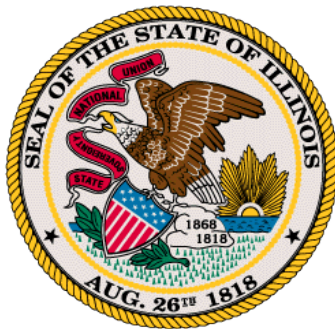


Legionnaires' Disease Response And Remediation At The Illinois Veterans' Home At Quincy



April 6, 2018

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Executive Summary

In August 2015, the Illinois Veterans' Home at Quincy (IVHQ) experienced an unprecedented outbreak of Legionnaires' disease. The outbreak led to a coordinated local, state, and federal response that applied the best scientific practices to reduce the sharp rise in cases. Since August 2015, the Adams County Health Department (ACHD), the Illinois Department of Veterans' Affairs (IDVA), the Illinois Department of Public Health (IDPH), the Governor's Office (GO), and the Centers for Disease Control and Prevention (CDC) have worked to determine the source of the outbreak, improve the water quality at IVHQ, and prevent further exposures. The quick, coordinated, and comprehensive response to this outbreak has, according to the CDC, reduced the number of Legionnaires' cases and the amount of *Legionella* bacteria at IVHQ.

The tragic illnesses and deaths at IVHQ spurred a continuous quality improvement plan, still in place, to eliminate *Legionella* risk at IVHQ. ***Since August 2015, local, state, and federal agencies have dedicated themselves to protecting the health and safety of Illinois' veterans.*** Pursuant to H.R. 0726, this report chronicles the initial response, as well as the subsequent remediation efforts that dramatically reduced *Legionella* bacteria levels in the IVHQ water supply. This report also describes the continuing efforts to ensure the safety of all residents and staff at IVHQ.

Across the United States, and in Illinois, Legionnaires' disease rates continue to rise. The disease presents a growing risk to susceptible individuals with compromised immune systems, respiratory issues, and other health challenges, like many IVHQ residents. The disease's common clinical presentation paired with its challenging diagnosis leaves cases underreported.

In any outbreak, the primary goal is to stop the sharp increase in cases to protect public health. Once the outbreak was identified, the State of Illinois team began implementing protective measures designed to reduce the risk of infection. Misconceptions around perceived notification delays and lack of a clear plan have led to misunderstandings around what different agencies do, how that work is accomplished, and most importantly, how best to move forward. To correct those inaccuracies, this report provides a transparent account of the response to the outbreak and the steps going forward. ***In August 2015, state and local agencies applied CDC-approved scientific interventions that reduced the risk to the residents.*** If Illinois had not taken the quick, coordinated approach that it did in 2015, the number of cases would most likely have been much higher.

Upon notification of a second confirmed case, IDPH implemented its response plan and provided initial guidance to IVHQ within 27 minutes. IDPH continued to execute this plan over the subsequent weeks with the following prevention and mitigation steps:

- Work with IVHQ to provide clinical, environmental, and epidemiological recommendations to:
 - Increase active clinical surveillance of cases and potential cases

- Discontinue operation of water systems that aerosolize *Legionella*
- Install point-of-use mitigation systems
- Determine who is at risk, from where are they at risk, and how to protect them
- Conduct water and environmental sampling and risk assessment of infrastructure
- Conduct regular meetings with CDC and other federal, state, and local partners

Following notification from IDPH, IVHQ implemented its own response to the cases, including:

- Educating and informing staff within fewer than 15 hours of IDPH notification
- Informing residents of a respiratory illness spreading throughout the campus within fewer than 15 hours of IDPH notification
- Informing powers of attorney—often a family member—of any health status changes within three hours of symptom presentation and informing them about Legionnaires’ disease upon notification of a positive test result
- Implementing IDPH/CDC scientific recommendations

Through an intensive investigation following the initial outbreak, and as documented by CDC in its three comprehensive trip reports, federal, state and local officials have, in retrospect, identified risks and vulnerabilities that were not known in 2015 when the *Legionella* cases were originally identified. To address these findings, since 2015, IDVA has invested \$6.4 million in building a water treatment facility. IVHQ has implemented all three expert-recommended approaches to water remediation: heat treatment, chemical treatment, and water filtration. IVHQ also installed Pall filters on every shower, tub, sprayer, icemaker, drinking fountain, and, most recently, sink faucet across the campus to block *Legionella* bacteria. IDPH has requested CDC’s on-site expertise four times and, together, the two public health agencies have provided specific scientific recommendations to address the risk of *Legionella*.

With recent cases at IVHQ, IDVA, IDPH and CDC all remain committed to reducing illness and preventing death from *Legionella*. Our work with the Illinois General Assembly to secure appropriations, with the U.S. Congressional delegation to obtain federal funding, and with local, state, and federal partners to implement prevention, mitigation, and remediation efforts all continues. A draft report with recommendations was submitted to members of the Water Management Task Force and the Infrastructure Investment Task Force on March 31, 2018 for review, with a final plan to be submitted on May 1, 2018. Any and every option remains on the table to serve Illinois’ veterans.

As the CDC notes, “Efforts by IDPH and IVHQ to control Legionella resulted in substantially fewer Legionnaires’ disease cases” since 2015.¹ IVHQ, IDVA, and IDPH, are committed, as always, to protecting the health and safety of all IVHQ residents and staff.

¹ Centers for Disease Control and Prevention. (2018). “Illinois Veterans Home *Legionella* Investigation — Quincy, Illinois, 2017.” Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 11.

I. Statements in HR 0726 Require Correction and Clarification

The language and assertions included in H.R. 0726 require clarification and correction for the record.

Page 1; Lines 15-17: WHEREAS, The first confirmed case of Legionnaires' disease was found at the Illinois Veteran's Home at Quincy on July 24, 2015.

The first laboratory-confirmed case was not found on July 24, 2015. In retrospect, we now know that July 24, 2015, is the date on which the first laboratory-confirmed case began exhibiting symptoms of Legionnaires' disease and was provided treatment. The hospital collected the specimen from this resident on July 29, 2015, and laboratory results were completed on August 3, 2015. On August 4, 2015, the hospital informed ACHD, which, in turn, notified IVHQ on August 6, 2015.

A single case of Legionnaires' disease does not constitute an outbreak, but does warrant an investigation. ACHD began such an investigation and traced the case's whereabouts during the incubation period. Because the resident had left IVHQ to visit the doctor, eat at restaurants, and take walks, ACHD could not determine whether the resident acquired the infection at IVHQ.

Page 2; Lines 9 and 16 and Page 3; Line 1

The resolution mentions three people: Melvin Tucker, Gerald Kuhn, and Dolores French. While their deaths are tragic, the description in the resolution, based on pending litigation, is not complete and does not include the factual history of each case, in its entirety. Because of the State's obligation to protect patient privacy under the federal Health Insurance Portability and Accountability Act (HIPAA), the State is not able to disclose the medical and treatment history of these residents that would provide the needed clarification.

Page 3; Lines 21-23 whether they should have publicized the outbreak earlier in order to afford families the best chance to help their loved ones.

In suspected health care facility outbreaks, the responsibility of public health authorities is to notify the facility. In this case, such notification was made 27 minutes after IDPH was notified of a second confirmed case. It is the facility that can put into place remediation measures that keep residents safe, with IDPH's guidance. Here, IVHQ instituted remediation measures, such as restricting exposure to aerosolized water, that ultimately prevented further Legionnaires' disease cases.

In addition, according to the CDC, "There is no vaccine for legionellosis, and antibiotic prophylaxis is not effective."² ***Thus, the only scientifically known way to prevent***

² Kutty, P.K. and Garrison, L.E. (2017, May 31). Legionellosis (Legionnaires' Disease & Pontiac Fever) Retrieved from <https://wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/legionellosis-legionnaires-disease-pontiac-fever>

additional cases among those who had not already been exposed was to implement the various measures that IDPH recommended. IVHQ did so immediately. Unfortunately, even if the full picture of the outbreak had been known after confirmation of the second case, because of the lengthy incubation period of the disease (up to 12 days), moving residents who had already been exposed would not have prevented them from developing the infection. Simply stated, the majority of the residents that contracted Legionnaire's disease in mid-August 2015 were exposed to the bacteria days before the outbreak was known.

Page 4, Lines 3-4 stating that the administration has not made this a top priority.

This administration has made the response to the 2015 Legionnaires' disease outbreak and subsequent remediation and mitigation efforts one of its highest priorities. Upon notification of the initial cases in 2015, the administration, IDPH, IDVA, and IVHQ responded immediately, provided proper notifications to staff, residents, and families, and initiated remediation measures to keep staff and residents safe. These remediation measures continue, as outlined in this report.

Twelve of the thirteen deaths from Legionnaires' disease since 2015 occurred in the initial outbreak in the fall of 2015. Since the initial outbreak, one resident associated with Legionnaires' disease has died. This administration takes the care and safety of our veterans and residents extremely seriously, and has pursued every necessary action to keep them safe and well-cared for.

II. IVHQ Background

In 1885, the 34th Illinois General Assembly passed legislation to establish a soldiers' and sailors' home for disabled Illinois veterans of the Mexican and Civil Wars. On June 1, 1886, Governor Richard Oglesby decided on Quincy as the site of the new home and on October 19, 1886, the Illinois Soldiers' and Sailors' Home was formally dedicated. In June 1973, the name was formally changed to the "Illinois Veterans' Home at Quincy." IVHQ is the largest and oldest veterans' home of the four in Illinois and one of the larger and older veterans' homes in the country. Today, nearly 400 veterans and spouses call the facility home. Four full-time physicians and more than 330 Registered Nurses, Licensed Practical Nurses, and Certified Nursing Assistants provide 24-hour a day, seven-day a week medical and skilled nursing care to residents.

