# COVID-19 transmission across Washington State

Washington State Department of Health
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# SitRep 22: COVID-19 transmission across Washington State

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***Results as of December 6th 2020.***

We are publishing situation reports on a biweekly schedule on Wednesdays to better accommodate news cycles. If, on an off week, we identify a time-sensitive feature in the data, we will produce an updated report that week to ensure that changes in the situation are reported quickly.

For a comprehensive and up-to-date picture of what's happening around the state, see the WA State COVID-19 Risk Assessment and WADoH COVID-19 data dashboards.

## *Summary of current situation*

Changes in healthcare seeking behavior are typically observed over holidays. For this reason, hospitalizations and cases over Thanksgiving week may not reliably reflect disease transmission that occured around that time. Therefore, we are presenting estimates that do not rely on data from Thanksgiving week. This results in us using data with a longer lag period than usual. Using data from the Washington Disease Reporting System (WDRS) through November 20, we estimate the effective reproductive number ( $R_e$ ) in western Washington on November 15 was likely between 1.35 and 1.53, with a best estimate of 1.44. Meanwhile, we estimate that in eastern Washington, $R_e$ was likely between 1.20 and 1.46, with a best estimate of 1.33.

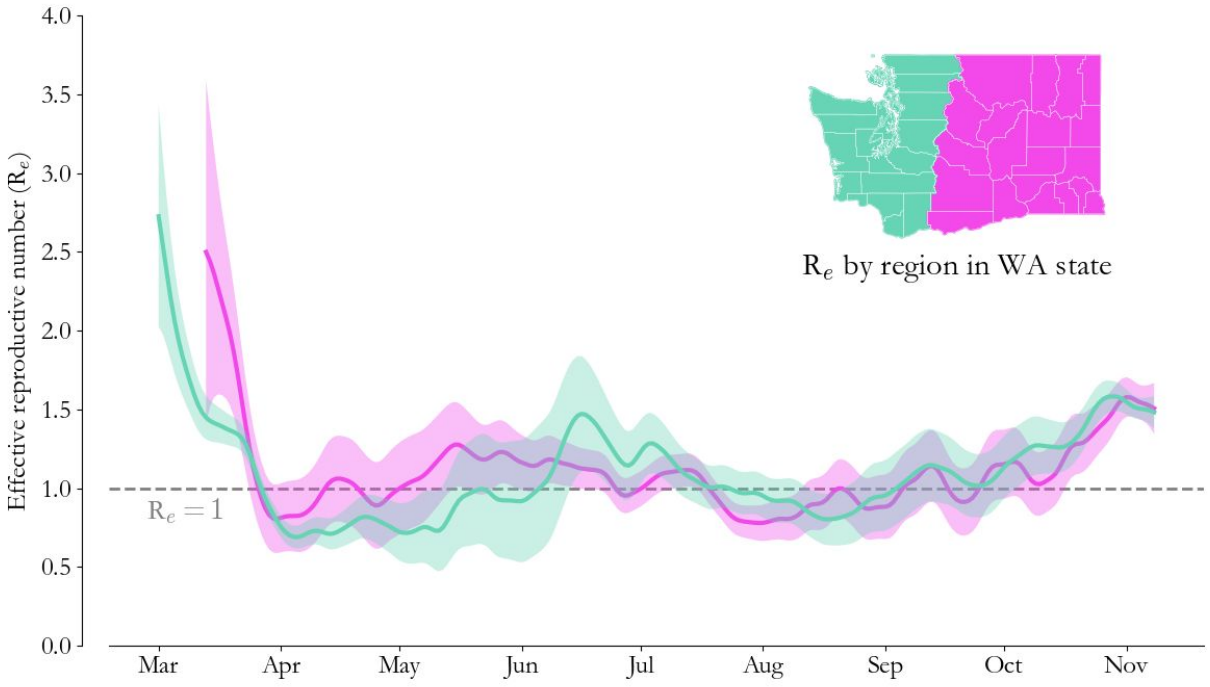


***Figure 1**: $R_e$ estimates for eastern (pink) and western (green) WA, with 2 standard deviation error bars. Our most recent estimates show $R_e$ as being substantially above one since mid-October in both eastern and western Washington, and that the increases in cases and hospitalizations represent exponential growth in infection.*

