Los Angeles County COVID-19 Hospital Demand Modeling Projections

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About the Effort

Los Angeles County DHS, under the guidance of Dr. Ghaly, assembled a multidisciplinary team of clinical, epidemiological, and statistical modeling experts led by Roger J. Lewis, MD, PhD, the Chair of Emergency Medicine at Harbor-UCLA Medical Center in Torrance and an accomplished statistician.

Two-pronged approach: The modeling team was tasked with

- Taking available data and making the **best possible predictions regarding the spread of COVID-19** in Los Angeles County and the associated demand for hospital-based care including hospital beds, intensive care unit (ICU) beds, and ventilators.

- Assessing the **effectiveness of current physical distancing** efforts in slowing the spread of COVID-19 and “flattening the curve.”

About the Team

Acknowledgements

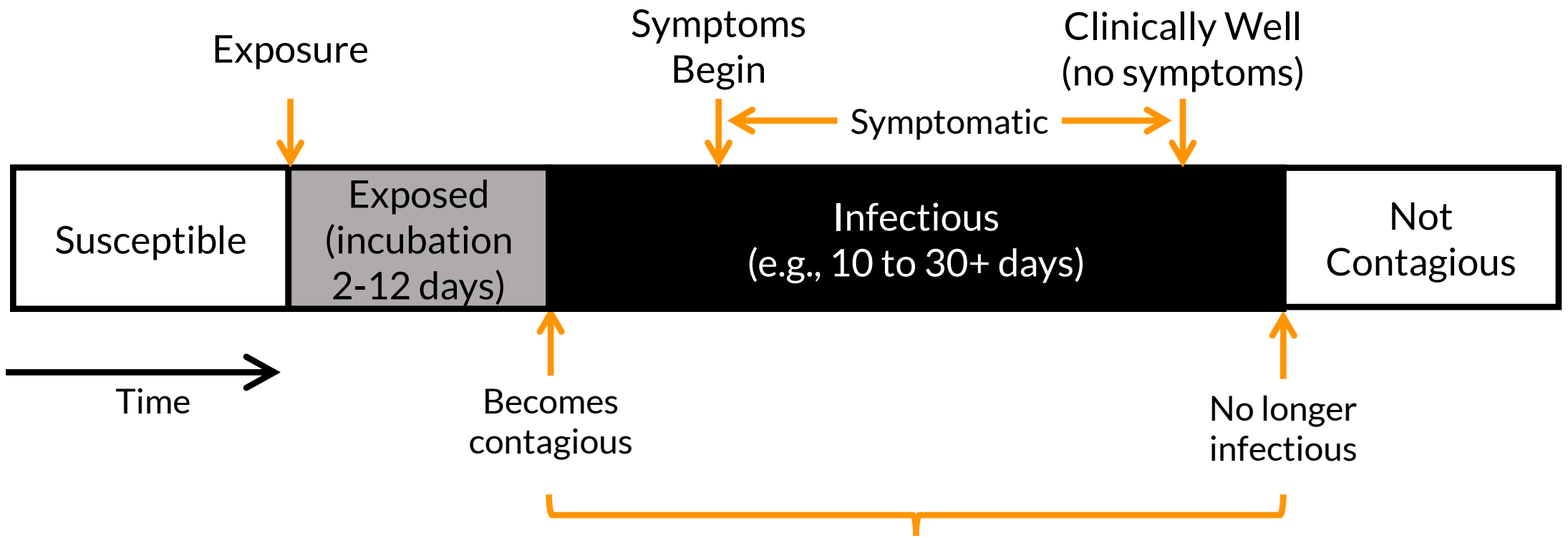
Statistical modeling experts led by **Roger J. Lewis, MD, PhD**, the Chair of Emergency Medicine at Harbor-UCLA Medical Center in Torrance. The statistical modeling work was performed by statisticians from Berry Consultants, LLC, Austin, Texas.

Joseph Marion, PhD, **Kert Viele, PhD**, and **Todd Graves, PhD** supported the effort by performing all modeling of epidemic and healthcare resource data for Los Angeles County related to the COVID-19 epidemic.

In addition to Dr. Lewis, the modeling team included **Juliana Tolles, MD, MHS** (Emergency Physician, Harbor-UCLA Medical Center), **M. Claire Jarashow, PhD, MPH** (Acting Director, Vaccine Preventable Disease Control and Chief, Epidemiology and Data, Acute Communicable Disease Control, Los Angeles County DPH), **Fei Wu, PhD** (Office of the Chief Information Officer, Los Angeles County CEO Office), and **Frederic Schoenberg, PhD** (Professor of Statistics, UCLA).

Important insights and guidance were received from others, including personnel at the California Department of Public Health, as well as other modeling teams addressing the COVID-19 epidemic across the country.

