ID: 55916092
Infectious Diseases - Host Site Description
New York City Department of Health and Mental Hygiene

Assignment Location: Long Island City, US-NY
New York City Department of Health and Mental Hygiene
Immunization/Disease Control

Primary Mentor: Robert Arciuolo, MPH
Surveillance Informatics and Data Lead
NYC Department of Health and Mental Hygiene, Bureau of Immunization

Secondary Mentor: Krishika Graham, MD, MPH
Vaccine Preventable Disease Surveillance Unit Chief
NYC Department of Health and Mental Hygiene, Bureau of Immunization

Work Environment
Hybrid

Assignment Description

The Fellow will be assigned to the Bureau of Immunization (BOI) within the Division of Disease Control (DDC) at the NYC DOHMH. BOI is composed of units focused on: Vaccine Preventable Disease (VPD) Surveillance, Perinatal Hepatitis B Prevention, School and Child Care Immunization Compliance), Response Readiness, Administration, Citywide Immunization Registry, the Vaccines for Children Program and Vaccine Management, and Immunization Infrastructure and Clinical Support. Upon arrival, the Fellow would meet with each Unit Chief to learn about their work, explore possible projects and activities of interest. The Fellow will dedicate most of their time to proposed projects including a surveillance system evaluation evaluating syndromic surveillance and regional health information organization data for mumps and pertussis case ascertainment and a major analytic project looking at vaccine-associated rash from wildtype measles infection during an outbreak of measles.

For their day-to-day activities, The Fellow will be primarily assigned to the VPD Surveillance Unit with which they will participate in intake and investigation of reportable disease cases and clusters, intermittent analyses of surveillance data, weekly case classification, weekly epidemiology meetings, and all staff meetings. The VPD Surveillance Unit and BOI also regularly respond to outbreaks of measles, mumps, pertussis, and varicella. In 2022-2024, BOI investigated and provided control measures for a large outbreak of varicella among recent immigrants to NYC residing in congregate settings. In 2024, BOI, in collaboration with NYC Health and Hospitals and NYC Department of Homeless Services, also responded to cases of measles among residents of a large congregate living facility. During 2018-2019, BOI investigated the largest outbreak of measles in the United States since 1992, with nearly 650 cases of measles. Other notable outbreaks and responses have included large community and college campus outbreaks of mumps in 2010, 2014, and 2015, community measles outbreaks in 2013 and 2014, a citywide outbreak of pertussis in 2011-2012 and a community-based pertussis outbreak in 2015. The VPD Surveillance Unit also conducts polio surveillance following identification of a paralytic polio case in a nearby county of New York State in 2022. The Fellow will be incorporated into outbreak response and control activities such as these, including data epidemiologic summaries and data analysis. These outbreaks have also consistently led to opportunities for additional studies, presentations, and publications for the Fellow as well.

The Fellow will also attend meetings within BOI (e.g. NYC Childhood and Adult immunization Coalition meetings), DDC (e.g. trainings and Town Halls), and across DOHMH (e.g. Epidemiology Grand Rounds) to gain exposure to all aspects of the BOI's and DOHMH's work.

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

The Citywide Immunization Registry (CIR) is NYC's immunization information system, a centralized repository of immunization information on New Yorkers with the City Health Code requiring that all immunizations for those aged less than 19 years be recorded in the CIR. The CIR contains over 187 million immunizations for over 15.2 million people. The CIR is a robust source of data to confirm immunization among persons with vaccine-preventable diseases and conduct analyses around immunization coverage.

The Bureau's Surveillance Units maintain their data in a web-based data system "Maven." Trainings in use of Maven will be made available to the Fellow. The primary mentor, Robert Arciuolo, serves as the Maven administrator for BOI and has extensive experience using Maven. Mr. Arciuolo also has robust experience with various analytic and data visualization software (e.g., SAS, GIS, SaTScan, Tableau, REDCap) and serves as co-lead for the DOHMH SAS User Group. In addition, the Center for Population Health and Data Services' (CPHDS) Epidemiology Services Unit offers support services, including statistical and analytic consultations when needed.

Within CPHDS there are also a number of large datasets such as the NYC Community Health Survey, hospital discharge datasets and vital records data, which have been used for analytic projects.

