Milwaukee's Public Health Laboratory: Protecting the City's Health with Cutting-Edge Methods

by Emily Mumford, writer

Director

Steve Gradus, director of the City of Milwaukee Health Department public health laboratory, is from Helena, Arkansas, a small town near the eastern border of the state. At the University of Arkansas for Medical Sciences in Little Rock, he earned a bachelor's in medical technology and a master's in medical microbiology and immunology. After graduation, he worked at a local hospital in Little Rock in clinical microbiology. Gradus then returned to school, attending the University of Oklahoma Health Sciences Center in Oklahoma City to earn a doctorate in medical microbiology and immunology. A two-year post-doctorate at CDC in medical and public health laboratory microbiology persuaded Gradus that he had found his field: "I enjoyed clinical microbiology, but once I saw the public health side, I understood what I really wanted to do." In 1985, after his stint at CDC, Gradus accepted a position at the Milwaukee public health laboratory as chief microbiologist. A couple of years later, he was serving as interim director. In 1990 it was made official, and Gradus became the director of the city's public health laboratory.

Location

Milwaukee is on the western shore of Lake Michigan, about 90 miles from Chicago. Its name precedes the city: the Algonkian tribes called it "Millioki," or "gathering place by the waters." Currently, Milwaukee is home to about 600,000 people, although the metropolitan area encompasses about 1.5 million.[1] Milwaukee is a diverse city with many cultural opportunities, from performing arts to museums to professional sports. Every summer the city enjoys lakefront festivals.

History

The laboratory was founded in 1874 to test milk and water. By the end of the nineteenth century, it had expanded its services to food safety and daily water quality exams. During the next 50 years, the lab continued to grow, testing widely for infectious disease. In 1953, Milwaukee's laboratory began to investigate viral diseases, putting it on the cutting edge of research on influenza and polio.[2]

Facility

The city laboratory is located in downtown Milwaukee, in a municipal complex of three buildings. In the same facility as the health department, the lab occupies the second floor, about 15,000 square feet of space. Fully renovated in 2001, the laboratory "is very lucky to have a modern facility," said Gradus. The city also has an off-site laboratory at the largest STD clinic in Wisconsin. A BSL-3 suite at the Milwaukee facility was upgraded in 2003, enabling membership in the Laboratory Response Network.

> "The work we do with community organizations helps address public health outcomes and keeps us on the developmental edge. It's important to keep fresh.—*Steve Gradus, director of the City of Milwaukee Health Department public health laboratory*"

Staff

The laboratory has 27 staff and no current vacancies. Of those, 21 are scientific staff—microbiologists, virologists and chemists—representing two sections: environmental and clinical microbiology; and virology, chemistry and molecular science. There are two lab assistants, two office assistants, a laboratory information system (LIS) coordinator and Gradus.

However, in January 2007, the health department restructured the program, folding the disease control and prevention program, or epidemiology, into the laboratory. Now called "Laboratory and Epidemiology Services," Gradus's department has grown by about 50 people. "Fortunately we have good managers to help with the transition," he said.

Testing

Technically, the lab serves the municipal area, but it reaches into the greater metro area through its reference testing for area hospitals. It performs approximately 80,000–100,000 tests annually, with STD and lead testing at the front of the pack. "Milwaukee has an active lead abatement program that aims to get lead paint out of the city's aging homes. Through a grant, we've done a lot of work on that front," said Gradus.

Their environmental health section has also participated in a unique allergen testing program—again, funded by a grant—that helps children at high-risk for asthma by testing for allergens in the home.

Teaming up with the city's water department, the laboratory performs water quality testing and participates on a water health subcommittee that meets monthly to discuss water quality issues. The Milwaukee lab also has an unusual waterborne pathogen testing program. It has EPA approval to do environmental

isolation and identification of waterborne pathogens, as well as environmental virology. This role originates from a large waterborne *Crytosporidium* outbreak in the 1990s that threatened the city.

