

VA Medical Center 595
Lebanon, PA 17042

MEDICAL CENTER MEMORANDUM 200-04

August 24, 2015

PREVENTION OF LEGIONELLA DISEASE AND SCALD INJURY

1. **PURPOSE:** To establish a policy for a multidisciplinary program designed to minimize the risk of Health Care Associated Infection (HAI) and minimize the risk of scald injuries from potable water distribution systems.

2. INTRODUCTION:

a. Legionella was discovered in 1976, at the American Legion Convention in Philadelphia, PA, when 34 conference attendees died and 221 were infected with Legionnaires' Disease (LD). The Legionella bacteria is an aquatic organism found in lakes, ponds and streams, and the disease is spread by inhalation of contaminated water droplets and aerosols. The disease incubation period is 2-10 days. LD is not transmitted from person to person. Legionella bacteria can cause severe pneumonia that looks like other atypical pneumonias.

b. Legionella Pneumophila Serogroup 1 accounts for over 90% of all cases of LD. Systems known to contribute to the spread of Legionella in hospitals include showers, faucets, whirlpools, cooling towers, decorative fountains, room-air humidifiers, and evaporative condensers.

c. Legionella grows best in systems that have a temperature between 77-108° Fahrenheit (F), in places with stagnant water, and a presence of scale, sediment, and/or biofilms. Some examples include hot water heating tanks, shower and faucet aerators, cooling towers, and evaporative condensers.

d. Patients at risk for acquiring LD include:

(1) Immunosuppressed patients (solid organ or bone marrow transplant or malignancy).

(2) Immuno-depressed patients (over 50, smokers, alcoholics).

(3) Acquired immune deficiency syndrome (AIDS) patients.

(4) Patients on steroid therapy.

(5) Patients with chronic lung disease, congestive heart failure, or end stage renal disease.

(6) However, healthy individuals can also develop the disease.

e. Lebanon Veterans Affairs (VA) Medical Center has a Legionella Prevention Plan and completes a review of the plan annually.

3. **POLICY:** Lebanon VA Medical Center maintains a multidisciplinary program designed to minimize the risk for infection due to Legionella species bacteria (Legionella disease) by implementing consensus standards for controlling Legionella in the environment. It is believed that by implementing these standards we will decrease colonization of water borne pathogens, as well as include provisions necessary for the prevention of scald injury. This program is maintained by the Water Safety Committee (WSC). This program will focus its mitigation efforts on buildings which house overnight stays, and additional buildings based on a risk assessment.

4. **DEFINITIONS:**

a. Health Care-Associated Legionella Disease (HCA-LD): HCA-LD is a laboratory-confirmed (not clinically defined) case of Legionella disease that is epidemiologically linked to the health care facility. HCA-LD cases may be "definite" or "possible".

b. Definite HCA-LD: Definite HCA-LD is a laboratory confirmed (not clinically defined) case of Legionella disease with an inpatient stay that is equal to or greater than 10 days of continuous inpatient stay prior to onset of illness.

c. Possible HCA-LD:

(1) Possible HCA-LD (inpatient) is a laboratory confirmed (not clinically defined) case of Legionella disease in which a patient has spent 2-9 days in a health care facility prior to onset of illness.

(2) Possible HCA-LD (outpatient) is a laboratory-confirmed (not clinically defined) case of Legionella disease in which the patient has exposure to a health care facility for a portion of days prior to onset of illness.

d. Community Associated Legionella Disease (CA-LD): In general, CA-LD is a laboratory confirmed case of Legionella disease, in which the patient has not had contact with the healthcare setting the 10 days prior to onset of illness.

e. Water Safety Committee (WSC): The WSC is chaired by the Associate Director of Lebanon VA Medical Center and co-chaired by the Water Safety Infection Preventionist (WSIP). Additional members of the committee include but are not limited to: Infection Preventionist (IP), Industrial Hygienist, Infection Disease Physician, Facilities Manager, Supervisor, Plumbing Section, and the President of American Federation of Government Employees (AFGE) or designee. Ad hoc members of the committee include but are not limited to: an Occupational Health representative, Associate Chief Nursing Service (ACNS) of Acute Care, a Dental representative, a Nutrition/Food Service representative, Sterile Processing Services (SPS) representative, and a Pathology/Laboratory Medicine representative.

