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Infectious Diseases, One Health - Host Site Description
Wisconsin Department of Health Services

Assignment Location: Madison, US-WI
Wisconsin Department of Health Services
Division of Public Health, Bureau of Communicable Diseases

Primary Mentor: Angie Maxted, DVM, PhD
State Public Health Veterinarian
Wisconsin Department of Health Services

Secondary Mentor: Hannah Segaloff, PhD, MPH
Career Epidemiology Field Officer
Wisconsin Department of Health Services, Centers for Disease Control and Prevention

Work Environment
Hybrid

Assignment Description

The CDC/CSTE Applied Epidemiology Fellow will be assigned to the Communicable Diseases Epidemiology Section (CDES) within the Bureau of Communicable Diseases (BCD). BCD is responsible for the prevention and control of communicable diseases in Wisconsin. The Bureau provides surveillance and epidemiological follow-up of more than 80 reportable communicable diseases.

The Fellow's assigned section, CDES, is responsible for maintaining and improving surveillance for all communicable diseases other than AIDS/HIV, sexually transmitted diseases, TB, healthcare-associated infections, and vaccine preventable diseases, which are handled by other BCD sections. CDES's responsibilities include the epidemiologic investigation and response to: foodborne, waterborne, and vectorborne diseases; zoonotic diseases; most communicable disease outbreaks; influenza, COVID-19, and other respiratory diseases; invasive diseases; and emerging and re-emerging diseases among others.

The Fellow will be assigned physical space in CDES near the mentors. The Fellow will have flexibility to work remotely 1-5 days/week as projects allow. 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. Attendance at off-site meetings and conferences is encouraged.

Daily activities, particularly early in the Fellowship, will be related to the Fellow's surveillance activities and major projects, and learning the basics of disease surveillance in Wisconsin. With the mentors' guidance, the Fellow will develop an in-depth understanding of communicable disease investigation and follow-up. The Fellow will be expected to conduct some routine and outbreak-related patient interviews using existing interview tools as a component of surveillance. As an initial surveillance activity, the Fellow will review campylobacteriosis and salmonellosis 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 guidance, the fellow will investigate clusters of illness related to contact with live poultry. The fellow will review, improve, or establish additional disease surveillance systems for zoonotic diseases (toxoplasmosis, animal rabies, rabies post-exposure prophylaxis), respiratory diseases (influenza hospitalizations, severe acute respiratory illness (SARI)), and will evaluate the recently-established Foodborne & Waterborne Illness Complaint System.

With progressive gains in expertise, the Fellow will be encouraged to identify additional projects of interest. The Fellow will be expected to attend and participate in bi-weekly communicable disease meetings with the other program areas in the CDES, weekly conference calls with the Wisconsin State Laboratory of Hygiene, and bi-monthly interagency One Health meetings. The Fellow will be encouraged to participate in CSTE, CDC, and other workgroup calls to learn more about communicable disease surveillance, investigation, and prevention across the country. While all mentors are available at any time and would expect routine contact with the Fellow, weekly meetings will be scheduled to review progress, discuss the work plan, and ensure any needs are being addressed.

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

We are committed to helping the Fellow develop analytical expertise. CDES staff routinely use SAS applications, but R and Tableau are also used. While not used routinely, SPSS and STATA are available to the Fellow upon request. The fellow will have opportunities for training and to grow their abilities in these systems. Epidemiologists, statisticians, and other analysts within CDES and throughout the Division of Public Health are willing and able to provide technical support. The Fellow will have the opportunity to access and use multiple databases. Work conducted within BCD will intensively use the Wisconsin Electronic Disease Surveillance System (WEDSS) which is the State's web-based disease reporting and management system and is the system to which cases of reportable diseases and animal bites are reported, laboratory data are submitted, and case interview data are entered. The Fellow will also become familiar and comfortable using both EpiInfo and Access databases. Data from ESSENCE and the National Syndromic Surveillance System will be used to identify animal bites and rabies post-exposure prophylaxis events from emergency department visits; ESSENCE data is also used for health monitoring during large gathering events. Depending on specific project needs other potential data sources that may be accessed include vital statistics, hospitalizations, emergency department visits, EMS data, immunization registry, BRFSS, poison control center calls, cancer registry, birth defects registry, and air and water quality datasets. In addition, the Fellow will be encouraged to use GIS to visualize and map health data, and training courses are available in-house.

