

Title: Surveillance infrastructure and epidemiologic capacity building among Epidemiologists during a pandemic in Marin County, California

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Background: The COVID-19 pandemic illuminated limitations in existing communicable disease surveillance infrastructure and skills needed for local epidemiologists. While responding to the pandemic led to significant burnout and fatigue among the Epidemiology workforce, it has also provided an environment of accelerated learning and improved resources to accomplish challenging tasks. Using the experience of Marin County, California, we describe epidemiologic and surveillance capacity building, highlight significant challenges, and comment on stages of building COVID-19 surveillance infrastructure.

Methods: We used operational materials to document milestones in development of COVID-19 surveillance and reporting systems. We conducted focus group interviews with key response actors covering lessons learned in infrastructure development throughout the pandemic. A mixed methods survey evaluating skills used and learned, burnout, and adaptability throughout stages of the pandemic will be conducted among members of Marin County's Epidemiology team who participated in the response.

Results: From March-July 2020, G Suite, a HIPAA-compliant version of Google Drive, was used for COVID-19 surveillance and reporting. As COVID-19 response needs grew, Google Sheets no longer met user needs and could not accommodate case burdens, prompting rapid development of a local SQL-based application, CoDa, in collaboration with the County's Information, Security, and Technology team (IST). CoDa provided a platform for automating tasks, saving significant staff time, and allowed for customizable, e-mail-automated reports summarizing recent cases and testing. Surveillance reporting priorities shifted throughout the pandemic. Data tracking tools began as test-based to describe testing prevalence and positivity then became person-based to document case outcomes and vaccination status. Epidemiologists learned new informatics skills, including Tableau, SQL, and ArcGIS, to automate COVID-19 reporting activities. Epidemiologists experienced challenges with differing understandings of data compliance and security and reconciling numbers with data from other sources (e.g., state systems). Collaborations with IST, community-led groups, Communicable Disease, and Emergency Response & Preparedness significantly improved the team's impact.

Conclusions: Working across interdisciplinary programs advances Epidemiologic capacity and informatics skills. Pandemics prompt the need for Epidemiologists to flexibly adapt to changing needs. The team's ability to produce a robust data response would not have been possible without strong partnership and flexibility from IST colleagues. Partnerships with IST, particularly in small and medium-sized jurisdictions, significantly improve Epidemiologists' impact and free staff-time to support other needs locally. Standardizing and documenting operations to leverage team expertise and interdisciplinary collaborations are needed even outside of a public health emergency; routine, collaborative preparedness planning could strengthen an Epidemiology team's response potential.

