# SESLHD PROCEDURE COVER SHEET

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| **NAME OF DOCUMENT** | Water Systems: Legionella Control in Hospitals |
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| **LEVEL OF EVIDENCE** | *Public Health Act 2010* and *Public Health Regulation 2012* and NSW Health Department Policy Directives and Australian/New Zealand Standards<br>National Safety and Quality Health Service Standard: Standard 3 – Preventing and Controlling Infections |
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| **EXECUTIVE SPONSOR or EXECUTIVE CLINICAL SPONSOR** | Director, Clinical Governance and Medical Services |
| **AUTHOR** | SESLHD Infection Prevention and Control Committee: Infection Control Procedure Working Party |
| **POSITION RESPONSIBLE FOR THE DOCUMENT** | SESLHD Infection Prevention and Control Working Party<br>SESLHD-InfectionControl@health.nsw.gov.au |
| **FUNCTIONAL GROUP(S)** | Infection Control |
| **KEY TERMS** | Legionella, warm water systems, cooling towers |
| **SUMMARY** | This procedure outlines the process for monitoring water systems to ensure a safe environment with respect to the control of Legionella in hospital settings. |

**COMPLIANCE WITH THIS DOCUMENT IS MANDATORY**



Feedback about this document can be sent to SESLHD-Policy@health.nsw.gov.au

## 1. POLICY STATEMENT

SESLHD is committed to ensuring a safe environment for the delivery of healthcare services, including by the prevention, control and management of infectious disease hazards in the environment. All SESLHD facilities are required to install, operate and maintain air handling and water systems in compliance with Part 2 of the Public Health Regulation 2012 (NSW) and the Australian/New Zealand Standard AS/NZS 3666 Parts 1, 2, 3 and 4: Air-handling and water systems of buildings - Microbial control.

## 2. BACKGROUND

This internal procedure ensures that all facilities across SESLHD monitor water systems in accordance with the requirements of the *Public Health Act 2010* and *Public Health Regulation 2012.*

Legionnaires' disease is caused by infection of the respiratory tract with *Legionella* bacteria. It is characterised by severe pneumonia and damage to other body systems. Unless diagnosed and treated rapidly, the disease can be serious or even fatal, especially in vulnerable people.

The Legionnaires' disease incubation period is considered to be 2–10 days from the time of exposure to the onset of illness, typically 5–6 days. Exposure to *Legionella* bacteria is a significant concern in health care facilities because of the presence of people with clinical risk factors that increase both the likelihood and the potential severity of *Legionella* infection.

People at highest risk of acquiring legionellosis in healthcare facilities are:

- severely immunocompromised patients
- those with chronic underlying disease, such as chronic obstructive pulmonary disease, diabetes mellitus, congestive heart failure, chronic liver failure, chronic renal failure
- transplant recipients who are on immunosuppressant therapy.

Additional risk factors for healthcare associated infections include recent surgery, intubation and mechanical ventilation, aspiration of water contaminated with *Legionella* including nasogastric feeds and the use of respiratory therapy equipment contaminated with *Legionella*. Risks are further elevated if there has been recent plumbing work which has caused disturbance of biofilm or a prior history of nosocomial cases in the healthcare facility, given the difficulties of eradicating *Legionella*.

Potential sources of *Legionella* in a hospital setting include: cooling water systems, i.e. air conditioning cooling towers; warm water systems; birthing pools; hydrotherapy pools; water features and ice machines.

The management of *Legionella* risk in health care facilities is an ongoing process that involves the establishment, implementation and maintenance of control measures. The control measures and their maintenance should be documented in the risk management plan, and should be regularly monitored and reviewed for their effectiveness in reducing the overall risk.

## 2.1 DEFINITIONS

**Approved forms** are forms required by the *Public Health Regulation 2012* for aspects of managing a cooling water system.

**Audit** is an assessment of the compliance of a cooling water system with the actions and timeframes required by the Risk Management Plan (RMP) and mandatory requirements by the Regulation. The audit must be conducted every year by an independent auditor.

**Authorised officer** is a person appointed by NSW Health or a local government authority to carry out regulatory oversight functions and ensure that occupiers, duly qualified person, competent persons and independent auditors comply with the Regulation.

