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**Keywords:** Legionella, Legionellosis, Legionnaires Disease, Pontiac fever, pneumonia, water restrictions, water testing

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## **I. OBJECTIVES**


The objective of this policy is to minimize the risk of nosocomial spread of *Legionella sp.* at the Johns Hopkins Hospital.

## **II. INDICATIONS FOR USE**

This policy outlines processes for the control of *Legionella sp.* required to minimize the risk of nosocomial legionellosis.

## **III. DEFINITIONS**


Legionella sp. & legionellosis (Legionnaires disease; Pontiac fever),	<ol style="list-style-type: none"> <li>1. A Gram negative bacillus species commonly found in various natural and man-made aquatic environments. In hospital environments, found in fixtures associated with water including sinks, showers, and ice machines. Additionally, cooling towers, evaporative condensers and incoming city water have been associated with <i>Legionella sp.</i></li> <li>2. Legionellosis, the infection caused by <i>Legionella sp.</i> occurs primarily in immunocompromised patients.</li> </ol>
Definite Nosocomial	A case is considered a definite nosocomial case if <i>Legionella sp.</i> is identified and the patient has been hospitalized continuously for 10 days prior to the onset of symptoms.
Possible Nosocomial	A case is considered a possible nosocomial case if <i>Legionella sp.</i> is identified and the patient has been hospitalized 2-9 days prior to the onset of symptoms.
Immunocompromised Patients	For the purposes of Legionella acquisition, patients of known high risk meeting the following criteria will be considered immunocompromised: <ol style="list-style-type: none"> <li>1. Patients who have undergone solid organ transplantation.</li> <li>2. Patients who have received a bone marrow transplant within the past year.</li> <li>3. Patients receiving cancer chemotherapy currently, or who have received it within the past month.</li> </ol>

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4. Patients receiving anti-rejection drugs (cyclosporin, azathioprine, ect).
5. Patients who have had a white blood cell count < 1000 mm<sup>3</sup> and/or an absolute neutrophil count < 500/mm<sup>3</sup> for 7 days or more.
6. Patients who have received high doses of glucocorticosteroid therapy for at least 1 month duration.
  - a. The following are examples of high adult doses:
    - Dexamethasone 3 mg daily
    - Cortisone 100 mg daily
    - Hydrocortisone 80 mg daily
    - Prednisone 20 mg daily
  - b. For children's dosage information, contact the Pediatric Pharmacy at x5-5926

#### **IV. RESPONSIBILITY**

- A. Legionella Task Force (LTF)
  1. The Legionella Task Force includes Hospital Epidemiology and Infection Control (HEIC), Facilities Engineering, Department of Medicine, Risk Management, Nursing, Infectious Diseases, Health Safety & Environment, Environmental Services, Administration, Microbiology, and Public Affairs.
  2. It is the responsibility of the individuals in this group to implement this policy in their respective areas of responsibilities.
  3. The task force meets quarterly and on an ad hoc basis when convened by the Hospital Epidemiologist.
- B. Facilities Engineering
  1. Maintain and monitor the chlorine dioxide treatment system for water disinfection.
  2. Report the operation of chlorine dioxide system to HEIC monthly.
  3. Disinfect and investigate the water systems as indicated.
  4. Maintain cooling towers, evaporative condensers, and potable water distribution systems (sinks, showers, ice machines, hot water generators).
  5. Maintain water culture database and share its access with HEIC.
  6. Maintain data related to flushing water systems.
  7. Respond to questions related to this policy.
- C. Hospital Epidemiologist/Infection Control (HEIC)
  1. Monitor the recoveries of *Legionella sp.* in human specimens by daily review of microbiological data.
  2. Report cases of definite nosocomial legionella transmission to the Baltimore City Health Department.
  3. Work with Facilities Engineering to implement water testing/treatment protocols.
  4. Periodically review the Legionella database maintained by Facilities Engineering.
  5. Communicate this policy to units on which definite cases of legionella have occurred.
  6. Notify Baltimore City Health Department of definite nosocomial transmission, water restrictions and action plans.
  7. See Section V, Procedure K, Miscellaneous #1 d.
  8. Respond to questions related to this policy.
- D. Microbiology Laboratory


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1. Communicate to HEIC positive Legionella respiratory and/or urine antigen results.
  2. If *Legionella pneumophila* is recovered from patients from a definite nosocomial transmission, every effort will be made to use pulsed field gel electrophoresis to compare clinical and environmental isolates.
- E. Environmental Services/Support Associates: Flush taps in all patient rooms for 5 minutes daily to facilitate chlorine dioxide disinfection through pipes. This includes both hot and cold taps and showerheads. This shall be done during daily cleaning of rooms.
- F. Dietary: Deliver bagged ice. This shall only occur during periods of water restrictions.
- G. Central Stores: Deliver bottled water. This shall only occur during periods of water restrictions.
- H. Occupational Health Services: Monitor pneumonia in Johns Hopkins employees. A positive legionella urine antigen or respiratory culture shall be reported to HEIC for outbreak investigation.


