ID: 60276316
Infectious Diseases, Infectious Diseases - COVID-19 - Host Site Description
California Department of Public Health

Assignment Location: Richmond, US-CA
California Department of Public Health
Division of Communicable Disease Control

Primary Mentor: Pennan Barry, MD, MPH
Surevillance and Epidemiology Section Chief
California Department of Public Health-Tuberculosis Control Branch

Secondary Mentor: Adam Readhead, PhD, MPH
Tuberculosis Surveillance and Economic Senior Epidemiologist
California Department of Public Health-Tuberculosis Control Branch

Work Environment
Hybrid

Assignment Description

For more than two decades, the rate of TB disease declined steadily in California. During 1992-2000, there was an average 5.6% annual decline whereas during the most recent decade, the average annual case decline was 3.4%. Despite the overall decrease in TB disease, the TB case rate in the State of California continues to report the most TB cases in the nation (2022, n=1,843). California's 2022 TB case rate of 4.7 per 100,000 is nearly twice the U.S. rate (2.5 per 100,000).

To protect and improve the health of all, the California Tuberculosis Control Branch (TBCB) provides leadership and resources to prevent and control tuberculosis (TB). The TBCB collaborates with large urban jurisdictions as well as with rural and small health jurisdictions on diverse statewide activities to prevent and control tuberculosis (TB). These activities include surveillance, research, program evaluation, and outbreak investigation. There are approximately 40 TBCB staff, including epidemiologists, clinicians, program liaisons, public health advisors, communicable disease investigators, and other professional and support staff. The TBCB serves the entire population of California, focusing on individuals with both latent and active TB and those at risk of developing TB.

The fellow will be located organizationally within the Surveillance and Epidemiology Section of the Tuberculosis Control Branch. The fellow will work primarily with both Surveillance and Epidemiology as well as with the Outbreak Prevention and Control Section on tuberculosis projects and investigations. The fellow will also have the opportunity to work on projects with the COVID-19 Control Branch.

The fellow will become a member of the team of epidemiologists examining statewide data important for guiding TB control and prevention activities in California. They will also become a member of the outbreak investigation team. The fellow will interact with these teams at least daily but likely more often through in-person and virtual meetings. They will participate in regular section and branch meetings as well as project and investigation specific meetings involving internal and external partners. They will also spend time planning, analyzing, interpreting, and presenting data with the support of their supervisors and team members.

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

Data from TB disease surveillance and the latent TB infection surveillance will be available for the fellow along with the necessary software for analysis, including but not limited to, R, RStudio, R workbench, SAS, and ArcGIS, among others.

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TB surveillance data comes from several sources including the CDPH web-based reporting system, CalREDIE which receives electronic laboratory reporting, CDC's Tuberculosis Genotyping Information Management System (TB GIMS) for reporting on genotyping/sequencing data, and CDC's Electronic Disease Notification (EDN) system for reporting results of immigration medical examinations. Larger datasets are stored in Snowflake.

The Tuberculosis Control Branch works closely with UC San Francisco (UCSF) and many of the branch staff are UCSF employees. We are able to designate interns and Fellows as UCSF affiliates, which grants them access to robust resources of an academic institution, including the UCSF library, the use of RedCap, and access to their Data Science Education and Training Portal.

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Projects

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Surveillance Activity Title: Integration of TB screening data from the California Immunization Registry into routine LTBI surveillance

Surveillance Activity Description:
The California Immunization Registry (CAIR) holds data on a variety of immunizations as well as data on TB screening. To date, these data have not been integrated into LTBI surveillance in part because coverage of these data has been incomplete. There have been recent changes to California reporting laws and reporting of TB screening via CAIR is now mandated. With mandated reporting, we believe reporting via CAIR will increase and integration of this data source into routine LTBI surveillance has become a priority.

