Much publicity has been generated regarding the Guidelines for Managing Microbial Water Quality in Healthcare Facilities, released in late 2013 by Queensland Health. Although the Guidelines apply to Queensland healthcare facilities, they have been recognized as best practice nationally and are being used as a framework for facilities in other States. Furthermore, it is now a directive for healthcare facilities in Queensland to develop a Water Quality Risk Management Plan (WQRMP) and undertake ongoing monitoring and sampling of the potable water systems. This approach is also recommended for healthcare facilities in other states in order to control and manage microbial risks and prevent further Legionella outbreaks. The process is site specific, requires a multi-disciplined approach, and can be challenging.

This article will discuss some of the major considerations of a WQRMP in order to control these risks.

**FORMATION OF A WATER QUALITY TEAM**

In order to prepare and manage a WQRMP, a Water Quality Team is required. A water quality team should be made up of a combination of internal and external resources. Every healthcare facility is different and the positions and titles allocated in Figure 1 below may not necessarily apply to all facilities. However, it is important that the internal resources (and subsequent responsibilities outlined in any WQRMP) cover more than just an engineering component. A Legionella or microbial outbreak will have significant impacts on a wide range of hospital groups and any treatment methodologies, such as chlorination or others, can also impact these groups.

The guidelines acknowledge that external assistance is likely to be required for both the formulation of a WQRMP and its ongoing monitoring. Internal knowledge regarding the hydraulic systems of a facility may be well known, however, the interpretation of microbial test results, applying these to determine level of risk and response, ongoing treatment options, human resources and outrage management, and consideration of the system in a holistic sense may be a significant challenge for many facilities. It important to identify these gaps in knowledge and experience and source external advice early.

**WHAT’S REQUIRED FOR A WQRMP?**

Every facility will be different and, as such, the inputs for a WQRMP will differ. Nonetheless, some important considerations utilised for the Risk Management Framework should include:

- Collation of available and relevant hydraulic, engineering, and maintenance information
- Sampling and monitoring program
- Clinical risk assessment
- Control and responsibilities for the team
- Clear response plan, including consideration of obtaining rapid results during a crisis
- Human resource strategies
- Outrage and media management

The WQRMP is a live document. As changes occur to infrastructure, patient profiles, clinical risk, water quality, and microbial test results, so too should the WQRMP. The Water Quality (WQ) team should respond to the changes and revise the Plan as required. Changes may include, but not be limited to:

- Maintenance
- Moving patients between wards
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• Changes in clinical risk
• Wards and rooms that may not be occupied
• Change in microbial and/or chlorine results
• Change in water system risk
• Interruption to supply and/or quality of water by the provider

SOME IMPORTANT INPUTS – HYDRAULIC INFRASTRUCTURE

As hospital engineers and maintenance managers would now be aware, the hydraulic infrastructure within a healthcare facility has the potential to house microorganisms that can be potentially harmful to human health. Consequently, a detailed and documented understanding of the hydraulic infrastructure is critical. It is also important to acknowledge that this is not just a warm water issue. Recent research by the team at CETEC has found significant contamination within cold water infrastructure within facilities, including within storage tanks and both cold inlet and warm outlet points of thermostatic mixing valves (TMVs). Furthermore, the wide ranging Australian climate means that cold water temperatures have often been measured above 30°C, which coincides with the optimum temperature for microbial growth.

Figure 2: Area where a coffee machine was removed. The hydraulic infrastructure remained and resulted in a dead leg risk.
An understanding of hydraulic infrastructure for a WQRMP should include (but not limited to):

- Detailed and current hydraulic documentation
- Changes to the system over time
- Identification and planned removal of dead legs
- Unused outlets
- Fittings and maintenance regimes
- Presence of TMVs and any traditional warm water loop systems
- Investigation of the system for potential to house microbials
- Water storage on site
- Temperatures of cold, hot and warm water
- On-site treatment of potable water (if applicable)
- Water flows through the system

Figure 2 shows an example of a change to the hydraulic system at a facility over time. The area was previously used for a coffee machine with water being supplied to it via a branch off the nearby ward. When the coffee machine was removed, all the plumbing remained and a new and very long dead leg of the water system was created. This leg had never been flushed since the removal of the coffee machine several years earlier.

**SOME IMPORTANT INPUTS – WATER SUPPLY**

Engagement with water suppliers is critical to properly assess the reliability of quantity and quality of water supply. It is important to acknowledge that the water that is being provided to healthcare facilities may be compliant to the Australian Drinking Water Guidelines, but is not sterile. Some residual disinfection is likely to have taken place at the treatment plant; however, by the time it has arrived at your facility, the residual may not be sufficient to limit the effect of microbial growth. Key questions to consider may include:

- Who is your water provider?
- Where does your water come from?
- Is it treated?
- How is it treated?
- To what extent is it treated?

**SOME IMPORTANT INPUTS – SAMPLING AND MONITORING OF THE WATER SYSTEM**

Sampling of water from the system is critical, however, it can be complex. Figure 3 shows what should be sampled and the tests required, however, every system is different and representative outlets may include multiple water systems. This should be identified in the WQRMP and external advice can assist in this regard. Furthermore, frequency should be dependent on the system level risk, which is detailed in the Guidelines. It is important to use a NATA accredited laboratory and, where required, engage a scientific consultant to properly assess the implications of the microbial and chlorine results.

**ARE YOU PREPARED?**

There is no single approach or solution for dealing with water quality issues within healthcare facilities due to the complexities and nature of these facilities. The key is to start engaging with relevant parties and putting the necessary controls in place. A WQRMP is essential for protecting patients, staff, and the brand of the hospital in the event of a microbial outbreak, which may include Legionella.

Jack Noonan is the Queensland Manager and Dr Vyt Garnys is the Managing Director for CETEC who were members of the Technical Advisory Panel for Queensland Health, which developed the Guidelines for Managing Microbial Water Quality in Healthcare Facilities (2013). The CETEC team has been conducting water risk assessments since 1987. The team can be contacted on 07 3857 5531 or at www.cetec.com.au