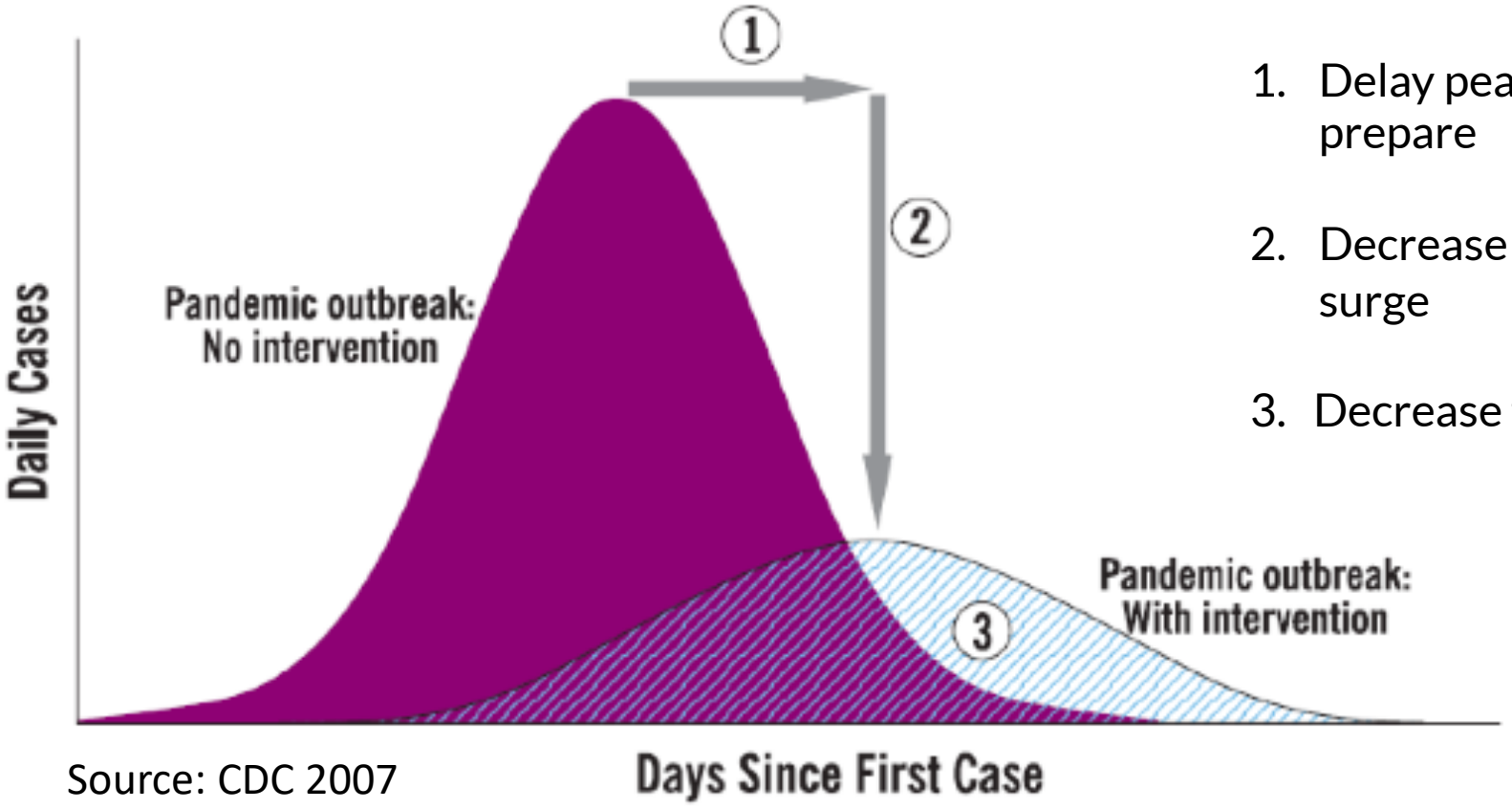
A Patient's Journey | COVID-19



Goal of physical distancing, public use of cloth face coverings, quarantine, isolation and similar actions *is to reduce the number of new susceptible people exposed during this time*

Goal of Public Health Response

"Flattening the Curve" with Public Health Interventions



Source: CDC 2007

Public health interventions—including physical distancing—have a clear impact:

1. Delay peak in demand, increased time to prepare
2. Decrease peak demand, increased ability to surge
3. Decrease total population infected

