Infectious Diseases- HAI
Tennessee Department of Health, Healthcare Associated Infections and Antimicrobial Resistance Program/ CEDEP
Nashville, Tennessee

Assignment Description
The Fellow will be located within the Healthcare Associated Infections and Antimicrobial Resistance Program located within the Communicable and Environmental Diseases and Emergency Preparedness Division. The Fellow will perform job functions similar to an introductory level epidemiologist. They are expected to have strong data analytical skills and the potential for continued learning and improvement of those skills. Tennessee is fortunate to have received significant funding for HAI activities under the emerging infections program and the epidemiology and laboratory capacity grant.

Program goals include:
- Elimination of Preventable Healthcare Associated Infections (HAI) across spectrum of healthcare
- Prevent emergence and spread of multidrug-resistant organisms [MDRO], C. difficile, emerging pathogens (e.g., Ebola, MERS CoV)
- Optimization of antimicrobial use and healthcare worker influenza vaccination

Program strategies include:
- Analyze data reported to the National Healthcare Safety Network [NHSN] and integrated disease surveillance system [NBS], issue reports & use data for action (including prioritization of healthcare facilities, HAI, MDROs)
- Assure quality of data reported (e.g., education, quality data reports, data validation)
- Provide technical expertise and work with partners (e.g., THA, TIPQC, QIN, Network 8, APIC) on quality improvement initiatives/ prevention collaboratives to achieve above goals,
- Perform research studies on the burden, epidemiology of HAI in different settings (e.g., acute care hospitals, nursing homes, dialysis) and emerging pathogens (e.g., carbapenem resistant enterococci [CRE]), HAI mortality, MDRO mortality and piloting of innovative surveillance strategies and/or interventions

The Fellow will receive substantial and continuous support from mentors, peers, and office and administrative staff. The Fellow will interact closely with members of the HAI team. They will have substantial input in determining the projects they pursue. The Fellow will be able to interact and work with team members and receive epidemiological and statistical support from the team. They will also be able to network with other epidemiologists and analysts outside the HAI program.

The Fellow will have the opportunity to work with a variety of different data sets/sources, utilize various types of methods/analyses, engage in primary data collection (including sample selection) as well as data management, linkage of databases, and mapping of data using GIS.
**Day-to-Day Activities**

Depending on their interests and analytic skill level, and the project(s) they choose to participate in, the Fellow’s day-to-day activities may vary. However, the Fellow will, in general, perform the following activities under the supervision of his/her mentors:

- Working on assigned projects (see examples below) and acute outbreak investigations
- Become familiar with the current projects in HAI&AR program and identify projects they want to participate in
- Provide epidemiological support to HAI&AR program, including surveillance
- Write research articles or manuscripts for publication
- Recommend improvements to existing disease surveillance systems and/or initiate the development of new systems
- Write SAS programs to clean data, perform descriptive and analytical statistical analyses, and output results
- Develop written communications (burden report, factsheets, etc.)
- Participate in HAI team meetings and multiple educational opportunities as they arise
- Work collaboratively with other HAI team members and stakeholders on various prevention collaboratives (prevention of catheter associated urinary tract infections, dialysis events, CDI, MRSA, CRE; antimicrobial stewardship) especially across the healthcare spectrum (beyond just acute care hospitals)
- Participate in other activities within HAI &AR program and work interactively and effectively as a member of the HAI team
- Participate in infection control assessments of hospitals, outpatient settings (e.g., urgent care), nursing homes, dialysis facilities
- Meet with primary, secondary, and tertiary mentors
**Potential Projects**

**Surveillance**
Real time surveillance and situational awareness of Carbapenem Resistant Enterobacteriaceae [CRE]

CRE, also named the "nightmare bacteria" by Tom Frieden, director of CDC, has a mortality of 40-50\% among patients with blood stream infections. The resistance element is on a mobile element, which means that resistance could pass from an E. coli to a Salmonella or Shigella. Real time surveillance and situational awareness are critical in controlling antimicrobial resistance as outlined in the August 2015 CDC Vital signs report (see http://www.cdc.gov/vitalsigns/stop-spread/index.html).

