ID: 76135395
One Health, Infectious Diseases - Host Site Description
Massachusetts Department of Public Health

Assignment Location: Jamaica Plain, US-MA
Massachusetts Department of Public Health
Bureau of Infectious Disease and Laboratory Sciences

Primary Mentor: Catherine (Katie) Brown, DVM MSc MPH
State Epidemiologist and State Public Health Veterinarian
Massachusetts Department of Public Health

Secondary Mentor: Matthew Osborne, MPH
Senior Zoonotic Disease Epidemiologist
Massachusetts Department of Public Health

Work Environment
Hybrid

Assignment Description

The fellow's assignment will be as a Zoonotic and Vector-borne Disease epidemiologist in the ZVBD Program in the Division of Epidemiology. The fellow will participate in all programmatic activities related to surveillance, prevention and control of VBDs. A primary focus of this assignment will be on the impact of extreme weather on endemic and emerging VBDs and associated vectors. Massachusetts is a high incidence state for several VBDs resulting in significant morbidity. The assignment will utilize a One Health approach, coordinating with external partners including CoEs and agencies including the Bureau of Climate and Environmental Health and the Department of Agricultural Resources.

Day to day activities will mirror that of other VBD epidemiologists. These activities include but are not limited to: participating in a variety of monthly national, stakeholder and regional VBD related calls and webinars (CDC, CSTE, etc.), weekly check-ins with VBD Program leads and VBD Program team meetings, bi-weekly division huddles with clinical leadership, monthly division meetings, quarterly Bureau meetings, weekly responsibility for coverage of VBD related morbidity and investigations, work on specific analytic projects related to ZVBD Program responsibilities and goals, and participation in VBD outbreak investigations.

The Fellow will also have the opportunity to gain experience on zoonotic disease case investigations under the guidance of the Zoonotic Disease Epidemiologist and the State Epidemiologist/State Public Health Veterinarian.

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

The fellow will have access to all of the same surveillance systems, data sources, and statistical software that all members of the Zoonotic and Vector-borne Disease Program have access to. These data include but are not limited to the Massachusetts Virtual Epidemiologic Network (MAVEN) data (our web-based surveillance and case management system), and a separate database that houses all mosquito surveillance data going back to 2004 (the Arbovirus Database). The mentors will also help introduce the Fellow to publicly accessible data on climate and land use, and will coordinate with the MDPH Bureau of Climate and Environmental Health to learn from surveillance data collected by them. Access to syndromic surveillance data, through ESSENCE may also be arranged depending on need. All staff have access to the Office 365 suite of products, as well as SAS and R. In terms of analytic support, the Division of Epidemiology has an active SAS user group, to support one another with analytic project work, and access to periodic SAS courses through the state's online training platform.

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Within the Division of Surveillance, Analytics and Informatics, also within BIDLS, there are staff with expertise in GIS using the ArcGIS platform, R Studio, SatScan, Tableau and other analytic and visualization tools.

Projects

Surveillance Activity Title: Climate Effects on the Epidemiology of Vector-borne Diseases in Massachusetts

Surveillance Activity Description:
Endemic and emerging Vector-borne diseases (VBD) are a leading cause of infectious disease in Massachusetts. In a typical year, the ZVBD Program identifies and classifies several thousand tick-borne disease cases. During periods of arboviral outbreaks, caused by the mosquito-borne pathogens West Nile virus and eastern equine encephalitis, dozens of human cases will be identified and investigated. While we are fortunate to have a robust and adaptable surveillance and investigation platform (MAVEN), to assist with our management of these responses and associated lab results and facilities, the data visualization capabilities of MAVEN are limited. Robust arboviral surveillance data is held in a separate accessible MDPH database. Regional active tick surveillance data are available and passive tick surveillance data are held by a partnering CoE.

The ZVBD team intends to develop a surveillance and resource guide for MDPH and the 351 municipal Boards of Health drive adaptations to extreme weather and its' impacts on endemic and emerging VBDs. This resource will be built using accessible databases held by MDPH, state agencies, federal agencies, and partnering CoEs With support and guidance from ZVBD Team Leads, colleagues in our Division of Surveillance, Analytics and Informatics and the Bureau of Climate and Environmental Health, the fellow will develop the parameters and list of data elements necessary to populate models to monitor changes in VBDs associated with extreme weather impacts and which can be used to develop intervention strategies. Identifying these elements will be followed by a gap analysis and recommendation of ways to capture missing data elements.

