

Rapid Update: COVID-19 intervention effectiveness and epidemic trends for Oregon

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Purpose of this update

To estimate the number of people who are likely to have COVID-19 and need hospital services in Oregon over the next 8 weeks (April 14th through May 22nd), given the “Stay Home, Save Lives” intervention.

Methods

Orpheus data on COVID-19 cases were used. Orpheus is an integrated electronic disease surveillance system for public health to manage communicable disease reports ([Orpheus description](#)). The data file was obtained on April 14th, but data after April 10th was considered incomplete because of a approximate 4 day lag in reporting.

We applied Covasim ([Covasim code](#)), an individual-based COVID-19 transmission model with parameters informed by literature, as described in previous IDM reports. The model was calibrated by modifying the assumptions to best fit data from Orpheus on confirmed positive COVID-19 diagnoses, number of tests completed, hospitalizations, intensive care unit (ICU) admittance, and deaths for Oregon. The model was then used for projecting future epidemic trends.

Interventions

A large number of measures intended to slow the transmission of COVID-19 were put in place on March 12th 2020, such as bans on gatherings of more than 250 people; these are detailed [here](#). Schools were closed statewide on March 16th, as detailed [here](#). Further measures were put in place on March 16th, including the closure of restaurants and bars and gatherings of more than 25 people, as detailed [here](#). Aggressive interventions, namely the [“Stay Home, Save Lives” recommendations](#), were put in place on March 23rd 2020.

Results

Based on new modeling results calibrated to April 14th data from Oregon, we estimate that there have been approximately 7,600 infections in Oregon by April 10th, of which 1,600 had been diagnosed. Estimates for number of infections continue to change, as reported local diagnoses and hospitalizations improve and the science evolves.

From calibrating the model to the local data, there is evidence that these measures, combined with increased hygiene and other measures that appear to have begun earlier, have dramatically reduced the burden of COVID-19 in Oregon (Figure 1). The data are consistent with a stepped reduction in transmission in Oregon, beginning with a 10% decrease in transmission by March 8th, through to a sustained decrease in transmission after March 23rd of approximately 60%. Indeed, while the interventions until March 22nd appeared to have slowed epidemic growth, the additional aggressive measures implemented on March 23rd (i.e., Stay Home, Save Lives) appear to have reversed the growth. These results are consistent with large reductions in movement as shown in Google data for Oregon ([Google mobility reports](#)).