Surveillance Activity Objectives:
The fellow will work with TB branch staff and CAIR staff to plan and execute a sustainable flow of data from CAIR to the latent TB infection registry. The fellow will also be responsible for creating a short report of these data to be included in the latent TB infection report, published annually by the TB control branch.

Surveillance Activity Impact:
While TB blood tests (IGRAs) are reportable through electronic laboratory report, TB skin tests performed in the general population are not reportable except to CAIR (through new legislation). Integrating CAIR data will enhance the coverage of the LTBI surveillance system and support follow-up of latent TB infected persons by local health departments.

Surveillance System Evaluation Title: Evaluation of LTBI surveillance system

Surveillance System Evaluation Description:
California has the largest TB disease and TB infection burden of all jurisdictions within the U.S. The Surveillance and Epidemiology Section of the TB Control Branch has been working to build a new latent TB infection surveillance system to help address the burden of latent TB infection within California. This system uses several existing and new data sources on TB infection and treatment but it has not been fully evaluated. The fellow will conduct an evaluation of the LTBI surveillance system in its current state, using CDC's guidelines for evaluating public health surveillance systems, with the aim of providing prioritized recommendations for improvements.

Surveillance System Objectives:
A short report evaluating the LTBI surveillance system and providing actionable recommendations for improvement.

Surveillance System Impact:
Improving the LTBI surveillance system will help to improve public health action on TB elimination and provide more actionable data for targeted testing and treatment of persons with latent TB infection.

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Major Project Title: Long-term mortality of people with TB

Major Project Description:
Based on a recent global meta-analysis, mortality among people with TB post-treatment is estimated to be three times higher than the general population after adjusting for age and sex. However, there is likely to be substantial heterogeneity in survival based on local resources. Furthermore, mortality is not frequently measured in low incidence, high resource settings. There have been very few estimates of long-term mortality of persons with TB in the U.S. We aim to estimate long-term mortality of people with TB in California using data from the TB registry and death certificates.

Major Project Objectives:
The fellow will conduct an analysis estimating the post-treatment mortality of people with TB, beginning with a linkage between the TB disease registry and death certificate data. The fellow will draft and submit a manuscript to an academic journal detailing the results of the analysis.

Major Project Impact:
Post-treatment mortality is crucial to estimating the cost of the TB disease, because premature death accounts for most of the societal cost of TB. This analysis could help show that TB disease is more costly than previously reported. Also, by estimating mortality among this group we can better describe the burden of disease; currently the burden of disease is not estimated for people with TB after treatment. Furthermore, it is important to identify and measure disparities in this key outcome, death. There may be important equity findings.

Additional Project #1 Title: Improved case increase/decrease analytic reports
Project #1 Type: Surveillance Activity

Project #1 Description:
Improved case increase/decrease analytic reports.

Project #1 Objectives and Expected Deliverables:
The project objective is to update existing case increase/decrease analytic report to reflect changes in TB disease surveillance and automate these reports such that they can be produce easily for multiple time periods and local health jurisdictions. This effort is especially important because of the notable decrease in reported TB disease in 2020 and notable increase in 2023. The expected deliverable is flexible code capable of producing increase/decrease analytic reports for all 61 local health jurisdictions as well as the state as a whole for the time period of the user's choosing. The reports will include standard demographic stratifications and observation of case volume for groups known to experience increased risk for TB.

Project #1 Impact:
Case increase/decrease analytic reports are used to inform local and statewide TB prevention and control activities. Automated reports would enable local TB programs to have more frequent reports and enable state TB epidemiologist to spend time on more in-depth increase/decrease analyses using the automated reports as a foundation.

This project is related to the data modernization priority #1 "Building the right foundation" which calls for "improving data collection, analysis and sharing at CDC and across a set of core public health surveillance systems…". This project would improve analysis of TB disease surveillance data directly in service of sharing data with local health partners.