Projects

Surveillance Activity Title: Conduct a VPD outbreak investigation

Surveillance Activity Description:
The CSTE Fellow would be responsible for conducting the investigation and epidemiologic analysis of a vaccine-preventable disease outbreak. Details of the investigation would vary depending on the nature of the outbreak.

Surveillance Activity Objectives:
Additional analytic projects could be developed specific to outbreaks or emergent issues that may arise during the fellowship. Examples of past projects conducted by CSTE Fellows include:

- Evaluation of rubella diagnostic testing and surveillance in NYC
- Evaluation of the use of social media during a mumps outbreak in 2015
- Evaluation of non-mumps parotitis during the 2014-2015 influenza season
- Mumps vaccine effectiveness and risk factors for disease in households during an outbreak in NYC
- Effectiveness of measles post-exposure prophylaxis during an outbreak in NYC
- Provider awareness and altered practices survey following a 2011-2012 pertussis outbreak in NYC

Surveillance Activity Impact:
Training in outbreak surveillance, control, and data summary/analysis.

Surveillance System Evaluation Title: Evaluation of syndromic surveillance and regional health information organization data for mumps and pertussis case ascertainment

Surveillance System Evaluation Description:
New York State Public Health Law and NYC Health Code requires health care providers to report select conditions to DOHMH at the time of clinical diagnosis. Additionally, laboratories are mandated to electronically report lab results for select diseases. VPD reports received by DOHMH are investigated and case managed by the VPD Surveillance Unit.

The unit also ensures timely control measures are enacted including guidance to providers, contact tracing, isolation and quarantine recommendations, and post-exposure prophylaxis. Among the conditions managed by the VPD Surveillance Unit are mumps and pertussis. While both are provider and laboratory reportable, the majority of case investigations are initiated from a laboratory report and not reported by a health care provider due to a lack of suspicion and/or delayed provider reporting to DOHMH. This evaluation will assess regional health information organization (RHIO) medical record data as an alternative reporting method for capturing mumps and pertussis at the time of provider diagnosis.

RHIOs are organizations formed and operated to facilitate the exchange of electronic health records among hospitals, physicians, and others in the health care system. The VPD Surveillance unit has worked with RHIOs to setup electronic case reporting via RHIO alerts when available medical records meet select trigger criteria for public health reporting. These include diagnosis of mumps or pertussis, but have not yet been evaluated.

It is hypothesized that RHIO alerts may assist in identifying otherwise unreported mumps and pertussis cases. However, given that mumps and pertussis often require laboratory testing for providers to diagnose; the volume and accuracy of RHIO alerts is uncertain. This evaluation will assess the sensitivity, positive predictive value, timeliness, and new case finding from RHIO data. The evaluation will compare the utility of RHIO data to other surveillance tools such as syndromic surveillance reporting. Findings may also inform future work of the unit relating to broader electronic case reporting activities.

Surveillance System Objectives:
Presentation and potential publication of findings.

Surveillance System Impact:
Findings from this evaluation will inform future work conducted by the VPD Surveillance Unit and whether to include RHIO alerts as an alternative reporting method in routine surveillance activities.

Major Project Title: Differentiating vaccine-associated rash from wildtype measles infection during an outbreak of measles

Major Project Description:
Measles is a highly contagious viral respiratory illness characterized by a maculopapular rash throughout the body, fever, and cough, coryza, and conjunctivitis. Severe complications of measles may include miscarriage, encephalitis, and death. Rapid time-intensive public health control measures are required following a measles exposure to prevent the spread of measles to other susceptible persons. Measles vaccination (MMR or MMRV vaccines in the US) is highly effective in preventing measles infection. However, approximately 5% of MMR vaccine recipients may develop a transient rash 7 to 10 days after vaccination. While vaccine-associated rash is generally mild and is not communicable to others, it may be difficult to distinguish from a true measles infection especially in an outbreak setting. Traditional diagnostic testing via polymerase chain reaction (PCR) and serology, cannot distinguish vaccine-associated rash from wildtype infection. Viral genotyping is required to distinguish the two but may take days to weeks to perform leaving public health officials to implement taxing control measures while awaiting results. In recent years a specific PCR test known as MeVA was introduced to rapidly detect vaccine-strain virus. Both genotyping and MeVA were utilized during a large 2018-2019 measles outbreak to triage cases with recent vaccination.