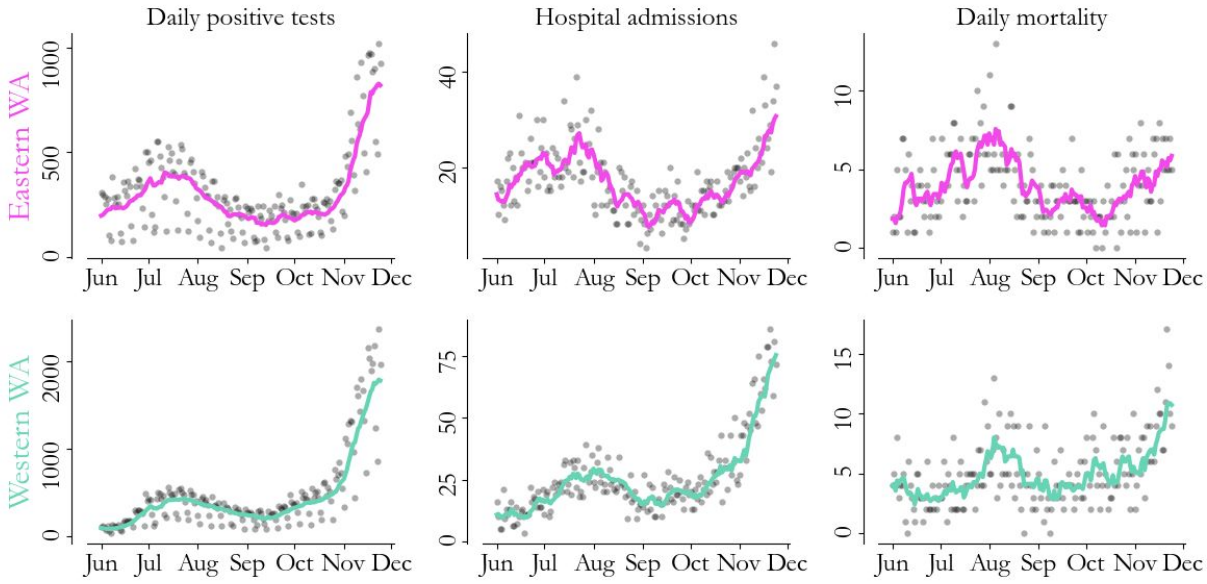


***Figure 2****: Seven-day rolling case counts (left panels), hospitalizations (middle panels) and deaths (right panels) for eastern Washington (top) and western Washington (bottom). Increases in case counts accelerated in both eastern and western Washington from mid-October to mid-November, and this represents a period of exponential growth in infection. Recent case counts show some signs of leveling off, however this may be related to changes in test-seeking behavior around Thanksgiving rather than reduced transmission. Substantial increases in daily hospital admissions have been seen since the start of October. Since growth in hospitalizations typically lags growth in cases, we would expect to see hospitalizations continue to increase through the end of November. However, changes in healthcare seeking behaviors that typically occur over Thanksgiving may simultaneously have artificially lowered hospitalizations over the last week of November.*

## *Details*

Cases, hospitalizations and deaths are sharply increasing in both eastern and western Washington through November 20.

The seven-day rolling average case count in eastern Washington has increased from 153 cases per day on September 13 to 781 on November 20. This growing trend has been mirrored in an almost three-fold increase in daily hospital admissions since the start of September.

Case counts in western Washington have been steadily increasing since September 12, and this increase has accelerated since October 24, increasing from a seven-day moving average of 202 cases per day on September 12 to 489 cases on October 24 to 1711 cases on November 20. Daily hospitalizations in western Washington have been increasing since the beginning of October, from a seven-day rolling average of 15 admissions per day on October 3 to 66 on November 20.

Growth in cases is widely distributed across Washington, with many counties showing increases in case counts and 30 of 39 counties showing 14-day rates of new cases above 200 per 100K population.

- Among the five largest counties, Clark, Snohomish, and Spokane continue to see increases in case counts through November 20, while some flattening is evident in King and Pierce counties.

- Data from several medium-sized counties (Benton, Cowlitz, Franklin, Grant, Skagit, Thurston, Yakima) indicate steep increases through mid-November, with some recent flattening in case counts through November 20. Other mid-sized counties such as Kitsap and Whatcom continue to see increases through November 20.

