Projections of Hospital-based Healthcare Demand due to COVID-19 in Los Angeles County

November 18, 2020 Update

County DHS COVID-19 Predictive Modeling Team:

Roger J. Lewis, MD, PhD;1 Juliana Tolles, MD, MHS;1 M. Claire Jarashow, PhD, MPH;2 Fei Wu, PhD;3 Joe Marion, PhD;4 Kert Viele, PhD;4 Todd Graves, PhD;4 Henry Shin;1 Frederic Schoenberg, PhD;5 Andrea Bertozzi, PhD;5 Tom Belin, PhD5

1. Los Angeles County, Department of Health Services
2. Los Angeles County, Department of Public Health
3. Los Angeles County, Office of the Chief Information Officer
4. Berry Consultants, LLC, Austin, TX
5. University of California, Los Angeles
Key Findings of the November 18th Update

- This update includes data through November 16th, 2020.
- There have been no changes to our approach to making projections since last week.
- Key findings:
  - The number of new patients with COVID-19 requiring hospitalization each day across Los Angeles County is increasing.
  - The estimated transmission number ("R") is 1.18 with an uncertainty of 1.10 to 1.27. This is a marked increase from last week, when the estimate was 1.03 with an uncertainty of 0.97 to 1.09. When R is above 1 the number of cases will increase over time.
  - Based on the current estimate for R, and assuming no change in behavior, it is likely the number of cases will go up rapidly, with likely shortages in the number of hospital beds and ICU beds over the next 2 to 4 weeks. The number of ventilators in Los Angeles County is likely to be adequate over the next 4 weeks.
  - The model suggests about 1 in 250 Los Angeles County residents are currently infectious to others and that about 1 in 6 have had COVID-19.
How Many in Los Angeles are Infectious to Others?

• The DHS team’s epidemic model estimates the number of people in Los Angeles County who:
  • Are still **susceptible** to infection if exposed;
  • Have been **exposed** and are incubating, but not infectious;
  • Have COVID-19 and are **infectious** to others, though they may have no symptoms; and
  • Have had COVID-19 and either **recovered** or died, so they are no longer infectious

• The model suggest that about 0.40% (uncertainty of 0.26% to 0.60%) of everyone in Los Angeles County is **currently** infected and infectious to others.

• This suggests about 1 in 250 (between 1 in 390 and 1 in 170) Los Angeles County residents are currently infectious to others. Last week this estimate was 1 in 580.
A Patient’s Journey | COVID-19

Susceptible

Exposed (incubation 2-12 days)

Potentially Infectious (e.g., 5 to 30+ days)

Not Contagious

Exposure

Symptoms May Begin

Symptoms Resolve

May be Symptomatic

Becomes contagious

No longer infectious

Time

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.
Hospital New Patient Projections: From Last Week

Effect of Physical Distancing

Where we were

Additional uncertainty if R varies

Uncertainty with no change in R
Hospital New Patient Projections

Effect of Physical Distancing

Where we are today

Uncertainty with no change in R

Additional uncertainty if R varies
Effective Transmission Number “R”

Where we are today

Effect of Physical Distancing

R = 1.0

Additional uncertainty if R varies

Uncertainty with no change in R

Note: We have adjusted the R that we present to account for the fraction of the population that is presumed to be immune to reinfection. At the beginning of the pandemic, this fraction was essentially zero so this would not have made any difference. But as more people have been infected, and are presumed to have immunity, we are presenting an R that includes this factor.
Predictions of Demand in LA County | Hospital Beds

Bed Capacity for COVID-19 Patients

Where we are today

Uncertainty with no change in R

Additional uncertainty if R varies
Predictions of Demand in LA County | ICU Beds

ICU Bed Capacity for COVID-19 Patients without activation of alternative ICU locations or staffing

Where we are today

Uncertainty with no change in R

Additional uncertainty if R varies
Ventilator Availability for COVID-19 Patients

Where we are today

Predictions of Demand in LA County | Ventilators

Uncertainty with no change in R

Additional uncertainty if R varies

Uncertainty with no change in R
Predictions of Daily Mortality LA County

Where we are today

Additional uncertainty if R varies

Uncertainty with no change in R

Daily reported deaths

Δ 7-day running average
Hospital Admissions are a Varying Fraction of New Cases
Daily New COVID-19 Hospitalizations by Service Planning Areas (SPAs), per 100 Hospital Beds

- SPA 1 Antelope Valley
- SPA 2 San Fernando Valley
- SPA 3 San Gabriel Valley
- SPA 4 Central Los Angeles
- SPA 5 West Los Angeles
- SPA 6 South Los Angeles
- SPA 7 East Los Angeles
- SPA 8 South Bay

• The transmission of COVID-19 in Los Angeles County is changing over time, with different patterns in different geographic areas

• More detailed geographical analysis is required to identify specific communities needing additional support in identifying cases and limiting spread
What about Influenza?

• We have not yet seen significant influenza activity in Los Angeles County. The usual seasonal increase in utilization of hospital beds from influenza-associated illnesses is shown below. Influenza-associated illnesses typically lead to a demand for hospital beds similar to the current demand for patients with COVID-19. These estimates will be updated when influenza activity is detected.

• Typical daily hospital admissions for influenza-associated illnesses

• Typical hospital census of patients with influenza-associated illnesses

• Daily hospital admissions for COVID-19

• Hospital bed utilization for COVID-19
Effect of Behaviors to Control Transmission

If transmission....

- **Maintained at Current Levels**: 48% (uncertainty 33% to 60%)
- **Increases by ½ above Current Levels**: 80% (uncertainty 74% to 86%)
- **Increases to Pre-order Levels**: 79% (uncertainty 76% to 82%)

...of LA County residents will have been infected by **March 31, 2021** *

*(This includes adults and children)*