5. **PROCEDURES:**

a. An evaluation of the Legionella Prevention Program will be conducted annually and presented to the infection Control Committee (ICC). Additionally, at a minimum, quarterly reports will be given to the ICC to include the following.

(1) The plan, which will include:

(a) Clinical surveillance

(b) Water testing

(c) Outbreak investigations and management

(d) Maintenance, construction, and renovation guidance of Legionella prevention

(e) Environmental surveillance

(f) Legionnaires Disease (LD) Risk Assessment

(2) Total number of urinary antigen tests and clinical sputum cultures for Legionella ordered per quarter.

(3) Total number of persons with positive results for Legionella during the past quarter.

(4) Total number of persons with health care acquisition of Legionella infection during the past quarter.

(5) Results of environmental testing for Legionella during the past quarter.

(6) Summary of maintenance, renovation, and construction activities as they relate to the prevention of Legionella Disease.

(7) Include assessment and recommendations for improvement of the facility approach to decrease the risk for Legionella disease in the annual Infection Control Risk Assessment (ICRA).

b. Legionella Risk Assessment: The Legionella Risk Assessment is a component of the Annual HCA-LD prevention plans.

c. Clinical Testing: The Chief of Staff (COS) and designee(s) will make efforts to ensure that Legionella disease is considered for patients hospitalized with pneumonia which has been radiologically confirmed. These efforts may include educational campaigns involving emergency department and intensive care unit staff, didactic training sessions, use of laboratory order sets and other means.

d. Environmental Testing: Testing of select distal water sites (e.g., faucets and showers) of the facility hot water distribution systems(s) are done quarterly at minimum (Attachment A). In buildings with overnight stay, remedial action will be implemented for any site found to be Legionella-positive by environmental sample. If remedial action is needed, the facility implements an Action Plan, determined by the facility WSC to reduce Legionella in the water distribution system (Attachment B). If the environmental testing for Legionella at distal sites is negative, then the Action Plan does not need to be implemented.

e. Engineering Service will perform and document routine and other maintenance of all aspects of the facility water system, equipment and appliances utilizing water, such as ice machines, in accordance with published national Veterans Health Administration (VHA) and manufacturer guidelines, including:

- (1) Situating cooling towers so that drift is directed away from clean air tanks.
- (2) Using an oxidizing biocide continuously (bromine, chlorine, iodine, chlorine dioxide, etc.) to prevent bio-film formation and bacterial growth.
- (3) Cleaning systems prior to seasonal shutdown and again before starting system for the first time of the new season.
- (4) Recording maintenance on cooling towers (see Engineering Section Standard Operating Procedures [SOP] 6.10).
- (5) Only steam humidifiers are accepted.

f. The WSC will work together to ensure that environmental testing of distal sites of the water system is completed at least quarterly in buildings where patients, residents or visitors stay overnight.

g. For any positive Legionella Sputum Culture or Legionella Urinary Antigen (LUA), the following steps will be taken:

- (1) The facility Laboratory Service will notify the WSIP/IP, immediately.
- (2) The WSIP/IP will determine association (i.e., HCA-LD, CA-LD).
- (3) The WSIP/IP will notify the Infectious Disease (ID) Physician and notify the Director and/or COS.
- (4) Patient care providers will be notified and remedial action will be taken as determined by the WSC. Options may include:

(a) Thermal eradication: Flush showers and faucets with water at a temperature of at least 160°F at the tap for 30 minutes. This option can be performed without

additional apparatus, can be performed quickly, and should be performed with attention to the risk of scalding patients.

