

Environmental Health

Assignment Description:

Dr. David M. Dziewulski will be the primary mentor for the CSTE Applied Epidemiology Fellow. He is a Research Scientist (Microbiologist) in the Bureau of Water Supply Protection and has directed CDC EHS-Net water activities since 2005. The CSTE Fellow could take the lead on evaluating the existing surveillance systems for determining the association between water quality and infrastructure failure and gastrointestinal (GI) syndrome. The Fellow could play a key role in researching/refining the use of various tools used to evaluate the vulnerability of small water systems to contamination or the vulnerability of healthcare facilities to the occurrence of legionellosis. Dr. Dziewulski's day-to-day responsibilities include the New York City (NYC) watershed and distribution systems with an emphasis on water quality monitoring (routine microbiological monitoring, virus and protozoan monitoring and overall water quality review). The NYC work also includes participation in the programs that led to the building of the Catskill-Delaware UV disinfection plant that is the largest facility of its kind in the world.

Dr. Lloyd Wilson will be the secondary mentor for Fellow, and he is Coordinator of Special Projects and Research, Bureau of Water Supply Protection (BWSP). His responsibilities are focused on emerging public water supply issues that require development of expertise and coordination of several organizational units. Topics of current concern that the Fellow could be exposed to include Marcellus Shale Natural Gas development, harmful-algal blooms, emerging contaminants (e.g. hexachrome, pharmaceuticals), PCB contaminated sediments from the Hudson River, and FOIL requests. I represent the department in many committees such as the Water Management Advisory Council, New England Interstate Water Pollution Control Commission, Great Lakes Basin Advisory Council, Association of State Drinking Water Administrators and serve as a program advisor to the New York State Energy Research and Development Agency (NYSERDA) Environmental Monitoring and Evaluation Program (EMEP).

Day-to-Day Activities:

The CSTE Fellow will be fully integrated into Department's and Bureau's daily activities. The CSTE Fellow's anticipated day-to-day activities may include (depending on Fellow interest and projects chosen):

- Statistical data analysis;
- Writing reports, scientific papers, and material for newsletters;
- Preparing scientific and public presentations, including material for conferences;
- Developing/presenting scientific posters;
- Working with CSTE Fellowship Primary Mentor and Secondary Mentor on most work days, with scheduled meetings to review progress bi-weekly;
- Attending scientific conferences within NYS, the region including the annual Northeast Epidemiology Conference;
- Attending training classes on public health emergency preparedness;
- Attending training classes on Project Management and statistical packages;
- Directing UAlbany graduate student work to assist in CSTE Fellow projects;
- Providing lectures to UAlbany public health graduate courses;
- Working with local health departments, hospitals, and nursing homes;
- Interacting with scientists and engineers on special projects or tracking that requires geographic information systems (GIS);
- Work with the State Drinking Water Information System (SDWIS)
- Interact with Regional Offices, local health departments and water operators including participating on conference calls and collaborating with other scientists on legionellosis issues;

- Training specialists (engineers, scientist and sanitarians) in protocols for the environmental response to legionellosis in healthcare facilities and in the community;
- Participate in and understand the data gathering needs of the CDC National Outbreak Reporting System (NORS);
- Become familiar with and use, when appropriate, the NYSDOH Outbreak Management Solution (OMS) for logging and tracking outbreaks in New York State;
- Participate in Interagency meetings coordinating programs;
- Participate in stakeholder groups (water management advisory council);
- Attend public meetings;
- Attend training for water operator certification courses;
- Opportunity to attend sanitary survey courses for ground water and surface water;
- Attend training designed to give Professional engineers Continuing Education credits;
- Learn and participate in Federal/State rulemaking process;
- Review draft legislation;
- Learn about hydrofracking and natural gas development;
- Participate in watershed protection meetings;
- Participate in Agency Poster Day, Participate in School of Public Health Poster Day.

