Infectious Diseases

New York City Department of Health and Mental Hygiene, Bureau of Tuberculosis Control (BTBC)

 Long Island City, New York

Assignment Description

The fellow will be assigned to the Bureau of Tuberculosis Control (BTBC) which is housed within the Division of Disease Control of the NYC DOHMH. New York City has one of the highest rates of TB (6.9 per 100,000 in 2016) in the US and the BTBC is the largest TB control program in the US with approximately 200 staff. BTBC is composed of the following offices: Bureau Director, Surveillance and Epidemiology, Clinic Operations, Field Operations, Outreach, Education and Training, Administration, Policy and Planning, and Medical Affairs.

The fellow will be assigned to the BTBC Surveillance and Epidemiology Office and will function as a full member of that office. The Office of Surveillance and Epidemiology is comprised of a surveillance team, data team, field epidemiology team, laboratory reporting team, and outbreak prevention and control team. Surveillance and Epidemiology Office staff perform a number of functions including TB registry maintenance and support, research, TB contact investigations at congregate settings, and TB outbreak and cluster investigations. The fellow will have the opportunity to work closely with each of the units and teams of the Office of Surveillance and Epidemiology. The BTBC is an interdisciplinary setting and the fellow will also work in close collaboration with staff in other offices and units, particularly the Planning and Policy, Education and Training and Outreach, and Medical Affairs units. Working at BTBC will provide the fellow a unique opportunity to participate in many local public health agency functions in a diverse setting where there are high rates of infectious and chronic diseases along with social disparities.

Day-to-Day Activities

The fellow will participate in routine surveillance and epidemiology activities such as analyzing epidemiologic and surveillance data, participating in research from the protocol development stage through manuscript preparation, conducting outbreak and cluster investigations, and presenting at internal and external seminars. These activities will provide opportunities for the fellow to gain hands-on program management experience (including creating and revising protocols), work with large datasets, and be involved in many aspects of the largest TB control program in the country.

The fellow will have the opportunity to attend a BTBC orientation, monthly TB-related journal club and methods seminars, the Columbia Mailman School of Public Health TB epidemiology course, epidemiology staff meetings, DOHMH epidemiology grand rounds, relevant team meetings, and Citywide TB rounds. SAS, GIS and other relevant computer software training will be available along with other trainings at the NYC DOHMH in many areas such as scientific writing, presentation skills, and epidemiology.

<u>**Potential Projects**</u>

Surveillance   **Monitoring and follow-up activities related to reporting of children under 5 with**
Activity   **latent TB infection**

The NYC Health Code mandates reporting of latent TB infection (LTBI) among children less than 5 years old. This includes a requirement that laboratories report all positive results of blood-based tests for TB infection performed on children under 5. It also mandates that providers report on chest radiograph results of children who test positive for TB infection and initiation of TB preventive treatment. This surveillance activity will require the Fellow to follow-up with providers or check external databases to obtain any missing data and conduct brief interviews with providers and/or parents of children with LTBI. This activity will also allow the fellow an opportunity to engage in provider and patient education regarding LTBI.

Surveillance   **Evaluating reporting of "missed contacts" among NYC's TB patient population**
Evaluation

The Center for Disease Control and Prevention's cooperative agreement mandates that TB programs collect and report key patient characteristics (e.g., demographic, clinical, social) to the CDC in form of a Report of Verified Case of Tuberculosis (RVCT). A subset of this report includes variables that capture TB risk factors, including the variables "Contact of an infectious TB patient" and "Missed contact" within the past two years. Contact investigation is a key component of routine TB control efforts, and accurately capturing these variables has implications for our ability to prevent TB transmission in NYC. The fellow will evaluate the Bureau's current methods for identifying and documenting missed contacts, its criteria for defining a missed contact, and analyze data to assess the accuracy and completeness of current RVCT data.