(b) Hyper-shock chlorination: Flush systems with >10mg/liter of chlorine in water for at least 5 minutes.

(5) Water use will be restricted during the remediation period.

(6) The WSIP/IP will coordinate enhanced surveillance for additional cases of Legionella disease and will initiate an investigation to determine the potential source of Legionella within the facility.

(7) Inpatient clinical and nursing staff will work with the WSIP/IP to identify other persons with HCA-LD (enhanced surveillance).

(8) The WSC will ensure that environmental cultures in both the affected area and an unaffected area within the facility are obtained per protocol (Attachment A).

6. **RESPONSIBILITIES:**

a. The **Director** is responsible to:

(1) Ensure that adequate resources are available for the implementation of this policy, to include competency requirements, education, and additional requirements of those involved in water safety.

(2) Approve the initial HCA-LD Prevention Plans for those buildings which house overnight stays.

(3) Certify that each HCA-LD plan is maintained annually.

(4) Ensure that the actions in the written HCA-LD Prevention Plans are implemented.

(5) Submit initial and annual HCA-LD Prevention Plans, certifications, and approvals to the Veterans Integrated System Network (VISN) Director.

(6) Submit an annual summary of the number of Legionella disease cases (definite HCA-LD, possible HCA-LD, and CA-LD) and clinical Legionella testing to the VISN Director.

b. The **Chief of Staff** is responsible to:

(1) Ensure that the members of the clinical care staff are knowledgeable in the recognition, diagnosis and treatment of pneumonia, including pneumonia due to Legionella species.

(2) Ensure that clinical staff involved in direct patient care is notified when cases of definite or possible HCA-LD are identified to increase diagnostic awareness.

(3) Ensure that clinical staff involved in direct patient care is notified when environmental water testing is positive for Legionella to increase diagnostic awareness.

c. The **Facilities Manager, Engineering Service** is responsible to:

(1) Ensure maintenance of appropriate water temperatures in the hot water distribution system(s) and the cold water distribution system(s) in accordance with current Lebanon VA Medical Center (see Engineering Section SOP 138.05) facility's approved HCA-LD Prevention plans, and VHA policy.

(a) Document the facilities policy for the implementation and monitoring of temperature limits in the hot and cold potable water distribution systems, including written explanation of any conditions or circumstances that may delay implementation, in accordance with the facility's HCA-LD plans.

(b) Prepare written documentation of engineering procedures, in accordance with, facility HCA-LD plans for the prevention of scald injury.

(c) Ensure ongoing monitoring of the temperature levels in the buildings potable water distribution systems to ensure they are within the requirements defined in the facilities approved HCA-LD plans.

(d) Verify the implementation and monitoring of water temperature levels in accordance with the facility's written policy.

(2) Ensure continuous monitoring of incoming water quality entering buildings (from municipal sources) as required by the facility's approved HCA-LD plans.

(3) Annually (and more frequently as warranted) confirming treatment systems utilized by the local water company are functioning properly.

(4) Ensure maintenance of appropriate biocide levels for Legionella control in potable water distribution systems, in accordance with, applicable regulatory requirements for safe drinking water and effluent concentrations.

(a) Ensure that MIOX-Rio Zuni (Mixed oxidant) disinfection system is approved/recognized for the intended use by the State regulatory water authority. Documentation of the system design, approval, installation, and operation shall be maintained up to date

(b) Documentation of the facility's policy for biocide concentration levels in the hot and cold potable water distribution systems (to include minimum and maximum biocide

levels, allowable disinfection byproduct levels, biocide monitoring method, and frequency) and compliance with operating permits.

(c) Ongoing monitoring of biocide and disinfection byproduct levels in the potable water distribution systems to ensure they are within compliance with operating permit requirements.

(5) Ensure that any treatment measures implemented in facility water distribution systems are functioning according to the manufacturer's specifications for the particular systems being used and at recommended capacity for Legionella inhibition.