Surveillance Activity Objectives:
The primary objective is to create a comprehensive catalog of data elements that are necessary to fully describe and monitor the impact of weather on vector-borne disease trends. Specific deliverables include:

- Complete MAVEN training and achieve required competencies to be granted access to the system.
- Develop a project plan and obtain approval from ZVBD Program Leads.
- Develop a list of desired resources, based on feedback from interviews with ZVBD Program leads and experience from engagement with internal and external partners.
- Create a list of required data elements from individual and cluster surveillance data in MAVEN, necessary for analysis
- Collaborate with partners to evaluate arboviral surveillance data
- Collaborate with CoEs on extrema weather data resources
- Gap analysis identifying missing data elements
- Recommendations for collection of missing data identified through gap analysis

Surveillance Activity Impact:
Massachusetts is on the leading edge of the emergence of at least one invasive tick species and one invasive mosquito species. The emergence of both of these vectors may have significant implications for trends in vector-borne disease. The public health goal of this project is to assist MDPH in developing necessary additional surveillance tools to capture important data necessary to monitor and respond to changes in teh epidemiology of vector-borne diseases.

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Surveillance System Evaluation Title: Completeness of Case Classification of High-Volume Tick-borne Diseases in Massachusetts

Surveillance System Evaluation Description:
Surveillance data for vector-borne disease is held in the Massachusetts Virtual Epidemiologic Network (MAVEN), our web-based surveillance and investigation platform. Every year, because of the high volume of positive lab reports for babesiosis and anaplasmosis, many reports go uninvestigated by the municipal Boards of Health with the result being that they cannot be classified or counted in the surveillance system. The over-arching result is an annual under-counting of the true burden of these two tick-borne diseases. In addition, important data elements go uncollected even in cases that are investigated so that the demographic details of these two diseases remains unknown. Additional critical data variables that are incomplete include industry and occupation and exposure risk questions relevant to each disease. The Fellow will work with the ZVBD Program to analyze missingness in key data elements, describe gaps in the ability to fully describe the affected populations, and quantify the number of lab reports consisting of confirmatory evidence that are incomplete each year. There are likely to also be opportunities to match case data with workmen's compensation claims data to assess the burden of tick-borne diseases on certain employees and employers.

Surveillance System Objectives:
The overall objective is to evaluate the quality and completeness of data available to fully describe the second and third highest volume tick-borne diseases in Massachusetts, babesiosis and anaplasmosis. Specific deliverables include:

- Complete MAVEN training and achieve required competencies to be granted access to the system.
- Develop a project plan including the list of key variables and obtain approval from ZVBD Program Leads.
- Analyze data completeness of key variables for both diseases and describe gaps
- Propose a list of suggestions to improve data completeness.
- Present findings to the Zoonotic and Vector-borne Disease Working Group and municipal Boards of Health during a regular call

Surveillance System Impact:
By identifying the largest gaps in surveillance data for anaplasmosis and babesiosis, MDPH hopes to:

- encourage improved data completion by municipal Boards of Health during case investigation
- include a description of what is not known about cases of these two tick-borne diseases in surveillance reports
- illustrate the possible total case count based on confirmatory laboratory data reports without corresponding clinical information in order to demonstrate an estimate of the true burden of these two diseases
- document the impact of tick-borne diseases on employers through measurement of workman's compensation claims

Major Project Title: Exploring Simple Models to Describe the Effects of Climate on Vector-borne Diseases in Massachusetts

Major Project Description:
Endemic and emerging Vector-borne diseases (VBD) are a leading cause of infectious disease in Massachusetts. We are a high incidence state for tick-borne diseases such as Lyme disease Anaplasmosis, and Babesiosis. Arboviral diseases including Eastern Equine Encephalitis virus, Powassan virus, and West Nile virus result in significant morbidity and mortality annually. Vector-borne disease transmission dynamics are highly complex, making outbreaks difficult to predict and control. VBDs are influenced by environmental factors, weather instability poses statewide structural surveillance and response challenges. A One Health perspective that recognizes the interplay between animal hosts, vectors, environmental variables and human activity is vital to assess and intervene. To this end MDPH collaborates with external partners such as CoEs and multiple agencies including the Bureau of Climate and Environmental Health and the Department of Agricultural Resources.

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The Fellow will work with the secondary Mentor on an initiative to assess the impacts of shifting weather patterns on endemic and emerging VBDs. The goals of this effort would be to assess both short and long-term impacts of observed changes in the length of the mosquito and tick seasons on VBD transmission, changes in winter weather severity and emergence of new vectors. Using information gained from the Surveillance Activity and depending upon the interest and biostatistical skill of the Fellow, the Mentor and Fellow may develop their own simple models or may collaborate with the CoEs and other academic partners (or both). The intent is to form a collaborative with multiple state agencies and external partners including neighboring state agencies, CoEs and Mosquito Control Projects and utilize the information to help focus surveillance efforts for endemic and invasive vector species. This project will require work with the collaborative in order to fully develop the objectives and deliverables based on what is achievable with the data currently know,

Major Project Objectives:
The overall objective is to create a collaborative to share knowledge and utilize existing data to focus surveillance efforts for both endemic and emerging VBDs.