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

Preparedness and Response (<0.05 FTE): The CSTE fellow will have the opportunity to serve in the Division of Communicable Disease Control's Duty Officer of the Day program, where they will be trained to provide clinical and scientific support to local, state, and federal agencies for urgent communicable disease issues that cannot wait until the next business day. In addition, the Fellow will become familiar with the CDPH/Medical Health Coordination Center and may be activated to provide support during an outbreak or emergency response event. Training in Incident Command System (ICS) for public health outbreak investigations will be provided.

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

Overview: The Fellow will spend roughly 40% of their time serving as an active member of TBCB's Outbreak Response Team (ORT). This is an interdisciplinary team that meets at least weekly and includes epidemiologists, nurses, physicians, disease intervention specialists, and a cultural anthropologist. The CSTE Fellow will be an integral part of the team and will regularly collaborate with professionals from these different disciplines. The ORT conducts molecular surveillance in partnership with CDC and local TB programs to detect potential TB outbreaks by investigating approximately 30 TB molecular clusters. Molecular surveillance plays an important role in detecting the roughly 20 incident and prevalent TB outbreaks that occur in California each year.

The ORT provides outbreak investigation, response, and monitoring support to LHDs, including epidemiological support, data analysis, clinical consultation, patient interviews, investigation planning and management, and program evaluation. Working in a highly diverse state that reports the highest number of TB cases in the U.S., the Fellow will have opportunities to work on TB outbreaks in a wide range of populations and settings, ranging from multigenerational homes, casinos, schools, and places of worship, to large agricultural processing plants, healthcare facilities, and correctional facilities. California's size and diversity is also reflected in its 61 LHDs, some in small, rural counties like Mono or Alpine, others in large, urban counties like Los Angeles County, that collectively span from the California-Mexico border to the Oregon border. In 2022, the ORT assisted in the investigation of 6 confirmed, 9 probable outbreaks, and 14 suspected TB outbreaks, including a growing outbreak among migrant workers at a food processing plant.

Developing and maintaining partnerships with other state, local, federal, and academic colleagues will be central to the Fellow's experience. The ORT works closely with the CDC Division of TB Elimination's Molecular Epidemiology Activities and Outbreak Investigation Team. This includes monthly meetings to review the highest priority TB outbreaks and challenging cluster investigations, work on special projects, with CDC and writing the outbreak-related content of TBCB's federal funding applications and CDC progress reports. For example, the ORT is currently collaborating with CDC on pilot testing pediatric alerts as a strategy to identify recent TB transmission hotspots in California. Also, for example, the ORT meets with Los Angeles County's TB Genotype Cluster Investigation and Assessment Team at least monthly to review and discuss TB outbreaks. The Fellow will also participate in CDPH's twice monthly Lab Epi meetings that bring together epidemiology and laboratory staff at CDPH to discuss many kinds of disease outbreaks. These and participation in professional conferences and trainings will provide the Fellow with ample opportunities to learn and network.

Outbreak Investigation and Response (0.2 FTE): The Fellow will learn to nimbly adapt outbreak investigation and response strategies, including data collection and analysis, to the diversity of settings and populations affected by outbreaks. The Fellow will be assigned as the TB Outbreak Liaison with LHDs in a large region of California and will, after initial training and gaining experience working with senior staff, serve as the CDPH Outbreak Lead on TB outbreak investigations in that region.

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The CDPH Outbreak Lead is responsible for collaborating closely with LHD colleagues to plan the outbreak response, by providing epidemiologic and analytic support to local health departments, facilitating interjurisdictional coordination when outbreaks involve multiple counties or states, interacting with other involved health jurisdictions, providing technical assistance in writing provider and media alerts, facilitating LHDs' requests for TB emergency funds provided by CDPH, and coordinating the outbreak response support activities of ORT. The Fellow will also have regular opportunities to work in the field alongside LHD personnel. Specific analytic, planning, and communication activities will include analyzing contact data in TB outbreaks to assess transmission and measure progress with containment activities, planning and facilitating outbreak meetings with LHDs and other partners developing and communicating recommendations to contain outbreaks, preparing and delivering presentations, writing summary reports, developing outbreak response action plans in collaboration with partners, and pilot testing the Salesforce-based platform CalCONNECT, which is currently being adapted for TB case investigation, contact tracing, and outbreak response.

