

FEATURE PUBLICATION EXCLUSIVE

Deadly Legionnaires' disease outbreak in Michigan highlights surveillance issues

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A recent outbreak of Legionnaires' disease in Genesee County, Michigan, underscored surveillance issues surrounding the sometimes deadly lung infection, according to experts.

The outbreak — involving both area health care facilities and the community — is thought to have been caused by municipal water originating from the Flint River, which also was shown to have carried high levels of lead into the homes of area residents. The outbreak infected 87 people between 2014 and 2015, killing nine.

“The United States has lagged far behind the rest of the world in having some kind of standard or requirement for addressing *Legionella* in building water systems,” **Janet E. Stout, PhD**, president of Special Pathogens Laboratory in Pittsburgh, told *Infectious Disease News*.

Research by Stout and others has shown the potentially lifesaving benefits of protecting against outbreaks of Legionnaires' disease by proactively testing water for *Legionella*, an approach she has been recommending for more than 30 years.



Janet E. Stout

However, national guidelines regarding *Legionella* are generally reactive, according to Stout.

“The increase in chance of death happens when there’s a delay in diagnosis and a delay in initiating appropriate therapy,” she said.

The benefits of proactive testing

Stout and colleagues showed in a 1982 study that during an outbreak of Legionnaires' disease, *Legionella* was more widely distributed at a Veterans Affairs hospital in Pittsburgh than previously believed. The hospital's water distribution system was identified as the reservoir for the pathogen.

In a 2005 study, Stout and colleagues demonstrated that guidelines favoring a proactive approach significantly decreased the number of nosocomial Legionnaires' disease cases in Allegheny County, Pennsylvania, even as there was an increase in community-acquired cases in the area. The county recommended routine testing of the hospital water distribution systems even in the absence of reported cases — a departure from national guidelines.

“The results showed that it was highly effective in reducing hospital-acquired Legionnaires’ disease,” Stout said. “And the reason it was effective is that people tested the water. If they found *Legionella* in the water, then they disinfected the water system and cases stopped.”

Testing to discover whether or not the water supply contains the bacteria is a “logical” step hospitals can take to protect patients, Stout said.

“If *Legionella* is present in that water system, then they can protect their patients by disinfecting the water,” she said. “The physicians can protect their patients by being aware that *Legionella* is a potential cause for pneumonia in their hospitalized patients and then select the right antibiotic.”

Flint outbreak follows switch to river water source

In April 2014, the city of Flint, Michigan, switched its primary water source from the Detroit water system to the Flint River. The switch was to last 2 years while construction of a pipeline from Lake Huron was completed. However, amid an outcry over the levels of lead in the water, Flint was reconnected to the Detroit water system on Oct. 15, 2015.

Two outbreaks of Legionnaires’ disease were detected in Genesee County during the time Flint was getting its water from the river, according to the Michigan Department of Health and Human Services (MDHHS). The first, between June 2014 and March 2015, included 45 confirmed cases, with five associated fatalities. Between May and October 2015, there were 42 confirmed cases and four deaths. The average number of Legionnaires’ disease cases reported in Genesee County over the previous 4 years was between six and 13.

According to the MDHHS, 36% of the patients in the outbreaks used Flint city water in their homes, and 48% had stayed overnight in an area hospital in the 2 weeks before the onset of their symptoms.

During the initial increase between June 2014 and March 2015, more than half of cases had contact with McLaren Medical Center within 2 weeks of symptom onset. McLaren, where Stout has been consulting since August 2015 after working with the county health department, gets its water from the City of Flint. She said the lessons learned from the outbreak are clear.

“Our proactive message,” she said, “is seek *Legionella* out and you will protect your patients. ... Health care facilities should be testing for *Legionella*, especially in Genesee County.”

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Delayed public warning

Kristen Nordlund, a CDC spokesperson, told *Infectious Disease News* that Michigan sought and received assistance during the outbreak from the CDC's *Legionella* experts via telephone and email. The state did not request on-site assistance, which is required at a state level for the CDC to become involved. Nordlund said the CDC's experts, seeing how many people had been affected by the outbreak, "felt the situation warranted a comprehensive investigation."

However, the MDHHS said it was equipped to handle the outbreak investigation and did not need on-site help from the CDC.

"In terms of our involvement with the CDC for this investigation, because MDHHS provided Genesee County with state epidemiologists and additional staff resources, we were able to meet the epidemiological case investigation need in the county," **Angela Minicuci**, an MDHHS spokesperson, told *Infectious Disease News*. "CDC was a part of these conversations as they were involved in many aspects of the investigations going back to January of 2015."

In its summary of the first outbreak, dated May 29, 2015, the MDHHS declared the "outbreak is over." But cases persisted that summer, and the public was not notified of the spike in Legionnaire's disease cases in Genesee County until Michigan Gov. **Rick Snyder** held a news conference on Jan. 13.

Although the general public is not at great risk for acquiring Legionnaires' disease even if the bacteria is present in the water, groups that are immunocompromised should take precautions, Stout noted.

"In outbreaks of Legionnaires' disease, it's been shown that when there's good notification of the public and notification of physicians, deaths are significantly reduced because physicians are aware of *Legionella* being a problem," she said.

Source of outbreak still unknown

The MDHHS said it could not conclude — nor could it rule out the possibility — that the switch to the Flint River as a water supply was responsible for the outbreak of Legionnaires' disease in Genesee County. Stout sees an "obvious" correlation between the two.

“The reason I say that it’s obvious is ... there’s ample evidence in the literature and our understanding of *Legionella* ecology in water that shows that such disturbances of water quality would lead to the growth of bacteria, including *Legionella*,” she said.

That, in addition to the large increase in Legionnaires’ disease cases in Genesee in 2014 and 2015 that was not seen in any other county in the area, led Stout to the conclusion that the change in water quality was responsible.

Marc A. Edwards, PhD, professor of civil and environmental engineering at Virginia Tech, told *Infectious Disease News* that “the vast majority of evidence supports the hypothesis that the lack of corrosion control [in water pipes] and/or the Flint River source water had something to do with it.”

However, Edwards, the lead researcher for the group that identified the lead problem in Flint’s water supply, said proving that association is not so easy.

“Obviously, it is hypothetically possible to prove the [Legionnaires’ disease] outbreak was water-related months after the fact,” Edwards said, “but it is much, much more difficult.”



**Marc A.
Edwards**

Stout expressed frustration that there was no testing done for *Legionella* in the community water pipes or in the homes of people infected, but said there is still time.

“It does not appear and disappear,” Stout said. “It finds a niche and it stays there.” – *by Gerard Gallagher*

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