Major Project   **Whole genome sequencing to infer and assess TB transmission in NYC**

Over the last few decades, genotyping methods have aided TB care and prevention efforts by helping to discriminate between disease strains and more effectively assess TB transmission. However, traditional genotyping methods characterize only a small portion of the TB genome and are limited in their discriminatory power. Next generation whole genome sequencing (WGS), in contrast, can detect genomic variation at the level of single nucleotide polymorphisms (SNPs), resulting in the highest possible resolution of strain variation. For this reason, WGS is quickly being implemented to support and enhance routine TB control efforts at local, national, and international levels. However, many questions remain about how to use this data for inferring or refuting transmission. The fellow will use WGS data to investigate 1) the discrepancy between traditional genotyping methods and WGS in distinguishing select TB strains; 2) the extent to which WGS can support or refute epidemiologic links identified through contact and cluster investigation; c) strain-specific mutation rates and SNP thresholds that can be used to inform the use of WGS data for TB control efforts in NYC.

Surveillance Evaluation   **Application of whole genome sequencing in TB drug susceptibility testing**

Effectively and accurately diagnosing drug resistance is a crucial part of TB treatment and control. Conventional phenotypic drug susceptibility testing (DST) is slow, which can delay appropriate treatment and increase the risk of TB transmission by infected patients. Whole genome sequencing provides the ability to quickly identify a catalogue of known mutations that have previously been associated with resistance to existing TB drugs. This project will describe differences in drug resistance profiles obtained via WGS and conventional DSTs and quantify time to identification of resistance for WGS and phenotypic testing. The fellow will evaluate if the use of WGS data shortens the time to appropriate TB treatment initiation. In addition, the fellow will assess how WGS-generated mutation results are communicated to, and used by, non-DOH physicians in an effort to optimize TB treatment in NYC.

Major Project   Improving LTBI prevalence estimates in NYC

Persons with latent TB infection (LTBI) are not infectious and cannot spread TB to others; however, those with LTBI represent a reservoir of individuals at risk of developing active TB disease. Having accurate LTBI prevalence estimates specific to NYC is a crucial step in addressing LTBI and can inform TB prevention and elimination efforts. TB prevalence estimates from the National Health and Nutrition Examination Survey (NHANES) may be representative on a national level but are unlikely to be reflective of local epidemiology in urban areas such as NYC. Currently available NYC-specific estimates are based on patients tested at NYC TB clinics, which also may not be representative of the NYC population as a whole. The goal of this project will be to develop more generalizable estimates of the prevalence of LTBI in NYC using TB testing data from sources available outside of the health department (e.g., commercial laboratories, hospital records, community health providers). The fellow will be responsible for cleaning and analyzing the testing data to generate LTBI prevalence estimates.

Preparedness Role

The fellow will be part of NYC DOHMH's emergency response structure and be assigned to the Epidemiology/Surveillance sub-section of the NYC DOHMH Incident Command System. This section is responsible for 1) investigating the incident to characterize event by person, place, and time; 2) collecting data and developing databases; 3) implementing enhanced, active or passive syndromic surveillance to monitor impact and recommend preventive measures. The fellow will receive emergency response training and may have the opportunity to participate in emergency response exercises such as point of distribution (POD) exercises. In the past few years the health department has been activated for a number of major city-wide emergencies including Hurricane Sandy, Ebola, Legionnaires' disease, and most recently Zika.

Additional Activities

Genotype cluster/outbreak investigations:

The fellow will participate in and lead genotype cluster investigations. This involves collecting, reviewing and analyzing patient records, re-interviewing patients to identify sites of exposure and epidemiologic links between cases, and generating transmission assessments and related recommendations for public health intervention.

Field-based contact investigations in congregate settings:

The fellow also will serve as lead investigator for an expanded contact investigation (ECI) at a congregate setting (school, worksite, hospital, etc.) that has had a TB exposure. This typically involves working with the site to conduct an education session on TB and its transmission, arranging testing of persons exposed to TB, ensuring all that are exposed are evaluated, reviewing and analyzing the evaluation results to make a transmission assessment, and writing a report of the investigation.

Mentors

Primary   Steffen Foerster PhD, MSc

City Research Scientist II, Office of Surveillance and Epidemiology

Secondary   Jillian Knorr MPH

City Research Scientist I, Office of Surveillance and Epidemiology