- Several small counties (Adams, Asotin, Clallam, Walla Walla, Whitman) show recent flattening in case counts, though seven-day average case counts remain above 10 cases per day. Other small counties (Chelan, Kittitas, Lewis, Stevens) continue to show increases in case counts.

- Several small counties (Douglas, Mason, Okanogan, Pacific, Pend Oreille, Columbia, Ferry, Skamania, Wahkiakum) are seeing increases, however absolute numbers of cases are still low in these counties.

- Per capita case rates are particularly high in several southeastern counties.

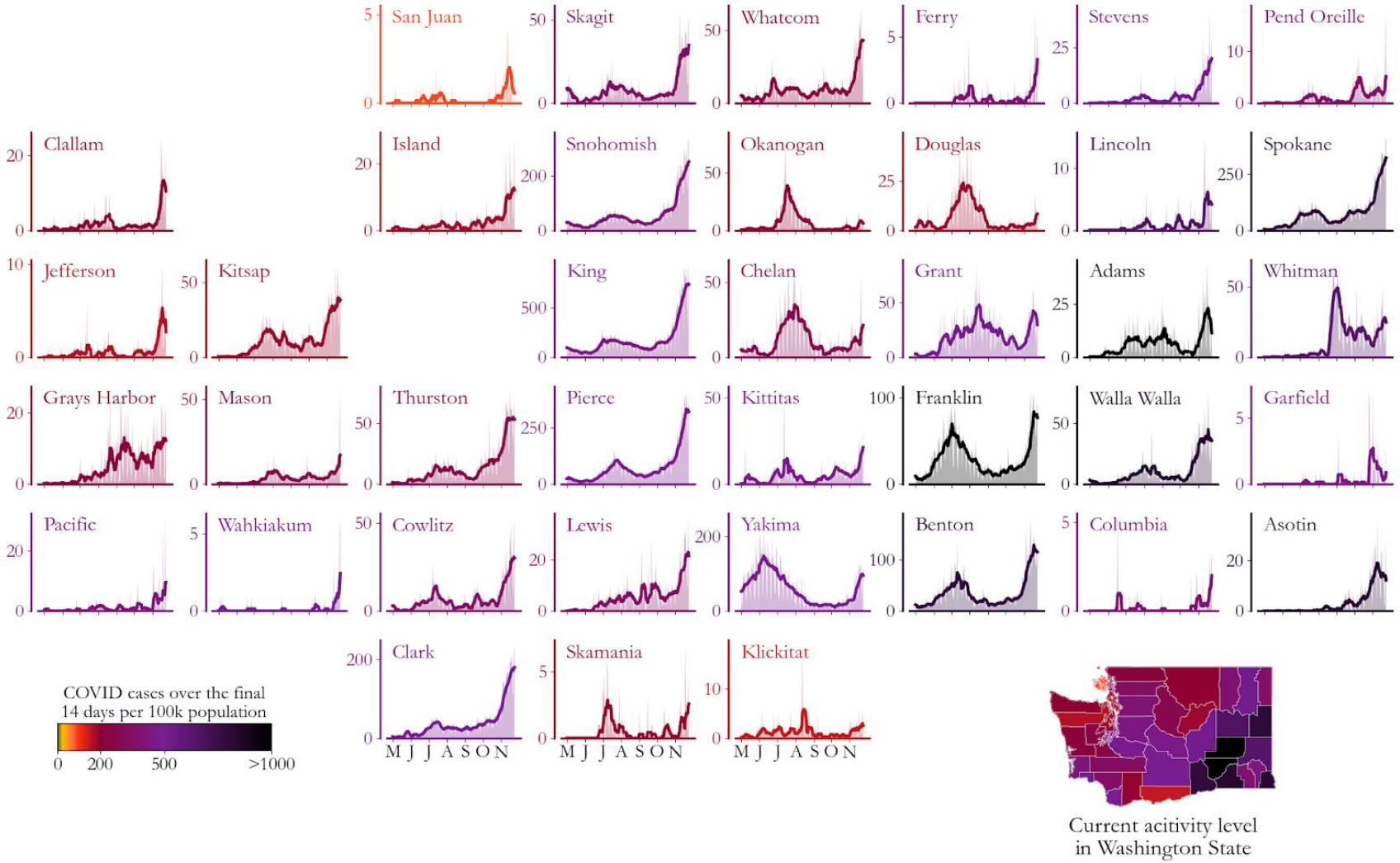


***Figure 3**: Daily COVID-19 positives (shaded areas) and 7-day moving averages (curves) arranged geographically and colored by COVID-19 activity level (total cases from November 10 to November 24 per 100,000 people). Case trends across counties highlight geographic correlations and help us better understand region-level estimates of the transmission rate (see Figure 1). With $R_e$ considerably higher than 1 in both eastern and western WA from mid-October to mid-November, per capita case rates are high in multiple counties.*