**Certificate of audit completion** is the last section of the audit which is competed by the independent auditor and documents the outcome of the audit. The occupier must provide the certificate to the local government authority within 7 days.

**Certificate of RMP completion** is the last section of the RMP which is completed by the competent person and documents the outcome of the risk assessment. The occupier must provide the certificate to the local government authority within 7 days.

**Cold water** refers to unheated water being delivered to fixtures.

**Competent person** is a person who undertakes a risk assessment of the cooling water system, and documents this in an RMP. A competent person must have appropriate training or practical experience in the installation, operation or maintenance of cooling water systems, sufficient to provide safe and satisfactory performance of these systems.

**Cooling tower** is a device for lowering the temperature of water that incorporates a device containing refrigerant or heat exchanger. One or more cooling towers can be connected with associated equipment and pipework.

**Decontamination** is a procedure for reducing the amount of *Legionella* and other bacteria.

**Devices** such as thermostatic mixing valves mix cold water and hot water to produce warn water for personal ablutions that will not scald people. Warm water can also be produced by heating cold water directly to the desired temperature.

**Duly qualified person (DQP)** is a person who installs, operates or maintains the cooling water system on a routine basis. This person is typically employed by a water treatment company.

**Facilities Manager:** General Manager within hospital inpatient services and Director of Population and Community Health (PaCH) services

**Heated water** refers to water that has been heated and delivered to fixtures as either warm water or as hot water.

**Heterotrophic Colony Count (HCC)** is the count of all bacterial colonies that grow on a plate following inoculation with a water sample.

**Hot water** is delivered directly to fixtures for beverage making and for washing and cleaning purposes.

**Legionnaires' disease** is a potentially fatal illness characterised by pneumonia.

**Local Government Authority** is the regulator, along with NSW Health, for the regulation of cooling and warm water systems within their boundaries.

**Microbial testing** is the testing of a water sample for *Legionella* count and HCC which must be carried out by a NATA accredited laboratory. Testing must be carried out at least monthly and documented on an approved form.

**Register of cooling and warm water systems** – Local Government authorities must maintain a register of cooling water and warm water systems in their boundary. The Regulation outlines what information is required.

**Required documents** are documents that must be either kept on the premises and made available on request or kept electronically and made available within 4 hours of request by an authorised officer. These documents include:

- RMP and certificate of RMP completion
- Audit report and certificates of audit complete for the past 5 years
- Monthly reports for the past 5 years
- The operating and maintenance manuals for the system
- All records of the maintenance and service of the system.

**Reportable test result** are the results of a laboratory test of a cooling water system that show a Legionella count of >1000 cfu or HCC > 5,000,000 cfu/ml.

**Risk Management Plan** – the RMP documents the risk assessment, actions and control strategies to reduce the risk of *Legionella* growth and transmission from a cooling water system. The information must be completed on an approved NSW Health form.

**Thermostatic mixing valve** is a mixing valve in which the temperature from the mixed water outlet fixture is automatically controlled by thermostat to a pre-selected temperature.

**Unique identification number** is number that must be displayed on all cooling towers in NSW and used on all documentation and test results relating to cooling towers and cooling water systems. The unique identification number is issued by the local government authority when they are notified of a new installation by the occupier. The ability to readily and accurately identify cooling towers is critical during Legionnaires' disease outbreaks, and also during the routine management of cooling water systems.

**Water systems** includes cooling towers and associated air handling systems, warm water systems, evaporative cooling systems, hot water systems.

**Warm water systems** are designed to heat and deliver water at a temperature of less than 60 degrees at each outlet and includes systems which utilise a thermostatic mixing valve to deliver water at a temperature of less than 60 degrees. In patient care areas:

- Adults 40.5 - 43.5ºC
- Children and neonates 38.0 - 40.5ºC

## 3. RESPONSIBILITIES

This section outlines the responsibilities of all those concerned with various aspects of microbial control in water systems, which may harbour *Legionella*.