Data Considerations

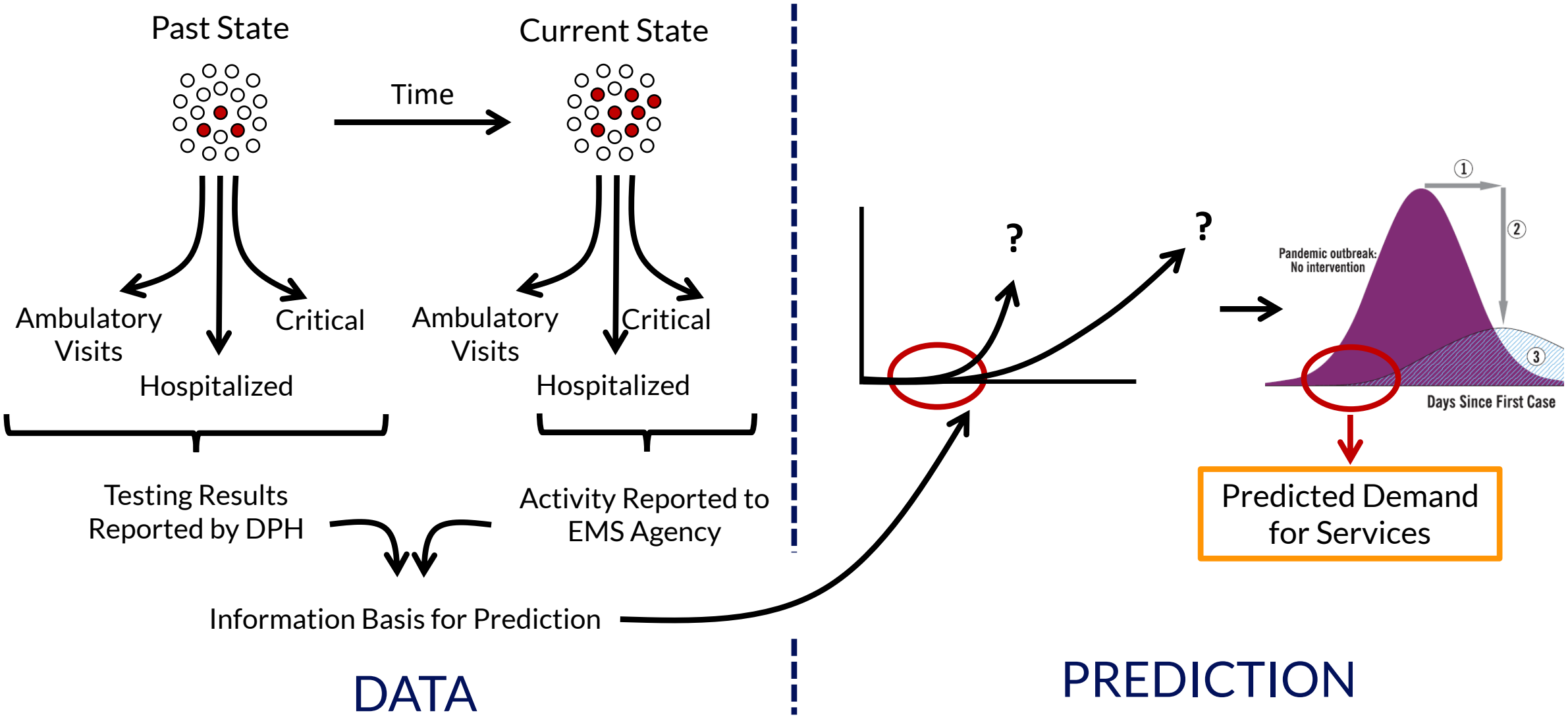
Uncertainty is a Given.

Based on the data we have, it is still not certain what trajectory this epidemic will take. There is a range of possibilities for which we as a system need to be prepared.

Caveats we need to remember:

