Quality and Productivity Commission

# 34th Annual Productivity and Quality Awards Program

*"Leading with Excellence"*

**2021 APPLICATION - PLEASE CONSIDER FOR THE COVID-19 IMPACT AWARD, TOO.**

Title of Project (Limited to 50 characters, including spaces, using Arial 12-point font):

**NAME OF PROJECT: PREDICTIVE MODELING OF THE COVID-19 PANDEMIC**

**DATE OF IMPLEMENTATION/ADOPTION:** **MARCH 2020 THROUGH MAY 2021**

(Must have been **fully** implemented **for a minimum of** at least one year - on or before July 1, 2020)

**CHECK HERE IF THIS PROJECT IS BEING SUBMITTED FOR THE *COVID-19 IMPACT AWARD* ONLY.** (Projects must be implemented on or before December 31, 2020. **Note**: Projects implemented less than one year ago will not be eligible for any other PQA awards. In addition, once a project is submitted, you cannot submit the same project for awards consideration in subsequent years).

**PROJECT STATUS**: _____ Ongoing X One-time only

**HAS YOUR DEPARTMENT PREVIOUSLY SUBMITTED THIS PROJECT?** _____ Yes X No

**EXECUTIVE SUMMARY:** Describe the project in 15 lines or less using Arial 12 point font. State clearly and concisely what difference the project has made.


The demand generated by the COVID-19 pandemic for acute hospital care, ICU care, ventilators, and morgue services in 2020 had the potential to exceed the available resources in Los Angeles County. An accurate forecast of demand for such services was needed to guide the deployment of available County and State resources, to inform public health policy decisions, and to communicate effectively with the public. We assembled a multidisciplinary team of collaborators from both within and beyond the County to develop a sophisticated statistical forecasting model and the team produced publicly posted, weekly COVID-19 activity and resource utilization forecasts from April 2020 to May 2021. These forecasts allowed DHS to provide the public and news media with timely and accurate information about projected healthcare resource availability, served as an early warning system for surges in disease activity, and made possible the implementation of mitigation strategies to reduce death and suffering caused by the pandemic in Los Angeles County.


BENEFITS TO THE COUNTY

| (1) ACTUAL/ESTIMATED **ANNUAL** COST AVOIDANCE | (2) ACTUAL/ESTIMATED **ANNUAL** COST SAVINGS | (3) ACTUAL/ESTIMATED **ANNUAL** REVENUE | (1) + (2) + (3) = TOTAL **ANNUAL** ACTUAL/ESTIMATED BENEFIT | SERVICE ENHANCEMENT PROJECT |
|---|---|---|---|---|
| **$ NOT APPLICABLE** | **$ NOT APPLICABLE** | **$ Not Applicable** | **$ NOT APPLICABLE** | ☒ |

**ANNUAL = 12 MONTHS ONLY**

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|---|---|---|
| **SUBMITTING DEPARTMENT NAME AND COMPLETE ADDRESS**<br>Los Angeles County Department of Health Services (DHS)<br>313 S. Figueroa St, Los Angeles, CA 90012 | | **TELEPHONE NUMBER**<br>(213) 288-8101 |
| **PROGRAM MANAGER'S NAME**<br>Roger J. Lewis, MD, PhD | **EMAIL** rlewis@dhs.lacounty.gov | **TELEPHONE NUMBER** |
| **PRODUCTIVITY MANAGER'S NAME AND SIGNATURE**<br>(PLEASE CALL (213) 893-0322 YOU DO NOT KNOW YOUR PRODUCTIVITY MANAGER'S NAME)<br>Connie Salgado-Sanchez C. Salgado-Sanchez | **DATE**<br>6/18/21 | **TELEPHONE NUMBER**<br>(213) 288-8483<br>**EMAIL**<br>cosanchez@dhs.lacounty.gov |
| **DEPARTMENT HEAD'S NAME AND SIGNATURE**<br>Christina R. Ghaly, M.D. | **DATE**<br>06/18/2021 | **TELEPHONE NUMBER**<br>(213) 288-8101 |

****ELECTRONIC, WET, OR SCANNED SIGNATURES ARE ACCEPTABLE****



*We Support Plain Language*

Title of Project (Limited to 50 characters, including spaces, using Arial 12-point font):
**NAME OF PROJECT: PREDICTIVE MODELING OF THE COVID-19 PANDEMIC**

**1st FACT SHEET – LIMITED UP TO 3 PAGES ONLY:** Describe the **challenge(s), solution(s), and benefit(s)** of the project **to the County**. What quality and/or productivity-related outcome(s) has the project achieved? Provide measures of success **and specify assessment time frame**. Use Arial 12 point font.

**Challenges**. In March 2020, the emerging COVID-19 pandemic presented the County of Los Angeles, and the Department of Health Services (DHS) specifically, with a monumental challenge. New York City's experience during the early pandemic had demonstrated that major metropolitan areas and their healthcare systems were vulnerable to becoming overwhelmed, with devastating consequences for their patients and their communities. Similarly, the demand generated by the pandemic for acute hospital care, intensive care unit (ICU) care, mechanical ventilators, and morgue services had the potential to exceed the available resources of Los Angeles County.