### 3.1. Chief Engineer or Facility Manager will:

- Use a risk assessment process to ensure all equipment known to harbour legionella is accessed and maintained and that staff are trained in appropriate use
- Ensure operation of the cooling water systems are in accordance with the *NSW Guidelines for Legionella Control in Cooling Water Systems* and installation of new towers is in accordance with AS/NZS 3666 Part 1
- Ensure that the Risk Management Plan and Auditors Report are completed and any recommendations are completed
- Ensure that reportable results are reported to the Local Government Authority
- Ensure cleaning and maintenance schedules are maintained and available on request by the Public Health Unit
- Inform the Public Health Unit verbally of any failed results (whether presumptive or confirmed) on the same day that the results are received. Contact details for Public Health Unit below:

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| **During Business Hours** | (02) 9382 8333 |
| **Outside of Business Hours** | (02) 9382 2222 |

- Ensure remedial work for failed results, including resampling, is undertaken and communicated in a timely manner
- Have a microbial water sampling program based on risk
- Report testing results to the SESLHD and local facility Infection Prevention and Control Committees.

### 3.2. Maintenance staff will:

- Liaise directly with Public Health Unit Environmental Health Officers including timely response to all requests
- Liaise with the Competent Person to ensure requirements in the Risk Management Plan are completed
- Liaise with the duly qualified person to ensure maintenance and remedial work is undertaken in a timely manner
- Communicate and escalate any identified issues to the Chief Engineer and Public Health Unit Environmental Health Officers

### 3.3. Facility Infection control managers/infection control committee will:

- Table all water system testing at hospital site monthly Infection Prevention and Control committee meetings
- Receive and table all corrective actions as completed and reported by facility Chief engineer and/or delegated maintenance staff
- Table any suspected water system failure and infection investigations.

### 3.4. Public Health Unit will:

Environmental health officers will undertake routine microbial water samples on a regular basis as part of the State-wide independent monitoring program. The program includes a sampling program of each public hospital at least once per year.

The Public Health Unit provides advice on *Legionella* control in hospital settings.

**Case investigation**: When a Legionnaires' disease case is notified, irrespective of the LHD of residence of the case, the Public Health Unit is responsible for investigating potential exposure sources within the Local Health District. Where the case has spent time in a SESLHD facility during their incubation period, an environmental health investigation will be undertaken involving the inspection of water cooling towers, warm water systems and other potential water sources; investigation includes the collection of water samples for microbial analysis by the Forensic and Analytical Sciences Service (NSW Health Pathology).

**Case finding in implicated healthcare settings:** the Public Health Unit staff specialist will liaise with infectious diseases and infection control of the implicated hospital to consider the need for active surveillance for pneumonia in other patients and staff for at least ten days (maximum incubation period) after the risk is believed to have been controlled.

## 4. PROCEDURE

### 4.1 Cooling water systems

- The cooling water systems are to be managed in accordance with the *Public Health Act 2010*, *Public Health Regulation 2012* and the Legionella Control in Cooling Water Systems, NSW Health Guidelines.

- All cooling towers are required to have a unique identifying number (UIN) for the system as provided by the local government authority.

- The facility manager may engage a competent person to undertake a risk assessment and document the findings in a risk management plan (RMP). The risk assessment and RMP must identify and document measures to limit the growth and transmission of *Legionella* bacteria. The risk assessment must classify the system as low, medium or high risk.

  A risk assessment must be completed at least every five years. More frequent risk assessments are required if:

  - the system was found to be high risk
  - the risk level of the system has changed
  - the previous risk assessment is no longer valid
  - an authorised officer requires a new risk assessment.

- The duly qualified person (DQP) must carry out inspection, maintenance (including servicing), chemical analysis, and microbial testing (for *Legionella* count and heterotrophic colony count) every month, or more frequently if required by the RMP.

- The DQP must complete a monthly report **(**Approved Form 3**)** each month to document the results of the above, as well as any remedial actions taken or recommended.

- The DQP collects cooling water samples which are delivered to a laboratory accredited by the National Association of Testing Authorities (NATA). Samples are tested for *Legionella* count and heterotrophic colony count.

- Each hospital must have a written sampling and monitoring program based on risk and location. It is preferred that an independent company is engaged to undertake these samples.

- The DQP must carry out system cleaning at the frequency specified in the RMP.

