



**Legionnaires' Disease Outbreak at the Luxor Hotel and Casino, Las Vegas, NV, 2011
Interim Report #2
January 24, 2012
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BACKGROUND:

On January 06, 2012, the Centers for Disease Control and Prevention (CDC) Respiratory Diseases Branch, as part of the national surveillance system to detect cases of Legionnaires' Disease among travelers, informed the Southern Nevada Health District (SNHD) Office of Epidemiology (OOE) of a case report of laboratory-confirmed Legionnaires' Disease (LD) in a person who had stayed at the Luxor Hotel in Clark County during their incubation period. Case had illness onset in December 2011. At the time of the report, the case was deceased.

On January 06, 2012 the SNHD OOE notified Environmental Health (EH) about the new case report. There was no room number provided on the original notification and no case name or age. OOE requested that CDC consult with the reporting state and request a room number. The room number was provided by CDC to the OOE on January 10, 2012.

The Luxor was previously associated with LD cases in the spring of 2011. The first case had illness onset in March of 2011 and had stayed at the hotel from March 16 through 21. This case was reported to SNHD by CDC on May 6, 2011. A second case was reported on June 15, 2011. This case had illness onset in April 2011 and had stayed at both the Luxor and the Aria within the incubation period. All three cases resided in other states. In June 2011, SNHD Environmental Health staff took bulk water samples, environmental swabs and conducted the CDC Environmental Assessment at the Luxor in response to these two cases being reported from the CDC. Results showed that *Legionella sp.* was not detected in the water samples. The environmental swabs leaked in transport and could not be tested. The CDC Environmental Assessment did not indicate that the facility was at an increased risk of having a person who stayed at the facility contract legionellosis.

Based on the facility's previous history and the report from CDC on January 06, 2012 of a new cases associated with the facility, an epidemiologic and environmental investigation was initiated on January 11, 2012.

METHODS:

Environmental Investigation

SNHD staff visited the hotel on January 11, 2012 and collected samples from the two rooms on the same hot water riser as the case's room, as the case's room was occupied. An additional sample was taken on the return from the hot water loop. A total of 23 environmental samples were taken from the two rooms served by the same riser that the case stayed in along with the hot water return. These samples included 18 bulk water samples and 5 environmental swabs. The sampling was done using CDC recommended procedures and delivered to the Las Vegas NALCO office to be sent to NALCO Laboratories (Naperville, IL) for testing. After the sampling of each fixture, a water temperature and free chlorine residual was measured. Additional sampling on the same date was completed by a third party, Phigenics, Naperville, IL, a laboratory selected by the Luxor facility management. The samples collected by Phigenics mirrored the bulk water samples taken by SNHD and were taken immediately following any SNHD bulk water sample collection. Phigenics did not take any environmental swabs. The SNHD requested that facility managers provide a copy of their current water management plan and any sampling results that occurred during the past six months. After the sampling was completed EH staff reviewed the CDC Environmental Assessment and documented any changes from the one completed in June 2011.

A second visit was made on January 12, 2012 to review the testing and water management plan and receive maintenance and disinfectant records for the indoor spa. During this visit, SNHD also conducted water chemistry testing of the water contained in the permitted public bathing places located within the spa.

On January 13, 2012, EH staff observed Phigenics sample the room where the case stayed. SNHD requested that no preventative or preemptive maintenance occur until EH returned on January 17, 2012 to conduct its own environmental sampling room of the fixtures in the case's room, using the CDC recommended procedures. Fourteen samples were taken in this room that consisted of four environmental swabs and ten bulk water samples.

Epidemiological

Clinical laboratory results and case histories of the three known cases were reviewed.

Through CDC, OOE staff was able to contact the state epidemiologist in the state where the most recent case resided. The epidemiologist shared detailed case history, advised that a pre-mortem sputum specimen from the case had been obtained and that the state public health laboratory would culture for *Legionella* bacteria. Additionally, if cultures were positive, the isolate would be submitted to CDC for genetic comparison with any positive environmental isolates.

Case-finding

To enhance case-finding, on January 18, 2012 the SNHD posted on CDC's EPI-X a request to other state and local health departments to report to the SNHD cases of legionellosis with a travel history to Las Vegas in 2011.

RESULTS:

Environmental

Survey Results:

The screening of the spa found that the pH levels of the water were above the regulatory standard and the bromine and total alkalinity were within regulatory standards. A Luxor representative submitted their water management program on January 19, 2012. After review and additional discussion, Luxor submitted a revised plan on January 23, 2012.

Laboratory Results:

On January 17, two of the preliminary results of the environmental samples taken by the SNHD on January 11, 2012 were received from NALCO. These results documented the possible presence of *Legionella* sp. in the water system. Final results were received on January 23, 2012. The same two results that were preliminarily positive were confirmed as positive. NALCO shipped the isolates to CDC per SNHD instruction. CDC was advised of the positive results and the pending shipment.