Projects

Surveillance Activity Title: Campylobacter Infection Surveillance

Surveillance Activity Description:
The burden of illness associated with Campylobacter infections among Wisconsin residents is significant. Approximately 1500 campylobacteriosis cases are reported annually, and multiple campylobacteriosis outbreaks. Case data are submitted from laboratories and clinicians throughout the state. Patients diagnosed with campylobacteriosis are interviewed by local public health staff regarding their exposures and clinical specimens are forwarded to the Wisconsin State Laboratory of Hygiene for confirmation and subtyping. This data is reported to the Wisconsin Electronic Disease Surveillance System (WEDSS).

The Fellow will work with the enteric disease epidemiologists to learn all aspects of enteric disease surveillance. This will include conducting routine surveillance activities aimed at identifying clusters for further investigation, or individual cases requiring additional follow-up or interventions by local public health. These surveillance activities provide essential experience for understanding the roles of local and state agencies. The Fellow will also have the opportunity to work with staff at the Department of Agriculture, Trade, and Consumer Protection (DATCP) to gain an understanding of the regulatory and environmental health components of food safety and outbreak investigations.

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Surveillance Activity Objectives:
1. The Fellow will complete a 10-year surveillance summary and analysis of campylobacteriosis data to describe burden and demographic, temporal, or exposure trends.
2. Based on the results from the surveillance summary and analysis the Fellow will provide recommendations to update DHS investigation recommendations, control measures, and WEDSS case form.
3. The Fellow will create a presentation to share the results of the summary and data analysis with professional audiences.
4. The Fellow will create a presentation on the prevention and control of campylobacteriosis in Wisconsin for the general public based on the results of the surveillance summary and data analysis.
5. The Fellow will create an infographic for the prevention and control of campylobacteriosis in WI using the results from the surveillance summary and data analysis.

Surveillance Activity Impact:
Results of the surveillance summary and data analysis will be used by DHS to update investigation recommendations for local health departments. It will also allow the department to improve our communication about campylobacteriosis risk factors and prevention measures to the public.

Surveillance System Evaluation Title: Evaluation of the Foodborne & Waterborne Illness Complaint System

Surveillance System Evaluation Description:
On February 1, 2024, the Enteric and Waterborne Diseases Unit (EWDU) of the Wisconsin Division of Public Health released the "Feeling Sick? Report it Quick!" centralized food and waterborne complaint tool (https://www.dhs.wisconsin.gov/foodborne/report-illness.htm). This complaint tool was designed to address local and tribal health departments (LTHDs) need for a more efficient way of collecting and documenting complaints of possible foodborne illness. Additionally, the centralized complaint system allows the EWDU team to monitor for multijurisdictional outbreaks that might not be noticed if individual complaints are reported to different LTHDs. Enteric diseases epidemiologists collaborated with DHS WEDSS and Self Reporting Team to develop a user-friendly web-based form able to collect the complaints and transfer that data securely to WEDSS. Now that the system has been operational for a full year, a formal surveillance system evaluation is planned describe and assess the utility of the system against expectations and published guidelines.

Surveillance System Objectives:
Under the guidance of EWDU epidemiologists, the Fellow will
1. Summarize data generated by the system during its first year of operation (including code development);
2. Perform a formal evaluation of the Foodborne & Waterborne Illness Complaint System using standard, published criteria; and particularly the applications effectiveness in detection of multi-jurisdictional outbreaks;
3. Track the tool's performance according to the Council to Improve Foodborne Outbreak Investigations (CIFOR) Guidelines, Chapter 8: Performance Metrics for Foodborne Illness Programs.

