ID: 35941968
Infectious Diseases, Maternal and Child Health - 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: Shua Chai, MD MPH
Science and Policy Advisor, Division of Communicable Disease Control
California Department of Public Health

Secondary Mentor: Robert Snyder, PhD, MPH
Surveillance, Epidemiology, Assessment, and Evaluation Chief, STD Control Branch
California Department of Public Health

Work Environment
Hybrid

Assignment Description

The fellow will be in CDPH's Center for Infectious Diseases, Division of Communicable Disease Control (DCDC), which is responsible for all communicable diseases in California except healthcare-associated infections and HIV/AIDs. Within DCDC, the fellow will primarily be attached to the Sexually Transmitted Disease Control Branch (STDCB), with day-to-day supervision from Dr. Snyder. The fellow will also benefit from regular supervision from the Division-level supervisor, Dr. Chai, who can provide additional exciting opportunities across other branches of DCDC. The fellow will spend about 70% of their time within STDCB, supervised directly by Dr. Snyder (Section Chief, secondary mentor), with the other 30% working on projects with Dr. Chai (Science and Policy Advisor, primary mentor).

The DCDC STDCB works to prevent and control all sexually transmitted infections (STIs), including chlamydia, gonorrhea, syphilis, chancroid, mpox, and hepatitis C. These conditions include five of the seven most prevalent reportable infectious diseases in California, and prior to COVID-19, chlamydia was the most prevalent reportable infectious disease in California. In addition to the magnitude of the public health impact from STIs, certain vulnerable or disadvantaged populations at risk lead to work that is impactful and rewarding and prevention methods applicable to many other conditions, providing the potential to learn skills that are invaluable regardless of a fellow's area of interest. Furthermore, CDPH STDCB enjoys a close working relationship with the state public health laboratory, local health departments, community-based organizations, and other branches within CDPH DCDC and elsewhere in the California government. CDPH STDCB staff are multidisciplinary, including epidemiologists, clinicians, data scientists, program development personnel, disease intervention specialists and other STI subject matter experts, allowing for a well-rounded learning experience. The fellow would be integrated into day-to-day operations of the CDPH STDCB surveillance, epidemiology, assessment and evaluation (SEAE) section, the largest epidemiology team within DCDC.

In the fellow's work at the DCDC level, the fellow would have an opportunity to be involved in surveillance and epidemiological studies involving the California Emerging Infections Program (CEIP) and outbreak activities with other branches across DCDC, especially in foodborne diseases. CEIP is California's site of CDC's Emerging Infections Program, a 30+ year nationally representative active sentinel surveillance system that collects cases of disease across multiple programs, including mpox vaccine effectiveness, as well as data on bacterial pathogen surveillance that have direct impacts on national vaccine policy. In addition, given the multiple public health emergency responses in communicable disease we have had over the past 10 years, DCDC has served as the focal point for CDPH for these responses, and the fellow would be engaged as an integral part of these responses also, at the DCDC level.

ID: 35941968
Infectious Diseases, Maternal and Child Health - Host Site Description
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The goal of the fellowship would be for the fellow to develop skills in public health through experiential learning alongside California's epidemiology and surveillance subject matter experts. These could include but are not limited to: participating in the development of surveillance systems and evaluation of the performance of both novel and existing systems, conducting and developing novel workflows to support essential surveillance and informatics functions to enumerate STIs in California, examining burden and risk factors for emerging bacterial infections (e.g., group A streptococcal infection emm types), assessing characteristics of disseminated gonococcal infections, integrating mpox into routine STI surveillance, supporting investigations of clusters and outbreaks of STIs and foodborne diseases, and conducting novel epidemiologic analyses of STIs and other communicable diseases. Importantly, Drs. Chai and Snyder are committed to integrating a fellow's areas of interest into a workplan, while keeping in mind the priorities and needs of CDPH and public health in California.

PLEASE NOTE: As public health priorities change rapidly, projects and needs may change. Several possible options for activities and projects are listed below but the below list may change as priorities shift. We will work with the fellow to identify appropriate projects along similar lines and adjust the scope of the projects depending on the fellow's experience and skills.

