Example – CSTE Applied Epidemiology Host Site
Infectious Diseases-Foodborne, Infectious Diseases - Host Site Description
Tennessee Department of Health

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Disclosure: This is an example of a past host site projects proposal and is not intended to be an available host site location. This is posted for example purposes of the projects and activities a host site can propose for the fellow.

Assignment Location: Nashville, US-TN
Tennessee Department of Health
Communicable and Environmental Diseases and Emergency Preparedness

Work Environment
Hybrid

Assignment Description

The CSTE fellow will be fully integrated into the TDH's Communicable Environmental Disease Services and Emergency Preparedness (CEDEP) program. He or she will gain a detailed understanding of TN's Foodborne Diseases Active Surveillance Network (FoodNet), Foodborne Diseases Centers for Outbreak Response Enhancement (FoodCORE) and TN's Integrated Food Safety Center of Excellence's (TN CoE) surveillance and programmatic activities. FoodNet conducts surveillance for nine foodborne disease pathogens and FoodCORE centers work collaboratively with CDC to develop new and better methods to detect, investigate, respond to and control multistate outbreaks of foodborne diseases. The TN CoE is a partnership between TDH and the University of TN as serves as a resource for local, state and federal public health professionals to respond to foodborne outbreaks. TN has been a member of FoodNet since 2000, a member of FoodCORE since 2010 and developed the TN CoE in 2012.

The fellow will be expected to participate and eventually lead, all aspects of an outbreak investigation including questionnaire design, interview training and case/control interviews, data collection and management, data analysis, after-action reviews and report writing. Collaboration with local, regional and state health department staff, as well as agencies outside of TDH such as the Tennessee Department of Agriculture, CDC, FDA, USDA-FSIS and others will be necessary.

CEDEP staff members and fellows have been involved in numerous outbreak investigations and surveillance system projects. Our previous fellow evaluated TDH's Shiga toxin-producing E.coli (STEC) surveillance system to better understand the system's strengths and weaknesses during a time of changing laboratory testing practices. They worked on numerous foodborne outbreak investigations with frontline public health staff. They also collaborated with state and local environmental health and epidemiology staff to create a statewide web-based foodborne illness complaint system. They also collaborated with our previous State Epidemiologist on the development of a manuscript.

Our fellow will have the opportunity to collaborate with CDC and other regional Integrated Food Safety Centers of Excellences (CoE) in developing and delivering food safety training and educational materials to states and jurisdictions in need. In collaboration with the University of TN, the fellow will participate in Whole Genome Sequence training development and delivery. Our fellow will also work with UT to develop best practices on marketing on-line outbreak response trainings for epidemiologists, nurses, disease investigators, laboratorians and environmental health specialists. Our fellow will also work with TDH's SSIP to assist the FDP in the implementation of either the Foodborne Diarrheal Diseases Message Mapping Guide (FDD MMG) or a recreation of the foodborne pages in CEDEP's surveillance system. This will drastically change how TDH captures and manages foodborne disease surveillance data, the National Electronic Disease Surveillance System (NEDSS) Base System (NBS). The fellow will be instrumental in working with both FDP and SSIP staff in creating new enteric disease case report forms, working with SSIP staff to create new pages in the NBS, piloting data entry and evaluating the MMG/updated foodborne disease pages.

We anticipate the new fellow will similarly and successfully work within the context of CEDEP. The fellow will be fully supported to complete projects and take on responsibilities that will influence statewide activities.

