

ID: 87079801

Infectious Diseases, Wastewater Surveillance - Host Site Description

Chicago Department of Public Health

Assignment Location: Chicago, US-IL
Chicago Department of Public Health
Disease Control and Emergency Preparedness Bureau

Primary Mentor: Peter DeJonge, PhD, MPH
US Centers for Disease Control and Prevention Career Epidemiology Field Officer (CEFO)
Chicago Department of Public Health

Secondary Mentor: Stephanie Gretsch, MPH
Epidemiologist IV
Chicago Department of Public Health

Work Environment

Hybrid

Assignment Description

The CSTE AEF fellow would sit in the Epidemiology and Disease Surveillance Program (EDS) within the Disease Control and Emergency Preparedness Bureau (DCEP) at CDPH. DCEP is tasked with protecting the public from infectious diseases by conducting outbreak investigations, implementing control measures, and responding to public health emergencies. The Bureau is composed of several other programs in addition to EDS, including Immunization and Emergency Response (IER), Laboratory-Based Surveillance (LBS), Communicable Diseases (CD), and Healthcare and Congregate Settings (HCS). Though the CSTE AEF fellow would sit specifically within the Epidemiology Unit in the EDS program, they would contribute to and support a variety of cross-program projects within DCEP.

The Epidemiology Unit within EDS consists of 7 epidemiologists with a variety of skillsets and trainings (3 PhDs, 1 MD-PhD, 2 MPH) and works with the other programs within DCEP as a central source of epidemiologic expertise. While many other programs at DCEP have their own epidemiologists, the Epidemiology Unit bolsters the data capacity of other programs in regular data collection, cleaning, and advanced analytic assistance. The work of the Unit will provide the fellow with a wide range of experiences and flexibility to pursue projects based on their interests. Additionally, the fellow's secondary mentor is the supervising epidemiologist for the Vaccine-Preventable Diseases (VPD) Unit in EDS which is responsible for vaccine-preventable disease and respiratory illness surveillance. The VPD Unit includes 5 epidemiologists, including 2 former AEF fellows. The fellow would also work with VPD epidemiologists on routine surveillance activities and cluster and outbreak responses to gain experience in disease surveillance and control.

The fellow will have routine meetings with both mentors to review projects and support their professional development. Day-to-day activities would include surveillance and major project activities, weekly Bureau outbreak meetings, surveillance during large-scale events, and maintaining an internal decision support system housed within the Epidemiology Unit called SENTRII (Surveillance for Emerging and Novel Threats and Reportable Illnesses and Injuries). The SENTRII system functions as a collection of webpages, dashboards, advanced analytics, and resource repositories for a variety of public health topics, ranging from respiratory season illnesses and mpox surveillance, to large-scale event and bioterrorism preparedness. The fellow can expect to be involved in development and maintenance of specific SENTRII pages. Based on interests, the fellow can assist more on the backend (technical coding, Javascript, debugging, API and sFTP processes) or the front-facing material (visualizations, reports, dashboards) or all of the above.

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Describe Statistical and Data Analysis Support, Such as Databases, Software, and Surveillance Systems Available to the Fellow

The fellow would receive statistical and analytic support from DCEP subject matter experts. DCEP epidemiologic analyses and data cleaning processes utilize both R and SAS software (though R scripts are becoming more common). Other commonly used software include REDCap, Tableau, ArcGIS products, EMResource and EMTrack (Juvare systems for hospital capacity and patient tracking capabilities), and SaTSCaN. The fellow would have access to NSSP's ESSENCE system, National Poison Data System, and Chicago-based data in several Illinois surveillance systems including the Illinois National Electronic Disease Surveillance System (I-NEDSS), Illinois Comprehensive Automated Immunization Registry Exchange (I-CARE), Illinois Hospital Discharge Database, and Illinois Vital Records System.

DCEP also has access to unique Chicago-specific databases, including the Chicago Health Atlas (chicagohealthatlas.org) which provides demographic, socioeconomic, mortality, healthcare access, and other health indicators across Chicago geographies. The publicly available Chicago Data Portal (data.cityofchicago.org) also contains a wide range of pertinent databases, including those collected by other city departments like Chicago Police and Chicago Fire.

In-house, the Epidemiology Unit helps to maintain two unique CDPH surveillance systems. The first, which leverages SaTSCaN methods, is based on an internally developed R package called CluDet(). This package monitors I-NEDSS disease reports for spatiotemporal clusters, which are reported on to associated programs for public health follow-up. The second surveillance system, which is maintained alongside the Laboratory-Based Surveillance (LBS) program at DCEP, is the city's wastewater surveillance program that monitors numerous pathogens including influenza A and B, SARS-CoV-2, RSV, mpox virus, and measles virus.