Specific deliverables include:

- Engage agencies and neighboring states in a collaborative
- Develop a monitoring program for invasive vectors
- Coordinate VBD activities and surveillance strategies with CoEs to promote efficiency of effort and prevent duplication
- Create a monitoring schedule and assigned duties to partner agencies
- Present to the Working Group and Epidemiology Program
- Develop a resource for local health engagement and community buy in to existing mosquito and tick control structures

Major Project Impact:
Although this work is likely to serve as a foundation for additional work rather than a solution in and of itself, the long-term public health goal is to improve the ability of public health to predict outbreaks of vector-borne diseases, track changes in vector distribution and abundance, and provide early alerts to residents and healthcare providers in Massachusetts.

Additional Project #1 Title: Statewide Zoonotic Disease Working Group
Project #1 Type: Major Project

Project #1 Description:
MDPH previously organized and led a multi-agency zoonotic disease advisory committee which included representatives from public health, state wildlife agency, state and federal departments of agriculture, Tufts Veterinary School, animal welfare organizations, animal control, the New England Zoo, and others as needed. The primary benefit of the group was the routine ability to discuss current One Health issues that affected animals and people in Massachusetts. When the group was originally most active, both H5N1 avian flu and terrestrial rabies were issues of ongoing concern. The group developed a multi-agency avian flu frequently asked questions that was approved through all agencies and became the standard for communication on the topic across Massachusetts. The group also developed a shared understanding about inter-agency communications about identification of diseases in wildlife, domestic animals and humans. While only certain diseases in domestic animals and humans are reportable, there was often utility in sharing that information with the wildlife agencies and in them sharing information about the identification of diseases in wildlife with public health. The group organically fell apart due to changes in staffing but the need for it has not vanished. In the current setting, H5N1 remains a concern and other potential issues include brucellosis in canines, raw milk, antibiotic resistance emergence in domestic pets and invasive mosquito and tick species.

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Project #1 Objectives and Expected Deliverables:
The project objective is to re-establish regular working group meetings focusing on a core set of representatives and a secondary group of representatives from agencies that could be pulled in for specific topics. The AE Fellow would be expected to:

- work with mentors to develop a list of core agencies and identify representatives from each who can commit to regular attendance (no more than once monthly)
- survey the core group on issues of concern that this working group should consider taking on
- work with the core group to identify other agencies and individuals who could be invited optionally but would be approached to participate when they could provide expertise for a certain topic or issue
- survey the optional invitees for additional issues of concern that the working group could address
- develop agendas and organize meetings on a regular cadence to support the working group

Project #1 Impact:
The expected public health impact of this is to re-establish relationships between agencies and groups focused on human and animal health and environmental health issues. Working together, these groups are uniquely positioned to craft One Health responses to multi-disciplinary problems. Responses to zoonotic disease issues that are driven solely by human health interests, or those driven solely by agricultural interests, are unlikely to succeed and have historically led to aggravation of already complicated relationships and incomplete outcomes.

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

The Division of Epidemiology enjoys a collaborative working relationship with our partners in the MDPH Office of Preparedness and Emergency Management (OPEM). There are multiple preparedness activities ongoing at the Department including: development of an inter-state transfer protocol for patients diagnosed with a high-consequence infectious disease (e.g. Ebola virus disease) requiring care at the Region 1 Regional Emergency Special Pathogens Treatment Center which exists in Massachusetts; refinement of existing plans for response to outbreaks of Eastern equine encephalitis (EEE), a mosquito-borne disease which impacts Massachusetts disproportionately; and updates to the statewide Infectious Disease Emergency Response plan which includes appendices for specific pathogens. Depending on the progress of each of these efforts and the specific interests of the fellow, these are several of the opportunities for involvement in preparedness efforts that they could engage in. In terms of response efforts, large outbreaks often require an all- hands on deck approach for at least some period of time. Previous Applied Epidemiology Fellows have been included in large, multi-state food- borne disease outbreaks and EEE response activities. Emerging issues that could also provide experience include response to migrant populations and significant increases in active tuberculosis and congenital syphilis cases. We anticipate that emergency preparedness work will be 5% or less but that involvement in response activities may add to the proportion of time the fellow spends in cluster and outbreak investigation by 5-10%.

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

Zoonotic and vector-borne diseases are less likely than other types of diseases to result in clusters or outbreaks (according to our experience at MDPH). However, there larger outbreaks and clusters that inevitably occur in food-borne or water-borne diseases and healthcare-associated infections, as well as sometimes in viral hepatitis. There is currently an HIV cluster ongoing among people with injection drug use which will likely take additional response efforts as well as a tuberculosis outbreak among people who are unstably housed that is also likely to continue for some time. Most previous AE Fellows hosted by MDPH have gained their required competency through responding to a food-borne outbreak and the mentors will work with the Fellow to identify an appropriate cluster/outbreak to gain experience from.