- When carrying out maintenance, the DQP must minimise contamination of the environment from liquids or aerosol dispersion and prevent public access to the area.

- The DQP must urgently implement control strategies set out in the RMP and AS/NZS 3666 Part 3 if a test result shows:
    - *Legionella* count ≥10 cfu/mL
    - Heterotrophic colony count ≥100,000 cfu/mL.
- The facility manager must notify a test result to the local government authority as a **reportable test result** if it shows:
    - *Legionella* count ≥1,000 cfu/mL
    - Heterotrophic colony count ≥5,000,000 cfu/mL.
- The reportable test result must be notified to the local government authority within 24 hours of receiving the result. The notification must be made in writing by completing the notification of reportable test results form **(**Approved Form 4**)**.
- The facility manager must engage an independent auditor to audit compliance with the RMP and Regulation every year. Each audit must cover a 12 month audit period, which commences on the first day of the month following the month in which the risk assessment was undertaken. The audit is to be completed on Approved Form 2.
- The local government authority will review the certificate of audit completion, and may investigate systems that did not comply with the RMP and Regulation.
- The facility manager must ensure that required records and information are either kept in hard copy on the premises, or kept electronically and made available for inspection within 4 hours of request by an authorised officer.
- The occupier must notify the local government authority of a change in particulars (e.g. adding a new cooling tower) within 7 days.
- The occupier must notify the local government authority of the decommissioning within 7 days by completing the notification of installation or change in particulars form **(**Approved Form 6).
- There must be safe and easy access to the cooling tower at all times.

### 4.2 Warm water systems and thermostatic mixing valves (TMVs)

- Under the *Public Health Regulation 2012*, a warm water system must not be installed in a hospital unless it is of a kind approved in writing by the Secretary of the NSW Ministry of Health.
- The NSW Health Policy Directive PD2015_008 - Water - Requirements for the Provision of Cold and Heated Water contains requirements for the provision of cold and heated water to be observed by hospitals, as defined in the *Public Health Act 2010*, to manage the risk of *Legionella* and to prevent scalding.

- Each facility must have a water risk management plan. The plan shall include details of remedial action to be undertaken on failed water sampling results.

- Each facility must have a water microbial testing and monitoring program based on risk, location and frequency.

- Testing of warm water temperatures is undertaken and recorded with action taken on failed results.

- The facility manager is responsible for ensuring that the local government authority is notified of an installation or change in particulars of a warm water system, using Approved Form 6: Notification of installation or change in particulars.

**See Appendix 2 for details on warm water and TMV testing requirements.**

### 4.3 Hydrotherapy pools

- The higher water temperature of a hydrotherapy pool is conducive to the growth of *Legionella*, with the patrons using the facility vulnerable to disease and possibly incontinent.

- All pools must be managed in accordance with the *Public Health Regulation 2012* Schedule 1.

### 4.4 Birthing pools

- Neonatal cases of Legionella pneumonia caused by immersion in contaminated birthing pools have been recognised.

- Central hot or warm water tanks and hot or warm water outlets can contain *Legionella* if not maintained and disinfected appropriately.

- In addition to the management of warm water systems and thermostatic mixing valves (TMVs) (Section 4.2) the cleaning of birthing pools are post-delivery and to be conducted according to the area risk rating.

- Microbial testing may be considered in consultation with the hospital's Infection Prevention and Control Department where cases of Legionellosis are suspected.

- Principles of infection prevention and control and associated measures must be implemented where birthing pools are used.

- This potential source should be included in the hospital's water risk management plan identifying any potential issues and putting steps in place to mitigate those issues to keep people safe from harm.

### 4.5 Ice machines

- Cases of Legionnaires' disease in individuals with severely compromised immune systems have been linked to consumption of ice or water from machines in hospital settings.

- Warmth generated by the chiller compressor is thought to be responsible for providing temperatures suitable for growth of the bacteria in the incoming cold water lines of these machines.

- Ice and water given to patients should be subject to similar controls applied to other environmental conditions (e.g. air and food quality). Patients provided with increased protection from infection (e.g. HEPA filtered air and low bacteria food) should not be provided with ice or chilled water from these machines.

