Infectious Disease

Assignment Description

The CSTE Fellow assigned to the of the Minnesota Department of Health (MDH) Vector-Borne Disease (VBD) Group will work in the Acute Disease Investigation and Control (ADIC) Section, Foodborne, Vectorborne and Zoonotic Disease Unit (FVZDU). ADIC includes an Emerging Infections Unit, an Infection Control & Antibiotic Resistance Unit, and FVZDU. ADIC is supervised by Deputy State Epidemiologist Richard Danila, PhD, who will act as Primary Mentor.

The VBD Group is a very busy, active group constantly involved with case surveillance, field surveillance, laboratory surveillance, and special investigations for a number of vector-borne diseases. The group interacts on a daily basis to discuss our current cases or investigations. We also meet briefly every morning with other ADIC epidemiologists to keep well informed of unit and section activities outside our own. In addition, we frequently collaborate with CDC subject matter experts and with epidemiology colleagues from other states on various VBD projects or investigations.

Day-to-Day Activities

The Fellow will be involved with human case surveillance of vector-borne diseases (VBDs) (e.g., Lyme disease and other tick-borne diseases, West Nile virus and other mosquito-borne diseases), field surveillance for selected VBD agents or vector species, investigations of novel, rare, or especially concerning VBDs (e.g., Powassan virus, novel Ehrlichia species, transfusion-associated infections), service and outreach to the public, and VBD prevention. While the majority of the Fellow's time would be spent in the VBD area, opportunities may also be available to work with the food-borne disease group on food-borne illness outbreaks, with the zoonotic disease group to provide guidance on animal bites and rabies prophylaxis, and a variety of other projects.

VBDs include some agents of bioterrorism (e.g. the agents of tularemia and Q fever); as such, there may also be opportunities to work on special bioterrorism or emergency preparedness projects. The Fellow will participate in the day-to-day work of the VBD Group, and his or activities will vary depending on the specific projects. In addition, publication opportunities are frequent at MDH and would likewise be made available to an ambitious Fellow with good composition skills. Because infectious disease surveillance in Minnesota is centralized at the state health department level, the VBD Group at MDH is moderate to large in size compared to most other states. Unlike many other states, where day-to-day surveillance is conducted at the local public health agency level, Minnesota's VBD surveillance activities are conducted "in-house" at MDH by the three VBD epidemiologists and by its graduate student workers. Therefore, our VBD activities are conducted by epidemiology staff who have specialized experiences and knowledge in this field. However, given the burden of VBDs in Minnesota (including recent rises in disease incidence, geographic expansion of disease risk, and identification of emerging VBDs), the VBD Group sorely lacks capacity for numerous surveillance or prevention activities that could positively impact the public health. This is especially evident for tick-borne diseases, which have undergone marked rises in incidence, changes in geographic risk, and emergence in Minnesota in recent years. Therefore, the VBD Group has high potential for expansion of our surveillance and prevention activities, depending on the Fellow's background and interests.

A major part of the Fellow's activities will include ongoing instruction in the clinical, epidemiologic, ecologic, and prevention aspects of endemic and emerging tick- and mosquito-transmitted diseases.

Potential Projects

Several major vector-borne disease (VBD) projects that our CSTE Fellow might choose to undertake include:

1. Human case surveillance for rare, emerging, and novel diseases or other disease events of special concern. This would include data analysis and potentially an opportunity for the Fellow's surveillance system evaluation. Surveillance for disease reports for the following agents would be included: La Crosse encephalitis virus, exotic arboviruses (chikungunya, yellow fever), spotted fever Rickettsia (including the Rocky Mountain spotted fever agent), exotic Rickettsia (e.g., typhus group), Powassan virus, human ehrlichiosis (Ehrlichia chaffeensis and a novel E. muris-like agent [EML]), disease agents acquired by blood transfusion (e.g., Babesia, Anaplasma), and others as identified.

Associated activities include: performing clinical follow-up with physicians and reviewing charts; interviewing patients or their family members, coordinating case site investigations at case sites when relevant; coordinating submission of clinical specimens when needed; communicating with CDC epidemiologists; maintaining data records; and providing updates to other ADIC staff.