III. Clinical Background On Legionnaires' Disease

Legionnaires' disease is caused by a bacterium called *Legionella*. It is named after a 1976 outbreak, during which some people who went to a Philadelphia convention of the American Legion suffered from a new type of pneumonia (lung infection) that became known as Legionnaires' disease. A milder infection, also caused by *Legionella*, is called Pontiac fever. The term "legionellosis" may be used to refer to either Legionnaires' disease or Pontiac fever.

A. Reported Cases of Legionnaires' Disease Are On The Rise

According to CDC, illnesses caused by *Legionella* are on the rise. About 6,000 cases of Legionnaires' disease were reported in the United States in 2015, an increase of nearly 1,000 cases compared to 2014. Since 2000, there has been a 350 percent increase in the number of reported cases in the United States.

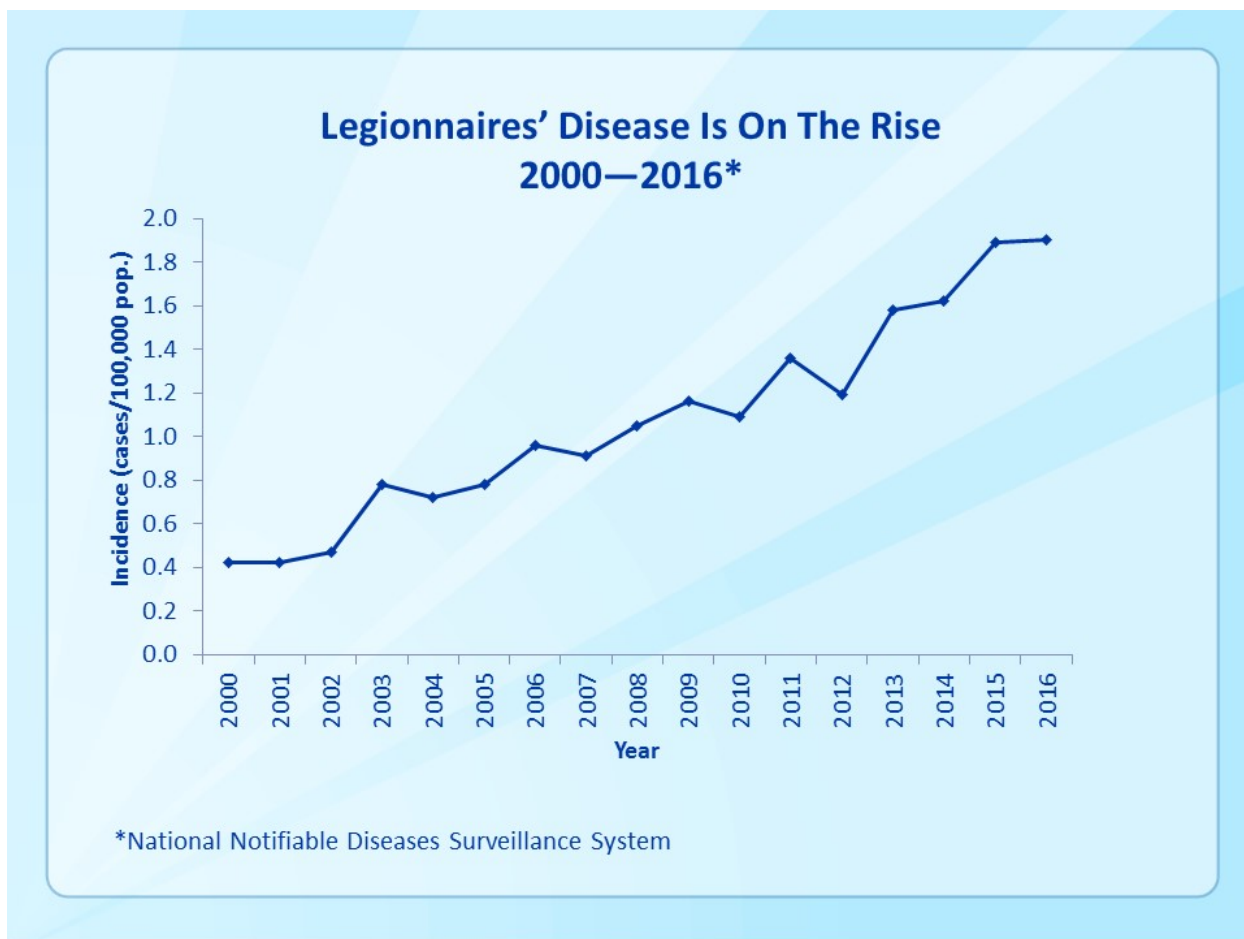


Figure 1: Incidence of Legionnaires' Disease in the U.S. Increasing Since 2000
(Source: Centers for Disease Control and Prevention <https://www.cdc.gov/legionella/qa-media.html>)

In Illinois, there were 318 cases reported in 2016—a 100 percent increase since 2010. Because Legionnaires' disease is likely under diagnosed, this number may underestimate the true number of cases each year. It is unknown whether the increase in reported cases represents a true rise in the actual number of cases, the result of better diagnostic methods, or increased awareness and testing. The more that health care providers become familiar with *Legionella*-related illnesses, the more likely they are to diagnose Legionnaires' disease.

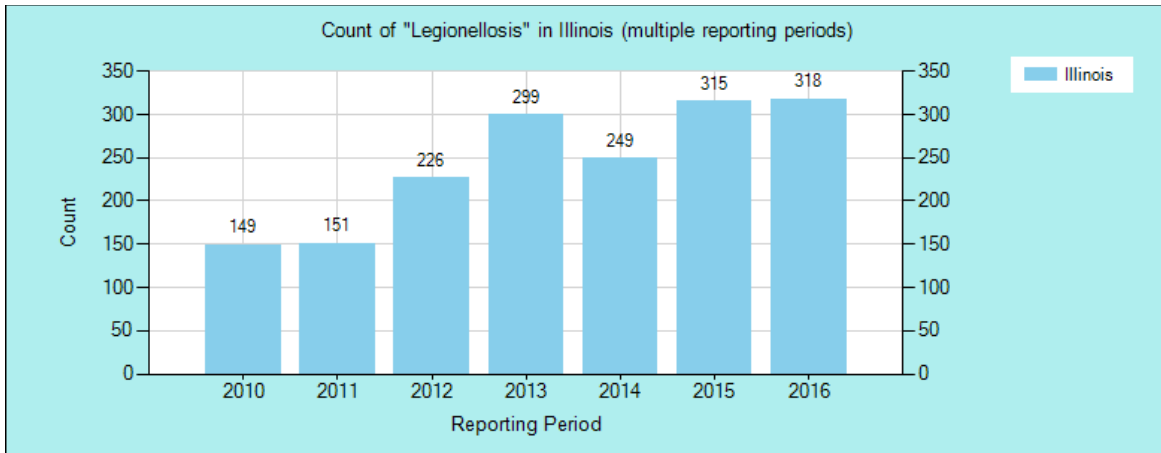


Figure 2: Cases of Legionnaires' Disease Increasing in Illinois
(Source: IDPH Data)

B. People At Increased Risk

Most healthy people exposed to *Legionella* do not become ill. People at increased risk of getting sick are:

- People 50 years or older
- Current or former smokers
- People with a chronic lung disease (like chronic obstructive pulmonary disease or emphysema)
- People with weak immune systems or who take drugs that weaken the immune system (like after a transplant operation or chemotherapy)
- People with cancer
- People with underlying illnesses such as diabetes, kidney failure, or liver failure

These factors are present in many of the residents of IVHQ. In the 2015 outbreak at IVHQ, the average age of residents with Legionnaires' disease was 85. Of those affected, 49 percent were current or former smokers, and 37 percent had chronic lung disease.

The average age at time of admission is approximately 80 years of age. On average, a resident resides at IVHQ for 3.5 years. 90 percent of admissions are due to a decline in health. IVHQ is where veterans and their families choose to come, because of the community, the facility, and the wonderful care they are provided.

Clusters of individuals with increased susceptibility complicate finding the source of an outbreak. In a community-wide outbreak, IVHQ residents would be more predisposed toward illnesses than the general population.

C. Signs and Symptoms Are Similar to Other Respiratory Diseases

Legionnaires' disease is a type of pneumonia with symptoms that include:

- Cough
- Shortness of breath
- Fever
- Muscle aches
- Headaches

The signs and symptoms of Legionnaires' disease are similar to those of other respiratory diseases, such as community-acquired pneumonia and influenza. This commonality can delay the diagnosis. Symptoms can appear up to 12 days after being exposed to the bacteria.

