

Infectious Diseases-HAI, Infectious Diseases

Arizona Department of Health Services, Public Health Services

Phoenix, Arizona

Assignment Description

The Fellow will be situated in the the Office of Infectious Disease Services (OIDS) within the Bureau of Epidemiology and Disease Control (EDC) in the Arizona Department of Health Services (ADHS). The Office of Infectious Disease Services (OIDS) is responsible for monitoring and controlling a variety of diseases, including healthcare-associated infections; influenza; foodborne/waterborne diseases; invasive organisms; vaccine-preventable diseases; and vectorborne and zoonotic diseases. OIDS also implements and maintains systems for reporting, managing, and analyzing communicable disease data. To accomplish this, OIDS staff work closely with other public health and healthcare professionals at local health departments, healthcare facilities, federal agencies, and other agencies. OIDS staff also collaborate with colleagues in other ADHS offices and bureaus including: Environmental Health; Immunization Program Office; State Health Laboratory Services; and Public Health Emergency Preparedness, all within the Division of Public Health Services, and the Office of Border Health. The Fellow will work under the supervision of the Surveillance Epidemiologist and the State Epidemiologist. According to the specific project the Fellow will be able to also work with other epidemiologists and managers and with local and tribal health partners.

Day-to-Day Activities

Anticipated day-to-day activities for the Fellow will include:

- Monitoring disease reports to identify outbreaks and risk factors for infection.
- Assisting with outbreak and exposure investigations, by participating in study design, data collection, data analysis, and intervention recommendations.
- Producing surveillance reports based on state-wide electronic disease surveillance system (MEDSIS) data.
- Developing and implementing response and prevention activities aimed at reducing transmission of pathogens in the population overall.
- Responding to inquiries from the public and health care providers in Arizona.
- Communicating and coordinating with various partners (Arizona State Public Health Laboratory, local health departments, tribes, other states, CDC, IHS, FDA and USDA).
- Participating in a CDC Epi-AID as opportunities arise.
- Utilizing the incident command structure during public health emergencies including widespread infectious disease outbreaks.

Primary responsibilities of the Fellow will depend on chosen projects and current public health needs within the state. The Fellow will participate in weekly OIDS staff meetings, monthly state laboratory & epidemiology meetings, and routine calls with local health department partners. The Fellow will have an opportunity to help plan and participate in the annual Arizona Department of Health Services Infectious Disease Training & Exercise. Additionally, the Fellow will also have the ability to cross-train in vaccine-preventable diseases (e.g., measles, rubella, pertussis and hepatitis B); HIV/AIDS; emergency preparedness; vector-borne diseases (e.g., rabies, hantavirus, plague, Zika, dengue and West Nile virus infections); sexually-transmitted diseases; as well as other emerging infectious diseases. Orientation will include a tour of our state laboratory, HIPAA training, meeting with key individuals and managers, training on MEDSIS, and inclusion in routine disease surveillance activities.

Potential Projects

Surveillance Activity Carbapenem-resistant Enterobacteriaceae (CRE) surveillance in Arizona

Carbapenem-resistant Enterobacteriaceae (CRE) infections are of increasing concern in recent years, as potential healthcare-associated infections that can be difficult to treat. Previous work by Arizona's public health laboratory helped confirm that CRE infections do occur in the state. In January 2018, CRE will become laboratory-reportable in Arizona for the first time, giving us the opportunity to monitor these infections statewide and over time. Statewide surveillance for CRE will help us identify the extent of the problem and, hopefully, reduce spread through better awareness and infection control practices.

The Fellow will analyze the new surveillance data and develop meaningful statistical reports for routine dissemination; identify key investigation information to collect from patient medical records or other sources; prepare and present findings on the first year of data collection to internal and external public health partners; and work with the Healthcare-Associated Infections Program, other epidemiologists, and State Public Health Laboratory staff to expand and effectively use this newly available information on an emerging threat.

Surveillance Evaluation Evaluating the sensitivity of Arizona's communicable disease surveillance for capturing Legionnaires' disease hospitalizations.

Legionnaires' disease is caused by the Legionella bacteria through inhalation of aerosolized water contaminated with the bacteria. It is a serious condition characterized by fever, myalgia, cough, and clinical or radiographic pneumonia, which often results in hospitalization. In the US about 6,000 cases of Legionnaires' disease were reported to CDC in 2015, and an increase of nearly four and a half times the numbers reported in 2000.

In Arizona, an increasing number of cases have been reported in recent years, with a peak of 93 cases in 2015. The data is stored in the Arizona's Medical Electronic Disease Surveillance Intelligence System (MEDSIS), which can be used to collect information on case hospitalization. However, the accuracy and completeness of this information relies on the laboratories and healthcare providers reporting the case and on the county health department carrying out the investigation to identify hospitalization status.

The Fellow will evaluate the sensitivity of MEDSIS for capturing hospitalization data for the Legionnaires' disease cases reported in recent years, using the Arizona Hospital Discharge Database (HDD) as an external standard. HDD captures all hospital visits, including both inpatient and emergency department visits, at non-federal acute care hospitals in the state. HDD will be searched for cases of Legionnaires' disease; these will be compared to MEDSIS data to ensure that a) the cases were captured by the surveillance system, and b) that inpatients were identified as having been hospitalized. Medical records may be reviewed for non-reported cases to confirm whether they should have been reported. The evaluation will help identify any areas of under-reporting that need

to be addressed, and allow for better future estimation of hospitalization rates of Legionnaires' disease from MEDSIS data.