Molecular Epidemiology (0.15 FTE): The TBCB ORT is a national leader in using molecular data to detect, investigate, and monitor outbreaks and has more than 12 years of experience using whole-genome sequencing data to focus public health interventions to stop ongoing recent TB transmission. Nearly all TB isolates in the United States are sequenced, providing a robust dataset for Fellows wishing to develop their molecular epidemiology skillset. ORT's senior staff were founding members of the CDC-supported National TB Outbreak Detection Workgroup established to develop and promulgate best practices in TB molecular epidemiology. The Fellow will work with state and national subject matter experts to learn how to use integrated analyses of molecular, clinical, and epidemiologic data for making decisions about public health action. This activity will include interpreting and visualizing complex data for a wide variety of partners, including local public health department staff and leaders. The Fellow will help build LHD capacity to integrate molecular epidemiology into program operations by providing tailored training and consultation.

Outbreak Field Investigation (0.05 FTE): The CSTE Fellow will learn how to conduct TB field investigation activities, including: performing patient interviews and home visits to provide TB education, assess transmission risks and identify contacts; meeting onsite with leadership staff at outbreak settings such as schools to develop TB testing plans; occasionally assisting LHDs with non-clinical duties at congregate TB testing events; notifying contacts about their exposure and connecting them with evaluation and treatment services; abstracting TB case and contact data from clinical and public health records; and using personal protective equipment.

Please Describe the Fellow's Anticipated Role in the COVID-19 Response – Include Activities and Time Allocation

COVID-19 Response (0.10 FTE): The COVID-19 and TB Control Branch share access to pilot Health Information Exchange data. Using Health Information Exchange data, the Fellow will identify missed opportunities for LTBI screening among people diagnosed with COVID. Another activity using Health Information Exchange data is data will involve the CSTE fellow to look at demographics and outcomes of COVID positive individuals prescribed Paxlovid. Additionally, the skills acquired in working on TB outbreak investigations can be transferrable to COVID-19 outbreaks. The Fellow will have the opportunity to work with the clinical team on COVID-19 outbreaks in skilled nursing facilities.

Please Describe Opportunities for Fellows to Work in Health Equity as well as Incorporating Diversity, Equity, and Inclusion into their Work

Analyses by the ORT have demonstrated that TB patients who are part of outbreaks are much more likely to live in neighborhoods with the least healthy conditions in California (as measured by the Healthy Places Index) compared to TB patients who are not part of outbreaks and compared to the general population. In addition, the robust national TB surveillance system identifies patients who are reported to be unemployed, have no healthcare provider, experiencing homelessness, recent arrivers in the US, or migrant workers.

The ORT routinely include patient-level data about the Healthy Places Index and key surveillance measures to help assess the types of challenges and support needs that patients and their contacts are likely to need to successfully adhere to public health and clinical recommendations aimed at preventing further TB transmission. More resource-intensive public health interventions, such as providing field-based TB testing, can then be strategically focused where most needed.

The ORT also identifies statewide and regional needs for special measures to reduce disparities by enhancing TB prevention activities in certain settings and populations. For example, the ORT determined that a disproportionate number of TB outbreaks in California were occurring among indigenous persons from Oaxaca. Following further discussion with LHD partners, the ORT determined that multiple LHDs wanted to strengthen their ability to work with persons in this population. TBCB is now planning a series of TB roundtables with members of community-based organizations that serve these communities and LHDs to discuss shared challenges and opportunities to enhance TB control and prevention services by understanding and addressing the needs of indigenous Oaxacan communities in California.