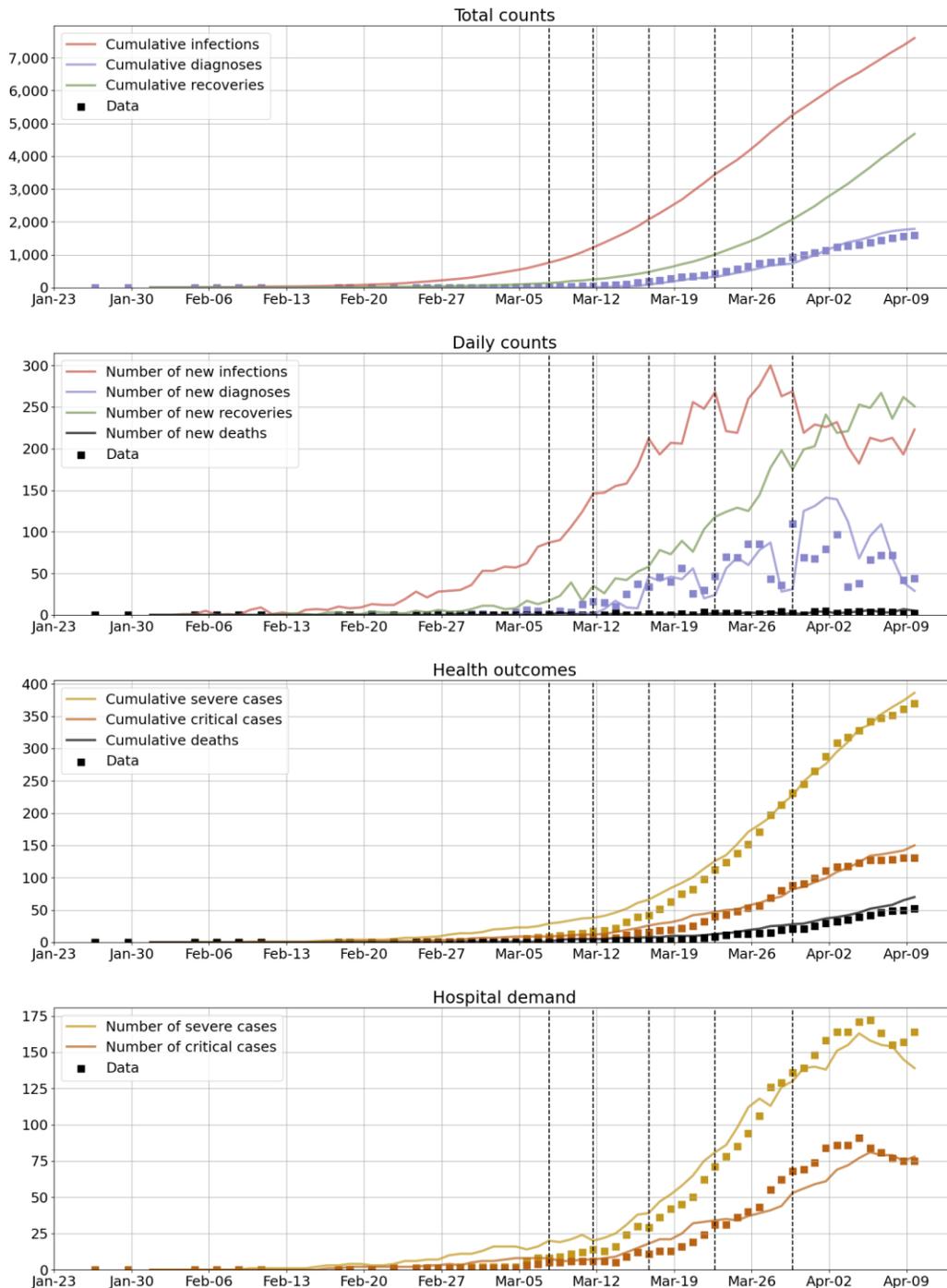


Figure 1: Best-fit model calibration. Dotted vertical lines correspond to estimated reductions in transmission relative to baseline, from left to right, of 10%, 20%, 30%, 50%, and 62%. The impacts of these interventions were estimated by calibrating to numbers of positive diagnoses (squares, top two plots), plus severe (hospital) cases, critical (ICU) cases, and deaths (bottom two plots). Note that Orpheus data were from April 14th, but because of delays in reporting, data after April 10th was considered incomplete.

Projection

We projected the number of infections through May 22, assuming continuation of “Aggressive interventions” (i.e., Stay Home, Save Lives), which correspond to an estimated 62% reduction in transmission compared to baseline. With continued aggressive interventions, the number of cumulative infections is estimated to slowly increase, while the number of active infections slowly declines (Figure 2).