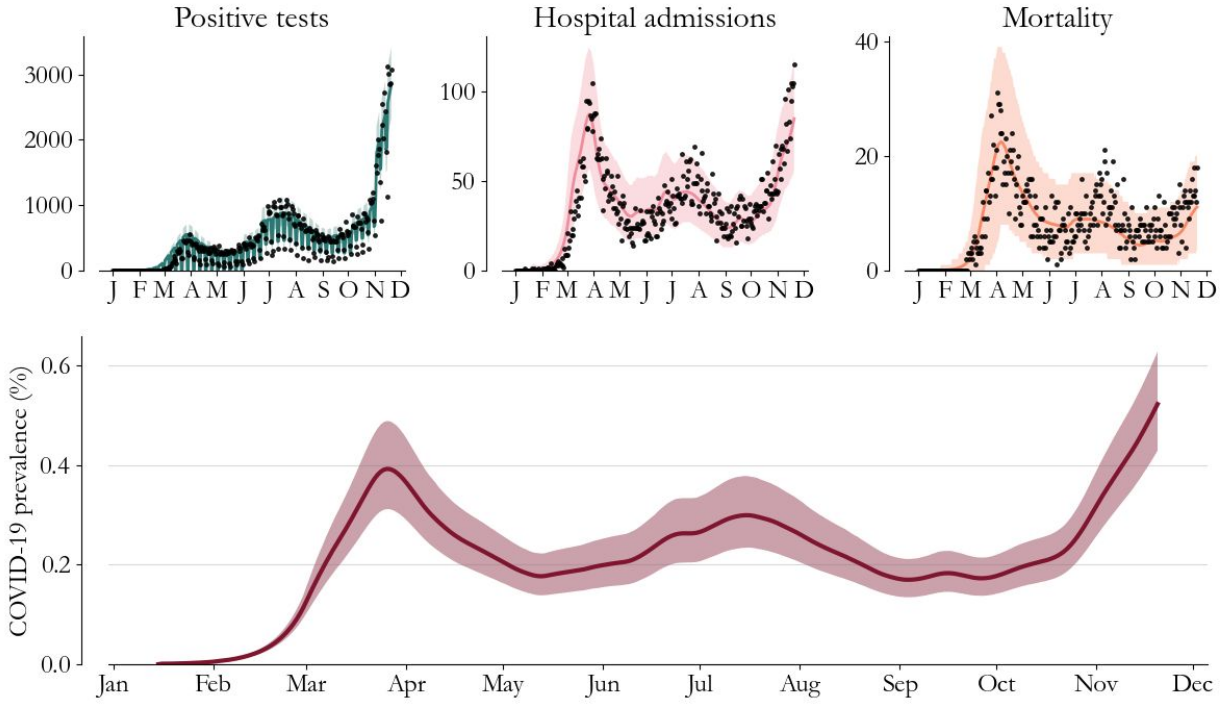


***Figure 4****: Model based prevalence estimates (bottom, 95% CI shaded) and model fit to cases (top left), hospitalizations (top middle) and deaths (top right) for Washington state. Prevalence is the percentage of Washington state residents with active COVID-19 infection.*

On November 20, overall prevalence (the percentage of Washington state residents with active COVID-19 infection) in Washington state was likely between 0.43% and 0.63%, with a best estimate of 0.52%. This estimate is higher than the peak estimate in late March, and hospital admissions through November 20 have reached peak March levels. Deaths remain substantially lower than the March peak. Higher prevalence today than mid-March with fewer severe outcomes is consistent with evidence that the infected population is generally younger than in mid-March and that advances in treatment have improved survival, but because hospitalizations and deaths generally occur some time after initial infection, the most recent hospitalization admission rates reflect exposures that occured at least 4 or 5 days earlier.