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

Due to the large volume of STI/Hep C/mpox morbidity in the state of California, we are uniquely positioned to conduct robust and statistically valid analyses across the entire state of California, and to leverage our surveillance data. Our strong partnerships throughout CDPH and beyond enable us to leverage additional individually identifiable data (e.g. vital statistics, immunization records, HIV surveillance data) to conduct novel analyses that inform and guide state, local, and national STI policies and interventions. Furthermore, California's CEIP can leverage not only California-specific data on emerging pathogens under surveillance, but also network-wide (national) data, if other sites agree, to leverage larger numbers of bacterial infections under surveillance, improving the power and validity of analyses.

The statewide electronic reportable disease surveillance system (CalREDIE) currently resides with DCDC, and the fellow would learn how to compile, query, and modify/improve the state STI surveillance (consisting of bacterial STI data from ~2005-present), hepatitis C virus (~2005-present), and mpox case registries (2022-present). The recent development and anticipated launch of the state's case investigation and contact tracing system (California CONfidential NEtwork for Contact Tracing [CalCONNECT]) in June 2024 as well as the implementation of electronic case reporting in California offer abundant opportunities for the fellow to participate in one of the country's leading STD surveillance programs.

The team works variably with SAS, R, and Python software, along with the usual suite of Microsoft Office tools (including Power BI) and is transitioning to cloud-based access to our infectious disease surveillance databases. Access to all of these systems/software will be made available to the fellow as appropriate. CDPH STDCB works closely with Office of AIDS surveillance staff, the CDPH Immunization Branch, and the Infectious Diseases Branch to conduct regular data matches to (respectively) HIV surveillance registry, mpox vaccination data, shigellosis case registry. Both software packages mentioned above and hardware (i.e. computer) will be made available to the fellow as needed. Dr. Snyder possesses a PhD in epidemiology from UC Berkeley and will provide advanced methodological and statistical support as needed. His team is made up of epidemiology/coding experts with more than 50 years of combined experience as professional epidemiologists employing biostatistical methods.

ID: 35941968
Infectious Diseases, Maternal and Child Health - Host Site Description
California Department of Public Health

Projects

Surveillance Activity Title: Enhanced case surveillance for mpox in California

Surveillance Activity Description:
California has reported more mpox infections than any other state in the United States. California has been working with CDC CEIP to conduct enhanced case surveillance of all mpox cases in California to evaluate vaccine effectiveness, as well as behavioral risk factors for mpox infection (among others). The fellow will participate in all aspects of the project, including but not limited to, learning how to maintain and develop data and surveillance workflows to feed case interviewers, conduct case interviews, conduct interviews with persons who test negative, as well as interviews with gonococcal cases. This will also include learning how to use both the CalREDIE and CalCONNECT systems and conducting analyses of the captured data.

Surveillance Activity Objectives:
1) Learn how mpox surveillance occurs in the State of California.
2) Learn how to develop, build, and maintain surveillance workflows to support case surveillance for mpox.
3) Learn how to abstract clinical, laboratory, and epidemiologic data in a rigorous and standard way.
4) Learn how to develop appropriate surveillance questions, answer those questions/test those hypotheses, and communicate the results of these analyses to different audiences.

The fellow will be expected to develop a surveillance report and presentation on a specific question related to mpox in California developed by the fellow along with mentors. Additional analyses of mpox case control study data may be developed and may lead to presentations, abstracts for conferences, and if appropriate, publications.

Surveillance Activity Impact:
California has had more mpox cases than any other state in the country. Therefore, there is more statistical power to conduct analyses and drive the science of mpox in the USA since its emergence in 2022. The fellow will play a vital role in the surveillance of mpox in California as we move towards integrating it into routine sexual healthcare.

Surveillance System Evaluation Title: Evaluation of the impact of the implementation of California CONfidential NEtwork for Contact Tracing (CalCONNECT) on STI surveillance

Surveillance System Evaluation Description:
CDPH is adapting the CalCONNECT system from its current implementations of mpox and COVID-19 for use with STI/HIV (including mpox) for integrated partner services and follow up of STI infections in California. The fellow will be involved in evaluating the implementation of this platform for STI use. The fellow will use a variety of data inputs, including the existing (pre-implementation) STI/mpox registry - and compare how the quality and completeness of data change with the adoption and implementation of CalCONNECT. This will also include evaluating partner services metrics (e.g. number of contacts elicited, follow-up completed, etc.).