IVHQ patients presented symptoms consistent with all other pneumonias, which required a clinical discussion over the cause. Clinicians held differing diagnoses of the causative bacteria. Upon reviewing case chest X-rays, a Blessing Hospital pulmonologist confirmed signs of congestion, but saw no patterns indicating *Legionella* infection. In addition, a Blessing Hospital pathologist raised the possibility of other causative agents for the residents' respiratory illness. This highlights the challenge of diagnosing *Legionella* infections given their common clinical symptoms. It also demonstrates why clinicians rely on broad-spectrum antibiotics at the outset to treat all pneumonias.³

D. Diagnosis of Legionnaires' Disease Should Use Rapid Urine Antigen Testing

The diagnosis of Legionnaires' disease remains a clinical challenge. There is no one clinical sign or symptom that uniquely distinguishes Legionnaires' disease from other, more common causes of pneumonia. The similar symptoms between Legionnaires' disease and other pneumonias or respiratory infections can delay the determination that Legionnaires' disease testing is necessary. Thus, the clinician must have an index of suspicion for Legionnaires' disease, and order a specific test to make a confirmed diagnosis. Nationwide, in most cases testing for Legionnaires is not done when pneumonia is diagnosed. ***Despite the diagnostic challenge, most cases of Legionnaires' disease will nevertheless be appropriately treated with broad-spectrum antibiotics at the time their pneumonia is diagnosed.*** This is because the same antibiotics that treat Legionnaires' disease also treat other common causes of pneumonia.

When testing for Legionnaires is done, results should be returned quickly. As the CDC noted in its 2015 report, "The lack of on-site rapid *Legionella* urinary antigen testing with local clinical care providers delayed the identification of confirmed cases for exposure assessment. Additionally, there is evidence that limited access to timely testing may

³ Discussed further in Section E: Treatment

limit case detection, which may have slowed early identification of this outbreak and limited the validity of baseline Legionnaires' disease in the community."⁴ According to longstanding best practices, CDC recommends "local capacity to conduct UAT to improve turnaround time to under 48 hours."⁵ Thus, CDC recommended, "local hospitals build capacity for onsite UAT (rapid antigen detection test) and culturing *Legionella* from lower respiratory specimens."⁶

Blessing Hospital began working to bring UAT testing online. Rapid onsite testing—as opposed to testing at distant laboratories—is preferred, both to facilitate appropriate patient care as well as allow for early identification of outbreaks. Blessing Hospital went online with its local UAT capacity in early 2018. In addition, IDPH identified a need for excess statewide UAT capacity in the event of a widespread outbreak. Accordingly, the IDPH Springfield laboratory went online with UAT capabilities in February 2018.

E. Treatment of Legionnaires' Disease Is Similar to Other Pneumonias

Legionnaires' disease can be treated successfully in most cases. When a patient displays the symptoms of pneumonia, there are two major classes of antibiotics—fluoroquinolones and macrolides—that can treat most pneumonias, including Legionnaires' disease, regardless of the underlying causative bacteria. Based on a variety of considerations, the clinical provider determines which antibiotic(s) is appropriate to initiate.

At IVHQ and Blessing Hospital, even while clinicians worked to identify the bacteria causing residents' pneumonias, appropriate antibiotic treatment was provided to patients who accepted it. Thus, there was no delay in treatment for patients (other than those who may have declined) while test results were coming back.

F. The Bacteria That Causes Legionnaires' Disease Is Ubiquitous

Legionella bacteria are found naturally in freshwater environments, like lakes, rivers, and streams. According to the World Health Organization, "*Legionella* is ubiquitous in the natural environment, especially in damp soil and water."⁷ *Legionella* can become a health concern when it grows in human-made water systems and spreads through:

- Showers and faucets
- Cooling towers (air-conditioning units for large buildings)

⁴ Centers for Disease Control and Prevention. (2015). "Epi-Aid 2015-037 Trip Report: 'Undetermined source of an healthcare-associated outbreak of Legionnaire's disease — Illinois, 2015.'" Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 24.

⁵ In 2015, Blessing Hospital sent UAT specimens to an outside laboratory, which took 4-5 days to return a result.

⁶ Centers for Disease Control and Prevention. (2015). "Epi-Aid 2015-037 Trip Report: 'Undetermined source of an healthcare-associated outbreak of Legionnaire's disease — Illinois, 2015.'" Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 11.

⁷ Sakamoto, R. (2015, March 27). Legionnaire's disease, weather and climate. Retrieved from <http://www.who.int/bulletin/volumes/93/6/14-142299/en/>

- Hot tubs that aren't drained after each use
- Decorative fountains and water features
- Hot water tanks and heaters
- Large plumbing systems

G. Legionella Spreads Through Water Systems, Which Makes City-Wide Outbreaks Possible

After *Legionella* grows and multiplies in a building water system, contaminated water then has to spread in droplets small enough for people to inhale. People most commonly acquire Legionnaires' disease when they breathe in small droplets of water in the air that contain the bacteria.

In general, people do not spread Legionnaires' disease (or Pontiac fever) to other people. This fact adds to the complexities of an investigation. Determining the source is difficult when cases have common, community-level exposures, such as being within the radius of a municipal cooling tower or having visited the same locations in a small town. This was seen with some of the early cases in 2015. In fact, there were two cases in August 2015 from Adams County that had no contact with IVHQ. In addition, the early cases at IVHQ had several exposures outside of the facility. The reporting of community cases along with IVHQ residents who had travelled across the city of Quincy complicated identification of the source of the outbreak. Investigators from Adams County and IDPH interviewed each patient, developed a comprehensive travel history for the two weeks preceding the onset of symptoms, and then looked across those various findings for common locations that all the cases visited. Thus, public health's outbreak response simultaneously provided the facility guidance on mitigation strategies while investigating the possibility of a community-level source.

IV. Baseline Epidemiology At IVHQ

In assessing any outbreak, comparisons to the baseline level of disease are the first step toward understanding the situation. Prior to 2015, IVHQ residents experienced seasonal peaks (although not above the national average) in pneumonia rates.⁸ As displayed in Figure 3, there were notable pneumonia spikes in 2006 and 2008. There is no evidence that testing for Legionnaires' disease was done during the pneumonia spikes in 2006 or 2008. Because the symptoms of different pneumonias are largely identical, regardless of cause, and Legionnaires' disease is under diagnosed, there is a possibility that some prior "pneumonia" cases were actually Legionnaires' disease cases. And because providers in the past may not have tested specifically for Legionnaires' disease, arriving at a baseline rate of disease is challenging. Once a patient is treated with antibiotics, symptoms typically diminish, negating the need for further testing. This resolution of clinical symptoms and lack of historical testing further complicates efforts to determine the baseline rate of Legionnaires' disease at IVHQ.

⁸ According to IDPH data, there were two cases of Legionnaires' disease Adams County from 2010-2014.

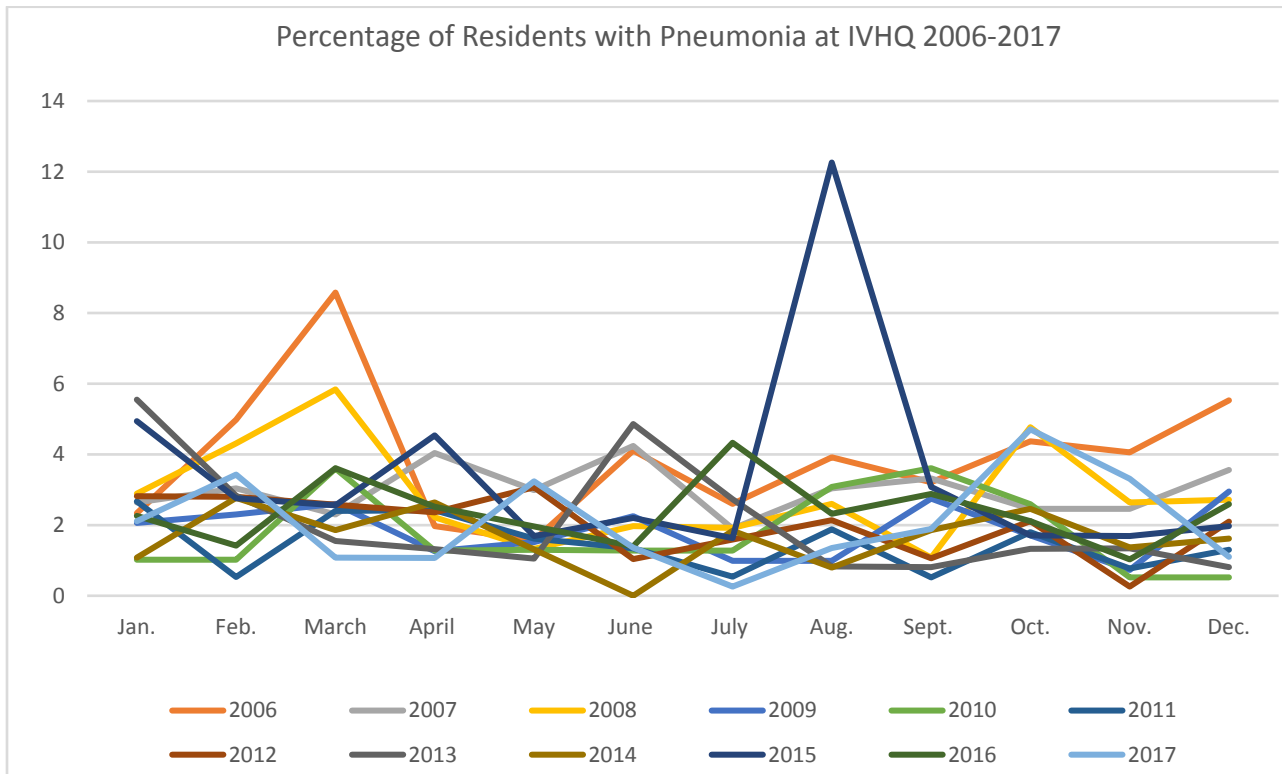


Figure 3: Pneumonia rates among IVHQ residents between 2006-2011. Seasonal fluctuations are common and notable spikes in illness can be seen in 2006 and 2008, as well as 2015. IVHQ reported below-average rates of pneumonia (which may have included undiagnosed Legionnaires' disease cases) prior to 2015. (Source: IDPH Data)

V. The Response To The Outbreak Followed CDC's Best Practices And Reduced The Spread Of Disease

The goal of outbreak response is to stop a sharp rise in case counts and protect public health. On August 21, 2015, IDPH was notified of a second confirmed case of Legionnaires' disease associated with IVHQ. IDPH immediately notified IVHQ and, in conjunction with ACHD, provided guidance on mitigation steps that would reduce the risk of further disease transmission to residents who had not already been exposed to *Legionella* bacteria.⁹ In doing so, IDPH followed a CDC-approved outbreak response plan that focuses on three areas: epidemiological assessment, environmental health testing, and clinical/infection control strategies. IVHQ implemented IDPH and CDC's guidance. The quick, coordinated, and comprehensive response to this tragic outbreak reduced the spread of disease and stopped the rise in cases.

