Infectious Diseases, Environmental Health

Virginia Department of Health, Division of Environmental Epidemiology/Division of Surveillance and Investigation

Richmond, Virginia

Assignment Description

The Virginia Department of Health's Office of Epidemiology is responsible for a broad range of disease surveillance and control activities in Virginia. The Fellow would be placed in DEE and DSI. Responsibilities of these divisions include investigating or providing consultation on cases and outbreaks of communicable diseases or environmental factors that pose a human health risk; developing and implementing disease databases and surveillance systems; analyzing and presenting data from those systems; developing guidelines for communicable disease management; developing policies and procedures to support the prevention and control of human diseases and conditions due to chemical or biological agents in the environment and transmission from animals to humans; and supporting statewide epidemiologic infrastructure and capacity by providing training and maintaining grants, regulations, and policies.

The Fellow will become a member of the DEE and DSI team and be exposed to a wide variety of projects in applied public health epidemiology. The Fellow will be responsible for special analyses and projects, but involvement in other projects will be strongly encouraged to assure exposure to the full scope of both general communicable disease and environmental factors influencing health. The mentors will seek opportunities for the Fellow to also support field epidemiology work through interacting with district epidemiologists in Virginia's thirty-five health districts. Projects will focus on program evaluation, surveillance, analysis, and conducting investigations. Most of the outbreaks requiring investigation will be foodborne or healthcare-associated, the latter including respiratory or invasive infections or bloodborne pathogens. Opportunities also exist to work on zoonotic conditions, environmental exposures, or vaccine-preventable illnesses and to participate in emergency preparedness exercises and activities. The Fellow will also be expected to assist with the public health response to any emerging infectious disease challenge that arises during the assignment, such as in the past with Zika virus, Ebola virus disease, and the Middle East Respiratory Syndrome.

Day-to-Day Activities

The Fellow's day-to-day activities will involve active participation as a team member within both DEE and DSI. With support from staff, the Fellow will work on projects outlined in the billet, as well as other relevant projects determined to be of public health importance in Virginia. This may include collecting and analyzing epidemiologic data and reporting findings, working to improve surveillance systems or the use of existing systems, creating information for the public and healthcare providers and guidance for health departments, and giving presentations on public health topics. Outbreak or cluster investigations involve collecting information, designing and implementing an analytic approach to identify the source of the outbreak, conducting site visits, and developing recommendations to prevent further spread of disease. The Fellow will participate in weekly division staff meetings, monthly statewide epidemiology conference calls, and training events.

Potential Projects

Surveillance Activity **Outbreak Management System Evaluation**

DSI maintains a database that captures information on each of the approximately 400 outbreaks that are reported in Virginia each year. The Fellow will learn the workflow processes supporting outbreak investigations and management of the statewide outbreak database. The Fellow will be responsible for evaluating this outbreak database. In addition, the Fellow will identify key stakeholders within the state that rely on the division's outbreak data and conduct an informational needs analysis to determine what data would be useful to stakeholders about outbreaks that occur in Virginia. The Fellow will assess all the information gathered and make recommendations for system enhancements and data products needed and present the methods, results, and recommendations from this project to DEE and DSI managers. The final product will be a comprehensive surveillance plan for the division's outbreak data. At the completion of this project, the Fellow will have strengthened skills in database management, SQL, Tableau, and R.

Surveillance Evaluation **Expansion of Surveillance System Disease-Specific Information on Vector-borne Diseases/Conditions**

The Fellow will conduct an informatics project related to vector-borne disease in Virginia. The fellow will be responsible for reviewing existing case report forms and conducting a gap analysis utilizing the data fields available in the Virginia Electronic Disease Surveillance System. The purpose of the gap analysis will be to determine and make recommendations on what advancements are required to the surveillance system to ensure accurate collection of surveillance data as they relate to diseases such as Lyme disease. Currently, the system is limited in its ability to collect comprehensive data on clinical presentations and exposure histories of persons being reported as having a vector-borne disease. Through the gap analysis, determinations can be made regarding the usefulness, flexibility, and data quality of the surveillance system to capture information on vector-borne disease. As part of this project, the Fellow will work closely with the State Public Health Entomologist and the State Public Health Veterinarian and their respective staff. As time permits, the Fellow will also have the option of participating in the development and creation of case report pages in VEDSS, as well as participating in the development of training guidance for the local health departments to explain the changes being implemented. This project will introduce the Fellow to public health informatics and surveillance practice and will involve working with surveillance specialists in the Division as well as in other divisions and in the district health departments.

Major Project **Surveillance for travel-associated and not travel-associated Legionnaires' disease in Virginia, 2012-2017**

Legionnaires' disease, a severe form of pneumonia, is typically acquired through inhalation of aerosolized water containing Legionella bacteria. It most often occurs in susceptible persons including individuals 50 years and older, current or former smokers, and those with weakened immune systems. Legionella is naturally occurring and can grow and spread in water systems like building water systems, showers and faucets, hot tubs and fountains, and hot water tanks and heaters. Since 2012, Virginia has seen an increase in the number of cases of legionellosis reported each year (from 76 in 2012 to 144 in 2016 to over 150 by October 2017). The Fellow will work to conduct a five-year analysis of legionellosis cases in Virginia to characterize the reported case exposures, risk factors, and potential prevention strategies. The Fellow will categorize legionellosis cases as health care-associated or not health care-associated. Further characterization will occur to determine what health care-specific settings were associated with exposure (i.e., hospitals, long-term care facilities, clinics, and others). Additionally, legionellosis cases not associated with health-care setting exposure will be evaluated to determine the characteristics associated with illness given the details reported in the epidemiologic investigation. Descriptive statistics will be generated, as well as bivariate analysis conducted. A geospatial analysis of cases is needed to further evaluate the clustering of cases. Such analysis can assist with identifying areas in need of outreach and prevention strategies.