Surveillance System Impact:
Results of the evaluation will be used by DHS to make further system modifications to improve efficiency, acceptability, and usefulness.

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Major Project Title: Identifying Potential Rabies Exposures and Rabies Post-Exposure Prophylaxis using Novel Data Sources

Major Project Description:
Despite the obligation that public health has to prevent human rabies, neither rabies exposures nor animal bites are reportable statewide in Wisconsin. Neither are courses of rabies post-exposure prophylaxis (RPEP) reportable. It's thought that gaps exist in Wisconsin's rabies control environment, involving both public health and healthcare, which result in suboptimal follow-up, inefficiencies, and healthcare waste. Follow-up of animals that have bitten a person can determine whether rabies was transmitted at the time of the bite; however when bites are not reported to ensure proper animal follow-up 2 different poor outcomes may occur: 1) an animal that was assumed not to be rabid at the time of the bite is in fact rabid and rabies transmission occurred, or 2) an animal is assumed to be rabid, even when it can be determined that it is not, and the bitten person receives RPEP unnecessarily. Guidelines exist for determining when RPEP should be considered, but it's likely that far more RPEP courses are administered than are necessary. Currently, the number of animal bites or other potential rabies exposures, and the number of RPEP courses administered (including those courses that are started and never finished) in Wisconsin, and how these vary geographically, are unknown. These data are important to understanding the burden of animal bites and potential rabies exposures, the burden upon the healthcare system for RPEP, and how much RPEP could potentially be avoided. Evaluation of such data could help public health understand where further guidance and communication is needed.

Recently, other states have explored novel sources of data to quantify animal bites and potential rabies exposures within their state and have found that use of passive data systems, e.g., emergency department discharge diagnoses, and immunization registries, perform just as well or better than healthcare provider-dependent event reporting for tracking bites/exposures and RPEP. Wisconsin uses ESSENCE for ED discharge and syndromic surveillance, and the Wisconsin Immunization Registry to capture rabies vaccine administrations.

Major Project Objectives:
The Fellow will:
1. Use existing queries developed by other states on Wisconsin ESSENCE data, to identify potential animal bites or rabies exposures and particularly when RPEP was administered (initiated and completed);
2. Use immunization registry data to identify courses of RPEP;
3. Evaluate several years' worth of data to identify metrics that might be used as a proxy for RPEP and that are useful to signal trends or gaps.

Major Project Impact:
This work is expected to provide WI DHS with useful tools to evaluate the effectiveness and efficiency of rabies prevention measures, using existing data sources, and without any additional effort necessary by healthcare providers.

Additional Project #1 Title: Severe Acute Respiratory Infection Surveillance
Project #1 Type: Major Project

Project #1 Description:
Since the beginning of the COVID-19 pandemic, circulation of seasonal respiratory viruses has been augmented. The introduction of a new seasonal respiratory virus in SARS-CoV-2, in addition to altered pattern of disease circulation and intense strain on the hospital system has highlighted the importance of a robust and multifaceted respiratory virus surveillance system. Wisconsin currently requires reporting of hospitalizations associated with influenza, COVID-19, and RSV. In order to enhance respiratory virus surveillance in Wisconsin, DHS is commencing severe acute respiratory infection surveillance among pediatric patients.

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The fellow will aid Dr. Segaloff and the Respiratory Virus Surveillance coordinator in the launch and monitoring of this system through coordination with laboratory colleagues and infection preventionists at children's hospitals across Wisconsin. They will also have the opportunity to monitor initial data retrieved from this system and contribute to improvements throughout the season.

Project #1 Objectives and Expected Deliverables:
1. Work with health department subject matter experts and external collaborators to ensure surveillance data is flowing properly at the beginning of the respiratory virus season.
2. Monitor weekly data and address any gaps in the surveillance with laboratory or health system colleagues to improve the system.
3. Work with health department colleagues to develop outreach and communication based on the data received, including integrating results into the standing weekly respiratory virus surveillance report.
4. At the end of the season, interpret and describe seasonal data for an external communication to describe viral activity during the respiratory virus season.