- Ice and chilled water from machines should not be provided to patients with high risk of micro aspiration and susceptibility to legionellosis. Instead, pre-boiled tap water should be chilled or frozen in conventional style fridges or freezers for these patients.

- All internal wetted surfaces of ice and chilled water machines (pipes, tanks and hoses) should be cleaned and disinfected at least once a year (ideally every 3-6 months) to remove any *Legionella*, and other organisms, that may be present. This may require the use of heat and or chemicals. In any case, the machine manufacturer's advice should be sought to determine appropriate cleaning and *Legionella* decontamination methods.

### 4.6 Other water features

- Decorative fountains and water features: Commonly found in public spaces such as foyers and contemplation rooms, these devices can generate aerosols that may lead to infection of at-risk individuals.

- Aerosols from these devices can be drawn through open windows, doors and air intakes, or onto balconies and patios. Submerged lighting and pumps can provide a heat source that can promote the growth of *Legionella.*

- Where there are water features or fountains in hospitals, the facility manager should develop a protocol for managing any risk, including the addition of a disinfectant, such as chlorine.

### 4.7 New buildings

- Any new systems being installed must comply with the provisions outlined in all relevant regulations, codes and AS/NZ Standards.

- The Public Health Unit should be notified of any new buildings so they can provide early advice on legislative compliance.

### 4.8 Reporting

All failed water sampling results must be emailed by the Chief Engineer to the Public Health Unit within 24 hours of receipt of the results (please email Director with a cc to SESLHD-PublicHealthUnit-EH@health.nsw.gov.au.

A second report shall be forwarded by the Chief Engineer to the Public Health Unit on the remedial actions undertaken and a copy of the follow up water sampling results taken at least 72 hours following the remedial action.

The Public Health Unit will inform the relevant Facility Manager and the Chief Engineer if any independent samples collected by the Unit's environmental health officers show a *Legionella* count ≥10 cfu/mL or a heterotrophic colony count ≥100,000 cfu/mL.

**See Appendix 1 Flowchart**

## 5. AUDIT

The auditor is a person who has:

- completed training specified by NSW Health
- demonstrated appropriate qualifications and experience
- received approval from the Health Secretary.

The auditor must be independent of the facility manager, risk assessor, duly qualified person, and laboratory.

The Regulation requires an auditor to assess whether the occupier (facility manager) demonstrates compliance with the actions, control strategies, monitoring and timeframes required by the RMP, and mandatory actions required by the Regulation.

The auditor does not assess the quality of the risk assessment or compliance with any optional recommendations in the RMP that do not affect the risk of *Legionella* growth or transmission.

The facility manager must ensure that an audit takes place for each 12 month period, with no gaps between periods. The audit period commences on the first day of the month following the month in which the RMP was completed.

As the audit is a retrospective review of documents generated within the 12 month period, the Regulation allows for the audit to be completed within two months after the end of the audit period. For example, if the RMP was completed on 15 January, the audit period would commence on 1 February and end on 31 January the following year. The audit for this period would need to be completed by 31 March, using data and documentation from the 12 month audit period.

The audit is a document-based review. It is not mandatory for the auditor to conduct an on-site inspection of the premises where the cooling water system is located.

For the 12 month audit period, the auditor should review:

- current RMP
- monthly reports covering inspection, maintenance (including servicing), chemical analysis, and microbial testing
- records of any actions taken to meet RMP requirements or address non-compliance identified by previous audit
- records of any notifications made to the local government authority (e.g. for a reportable test result).

The auditor should obtain these records from the occupier or the duly qualified person(s).

When conducting an audit, the auditor should review:

- actions, control strategies and monitoring required by the RMP
- sampling and testing for *Legionella* count and heterotrophic colony count, every month
- notifying the local government authority of a reportable test result, within 24 hours of receiving the result
- providing the local government authority with a certificate of RMP completion and certificate of audit completion, within 7 days of receiving the document
- preparing a monthly report of inspection, maintenance (including servicing), microbial testing, and chemical analysis
- The auditor must document their findings in the Audit report (Approved Form 2).

This includes a Certificate of audit completion which notes the outcome of the audit (compliant or non-compliant).