## **V. PROCEDURE**

### Surveillance

- A. Facilities Engineering shall conduct quarterly water culture surveillance of campus water systems for Legionella sp. in inpatient care buildings, i.e., the Weinberg, Meyer, Halsted/Osler, Nelson/Harvey and Childrens Center Buildings. Water samples for culturing shall be obtained from sinks faucets, showers, ice maker/water dispensing machines, drinking fountains, cold and hot water potable water mains and hot water generators.
1. Heterotrophic Plate Count water cultures shall be obtained as necessary with Legionella water cultures to determine overall water quality.
- B. All water cultures shall be sent to an approved outside laboratory. HEIC, Facilities Engineering and Microbiology shall have input on the selection of the laboratory.
- C. Nelson 7 (Transplant Surgery) shall be monitored with 4 water samples quarterly due to the risk to its patient population. Lists of quarterly water culture sites shall be provided in the "Legionella Prevention & Control - Facilities Engineering Management Plan".
- D. HEIC shall review all Legionella water cultures and Clinical Microbiology data to determine if a case meets the definition of nosocomial case of legionella.
- E. If criteria are met for implementing water restrictions, HEIC and Facilities shall determine an adequate sampling strategy. The Legionella Task Force (LTF) shall be convened if it is decided that water restrictions must be implemented.
- F. Water culture results shall be maintained in a database developed by Facilities Engineering. HEIC shall have access to Facilities database and the water culture results from the approved outside laboratory.
- G. Criteria for Implementing Water Restrictions
1. A single case of definite nosocomial legionellosis would place water restrictions limited to the immunocompromised patients located in the affected building. Example: a single definite nosocomial case of Legionella on Nelson 7 would place all patients meeting the definition in the Nelson building on water restrictions.
  2. In the event of a possible nosocomial case of legionella, water shall be restricted as in a definite case, until the status of the case has been determined. When a case has been determined to not be nosocomial, water restrictions shall be lifted.
- H. Criteria for Lifting Water Restrictions

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1. Re-tests of water from the originally positive test sites must return results of < 50 CFU of Legionella after remediation.
  2. At least 10 water cultures from the original positive site related to a nosocomial case of Legionella, and other sites fed by the same water system shall be taken bi-weekly by Facilities bi-weekly (n > 10) for two months.
    - a. After 2 months (4 bi-weekly samples), <10% of the water culture results can be positive for *Legionella sp.* in order for the water system to be taken off restrictions.
    - b. HEIC request approval from the Baltimore City Health Department prior to lifting restrictions.
- I. Criteria for Discussion Among Members of the Legionella Task Force (LTF)
1. If >50 CFU (colony forming units) of Legionella sp. are detected in any water system, the LTF shall determine whether to restrict water use in affected unit and/or buildings.
    - a. Any distal site that tests positive for >50 CFU *Legionella pneumophila* shall be locally, hyper-chlorinated by Facilities Engineering.
    - b. Factors for the Legionella Task Force to consider when restricting water: sampling site, colony forming units (CFU's), and species of Legionella.
  2. If >10% of sites test positive for Legionella sp., the Legionella Task Force shall determine whether to restrict water use in the affected unit and/or buildings.
  3. If there is a disruption in either the monitoring or injection of the Halox chlorine dioxide system for > 1 week, Facilities must inform the LTF. LTF shall determine whether to restrict water.
  4. In the event that the LTF cannot be convened, the hospital epidemiologist (or designee) has the authority to restrict water and ice. If the LTF applies a water restriction, the criteria for lifting the restriction shall be defined.
- J. Outbreak Management
1. Culture sites on unit(s) where the affected patient(s) reside include aerators, faucets, taps, water fountains, ice makers and showerheads.
  2. Immunocompromised patients shall be on complete water restrictions. This patient population shall not bathe, shower, use ice, brush teeth or in any way use or consume water on the unit from the taps.
    - a. This patient population shall be delivered bottled water and ice.
    - b. If needed, these patients may bathe or shower on non-restricted units.
    - c. Sterile water must be used for nebulizer treatment, the cleaning of bronchoscopes and the decontamination of respiratory equipment during water restrictions.
  3. If *Legionella pneumophila type 1* is isolated from the water system and from patients, every effort shall be made to genetically compare the isolates.
  4. HEIC shall be responsible for notifying units of water restrictions.
  5. Local and State Health Departments shall be notified by HEIC.
  6. Recommendations mandated by the Baltimore City Health Department shall be followed.
  7. Restrictions shall continue until requirements made by Health Department have been met, and the Baltimore City Health Department has approved the lifting of restrictions.
- K. Miscellaneous
1. In order to minimize the risk of hospital acquired Legionellosis, the following additional measures shall be followed:

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- a. Decorative fountains are forbidden.
- b. Room or area humidifiers are forbidden.
- c. Enclosed fish tanks shall be professionally maintained.
- d. HEIC must approve the introduction of new products that could be used to deliver water. This applies to all forms of water, liquid, vapor, and ice.

## **VI. REPORTABLE CONDITIONS**

- A. Any positive respiratory culture and/or urinary antigen test for *Legionella pneumophila type 1* must be reported immediately to HEIC so that it can be promptly assessed for nosocomial acquisition.
- B. Patients who are assessed for definite nosocomial acquisition, who test positive for *Legionella pneumophila type 1*, shall be reported to the Baltimore City Health Department by HEIC.

## **VII. SUPPORTIVE INFORMATION**

### **Communication & Education:**


1. In addition to notifying the Baltimore City Health Department, the following individuals at The Johns Hopkins Hospital shall be contacted by HEIC in the case of water restriction:
  - a. The President, Chief Operations Officer, Vice President of Nursing, Vice President of Medical Affairs, On call Administrator, Disaster Control Administrator, Shift Administrators, Nurse Managers of affected buildings, Office of Media Communications, and Office of Risk Management.
2. This policy shall be communicated to the appropriate JHH personnel via the following channels:
  - a. HEIC Committee shall communicate this policy to departments. HEIC is responsible for implementing this policy on units during water restrictions.
  - b. Department Managers shall monitor compliance during water restrictions.
  - c. This policy shall be placed in the Interdisciplinary Clinical Practice Manual on the JHH Intranet site [www.insidehopkinsmedicine.org/icpm](http://www.insidehopkinsmedicine.org/icpm). Paper distributions shall be made to the Departmental Unit Nursing offices.

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- Medical Care Evaluation Committee

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**Developer:**

- Hospital Epidemiology and Infection Control

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