(6) Conduct Infection Control Risk Assessment (ICRAs) in cooperation with other facility stakeholders to address the potential impact of construction and maintenance of water systems on growth or transmissions of waterborne pathogens and determine the extent of precautions.

(7) In conjunction with Infection Control and Safety, Engineering Service will consider potential interventions during all renovation and construction projects directly or indirectly involving the facility water distribution system. These interventions may include, but are not limited to, removal of dead legs (which are to be capped at the main supply/recirculation supply lines) in the water supply system and the installation of engineered controls to prevent/minimize Legionella contamination of the water system (i.e., point of use filters, as needed and instantaneous hot water heaters).

(8) Ensure that newly installed piping and distribution components are flushed of debris and disinfected prior to being placed into service.

(a) Piping and components must be cleaned and protected from accumulation of debris and contamination prior to and during installation.

(b) Documentation of flushing and disinfections must be maintained.

(c) Add water testing to contracts as indicated.

(9) Ensure unused water branch lines and dead-legs are removed and capped from the main supply/recirculation supply lines to limit stagnation and reservoirs for Legionella growth, in accordance with, approved HCA-LD plans.

(10) Ensure that only steam is used for humidification purposes.

(11) Assess and document competency of contractors and the contractor's personnel as part of the acquisition process prior to the start of any work on facility water systems, including water treatment. Competencies should be re-assessed on an on-going basis, and at minimum, annually.

(12) Ensure competent personnel are available at all times to address water system operations.

(13) Engineering Service will quarterly, or more frequently if needed, obtain assurances that the MIOX-Rio Zuni (Mixed oxidant) disinfection system is in working order. Process for verification to be determined by engineering service (this will be updated with information when available). This information will be presented quarterly or more frequently as needed as part of the Legionella report to the ICC.

(14) Forward notification to all medical facility employees when:

(a) Maintenance and Repair procedures are taking place that could affect water systems;

(b) Maintenance and Repair procedures have been completed; and

(c) Affected systems have been tested and are returned to normal operations.

(15) Provide facility WSC, Safety Committee, and ICC with an annual report to the water system maintenance and monitoring and any Legionella mitigation actions taken.

d. The **Chief of Pathology and Laboratory Medicine** is responsible to:

(1) Ensure the facility laboratory has access to Legionella pneumophila sero group 1 urinary antigen testing.

(2) Ensure access to a clinical laboratory that can perform cultures on respiratory secretions for Legionella, with identification at the species level, and can determine the Serogroup of L. pneumophila.

(3) Ensure that clinical cultures for Legionella and/or antigen tests are performed in accordance with current VHA policy on laboratory testing.

(4) Ensure that results from laboratory tests and clinical cultures are entered into the Computerized Patient Record System (CPRS) in a clinically relevant timeframe.

(5) Ensure that WSIP/IP is notified of all positive test results.

(6) Provide annually to the ICC and facility WSC:

(a) Total number of urinary antigen tests and clinical cultures of Legionella ordered.

(b) Total number of persons with positive results for Legionella.

e. The **WSC** is responsible to:

(1) Ensure that each building which houses overnight stays has a written HCA-LD Prevention Plan in place (to include provisions necessary for the prevention of scald injury).

(2) Develop written HCA-LD prevention plans for each building subject to this Memorandum and in accordance with requirements regulated by the VHA Water Safety Program. Components of each prevention plan must address building associated risk assessments, implementation and monitoring of engineering controls, validation that the engineering controls are effectively preventing Legionella growth, and scald prevention. (The annual HCA-LD Prevention Plan is located in the WSC Drive of the Lebanon VA Medical Center Document Directory.)

(3) Review the written HCA-LD prevention plan(s) at least annually and update as necessary. Plans will be submitted to the Director annually.

(4) Conduct an annual assessment to determine which buildings fall subject to this memorandum.

(5) Establish the policy for conducting environmental water testing for Legionella, (for each building subject to this memorandum) to include:

(a) Determining the number and location of outlets tested and the frequency of such testing.