⁹ Unfortunately, there are no known scientifically proven measures that could have protected residents who had been exposed to *Legionella* bacteria in the preceding twelve days.

A. The Immediate Response Put Into Place Measures That Protected Patients From Further Risk

In any outbreak response, there are three fundamental questions that must be addressed:

- Who is at risk?
- From where are they getting infected?
- What can at-risk individuals do to prevent further cases?

These three questions frame the pillars for a public health agency's role in an outbreak situation:

- **Epidemiological Assessment** – identifying similarities and common sources of exposure to determine *who is at risk*
- **Environmental Health Testing** – determining the source of the outbreak to determine *from where affected patients are getting infected*
- **Clinical and Infection Control** – providing recommendations to increase screenings and implement controls to *prevent further cases in at-risk individuals*

In suspected healthcare facility outbreaks, the first priority of a public health agency is to provide recommendations to the facility, since it is the facility that can put into place measures to keep residents safe. Within 27 minutes of receiving confirmation of the second case of Legionnaires' disease at IVHQ, IDPH staff coordinated a conference call with IVHQ and IDVA staff and representatives from ACHD to discuss the two cases and provide recommendations. These recommendations addressed any immediate risk at IVHQ while IDPH and ACHD staff continued their investigation. IDPH recommended that IVHQ:

- Turn off the outdoor fountains
- Keep windows closed
- Use bathing facilities other than the one the two cases used
- Ensure appropriate disinfectant in the cooling tower and water chiller units
- Provide cooling tower maintenance log to IDPH EH specialists
- Conduct prospective surveillance for other respiratory illnesses
- Begin conducting vital screenings at four-hour intervals for skilled nursing care residents

IDVA accordingly took the following actions on August 21st, 2015:

- Turned off all fountains on grounds
- Notified staff to close all windows and keep them closed
- Removed aerators from sink faucets in residents' rooms
- Checked Whirlpool tubs for bubbling features – none detected
- Suspended the use of tubs in the West/Elmore II bathing room
- Suspended the use of ice machines in the Elmore building
- Inspected the disinfectant levels in the cooling tower and water chiller units
- Began checking for signs and symptoms of respiratory illness and checked vitals of every skilled care resident every four hours beginning August 22, 2015

B. The Epidemiological Response Is Designed To Find Common Sources Of Exposure Among Cases

The epidemiological response is designed to identify similarities among cases and find common sources of exposure. Epidemiologists begin by thoroughly investigating the case(s) to determine all potential exposures during the case's incubation period. This includes identifying everywhere an individual visited, worshipped, ate, drank, and socialized. Most people would find it difficult to chronicle the last 24 hours of their lives with the necessary specificity to track exposure, let alone the last two weeks. Given that elderly individuals may have limited recall, the disease detectives faced significant challenges.

These findings guide the environmental assessment, as they determine possible sources and areas for testing, such as where a person showered. Epidemiologists also conduct retrospective surveillance of the past several months of medical data to determine if there were prior individuals who became ill that were not identified as being part of the outbreak. Simultaneously, scientists begin intensive prospective surveillance for additional health care associated infections.

Given the lengthy incubation period of *Legionella*, it is difficult to collect case histories and isolate a source of infection.¹⁰ The population that most often demonstrates symptoms has underlying health issues, particularly respiratory health issues, like many of the residents who became ill at IVHQ.

At the same time cases began to be reported at IVHQ, Adams County began seeing cases in the broader community.¹¹ Because of these community cases in Quincy during this time, IDPH could not determine immediately whether the source of the outbreak was at IVHQ or elsewhere in the community. The multiple exposure points and wide geographical area with cases reported meant that investigators had to consider several different sources. Over the weekend following the second confirmed case, IDPH worked to determine case histories for the affected patients and conducted environmental testing to try to identify the source(s) of infection.

After the investigation, the community cases were determined to be point source cases unrelated to those cases at IVHQ. At this time, IDPH determined the outbreak was centered around IVHQ. Thus, there was not thought to be a generalized risk to the public. Once this determination was made efforts could be solely directed at IVHQ.

¹⁰ Case history collection entails asking a suspect case to list every location they have visited in the two weeks prior to symptom onset. This is obviously very challenging to recall, especially for ill individuals. Once travel histories for all cases have been assembled, epidemiologists must review all the locations to look for common sites, which could suggest the source of infection in an outbreak.

¹¹ A total of five community cases were eventually reported.

Epidemiological response is also focused on determining precisely when an outbreak began, peaked, and subsided. According to CDC, “the Legionnaires’ disease outbreak curve indicated a likely point-source outbreak with a peak on August 23-24, which had largely resolved by August 31.”¹² This means that the remediation efforts recommended by IDPH and implemented by IDVA within the first two weeks significantly reduced further infections, as demonstrated by the CDC’s chart, shown in Figure 4.

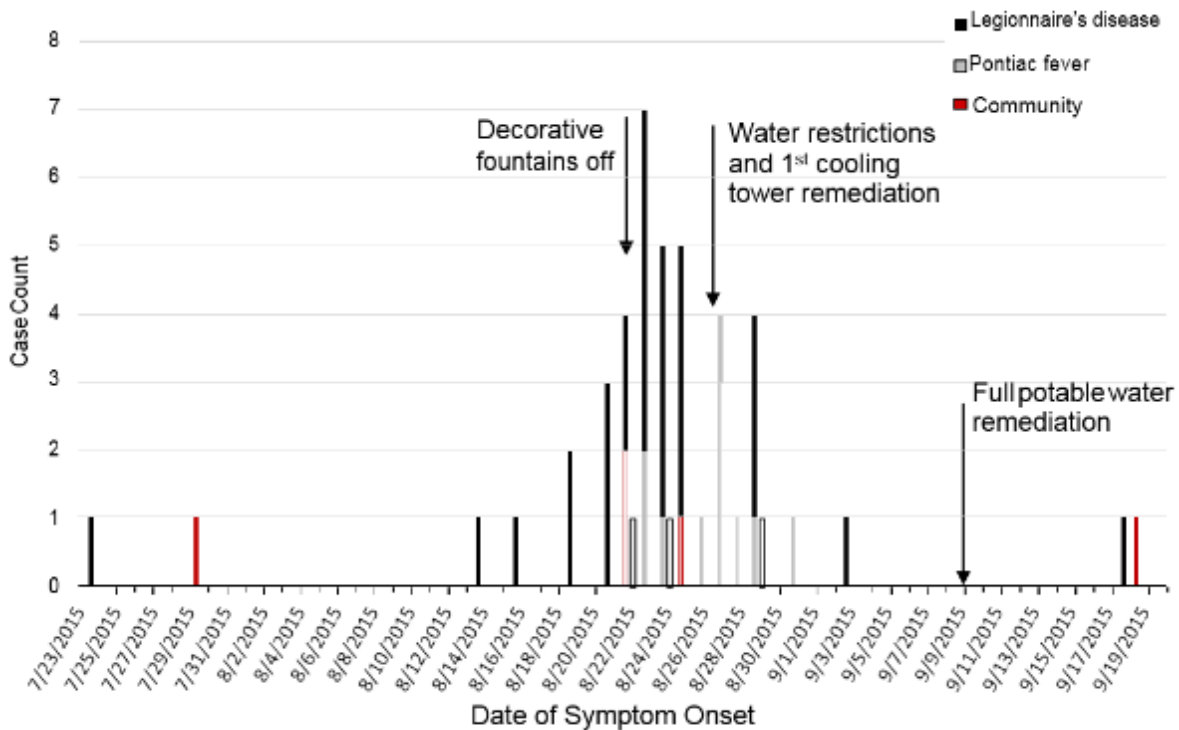


Figure 4 Epi-curve of confirmed Legionnaires’ disease Pontiac fever cases by date of symptom onset with select dates of interventions shown – Illinois Veterans Home, Quincy, Illinois – 2015

* Community cases are confirmed Legionnaires’ disease case-patients with no exposure to the IVH facility or surrounding area. (Source: CDC Trip Report <http://dph.illinois.gov/sites/default/files/publications/cdc-trip-reportquincyl12.31.15.pdf>)

C. The Environmental Health Response Is Focused On Finding The Source Of An Outbreak

The environmental health response is focused on determining the source of the outbreak. In *Legionella* situations, environmental engineers conduct an investigation by

¹² Centers for Disease Control and Prevention. (2015). “Epi-Aid 2015-037 Trip Report: ‘Undetermined source of an healthcare-associated outbreak of Legionnaire’s disease — Illinois, 2015.’” Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 11.

collecting water samples from potential sources of aerosolized water. If a source of infection is identified, engineers provide guidance on properly decontaminating the source. Environmental health specialists also provide guidance on implementing water restrictions, as was done with IVHQ. Further, engineers continue to collect samples as interventions are put into place to determine whether bacterial levels are falling.