The Fellow would expand on the work performed by our current CSTE fellow (see: http://cste.sitemym.com/blogpost/1084057/228108/Maps-as-a-Tool-for-Combating-Antimicrobial-Resistance). We envision creation of maps of likely carbapenemase producers and by mechanism or resistance (e.g., KPC, NDM). The Fellow also would have the opportunity of providing input into a proposed XDRO registry for CRE that would allow healthcare facilities to identify patients already known to be colonized/infected with CRE.

To really leverage these data, we also wish to get a better understanding of the degree of connectivity of individual healthcare facilities to each other across the spectrum of healthcare within TN and our neighboring states, especially in our areas of high incidence. Understanding connectivity better will likely help us target our interventions even more specifically within those regions, if it turns out that much of the problem is in a subset of facilities that are highly interconnected with regard to sharing of patients or that are facilities that seem to be amplifying or disseminating CRE to other facilities in the region.

**NOTE:** the Fellow will have substantial input on which surveillance activity they would like to pursue; there are multiple other projects for the fellow to pursue if they wish. Specific assignments will be finalized after the Fellow matches with TDH and after consideration of the Fellow’s interest and professional needs as well as needs of the HAI program.

**Surveillance**
Evaluation of dialysis event reporting from outpatient dialysis facilities to the National Healthcare Safety Network [NHSN]

Infections are a leading cause of death among patients with end stage renal failure. Dialysis events (blood stream infections, antibiotic starts and local infection) are reportable in TN. The fellow would evaluate whether facilities/corporate offices currently use these data for action/targeted prevention and how this can be improved. Findings would be shared with our partners, Network 8 and dialysis facilities to improve patient safety.

**NOTE:** the Fellow will have substantial input on which surveillance system they would like to evaluate. There are multiple other projects for the fellow to pursue if they wish. Specific assignments will be finalized after the Fellow matches with TDH and after consideration of the Fellow’s interest and professional needs, as well as needs of the HAI program.
Major Project: Analysis of IMS Health Outpatient Antibiotic Prescription Data from Tennessee providers

Tennessee has the third highest outpatient antibiotic prescription rate in the country; antibiotic prescription rates are twice that of California, Alaska and Hawaii. Descriptive epidemiology of provider types, geographic distribution, types of antibiotics prescribed will allow for a more targeted approach to antimicrobial stewardship interventions in the community. TN is one of the few states currently funded to improve antimicrobial stewardship in the community.

Evaluate whether there is a correlation between antibiotic and opioid prescribing practices across Tennessee (TN has one of the highest number of opioid prescriptions in the country). Findings from this analysis would directly feed into prevention activities. The HAI&AR program has a strong interest and history of using data for action.

NOTE: the Fellow will have substantial input--- there are multiple other projects for the fellow to pursue if they wish. Specific assignments will be finalized after the Fellow matches with TDH and after consideration of the Fellow’s interest and professional needs as well as needs of the HAI program.

Additional Project: CDC/CMS statement on adherence to NHSN definition and impact on clinical practice and/or reporting.

On Oct 6, 2015, CDC/CMS published a document emphasizing importance of adherence to NHSN definitions (see: http://www.cdc.gov/nhsn/cms/cms-reporting.html), including addressing instances of over/under-use of diagnostic tests by some facilities to avoid events meeting a definition of a healthcare associated infection. The Fellow would consider various methods to evaluate the impact of this guidance: e.g., change in incidence of UTIs that are considered "present on admission" (e.g., from hospital discharge database); changes in the number of urine cultures ordered; changes in number of blood cultures ordered.

Additional Project: Examine utility of tools such as SATSCAN and WHONET to better analyze susceptibility data captured within NHSN or NBS

Use two tools (SATSCAN and WHONET) to characterize and describe susceptibility data of organisms reported to NHSN and use these tools for outbreak detection in hospitals, LTACS, dialysis facilities and other healthcare facilities. Examine use of SATSCAN to hospital locations, rather than latitude and longitude; potential collaboration with developer of SATSCAN to assist in outbreak or cluster detection. Examine the impact of different methods of creating antibiogram on ability to detect outbreaks across facilities.

