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

December 16, 2020 Update

County DHS COVID-19 Predictive Modeling Team:

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Key Findings of the December 16th Update

• This update includes data through December 14, 2020.
• Because of the increase in COVID-19 hospital utilization and to focus on recent changes, the vertical and horizontal scales on multiple graphs have been changed.
• Key findings:
  • The number of new patients with COVID-19 requiring hospitalization each day across Los Angeles County has continued to increase rapidly.
  • The estimated transmission number (“R”) is 1.20 with an uncertainty of 1.13 to 1.26. This is a marked increase from last week, when the estimate was 1.14 with an uncertainty of 1.09 to 1.21. When R is above 1, cases will increase over time.
  • Based on the current estimate for R, and assuming no change in transmission behavior, the number of cases will continue to increase, with shortages in the number of hospital beds and especially ICU beds over the next 4 weeks. The number of ventilators in Los Angeles County may become inadequate over the next 4 weeks as well.
  • The model suggests about 1 in 80 Los Angeles County residents are currently infectious to others and that about 1 in 4 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 suggests that about 1.23% (uncertainty of 0.85% to 1.70%) of everyone in Los Angeles County is currently infected and infectious to others.

• This suggests about 1 in 80 (between 1 in 120 and 1 in 60) Los Angeles County residents are currently infectious to others. Last week this estimate was 1 in 140.
A Patient’s Journey | COVID-19

- **Susceptible**
  - Exposed (incubation 2-12 days)
    - Becomes contagious

- **Exposed**
  - Potentially Infectious (e.g., 5 to 30+ days)
    - Symptoms May Begin
      - May be Symptomatic
    - Symptoms Resolve
      - Not Contagious

- **Symptoms Resolve**
  - No longer infectious

**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.
Uncertainty with no change in transmission behavior

Additional uncertainty if transmission behavior varies

Effect of Physical Distancing

Where we were
Hospital New Patient Projections: Same Scale as Last Week

Start date: March 1
Scale 0 to 1000/day

Where we are today

Effect of Physical Distancing

Uncertainty with no change in transmission behavior

Additional uncertainty if transmission behavior varies
Changes in Scales to Make Room for Current Cases and Projections

1. Original time scale from beginning of epidemic to present, showing up to 1000 admissions per day
2. Expanded time scale to focus on more recent changes in the epidemic
3. New format: Larger vertical scale to show cases or predictions of up to 1500 admissions per day
Hospital New Patient Projections | Scale 0 to 1,500/day

- Start date July 1
- Scale 0 to 1500/day
- Where we are today

Uncertainty with no change in transmission behavior

Additional uncertainty if transmission behavior varies

Top of Prior Graphs (1000/day)
Effective Transmission Number “R”

Where we are today

R = 1.0

Start date July 1
Scale 0 to 2.0

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.
Bed Capacity for COVID-19 Patients

Predicted hospital bed demand is off top of graph.

Additional uncertainty if transmission behavior varies.

Where we are today

Start date April 1
Scale 0 to 5,000
Bed Capacity for COVID-19 Patients

Uncertainty with no change in transmission behavior

Additional uncertainty if transmission behavior varies

Predictions of Hospital Bed Demand | Scale 0 to 15,000

Start date July 1
Scale 0 to 15,000

Where we are today
Predictions of ICU Bed Demand | Scale 0 to 2,000

Current ICU Bed Capacity for COVID-19 Patients

Start date April 1
Scale 0 to 2,000

Where we are today

Uncertainty with no change in transmission behavior

Additional uncertainty if transmission behavior varies
Uncertainty with no change in transmission behavior.

Additional uncertainty if transmission behavior varies.

Current ICU Bed Capacity for COVID-19 Patients

Start date July 1
Scale 0 to 4,000

Where we are today

Predictions of ICU Bed Demand | Scale 0 to 4,000

Where we are today

Current ICU Bed Capacity for COVID-19 Patients

Start date July 1
Scale 0 to 4,000
Predictions of Demand in LA County | Ventilators

Ventilator Availability for COVID-19 Patients

Where we are today

Uncertainty with no change in transmission behavior

Additional uncertainty if transmission behavior varies

Start date July 1
Scale 0 to 2,000
Predictions of Daily Mortality | Scale 0 to 300/day

- Daily reported deaths
- Δ 7-day running average

Uncertainty with no change in transmission behavior

Additional uncertainty if transmission behavior varies

Start date July 1
Scale 0 to 300/day

Where we are today
Hospital Admissions are a Varying Fraction of New Cases
Daily New COVID-19 Hospitalizations by Service Planning Areas (SPAs), per 100 Hospital Beds | Scale 0 to 15

• Prior scale was 0 to 10 daily COVID-19 admissions per 100 hospital beds
• 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.

- Daily hospital admissions for COVID-19

- Hospital bed utilization for COVID-19

- Typical daily hospital admissions for influenza-associated illnesses

- Typical hospital census of patients with influenza-associated illnesses
Effect of Behaviors to Control Transmission

**If transmission...**

<table>
<thead>
<tr>
<th>Maintained at Current Levels</th>
<th>½ way between Pre-order and Current Levels</th>
<th>Increases to Pre-order Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="People icons" /></td>
<td><img src="image2" alt="People icons" /></td>
<td><img src="image3" alt="People icons" /></td>
</tr>
<tr>
<td>50% (uncertainty 41% to 58%)</td>
<td>66% (uncertainty 62% to 71%)</td>
<td>77% (uncertainty 74% to 81%)</td>
</tr>
</tbody>
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... of LA County residents will have been infected by **March 31, 2021** *

*(This includes adults and children)*