Legionella investigations in health care facilities are challenging, especially one with a large, aging, and complex plumbing system such as that at IVHQ. Starting on August 21, 2015, IDPH's Division of Environmental Health (EH) and ACHD completed a series of environmental assessments to identify *Legionella* exposure sites and to implement initial risk mitigation strategies.¹³ These tasks entailed a review of water system operation and maintenance records, sampling protocols and results, water emergency plans, and discussion with staff about training and experience with *Legionella* prevention and control. Given that IVHQ is a multi-building campus, the environmental health assessment was especially complex. Specific areas assessed included resident care areas, resident bathing areas, facility common areas, decorative fountains, and the hot and cold-water infrastructure.

Evaluating, testing, and treating all potential sources requires time and coordination. Given the complexities of *Legionella* investigations, IDPH worked with CDC and invited CDC representatives to visit IVHQ to provide technical assistance and conduct additional testing. Having recently assisted New York City on its *Legionella* response, CDC initially suspected the IVHQ cooling tower as the primary source of the outbreak. However, IDPH staff felt that the hot water tanks might have also contributed to disease spread. Through the EH investigation, it was determined that the high levels of bromine, a disinfecting substance, found in the cooling towers would not support *Legionella* growth. Therefore, the cooling towers were likely not the source. IDPH began campus-wide environmental testing to search for other potential sources—the top candidate being the potable water system. Test results, which can take up to two weeks for final confirmation, would help guide analysis and determination of a potential source.

Given the case distribution throughout the campus' many buildings, with some residents visiting a number of the buildings, as well as traveling off campus, all of these locations presented a potential source of the infection. The abundance of exposure points and limited case history data prompted the EH team to assess all the likely sources of *Legionella* across the City of Quincy, not just those at IVHQ. The following direction was given by IDPH EH Engineering:

- Immediately increase cooling tower free bromine level to 10ppm, logging every four hours
- Isolate tank #2 from the hot water supply in the power house, empty tank #2 for swabbing 8/27/15
- Desist using tap water for any resident care or service
- Order bottled or packaged water for potable uses

¹³ As noted in the timeline, CDC was consulted and briefed at each step starting on August 23, 2015

- Discontinue any potable water use involving point-of-use fixtures where aerosols are likely

IDVA accordingly took the following actions:

- Shut the cooling towers down to clean and disinfect them – increasing bromine levels to 10ppm, but returned them to operation to prevent building evacuation on August 28, 2015. (*These towers provide air conditioning to the buildings and IVHQ is required to maintain air conditioning in residential buildings*).
- IVHQ began keeping a daily log of tower disinfection on August 26, 2015 and that protocol continues in cooling season to this day.
- IVHQ isolated tank #2 from the hot water supply and emptied the tank for swabbing on August 27, 2015
- The cooling tower was cleaned and disinfected again on September 8, 2015 and was shut down completely on September 30, 2015, for the season.
- Ordered a 500-ton portable cooling tower on August 26, 2015, for delivery in the next 48 hours
- Ordered bottled and packaged water for distribution site-wide on August 26, 2015
- Implemented a site-wide ban on bathing with domestic water (alternate bathing methods implemented) and ceased using tap water for resident care or service on August 26, 2015
- Implemented emergency purchasing action to onboard a consulting firm to assist with mitigation (Phigenics) on August 26, 2015
- Emptied the main entrance fountain on August 26, 2015

D. The Clinical And Infection Control Response Prevents Disease Transmission

The clinical/infection control aspect of an outbreak response provides recommendations to facilities that can ultimately reduce disease transmission. These recommendations include increased patient screenings as well as additional controls against infection, where applicable. In a *Legionella* situation, the clinical recommendations focused on these areas:

- Increase vital sign checks on all patients to actively search for potential *Legionella* infections (called “active disease surveillance”)
- Maintain a high index of suspicion for the diagnosis of healthcare associated Legionnaires’ disease, especially among high-risk patients
- Perform laboratory diagnostic testing (both culture and urine antigen)
- Submit isolates to CDC for speciation¹⁴

¹⁴ Tablan, O.C., Anderson, L.J., Besser, R., Bridges, C., and Hajjeh, R. (2003). Guidelines for Preventing Health-Care--Associated Pneumonia, 2003. Retrieved from <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5303a1.htm>

CDC noted that, prior to the outbreak, “IVH ha[d] a well-established clinical infection surveillance and prevention program in place.”¹⁵ Per IDPH guidance, IVHQ increased the frequency of vital sign checks to every four hours for skilled care residents on August 22nd, in order to find pneumonia as early as possible. Further, CDC noted, “Per established IVH protocol, any resident developing symptoms consistent with a lower respiratory infection had a chest X-ray performed immediately for pneumonia diagnosis. This standard protocol was expanded to include urine and sputum sample collection for *Legionella* testing throughout the outbreak period. Residents diagnosed with pneumonia were transferred to Blessing Hospital for treatment unless they refused or treatment was contraindicated due to a standing ‘comfort care only’ order.”¹⁶

Patients who agreed to treatment did not wait for a confirmed diagnosis. Rather, according to CDC, “IVH chose to empirically treat these residents in an effort to ensure patient safety.”¹⁷ This means that patients were given an antibiotic that would appropriately treat their pneumonia, regardless of the bacteria causing it.

VI. IVHQ Residents And Employees Were Notified About Legionnaires’ Disease

A. Residents Were Notified During Enhanced Vital Sign Screenings

Upon notifying and educating the IVHQ nursing staff on *Legionella*, IVHQ staff increased clinical protocols to include taking vital signs every four hours and monitoring residents in intermediate and skilled care for signs and symptoms of pneumonia.¹⁸ During these clinical checks, residents were informed that a respiratory infection was affecting residents across the campus. IVHQ’s protocol of immediately notifying every resident’s POA whenever his or her health status changes continued during this time and continues today.

B. Employee Notification Included Education About Legionnaires’ Disease

In 2015, the recommendations and guidance IDVA gave to the IVHQ staff primarily included education regarding Legionnaires’ disease, how to provide appropriate clinical care to affected residents, and how to screen for potential new cases. This specific

¹⁵ Centers for Disease Control and Prevention. (2015). “Epi-Aid 2015-037 Trip Report: ‘Undetermined source of an healthcare-associated outbreak of Legionnaire’s disease — Illinois, 2015.’” Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 10.

¹⁶ Centers for Disease Control and Prevention. (2015). “Epi-Aid 2015-037 Trip Report: ‘Undetermined source of an healthcare-associated outbreak of Legionnaire’s disease — Illinois, 2015.’” Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 11.

¹⁷ Centers for Disease Control and Prevention. (2015). “Epi-Aid 2015-037 Trip Report: ‘Undetermined source of an healthcare-associated outbreak of Legionnaire’s disease — Illinois, 2015.’” Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 10-11.

¹⁸ Beginning on August 28, 2015, vital signs were also taken every four hours for residents of the independent living facilities.

education was important because, as CDC has noted, IVHQ already had a well-established clinical infection surveillance and prevention program in place.

IVHQ leadership took immediate action to inform the staff of two positive cases of Legionnaires' disease after being informed of those cases by IDPH and ACHD on August 21, 2015. On August 22, the IVHQ Infection Control Coordinator (ICC) spoke directly to the entire nursing staff in the building with the positive cases and issued an email to all direct care licensed nursing staff notifying them of the results. Additionally, the ICC provided a short educational training on Legionnaires' disease for licensed direct care staff via email. CNAs, who do not have state-issued email accounts, were informed by their supervisors at the beginning of each shift. On August 25, an email was sent to IVHQ employees, with a read-receipt notification indicating whether the email was opened and read, regarding the discovery of *Legionella* and providing information about Legionnaires' disease.

On August 26, 2015, the IVHQ Administrator conducted two mandatory all-staff meetings. These meetings provided the entire staff with training and education on Legionnaires' disease. During the meetings, IVHQ leadership distributed educational information from CDC about Legionnaires' disease. These educational handouts were also emailed to IVHQ employees and posted at the nurses' station. All employees had to sign in at the all-staff Town Hall style meetings where IVHQ leadership provided an opportunity for staff to share concerns, ask questions, and clarify further actions. In addition, all emails were sent with a read-receipt notification indicating whether the email was opened and read. Staff members without email were given educational materials and minutes from the Town Hall style meetings.

VII. Remediation Efforts Improved Water Quality And Significantly Reduced Legionnaires' Disease Cases

IDVA and IDPH remain focused on eliminating the risks of Legionnaires' disease for the veterans who live at IVHQ and staff who work there. We continue to engage fully with experts from CDC to implement and exceed its recommendations and to ensure that remediation efforts adhere to best practices.

Since 2015, IDVA has developed and implemented a formal water management plan, including a *Legionella*-specific prevention plan. At the time they were enacted, neither was required by IDPH nor the CDC. ***The CDC reported in 2016, "[IVHQ's] written water management program aligned with the best practices identified in CDC's water management toolkit.*** Control measures, control limits, and control points, were routinely identified and corrective actions consistently taken. The program included contingency responses, verification and validation procedures, routine program review, and communication procedures."¹⁹

¹⁹ Centers for Disease Control and Prevention. (2017). "Epi-Aid 2016-045 Trip Report: 'Healthcare-associated outbreak of Legionnaires' disease among veterans—Quincy, Illinois, 2016.'" Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 14.

