Estimates of COVID-19 Patient Hospitalizations with Social Distancing Practice in Stanislaus County

As COVID-19 (coronavirus) spread across the world, many jurisdictions, including California, have implemented policies and recommendations to increase social distancing, including closing non-essential business operations, asking people to work from home when possible, closing schools, prohibiting group gatherings, and maintaining at least a six-foot separation from other people. These measures were instituted with the hope of “flattening the curve,” or slowing the spread of this disease, so that hospitals are not overwhelmed by a large number of patients seeking care all at once (which could mean an insufficient number of hospital beds, medical staff, and ventilators for those who need them). Publicly available platforms (e.g., unacast, cuebiq) estimate that these control measures have led to a 40% reduction in physical contact with people outside of a household.

Utilizing an estimate of the reduction in physical contact, data scientists from universities and private sectors have created mathematical and/or statistical forecast models to predict the impact of social distancing on hospital bed utilization and the highest number of hospital beds needed during the COVID-19 emergency period in a geographic area, often referred to as the “peak.” These models not only consider the local transmission rate but also incorporate multiple other pieces of local information, such as when the COVID-19 epidemic started and the amount of social distancing practiced. While the models use many of the same variables, how the variables are accounted for and

Note: * The UPenn CHIME model (blue line) predicts the number of hospital beds only for the next 30 days from the current date.
This graph is based on the data available as of May 26th, 2020. Please note that there is considerable uncertainty in the estimates of each epidemiologic model at this time, driven by the uncertainties in key aspects of the virus and lack of data regarding the prevalence of infection.

Figure 1 Impact of Social Distancing on Hospital Beds in Stanislaus County, CA
Figure 2 Model Estimates and Actual Hospitalization

estimated within each model differ. For example, the UC Davis model assumes that social distancing measures have resulted in a 25% reduction in physical contacts, while the other models assume a larger reduction of 40%. As a result of these differences, the models predict different timing and growth of hospital beds needed for COVID-19 patients.

Figure 1 shows four different predictions, generated by four different models, for the anticipated impact of social distancing on the number of hospital beds needed by COVID-19 patients in Stanislaus County. Each model’s growth curve is represented by a different color. The black dotted line shows the anticipated number of hospital beds needed if the virus had been allowed to spread without any social distancing. The straight grey and straight blue lines show the number of hospital beds in Stanislaus County and the number of those beds that are not in use and are available for COVID-19 patients. The black squares show the number of confirmed Stanislaus County COVID-19 patients who were hospitalized a local hospital on a given day. It is important to note that the variance of these models indicates how difficult it is to predict the course of this disease’s spread.

Figure 2 above is a magnification of the modeling and hospitalization data shown in Figure 1. By comparing model estimates to actual hospitalizations, researchers are able to monitor how well their models are performing as a predictive tool and adjust accordingly. It is important to bear in mind that models try to strike a balance between fitting observed data, in this case COVID-19 hospitalizations up to this point in time, and a theoretical logic for future predictions. Of those four models, the UPenn (blue) and Stanford (red) models most closely fit actual hospitalizations over the observed period. While this does not necessarily mean that they would be the most accurate models over the long run, it does give some support to the assertion that social distancing measures are helping to limit the spread of COVID-19 in Stanislaus County.

Stanislaus County is coordinating with local hospitals to monitor what resources are currently in use and available for new patients. Please visit our dashboard and go to the hospital tab to see the hospital resource information.