

Environmental Health – Waterborne Diseases, Infectious Diseases

Wisconsin Department of Health Services, Division of Public Health, Bureau of Environmental & Occupational Health and Bureau of Communicable Diseases

Madison, Wisconsin

Assignment Description

The Fellow will have a unique opportunity to address waterborne disease across multiple programs within the Wisconsin Division of Public Health (DPH). This cross-disciplinary opportunity will provide the Fellow with experience working in environmental surveillance focused on freshwater harmful algal blooms and communicable disease surveillance focusing particularly on waterborne disease and cryptosporidiosis and giardiasis surveillance.

The Fellow will work with numerous staff having expertise in risk assessment, communicable disease surveillance, and outbreak investigation and response. Within the Bureau of Communicable Diseases (BCD) the Fellow will work directly with the waterborne, foodborne, and enteric disease epidemiology program but will also have opportunities to work with staff who manage other programs including influenza, vectorborne disease, hospital-acquired infections, invasive bacterial disease, rabies and tuberculosis.

The DPH's freshwater harmful algal bloom surveillance program is seated in the Bureau of Environmental and Occupational Health (BEOH), which is located in the same building as the BCD. The BEOH's range of programs includes asthma, environmental public health tracking, occupational health surveillance, Superfund site assessment and consultation, radon assessment and mitigation, and climate change surveillance. The Fellow will be provided an introduction to all programs within the section, and may contribute to other programs in BEOH.

The personality of both Bureaus is professional and friendly, emphasizing a willingness to share ideas and resources for collaborative activities. Expertise includes epidemiologists, veterinarians, physicians, toxicologists, outreach and education specialists, evaluation specialists, and GIS analysts.

Day-to-Day Activities

During the course of the placement, it is anticipated that the Fellow will spend approximately 40% of his/her time working with the communicable disease waterborne program and 40% with the harmful algal blooms program. The remaining 20% of the time may be allocated based on the Fellow's specific interests and will be agreed upon by the Fellow and mentors. The Fellow will be assigned physical space in the BEOH and a majority of time there will be spent in the home office. Field work opportunities most commonly occur during outbreak situations. When appropriate, every effort will be made to facilitate the Fellow's participation in on-site assessments or environmental sampling which are conducted as part of an investigation.

Daily activities in the BCD, particularly early in the Fellowship, will be related to the Fellow's giardiasis surveillance summary project and Legionellosis surveillance system evaluation. With the primary mentor's guidance, the Fellow will also develop an in depth understanding of communicable disease follow-up. While the Fellow's primary duty is not patient interviewing (most interviewing is conducted by the local health department) it will be important that he/she conduct some patient interviews using the existing interview tool to become familiar with the surveillance protocol. The Fellow will also have the opportunity to help conduct interviews during any waterborne outbreak investigations. When the Fellow has become familiar with the surveillance system, he/she will be encouraged to

review cryptosporidiosis case reports in real-time to identify clusters of illness and work with the mentor and local health department staff to investigate suspected outbreaks. With progressive gains in expertise, the Fellow will be encouraged to identify additional projects of interest. Finally the Fellow will be expected to attend and participate in bi-weekly communicable disease meetings with the other program areas represented and attend weekly Monday morning conference calls with the Wisconsin State Laboratory of Hygiene.

Daily activities of the Wisconsin Harmful Algal Blooms Surveillance program (which occur seasonally from May-October) will include reviewing new case data as it arrives, interviewing patients, consulting with Wisconsin Department of Natural Resources staff to determine whether follow-up sampling is appropriate, informing local public health officials about cases and concerns, and consulting with program staff to determine appropriate responses to case reports. The Fellow will also actively report bloom and illness data to CDC's One Health Harmful Algal Bloom System (OHHABS) and clean and standardize existing HAB surveillance data. While there may be circumstances when the Fellow will need to work in the field as part of an investigation or exercise, a majority of the time is spent in the home office. There will also be opportunities to perform outreach activities to increase program awareness.