Since the water management plan has been implemented, **CDC found that the “significant remediation efforts undertaken by [IVHQ] have substantially reduced the presence of Legionella in the potable water system.”**²⁰ Based on observations during the Epi-Aid investigation, the water management program was fully implemented, followed, and continuously reviewed by the water management team to optimize the water systems.”²¹

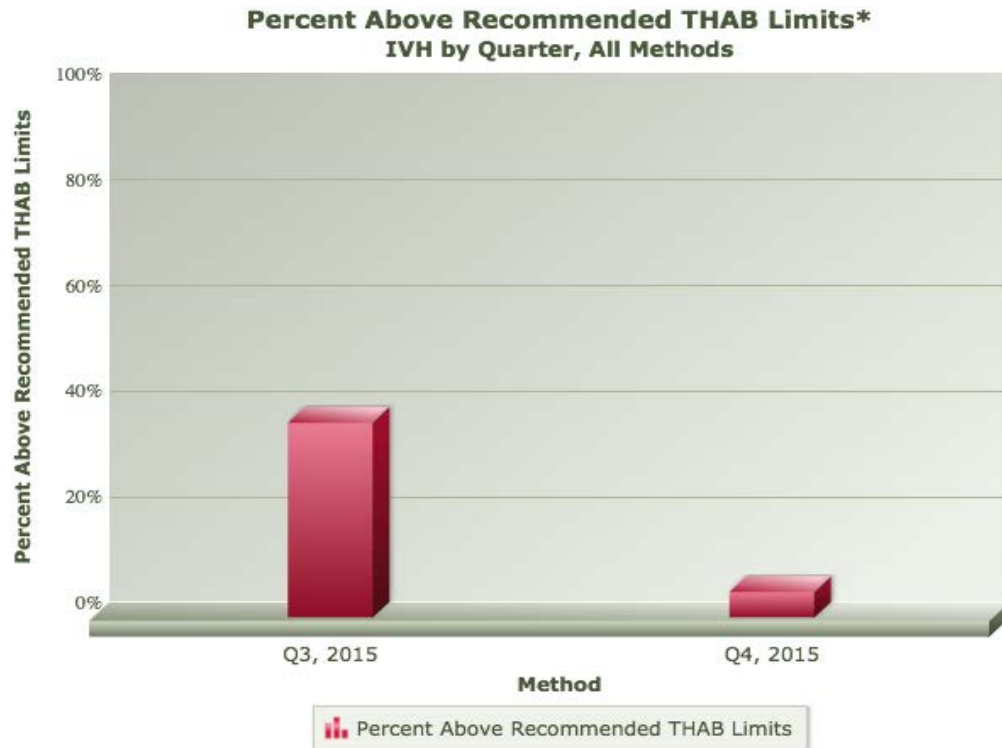


Figure 5: Fall in Legionella bacteria levels at IVHQ following initial 2015 remediation efforts (Source: Phigenics Test Results)

As CDC stated in its 2018 report, “Recognizing the persistence of this strain [of Legionella] within IVHQ and the probability that some level of Legionella colonization may continue, our recommendations are focused on minimizing the risk of exposure among residents, staff and visitors. While adoption of these recommendations should further reduce risk, the possibility of future cases of disease associated with IVHQ cannot be eliminated.”²²

²⁰ See Figure 5.

²¹ Centers for Disease Control and Prevention. (2017). “Epi-Aid 2016-045 Trip Report: ‘Healthcare-associated outbreak of Legionnaires’ disease among veterans—Quincy, Illinois, 2016.” Retrieved from, 15.

²² Centers for Disease Control and Prevention. (2018). “Illinois Veterans Home Legionella Investigation — Quincy, Illinois, 2017.” Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 11.

A. Remediation Steps Were Designed To Reduce Bacterial Levels And Risk of Disease

Beginning in August 2015, IDVA and IDPH enlisted the expertise of the CDC, which provided recommendations designed to reduce levels of *Legionella* bacteria quickly. The recommendations, which IDVA implemented, included:

- Taking the water tower out of service
- Building a new multimillion-dollar water treatment plant that constantly monitors and chemically treats the water
- Taking the cooling towers offline, disinfecting them, and monitoring them with proper chemical control and treatment
- Ensuring every building's plumbing entrance was equipped with a backflow prevention mechanism
- Installing more than 40 water heaters in 37 buildings, including residential buildings
- Heating water at the source to 165 degrees Fahrenheit to kill the *Legionella* bacteria, where possible
- Installing water mixing valves at every faucet to cool water
- Installing filters on every shower and sprayer
- Replacing therapy tubs with soaking tubs
- Implementing a state of the art water management program, which includes daily flushing, testing, and treatment of the water
- Installing Pall filters on every faucet on the grounds. More than 700 Pall filters have recently been fitted. These filters block the *Legionella* bacteria, preventing anyone near that faucet from exposure
- Flushing the entire system twice a day so there is no stagnant water in the pipes

B. Potable Water Improvements Have Reduced The Risk of Legionnaires' Disease

After a thorough review of IVHQ's potable water system, a team comprising IDPH, IVHQ engineering and administrative staff, Quincy's municipal water works, private *Legionella* mitigation contractors, and CDC developed a potable water remediation strategy. The goal was to increase the amount of chlorine in the water to reduce the risk of *Legionella* across the entire system. ***Post-remediation samples taken at 15 select locations throughout IVHQ on September 11, 2015 and September 24, 2015, showed no Legionella growth.***

Following the recommendations from the CDC, IDVA made numerous improvements to the potable water system on the IHVQ campus. These improvements include:

- Removal of large sections of unused piping and the water tower from the water distribution system
- Consolidation of municipal water mains to one inlet delivering all potable water to the campus
- Installation of dedicated recirculating hot water systems in each residential building and Smith Hall kitchen to significantly increase hot water temperatures
- Installation of automatic flushing stations for on-campus water mains

- Construction of an on-campus chemical treatment plant for injection of secondary disinfectant (12.5 percent sodium hypochlorite and chlorine dioxide) into the potable water under guidance of water and chemical treatment service provider
- Installation of thermostatic mixing valves at sink faucet and shower fixtures, as well as 0.2 micron point-of-use filters for the removal of *Legionella* on all showerheads and hand-held sprayers on therapy tubs (*i.e.*, Pall filters)
- Daily flushing at all terminal fixtures per the water management program

C. Improvements To The Cooling Towers Reduced The Risk Of Aerosolized Bacteria

IDVA has made significant improvements to the cooling towers' operation and maintenance. These include automating the biocide delivery system and chemical parameter monitoring, under the guidance of a water and chemical treatment contractor.

D. Significant Infrastructure Improvements To Modernize The Water System

From an infrastructure perspective, IDVA invested \$6.4 million in building a water treatment facility. All necessary funds originated under grants from the federal Clean Water Act provided by the Illinois Environmental Protection Agency. In addition to building a brand-new water treatment facility, IVHQ also implemented a robust water management plan following the guidance and recommendations of IDPH and CDC. Water quality parameters are measured and adjusted every day.

Most recommendations for water remediation suggest either thermally heating the water, chemically treating the water, or filtering the water. IVHQ pursues all three strategies simultaneously. IVHQ thermally heats the water to 165 degrees Fahrenheit to kill bacteria in the water. Chemical treatment of the water with sodium hypochlorite and chlorine dioxide prevents bacteria growth. IVHQ also initially installed Pall filters, which are specifically designed to block *Legionella* bacteria, on every single shower, tub, and sprayer across the campus. More recently, IVHQ installed Pall filters on every sink faucet across campus. In its 2016 visit, the CDC “team further observed real-time application of contingency responses to potential exposure risks at facility.”²³

All of the abovementioned actions taken to mitigate the risk of Legionnaires' disease and protect residents and staff have reduced cases at IVHQ. As the CDC notes, “Efforts by IDPH and IVHQ to control *Legionella* resulted in substantially fewer Legionnaires' disease cases in 2016 (N=5) and 2017(N=6) compared to 2015 (N=46).”²⁴

In July 2016, the Capital Development Board (CDB) commissioned BRiC to research methods to reduce the likelihood to *Legionella*'s further recurrence. Approximately one

²³ Centers for Disease Control and Prevention. (2017). “Epi-Aid 2016-045 Trip Report: ‘Healthcare-associated outbreak of Legionnaires’ disease among veterans—Quincy, Illinois, 2016.” Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 14.

²⁴ Centers for Disease Control and Prevention. (2018). “Illinois Veterans Home *Legionella* Investigation — Quincy, Illinois, 2017.” Retrieved from <http://dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/legionellosis>, 11.

month after the completion of IVHQ's water treatment plant, BRiC produced the "IVHQ Legionella Response Plan 2016, Proposed Project Elements" report, dated August 5, 2016. The report's scope encompassed 12 of the 48 buildings on IVHQ's campus. While comprehensive, the BRiC report provided several options that could be considered by IVHQ to further remediate the water. The BRiC recommendations did not take into account the \$6.4 million water treatment facility that had just been completed at IVHQ. When the 2016 BRiC report was released, the IVHQ team was testing the efficacy of the new water treatment facility. In doing so, IDVA was following the CDC recommendations and guidance as the nation's leading experts on *Legionella* bacteria.

In January of 2018, CDB asked BRiC to update its August 2016 report to focus on replacing all site and building piping. The 2018 report's scope was more expansive and included 32 buildings, which accounts in large part for the price difference from the 2016 report. Put differently, the two proposals were not estimates for identical projects.