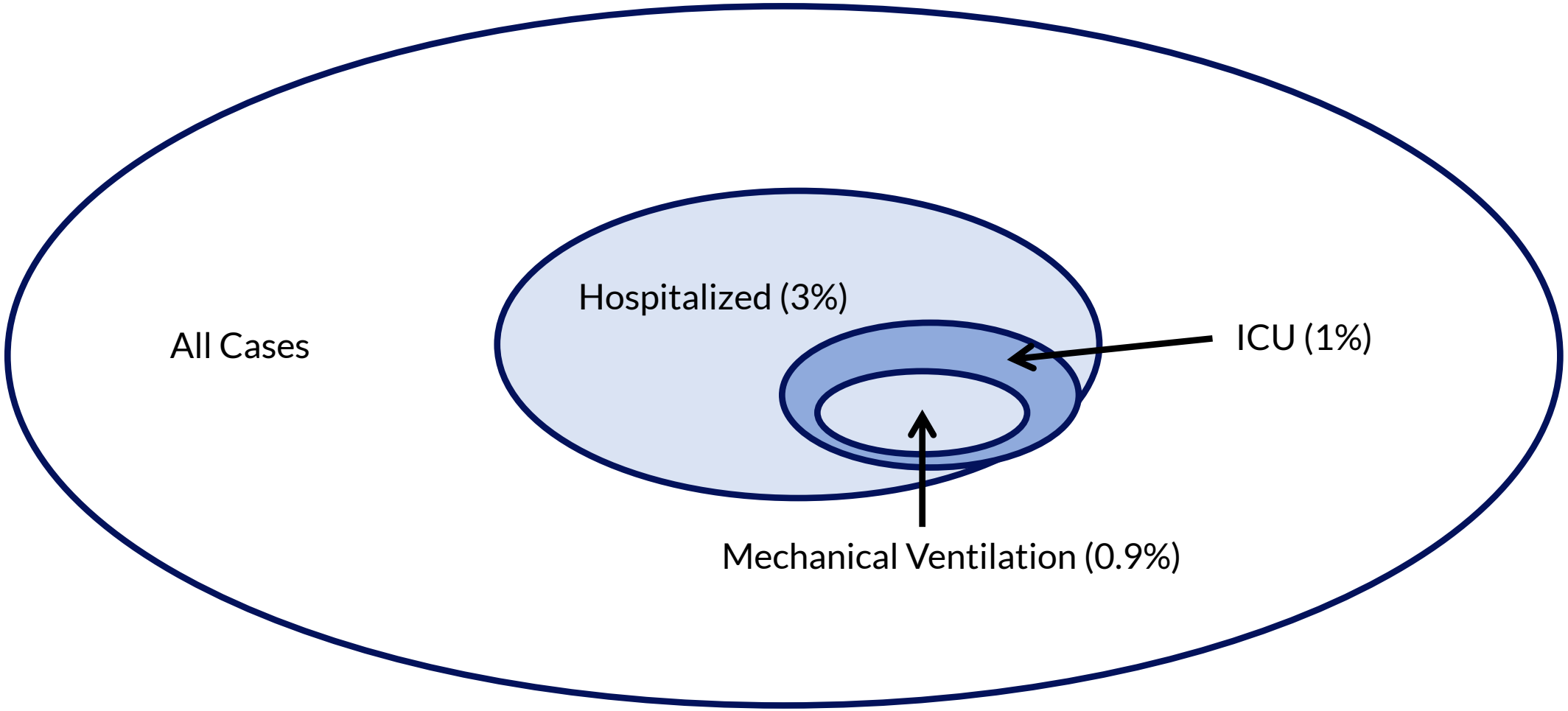
- Model is being updated with new data daily, thanks to EMS Agency and DPH
- Because each day is a new day with the possibility for different data, it is difficult to project with complete precision was the system demand could be
- Every day's new data is important
- We strive to avoid prediction models that are overly precise, and hide the true uncertainty in future healthcare demand

Predicting Future Demand from Available Data



Estimating Demand

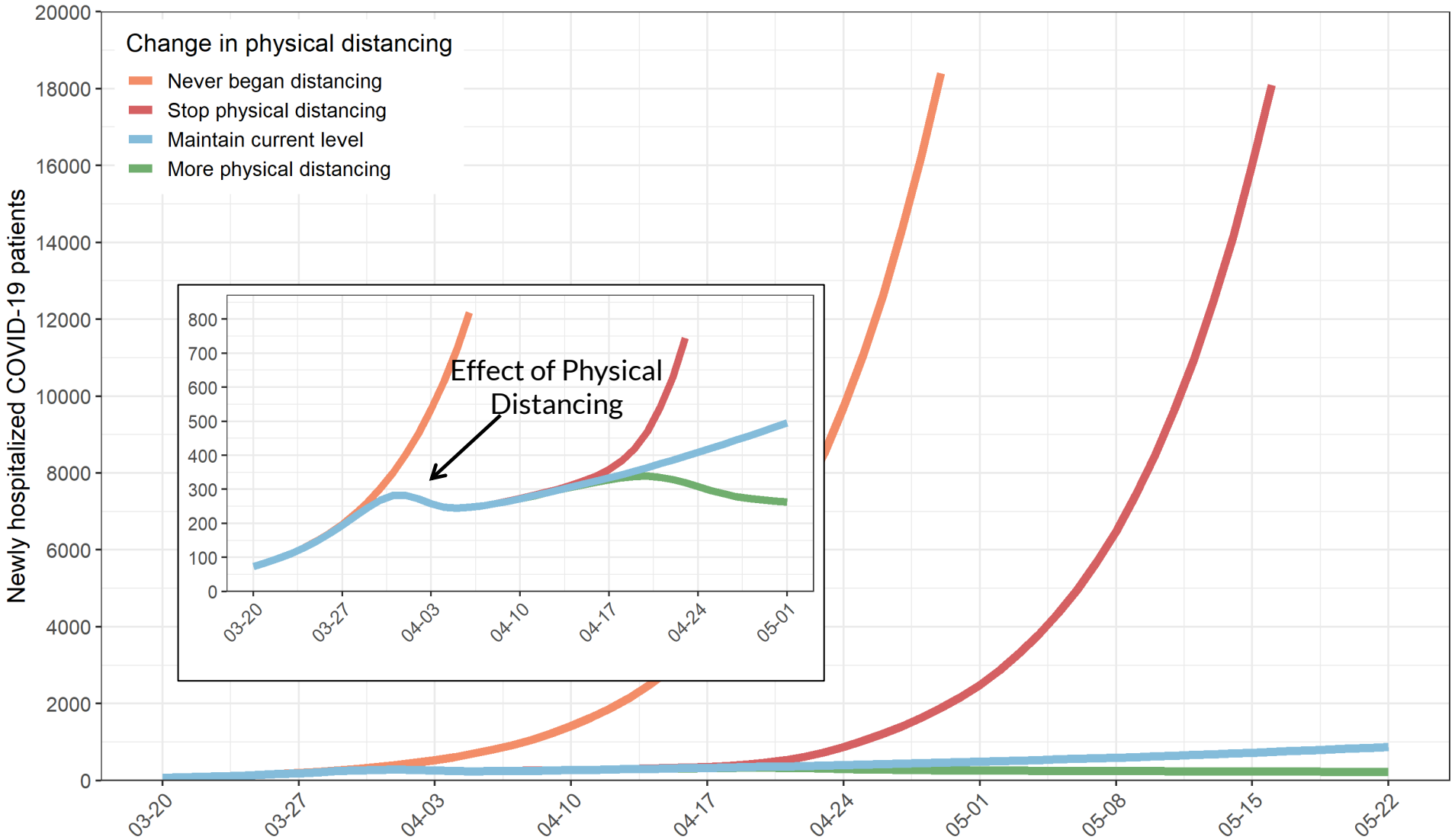
How many will need hospital care?