Surveillance System Objectives:
Quantify the change in STI data quality pursuant to the implementation of CalCONNECT, including but not limited to demographic characteristics (race/ethnicity, address [including experiencing homelessness], sexual orientation, and gender identity), clinical/epidemiologic characteristics (treatment status, HIV status, PrEP status, doxy-PEP use, gender(s) of sex partners, sex/partner history), and partner service metrics. Deliverables will include (and may evolve per fellow's interest and department goals), presentations to internal (CDPH STDCB/CDPH) and external (local health partners, national audiences) partners, as well as other formal reports and publications as appropriate.

ID: 35941968
Infectious Diseases, Maternal and Child Health - Host Site Description
California Department of Public Health

Surveillance System Impact:
STI (chlamydia, syphilis, hepatitis C, gonorrhea, mpox) are five of the top seven most frequently reported infectious diseases in California. Very limited follow up of chlamydia, hepatitis C, and gonorrhea currently occurs, with intensive in depth and manual efforts for syphilis and mpox. Different functionalities in CalCONNECT could offer the opportunity to conduct patient outreach for all persons in California impacted by STI. Quantifying this impact is paramount to evaluating the success of the CalCONNECT system.

Major Project Title: Characteristics of people with disseminated gonococcal infections and associated antimicrobial resistance after change in screening recommendations - California

Major Project Description:
Disseminated gonococcal infections (DGIs) are an uncommon but serious sequela of untreated gonococcal infections. DGIs have been on the rise from 2019 to 2021, more than doubling over that time. DGI occurs when the sexually transmitted pathogen Neisseria gonorrhoeae invades the bloodstream and spreads to distant sites in the body, leading to illness that affects the joints, skin, and even in rare cases, the heart or the lining covering the spine and brain. Gonococcal pathogens are one of CDC's key pathogens of highest public health concern for resistance to all antibiotics. DGI is conducted by both CDPH and CEIP and data were last described in 2020 and 2021, prior to a late-2021 CDPH change to testing recommendations for gonococcal infections that newly included all sexually active individuals who use illicit drugs, especially methamphetamine, at sites of potential exposure and for sexually active patients who report any signs or symptoms consistent with DGI at sites of potential exposure.

The fellow would combine California data from both CDPH and CEIP/CDC to describe characteristics of persons with DGI and assess antibiotic resistance patterns of DGIs, after the change in screening practices. As part of the project, the fellow would take on special ownership of DGI surveillance, helping to build out CDPH's DGI surveillance and antimicrobial resistance monitoring for gonococcal infections, and recommend and implement changes as needed to both.

Major Project Objectives:
1) Describe the demographic characteristics and other risk factors among people with DGI.
2) Assess prevalence of antibiotic resistance among DGI.
3) Build out CDPH's DGI surveillance (with close supervisor support) and antimicrobial resistance monitoring for gonococcal infections and recommend and implement changes as needed to both.

Fellow would be expected to present findings internally, develop an abstract to submit to a conference, and possibly develop a manuscript, depending on the findings.

Major Project Impact:
DGI and antimicrobial resistant gonococcal infections (ARGC) are priorities for public health prevention activities due to their severe morbidity and potential for continued reduction of the utility of antibiotic drugs to prevent infections. Robust surveillance infrastructure and ongoing study of the prevalence, risk factors, and impacts of these conditions is paramount to our public health preparedness to prevent and treat gonococcal infections.

ID: 35941968
Infectious Diseases, Maternal and Child Health - Host Site Description
California Department of Public Health

Additional Project #1 Title: Investigating the potential reasons for increasing cases of invasive group A streptococcal infections in California.
Project #1 Type: Major Project

Project #1 Description:
Group A Strepcoccus is a bacterium that causes a variety of infections, including routine ear infections, strep throat, and superficial skin infections, but can also be the source of invasive and serious infections (called iGAS), including rapidly spreading deep tissue infections, invasion of the bloodstream, pneumonia, and a toxic shock syndrome. Recent infections have increased in California. As iGAS is not reportable in California, understanding risk factors for these infection using data collected by CEIP are critical to understanding these infections. Molecular subtyping of iGAS isolates has shown that certain subtypes increase risk for invasive infection.