An accurate, quantitative forecast of demand for hospital services—and its likely time course—was desperately needed to guide the deployment of additional County and State resources, to inform public health policy decisions, and to communicate effectively with the news media and the public. The challenges in building a statistical forecasting model included the limited availability of data early in the pandemic, the data distortions produced by limited test availability, and the need for expertise in a diverse set of disciplines, ranging from infectious disease to statistical modeling to hospital operations. As the pandemic wore on, the forecasting effort faced the additional challenge of incorporating new insights regarding the dynamics of COVID-19 transmission and flexibly modeling fluctuations in disease activity associated with changes in public health officer orders and resulting public behavior.

**Solution**. In order to address this enormous challenge, we assembled a multidisciplinary team of collaborators from both within and beyond the County, including individuals from the Los Angeles Department of Health Services (DHS), the Los Angeles Department of Public Health (DPH), the Long Beach Department of Public Health, the Office of the Los Angeles County Chief Executive, the Los Angeles County EMS Agency, LA Care, the University of California at Los Angeles, and the private statistical consulting firm Berry Consultants, LLC. All external team members donated their effort. The group comprised experts in infectious diseases, statisticians expert in Bayesian modeling, hospital-based physicians, prehospital care specialists, and data scientists.

The group devised a system for collecting daily data from all the 911-receiving hospitals in Los Angeles County regarding acute COVID-19 related hospitalizations. That data was used as the basis for a Bayesian epidemic compartment model to

predict hospitalizations, demand for acute care beds, demand for ICU resources, and deaths related to COVID-19. Inpatient hospitalizations were explicitly selected as the driving data element to minimize the possibility of being misled by changes in test availability and test-seeking behavior amongst the public. The team devised and implemented a strategy for detecting and correcting data errors in real-time. The team also developed statistical strategies to account for the effect of public health interventions, such as physical distancing. The model was constantly reviewed and improved throughout the course of the project, increasing the sophistication of the modeling effort as more was learned about disease behavior and additional data sources were integrated.

**Benefits**. Although there was no prespecified project assessment timeframe, model projections of the COVID-19 pandemic impact on Los Angeles County health resources were published weekly, starting in April of 2020 and ending in May of 2021, resulting in a total of 54 public-facing model forecasts. The projections were posted on the DHS website, with virtually all available in both English and Spanish. The model was predictive—and was consistently proved correct.

The model served as an early warning system for upticks in disease activity, correctly projecting the winter surge (https://file.lacounty.gov/SDSInter/dhs/1081343_COVID-19ProjectionPublicUpdateLewis11.18.20English_2_.pdf). Equally importantly, model projections of downtrends in COVID-19 activity informed decision-making regarding the County healthcare systems' capacity to reopen resources for care unrelated to COVID-19 disease. Overall, we believe that the mitigation strategies made possible by accurate model forecasting reduced death and suffering related to the pandemic in Los Angeles County.

The hospital demand model was a cornerstone of the County's public information strategy as implemented in weekly press conferences. The public-facing strategy included sharing the model and its predictions with the public to increase awareness and to engender an accurate and data-driven understanding of what was happening—and what could happen as a result—in hospitals across Los Angeles County, and to encourage the public to adhere to public health safety messages. The model was a critical communication tool in explaining that what was happening in our hospitals at any time reflected what happened in our communities just a few weeks earlier and that what people did on a daily basis in their own communities had a real impact on our hospitals. By framing the model's projections and potential future scenarios as dependent on community behavior, the model was designed to not simply inform hospital management strategies, but also to empower the public to take control of their own behavior as the key lever that made the difference.

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The model was highlighted in a variety of communications efforts:

1. **Weekly Press Briefings**: For the majority of the pandemic, Dr. Ghaly spoke at the weekly or biweekly County media briefings. During these briefings, Dr. Ghaly consistently showcased the model to explain the current situation, current trends, and model predictions.

2. **Targeted Media-Only Model Background Sessions**: At a few key moments—at the introduction of the model, and at key points during the surge—we held press only media briefings to specifically educate the press on the model, on how it worked, and how to interpret it. Our belief was that if we wanted the model to be effective in mainstream media coverage, we had to support reporters and producers in understanding its value and how it worked. These briefings were consistently attended by nearly every local outlet, as well as numerous national outlets.

3. **Targeted Earned Media Pitching:** On both a local and national level, we pitched a variety of key spokespeople, including Dr. Roger Lewis, Dr. Tasha Dixon, Dr. Erika Flores Uribe, Dr. Margarita Pereyda and others to a diversity of reporters, producers and television news anchors through targeted pitching and developing a speaker's bureau consisting of experts speaking multiple languages and representing multiple ethnicities. At key inflection points throughout the pandemic, this was one of the most powerful ways to get the message across to the public, and the model often informed and drove key messaging and strategy.