DAY TO DAY ACTIVITIES

- Meet with primary and secondary supervisor (preferentially in-person) weekly
- Attend weekly CEDEP meetings, including FoodNet / FoodCORE staff meetings, EHS Net and Environmental Health meetings and SSIP meetings
- Work with SSIP staff to develop and/or modify enteric disease pages in NBS
- Revise enteric disease case report forms to model pages developed in NBS
- Participate fully in interviewing, cluster evaluation, and acute foodborne outbreak investigations
- Become familiar with Whole Genome Sequencing (WGS) and analyzing and interpreting WGS data
- Interview enteric disease cases using standardized surveillance interview tool
- Serve as a consultant for local and regional health department staff on questions regarding foodborne disease outbreak investigations
- Work with the Foodborne Outbreak Coordinator in managing and analyzing enteric outbreak data
- Provide data analysis and report writing support to local and regional health departments
- Attend all statewide epidemiology trainings including monthly CEDEP conference calls and face-to-face meetings
- Conduct special studies to include aspects of study design, implementation, and analysis
- Prepare presentations and publications, and deliver them at state and national meetings

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

The Communicable and Environmental Disease Services and Preparedness (CEDEP) Section of the TDH employs over 60 epidemiologists. Epidemiologists from various programs often meet and consult on how to best analyze data, set up databases and report results. CEDEP epidemiologists also have established a Young Career Professionals group who meet routinely to review journal articles, discuss professional development opportunities, and seek career advice. Our fellow will be integrated within this epidemiology network and will be given the trainings and opportunities all epidemiologists at TDH receive. The fellow will be able to participate in SAS, GIS, REDCap and Tableau training delivered in CEDEP. He or she will also be either introduced and/or trained on CEDEP's various surveillance systems including NEDSS, E-HARS, PRISM, etc.

Projects

Surveillance Activity Title: A review of Shigella sonnei cases in Tennessee

Surveillance Activity Description:
Approximately every five to ten years, TN reports an increase in Shigella sonnei cases. In 2008, TN reported over 900 cases of Shigella. From 2009-2012, between 218-374 cases were reported. However, in 2013, the number of cases of Shigella rose to 815 and was over 900 in 2014. Since 2015, TN has not reported more than 310 cases of Shigella per year. Our fellow will conduct a temporal and geo-spatial review of TN's Shigella sonnei cases to determine if crowding and/or poverty levels attributed to the increase in cases. Our fellow will also describe Shigella sonnei cases by age, race, ethnicity and socioeconomic status to examine possible disparities among these groups.

Surveillance Activity Objectives:

- Describe number and rate of Shigella sonnei cases in TN from 2008-2019

- Compare rates among age, race and ethnicity groups
- Identify locations where Shigella sonnei infections are highest in TN
- Examine poverty levels and household crowding among TN's Shigella cases
- Develop final report and develop manuscript
- Work with local and regional health departments to identify methods to educate populations most affected by Shigella
- Develop Shigella educational materials based on study findings

Surveillance Activity Impact:
This project will allow TN's FED program to better understand racial, ethnic and socioeconomic characteristics of Shigella cases reported in Tennessee. The project will also allow us to possibly determine why spikes of case reports are reported every 5-10 years. Information gained from the surveillance project will allow local health departments to target educational efforts towards groups at high-risk for contracting Shigella sonnei.

Surveillance System Evaluation Title: An Evaluation of Tennessee's Vibrio Surveillance Activities

