CalCAT: California's use of infectious disease modeling in public health response

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The California Communicable diseases Assessment Tool (CalCAT) demonstrates how infectious disease modeling can be translated into practical public health action. Since its launch in 2020, the platform has expanded beyond COVID-19 to include influenza and RSV. Through academic partnerships, transparent methods, and continuous improvement, CalCAT has become a trusted resource that strengthens California's preparedness for current and future infectious disease threats.

The "What"

As part of the COVID-19 pandemic response, the California Department of Public Health (CDPH) launched the California COVID Assessment Tool (CalCAT) in June 2020 to inform state and local public health response efforts. CalCAT brings together all publicly available California-specific modeling outputs, ensembles them, and interprets results for end users. Modeling products displayed on CalCAT include effective reproduction number ("R-effective") and variant proportion nowcasts, hospital admission and census forecasts, and scenario models for California and its constituent counties and regions.

The target audience includes California residents, public health staff and leadership, and researchers. To reflect broader disease coverage, CalCAT has since been renamed to the California Communicable diseases Assessment Tool. Influenza was added fall 2022, and combined respiratory burden (COVID-19, influenza, and respiratory syncytial virus [RSV]) was added winter 2023.

The development and longevity of CalCAT has benefitted from partnerships and ongoing collaborations with academic teams, particularly within the University of California system. These teams provided modeling subject matter expertise and results, which CDPH staff then collate, synthesize, and display on CalCAT. (More on this partnership here: "Building an agile state-wide research infrastructure to address COVID-19 and emerging threats: insights from an equity-centered public health and academic collaboration in California.")

CDPH has also built internal capacity for infectious disease modeling work, which has allowed for submission of California-specific results to ongoing national efforts including the FluSight Forecasting Challenge, the COVID-19 Forecasting and Scenario Modeling hubs, as well as the SARS-CoV-2 Variant Nowcast Hub.

Dissemination of results displayed is also facilitated by CalCAT "Open House" meetings, which support a community of practice among CDPH staff, local health department staff, and academic partners. These meetings were held weekly during the height of the pandemic, but were reduced to biweekly, then monthly after the public health emergency ended. During these meetings, CDPH staff share updates from CalCAT, modeling and analytical work conducted by CDPH, and presentations on other infectious disease modeling topics.

In 2020, over 200,000 unique users across California and around the world accessed CalCAT.

The "So What"

CalCAT has had a direct impact on public health decision-making. As one of the very few dashboards to include county- and region-level model outcomes, CalCAT enabled intensive care unit (ICU) capacity projections that were used to support the regional stay-at-home order in California in winter 2020–2021. Synthesized model output from CalCAT was used in weekly situational updates to California state government leadership throughout the COVID-19 pandemic response. Results provided leading indicator information (e.g., R-effective) and burden projections that supported public health decision-making. For example, CalCAT informed and was complementary to the Blueprint for a Safer Economy in 2020–2021, which identified risk tiers for counties that governed non-pharmaceutical interventions such as business capacity restrictions. (More on the full story of CalCAT's development here: "Keeping a modeling-driven public health dashboard relevant—lessons learned from the California Communicable diseases Assessment Tool.")

The "Now What"

CalCAT's success and longevity are due to it being more than just a dashboard; it is a commitment by CDPH to the provisioning and use of infectious disease models in California for public health practice and to the iterative process of constant improvement of these models and how they are shared and visualized. CDPH has built trust with end users through bidirectional communication, ongoing quality control and validation of results displayed on CalCAT. They strive for principles of openness and reproducibility in CalCAT development and maintain flexibility and relevance in the face of changing modeling inputs. CDPH aims for the contents of CalCAT to be FAIR—Findable, Accessible, Interoperable, Reusable. Extensive technical notes describe all constituent models with links to relevant underlying data, methodologies, and code repositories. The source code for a minimal reproducible version of CalCAT is maintained on GitHub for use by other teams and jurisdictions.

CalCAT development priorities will continue to be driven by stakeholder and end user input. For example, ensemble respiratory virus forecasts were recently incorporated as a new tab on the CDPH respiratory virus dashboard, which also displays relevant clinical data reporting for COVID-19, influenza, and RSV. Five years into CalCAT's existence, the dashboard has built on many lessons learned and will continue to be improved to better serve the people of California by providing infectious disease modeling to support evidence-based public health practice.

Key contributors to this project include Mugdha Thakur, Lauren White, John Pugliese, David Crow, Phoebe Lu, Ryan McCorvie, Sindhu Ravuri, Hector M. Sanchez C., Brent Siegel, and Jason Vargo as past and present members of the CDPH Modeling Team.

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