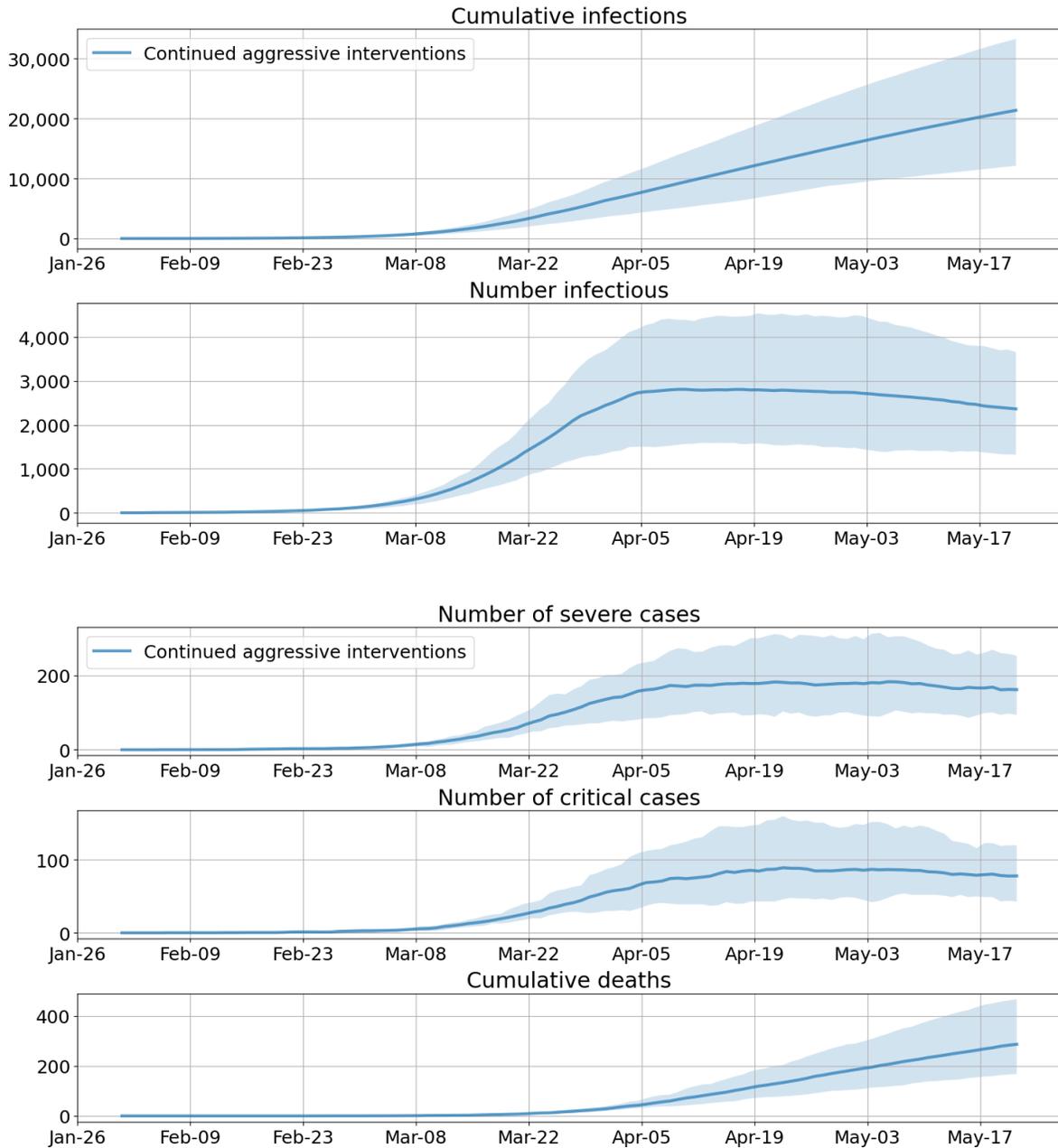


Figure 2: Model projections assuming continuation of “Stay Home, Save Lives.”

Limitations

The projections in this report should be considered preliminary and subject to change. The projections are based on the best available local data and evidence as of April 14th, 2020. However, the local collection of epidemiology data on COVID-19 cases may lag in ways we did not account for, and data improvement efforts are ongoing. In addition, we are working to continue improving the models. Last, there remain significant unknowns, including the current extent of social distancing, testing policies, and compliance with new interventions and how these vary throughout the state.

Recommendations

We commend Oregon for introducing aggressive interventions early in the epidemic. We acknowledge how strong the impacts of these measures will be across society, especially for low-income families and other vulnerable populations, and we hope Oregon will also act to mitigate the largest societal costs. Oregon's recent donation of ventilators to New York is a strong testament to the success of its early and forceful control measures.

Finally, we emphasize the urgent need for enormously increased testing capacity. It will not be possible to relax social distancing measures and avoid an epidemic rebound without significantly increased testing. Increased testing must be coupled with detailed contact tracing, asymptomatic testing of at-risk individuals, and likely the quarantining of infected individuals away from households, where significant transmission occurs. Additional vigilance to reduce the risk of reintroduction if travel restrictions were relaxed would also require substantial testing capacities. These measures have been successfully used to prevent epidemic rebound in other countries, [such as South Korea](#), and provide the clearest evidence to date of successful short- to medium-term COVID-19 management. Governor Kate Brown recently announced a framework for reopening Oregon, which is consistent with these measures, and expressed her commitment to collaborating with the Washington and California Governors in developing a coordinated plan for reopening ([framework](#)).