

## **Infectious Diseases-HAI**

### **Pennsylvania Department of Health, Bureau of Epidemiology**

Harrisburg, Pennsylvania

#### **Assignment Description**

This position will be in the Pennsylvania Department of Health, Bureau of Epidemiology's Healthcare-Associated Infection Prevention and Antibiotic Stewardship (HAIAP/AS) section. This section is responsible for a broad range of disease surveillance and control activities in Pennsylvania including HAI outbreak investigation and response, coordinated response and prevention efforts for emerging MDRO cases, HAI surveillance data analysis, working with partners to facilitate prevention-based collaboratives, providing education and training opportunities for HAIs and antibiotic stewardship, and the development of public health policy related to HAIAR. The section has conducted over 70 investigations this year so far and works closely with CDC, including via EpiAids.

The fellow will also have the opportunity to work with the Bureau of Epidemiology's Infectious Disease Epidemiology (IDE) Investigation and Surveillance Sections as needed. The HAI team typically handles all HAI-related outbreak and surveillance activities but sometimes requests assistance from the hepatitis viral coordinator, TB program or colleagues in facilities licensure and quality assurance.

The fellow will be mentored by HAI Epidemiologist Cara Bicking Kinsey and CDC Career Epidemiology Field Officer Jeff Miller. Drs. Bicking Kinsey and Miller have extensive experience in HAIAR outbreak response and analysis of epidemiologic data (including NHSN data) in SAS and R. As the program is in its third year of ELC HAIAR funding, the fellow will become part of a large HAIAP/AR team that includes three other Epidemiologists, two public health nurses, an antibiotic stewardship outreach coordinator, a data support technician, a scientific specialist, a program manager, a public health physician, and a public health program administrator. Six of the staff have earned their CIC.

#### **Day-to-Day Activities**

The fellow will join the HAIAR Team located in the Health and Welfare Building in downtown Harrisburg, PA a few blocks from the Capitol building and beautiful Susquehanna River. The fellow will fully participate in the day-to-day activities conducted by Epidemiology's Infectious Disease Epidemiology staff, including participating in disease investigations; analyzing data and writing surveillance reports; designing and implementing antibiotic stewardship interventions; participating in conference calls with federal, local and regional partners; attending departmental meetings as well as local, regional and national conferences.

The fellow will have a day-to-day role in the analysis and evaluation of HAI data using either SAS EG or R (with support as needed). Pennsylvania has the most extensive database of healthcare associated infections of any state in the country. This is because Pennsylvania's mandatory HAI reporting law requires all HAIs occurring throughout the hospital to be reported; the same applies to nursing homes. This requirement results in approximately 25,000 hospital-associated HAIs reported annually in over 10 million patient days and 40,000 HAIs in nursing homes reported annually in almost 30 million patient days. There is an abundance of data to be analyzed, including the ability to conduct sub-analyses of particular types of HAIs that cannot be assessed in other states where reporting requirements are more limited. There is also the ability to assess particular pathogens across a range of HAIs. This work can involve exploratory and descriptive analyses as well as the potential for statistical risk modeling. Annual reports on HAIs are issued, and the fellow can participate in the

preparation of the report. The fellow can also perform studies to assess the use and impact of the data in healthcare and public decision-making.

The fellow can also expect to be involved in a number of outbreak investigations; recent examples include identification of carbapenemase-resistant enterobacteriaceae in several long-term care facilities, E. coli infections following transrectal ultrasound (TRUS) guided prostate biopsy procedures, Burkholderia cepacia complex infections after use of non-sterile cleansing foam, invasive MRSA infections following injections at a pain clinic, numerous group A streptococcus outbreaks in long term care settings. Many investigations are performed onsite where the fellow will be trained to use Infection Control Assessment observational tools. These have been used to assess the 9 domains of infection prevention and control elements at healthcare facilities. Results from these form the basis for recommendations to contain and control outbreaks. These are especially useful when repeated visits are made to the same facility to make recommendations to improve infection control practices. These activities fall with CDC's and DOH's response protocol to contain multidrug resistant organisms deemed a serious threat to public health within facilities.