Preparedness Role

In the event of a public health emergency, the fellow would be part of the CEDEP response team. The Fellow would serve in either the epidemiologic/surveillance or data-management sub-teams. The Fellow also may participate in Community Assessments for Public Health Emergency Response (CASPER) or other exercises. Our current CSTE fellow was involved in Ebola response and MERS CO-V preparedness activities.
**Additional Activities**

Based on the Fellow’s particular interests or needs, they may participate in additional activities. These include:

- **Outbreak field investigation** - There are a plethora of opportunities to investigate a wide variety of outbreaks (in the community or healthcare associated) as the lead epidemiologist, with close supervision and support.
- **Capture-recapture analysis** of Clostridium difficile data between NHSN and emerging infections program [EIP] data
- **Analysis** of the data gathered through the National Healthcare Safety Network (NHSN), including data on:
  - (1) Central line associated blood stream infections (CLABSI)
  - (2) Catheter associated urinary tract infections (CAUTI)
  - (3) Surgical site infection (SSI) data following
    - (a) Coronary artery bypass graft surgery
    - (b) Abdominal hysterectomy and
    - (c) Colon surgery
  - (4) Ventilator associated events
  - (5) Healthcare worker influenza vaccination rates
  - (6) Clostridium difficile infection (CDI)
  - (7) Methicillin resistant Staphylococcus aureus (MRSA)
  - (8) Dialysis events from outpatient hemodialysis facilities

- **Evaluation of NHSN as a surveillance system** for collecting data on:
  - (1) central line associated blood stream infections (CLABSI)
  - (2) catheter associated urinary tract infections (CAUTI)
  - (3) surgical site infection (SSI) data following
    - (a) coronary artery bypass graft surgery
    - (b) abdominal hysterectomy
    - (c) colon surgery
  - (4) ventilator associated events
  - (5) healthcare worker influenza vaccination rates
  - (6) Clostridium difficile infection (CDI)
  - (7) methicillin resistant Staphylococcus aureus (MRSA) in different types of healthcare facilities and patient locations within healthcare facilities

- **Protocol development, conduct and analysis of validation** of CLABSI, CAUTI, SSI and methicillin resistant Staphylococcus aureus (MRSA), CDI and, dialysis event data reported through NHSN
- **Analyses of vancomycin-resistant enterococcus (VRE) infection** reported through the NEDSS Base System (NBS).
- **Standardization and analysis of antimicrobial susceptibility data** reported to the state reportable disease surveillance system. This includes development of programmatic guidance for data entry of manual lab results for different microorganisms, as well as programmatic
input into guidance for laboratory submission of electronic laboratory results reporting of susceptibility data.

- Use SATSCAN and WHONET to characterize and describe susceptibility data of organisms reported to NEDSS Base system (complex relational database)
- Analysis of Tennessee antimicrobial susceptibility testing data in NEDSS Base System
- Assist facilities in reporting data to NHSN's new Antimicrobial Use and Resistance [AUR] module (interaction with informatics team)
- Develop report cards on implementation of core elements of antimicrobial stewardship across the healthcare spectrum (confidential and public)
- Analysis of NHSN AUR data. Develop measures that are helpful and meaningful. Note as of Oct 15, 2 facilities have reported data to NHSN AU module). Encouraging reporting to the NHSN AUR module is a priority for the HAI team.
- Analysis of infection control assessment data across healthcare spectrum.
- Participate in HAI team meetings and multiple educational opportunities (e.g., conferences, meetings, webinars, teleconferences) as they arise
- Work collaboratively with other HAI team members and stakeholders on various prevention collaboratives (prevention of catheter associated urinary tract infections, dialysis events, CDI, MRSA, CRE; antimicrobial stewardship) especially across the healthcare spectrum (beyond just acute care hospitals).

Please also refer to Fellow's day to day activity section

**Mentors**

**Primary**

Marion Kainer, MD, MPH  
Director, Healthcare Associated Infections and Antimicrobial Resistance Program

**Secondary**

Tim Jones, MD  
State Epidemiologist