2. Retrospective case surveillance projects. A substantial problem we face in interpreting the apparent emergence or rise in incidence of some tick-borne diseases (e.g., Rocky Mountain spotted fever, human ehrlichiosis) is the limited quality of some information in disease reports from the 1980, 1990s, and early-mid 2000s, which hinders our ability to compare current and past trends. For instance, laboratory values that help us determine case status were frequently missing in older reports, especially for antibody testing (type of immunoglobulin, titer, cutoff values, species), as were clinical values (e.g., onset date, hospitalization status, rash descriptions). To better elucidate epidemiologic trends in these diseases, the Fellow would perform a retrospective surveillance project. This would involve obtaining medical charts for years prior to 2008, filling in gaps in our surveillance database, and re-evaluating incidence and other trends in light of more complete historical data. This could lead to possible publication.

3. Field surveillance. Since 2005, we have performed annual surveys for Ixodes scapularis ticks at several sites throughout Minnesota. Ticks are then tested for the agents of Lyme disease, anaplasmosis, and babesiosis. However, because of severe time limitations for the existing VBD epidemiologists, this effort has been scaled back in recent years. In addition, we urgently need to perform field surveillance for other disease agents (e.g., Ehrlichia spp., Rickettsia rickettsii, Powassan virus) or other tick species (e.g., Dermacentor variabilis, Amblyomma americanum). Field surveillance can also include case site investigations associated with specific cases and may include capturing and testing mammals. We would like to enhance collaboration with the University of Minnesota Departments of Medical Entomology and Veterinary Medicine on these efforts. In addition, surveillance for emerging mosquito-borne diseases or exotic vector species (e.g., Aedes japonicus, Ae. albopictus) at select southern Minnesota sites might also be possible. Efforts by the Fellow would include coordinating site visits, obtaining permission to enter public or private lands, coordinating student staff, performing collections, keying vector species, preparing specimens for laboratory submission, and analyzing infection prevalence data. Specific projects may vary depending on the Fellow's interests and skills, but ideally the Fellow would perform at least one field surveillance project.

4. Enhanced public health communication. Although we have one of the most extensive VBD websites among state health departments, our website needs critical review and updating. In addition, we lack fact sheets for several important or emerging VBDs in Minnesota. Therefore, the Fellow could develop print and web materials for these diseases. We also provide PowerPoint slides on our website, which need updating with current numbers and trends. In addition, we would like to develop prevention education materials for naturalists or interpretative staff (e.g., state parks) and other educators (e.g., schools). This is especially true for state parks, county parks, nature centers, and other public or nonprofit lands where a large proportion of reported tick-borne disease cases acquired their infections. Currently, parks offer very little information on tick or mosquito bite prevention. The Fellow could work closely with the other MDH VBD epidemiologists and with Minnesota Department of Natural Resources staff to develop naturalist talks, print materials, and signage on the ecology of vector-borne diseases, bite prevention, and signs of disease. Ideally, the Fellow will become comfortable enough in VBDs to himself/herself give talks to the public, medical providers, and local public health.

5. Other projects. Depending on time, resources, and interests, other VBD projects and activities could include: the coordination of seroprevalence studies with blood agencies or retrospective testing of archived clinical specimens at MDH; responding to data requests from outside groups and agencies; answering questions from the public by phone or email regarding ticks and mosquitoes, disease risk, prevention, and nuisance arthropods; initiating a public tick submission program; assisting with surveillance for malaria and dengue; exploratory/hypothesis generating data analysis on existing surveillance databases; and coordinating a physician survey project on the awareness and clinical practices for emerging tick-borne diseases.

Preparedness Role

Prior CSTE Fellows have participated in the response to BioWatch positive results and an evaluation of bioterrorism surveillance. The new Fellow would receive ICS training and participate in other emergency events that happen. Nearly every year, MDH-ADIC is faced with public health emergencies or emergent diseases that require large-scale, rapid, multi-faceted public health responses. Recent examples include H1N1 influenza, an outbreak of novel progressive inflammatory neuropathy among swine workers, and an investigation of exposure to Haemophilus influenzae type B among infants in a large area of Minnesota. When such events occur, nearly all staff members in ADIC are involved with the response. The CSTE Fellow would be called on to participate in such a response, in a way that best suits his or her skills and experiences.

Assignment Location:	St. Paul, Minnesota
Primary Mentor:	Richard Danila, PhD, MPH Deputy State Epidemiologist and Acute Disease Investigation and Control Section Manager Minnesota Department of Health
Secondary Mentor:	Melissa Kemperman, MPH Epidemiologist Senior (Vector-Borne Diseases) Minnesota Department of Health