ID: 58600248
Infectious Diseases, Wastewater Surveillance - Host Site Description
Pennsylvania Department of Health

Assignment Location: Harrisburg, US-PA
Pennsylvania Department of Health
Bureau of Epidemiology

Primary Mentor: Betsy Schroeder, DVM, PhD, MPH, DACVPM
State Public Health Veterinarian
Pennsylvania Department of Health

Secondary Mentor: Sameh Boktor, MD, MPH
Epidemiologist Supervisor
Pennsylvania Department of Health

Work Environment
Hybrid

Assignment Description

The Fellow's primary home will be the Bureau of Epidemiology with its core group of six medical epidemiologists, eight doctoral level epidemiologists, and thirteen master's level epidemiologists, as well as other professional staff, who have diverse expertise and extensive disease control experience. Additional staff have been added due to the COVID-19 pandemic response. Relationships exist with several Schools of Public Health and Medicine in the Commonwealth. The State Laboratory provides infectious disease testing and consultation with experienced public health microbiologists. There is substantial computer and technical support.

The Fellow's day-to-day activities will likely vary depending on what the Fellow is working on, but each day will likely have a combination of meetings (including a standing weekly meeting with the Fellow and Mentors) and free time to work on projects or outbreak investigations. Depending on the situation, the Fellow will likely have the opportunity to go into the field as part of an outbreak investigation, a site visit, or emergency response.

Describe Statistical and Data Analysis Support, Such as Databases, Software, and Surveillance Systems Available to the Fellow

Databases that will be available to the Fellow include: PA-NEDSS (web-based disease reporting and surveillance database), EpiCenter (syndromic surveillance database), PA Bureau of Laboratories laboratory database, and Pennsylvania Immunization Electronic Registry System (PIERS). Statistical and data analysis support is available within the Division of Surveillance; IT support is available from the PA DOH Bureau of Information Technology and its contractors. The Fellow will have access to SAS, R, ArcGIS, survey tools, and Whole Genome Sequence analysis tools that could be used for surveillance or outbreak investigation situations.

Projects

Surveillance Activity Title: Exploring the geographical distribution of early detections of key COVID-19 variants of interest in wastewater samples collected in Pennsylvania

Surveillance Activity Description:
The PaWSS team has been gathering data on the relative abundance of SARS-CoV-2 variants of interest in wastewater samples collected through PaWSS since mid-2022. These data are summarized in weekly reports to determine which variants are currently the most abundant in wastewater samples in the Commonwealth.

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While these summary reports are beneficial for identifying which variants are circulating across Pennsylvania, additional analyses may be done using these data to learn more about SARS-CoV-2 transmission and where new variants emerge.

To explore this, the Fellow will use data on the relative abundance of SARS-COV-2 variants of interest in wastewater samples collected through PaWSS to identify wastewater treatment facilities in Pennsylvania where new variants are identified earlier than other sites. Next, the fellow will explore factors that may impact the location of new variant emergence. These factors may include: region, urban vs rural areas, size of facilities, etc. The Fellow may also explore whether these patterns have shifted throughout the COVID-19 pandemic.

Surveillance Activity Objectives:
The Fellow will create a timeline of the emergence of key variants of interest in wastewater samples collected in Pennsylvania and create maps to display sites where the first detection of key variants occurred in wastewater. The Fellow may utilize GIS software training and support that is readily available through PADOH and other partners to assist with this analysis. The fellow will also use statistical software to compare sites where new variants are frequently detected earlier to sites where variants are detected later to determine if there are any factors (size, region, urbanicity, etc.) that are associated with these patterns. Finally, the Fellow will also summarize their findings into a presentation, a report, and potentially a publication.

Surveillance Activity Impact:
This project will allow the team to have a better understanding of SARS-CoV-2 transmission and may assist the team in identifying sentinel sites for new variant emergence.