Physical Distancing is Working.

Scenarios: Projected Impact of Physical Distancing on Spread

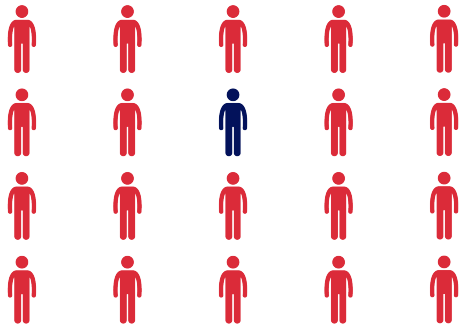
Daily Volume of Patients Requiring Hospitalization



Summer 2020: Projected Infection in LA County

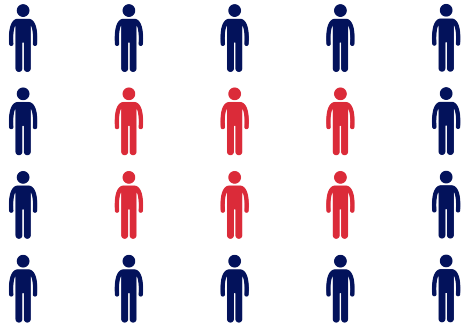
As summer approaches, if physical distancing is….

Reduced to
Pre-order Levels