Potential Projects:

The potential projects will include opportunities to fulfill the CSTE Fellow assignment deliverables, including surveillance system evaluation, conducting an outbreak investigation, bioterrorism/emergency preparedness and response, designing an epidemiologic study to address a health problem, designing/refining a questionnaire or other data collection tool, creating databases, using statistical software, interpreting findings from epidemiologic studies, recommending control measures and prevention programs, communication through written field investigation and surveillance reports, preparing a manuscript for publication, oral presentations, risk communication, understanding public health law and HIPAA, obtaining IRB training and certification, learning the essential public health functions, appreciating the diversity of how epidemiology is used in different program areas, and effectively negotiating cultural sensitivity issues. Multiple exciting project options exist with the Fellow working on one or more projects.

Possible project 1: Analysis of data collected with and evaluation of an Environmental Assessment Tool used to conduct investigations of health care facilities where legionella may be causing disease.

In New York State, cases of legionellosis have been associated with potable water systems at health care facilities. Usually in response to one or more cases of legionellosis, but also proactively, an Environmental Assessment Form (EAF) has been completed that describes the health care facilities, their hot and cold water systems, additional water and air management systems at the facilities, and the treatment(s) provided at each location. Additional information on recent changes at the facility such as events or construction is also collected. EAFs have been completed since June 2007 and there are now more than 50 completed forms available, but only minimal evaluation of the collected data has been made.

This project will take the information from the EAFs and evaluate whether any conditions or issues identified on the forms make the facilities more likely to host legionellae populations that cause illness. Likewise, once these issues were properly addressed, the evaluation should determine if disease at the facility ceased and/or did health outcomes, in general, improve? The data will be evaluated to determine whether there are patterns of repeated illness associated with the facilities. The EAF itself

will also be evaluated to determine whether the data collected on the form needs to be revised or other parameters collected, to make the form more useful. Mr. Neculai Codru, MPH epidemiologist and the EHS-Net coordinator, has helped manage EAFs; Ms. Jane Thapa, public health engineer has developed the relational database for gathering and sorting information from the forms.

Possible project 2: Retrospective and limited prospective study examining the association of NYSDOH problem alert (PA) information with syndromic data in the Emergency Department Syndromic Surveillance System (EDSurv).

The NYSDOH Center for Environmental Health electronically posts Problem Alerts (PA) that describe drinking water issues throughout the state. These problems most often involve loss of water, main failures, insufficient supply, loss of disinfection, power loss and other infrastructure or operational issues that may compromise a public water system. NYSDOH also has a program in the Center for Community Health that collects syndromic data from emergency departments statewide in EDSurv. These latter data are supplied on a voluntary basis and do not involve diagnoses of any kind; primary patient complaints are logged according to syndrome and NYSDOH Bureau of Water Supply is predominantly interested in tracking the occurrence of vomiting/nausea and diarrhea. By tracking classes of PA involving water problems by zip code and examining the database of syndromic reports from hospitals in the same zip codes, it is anticipated that the occurrence of underlying waterborne disease related to these problem events may be uncovered.

Preliminary studies have been completed and the program focus will turn toward specific problem alerts from the past that are strong candidates for the occurrence of low level disease. The retrospective work would involve defining a hazard periods for existing problem alert reports (i.e. select events) from 2005 through 2010. Retrospective work involving water system outages due to hurricane Irene and tropical storm Lee also will be examined. Using the currently developed protocol, syndromic data will be extracted from EDSurv and evaluated with a Cumulative Summation (CuSum) method as applied to the defined hazard period to determine alert signals. Select events that have occurred in 2011-2012 will also be examined. This work will assist in refining the current protocol to help with signal detection and to determine if the appropriate detection sensitivity exists.

The existing protocol must be refined and updated. Alternative methods also need to be examined. Prospective monitoring will be done on select current event (or events). In addition the use of Statewide Planning and Research Cooperative System (SPARCS) data, that includes diagnoses and treatments for both outpatient and inpatient cases could help refine or confirm detection of GI signals due to water quality or infrastructure issues.

Finally, corollary opportunities also can be examined. The current protocol could be applied to the evaluation of Harmful Algal Blooms (HABs) and/or a new protocol could be developed to determine if blooms generate a detectable signal in local emergency rooms. This is a great challenge because individuals using recreational water disperse to their homes in surrounding communities which can dilute the syndromic signal. A possible alternative is to examine multi-use water bodies where recreational water is also used as a drinking water source (after treatment). With a sentinel population present there may be some ability to detect a signal.