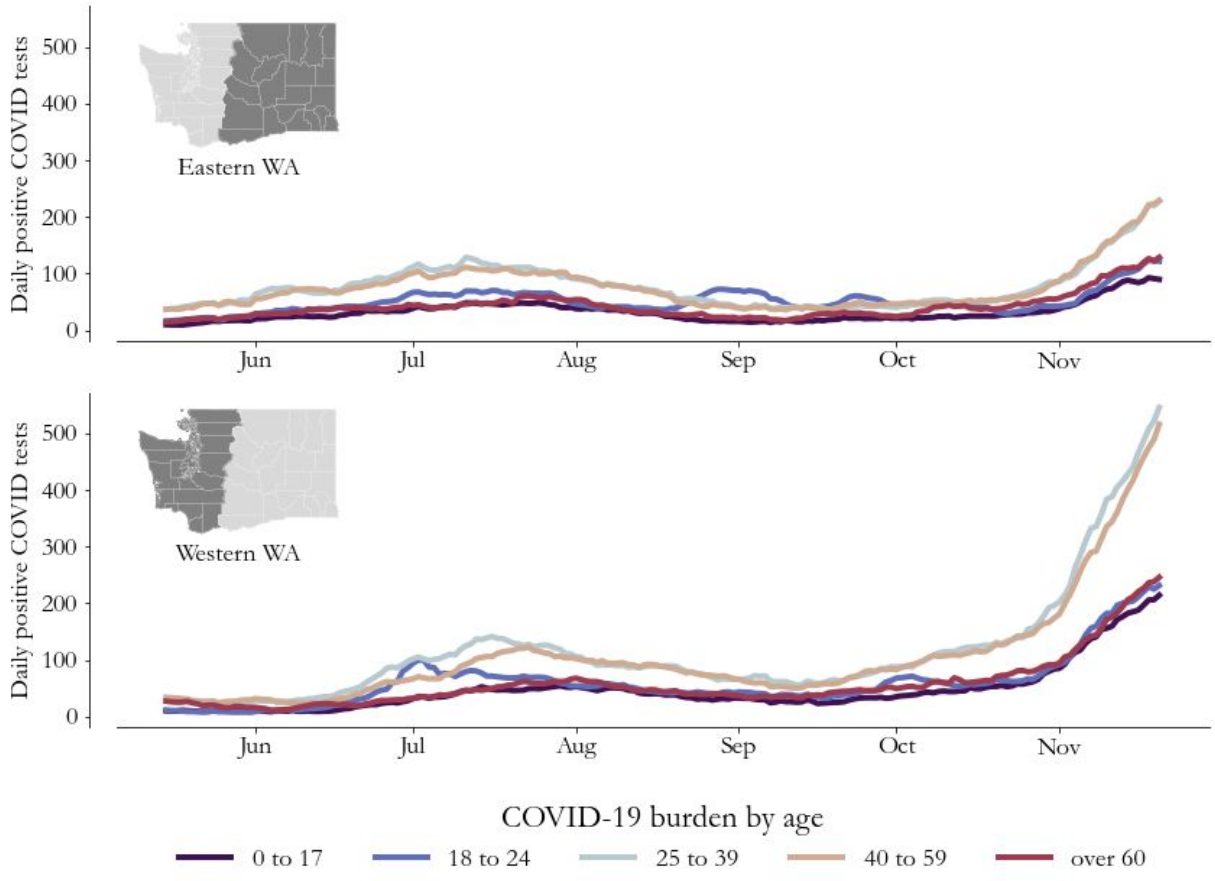


***Figure 5.*** *Seven-day rolling average case counts by age group for eastern Washington (top) and western Washington (bottom) showing that increasing trends are widely distributed across age groups, and the rate of increase is accelerating in almost all age groups.*

The rate of increase in cases is accelerating across all age groups in western Washington and all age groups except those 0-17 in eastern Washington. The largest increases are occurring in those ages 25 to 39 and 40 to 59. Rising trends in those over 60 (red lines in Figure 4) are particularly concerning, since the likelihood of severe outcomes grows significantly with age. Increases in infections in older age groups also have an outsized impact on hospital capacity as older adults are much more likely to be hospitalized and generally will have longer hospitalization stays than younger age groups.