Surveillance System Evaluation Description:
Cholera and Other Vibrio Illness Surveillance (COVIS) System is a CDC surveillance system for the collection of information for domestic cholera and vibriosis infections. Many cases are likely not reported because Vibrio is not easily identified on routine enteric media. Consequently, clusters or outbreaks of vibriosis may be not recognized. Therefore, CDC expanded the case definition in 2017 to include both confirmed (Vibrio isolated by culture) and probable (Vibrio detected by culture independent diagnostic tests such as PCR) cases. CDC also revised the COVIS form to include detailed information on case demographics, laboratory characteristics, clinical information, epidemiological/exposure data, and seafood traceback. CDC requests the COVIS form be submitted for confirmed and probable cases and Vibrio isolates to be sent to CDC's Reference Laboratory for confirmatory testing and molecular subtyping. Following these changes, Vibrio cases reported in TN increased from 6-20 cases/year in 2010-2016 to 29-37 cases/year in 2017-2021. Since 2017, almost half of TN cases reported travel out of state (47%) and consumption of seafood (50%) prior to the illness onset. From 2017-2021, only one case of V. Parahaemolyticus from TN, who reported eating raw oysters, was included in a 2021 multi-state cluster. During the same period, TN identified a few cases of vibriosis linked to Tennessee seafood venues through Tennessee's Foodborne Illness Complaint Database. In 2022, CDC identified an unprecedented global increase of Cholera infections with 25 countries reporting active Cholera transmission. As of December 2022, a total of 8 new reports of Cholera, including a case from TN, were linked to international travel. An evaluation of the COVIS Surveillance in TN is important to ensure the completeness and timeliness of reporting and data quality of the information requested by CDC. This may help in identifying areas of improvement to identify cases of Cholera and vibriosis and detect clusters and outbreaks. This surveillance system project will ultimately help to strengthen surveillance activities of COVIS within TN jurisdictions, the state public health laboratory, and federal agencies.

The fellow will evaluate the usefulness of Tennessee's COVIS surveillance system in the collection of case information and potential exposures of Cholera and Vibrio infections in a timely way. The fellow will utilize the CDC Guidelines for Evaluating Public Health Surveillance Systems, with a particular focus on the following attributes:

- Simplicity: Are the revised case definition of cholera and vibriosis being applied appropriately? This will be assessed by reviewing the case classification based on the laboratory reports. In the absence of laboratory data, epidemiological data will be assessed for epi-linked cases.
- Data quality: Was the data collected and recorded in COVIS reports and NBS complete and valid?
- Timeliness: What is the time interval between the onset date/isolate date and reporting/investigation of Vibrio cases?
- Sensitivity: How does the Tennessee's COVIS surveillance system help in identifying clusters and outbreaks of Cholera and vibriosis?

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Surveillance System Objectives:

- Interview local public health staff who conduct Vibrio and Cholera investigations and document their process and document successes and barriers to completing the COVIS form and conducting other components of the investigation (i.e., working with restaurants to obtain shellfish tags)
- Interview members of the CDC COVIS team to identify successes and barriers associated with Cholera and Vibrio surveillance activities
- Evaluate the completeness of 2022 and 2023 COVIS forms
- Review the last five years of the annual FoodNet Laboratory Survey to identify laboratory testing method changes
- Determine the percentage of Vibrio specimens/isolates not sent to the State Public Health Laboratory for confirmation and molecular subtyping
- Monitor vibriosis clusters in the System for Enteric Disease Response, Investigation and Coordinator also known as SEDRIC and Tennessee's Foodborne Illness Complaint System
- Complete a surveillance evaluation report with suggestions on how to improve reporting and investigation of vibriosis and Cholera
- Develop an abstract describing the surveillance system project to present at the CSTE Annual Meeting

Surveillance System Impact:

Cholera and all Vibrio species infections are nationally notifiable. Some species have severe outcomes and can be prevented. Evaluating our current ability to identify cases of Vibrio will help ensure we identify and subtype cases of Vibrio in a timely manner to identify possible routes of exposure, clusters and outbreaks, thus preventing future illnesses.

Major Project Title: Examining CIDT co-detections in TN

Major Project Description:
Culture-independent diagnostic tests (CIDTs) are changing the way that clinical laboratories diagnose patients with foodborne illness. These tests can identify bacteria, viruses and parasites within hours, without having to culture or conduct other complex laboratory testing. CIDTs allow clinicians to rapidly determine the possible cause of a patient's illness and have increased in use over the past decade. For example, the percentage of Campylobacter diarrheal illnesses diagnosed only by CIDTs in FoodNet sites increased from 13% in 2012-2014 to 40% in 2021. In some situations, cases can test positive for multiple pathogens making it unclear the cause of illness. CDC FoodNet only reviews data on CIDT co-detections for FoodNet pathogens and do not include pathogens such as C. difficile. The volume of CIDT co-detections is likely higher and could include pathogens that better explain patient illness. This project will explore the volume of co-detections from one large clinical laboratory by looking at pathogens detected by their gastrointestinal (GI) PCR panel test in which at least one reportable illness is identified.