Surveillance System Evaluation Title: Updated Validation of Syndromic ILI Data for ILINet Surveillance in Pennsylvania

Surveillance System Evaluation Description:
ILINet is a CDC program that has been used for years for influenza-like illness (ILI) surveillance, using a network of outpatient providers who volunteer to track and report weekly the number of visits due to ILI and the total number of visits to their practice. Pennsylvania has a network of 36 providers and student health centers that submit data to ILINet. However, ongoing challenges in recruiting and retaining providers, and inconsistent weekly reporting are barriers to receiving accurate, representative, and timely ILI surveillance data year-round. Syndromic surveillance data have been used to enhance outpatient ILI surveillance in a number of jurisdictions, including Pennsylvania. During the 2016-17 influenza season, we conducted an extensive analysis of data submitted by emergency departments across hospitals that have been part of the system for more than 5 years. Our investigation aimed to establish statistical correlations between this data and the information collected by ILINet during the same period. At present, 100% of all Pennsylvania hospitals with emergency departments (EDs), send chief complaint and other information on their ED visits to PADOH's syndromic surveillance system. PADOH uses the Epicenter platform hosted by Health Monitoring Systems (HMS) for syndromic surveillance.

Surveillance System Objectives:
The Fellow will reevaluate syndromic data from all the hospitals that submit data to our syndromic surveillance through graphical and statistical correlation methods.

The Fellow will use Pennsylvania ILINet data from the past 6 seasons (2017-2018 to 2022-2023, excluding 2020-2021). The Fellow will compare the statewide percent of visits due to ILI (influenza-like illness) to the percent of ED visits according to the state-developed ILI algorithm. The Fellow will use SAS or R programming skills to analyze the data following previously developed methods. The evaluation will be used to modify ILINet surveillance in PA and improve upon a previous study. The case definition of ILINet has changed recently and the fellow will use the updated case definition and compare chief complaint created syndrome to the ICD based syndrome to improve accuracy of selection.

The Fellow will investigate potential reasons for weak correlation and try to address these causes, when possible, to improve the usability of syndromic data. The Fellow would summarize their findings into a presentation, a report, and potentially a publication.

Surveillance System Impact:
This project would allow PADOH to select facilities that can be recruited to strengthen the state's ILINet and improve geographical representation.

Major Project Title: Geographic Analysis of Anaplasmosis Cases

Major Project Description:
Anaplasmosis has been increasing in Pennsylvania over recent years. It is the second most common tickborne disease in Pennsylvania, following Lyme disease. The Ixodes scapularis tick transmits both Lyme disease and anaplasmosis, and these ticks are found in every county of Pennsylvania. In 2021, Pennsylvania reported a total of 683 cases of anaplasmosis, compared to 218 cases in 2019.

Reported cases of anaplasmosis in Pennsylvania are entered into PA-NEDSS and are automatically geocoded by place of residence of the patient. To date, these data have only been used to assign cases to local jurisdictions (county or municipality) for case follow up. In the past, these data were shared with the Environmental Protection Agency, but they have not been used to determine local area risks for anaplasmosis in Pennsylvania. Risks of anaplasmosis at the sub-county level have never been assessed.

Major Project Objectives:
The Fellow would analyze geographic patterns of anaplasmosis in Pennsylvania from 2003 to the most recent data year. GIS software training and support are readily available through PADOH and other partners. The Fellow would summarize their findings into a presentation, a report, and potentially a publication.

Major Project Impact:
This project will assist in assessing the risk of anaplasmosis within jurisdictions and recommend targeted prevention activities.

Additional Project #1 Title: Improving the Completeness of Varicella Reports
Project #1 Type: Surveillance Activity

Project #1 Description:
One of the surveillance measures for the CDC vaccine preventable diseases grant is the completeness of varicella reports. Cases of varicella have been reportable in Pennsylvania since 2005, but the case reports are frequently missing vital data elements such as vaccination history and disease severity. In addition, varicella deaths are frequently misclassified, and cases of varicella are not counted if they are mistakenly closed out as cases of varicella zoster infection. In 2014, a SAS program was written to flag potentially misclassified or incomplete cases of varicella and generate a report to the Division of Immunizations (DoI). DoI then contacts the investigators and asks them to complete the missing data fields and reexamine and reclassify these cases as appropriate.

Project #1 Objectives and Expected Deliverables:
The Fellow will look at the PA-NEDSS data for varicella, varicella deaths, and varicella zoster virus infection. They will compare the accuracy of case classifications and completeness of reporting of the vaccination history and disease severity before and after the SAS report process was instituted.