Project #1 Impact:
The Fellow's work will improve respiratory virus surveillance in Wisconsin, giving stakeholders and the public a more nuanced picture of seasonal viral activity, encouraging appropriate action to reduce the burden of disease and enhance hospital preparedness.

Additional Project #2 Title: Surveillance and Response to Emerging Vector-borne Diseases
Project #2 Type: Surveillance Activity

Project #2 Description:
Vector-borne diseases, especially tick-borne diseases, are a significant disease burden in Wisconsin. In addition to Wisconsin being designated by the CDC as a high incident state for Lyme disease, rates of anaplasmosis reported in Wisconsin are routinely among the highest in the country. Furthermore, several emerging and geographically discrete tick-borne infections can be acquired in Wisconsin, including infections from Borrelia miyamotoi, Borrelia Mayonii, and Ehrlichia muris eauclairensis, the last of which was first identified in a Wisconsin resident in 2009. While more rare than tick-borne infections, the emergence of mosquito-borne infections (especially Jamestown Canyon Virus and Eastern Equine Encephalitis virus) are also of concern in Wisconsin. Finally, surveillance for tick species not routinely expected to be found in Wisconsin such as Amblyomma americanum and Haemaphysalis longicornis is becoming more important.

The CSTE Fellow would be encouraged to work with the DHS Vector-borne Diseases (VBD) Program to identify at least one project during their fellowship that would allow them to gain experience and expertise in Vector-borne disease surveillance or response. Projects would be tailored to both the interest of the fellow and emerging needs of the program but could include projects focused on data analysis, field work/tick surveillance, program evaluation, or communicating public health information. Wisconsin has a robust VBD Program within the DHS Bureau of Communicable Diseases that includes epidemiology capacity, a state public health entomologist, and support from public health educators. In addition, DHS works closely with the University of Wisconsin (which has been designated by the CDC as the Midwest Center of Excellence for Vector-borne Diseases), the Wisconsin Department of Natural Resources, Wisconsin local and tribal health departments, and private healthcare partners. The VBD Program conducts routine surveillance of reportable vector-borne diseases (tick-borne and mosquito-borne) in people, conducts active tick and mosquito surveillance via tick drags and other field work, provides annual training to local and tribal health agencies, runs an annual awareness campaign using social media called *Fight the Bite*, and manages a passive tick surveillance program offering an online tick identification service.

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Project #2 Objectives and Expected Deliverables:
Possible fellow projects and opportunities:
1. Evaluation of the VBD Program's enhanced surveillance program for the detection of rare/emerging arboviruses such as Powassan virus.
2. Develop and perform a surveillance project to assess occupational risk factors for tick-borne disease infection.
3. Conduct a surveillance program evaluation of emerging tick-borne disease pathogens (e.g., Borrelia miyamotoi or Borrelia Mayonii).
4. Conduct a field project with the state public health entomologist to characterize endemic tick populations or identify emerging tick species and/or pathogens.
5. Participate in response to an emerging vector-borne disease pathogen or a new cluster of human vector-borne disease cases (should one occur).
6. Coordinate the development of a multi-agency Asian longhorned tick state surveillance and response plan.

Project #2 Impact:
The Fellow's work will strengthen the understanding of vector-borne diseases, emerging threats, and effective response to these threats by the public, local public health agencies, state agencies, and other partners.

Additional Project #3 Title: Enhancing Surveillance for Toxoplasmosis, Congenital Toxoplasmosis, and Toxoplasma gondii Infection
Project #3 Type: Surveillance Activity

Project #3 Description:
Toxoplasmosis is reportable in only a handful of states, including Wisconsin. The first nationally standardized surveillance case definition for toxoplasmosis, including congenital toxoplasmosis, was adopted for 2024. The new case definitions also allowed for subclassification of toxoplasmosis cases into categories based on whether the infection was inactive or actively causing disease, and if active, if the disease was attributable to initial infection or reactivation of the parasite. Despite using the new case definition for toxoplasmosis, Wisconsin has yet to implement the more granular subclassification in surveillance and issue the associated guidance to local and tribal health departments (LTHDs) regarding case investigation and follow-up. Using materials developed by the national toxoplasmosis working group, the fellow will assist with creating new surveillance and investigation tools to be integrated into WEDSS, developing a guide for LTHDs for prioritization of case follow-up and case classification using the new subcategories, and providing ongoing review of new toxoplasmosis cases to identify possible foodborne disease clusters, congenital cases, or reactivation disease cases.

