionella and in the USA the figure was 20 per cent. Serious infection within the dental practice overall is a genuine, work-related hazard for the dental practice and HTM 01-05 deals extensively with DUWLs lack substantive content on the control and prevention of biofilm.

The surgery provides an ideal temperature range: dental surgeries are normally maintained at “room temperature” for the comfort of patients and staff. This is good news for the film forming bacteria as they can thrive in this temperature range.

Why is biofilm bad for the practice?

The presence of biofilm is bad news for the dental practice on a number of practical levels not least because the quality of output water is covered by HTM 01-05 guidance and the presence of biofilm makes compliance with this standard very difficult. The existence of biofilm can lead to a reduction in water flow and even tube blockage leading to unit downtime and repair costs. In addition, biofilm can potentially cause infection in patients or dental professionals either by direct contact or through the inhalation of aerosolised mist. Research by Reintaler in 1988 found that 50 per cent of dental staff presented with the antibodies for legionella and in the USA the figure was 20 per cent. Serious infection within the dental practice overall is a genuine, work-related hazard for the dental practice and HTM 01-05 deals extensively with DUWLs lack substantive content on the control and prevention of biofilm.

In section 6.79 the guidelines state Regular monitoring for microbiological contamination is not considered essential unless there are obvious physical signs of contamination such as poor colour or smell. The scientific community however has long recognised that water can accommodate large numbers of bacteria without any noticeable change in colour or smell and these symptoms are not an accurate indication of whether water lines are contamination free.

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The guidelines then go on to indicate a range of measures that can be used to reduce contamination and include the emptying and storage of water bottles at the end of each working day, the use of disinfectants “periodically” as a prevention measure, although no definition of “periodically” is provided and the flushing of water lines, “for two minutes at the beginning and end of the working day and after breaks. They should also be flushed for 20-30 seconds between patients.” Despite this recommendation however, the guidance acknowledges that flushing has little effect on biofilm build-up.

How clean is your water?

For many years the problem of biofilm in DUWLs has been studied and data collected that clearly demonstrates the presence of biofilm reduces water quality, making it unlikely to meet the minimum standards required by HTM01-05. In a study by Walker et al 2000, 95 per cent of samples taken from DUWLs had contamination levels above the current standard for EU drinking water. So in order to establish the quality of output water a practice needs to be aware of the quality of its input water and then regularly monitor levels of contamination.

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The hands are a dental practitioner’s most important tool and as such need to adhere to the same stringent methods of cleaning as all other equipment used in the surgery. Both patients and staff can be put at serious risk of infection from pathogenic invaders as a result of lethal bacteria being spread around the practice environment by touch. This makes good hygiene protocols a must to prevent infection transmission within a clinical environment.

For instance, it is essential that before any surgery begins, any cuts or lesions on the clinician’s hands must be securely covered with a waterproof dressing before touching a patient’s mouth, as blood or saliva born viruses can enter or leave the body via open wounds.

The simplest method to ensure the removal of germs is the thorough washing of hands, and if you use the correct hand washing procedure with just hot water and soap, you should be able to destroy the majority of bacteria.

All jewellery should be removed before washing as pathogens also collect on them. The best washing procedure for your hands using soap and water should involve:

- Rotational rubbing of thumbs clasped in opposite palms
- Rotational rubbing of finger-tips in palms

This should take around 30 seconds and is more effective with a liquid wash solution. You should then rinse your hands thoroughly under running water. It is essential that this procedure is performed meticulously not only after visiting the toilet and before handling food or drink but also upon entering the surgery, before putting on gloves, after removing gloves, before leaving the surgery and after clearing a working area or handling any instruments.

Washing is made more effective when combined with the use of gloves and disinfecting alcohol rubs. The latter is very effective in reducing the spread of lethal bacteria such as MRSA on the hands of dental staff.
However, there may be some side effects in the regular use of skin-cleansing products, as it can be detrimental to the condition of the skin. Indeed, weaker skin is more prone to skin complaints and cracking and this can deter some practitioners from being quite so strict in their hygiene.

In addition, occupational skin disease such as eczema, are on the increase in medical circles and can be exacerbated through excessive washing with perfumed soaps.

Therefore, it is important that professionals do not leave themselves open to long term suffering. To this end, a delicate balance is required to ensure that hands not only remain hygienic, but also that the professional does not suffer any ill effects.

