Infectious Diseases

Nebraska Department of Health and Human Services, Division of Public Health

Lincoln, Nebraska

Assignment Description

The Fellow will organizationally be located in the Office of Epidemiology and report directly to the Deputy State Epidemiologist.

The Epidemiology Fellow will be protected from clerical and routine work and will be expected to remain highly focused on specific epidemiologic projects. Because of the organizational structure of the agency, the Fellow will have ready access to personnel and data in the Vectorborne and Zoonotic Infectious Disease Surveillance Programs within the Epidemiology and Informatics Unit.

Because of the tremendous public health and medical burden of infectious diseases, and because of the great potential for prevention and reduction of morbidity and mortality, Nebraska public health officials have prioritized the understanding of the epidemiology and control of infectious diseases in our population. As we increasingly focus our resources on controlling and reducing health care costs, we believe that all sectors of society will need and want a thorough understanding of the distribution and determinants of infectious diseases in our population. Our agency’s goal is to be the leading provider of this information. We are extremely excited about the opportunity to supplement our current team with an Infectious Disease Epidemiology Fellow and believe that such a resource will enable us to advance this agenda. For the qualified applicant we expect employment opportunities to be available at the completion of the fellowship.

The Nebraska Office of Epidemiology provides an ideal training opportunity to an Infectious Disease Epidemiology Fellow. This office is responsible for studying the epidemiology of reportable infectious diseases and investigating infectious disease outbreaks. The infectious disease epidemiology team consists of State Epidemiologist, a CDC Career Epidemiology Field Officer (CEFO, Primary Supervisor), EIS Officer, and 13 other program-specific epidemiologists.

The Fellow will work as part of this team with particular focus on vector-borne and zoonotic diseases. The team members are located in close proximity to each other in various parts of our integrated Health & Human Services agency. The training and skill development of the Fellow will be the primary responsibility of the Deputy State Epidemiologist. All team members will be at the disposal of the Fellow to provide expertise in selected aspects of epidemiology and programmatic activities. The Fellow will be authorized to access and analyze data sets/surveillance systems in all of these areas. The Vector-Borne Disease Section at NDHHS currently has one full-time staff dedicated to the surveillance of mosquito and tick-borne diseases across the state. Some projects considered to be priorities have not been implemented because of limited capacity. Accordingly, the incoming CSTE Fellow will prove critical to enhancing surveillance capacity in this area.
Day-to-Day Activities

1) Develop an understanding of and familiarity with vector-borne and zoonotic disease surveillance datasets; 2) Refine data processing and data analysis skills; 3) Understand how to assess surveillance systems; 4) Analyze and interpret data; and 5) Prepare epidemiology reports. The training goals for the Fellow will be defined by Centers for Disease Control and Prevention (CDC)/Council of State and Territorial Epidemiologists (CSTE) Applied Epidemiology Competencies (AECs). At the completion of the fellowship, the Fellow will function as a well-qualified Tier 2, mid-level epidemiologist and will be highly employable in a wide range of public health settings.

Potential Projects

Surveillance Activity  Implement an Improved Tick-Borne Disease Human Surveillance System in Nebraska

Nebraska has seen increases in incidence of some tick-borne diseases (e.g., Lyme Disease and Spotted Fever Group Rickettsia) in recent years, so a major priority surveillance project will be to implement an improved tick-borne disease human surveillance system for the State based on the findings of the initial system evaluation. As mentioned above, cases of tick-borne disease are currently investigated but limited information is currently captured electronically in NEDSS, so detailed analysis of tick-borne disease clinical and risk factor information is precluded. Nebraska has recently developed a database in REDCap to capture clinical information and risk factors. The CSTE Fellow will conduct an analysis and review medical record data on cases through chart abstraction. The Fellow will then generate a report and map cases of tick-borne diseases for identification of potential hot-spots of disease in the state. Data gathered from this project will then be used to better understand the tick-borne disease burden in Nebraska, determine the need to improve our NEDSS investigation pages for improved surveillance going forward, and to help improve educational/preventive efforts.

Surveillance Evaluation  Evaluation of Nebraska’s Q Fever Surveillance System

As a proposed initial project, the CSTE Fellow will conduct an evaluation of Nebraska’s Q Fever human disease surveillance system. Cases reported to the State are currently investigated to collect demographic, clinical, and risk factor information using a limited investigation form in NEDSS. We also attempt to collect hard-copy CDC case report forms for each case. Limited information is currently captured electronically in NEDSS, so detailed analysis of Q Fever clinical and risk factor information is better captured through the CDC forms, but these data are not compiled into a database. Given complexity with diagnosis of the condition, an evaluation to define accuracy of case status based on published case definitions is needed to ensure that our LHD partners manage cases and assign status appropriately.
Major Project  Estimate the Economic Burden Associate with West Nile Virus in Nebraska