In addition, they will make recommendations for ways to further improve the process. The Fellow would summarize their findings into a presentation, a report, and potentially a publication.

Project #1 Impact:
This project will provide important information on the degree of completeness in reporting for varicella that will allow PADOH to meet CDC grant criteria, which allows for more targeted intervention and educational opportunities.

Additional Project #2 Title: Comparative Analysis of Populations Residing Inside vs Outside Sewersheds Participating in PaWSS to Assess the Representativeness of Wastewater Surveillance in Pennsylvania
Project #2 Type: Surveillance System Evaluation

Project #2 Description:
The Pennsylvania Wastewater Surveillance System (PaWSS) collects wastewater data from participating wastewater treatment facilities across the state. Currently over two million Pennsylvania residents reside in the service area of a wastewater treatment facility that is participating in PaWSS or another local wastewater surveillance project that shares data with PAWSS. However, it is currently unknown whether that population is representative of the population of Pennsylvania as a whole. This project will seek to utilize service area shapefiles of wastewater treatment facilities participating in PaWSS along with population data from the United States Census Bureau to compare the population that resides within sewersheds included in the PaWSS program to those that do not. Key variables of interest will include demographic and socioeconomic indicators to determine whether there are certain populations that are not sufficiently captured by the current PaWSS data. Findings will be used to advise future site recruitment efforts.

Project #2 Objectives and Expected Deliverables:
The Fellow will work closely with members of the PaWSS team to complete this project. Key objectives will be to gather data on demographic and socioeconomic indicators from the United States Census Bureau for analysis, use existing sewershed shapefiles to classify census tracts in Pennsylvania as being located within or outside of a sewershed of a PaWSS facility, and conduct data analysis to compare these census tract groups. Outcomes of this analysis will be summarized via internal reports in order to advise recruitment efforts and may also be used to draft an abstract to submit to local or national conferences.

Project #2 Impact:
This project will be used to determine whether there are certain populations in Pennsylvania that are more or less likely to be included in the PaWSS data. Findings will be used to inform the team's interpretation of PaWSS data, identify inequities in the distribution of PaWSS facilities across communities, and may advise future recruitment efforts.

Please Describe the Fellow's Anticipated Role in Preparedness and Response Efforts – Include Activities and Time Allocation (Required Competency of Fellowship)

Preparedness activities range from investigations of cases and outbreaks of CDC category A, B, and C agents (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5042a1.htm); novel influenza A, with special focus on HPAI and H5N1, (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6035a6.htm?s_cid=mm6035a6_w), and preparedness and response for all-hazards -- for public health emergencies not limited to bioterrorism and infectious disease outbreaks. Preparedness and response for other public health emergencies are within the purview of other offices of the PA DOH and other Pennsylvania state agencies. Numerous opportunities will arise for training provided by partner agencies and stakeholders, including human and animal health agencies, regional preparedness task forces, emergency medical services, emergency management, law enforcement (FBI), U.S. Department of Homeland Security, and the National Guard.

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The Fellow will have the opportunity to work closely with the Bureau of Public Health Preparedness and the Division of Community Epidemiology's Community Preparedness Section throughout the course of their fellowship. Opportunities for participation in regional preparedness conferences as well as training exercises and workgroup meetings are frequently available.

Please Describe the Fellow's Anticipated Role in Cluster and Outbreak Investigations – Include Activities and Time Allocation (Required Competency of Fellowship)

PADOH conducts at least seventy disease outbreak investigations each year. The Department also works closely with CDC. CSTE Fellows have continuous opportunities to provide public health consultation and to investigate disease outbreaks. The mentors for this Fellow are heavily involved in enteric outbreaks and zoonotic outbreaks, both of which lend themselves to investigation opportunities for Fellows. The plan is for the Fellow to become progressively more involved in outbreak investigations over the course of the Fellowship, from participating in an outbreak investigation under someone else's lead all the way up to leading an investigation themselves. Outbreak investigation needs can be vary depending on the year or the circumstances, but there has historically been a good balance between working on core competencies like a major project and responding to emergent situations like outbreaks.