This project will use surveillance data to assess differences between wildtype cases vs vaccine-associated rash. Criteria may include time since vaccination, prior vaccination status, severity of illness, known exposure, level of community transmission, and age. Information will be used to characterize potential predictors of vaccine-associated rash versus wildtype infection.

Additionally, this project will describe the timeliness and predictive value of MeVA testing as compared to traditional genotyping. Given an expanding commercial testing landscape findings may inform the utility and importance of MeVA testing at local public health laboratories.

Major Project Objectives:
Presentation and potential publication of findings.

Major Project Impact:
Differences in case characteristics may inform level of suspicion and urgency of control measures in future settings and/or further emphasize the necessity of lab testing to rule-out measles infection. The utility of MeVA testing may inform lab capacity needs at a local level.

Additional Project #1 Title: Epidemiology of infant pertussis and impact of Maternal Tdap
Project #1 Type: Major Project

Project #1 Description:
Since 2018, CDC's Advisory Committee on Immunization Practices has recommended that women receive a dose of Tdap during each pregnancy, which should be administered from 27 through 36 weeks' gestation, regardless of previous receipt of Tdap. The maternal Tdap serves to boost the maternal antibodies passed to the newborn to protect against infection. Subsequently infants begin a DTaP vaccination schedule at 2 months of age.

In NYC, an increase in pertussis cases citywide has been observed since July 2022. The majority of cases have occurred among unvaccinated children <5 years many of which were among infants <1 year of age. During pertussis case investigations DOHMH collects information on both infant DTaP (i.e. via CIR and medical records) and maternal Tdap vaccination status (i.e., via self-report and medical records). This project will analyze these data to assess the epidemiology of infant pertussis in NYC. The CSTE Fellow would assist in determining missing information via chart reviews and determine the proportion of mothers with maternal Tdap vaccination and reported barriers to uptake. Among infant cases >2 months of age, this analysis will assess differences in infant DTaP vaccination status and maternal Tdap vaccination (e.g. differences in race, ethnicity, geographic residence, age, prior pregnancies, etc.). The analysis will also describe any differences in infant outcomes by infant DTaP and maternal Tdap vaccination status.

Project #1 Objectives and Expected Deliverables:
Potential to present and publish findings.

Project #1 Impact:
Awareness of vaccination gaps, particularly maternal Tdap vaccination, may inform BOI's programmatic work to increase maternal Tdap vaccination.

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

BOI staff have specific emergency preparedness roles and the CSTE Fellow would be able to participate in these activities. BOI surveillance staff are a part of the Surveillance-Epidemiology Emergency Response Group within the Clinical Operations Section, which is responsible for surveillance and management of disease cases. Most remaining BOI staff are part of the Citywide Health Emergency Field Operations Section, which is responsible for pandemic vaccination campaign planning, including mass vaccination plans. The CSTE Fellow would attend emergency preparedness meetings and engage in emergency response activities.

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Examples of responses that past CSTE Fellows involved with include:

- Mass vaccination clinics for COVID-19 and influenza in underserved neighborhoods
- Investigation data quality and improvement during a 2022 mpox outbreak
- Pharmacy outreach for vaccine distribution during COVID-19 pandemic
- Epidemiologic data analysis during agency activations for measles, mumps, and other large-scale VPD outbreaks
- Monitoring of travelers from Ebola-affected countries who were traveling between U.S. jurisdictions
- Data collection during vaccine PODs for Neisseria meningitis among men who have sex with men and for hepatitis A following large restaurant exposures.

There may be opportunities for the CSTE Fellow to assist in the planning and data coordination of future mass or community-based vaccination clinics targeting underserved neighborhoods as was done in 2023 and 2024 for COVID-19 and influenza vaccination.

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

The CSTE Fellow would be responsible for conducting the investigation and epidemiologic analysis of a vaccine-preventable disease outbreak. Details of the investigation would vary depending on the nature of the outbreak. Additional analytic projects could be developed specific to outbreaks or emergent issues that may arise during the fellowship.