The fellow will also be able to join efforts to educate consumers, providers and healthcare facilities about antibiotic stewardship programs and participate in CDC's antibiotic awareness campaign. Current efforts include an art competition among students to increase awareness regarding proper use of antibiotics, collaborating with long term care centers to increase appropriate use of antibiotics when treating long term care center residents with urinary tract infections, and working with medical community leaders to display a commitment poster in which providers pledge to use antibiotics effectively.

Additionally, the fellow will have the opportunity to present at regional APIC conferences, all-day Department Quarterly Epidemiology meetings attended by 50-100 by field and state epidemiology staff, and at national meetings related to HAIs.

## Potential Projects

### **Surveillance      Multidrug Resistant Organism Surveillance System Activity**

In Pennsylvania, the list of reportable conditions is currently under revision and the draft has been expanded to include antibiotic resistant organisms of public health significance and Carbapenemase Producing Organisms (CPOs). With the advent of these newly reported organisms, comes the responsibility to classify them, develop appropriate responses, train local public health staff to investigate the reports, and develop a surveillance report. We are finalizing these processes for CPOs; however, the current surveillance system will need to be expanded when the new reporting list becomes law.

The fellow would assist the HAIP/AS team to address this gap. The fellow would work with the electronic laboratory reporting system administrator (PA-NEDSS) to develop criteria to identify these reports from all electronic lab reports. The fellow would develop standard questions to determine the characteristics regarding the person, place and timing of the infection and the appropriate public health response. The fellow would develop and present a webinar to train public health staff and develop education materials for frontline nursing staff and families. The webinar would describe the investigation process and teach them how to respond to a confirmed multi-drug resistant organism in a variety of healthcare settings. Additional educational materials may describe the importance of contact precautions and hand washing in reducing transmission to other patients in healthcare settings. The fellow would perform interim and final data analysis of investigations and laboratory reports from the electronic laboratory reporting system. The fellow would interpret the data and prepare a surveillance report of drug resistant organisms in Pennsylvania. The report may include factors such as geographic location, type of health care setting, patient age, type of resistance mechanism, and species of organisms. This would inform partners, DOH leadership, and policy makers about the burden of drug resistant organisms in the commonwealth, something that has never been done before.

### **Surveillance      Healthcare-associated infections with fungal organisms: Evaluation of current Evaluation      surveillance in PA**

Defining the public health burden of fungal diseases is a current challenge in the U.S. and promoting effective prevention guidelines and strategies depend on an understanding of this burden. In PA, we have become increasingly aware of the role that fungal diseases play in HAIs in general, and the emerging threat of azole-resistance in particular. Emerging pathogen *Candida auris* has been detected in all states surrounding PA and is likely to appear in PA residents soon. This project will allow the fellow to address emerging fungal infections by evaluating NHSN data using a descriptive approach per CDC guidelines for surveillance system evaluation. The fellow will then utilize a quantitative approach to compare NHSN reporting of fungal HAIs to microbiology and histopathology data available at a convenience sample of tertiary care facilities. The fellow's evaluation will serve to inform our state's understanding of whether NHSN data can provide adequate data to monitor fungal HAIs. If the scope of the project allows, the fellow may also conduct a related pilot study to determine the extent of azole-resistant aspergillus awareness in facilities across the state, including assessment of capacity to test for azole-resistance.

**Major Project**      **Assessment of long term acute care facility (LTAC) infection control and response activity**

There are 23 licensed long-term acute care (LTAC) facilities in PA. While the standard has been for LTAC facilities to receive infection control guidance and feedback according to the standards for acute care hospitals, these facilities serve a unique population. The long admission durations, high acuity of patients and high burden of MDROs in these facilities present unique challenges. The major project will focus on evaluation of infection control and response practices in LTAC facilities. The fellow will work with central office and regional PADOH staff and other stakeholders (e.g., regional chapters of the Association for Professionals in Infection Control and Epidemiology, Pennsylvania Association of Directors of Nursing Administration, Pennsylvania Patient Safety Authority, Hospital and Health System of Pennsylvania) to coordinate the evaluation of infection control practices, policies, and training at LTACs using standardized Infection Control Assessment and Response (ICAR) tools. Activities will include field work in a select number of facilities as well as data management and consultation to mitigate identified gaps in infection control and antimicrobial stewardship. Analysis will include descriptive epidemiology for LTACs and comparisons with LTC and acute care facility data. The objective of the project is to inform the department's approach to LTAC facility management; allowing us, within LTACs, to identify gaps, build infection control and antimicrobial stewardship capacity, promote effective surveillance, and develop appropriate and tailored approaches to infection prevention and education.