The fellow would utilize CEIP data from California, with the possibility of expanding their project to other network sites nationally, to better characterize iGAS infections. Detailed clinical and epidemiological data are available on individual cases, with laboratory information potentially available to link to the cases from CDC subtyping. Under supervision and with support, the fellow can combine these data together to develop a scientific question, develop an analysis plan, execute that plan, and disseminate the findings and recommendations for CDPH internal and external (e.g., CDC Emerging Infections Program [EIP] Active Bacterial Core [ABCs] sites) stakeholders. Development of a conference abstract and possibly publication would be encouraged, as appropriate.

Project #1 Objectives and Expected Deliverables:
1) Conduct a descriptive epidemiologic study on people with iGAS in California, incorporating epidemiologic and laboratory data.
2) Develop a scientific question related to iGAS that can be answered with data available (either from California, or if approved, across the CDC EIP ABCs sites), develop and conduct the analyses.
3) Disseminate findings and recommendations and findings to stakeholders, including, as appropriate, presentations, abstracts, and manuscripts.

Project #1 Impact:
Data on potential epidemiological or pathogen-specific factors associated with rising iGAS infections in California, which currently are not a reportable condition, will strengthen understanding of iGAS infections, enhancing the ability to develop interventions to decrease incidence of these potentially debilitating infections in California.

Additional Project #2 Title: Evaluate the effectiveness of doxy-PEP for prevention of bacterial STI
Project #2 Type: Major Project

Project #2 Description:
The use of doxycycline post exposure prophylaxis (doxy-PEP) offers a new and important opportunity to prevent bacterial STI (chlamydia, gonorrhea, & syphilis) and could contribute to decreasing the burden of STI. CDPH recommends doxy-PEP use in men who have sex with men (MSM) and transgender women (TGW). An estimated 65% of syphilis in MSM and TGW is estimated to be preventable using doxy-PEP. The utility of doxy-PEP to prevent syphilis in heterosexual women is undergoing additional study. Evidence exists supporting use of doxy-PEP, but studies in certain settings have shown lack of effectiveness. As doxy-PEP is rolled out in California, the fellow will have the opportunity to examine this cutting-edge issue in public health by evaluating the effectiveness of doxy-PEP to prevent STI in California using available surveillance data as we begin to capture data in the CalCONNECT system.

Project #2 Objectives and Expected Deliverables:
1) Develop surveillance methods, including natural language processing to pull out doxy-PEP usage from electronic case reporting, to identify individuals in California who are infected by an STI and are/are not using doxy-PEP (including understanding if we can estimate adherence/usage as prescribed for PEP).
2) Describe the characteristics of people in California who are and are not using doxy-PEP and are infected by bacterial STI.

Completion of this project may lead to submission to professional conferences and research journals, as well as presentations internal to STDCB staff and elsewhere within CDPH.

Project #2 Impact:
California, through CDPH efforts, is leading the way in the recommendation of doxy-PEP for prevention of STI in MSM and transgender female populations. Understanding the real-world effectiveness of its use in California will be paramount to understanding its potential to reduce the burden of STI in these populations.

Additional Project #3 Title: Understanding the causes of neonatal sepsis through expansion of surveillance and describing existing cases in California.
Project #3 Type: Surveillance Activity

Project #3 Description:
Description: Neonatal sepsis and pneumonia result in over half a million deaths in neonates annually worldwide and almost half of all deaths in babies aged 7 to 27 days of age. In developed countries, neonatal sepsis also has substantial mortality, and has been estimated to be between 5-10%. CEIP has been conducting special surveillance for neonatal sepsis as part of CDC's national Emerging Infections Program network, and CEIP's Active Bacterial Core (ABCs) program has collaborated with CEIP's Healthcare Associated Infections program to expand surveillance to include new California counties and cases owing to E. coli. In-depth data on individual cases are available, including clinical and epidemiological information. The fellow would be involved in developing a project focused on describing neonatal sepsis cases in the surveillance counties in California, and supporting the expansion of surveillance to additional counties, including ascertainment of cases, establishing laboratory isolate collection, and linking these critical elements of active sentinel surveillance. Presentation of the findings to a national expert panel may be part of the dissemination plan, in addition to presenting to stakeholders internally at CDPH.