The facility manager must provide the certificate to the local government authority within 7 days of completion of the audit.

The facility manager may engage another person, such as the auditor or duly qualified person, to make this notification on their behalf.

The list of approved auditors are available on the NSW Health website.

## 6. REFERENCES

- *Public Health Act 2010 (NSW)*
- *Public Health Regulation 2012 (NSW)*
- NSW Health Policy Directive PD2015_008 Water- Requirements for the Provision of Cold and Heated Water
- enHealth. *Guidelines for Legionella Control in the operation and maintenance of water distribution systems in health and aged care facilities* (2015)
- NSW Health Guidelines Legionella Control in Cooling Water Systems (2018)

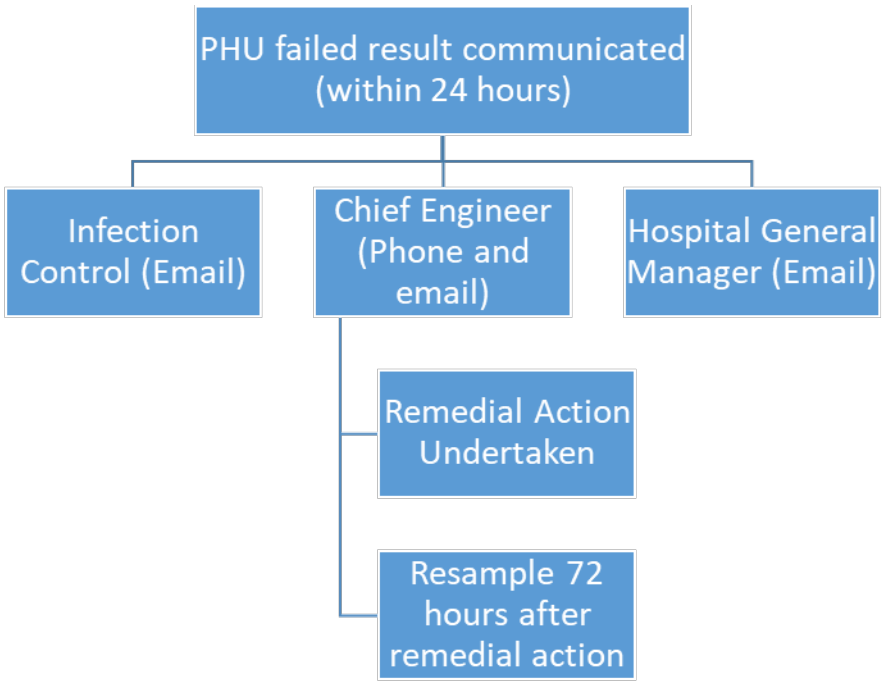
- NSW Health publications on *Legionella* control can be found at: https://www.health.nsw.gov.au/environment/legionellacontrol/Pages/default.aspx
- Standards Australia convenes technical committees to develop internationally-aligned standards for various industries in Australia (http://www.standards.org.au/Pages/default.aspx).
- AS/NZS 3666.1:2011 Air-handling and water systems of buildings – Microbial control – Design, installation and commissioning
- AS/NZS 3666.2:2011 Air-handling and water systems of buildings – Microbial control – Operation and maintenance
- AS/NZS 3666.3:2011 Air-handling and water systems of buildings – Microbial control – Performance-based maintenance of cooling water systems