Projects

Surveillance Activity Title: Surveillance for rotavirus gastroenteritis in Chicago, IL

Surveillance Activity Description:

Rotavirus is a common cause of gastroenteritis in infants and young children with nearly all children infected by age 5. Prior to routine childhood vaccination in the US in 2006, rotavirus contributed to a significant number of emergency room visits and hospitalizations among young children. In early 2026, HHS removed rotavirus vaccine from the routine childhood vaccination schedule in the US. Though Illinois and Chicago have adopted the AAP childhood vaccination schedule and still recommend rotavirus vaccine for all infants, the impact of this federal change on vaccination rates and disease burden in Chicago is unknown. Rotavirus gastroenteritis is not a notifiable condition in Illinois, and CDPH has historically not conducted surveillance for this condition. This surveillance project will be used to establish disease rates prior to 2026 and methods for prospective surveillance in Chicago.

Surveillance Activity Objectives:

- Utilize the Illinois hospital discharge database and syndromic surveillance system to describe the historical number and rate of rotavirus-related hospitalizations and emergency department visits among Chicago children.
- Compare disease rates among demographic and geographic groups in Chicago.
- Examine the utility of secondary surveillance sources (e.g., laboratory surveillance) for monitoring rotavirus disease activity and burden in Chicago.
- Establish methods to conduct prospective rotavirus disease surveillance based on the initial analysis.
- Make recommendations to DCEP program management on how learnings from this project could be applied to surveillance of other non-notifiable conditions of concern.

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Surveillance Activity Impact:

This project will allow CDPH to understand the historical burden of rotavirus-related hospitalizations and emergency department visits and monitor disease rates prospectively. Findings from the project will also be used to inform future surveillance activities for other non-notifiable conditions.

Surveillance System Evaluation Title: Contextualizing data signals in wastewater surveillance at O’Hare International Airport

Surveillance System Evaluation Description:

Since 2022, Chicago has monitored wastewater collected at O’Hare International Airport (ORD). In 2025, ORD was the busiest airport in the US and is a common first point of entry for many international travelers arriving to the country. We have not yet assessed the relationship between data signals collected at ORD (e.g., viral concentration levels, genomic sequencing results) and those same signals in city of Chicago sewersheds. Our hypothesis is that, given the role of ORD in national/international travel, we anticipate ORD to be a valuable, and unique, sentinel site to monitor emerging variants or outbreaks of concern.

Surveillance System Objectives:

- Organize and describe the breadth of historic and current wastewater surveillance data available at ORD.
- Visualize timing of similar data signals detected at ORD and throughout Chicago.
- In the event of notable signal patterns, propose epidemiologic investigation to assess relatedness of data signals.
- Draft messaging for DCEP leadership to explain any findings from surveillance system evaluation. Consider whether regular surveillance at ORD sewershed is warranted.

Surveillance System Impact:

CDPH/DCEP continues to sample wastewater from an ORD sewershed because of the importance of the airport in disease introduction and transmission chains within the city. However, CDPH/DCEP would benefit from an improved understanding of ORD data signal dynamics and their relation with similar signals throughout the city. Wastewater surveillance resources and funding are not unlimited and this proposed project would (i) better define the public health benefit of sampling at ORD and (ii) provide possible use-cases for this data.

Major Project Title: Establishing respiratory season thresholds for non-pharmaceutical interventions in healthcare settings

Major Project Description:

CDPH summarizes data from a variety of sources during each respiratory season to inform situational awareness and communication of public health recommendations to the public, local officials, and healthcare providers. To minimize the spread of respiratory illness in healthcare settings, the Illinois Department of Public Health issues recommendations to healthcare facilities to practice enhanced precautions (e.g., visitor restrictions, broader use of source control) when respiratory illness statewide reaches a moderate level. In recent seasons, Chicago healthcare facilities have expressed a need for locally defined thresholds to guide implementation of these recommendations and better align actions with local disease activity. The fellow would analyze and interpret multiple sources of respiratory illness data comprehensively (e.g., wastewater concentrations, laboratory test results, inpatient and emergency department visits, hospital capacity metrics) to generate a local level, or levels, that could be used to inform when CDPH recommends Chicago healthcare facilities implement enhanced precautions. CDPH also has access to a compartmental respiratory disease model, which can assist in generating counterfactual disease spread dynamics.

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Major Project Objectives:

- Conduct an environmental scan of national policies and guidance related to implementation of non-pharmaceutical interventions (NPI) in healthcare facilities, including among Chicago-area healthcare systems.
- Utilize respiratory illness surveillance data to establish thresholds for when Chicago healthcare facilities should implement NPIs to reduce the spread of respiratory illnesses.
- Validate proposed thresholds against historical respiratory season data.
- Present findings to CDPH leadership and hospital epidemiologists across Chicago.
- Explore setting up a regional public health - healthcare system coalition to support coordinated adoption of the proposed framework.

Major Project Impact:

Establishing a data-derived threshold (based on multiple previous seasons of respiratory illness in Chicago) would provide considerable credibility to hospital decision-makers and fill a local need for targeted guidance. Early and more consistent implementation of NPIs in Chicago healthcare facilities would help reduce disease transmission and mitigate infectious disease burden on the city's hospital system.