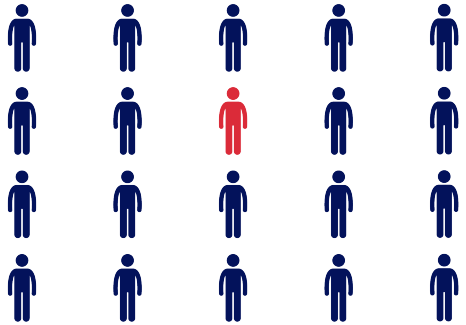
95.6%

Maintained at
Current Levels



29.8%

Increased Above
Current Levels

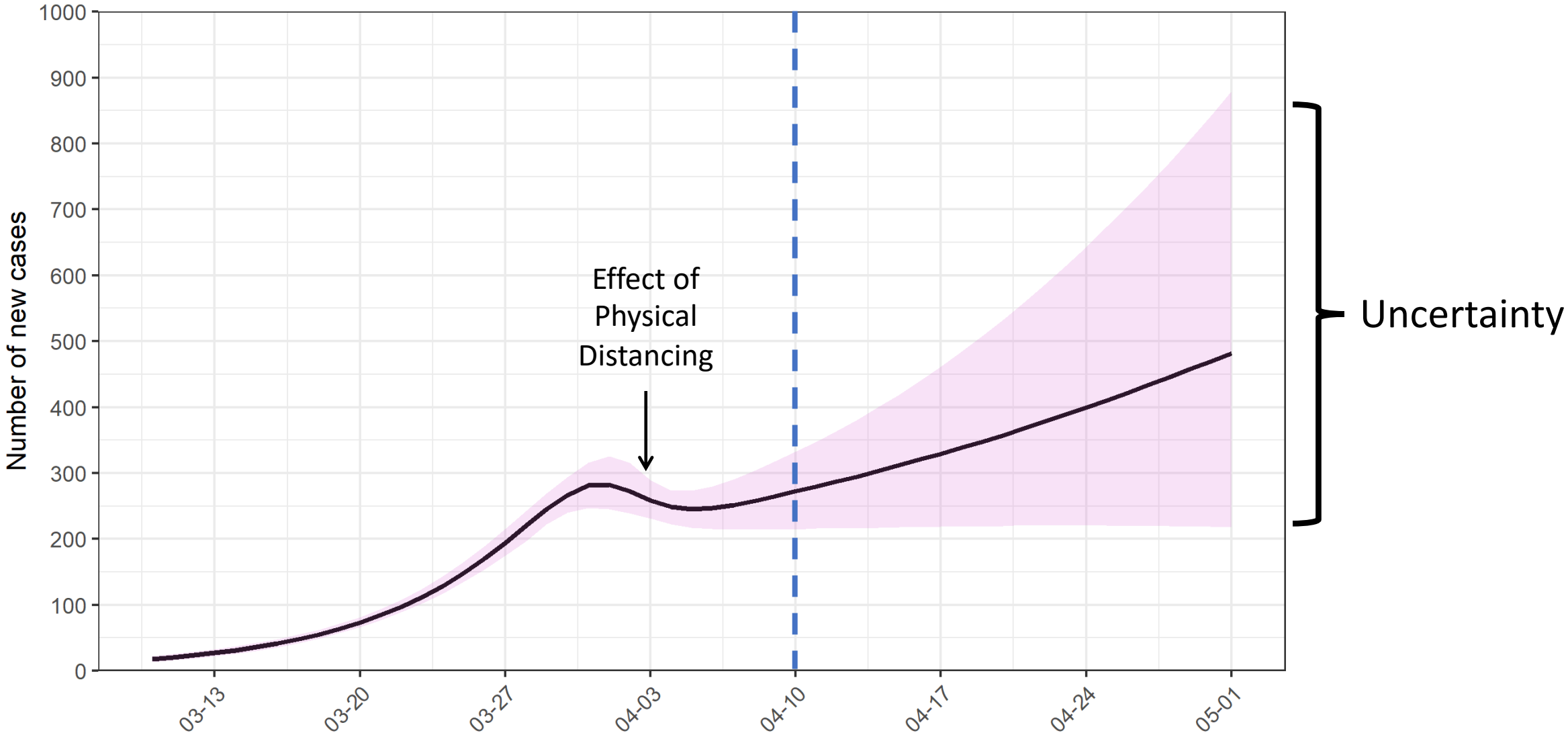


5.5%

… of LA County residents will have been infected over the course of the pandemic by August 1st, 2020.

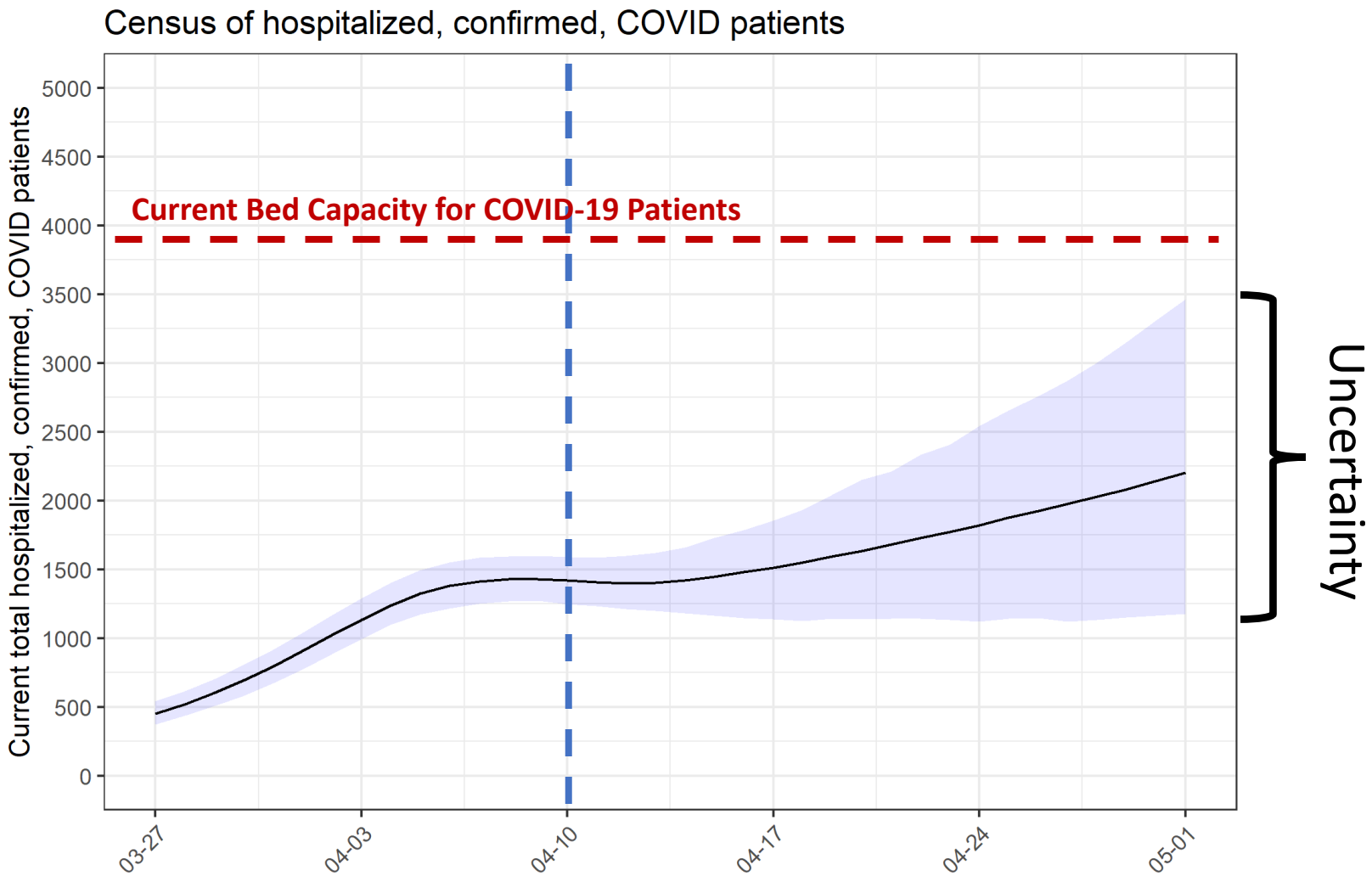
Certainly Uncertain: Hospital Patient Projections