To help this, use soap-free hand washes and find a rub that can minimise dryness and irritation. In addition, at the end of each clinical session after washing and drying your hands, enlist the use of a water-based moisturising cream or lotion to maintain healthy skin on hands and arms.

Allergies are also a severe issue for many people, and these can be linked to perfumes, colours and materials, such as latex. Those with such allergies can struggle to deal with them in a clinical environment, as the materials that trigger them are so crucial to the infection control procedures used in many surgeries.

For example, the natural rubber latex (NRL) is the material used in the manufacture of medical gloves and yet the material used in the manufacture of medical gloves and yet the number of people with allergic reactions to it is on the increase, especially among those in the medical field.

These reactions are due to the naturally occurring proteins within the material or many other additives used within poorer quality gloves and can result in a red itchy scaly rash, which may spread to other areas.

Direct contact is not the only thing that can trigger these reactions either. Inhaling latex powder from powdered gloves can also lead to these severe issues and in the worse cases, anaphylactic shock.

When wearing gloves is a necessity for your work in the dental industry, such allergies present a real obstacle in maintaining hygiene regimes. However, this problem is recognised by many supplies of gloves and as such, latex-free surgical gloves are now available. These can be worn without discomfort whilst still upholding rigorous infection control policies.

With the heightened awareness of infections and viruses in the healthcare environment, complying with the new HTM 01-05 requirements regarding hand hygiene should be essential to every practitioner.

The best products should be used in the washing, disinfecting and moisturising of their hands. However, practitioners need not put themselves at risk in order to have the most effective solutions.

With this in mind, suppliers, have produced hand disinfectants, along with soap free hand washes and protective emulsion with the aim of getting the perfect balance between infection control and your comfort.

All staff members should be advised to use hand-cleansing products, such as these, to give themselves and their patients the best protection possible from detrimental pathogens.

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How we did it

*Dental Tribune* talks to practice manager Janet Edwards on infection control

With all the changes to dentistry with HTM 01-05 and CQC, one practice has adopted the guidelines to suit them and work with their practice and not against it.

The changes that have been made at Hoghton Street Dental Practice has generated masses of attention; practice manager Janet Edwards has been invited to speak at this year’s BDA conference and Schülke UK used Hoghton Street Dental Practice for the re-filming of their training packages in infection control.

Janet talked to *Dental Tribune* about their experience and how they achieved and managed to comply in the best way that they could...

“In the beginning we went in to it blind with just the BDA guidance on infection control. To enable us to create a sterilisation room we took over another part of the building that our practice was in. We relied a lot on our equipment supplier, Eschmann, and Martin Loftus, Business Development Manager at Eschmann, was a great help. Martin helped us with the design, setting up the flow-through and the completion of the room. Initially we had looked at dividing the room in to two rooms but due to practicalities, it was decided that it was best to leave it as it was. In the room itself we’ve got four underbench washers and four autoclaves and at my other branch site I’ve got three underbench washers and four autoclaves. We basically complied with best standards.”

However, complying with best standards wasn’t the only thing that Janet’s practice did. After the draft of HTM 01-05 came out in 2008, and Martin Fulford, BDS MPhil DGDP, had audited for the practice, advising on training issues and even magnifying lights, Janet started making additional advances towards infection control that have since made her practices stand out.

“When the room was up and running we developed our own system that enabled us to trace instruments: This way if there is ever a query about a patient over a blood born virus we can prove that the tray of instruments that the patient had been treated with had gone through that particular washer, on that particular cycle, in that particular autoclave and we would know that the daily tests had been carried out on all the equipment. Basically, we validate the disinfection and sterilisation for patient instruments.”

“I believe no one else does this and we’ve had quite a few practices coming in to see how we work it and how we’ve developed it and they’ve taken some ideas away with them.”

Issues

However, as with any form of change, there were issues along the way, as Janet explained:

“One of the issues that was noticed when the washers were in use was that the number of hand piece repairs were in...
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A nurse examines instruments for any particles

You have to look at the number of instruments that you’ve got and the turnaround time of getting those instruments back; we had to increase on the number of instruments that we had in the practice and that added to the costs. These are the sorts of things that people need to be aware of.”

I do realise that there is a lot of resistance out there but it’s for the patient’s best interests; it helps regulate the industry’