**Infectious Diseases-Foodborne, Infectious Diseases**

**Tennessee Department of Health, Communicable and Environmental Health Services and Emergency Preparedness**
Nashville, Tennessee

**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 have the opportunity to 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, Jane Yackely, 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. Ms. Yackley worked on numerous foodborne outbreak investigations with frontline public health staff. She has also collaborated with state and local environmental health and epidemiology staff to create a statewide web-based foodborne illness complaint system. Ms. Yackley also collaborated with our State Epidemiologist, Dr. Jones on the development of a manuscript published in Foodborne Pathogens and Disease titled Foodborne Disease Outbreaks in the United States: A Historical Overview (https://www.liebertpub.com/doi/abs/10.1089/fpd.2017.2388).

The 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. The 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. The fellow will contribute to COE’s work by reviewing training competencies for Environmental Health Specialists and other disciplines being developed and piloted by UT the University of Colorado.

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. Ms. Yackley was able to complete all requirements in approximately one year.
**Day-to-Day Activities**

- Attend weekly CEDEP meetings, including FoodNet / FoodCORE staff meetings, EHS Net and Environmental Health meetings as time allows;
- 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 Salmonella and STEC 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;
Potential Projects

Surveillance  Temporal and spatial surveillance of Shigella sonnei cases in TN

Activity

Approximately every five to seven 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. We would like to better understand possible factors associated with increased reports of Shigella over time and geographic location. Our fellow will conduct a temporal and spatial analysis using SaTScan™. He/she will perform geographical surveillance of Shigella cases in TN to detect spatial or space-time disease clusters and to see if they are statistically significant. They will also test whether TN’s Shigella cases are randomly distributed over space, time or space and time. Finally throughout their fellowship, he/she will perform repeated time-periodic disease surveillance for early detection of disease outbreaks and will provide the program with a protocol to continue this surveillance.

Surveillance  Assessing the feasibility of implementing a single outbreak database in CEDEP

Evaluation

All healthcare providers and other persons knowing of or suspecting a case, culture, or specimen of a reportable disease or event shall report that occurrence to the Department of Health. In TN, disease outbreaks (foodborne, waterborne, healthcare acquired, etc.) are required to be reported immediately by phone to public health. TDH responds to close to 150 disease outbreaks each year. Currently aggregated outbreak information is captured in two separate databases. The Foodborne Outbreak Coordinator developed an Enteric Outbreak Database and a Non-enteric Outbreak Database in an attempt to capture all outbreaks reported to CEDEP for grant deliverables and to capture work conducted by frontline public health staff in TN.

Our CSTE fellow will be able to review both outbreak databases and assess whether or not it is feasible to create one centralized system to capture all outbreaks reported to CEDEP. Using the "Updated Guidelines for Evaluation of Public Health Surveillance Systems," our fellow will describe the simplicity, flexibility, data quality, acceptability, sensitivity, predictive value positive, representativeness, timeliness and stability of CEDEPs current outbreak reporting system. This comprehensive evaluation will be able to inform stakeholder of needed system and training improvements, as well as determining if combining both data systems would be beneficial to CEDEP in terms of improved timeliness of reporting and data quality.

Major Project  Integrating NORS Direct into TN’s current enteric disease database

TN reports enteric and waterborne disease outbreaks into CDC’s National Outbreak Reporting System, or NORS. Since NORS does not capture all data needed for various grant metrics (i.e. FoodCORE), a separate Enteric Disease Outbreak Database has been developed. NORS Direct is a feature of the NORS that launched in 2015. It enables state, local, and territorial public health staff to upload electronic outbreak data into NORS. The ability to upload outbreak variables into NORS from our current Enteric Disease Outbreak Database would increase the efficiency and data quality in TN’s outbreak reporting work flow.

Our fellow will work on adapting the TN Enteric Outbreak Database to allow for transmission of complete/finalized outbreak data to CDC via the National Outbreak Reporting System (NORS) Direct.
The database currently allows for transmission of preliminary outbreak information into NORS via NORS Direct. He/she will also explore the possibility of transmission via PHNMS rather than manual upload of outbreak files into NORS Direct. Our fellow will be responsible for completing the modifications to person-to-person outbreak variables in the TDH Enteric Outbreak Database. They will also create NORS Direct mappings and adapt TDH NORS Direct SAS code to incorporate variables for transmission of finalized person-to-person outbreak reports.