(b) Determining who at the building level is responsible for: collecting environmental water samples, ensuring that the water samples are transferred to the environmental testing laboratory, receiving the results, and reporting the results to the facility WSC, Safety Committee and the ICC.

(c) Determining the laboratory that will conduct the environmental water testing.

f. Facility **WSC Co-Chairpersons** are responsible to:

(1) Conduct routine meetings to review the records from the implementation of the HCA-LD prevention plan(s) to include:

(a) Building associated risk(s);

(b) Documented verification of policy implementation (e.g., implementation of engineering controls, water quality testing, water pressure, and scald control);

(c) Any results from water testing for Legionella;

(d) Whether any engineering controls were not within specified limits and why that may have occurred;

(e) Whether any corrective actions were taken on engineering controls;

(f) Whether the HCA-LD prevention plan(s) needed to be updated; and

(g) Whether there have been any cases of LD diagnosed at or potentially associated with each building.

(2) The facility WSC is to meet as necessary to address any non-routine Legionella control issues and HCA-LD. In the event of a health care associated case of Legionella pneumonia, the WSC Co-chairpersons will convene a task force.

(3) Document in the minutes any corrective actions that were initiated for maintaining water temperature and oxidant residual at appropriate levels to inhibit Legionella growth, and document the effectiveness of the corrective actions taken.

(4) Ensure that the results of the reviews are communicated to the medical facility Leadership Team, Safety Committee, ICC, and any other local committees as appropriate for the medical facility.

g. The **WSIP and IP** are responsible to ensure that all cases of LD are reported to the Pennsylvania Department of Health, in accordance with, applicable statutes, regulations and VHA policy for infectious disease reporting, protecting health information, and release of information.

7. **REFERENCES:**

VHA Information Letter IL 10-2013-001, Prevention of Legionella DISEASE, January 11, 2013.

VHA Directive 2008-010, Prevention of Legionella Disease

VHA Directive 1061, Prevention of Healthcare-Associated Legionella Disease and Scald Injury from Potable Water Distribution Systems

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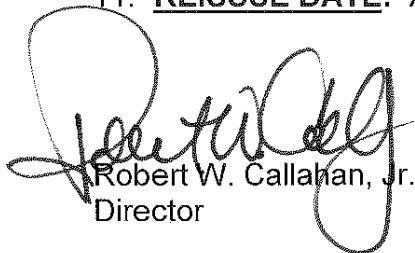
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8. **KEYWORDS:** Legionella, Infection Control, Center for Disease Control and Prevention, Scald Injury Prevention

9. **AUTHOR:** Water Safety Infection Preventionist

10. **RESCISSION:** MCM 200-04, 8-1-13, same subject

11. **REISSUE DATE:** August 2018



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Director

Attachments: 2

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Attachment A

ENVIRONMENTAL WATER SAMPLING PROTOCOL

1. Quarterly environmental samples are to be collected on both hot and cold water distribution systems for *L. Pneumophila*. Testing will employ 100 milliliters (ml) samples of water at each tested location.
2. Samples from at least 10 outlets on the hot water distribution systems and at least 10 outlets on the cold water distribution system will be tested from each building for each quarterly testing cycle.
3. Each sample should have documentation of the following:
 - a. pH
 - b. Temperature at time of sample
 - c. Level of residual biocide
4. Contracted agency is responsible for collection of the samples, with an Infection Prevention representative present for all sampling.
5. Once collected, samples are to be processed by a testing laboratory with experience in microbial testing of potable water. The Water Safety Committee (WSC) is to select the testing laboratory using the following criteria:
 - a. Laboratories that process the water samples for *Legionella* must be certified by the Centers for Disease Control and Prevention (CDC) Environmental *Legionella* Isolation Techniques Evaluation (ELITE) program or the Public Health England (PHE) *Legionella* External Quality Assessment (EQA) scheme as proficient at performing the culture of *Legionella* from environmental samples.
 - b. Consider selection of a laboratory capable of concentrating water samples prior to plating the samples on selective media to increase the sensitivity of the assay.
 - c. If there is a possibility that the facility will use molecular typing to characterize environmental *Legionella* isolates, the facility will make arrangements with the testing laboratory for storage of the environmental isolate(s) at least temporarily.
 - d. Prior to the initial environmental testing, the selected laboratory will be consulted regarding requirements and recommendations on sample collection and shipping.