## 7. REVISION AND APPROVAL HISTORY

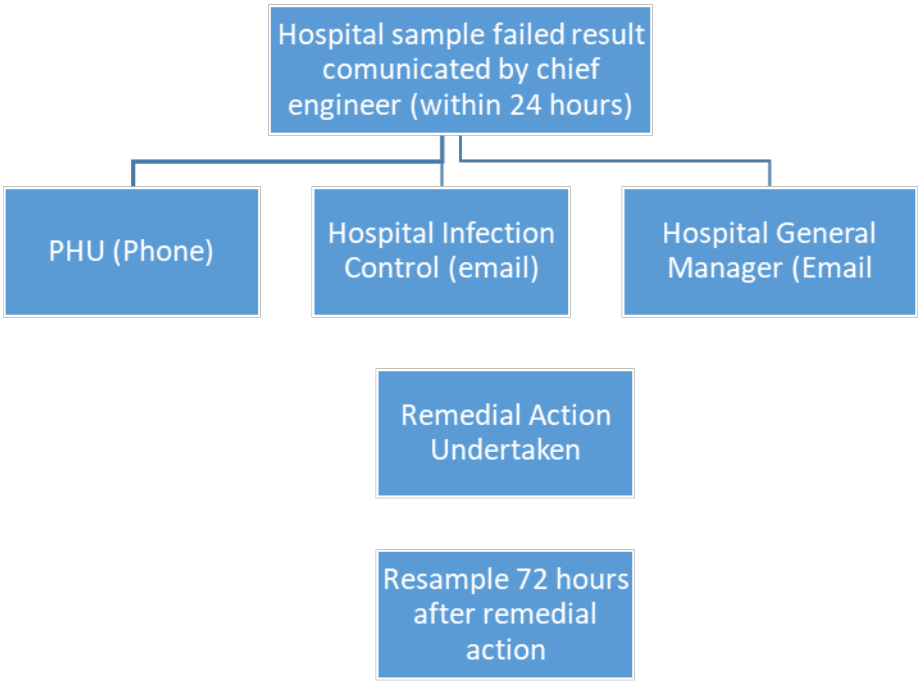
| Date | Revision No. | Author and Approval |
|---|---|---|
| Apr 2014 | 2 | Former SESLHDPD/113 updated by SESLHD Infection Prevention and Control Working Party |
| Jul 2014 | 2 | Approved by Executive Clinical Sponsor, Prof George Rubin, Director Clinical Governance. |
| April 2017 | 3 | Early involvement of PHU, accountability of Engineering Department Code of Practice. |
| October 2017 | 3 | Formatting reviewed by Executive Services |
| April 2022 | 4.0 | Major review completed: additional background information included; additional key terms defined; procedure and responsibilities updated; audit details included. Endorsed by SESLHD Infection Prevention and Control Committee. |
| May 2022 | 4.1 | Updated with input from Public Health Unit and Engineering. |
| July 2022 | 4.2 | Draft for comment period |
| October 2022 | 4.3 | Feedback incorporated. Approved by Executive Sponsor. |
| December 2022 | 4.3 | Approved at November 2022 Clinical and Quality Council. Processed and published. |

## Appendix 1 – Flowchart for Reporting of Failed Water Sampling Results

**PHU Water Sample Failed Result**




**Hospital Taken Failed Sample Result**



## Appendix 2 – Warm Water & TMV Temperature Requirements

- A monthly safety temperature check of warm water from at least one ablution outlet fixture (preferably a hand basin) running at 6 to 10 litres per minute, served by each warm water system, must be instituted by site management to monitor the temperature control performance of the warm water system. (Note that a flow rate of 6 to 10 litres per minute is equivalent to a time of between 12 to 20 seconds to fill a 2 litre water jug)
- The warm water system must be immediately isolated and not used where any variation of 2°C or more (after a 20 second stabilisation period) from the manufacturer's specified operating temperature range for the particular patient classification is detected. The warm water system must then not be used until the performance of the warm water system can be checked, adjusted or repaired as necessary by maintenance staff
- Details of any repairs, parts, replacement or any other work carried out on the warm water system must be detailed in a service report which is to be supplied by maintenance and service personnel to site management
- The report must explain the reasons for the temperature variation
- Before the warm water system is returned to service, the maintenance and service report must be referred to site management to acknowledge that the warm water system is reported by the maintenance staff to be operating satisfactorily and performing within the required temperature range
- The use of flow restrictions or outlet fixtures which are rated at flows below the minimum flow rate of the TMV shall be avoided in preference to outlet fixtures which operate comfortably at flow rates in excess of the TMV minimum flow rate
- In order to maintain a stable and acceptable temperature for mixed warm water from any TMV, the flow rate of water from the TMV should not fall below the manufacturer's recommended minimum flow rate for that TMV
- The flow rate from the outlet fixture is confirmed as being adequate before checking the warm water temperature and before the addition of any cold water from a separate source.