Major Project Objectives:

- Describe the benefits and barriers of CIDTs
- Establish relationship with key partners at large clinical laboratory to obtain needed data
- Request 5 years of GI PCR panel test results from Tennessee residents with at least one reportable illness identified
- Review co-detections by age, gender, race, ethnicity and pathogen type to see if certain groups are more likely to report co-detections than others
- Develop a final report and presentation to describe findings and impact on enteric disease surveillance
- Write and submit an abstract to the CSTE conference or other similar conference

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Major Project Impact:
This project will allow us to better understand the frequency of multiple pathogens detected on GI panels, regardless of if the pathogen is a reportable condition or not. We will also be able to examine if certain groups are more likely to report co-detections than others. Findings may allow us to further explore methods to determine pathogens responsible for illness when two or more are detected.

Additional Project #1 Title: Domestic One Health Zoonotic Disease Prioritization
Project #1 Type: Major Project

Project #1 Description:
The Centers for Disease Control and Prevention utilize One Health Zoonotic Disease Prioritization (OHZDP) workshops both domestically and globally to aid in the prioritization of zoonotic diseases in communities. The OHZDP Workshop is a voluntary and collaborative process that allows countries, regions, and other areas to understand the roles and responsibilities of all represented One Health sectors, create or strengthen multisectoral, One Health coordination mechanisms and networks, develop a list of priority zoonotic diseases of greatest concern agreed upon by all represented One Health sectors, and create recommendations for next steps and action plans for multisectoral, One Health engagement to address the priority zoonotic diseases, including the creation of a report highlighting workshop conversations. The Tennessee Department of Health is actively working toward training and participation in this process. Engagement in this process will be beneficial to Tennessee as we continue to reengage and strengthen foundational efforts of zoonotic disease and One Health work across the state.

Project #1 Objectives and Expected Deliverables:
- Conduct an extensive review of existing zoonotic surveillance data
- Interview key stakeholders who investigate/respond to zoonotic diseases nationally (CDC) and in Tennessee (Tennessee Department of Health, Tennessee Department of Agriculture)
- Attribute point scores to each zoonotic disease in five weighted buckets: clinical outcomes; exposure/transmission/prevalence; safety/security, social/cultural, economic; response capacity; and climate change
- Present research to key decisionmakers who are involved in zoonotic disease surveillance and outbreak response
- Submit research study results to a national conference such as CSTE

Project #1 Impact:
This project enables the fellow to become familiar with zoonotic diseases of greatest concern in Tennessee. Once these diseases have been identified, a clear plan of action stating how to address the chosen priority diseases with other relevant One Health stakeholders will be developed to allow an additional focus in prevention and control measures of the selected diseases.

Additional Project #2 Title: Build Syndromic Surveillance Process for HUS, Norovirus, and other enteric Outbreak Surveillance
Project #2 Type: Surveillance Activity

Project #2 Description:
Syndromic surveillance uses chief complaint and discharge diagnosis data from hospitals across the state to identify trends in a variety of health conditions. Currently, Tennessee has access to the ESSENCE syndromic surveillance system, but does not routinely incorporate this surveillance avenue into enteric disease surveillance. In particular, this avenue could be useful for identifying clusters or outbreaks of pathogens where individual cases are not laboratory reportable (e.g. norovirus) and for identifying diagnoses of hemolytic uremic syndrome, where reporting.