The Foodborne Program’s Outbreak Coordinator and current NORS administrator for TN will serve as the main point of contact for this project. Implementing NORS Direct in our current workflow will improve our outbreak reporting timeliness and data quality and will allow our program to achieve deliverables outlined in the OutbreakNet portion of the Epidemiology and Laboratory Capacity grant.

Additional Project Evaluation of WGS implementation in TN and other WGS activities

Whole-genome sequencing (WGS) is replacing pulsed-field gel electrophoresis (PFGE) as the gold standard for cluster identification. WGS provides the ability to identify distinct sub-clusters not distinguishable by PFGE. The TDH's State Public Health Laboratory implemented WGS for Listeria in 2015 and currently sequences all Salmonella, Campylobacter, STEC and Shigella flexneri isolates. Our fellow will evaluate sequence and analysis timeliness compared to PFGE and will provide recommendations to our SPHL partners on sequencing procedures and communicating results with epidemiologists and CDC. The impact of culture independent diagnostic testing on WGS in TN will also be assessed. Our fellow will also be involved with WGS sequence analysis activities and will work with TDH epidemiologists to identify and investigate enteric disease clusters.

Major Project Evaluation of TN’s Integrated Food Safety Center of Excellence web-based courses

The Integrated Food Safety Centers of Excellence identify and evaluate best practices for foodborne disease surveillance and outbreak investigation then share this knowledge with others. CDC named TDH and the University of TN as a Center of Excellence under the authority of the Food Safety Modernization Act (FSMA) on August 31, 2012. FSMA is the most sweeping reform of our food safety laws in more than 70 years. Signed into law on January 4, 2011, FSMA focuses on preventing food contamination and relies on CDC’s expertise in surveillance to accomplish this goal.

With CDC’s support, TN’s CoE aims to:

- Provide technical help and training in epidemiological, laboratory, and environmental investigations
- Decrease the burden of foodborne illness using improved techniques in detection, investigation, control, and reporting
- Use information gathered during outbreak investigations to prevent future illnesses and outbreaks
- Develop and share best practices

One of our Center’s main projects is the development of a web-based Outbreak Investigation and Response training series. The goal for this series of online courses is to train public health professionals and other involved personnel to rapidly identify, investigate and implement control
measures for a foodborne disease outbreak to ultimately reduce the incidence of foodborne illness. Our fellow will evaluate the published courses and in-person activities by describing course participants and analyzing pre/post test results and participant comments. The fellow will be able to provide recommendations for future course improvements and strategies on how to best publicize the course to the target audience.

Our fellow will also be given the opportunity to earn a Graduate Certificate in Food Safety by enrolling in TN CoE’s on-line program provided by the University of TN. The certificate program is designed to build upon and expand concepts from core courses of the curriculum of each discipline’s master’s degree programs and the previous experiences and interests of students. Credit hours obtained for the certificate may also count as graduate degree hours. The certificate is also designed for the current workforce in public health or food industry-related employment to acquire additional training and expertise relevant to their job functions. Course experiences will foster the examination and application of current policy research and the development of skills related to policy analysis, research, program evaluation, and advocacy.

**Preparedness Role**

Our fellow will participate in all ICS training and certification activities and participate in emergency response activities. These include optional participation in Community Assessment for Public Health Emergency Response (CASPER) and acute opioid overdose preparedness activities to provide field experience for the fellow. Tennessee is currently experiencing a Hepatitis A outbreak in many of our health regions. Our fellow will be given the opportunity to assist with the outbreak response at the local, regional and State level. He/she will participate in vaccination clinics and will work with local and TDH staff to identify and vaccinate high-risk cases. Opportunities will exist for the fellow to participate in emergency response training, exercises, and events. The fellow will become familiar with the State and Regional Health Operations Center, Incident Command System, and response plans.

**Additional Activities**

**After Action Review**

The Council to Improve Foodborne Outbreak Response (CIFOR) recommends post outbreak meetings among members of the outbreak team to assess lessons learned and to compare notes on ultimate findings. This type of after-action review is extremely important for multiagency investigations but is also important for single agency investigations. The CSTE fellow will develop an after action process for reviewing outbreaks led by TN public health staff. He/she will work with local, regional and state staff to develop and pilot this plan. Recommendations from frontline and state staff will be evaluated and implemented. A final plan will be presented and will be implemented at the conclusion of foodborne outbreaks led by TN staff. Our fellow will lead After Action Reviews activities during their tenure with TDH and summarize findings.

**Mentors**

**Primary**  
John Dunn DVM, PhD  
Deputy State Epidemiologist

**Secondary**  
Katie Garman MPH  
Epidemiologist 3