Major Project The role of neighborhood level socioeconomic characteristics and racial/ethnic health inequalities in enteric infections in Arizona

Socioeconomic and racial/ethnic status plays an important role in the incidence of a variety of diseases, including enteric infectious diseases. However, surveillance data often contain incomplete socioeconomic and racial/ethnic information, limiting public health access to this type of analysis. To address this gap, several methods have evolved in the last decade including the use of neighborhood-level characteristics obtained by geocoding the data and extrapolating the indicators of interest from the census or other publicly available datasets. In Arizona, enteric diseases are among the most commonly reported infectious diseases (third most common after influenza and valley fever), but little is known about their distribution across socioeconomic and racial/ethnic strata of the population. The Fellow will analyze selected enteric diseases, including salmonellosis, campylobacteriosis and shigellosis, using data from Arizona's Medical Electronic Disease Surveillance Intelligence System (MEDSIS) and the American Community Survey (ACS). The analysis will help the Fellow develop skills in data analysis in SAS 9.4, as well as data manipulation and mapping using ArcMap. Preliminary results suggest the presence of interesting socioeconomic and racial/ethnic disparities, which encourages further analysis of potentially publishable findings.

Additional Project Assessing Valley fever cases with repeated positive EIA tests in terms of clinical characteristics and diagnostic practices.

Valley fever (coccidioidomycosis) is one of the most commonly reported infectious diseases in Arizona. This infection is caused by a fungus that is found in the soil of the southwestern United States, and is transmitted via inhalation of contaminated dust. Symptoms may be acute, but infection may also persist into a longer, chronic illness. Laboratory confirmation of valley fever often involves a screening EIA (enzyme immunoassay) followed by confirmatory testing; case management after diagnosis and treatment generally would not require additional EIA testing, yet ADHS receives reports of repeated EIAs over long periods of time.

ADHS developed a laboratory-based case definition of chronic valley fever infection and has conducted a preliminary analysis of demographic and reported laboratory characteristics, using 2008-2014 data from the Arizona's Medical Electronic Disease Surveillance Intelligence System (MEDSIS). The analysis found many cases that tested positive via EIA repeatedly. Specifically, of the 6,397 cases with positive laboratory tests separated by at least 365 days, approximately half tested EIA positive at least a year after their initial positive test. The diagnostic reasons behind the use of repeated EIA testing as well as the clinical characteristics of patients who are positive for extended periods of time

are poorly understood. Anecdotal reports suggest that the EIA test is used to screen immunocompromised patients, but the prevalence of this practice and the characteristics of these persistently positive patients are unknown.

The Fellow will help address these unanswered questions by analyzing Valley fever data from 2013 and 2014 to identify the frequency and the number of cases with repeated positive EIA in this period. In addition, to assess whether these cases differ from the rest in terms of clinical characteristics and diagnostic rationale, the Fellow will collect clinical and diagnostic information for a random sample of these cases through medical record abstraction.

Additional Project Describing the impact of culture-independent testing by laboratories on enteric disease surveillance

Diagnosis of many enteric pathogens, including Salmonella, Shigella, and pathogenic E. coli, generally involved growing the bacteria in culture from a clinical sample, in the past. In recent years, other diagnostic assays, or “culture-independent diagnostic tests” (CIDTs) have become popular, offering faster turn-around times, among other advantages, but requiring some changes in public health surveillance and laboratory practices. CIDTs are now part of the surveillance case definitions for many enteric illnesses, and, as of January 2018, specimens that test positive by CIDT for several pathogens must be submitted to the state public health laboratory for further testing, as do isolates from culture assays.

The Fellow will work with epidemiologists in the foodborne disease and surveillance teams and staff at the State Public Health Laboratory to assess and describe how CIDTs are affecting public health surveillance for enteric diseases in Arizona. This may include looking at trends in the reporting of CIDT compared to culture-based tests over time; describing how CIDT-related case definition changes affect case counts; reviewing state laboratory confirmatory testing for submitted specimens; and making recommendations as needed for further data collection or analysis to enable monitoring of CIDT impact over time.

Preparedness Role

The Fellow will be incorporated into the state’s all hazard incident command structure during public health emergencies, including widespread infectious disease outbreaks. There will be opportunities to participate in semi-annual exercises for radiological release at the Palo Verde Nuclear Generating Station. During emergency responses, EDC staff is typically an integral part of the Operations Section. The Fellow may also have the opportunity to assist with development of the public health response task force as part of the state’s emergency response plan.

Additional Activities

The Fellow will have the opportunity to take part into field and outbreak investigation activities that will arise during his/her stay with us. Some examples of past activities include: investigation of a dengue outbreak in Yuma County, investigation of a West Nile virus and St. Louis encephalitis virus outbreak in Maricopa County and Rocky-Mountain spotted fever campaigns in the American Indian reservations.

Mentors

Primary	Irene Ruberto PhD, MPH Senior Surveillance Epidemiologist
Secondary	Kenneth Komatsu MPH State Epidemiologist