As a result of our concerted efforts to communicate what was happening in the hospitals and in our communities through the lens of the model, the model and its insights garnered extensive local and national media coverage. Locally, that included all the affiliates—ABC, CBS, FOX, NBC—as well as Telemundo, Univision, KTLA, and Spectrum. Nationally, the model and/or its insights were consistently discussed through interview segments on MSNBC, CNN, Good Morning America and the Today Show. A recent search for media activity highlighting or based on the DHS COVID-19 hospital demand model yielded 387 online news articles, 120 blog references, 40 separate newspaper articles, 21 examples of television and radio interviews, 21 Twitter references and 4 magazine articles. Newspapers including model results and graphics created by the modeling team included the New York Times, the Washington Post, and the Los Angeles Times on multiple occasions.

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**Linkage to the County Strategic Plan – 1 page only**. Which County Strategic Plan goal(s) does this project address? Explain how. Use Arial 12-point font.
This COVID-19 Hospital Demand Prediction Modeling project directly addressed Goal III of the County's 2016-2021 Strategic Plan, "Realize Tomorrow's Government Today." The COVID-19 pandemic presented an extraordinary challenge, and an opportunity for DHS in a data-driven, scientifically sound, and public facing manner. The modeling team developed an innovative and effective data tool to inform both public health and health care system responses, as well as the public. We specifically advanced two strategies under Goal III: "Strategy III.3 - Pursue Operational Effectiveness, Fiscal Responsibility, and Accountability" and "Strategy III.4 - Engage and Share Information with Our Customers, Communities and Partners."

Specifically:

**III.3.8 Develop an Early Warning Tool** Strategy III.3 urges County departments to use limited resources in a responsible, efficient, and strategic manner. To use limited resources wisely became a critical requirement for all of our healthcare systems during the pandemic. Our team created and tested a tool using real-time data to predict hospital demand and related medical resource needs, such as intensive care unit (ICU) beds and mechanical ventilators, two to four weeks in advance. The weekly model successfully predicted and warned DHS hospitals of multiple surges throughout the pandemic. Hospitals therefore were able to prepare accordingly, avoid depletion of resources, and meet their service needs.

**III.4.2 Share and Publish More Data** Strategy III.4 encourages departments to share more data and information internally and externally to enhance accountability and transparency. Making data on disease activity and resource utilization available to County and municipal colleagues and communicating the best available information on likely future disease transmission and hospital crowding to the public were both extremely important during the COVID-19 crisis. We published data and modeling results on multiple DHS websites and provided materials for the County weekly press briefing. We also offered data and technical support to data or modeling efforts of our colleagues from the State, other County departments, and municipalities. In addition, several data and research projects have derived from our hospital demand modeling endeavor, including modernizing our current data platforms and analytical tools.

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**COST AVOIDANCE, COST SAVINGS, AND REVENUE GENERATED (ESTIMATED BENEFITS TO THE COUNTY):** If you are claiming cost benefits, include a calculation on this page. Please indicate whether these benefits apply in total or on a per unit basis, e.g., per capita, per transaction, per case, etc. You must include an explanation of the County cost savings, cost avoidance or new revenue that matches the numbers in the box. Remember to keep your supporting documentation. Use Arial 12-point font

**Cost Avoidance**: Costs that are eliminated or not incurred as a result of program outcomes. Please indicate whether these are costs to the County or to other entities.

**Cost Savings**: A reduction or lessening of expenditures as a result of program outcomes. Please indicate whether these were expenditures by the County or by other entities.

**Revenue**: Increases in existing revenue streams or new revenue sources to the County as a result of program outcomes.

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## FOR COLLABORATING DEPARTMENTS ONLY

*(For single department submissions, do not include this page)*

| | |
|---|---|
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| **PRODUCTIVITY MANAGER'S NAME AND SIGNATURE**<br><br>**JOSE ANTONIO CHEW – SIGNATURE ON FILE**<br>**EMAIL: JCHEW@CEO.LACOUNTY.GOV** | **DEPARTMENT HEAD'S NAME AND SIGNATURE**<br><br>**FESIA A DAVENPORT – SIGNATURE ON FILE**<br><br>**EMAIL: FDAVENPORT@CEO.LACOUNTY.GOV** |
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| **PRODUCTIVITY MANAGER'S NAME AND SIGNATURE**<br><br>**CATHERINE MAK, MBA – SIGNATURE ON FILE**<br>**EMAIL:___CMAK@DPH.LACOUNTY.GOV_____** | **DEPARTMENT HEAD'S NAME AND SIGNATURE**<br>**BARBARA FERRER, MPH, MED, PHD – SIGNATURE ON FILE**<br>**EMAIL:_BFERRER@PH.LACOUNTY.GOV _** |
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| **PRODUCTIVITY MANAGER'S NAME AND SIGNATURE**<br><br>**EMAIL:_____** | **DEPARTMENT HEAD'S NAME AND SIGNATURE**<br><br>**SCOTT BERRY – SIGNATURE ON FILE**<br>**EMAIL:_SCOTT@BERRYCONSULTANTS.NET_____** |