Additional Project #1 Title: Spatiotemporal cluster detection using ED surveillance data

Project #1 Type: Surveillance Activity

Project #1 Description:

Currently, the Epidemiology Unit in DCEP/EDS utilizes spatiotemporal cluster detection algorithms to detect significant clusters of particular illness (clustet() R package based on SaTScan methods). These methods assess clusters across cases of notifiable disease that are reported to the state's electronic disease surveillance system statewide). Recently, the New York City Department of Health and Mental Hygiene released a preprint that describes similar spatiotemporal cluster detection methods, but applied to ICD-10 codes reported in emergency department visits citywide. This method requires no advanced preselection of ICD-10 codes or diseases of interest, but rather scans through everything available in recent ED visit records to find clusters of unique codes; this is known as asyndromic surveillance.

Project #1 Objectives and Expected Deliverables:

- Understand the methods and techniques behind the NYCDHMH asyndromic surveillance method and work with NYCDHMH contacts to apply these methods to Chicago data.
- Automate asyndromic surveillance as a major feature on the SENTRII system to serve as a valuable complement to the NNDS cluster detection already in operation.
- Retrospectively assess notable public health events in Chicago using ICD-10 cluster methods to determine whether asyndromic surveillance may have provided an early warning for impending disease/illness/injury.

Project #1 Impact:

These same statistical methods are currently being applied to one source of disease data in Chicago, which is derived from active reporting of specific illnesses and injuries. This project would bolster our understanding of emerging health threats in Chicago because it can help to monitor emergent trends passively, without any preconceived outcome of interest. Establishing this surveillance capacity has a variety of use cases including, (i) monitoring for novel diseases still without an established diagnosis or name, (ii) surveillance for nonreportable diseases, and (iii) enhancing emergency preparedness during large scale events in Chicago.

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Additional Project #2 Title: CASPER survey to understand internal and external readiness of Chicago households

Project #2 Type: Major Project

Project #2 Description:

The Community Assessment for Public Health Emergency Response is a standardized CDC project, with validated/replicable methodology, that can be used to collect pertinent household-level information for the purposes of public health preparedness and response. CASPERs have traditionally been used to collect data for public health response after major disaster events; recently, many jurisdictions have leveraged CASPER methodology to collect information on the readiness of their community in anticipation of public health emergencies. Chicago has plans to utilize its first CASPER household preparedness survey in May 2026.

Project #2 Objectives and Expected Deliverables:

- Assist in the interpretation of data collected during Chicago's first-ever CASPER and incorporate these results into public health emergency preparedness (PHEP) protocol.
- Provide insight into CASPER data during related CDPH/DCEP tabletop exercises
- Assist in formulating plans for 2027 and 2028 CASPER surveys, including selection of communities to be surveyed and drafting of questionnaire.
- Support or lead data analysis of follow-up CASPER surveys in 2027 and 2028.

Project #2 Impact:

Data from annual CASPER surveys (and the longitudinal comparisons over time) can provide CDPH with valuable information on household risk perception, knowledge of emergency resources, and outstanding needs relevant to community preparedness. Data collected are intended to be emergency agnostic and should ideally help improve the manner in which Chicago households access and utilize emergency and preparedness resources.

Please Describe the Fellow's Anticipated Role in Preparedness and Response Efforts – Include Activities and Time Allocation (Required Competency of Fellowship)

Chicago hosts several large-scale events annually (PRIDE parade, Lollapalooza music festival, Chicago Marathon). CDPH, and specifically the PHEP team within DCEP, stands up a public health emergency response team for each event (and other events, when warranted). This response team works in close collaboration with other city departments including the Chicago Fire and Police Departments and the Office of Emergency Management and Communications. The AEF fellow would have the opportunity to participate in epidemiologic surveillance during these large-scale events and contribute to regular situation reports within an incident command structure (ICS) framework. Fellows would gain experience in ICS responses (sitting often within the Epidemiology Program in the Planning Section) and communicating public health findings up to leadership within that framework.

Time allocated to emergency response and preparedness certainly increases during the summer season, when most large-scale events occur; across the entire year, working on this type of event surveillance data (ingesting, cleaning, preparing dashboards) may account for 10-20% of the Fellow's time. During an event, this may be the Fellow's full-time job at CDPH should they so choose.

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Please Describe the Fellow's Anticipated Role in Cluster and Outbreak Investigations – Include Activities and Time Allocation (Required Competency of Fellowship)

DCEP routinely responds to infectious disease outbreaks in Chicago, and we anticipate the fellow will spend ~15% of their time supporting cluster and outbreak investigations. The fellow would assist with outbreak investigation activities including questionnaire development, review of case investigations, communication of appropriate disease control and prevention guidelines, and writing a final outbreak summary. The fellow would primarily support cluster and outbreak investigations in the VPD Unit but would also be given opportunities to participate and potentially lead responses in other program areas, like foodborne disease, based on their interests. During large outbreaks DCEP will go into an incident command structure; recent examples include a measles outbreak associated with a shelter, HPAI(H5) at a local zoo, and a community outbreak of invasive meningococcal disease. The fellow will be trained on incident command procedures and support large outbreak responses, likely sitting within the Epidemiology Program in the Planning Section. DCEP holds a weekly outbreak huddle that the fellow would join to learn about ongoing outbreak responses in the Bureau and provide updates on any outbreaks they lead.