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Project #2 Objectives and Expected Deliverables:

- Receive ESSENCE access and training on building queries and dashboards
- Present to the FED team on the capabilities of ESSENCE and meet with the outbreak team to identify 2-3 conditions to monitor routinely using ESSENCE
- Develop ESSENCE dashboards for selected conditions. Solicit and incorporate feedback from the outbreak team
- Meet with the outbreak team to develop a plan for incorporating these dashboards into routine surveillance activities
- Write a protocol delineating the process for routine monitoring of existing dashboards and a simple ESSENCE SOP for future use.
    - Include any custom query conditions that may be useful in developing a new query down the line
- Optional: compare historical ESSENCE data during outbreaks, and current data during an ongoing outbreak, to determine how robustly ESSENCE may be able to assist with active case finding

Project #2 Impact:
This project will supplement existing surveillance and outbreak detection methods to monitor increases in disease activity, illness burden, and potentially identify disease cases that other reporting methods may have missed. Developing a process to then follow up on these identified clusters/cases will also help TDH staff better understand reportable disease training needs across hospitals.

Additional Project #3 Title: Review TN Outbreak Reports
Project #3 Type: Major Project

Project #3 Description:
Outbreak investigation data in TN is captured in a REDCap database and reported to the National Outbreak Reporting System. Both systems have a wealth of historical data and collect a standardized set of fields.

Project #3 Objectives and Expected Deliverables:

- Conduct a review of TN outbreak reports and summarize outbreak sources, findings, and interventions. Describe the frequency of different types of interventions in outbreaks (can use the new NORS categories) and whether implementation was successful
- Present findings to the FED team and a potentially a national audience
- Conduct a survey of reporting requirements from other states to identify what information, if any, is collected about an outbreak in addition to the standardized NORS fields
- Work with the outbreak team to determine if any fields may be useful for us to incorporate into the TN Enteric Outbreak Database

Project #3 Impact:
This review of historical outbreak data will help us capture more useful information (in aggregate) about outbreaks and determine which interventions are most commonly recommended and readily implemented. This can help outbreak team staff identify outbreak settings, recommendations, and investigation types that we may need a refresher on. Additionally, this project may be able to identify new fields that would be useful to capture as we revamp our outbreak database.

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

Foodborne and enteric diseases outbreak preparedness and response will be a primary job function for our fellow. The fellow will be incorporated into the FED outbreak team and will be responsible for updating the program's FED outbreak

protocol and participating and leading foodborne and enteric disease outbreak investigations. Our fellow will have the opportunity to work with frontline public health staff, the Department of Agriculture, FDA, and other partners on local and multi-state outbreak and cluster investigations. They will participate in at least one environmental assessment of a food service establishment implicated in a foodborne illness outbreak and will assist FED environmental health specialists and FDA in conducting traceback and trace-forward activities. Our fellow will become familiar with the State Health Operations Center and receive training in Incident Command System for public health outbreak investigations. The fellow will also serve as surge capacity during any CEDEP-related outbreaks and emergency response activities outside of foodborne and enteric illness outbreaks. Time allocation: 10-15 hours/month.

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

Our fellow will participate in the FED Program's weekly enteric disease cluster meeting where the FED outbreak team reviews molecular subtyping data to visualize human, animal, and environmental isolates genetic relatedness. Isolates closely related to one another will be examined by our fellow by reviewing the case report form or obtaining information on the origin of the animal/environmental isolates. After reviewing epidemiological data of genetically related isolates and reviewing the National Center for Biotechnology Information to find additional cases/isolates outside out Tennessee, our fellow will report his/her findings during the FED Program cluster meeting and will record information in a REDCap database. If a common source is discovered, moving the investigation from a cluster to an outbreak investigation, our fellow will lead (with support and guidance from CSTE mentors and FED outbreak team members) the outbreak investigation moving forward. As the outbreak investigation lead, our fellow will be asked to coordinate outbreak investigation activities among each discipline (epi, lab and environmental health) at the state and local level. They will be instrumental in developing a routine situation report and will engage with external partners such as FDA and CDC if necessary. Finally, our fellow will be responsible for developing final outbreak report and will develop an abstract/manuscript describing at least one investigation they led. Time allocation:15-20 hours/month.