While there are multiple resources and experts readily available to guide the Fellow's activities, the Fellow is expected to develop a reasonable amount of independence and initiative to identify areas of interest, seek out additional resources as needed and complete tasks.

Potential Projects

Surveillance Legionellosis Surveillance System Evaluation Evaluation

Legionellosis is an infection caused by bacteria of the genus *Legionella* that can cause respiratory illness ranging in severity from a mild respiratory illness resembling influenza (Pontiac Fever) to a severe pneumonia with a 30% case fatality rate (Legionnaire's Disease). *Legionella* species are bacilli that can be found in any type of water system. The bacteria proliferate in warm stagnant water such as those found in most plumbing systems, hot water tanks, evaporative condensers of large air conditioning systems, and hot tubs. People can become infected after inhaling droplets of aerosolized water containing *Legionella*. Most cases of legionellosis occur as single sporadic events; however, outbreaks also occur.

One of the Fellow's activities will be to evaluate Wisconsin's legionellosis surveillance system and capacity for outbreak detection using CDC criteria. The evaluation process will help detect limitations in the current system. The Fellow will make recommendations for improving the surveillance system and data collection tool and work with BCD epidemiologists to implement those improvements during the course of the fellowship. The Fellow will be encouraged to present evaluation findings in an oral presentation and written report to stakeholders.

Surveillance Activity Freshwater Harmful Algal Bloom Surveillance

Wisconsin's freshwater Harmful Algal Bloom (HAB) surveillance program seeks to collect, evaluate, analyze and disseminate data related to the health consequences of HABs in the state. During 2009-2013, Wisconsin received funding from the Centers for Disease Control and Prevention to support HAB surveillance. Program support from CDC has allowed Wisconsin to develop considerable infrastructure for HAB surveillance, including pathways for algae-related illness case reporting and partnerships with the Wisconsin Department of Natural Resources and the Wisconsin State Laboratory of Hygiene. HAB surveillance activities for a Fellow include collecting case reports of humans and animal HAB exposures, evaluating such reports to determine the likelihood that a health-relevant exposure has occurred, coordinating timely and appropriate water sampling with the partner agencies and analyzing, and maintaining and publishing program data to identify and evaluate public health interventions that may help address the problem. Work in this program may include specific surveillance-driven outreach projects related to the needs of local public health officers, veterinarians, recreational swimmers (including triathletes and race organizers), local lake management associations, and others.

Surveillance Activity Cryptosporidiosis Surveillance and Outbreak Investigation

The burden of illness associated with cryptosporidium infections among Wisconsin residents is significant. In Wisconsin during 2009–2013 the median annual number of reported cases of cryptosporidiosis was 688. In Wisconsin, case data are submitted from laboratories and clinicians throughout the state. Patients diagnosed with cryptosporidiosis are interviewed by local public health staff regarding their exposures. The Fellow will become familiar with all aspects of cryptosporidiosis surveillance in Wisconsin during their fellowship and once familiar with the system will review routine surveillance data collected by local health departments in the state. This data is entered into the Wisconsin Electronic Disease Surveillance System (WEDSS) and will be used by the Fellow in conjunction with other software to identify clusters of cryptosporidiosis which may represent outbreaks. The Fellow will work closely with the enteric disease epidemiologists in BCD on any outbreak investigations involving cryptosporidiosis with the ultimate objective of being able to lead an investigation. In addition to working with epidemiologists in the BCD during outbreak investigations, the Fellow will also have the opportunity to work with staff in BEOH and the Department of Agriculture, Trade, and Consumer Protection (DATCP) to gain a solid understanding of the environmental component of the outbreak investigation.

Surveillance Summary Giardiasis Surveillance Summary

Giardiasis is a parasitic infection associated with non-bloody diarrhea and other symptoms of gastrointestinal illness. The parasite can be spread in different ways, but water is the most common method of transmission. The burden of illness associated with *Giardia* infections among Wisconsin residents is significant. In Wisconsin during 2009–2013 the median annual number of reported cases of giardiasis was 529.