Project #3 Objectives and Expected Deliverables:
The fellow will:
1. Use material developed by the toxoplasmosis working group to create new investigation tools in WEDSS for each subclassification
2. Create a guide for investigation of newly reported toxoplasmosis cases for LTHDs

Project #3 Impact:
This project will lead to a greater understanding of the burden of toxoplasmosis along the continuum of disease stages in Wisconsin, and will provide direct support to LTHDs tasked with case follow-up.

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

CDES regularly participates in preparedness activities and collaborates with state's emergency preparedness program located in the Office of Preparedness and Emergency Health Care. The Fellow will have the opportunity to meet with these staff to learn more about the program and will be encouraged to complete ICS trainings and other trainings as they are available. The State Public Health Veterinarian is one of the BCD staff responsible for select agent response planning and will be able to identify opportunities for the Fellow to participate in plan revision, simulations, and table-top exercises. Dr. Segaloff works dually between CDES and the Office of Preparedness and Emergency Health Care, and will help identify potential projects of interest to the Fellow. When events occur requiring activation of emergency preparedness plans, the Fellow would be an active participant in a response. Depending on the Fellow's interest in preparedness and response efforts and responses during the Fellow's time at DHS, time allocation may range from a few hours of trainings and exercises to several weeks of full-time preparedness response efforts.

Current preparedness efforts include planning for large-scale outbreaks of zoonotic highly pathogenic avian influenza among the state's agricultural animals (dairy cattle, poultry) and the introduction of travel-associated emerging diseases (clade I Mpox, viral hemorrhagic fevers).

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

The Fellow's placement within the Communicable Diseases Epidemiology Section (CDES) assures they will have ample opportunity to gain experience conducting effective outbreak investigations from experienced epidemiologists. Responding to acute health events is a key responsibility of CDES, and we embrace the importance of opportunities for the Fellow to learn approaches to outbreak investigation and response. They will participate in all aspects of an investigation from generating a hypothesis and developing a questionnaire and database, to interviewing cases, conducting data analysis, and writing the outbreak report.

In particular, the Enteric and Waterborne Diseases Unit (EWDU) investigates dozens of outbreaks (large and small) each year. Routine surveillance activities aimed at identifying clusters for further investigation or individual cases requiring additional follow-up or interventions by local public health. These surveillance activities provide essential experience for understanding the roles of local and state agencies. Salmonella infections associated with backyard poultry (BYP) are increasing prevalent during the spring months as Wisconsin residents populate their backyard poultry flocks, and the Fellow will have responsibility in such outbreaks. The Fellow will work with the EWDU epidemiologists to conduct investigations into Salmonella illnesses from BYP. Whole genome sequencing (WGS) data, environmental testing data, and traceback data will be evaluated to determine the source of salmonellosis infections in BYP owners. Anticipated fellow responsibilities would include: Case patient interviews, coordination of environmental sampling efforts and sample submissions, communications with retail locations where chicks are sold, and providing targeted mitigation recommendations to WI-based source hatcheries.

Depending on the particular interest of the Fellow, opportunities for participating in disease investigations outside of enteric and zoonotic program areas may be available. These could include healthcare acquired infections, respiratory diseases, STIs, or others. In recent years the section has investigated outbreaks of leptospirosis, toxoplasmosis, blastomycosis, histoplasmosis, adenovirus, and Mpox.

Outside of the listed or additional projects, much of the Fellow's time will likely be allocated to cluster and outbreak investigation and particularly in the busy spring and summer months.