VIII. Next Steps

The State of Illinois remains committed to improving the safety of residents and staff at IVHQ. Every option is on the table and being studied. As detailed in this report, many interventions have already been completed, such as installing new faucets and Pall filters across the entire campus – approximately 700 points of use campus wide. As a result, there have been no post-filter positive water tests for *Legionella* since completion of the latest remediation.

A. Ongoing Actions

In February 2018, four cases of Legionnaires' disease were diagnosed. These cases were detected in part because of the active disease surveillance system in place since 2015. IDPH and CDC returned to IVHQ to provide technical assistance to IDVA. Since the cases confirmed in February, IVHQ has:

- Installed more than 700 new faucets with Pall micron filters across the entire campus. These filters block bacteria, including *Legionella*, and have been proven to be 99.9 percent effective
 - Filters have already been in use on showerheads since early 2016, per CDC recommendations
 - Water tests after the filters have shown zero presence of *Legionella* since the installation was completed on March 3, 2018
 - The filters will be replaced every 30 days, or sooner as needed
- Installed Bolus systems in residential buildings and will install these systems at each building campus wide. These systems monitor disinfection levels in real time and add an additional layer of chemical treatment, if needed, when the monitors detect low chemical residual
- Begun re-sanitizing the entire HVAC system on campus

- Continued flushing procedures and water testing before and after the filters to show the effectiveness at each point-of-use

IDPH continues its weekly calls with the IVHQ and IDVA facilities staff to monitor cases for any patients with respiratory symptoms. IDPH also works with CDC and water management consultants to review ongoing environmental testing results and advise on next steps. The State continues to improve the IVHQ water management plan, and explore additional steps that will ensure the safety of the IVHQ water system. The IDPH laboratory will maintain its advanced UAT capacity, while working with hospitals to ensure accuracy of their testing and responsiveness. Finally, IDPH will provide advice, as appropriate, on the health implications of any future plans involving resident relocation.

B. Short-Term Actions

The State is also working to procure a vacant nursing home a few blocks from IVHQ, renovate it, and prepare it for occupancy while renovations and new construction takes place on the Quincy campus. In addition, experts are studying further options to determine the best courses of action for water remediation. IDVA established a Water Management Task Force to review and assess an evolved plan for remediation of water at IVHQ. The remediation plan might include new plumbing, a new water source, new flushing protocols, new technologies for testing—or all of the above. The goal is to determine the most effective and cost-efficient way to ensure the continued provision of safe water for residents and staff.

The State is also exploring the use of modular buildings on the grounds that could serve as temporary residence halls. The new facilities will ensure IDVA has a temporary housing solution in the event residents need to be moved to further protect them from *Legionella*. There is no immediate plan to transfer residents.

These options will minimize risks inherent in moving elderly residents (so called “transfer trauma”), allow residents and staff to remain in the Quincy community, maintain their connection to fellow veterans, and provide a continuity of the high-quality care provided at IVHQ.

C. Long-Term Actions

As part of the State's long-term plan, CDB is searching for a firm to provide a master plan for a new, state-of-the-art facility that will meet the needs of today's veterans. Changing demographics of the veterans who will be served by the IDVA Veterans Homes requires IDVA to adapt service delivery models. These changes are due to differences in life experiences between generations, clinical needs, and the service expectations of veterans and their families. While most of these changes will be internal to IDVA processes, some of the needed changes will require significant infrastructure investment. This project will be informed by the Illinois Veterans Homes Capital Needs Assessment Report, which will be presented to the General Assembly by May 1, 2018.

A request for qualifications for a Master Planner is posted on the procurement section of CDB's website, and submittals are under review.

Governor Rauner has also tasked IDVA to establish an Infrastructure Investment Task Force to assess the plans for the design, build, and construction requirements for projects at IVHQ—and the other Homes, as needed. This Task Force will have the opportunity to think broadly about what the future of care will look like for our Illinois veterans. The Infrastructure Investment Task Force will need to take into account the needs that veterans will have in the next 5, 10, 20 years—and beyond. A final plan will be presented to the Illinois General Assembly with a request for appropriations to implement.

The State will continue to work with the Illinois General Assembly to expedite the procurement process and reduce red tape. Proposals will be submitted to the legislature when the Illinois General Assembly reconvenes in April 2018. The State also looks forward to partnering with Illinois' U.S. Congressional delegation to secure critical funding for this and other projects. The State will soon submit its initial application for a grant that covers up to 65 percent of building a new facility to the U.S. Department of Veterans Affairs. If these infrastructure changes occur, the projected capacity of the Veterans' Homes, by service, would greatly improve and residents will be offered additional amenities and more tailored care delivery.

IX. Timeline of Events

July 24, 2015 (Friday)

- First case begins showing symptoms (no diagnosis made)

July 29, 2015 (Wednesday)

- Specimen from first case collected

August 4, 2015 (Tuesday)

- Adams County Health Department (ACHD) receives outside lab results for first case

August 5, 2015 (Wednesday)

- ACHD investigation begins

August 6, 2015 (Thursday)

- ACHD notifies IVHQ of confirmed case and obtains further details of the individual (symptoms, exposures, etc.)

August 7, 2015 to August 20, 2015

- ACHD continues investigation – IDPH notified and consulted

August 21, 2015 (Friday)

- Conference call among IDPH, IDVA, ACHD, and IVHQ about second confirmed Legionnaires' disease case. IDPH requests additional information regarding:
 - Clinical and epidemiological information regarding case (symptoms, exposures, travel, etc.)
 - Cooling tower operations and maintenance
 - City of Quincy test of facility water
 - Cooling tower maintenance logs
- Initial recommendations from IDPH:
 - Turn off outdoor fountains
 - Keep windows closed
 - Use bathing facilities other than the one the two cases used
 - Ensure appropriate disinfectant in the cooling tower and water chiller units
 - Conduct prospective surveillance for other respiratory illnesses
 - Begin conducting vital sign screenings for skilled nursing care residents at four-hour intervals (temperature, heart rate, etc.)
- IDVA initial steps taken to implement IDPH recommendations:
 - Turned off all fountains on grounds
 - Notified staff to close all windows and keep them closed
 - Removed aerators from sink faucets in residents' rooms
 - Checked Whirlpool tubs for bubbling features – none detected
 - Suspended the use of tubs in the West/Elmore II bathing room
 - Suspended the use of ice machines in the Elmore building
 - Inspected the disinfectant levels in the cooling tower and water chiller units
 - Began checking for signs and symptoms of respiratory illness and checked vitals of every skilled care resident every 4 hours beginning August 22, 2015
- IDPH Chief Medical Officer describes situation as “possible outbreak”
Epidemiological link between the two cases not established at this time

August 22, 2015 (Saturday)

- IDPH requests further information about the IVHQ cooling towers
- IVHQ sends email to all nurses regarding the Legionnaires' disease cases. Email includes educational material about the disease.
- IVHQ supervisors brief all nursing staff at the beginning of their shift about Legionella bacteria and Legionnaire's disease
- IVHQ's infectious disease nurse meets with nursing and housekeeping staff, offering more information and answering questions about the disease
- IVHQ Infection Control Coordinator (ICC) provided an in-person education session to all nursing staff in the Elmore building and followed up the session with an email to all nurses campus wide
- All IVHQ direct care staff began conducting vital signs every four hours on all skilled-care residents

August 23, 2015 (Sunday)

- IDPH begins multiple, daily communications with CDC Legionella team (clinical, environmental health, and epidemiological)
- IDPH communicates with Blessing Hospital about IVHQ residents at the hospital and conducting interviews of cases to collect epidemiological information
- IDPH requests sputum collection from anyone at IVHQ suspected to have Legionella
- IDPH adds recommendations to its initial mitigation plan, including:
 - Continue surveillance/referral for medical care
 - Culture of sputum from all patients so that clinical and environmental isolates can be compared via Pulse Field Gel Electrophoresis (DNA subtyping)
 - Obtain more exposure information on cases
 - Conduct inspection of potential sources of infection
 - Perform environmental testing
- In response to the additional IDPH recommendations, IVHQ took the following actions:
 - Continued every four-hour vitals checks
 - Began attempting to take sputum samples from residents exhibiting signs and symptoms. This proved to be very difficult because respiratory illness (coupled with COPD and other respiratory issues) can make it impossible for a subject to provide a sputum sample
 - Maintained detailed charting protocols
 - Informed powers of attorney (POAs) of any health status changes immediately
 - Cooperated with the IDPH and ACHD teams to provide information for the investigations to identify potential sources of infection

August 24, 2015 (Monday)

- IDPH continues multiple, daily communications with CDC
- IDPH & IDVA begin daily updates to Governor's Office
- IDPH team on site at IVHQ. Three staff from environmental health and two from infectious disease
- Teams collect resident location and histories and enter information into Illinois National Electronic Disease Surveillance System (INEDSS)
- IDVA, IVHQ, IDPH, ACHD phone calls to review lists of suspect cases. Purpose is to compile clinical and laboratory information to determine if cases meet CDC case definition for Legionnaires' disease or Pontiac fever
- IDPH, IDVA, IVHQ, ACHD, and Blessing Hospital discuss suspect cases
- Review and inspection of HVAC, on-site mechanical systems, plumbing system, and two outdoor water fountains
- IDPH collects water samples and swab samples from fountains, cooling tower, bathing tub, and showerheads
- IDPH provides further mitigation plan recommendations:
 - No tub baths, not even use of tub with hand-held shower piece only
 - Sponge baths would be safest at this time
 - Replace shower heads with filter-type shower head