Physical distancing is putting LA County on a slower exponential growth curve—but it's still a growth curve.



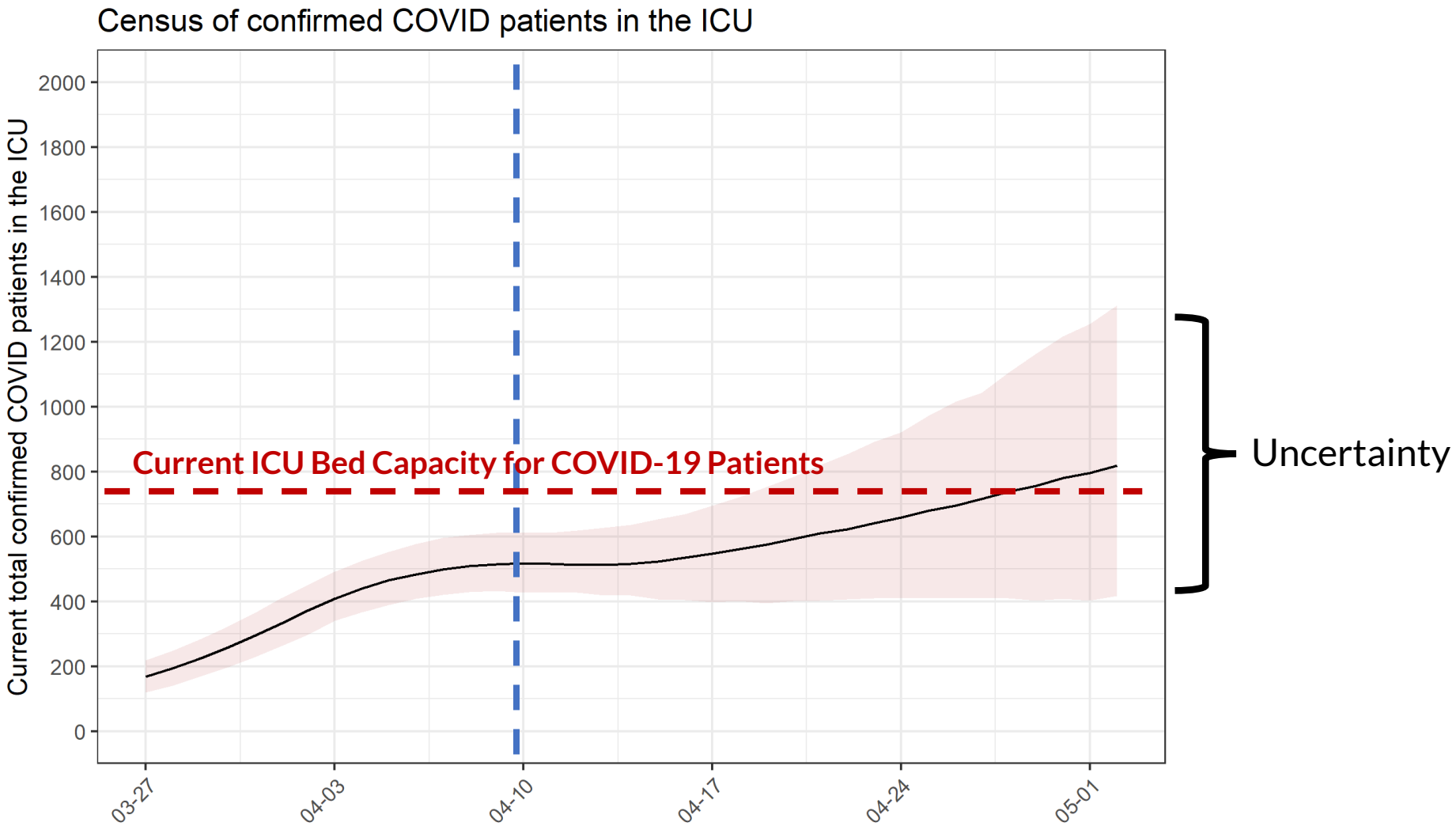
Predictions of Demand in LA County | Hospital Beds

If we maintain physical distancing, our hospital system is likely equipped with sufficient hospital beds.