Project #3 Objectives and Expected Deliverables:
1) Learn how to describe a special-risk population using clinical, epidemiological, and laboratory data and share those results with stakeholders inside and outside of the state health department.
2) Learn how active sentinel surveillance system can inform public health control measures.
3) Learn how to work with national, state, and local stakeholders to expand a surveillance system, including capturing data as well as laboratory isolates.

Project #3 Impact:
Given the high mortality of neonatal sepsis, describing the cases in California forms the foundation of understanding its causes, which is critical not only monitoring trends in risk factors, but also in developing potential interventions to decrease the burden of neonatal sepsis. Supporting the expansion of the surveillance will provide much needed statistical power (I.e., number of cases) and increased representativeness to better understand the condition.

ID: 35941968
Infectious Diseases, Maternal and Child Health - Host Site Description
California Department of Public Health

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

DCDC has been on the forefront of multiple large-scale communicable responses, sometime overlapping, over the past 10 years, ranging from Ebola, Zika, hepatitis A outbreaks, COVID-19, and mpox. Prior fellows have been expected to be part of, and contribute to, key parts of the response. The prior fellow served as a key epidemiologist both on the COVID-19 clinical response team with leading description of MIS-C (multisystem inflammatory syndrome in children) as well as on the mpox epidemiology team, where he served as essentially a staff epidemiologist. A fellow will have ample opportunities in the non-response times to be involved in preparedness efforts (e.g., current effort around establishing response procedures to the most recent Ebola cases in Africa). CDPH values CSTE fellows in these responses and will tailor their roles to their experience, skill set, and interest. Depending on the level of CDPH response, a fellow might spend 5-10% of their time in preparedness activities in non-response efforts, with 20-50% of their time in response efforts - during response efforts, the fellows' projects would be adjusted to align with their response work, to avoid overload of projects. Of note, 50% involvement would only be in cases of another pandemic, where essentially all CDPH efforts are geared towards response. It is the intention of the supervisors to protect the time of the fellow to ensure all CSTE requirements are met, and that the high involvement would be concentrated involvement for distinct periods of time, with protected "off" time to work on non-response activities.

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

As the fellow's primary mentor sits with the Division of Communicable Disease Control at CDPH, the fellow potentially would have ample opportunities to participate in multiple types of outbreaks investigations. One important type of outbreak that teaches classic/basic outbreak investigation techniques is foodborne outbreaks. The fellow will have multiple opportunities to join the foodborne outbreak team in weekly meetings to follow clusters of illness, participate in outbreak investigations (including interviews, tracking testing/tracing information, etc.), and potentially co-lead a cluster or outbreak investigation (once sufficient experience is gained). As the fellow would sit with the STI branch, outbreaks of STIs, such as syphilis among people experiencing homelessness, mpox at bathhouses and Pride events, and hepatitis C in healthcare facilities. Outbreaks could take up a fair amount of a workweek but within a time-bounded period, with an estimate of about 15-20% overall of the fellow's time. Of note, multiple competencies can often be met with the investigation and subsequent dissemination of findings/recommendations.

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

CDPH has transitioned away from a response framework to address COVID-19, and COVID-19 has moved into a new and separate branch within DCDC. As this position is focused on STIs and emerging infections, the workplan does not include substantial involvement in a COVID-19 response. However, if the fellow's projects overlap with issues related to COVID-19, both supervisors would support the fellow working with the COVID-19 branch (under DCDC).

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

Throughout the recent COVID-19 and mpox responses and the recognized need and resultant built public health infrastructure built within CDPH (Office of Health Equity at CDPH level, LGBTQ+ subject-matter expert at CID level, Health Equity lead at DCDC level), incorporating diversity and equity are now part of the ethos of CDPH work, especially in the STI realm. Use of the Healthy Places Index, developed in Southern California, which measures multiple social determinants of health to assess areas of California for health disparities have become routine throughout work in DCDC. California was the first to incorporate an equity metric to determine whether counties could adjust their COVID-

19 response tier of shelter-in-place. Furthermore, new California laws require CDPH collect and of sexual orientation, gender identity, and very detailed race/ethnicity (much more detailed than national standards) data. All work that the fellow completes will be viewed in these lenses, and the fellow will have access to all the staff and resources mentioned above to support the fellow's work.