Per the CDC, a total of 50,830 West Nile virus (WNV) cases have been reported in the US from 1999-2018 making it the most reported arboviral infection in the US. Of the total reported cases, 24,657 have been classified as the severe neuorinvasive form that can lead to significant morbidity and death. In Nebraska, WNV is considered hyper-endemic with the state reporting cases every summer/fall typically ranking in the top 5 states in reported cases. Since WNV was first detected in 2002 in Nebraska, a total of 3,972 cases have been reported statewide ranking fourth overall in the US. Out of the nearly 4,000 Nebraska cases, 782 have been classified as the neuroinvasive form. Despite the number of cases reported in the US, very few studies have looked at the economic burden in different states. To better estimate the economic burden associated with WNV in Nebraska, the Fellow will conduct a retrospective study to determine long-term costs of patients hospitalized with WNV disease. Using hospital discharge data, the Fellow will first identify diagnosed cases of WNV and then use private insurance and Medicaid data to estimate the cost incurred by hospitalized WNV cases within the state. Additionally, a representative sample of the hospitalized patients will be contacted for follow-up regarding outpatient medical and home care costs incurred after the initial hospitalization. All costs will be adjusted to current costs using the US Consumer Price Index. Once completed, the Fellow will use the findings of the study to assess the cost-effectiveness of prevention and intervention strategies and help guide public health decisions.

Additional Project  Enhanced Surveillance for Invasive Aedes Mosquitoes

Introduction of invasive Aedes mosquitoes (Aedes aegypti and Aedes albopictus) are a public health concern in Nebraska. Historically, Aedes albopictus was first detected in Nebraska in 1992 in an isolated scrap tire pile in rural Douglas Co. Additional detections were made in Cuming Co. in 1992-1996 and Lancaster Co. in 2000. No further reports of detections of Aedes albopictus in Nebraska were documented until 2013, when it was again detected in routinely used CDC light traps in Richardson Co. as part of NDHHS’s WNV/mosquito surveillance network. Since this detection, Aedes albopictus has been detected every year onwards in Richardson Co. and is most likely established. During 2018, a single Aedes albopictus specimen was collected from a routine CDC light trap in urban Douglas Co. (city of Omaha) for the first time. An additional specimen was then collected in 2019 at a different site within Omaha. Then during 2019, Aedes aegypti was discovered for the first time in York Co., Nebraska. This led to a response effort between NDHHS and the local health department to try and eliminate the mosquito and determine how it was introduced. The investigation is presently ongoing. While the potential of these mosquito species to serve as local vectors for diseases like chikungunya, dengue, and Zika (among others) is low, a potential still exists. Additionally, these mosquitoes are notoriously difficult to eliminate due to their peri-domestic nature once established. Therefore, determining presence or absence of these species in areas is important to prevent establishment within the state and reduce disease risk posed by these invasive mosquitoes. As a proposed project, the Fellow will conduct enhanced invasive Aedes mosquito surveillance within areas determined to be at high risk for their introduction. This will be accomplished through GIS and mapping to identify high risk locations and field work where mosquito traps (CDC light, BG Sentinel, and Ovicups) will be set out and retrieved. Furthermore, the Fellow will also learn to identify mosquito species as part of the field work experience and coordinate with CDC and other academic collaborators to conduct genetic testing. If invasive Aedes are detected, the Fellow will also help in response activities related to vector control and attempted
elimination. The data gathered from this project will be used to better determine the areas of risk and establish range.

**Additional Project: Investigate Observed Increase in Annual Number of Reported Histoplasmosis Cases**

Nebraska has also seen an increase in reports of histoplasmosis over the past three years. Prior to 2015, the average annual incidence was <20 cases/year but has since risen to around 100 per year. Limited resources are currently available to thoroughly investigate. The CSTE Fellow will retrospectively study this observed rise in reported cases using existing NEDSS investigation data and augment with medical chart review as necessary. Analysis of these data will help better define the timing and distribution of cases throughout the state to determine if undetected clusters or outbreaks might have occurred or if the increases are the result of recent changes in laboratory diagnostics or reporting. Further, the Fellow will compile and analyze risk factor data including occupational risks if appropriate to identify possible explanations for the observed increases to improve efforts for prevention.

**Preparedness Role**

The Fellow will be expected to respond to acute and emergent problems related to infectious disease epidemiology, including emergency response activities related to naturally occurring and intentional events which have actual or potential impact on infectious disease morbidity/mortality. Nebraska’s Bioterrorism Preparedness Program offers training and exercises to ensure Nebraska’s preparedness in the event of an incident or attack involving biological, chemical, radiological or other agents of bioterrorism. The Fellow can access this training and participate in such exercises.

**Additional Activities**

The CSTE Fellow would also be expected to participate in outbreak investigations. Depending on the number and frequency, there will likely be opportunity for the Fellow to take the lead on an investigation.

**Mentors**

**Primary**

Bryan Buss DVM, MPH, DACVPM  
Deputy State Epidemiologist & CDC Career Epidemiology Field Officer

**Secondary**

Samir Koirala MBBS, MSc  
Emerging Infectious Disease Epidemiologist