Further, as time permits, the Fellow will conduct additional analysis to evaluate unique trends observed in legionellosis in Virginia. National data from the Centers for Disease Control and Prevention (CDC) indicated that several states, including Virginia, observed an increase in cases in 2013. This increase has remained consistent to date in Virginia. One reason for this rise in incidence could be attributable to unusually warm and humid weather experience during the summer by many states in the mid-Atlantic region, as there is evidence that the incidence of legionellosis may be influenced by certain weather conditions. Additional analysis is needed to better understand and quantify the changes observed in the epidemiologic trends related to legionellosis prior to 2013. Descriptive, bivariate, and logistic regression can be utilized to better understand the differences in morbidity due to legionellosis in Virginia pre- and post-2013.

Additional Project **Field Work**

The Fellow will complete field epi investigation training with the Division of Surveillance and Investigation. This training will cover an introduction to the Virginia Department of Health, disease reporting regulations, epidemiologic concepts, risk communication, interview techniques, laboratory methods, community engagement practices, environmental health collaborations, disease and outbreak investigation procedures, and public health emergency preparedness. The Fellow will also receive training on the various surveillance systems used by the division including the Virginia Electronic Disease Surveillance System, ESSENCE, and the division's outbreak database system. The Fellow will have the opportunity to shadow regional and district epidemiologists when conducting case interviews and with site visits for outbreak investigations. The Fellow will be involved in various

aspects of multiple outbreak investigations and will have the opportunity to lead an outbreak investigation from beginning to end. The Fellow will also participate and assist in annual VDH training conferences. These include the Public Health Emergency Preparedness Academy, the Field Epi Seminar, and the Epi Program Overview.

Additional Project **Zika Virus Analysis**

Zika virus, a flavivirus that is primarily transmitted by Aedes mosquitoes, has rapidly spread throughout the Region of the Americas since 2015. Zika virus infection during pregnancy is a known cause of microcephaly and other congenital abnormalities, and infection is also associated with neurologic disorders, including Guillain-Barré syndrome (GBS). The Fellow will prepare an analysis on 2016 Zika virus cases in Virginia to evaluate the following measures:

1. Demographic comparison between individuals confirmed with Zika virus and those not confirmed with Zika virus. Logistic regression can be conducted to evaluate significant risk factors between the two groups. Results can be utilized to target education, outreach, and messaging in Virginia.
2. Geospatial analysis of confirmed Zika virus cases evaluating those individuals that traveled to one country versus traveling to multiple countries. Length of stay can be used as a risk factor to assist with targeting those individuals most at risk for Zika virus in Virginia.
3. Evaluation of Zika virus commercial testing results to estimate burden of incidence in Virginia
4. Evaluation of mosquito surveillance protocols in Virginia to determine resource efficacy and efficiency

Preparedness Role

The Office of Epidemiology plays a predominant role in emergency preparedness and response activities. DSI is responsible for leading the surveillance and investigation components of the CDC's Public Health Emergency Preparedness program in Virginia. Staff work closely with the VDH Office of Emergency Preparedness to conduct a wide range of activities which the Fellow will have an opportunity to participate in, including: emergency preparedness exercises and drills, developing emergency response plans, creating educational resources and materials (e.g., fact sheets and provider guidance) for biological, chemical and radiological emergencies, and responding to public health emergencies. The Fellow may also choose to join a local chapter of the Medical Reserve Corps, which will provide for additional exposure to emergency preparedness trainings and exercises. For example, past fellows have had the opportunity to research, develop, and lead table top exercises involving biological and chemical threats. These exercises were conducted with both internal and external partners including local and state police, FBI, and fire and school personnel.

Additional Activities

Opportunities will also exist for the Fellow to work on projects with other divisions within the Office of Epidemiology. Within the Division of Immunization, the Fellow can work on vaccine-preventable diseases, such as pertussis, measles, and varicella. Further, the Fellow will also have the ability to engage with the Division of Disease Prevention where HIV and STI surveillance is conducted. These opportunities will provide the Fellow with extensive practical experience and skills, a good understanding of the roles and responsibilities of state and local health departments, and access to significant projects related to the Fellow's interests and career goals.

Overall, it is expected that the Fellow will acquire a range of practical public health skills and experiences useful in a wide variety of career paths. These activities may also lead to presentations, conference abstracts, and/or peer-reviewed publications. We expect that the Fellow will have the time and autonomy to develop projects of interest, while participation in the Office of Epidemiology's many activities will provide opportunities to acquire a broad range of skills and experiences.

Mentors

Primary	Caroline Holsinger DrPH, MPH Division of Environmental Epidemiology
Secondary	Jonathan Falk MPH Epidemiology Program Manager