One of the Fellow's activities will be to summarize the available surveillance data from Wisconsin's giardiasis surveillance system. The Fellow will use SAS or other statistical software to extract and analyze existing giardiasis surveillance data maintained in the Wisconsin Electronic Disease Surveillance System (WEDSS) system. WEDSS data includes patient demographic, clinical and exposure information and is a robust data set. By working with the primary mentor and other epidemiologists the Fellow will analyze

data to describe the population affected and identify risk factors that indicate potential points of intervention. The Fellow will prepare a written summary report and will be encouraged to also present findings in an oral presentation. The Fellow will also make recommendations for updating the surveillance protocols and data collection tool.

Major Project Waterborne Disease Toolkit and Resources

Many agencies, in addition to the Division of Public Health, are involved in working to ensure that water in Wisconsin is safe for both drinking and recreating. Furthermore, when problems occur that may impact the safety of our water or outbreaks associated with waterborne exposures occur, the response and investigation also crosses multiple agencies. Under the guidance of the mentors, the Fellow will work to collate existing resources from across these agencies into a single toolkit that can be made available to state and local officials working in multiple agencies. The type of resources include, but are not limited to, fact sheets for the public, guidance for the public during adverse water events, training and educational materials, protocols for environmental inspections and sample collection, investigation manuals for public health officials including templates for letters, line list templates, and outbreak questionnaires. This process will also help identify gaps in existing resource or those that may require revision.

The Fellow will be able to help develop new materials for the public and public health officials. One resource in particular that the Fellow will play an integral role in revising is the Wisconsin Division of Public Health's "Foodborne and Waterborne Disease Outbreak Investigation Manual". This project will afford the Fellow opportunities to become well versed in the multitude of water related issues that public health officials encounter including both infectious and non-infectious illnesses that can be associated with ambient water in our lakes and rivers, treated recreational water venues, private wells, public drinking water systems, and built environment water features.

Preparedness Role

The state's emergency preparedness program is located in the Office of Preparedness and Emergency Health Care. This office works closely with staff in the BCD and BEOH and funds staff in many areas of public health. BCD and BEOH staff regularly collaborate with and participate in preparedness activities and the Fellow will have the opportunity to meet with these staff to learn more about the program, and will be invited to participate in simulations and table-top exercises. If actual events occur, the Fellow will be invited to be an active participant in the response.

Additional Activities

The Fellow will be encouraged, as they become familiar with both the infectious disease and environmental health programs, to seek out projects that they are both interested in pursuing and for which there is a need. In addition to any outbreaks caused by cryptosporidiosis or giardiasis, the Fellow may work on a variety of waterborne outbreak investigations during their fellowship which could be caused by infectious agents such as *Legionella*, Shiga toxin-producing *E. coli*, or norovirus. Concerns about wells becoming contaminated from surface spreading with manure has been an area of particular interest in recent years. The current Fellow has been able to work on several multi-agency projects associated with this topic including participating in a manure use working group and tailoring outreach materials for educating homeowners when a well is contaminated.

The presence of cyanotoxins in fish tissue is an emerging public health concern in the Great Lakes basin. The Fellow will have an opportunity to review the current body of literature regarding the accumulation of cyanotoxins in fish muscle tissue. This review may lead to the Fellow developing guidance documents to

complement existing recreational exposure outreach materials. The Fellow will be encouraged to create fact sheets to educate Wisconsin anglers about consuming sport fish caught during algal blooms.

Additionally, opportunities may exist to work on projects related to the health impacts of flooding with Wisconsin's Building Resilience Against Climate Effects (BRACE) program in BEOH. The BRACE program seeks to enhance the quality and quantity of data available for evaluating the impact of climate-related effects on health in the state and works to build capacity to address or mitigate these adverse effects. One potential project is assisting with the development of a flood vulnerability index (FVI) to identify geographically vulnerable populations across the state. Additional projects may include analyses and outreach related to vectorborne disease data and other climate-related health indicators.

Mentors

Primary	Sarah Koske, DVM, MPH Food & Waterborne Disease Epidemiologist
Secondary	Jonathan Meiman, MD Chief Medical Officer for Environmental Health