6. Any positive results will:

- a. Be documented and reported to the WSC and Facility leadership.
- b. Result in mitigation efforts within the entire water loop section in which the positive sample was taken.
- c. Re-testing will occur and mitigation will continue until test results in that area are negative for Legionella.

7. Location of water samples in the water distribution system.

a. Distal water sites are sampled any time environmental sampling is needed in the course of implementing the facility Legionella evaluation plan (e.g., for routine environmental surveillance, or for monitoring of an Action Plan mitigation effort).

b. Considerations when selecting site numbers and locations include:

1 If environmental testing is initiated due to a suspected Health Care-Associated Legionella Disease (HCA-LD) case, samples from distal sites in the immediate vicinity of the case should be included in the samples collected.

2 Sampling includes sites from high risk areas (e.g., Hematology/Oncology, transplant units, medical-surgical units).

3 If needed for the facility to implement environmental water testing to monitor an Action Plan mitigate effort (e.g., due to a prior history of epidemiologically-linked HCA-LD or positive environmental screening results), then it is recommended that 2 samples are taken from each Hot Water Tanks (HWT) in addition to testing at least 10 distal sights.

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Attachment B

**ACTION PLAN FOR THE MITIGATION OF LEGIONELLA IN FACILITY WATER
DISTRIBUTION SYSTEMS**

1. The Water Safety Committee (WSC) will determine and coordinate remedial action for environmental control if Legionella is identified.

2. Considerations for the Action Plan include the following:

a. The mitigation protocol needs to be implemented in the following situations:

(1) If the facility has positive environmental risk assessment results

(2) If the facility has a history of epidemiologically-linked Health Care Associated Legionella Disease (HCA-LD) or if the facility identified epidemiologically-linked HCA-LD from clinical screening, then the mitigation protocol needs to be implemented to reduce the risk of exposure of patients to Legionella from the facility water distribution system.

b. Mitigation protocol options include, but are not limited to:

(1) Thermal Eradication: This method, also referred to as superheat and flush, uses high water temperature to kill Legionella present in the water system. The procedure involves the temporary resetting of the hot water temperature to 160° Fahrenheit (F) - 170°F (71° Celsius [C] - 77°C) and the flushing of the system by selectively opening all valves for at least 30 minutes.

(2) Hyperchlorination: This method involves increasing the chlorine level such that a free chlorine residual of at least 2 milligram/liter (mg/L) maintained throughout the system for at least 2 hours (but not exceeding 24 hours). Chlorination of the water heater or tank to a concentration of 20 to 50 mg/L may be required to achieve this level of free chlorine residual. After the hyperchlorination procedure is complete, the system needs to be thoroughly flushed.

c. Monitoring of the mitigation protocol involves the culture of water in hot water tanks and distal water sites for Legionella. The frequency of the testing, determined by the facility WSC, will be at appropriate intervals to ensure that the mitigation protocol is successful at reducing the risk of exposure to Legionella.

d. Evaluation of the mitigation effort will:

(1) Use the results from the mitigation monitoring to determine if the mitigation effort has eliminated Legionella.

(2) If the post-mitigation evaluation indicates that the mitigation was not effective, the WSC will reassess the mitigation plan, modify the Action Plan to include revised mitigation protocols, and monitoring of the new mitigation efforts will occur.

(3) If the post-mitigation evaluation indicates that the mitigation was successful, the annual facility evaluation for Legionella risk is complete.

(4) A written summation of Action Plan activities and findings is to be submitted to the ICC.