- Empty all fountains
- Provide training for facility staff on water systems testing procedures
- Document all testing and temperature monitoring in water systems
- Document disinfection of bath tubs
- Implement hot water restrictions
- In response to the additional IDPH recommendations, IVHQ took the following actions:
 - Ceased all tub baths and showers
 - Ordered filters for shower heads
 - Conducted sponge baths using disposable wet towels
 - Emptied the fountains
 - Began testing, monitoring, and documenting results for all water systems

August 25, 2015 (Tuesday)

- IDPH continues multiple, daily communications with CDC
- IVHQ conducts an all-staff nursing education session on Legionnaires Disease
- IVHQ sends email to employees regarding discovery of Legionella bacteria and information about Legionnaires' disease
- One of the initial two cases noted to also be Mycoplasma positive, meaning that patient could have another form of pneumonia, not Legionnaires' disease
- IDPH disease surveillance epidemiologists look for increase in respiratory illness cases across Adams County
- IDPH Laboratory ships clinical specimens to CDC for antimicrobial testing
- Discussion of Blessing Hospital's surge capacity
- IDPH recommends that IVHQ not admit new residents until disease testing and environmental surveillance are complete
- Track people admitted to hospital for respiratory illness

August 26, 2015 (Wednesday)

- IDPH continues multiple, daily communications with CDC (including discussion of point-source (cooling tower or potable hot water supply))
- IVHQ holds two Town Hall-style meetings that included all staff members
 - During the meetings, IVHQ distributes educational handouts from the CDC
 - The educational handouts were also emailed to all IVHQ employees
 - All employees had to sign in at the Town Hall-style meetings
 - All emails were sent with a designation returning to the administration that the email was opened and read
 - Staff members without state email addresses were updated by their supervisor at the beginning of their shift
- IDPH issues recommendations for clinical sampling and continued active disease surveillance
- All sink aerators removed and hot-water restrictions continued to eliminate shower and tub use
- Blessing Hospital pathologist inquires about *Legionella* diagnoses
- Draft news release is circulated
- IVHQ is sending everyone with fever and cough to the hospital

- New information regarding the hot water distribution system collected
- IDPH performs targeted sampling of the domestic hot water system. Additional water samples and swabs collected. Polymerase Chain Reaction (PCR) and culture analysis were ordered for all samples
- Issuance of draft guidance on disinfection of cooling tower
- The following direction was given by IDPH EH:
 - Immediately increase cooling tower free bromine level to 10ppm logging every four hours
 - Isolate tank #2 from the hot water supply in the power house, empty tank #2 for swabbing 8/27/15
 - Desist using tap water for any resident care or service, order bottled or packaged water for potable uses
 - Discontinue any potable water use involving point of use fixtures where aerosols are likely
- IDVA accordingly took the following actions:
 - Shut the cooling towers down to clean and disinfect them – increasing bromine levels to 10ppm, then returned them to operation to prevent building evacuation on August 28, 2015. (These towers provide air conditioning to the buildings and IVHQ is required to maintain air conditioning in residential buildings).
 - IVHQ began keeping a daily log of tower disinfection on August 26, 2015 and that protocol continues in cooling season to this day.
 - The cooling tower was cleaned and disinfected again on September 8, 2015 and was shut down completely on September 30, 2015, for the season.
 - Ordered a 500-ton portable cooling tower on August 26, 2015, for delivery in the next 48 hours
 - Ordered bottled and packaged water for distribution site-wide
 - Implemented a site-wide ban on bathing with domestic water (alternate bathing methods implemented) and ceased using tap water for resident care or service
 - Implemented emergency purchasing action to onboard a consulting firm to assist with mitigation (Phigenics)
 - Emptied the main entrance fountain

August 27, 2015 (Thursday)

- IDPH continues multiple, daily communications with CDC
- Joint IDPH/IDVA press release announcing eight confirmed cases, no known deaths
 - Four of the eight treated at Blessing Hospital and have returned to the IVHQ with four remaining hospitalized
- IVHQ posts educational material at every Nurses' Station
- 20-30 persons associated with the IVHQ are being evaluated for respiratory illnesses (some at home, some at the hospital, some staff)
- One confirmed community case of *Legionella* in an Adams County resident. Case not known to be linked to the IVHQ

- State of Illinois Rapid Electronic Notification (SIREN) Alert issued to local health departments (LHDs), providers, hospital infection control nurses, and hospital emergency departments statewide
- IDPH EH issues interim guidelines for potable water restrictions at IVHQ
 - Recommendations focused on appropriate use and disinfection of ice machines, dishwashers, and steam tables in food service
- To expedite UAT turnaround time, IVHQ sends urine specimens for Legionella testing to Hannibal Regional Hospital in Missouri.
- Plans for IVHQ to take down cooling tower the following day along with plans to manual clean and flush in accordance with ASHRAE 188 Standard and refilling with appropriate sanitizers and biological control chemicals
 - CDC indicates concurrence with this plan on a call

August 28, 2015 (Friday)

- IDPH continues multiple, daily communications with CDC
- IDVA/IDPH news release of two deaths, 23 confirmed cases
- IDPH Interview with Illinois Radio Network on Legionnaires' disease on general health questions, signs, symptoms, who is most vulnerable, and how to stop it from spreading
- In addition to taking vitals every four hours for skilled nursing residents, IVHQ increased vital signs checks to every four hours for residents in the independent living facilities (domiciliaries)
- GO Chief Operating Officer emails IDPH Director indicating that Governor has been personally notified of the deaths
- Cooling tower cleaned, refilled, and back online. Increased operational disinfectant levels to 15ppm bromine
- Two laboratory confirmed cases in surrounding community

August 29, 2015 (Saturday)

- IDPH continues multiple, daily communications with CDC
- Conference calls among IDPH, IDVA, ACHD, GO, and CDC
- IVHQ began taking vitals on skilled units every two hours

August 30, 2015 (Sunday)

- IDPH continues multiple, daily communications with CDC
- IEPA assessment of water samples

August 31, 2015 (Monday)

- IDPH continues multiple, daily communications with CDC
- IDVA, ACHD, IVHQ, IEPA, and Garrett-Callahan, IVHQ's chemical treatment supplier, discuss sanitizing the potable water supply. Samples of the municipal water supply and the cooling tower taken for analysis

September 1, 2015 (Tuesday)

- IDPH continues multiple, daily communications with CDC
- Legislative conference call hosted by IDPH and IDVA

- IDVA/IDPH press release issued – seven deaths and 39 confirmed cases
- US Senator Kirk’s office receives an update on IVHQ

September 2, 2015 (Wednesday)

- IDPH continues multiple, daily communications with CDC
- News release – four confirmed cases (including one death) unconnected to IVHQ
- IVHQ orders Pall filters capable of trapping Legionella bacteria for showers
- IDVA speaks with USDVA to alert them to the emergency project beginning at IVHQ to request funds for the Veteran Home Reconstruction Grant

September 3, 2015 (Thursday)

- IDPH continues multiple, daily communications with CDC
- IDVA, IDPH, and CDC brief US Senator Durbin on IVHQ

September 4, 2015 (Friday)

- IDVA initiates the contract with Phigenics for water remediation
- IDVA and IDPH brief US Senator Kirk on IVHQ

September 8, 2015

- IDVA hyper chlorinated hot and cold water
- Cooling Tower cleaned again

September 9, 2015

- IDVA hyper chlorinated hot and cold water

September 11, 2015

- IVHQ changed protocols for vitals and began checking every shift

September 18, 2015

- Initiated installation of Pall Filters on showers/tubs

September 30, 2015

- IVHQ shuts down the cooling tower for the season

October 1, 2015

- Emergency declared by CDB for remediation work

October 5, 2015

- Engineering firm for CDB emergency project mobilized

October 6, 2015

- Contractor for CDB emergency project mobilized

October 23, 2015

- Temporary water treatment plant installed in place and operating in Quincy at Locust street site

- 6-bay garage was identified as the future location of the new water treatment facility

October 26, 2015

- Vendor begins installing point of use mixing valves at all points of use campus-wide

December 17, 2015

- Water Treatment Facility design is complete and provided to EPA for permitting of piping

December 31, 2015

- CDC issues Epi-Aid 2015-037 Trip Report: “Undetermined source of an healthcare-associated outbreak of Legionnaire’s disease – Illinois, 2015”

X. Appendices

A. CDC Trip Reports

Date	Link
December 31, 2015	http://dph.illinois.gov/sites/default/files/publications/cdc-trip-reportquincyil12.31.15.pdf
June 26, 2017	http://dph.illinois.gov/sites/default/files/publications/cdc-trip-reportquincyil06.26.17.pdf
January 4, 2018	http://dph.illinois.gov/sites/default/files/publications/cdc-trip-reportquincyil1.4.18.pdf

B. Case Summary Table

Illinois Veterans Home Quincy – all legionellosis cases (LD + PF), 2015-present

	2015	2016	2017	2018
Residents	47 (35 LD + 12 PF)	6	5	4
Staff	6 (LD)	0	1	0
Total cases	53	6	6	4
Dates of symptom onset	July 24 – Sept 18	July 14 – Dec 10	March 9 – Nov 20	Feb 8 – Feb 15
-	-	-	-	-
Fatalities	12 (11 LD + 1 PF)	0	1	0

LD = Legionnaires' disease

PF = Pontiac fever

C. Geographic Distribution of Legionellosis in Illinois, 2014-2016

Average Yearly Counts of Legionellosis & Pontiac Fever Cases by County, 2014-2016