**Additional Project**      **Descriptive analysis and comparison of rates of NHSN pediatric IVAC and PVAP in Pennsylvania**

Historically, the diagnosis of ventilator associated pneumonia (VAP) has been subjective, hampered by the lack of sensitive and specific laboratory and radiology tests. With the goal of standardizing surveillance methods and increasing the objectivity and reliability of VAP determinations the CDC has proposed a ventilator adverse event (VAE) definition. VAEs include a subset of infectious conditions namely infection related ventilator associated complications (IVAC) and possible ventilator associated pneumonia (PVAP). NHSN reporting of these events was required by PA State law for all adult inpatients greater than or equal to 18 years of age. Patients on high frequency oscillatory ventilation (HFOV) and extracorporeal membrane oxygenation (ECMO) are excluded from adult VAE surveillance. Anticipated in January 2019, VAE events including IVAC and PVAP, will be reportable conditions for children less than 18 years of age, including neonates, of which a subset will be excluded from VAE reporting due to the type of ventilatory support they are receiving (HFOV, ECMO). Currently, the exact pediatric definition for IVAC and PVAP reporting is still in development.

This project would involve using the NHSN database of VAE events reported from Pennsylvania healthcare facilities to describe the demographics of pediatric patients with IVAC and PVAP, including, but not limited to: type of healthcare facility, inpatient location of events (neonatal intensive care unit, pediatric intensive care unit, cardiac intensive care unit, burn unit etc.), age and gender of patients, VAE event type, length of stay prior to event, duration of ventilation prior to event, pathogen(s) detected including if multi-drug resistant, antimicrobial susceptibility of pathogen(s), presence of concomitant secondary bloodstream infection, if patient died and if event contributed to death. Statewide rates of pediatric IVAC/PVAP and analysis of pathogens isolated will be compared to historical rates using retired NHSN definitions for pediatric tracheitis and VAP.

**Additional HAI Outbreak Investigations Project**

The fellow would take an active role in HAI outbreak investigations. After participating in outbreak investigations, he or she would have the opportunity to lead outbreak investigations in varied settings. Investigations include activities such as case confirmation, case finding, chart review, data collection and database management, designing epidemiologic studies and questionnaires, and analyzing and interpreting data. These would also include infection control review on-site and providing IC recommendations to facilities. Opportunities for both formal and informal communication skill advancement are expected to be plentiful. In a safe, supportive and educational environment, the fellow will become familiar with the regulatory and legal aspects of these investigations. Outbreak investigations are often the source of data for oral presentation or publication in a peer-reviewed journal.

**Preparedness Role**

The fellow will work with emergency preparedness epidemiologists (secondary mentor and others) on a wide range of topics related to Emergency Preparedness and emerging infections, from bioterrorism to influenza. As learned from Ebola, MERS-CoV and other emerging diseases, fundamental infection control principles are critical in preventing transmission, ensuring healthcare worker safe and safeguarding our healthcare systems. The fellow will also provide support in any public health emergencies (i.e. novel influenza) that occur during the fellowship period.

**Additional Activities**

The fellow will be involved with other activities in the Bureau that are deemed to be valuable for competency development or educational experience including collaborations with IDE and Community Epi. The Bureau’s Antibiotic Awareness program is highly active in community outreach and may provide a breadth of public health experience. Other potential activities include participation in Northeast Epidemiology Conference and local and regional trainings as well as Bureau Quarterly Epidemiology meetings.

**Mentors**

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| <b>Primary</b>   | Cara Bicking Kinsey MPH, RNC CIC<br>Epidemiologist            |
| <b>Secondary</b> | Jeff Miller MD, MPH, CIC<br>Career Epidemiology Field Officer |