In its communicable diseases section, the lab has a molecular program that is funded by cooperative agreement money. Developing its assays, the lab has used molecular methods during "a pertussis outbreak in '03-'04, mumps in '05-'06, a large *E. coli* outbreak involving two restaurants and, of course, the recent national spinach outbreak. We were also involved in anthrax hoax testing in 2001, along with the state lab," said Gradus. Milwaukee's laboratory also has viral diagnostic, culture and serologic capability.

The laboratory plays a large role in supporting 25 city food inspectors with inspections and enforcement of the health codes. "We also test for norovirus now, which makes the epidemiologists very happy since it's the number one cause of foodborne disease," said Gradus. They also back seven communicable disease investigators and four environmental and disease control specialists who monitor the local beaches, BioWatch Program, emergency preparedness needs and HazMat.

The recent merging of the laboratory and epidemiology staff is explained by this close working relationship. "These are all people that we support. They're in the local establishments every day on the public's behalf. It's a two-way partnership in public health intervention. We share information in both directions," explained Gradus.

Revenue

The laboratory is roughly a $2.5 million operation, funded mostly by city tax money. "Over the past two to three years, we've pulled in about $1 million in grant funds for bioterrorism, lead testing, beach monitoring and STDs through local, state and federal grants," said Gradus.

Notable Success Stories

E. coli 0157:H7 – The Milwaukee laboratory was on the cusp of the 2006 spinach outbreak, receiving samples before the news had broken. "An alert staff member noticed that three or four samples of *E. coli* had come in from various places and brought it to our attention. We had PFGE results in 48 hours—a very quick turnaround." The laboratory had identified six cases of *E. coli* 0157:H7 by September 8.

Laboratory Information System – "The LIS continues to be a real asset. After budget cuts, we had to eliminate some positions, so our ability to send our lab reports electronically has been very helpful. We can auto-report to 11 distant programs and the state. No more envelope-stuffing or stamp-licking. So 10 years later, the investment continues to pay new dividends for the lab administration," said Gradus.

Public Health eLab Network – Electronic communications with area clinical microbiology laboratories are used to disseminate information, share educational opportunities and assist laboratory surveillance during communicable disease investigations.

Creating Revenue – The laboratory generates revenue for the city through its reference testing for local hospitals and the waterborne pathogen testing. About 10-15 percent of the testing fees are revenue.

Biggest Challenges

Workforce – Like many laboratory leaders, Gradus is concerned about finding qualified laboratorians to replace his retirement-age staff. "We have local academic partnerships and bring interns into the laboratory from public health programs. I think that's important," he said.

Funding – "It seems to get tighter every year." The laboratory is able to foray into unexpected and interesting areas of laboratory science by "seeking grants, collaborations and partnerships. But the question, 'where is the money going to come from?' is always there," said Gradus.

Staff Development – The laboratory seeks relationships with research programs at local institutions. "The work we do with community organizations helps address public health outcomes and keeps us on the developmental edge. It's important to keep fresh."

Goals

Develop deeper academic partnerships to encourage workforce development and meet our future hiring needs.

Maintain a well-trained and current staff.

Collaborate with local institutions to meet our public health mission and bring in more grant money in the process.

In the past year, Wisconsin has inaugurated a Public Health Laboratory Network to link the local and state public health laboratories. Spearheaded by the state lab and funded by grant money, the network aims to improve the support and communication networks among the community-based facilities. "The Wisconsin Public Health Laboratory Network provides local labs with a united voice. Common issues can be put forth with a bit more substance," says Gradus.

The Milwaukee laboratory's success was almost compromised a few years ago when staff pooled their money to play the state Superball lottery. "They got every number but the Superball. We would have lost half of the lab staff overnight," said Gradus. Each employee took home a nice paycheck of a few thousand dollars, but still needed a job. "I think they should probably outlaw the Superball," laughed Gradus.

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1 City information retrieved from www.milwaukee.org/static/index.cfm?contentID=254

2 Historical information gathered from www.city.milwaukee.gov/router.asp?docid=3466