Possible project 3: Follow-up to EHS-Net deliverables - Testing of Vulnerability Scoring Tool for Small Water Systems Developed by EHS-Net Water

Small drinking water systems may be vulnerable to contamination. A scoring tool to rapidly evaluate the vulnerability of these systems to contamination was developed under a cooperative agreement with the Environmental Health Specialist Network (EHS-Net) Water Program at the Centers for Disease Control and Prevention (CDC). To date, four complementary projects have investigated the vulnerability of small drinking water systems. The first was a prospective study of 12 voluntary participants from 78 qualifying State-only Regulated Small Water Systems (SRSWS) near Albany, NY that utilize their own ground water sources.

The remaining studies were the three phases of the retrospective study. Each phase examined different aspects of paper and electronic database records for different small systems. The information on operations, local geography and records of correspondence were entered into a database of system characteristics. These were used to develop the scoring tool for assessing system vulnerability to contamination.

Complex, detailed scoring systems for contamination risk at PWS have been previously developed, however they are unwieldy for rapid assessment or field use. The scoring tool developed in this study is able to utilize limited information and assigns points for the lack of information as well as points for actual data values. In the current scoring system, lack of information may be viewed as “risky”; therefore, points are added if information is not available. Another quality, failing to comply with regulations can be problematic, and will lead to a higher vulnerability score.

Objectives will include collating information received from various counties in response to a mailing by the Bureau of Water Supply Protection (BWSP). This mailing will be the recruitment phase of local health departments that want to use the scoring tool to prioritize the urgency to perform site visits for small water systems. Acceptance by the county will result in staff implementing the tool for prioritizing sanitary surveys or inspections for the systems of concern. This test will evaluate the effectiveness of this scoring system. If it reliably predicts vulnerable systems, it could become a routine means of prioritizing work.

Possible project 4: Transition pilot study to field study to determine pharmaceuticals and personal care products (PPCPs) occurring beneath wastewater absorption fields (on-site septic systems) in the Skaneateles Lake Watershed.

Skaneateles Lake, a partial focus of this study, does not receive discharges from Waste Water Treatment Plants (WWTP), which are known to contribute Pharmaceuticals and Personal care products (PPCPs) to the environment. PPCPs, an emerging chemical concern, have become a growing source water concern with much work focused on point sources such as WWTP and industrial discharges. Another concern has been the contribution of PPCPs to groundwater from on-site septic systems. The Lake is used as a source of potable water for the City of Syracuse, and by private homes that have intakes directly into the Lake. Each home that serves as a septic system sampling site for this pilot study will also have its drinking water analyzed.

Samples will be analyzed for the following compounds: atenolol (beta-blocker); bisphenol A (plasticizer); caffeine (stimulant); carbamazepine (anti-epileptic); the hormones 17-ethinylestradiol, 17-estradiol, and estrone; ibuprofen (nonsteroidal anti-inflammatory); oxybenzone (sunscreen agent); sulfamethoxazole (antibiotic); triclosan (antimicrobial); triclocarban (antimicrobial) and trimethoprim (antibiotic). The water samples will be extracted by solid-phase extraction (SPE) cartridges or disks, and the extracts will be subjected to analysis by liquid chromatography tandem mass spectrometry (LC/MS-MS). The

analytical method was developed by NYSDOH for use in a Study of the New York City Watershed and was approved by USEPA for analysis of atenolol, 17-ethinylestradiol, 17-estradiol, estrone, ibuprofen, and trimethoprim in water and wastewater samples. Method development steps carried out with a LC/triple quadrupole MS, the API 2000TM LC/MS/MS System demonstrate that detection limits for all pharmaceutical analytes will not exceed 1.0 ng/L.

Preparedness Role

The CSTE Fellow will have the opportunity to complete FEMA study courses on the Incident Command System and participate in drills and exercises that occur periodically throughout the state. BWSP staff work on emergency preparedness in coordination with the State Office of Emergency Management along with the Office of Health Emergency Preparedness within the Office of Public Health (see organization chart). The CSTE Fellow will have the opportunity for training and assisting with preparedness projects. Activities may include tabletop exercises with local officials, emergency responders and water suppliers.

Assignment Location: Albany, NY

Primary Mentor: David Dziewulski, PhD
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Secondary Mentor: Lloyd Wilson, PhD
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