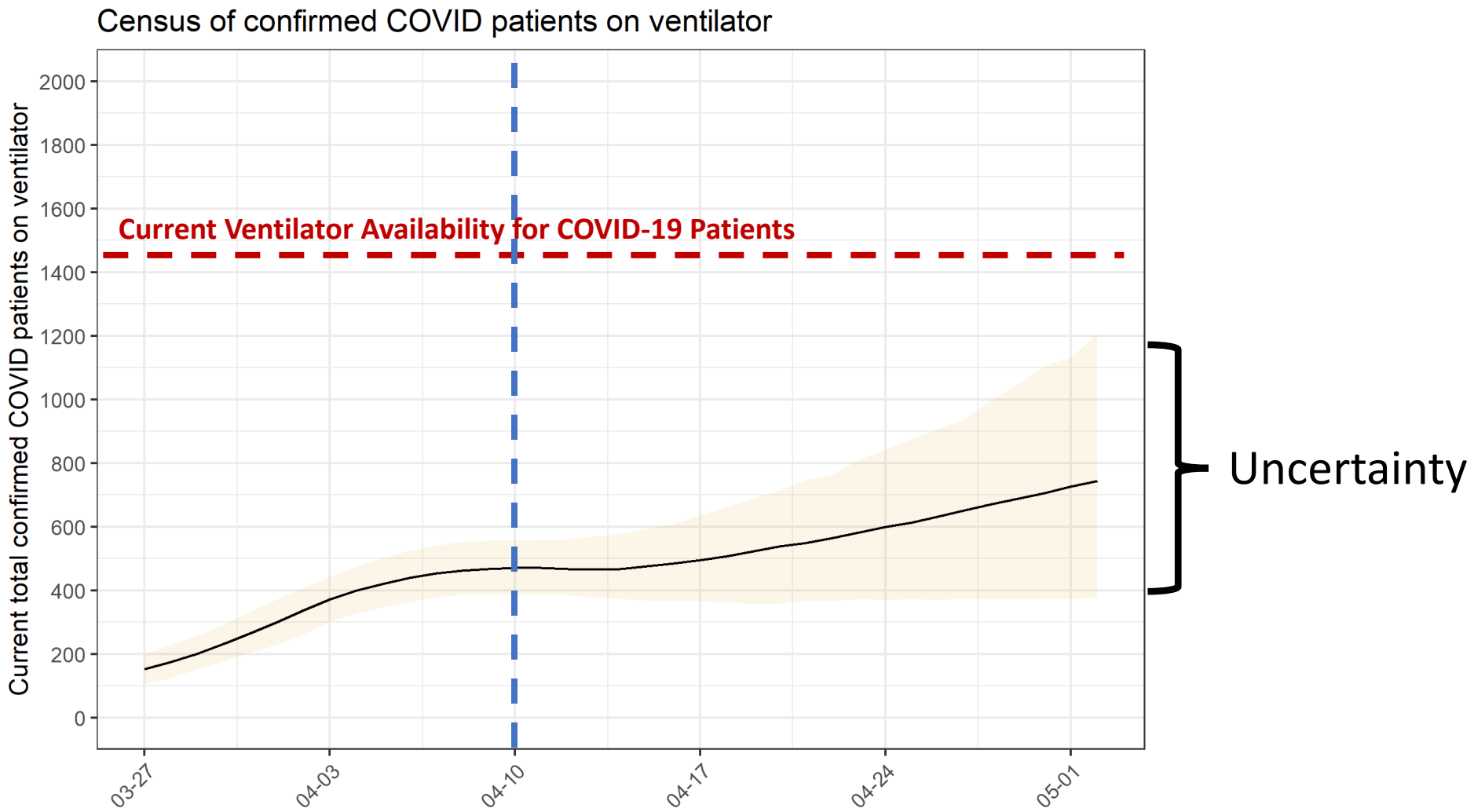
Predictions of Demand in LA County | ICU Beds

Even as physical distancing continues, ICU Bed capacity will need to be increased—which is underway.



Predictions of Demand in LA County | Ventilators

If physical distancing continues, the county projects sufficient availability of ventilators.



Physical Distancing is the best path forward.

We know that physical distancing has taken a toll on our entire community—and that some of us are tragically mourning the loss of loved ones.

There remains substantial risk that the need for hospital-based services will exceed system capacity, possibly by large margins, if there is any reduction in physical distancing behavior.

- Current data suggests that physical distancing and public health directives have slowed the spread of COVID-19
- It remains likely that current measures are not sufficient to lead to a reduction in illness over time, and therefore more effective measures will be required

Staying at home and physical distancing will allow our hospital system to do what it needs to do to ensure that those requiring hospital care receive the care they need, and that everyone else is at less risk of exposure so we can get back to normal.