Third Party Laboratory Testing Results:

Final Phigenics laboratory test results are pending.

Epidemiological

All three cases were laboratory confirmed by urine antigen testing. A sputum sample from the deceased case was culture-positive for *Legionella*. The isolate from this specimen as well as a fixed lung tissue sample were sent to CDC for further testing and genetic comparison to environmental isolates.

Case Finding Results:

As of January 24, 2012, no additional cases have been identified.

Case Definition:

Confirmed Case:

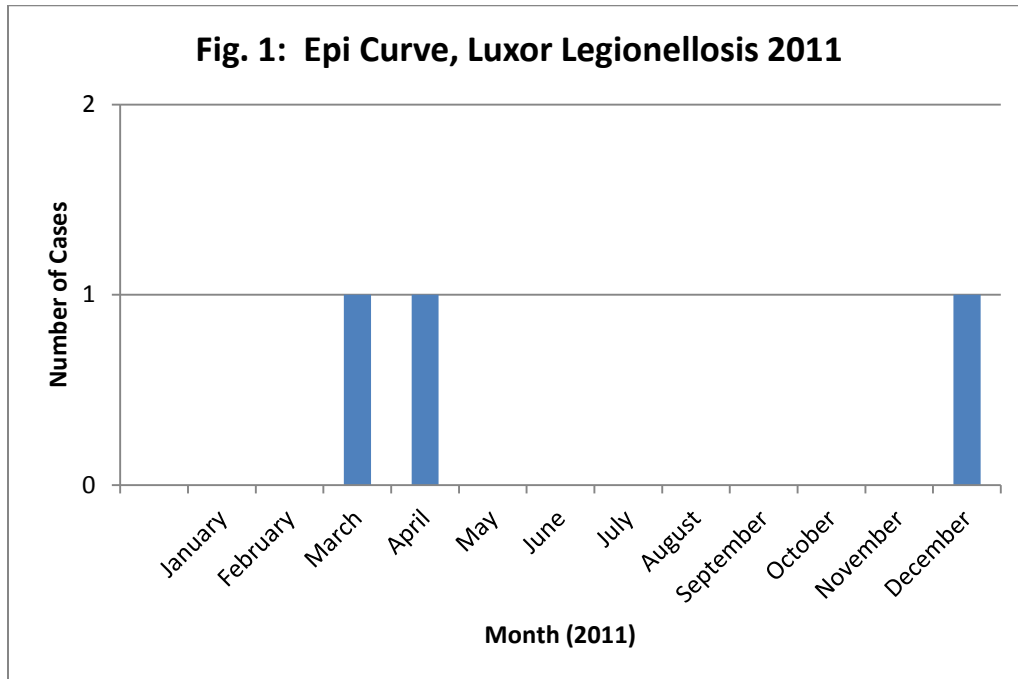
A person who stayed overnight at the Luxor and became ill between two days after arriving and fourteen days after leaving, had positive laboratory testing for *Legionella pneumophila* serogroup 1, including isolation (by culture) of any *Legionella* organism (from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid), by detection of *L. pneumophila* serogroup 1 antigen in urine using validated reagents, or by seroconversion (fourfold or greater rise in specific serum antibody), and met one of the following clinical criteria:

- Received care (as an inpatient or outpatient) for one or more symptoms consistent with pneumonia (fever equal or greater than 101° F, chills, cough, fatigue or weakness) OR
- Received antimicrobial treatment that is effective against *Legionella* and another pneumonia causing organism was not isolated such as *S. pneumoniae* OR

- Had radiographically-confirmed pneumonia.

If any criteria for the definition are unknown (e.g., receipt of antibiotics) and the case otherwise meets the definition, assume that the missing criteria exists for investigation purposes.

The epidemic curve is shown in Figure 1 below:



DISCUSSION and RECOMMENDATIONS:

The initial plan submitted by Luxor was not adequate for control of the *Legionella* in their water system. First and foremost, the plan focused on a single room where the positive test occurred. This proposal required that the fixture where the positive test result was found would be replaced and the system is flushed only at that point. Additionally, while the chlorine residual in the plan is at the recommended level per the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) guidelines, it is only held for one hour and all the fixtures on the riser were not flushed. The guidelines require a two hour minimum not to exceed 24 hours, to be followed by a through flushing of the system. The temperature Luxor is proposing to raise their hot water to (130° F) is well below the 160-170 ° F that is recommended for a hot water decontamination of hot water system.

Further discussions with Luxor representatives resulted in the submission of a more aggressive plan. Based on the positive environmental culture results at the Luxor and associated LD cases, this new plan should be executed as soon as possible.

SNHD will continue surveillance for any new cases as well as oversee the remediation and additional environmental testing progress at the Luxor once it starts.