***Figure 6.*** *Hospital beds occupied by confirmed COVID-19 patients (top, western Washington hospitals green line, eastern Washington hospitals pink line) and ICU beds occupied by COVID-19 patients (bottom). Data collection for ICU beds occupied by COVID-19 patients started September 17. Hospital occupancy data has minimal reporting lag, and is shown here using data to December 6. The recent plateau in acute care beds occupied in western Washington may be an artifact of reduced health-care seeking behavior over the Thanksgiving period.*

Over the month of November the number of hospital beds occupied by patients with COVID-19 rose sharply in both eastern and western Washington. ICU beds occupied by patients with COVID-19 show a similar trend, with the increase being particularly steep in western Washington. When hospital admissions are rising, hospital bed occupancy will rise faster than admissions as COVID-19 patients generally stay in the hospital longer than one day. The plateau in acute beds occupied in western Washington starting in December may be related to a reduction in healthcare seeking behavior over the Thanksgiving period rather than a result of drops in transmission. Forthcoming data should help clarify the cause of this plateau. A reduction in healthcare seeking would only be temporary and we would expect to see continued increases in the subsequent period if this were the cause.

## *Implications for public health practice*

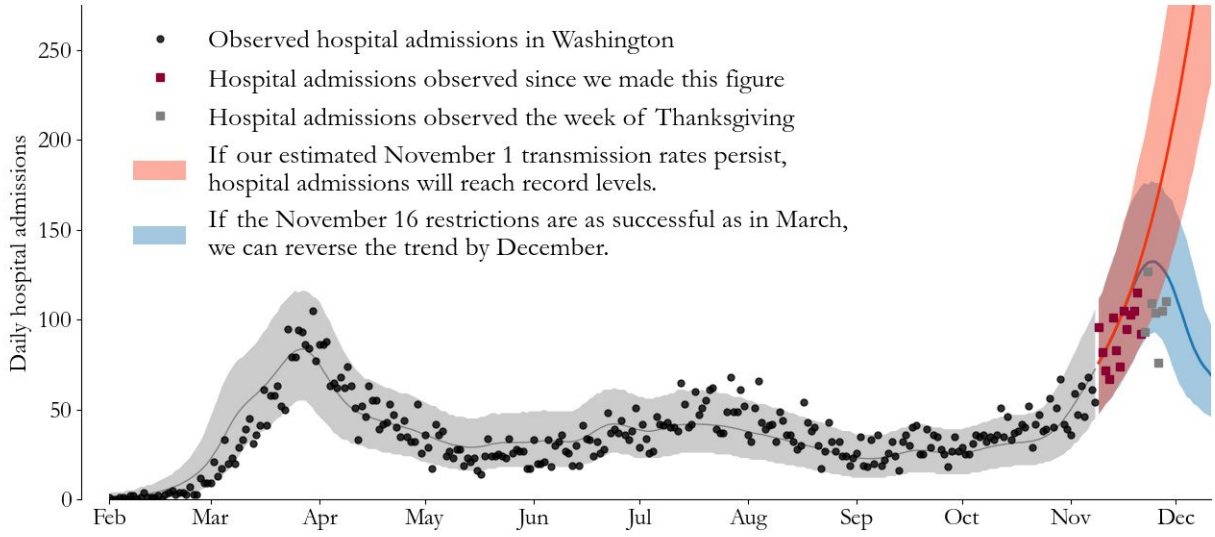


***Figure 7.*** *Revisiting previously projected hospital admissions for Washington state under two scenarios. Black dots show observed hospital admissions used for model fitting and the grey region is the model-based 95% confidence interval. The red line shows projected hospital admissions (shaded area 95% CI) if transmission rates estimated for November 1 persisted through December. The blue line shows hospital admissions (shaded area 95% CI) that were projected to occur if transmission declines after the November 16 restrictions were similar to the declines that occurred after the Stay Home Stay Healthy restrictions on March 23. Observations since these projections were made (squares) are difficult to interpret, especially since data from the week of Thanksgiving (grey) may be suppressed by holiday-related changes in health seeking behavior. Overall, except for the single data point corresponding to Thanksgiving day, hospitalization data to the end of November is generally consistent with both scenarios. (Institute for Disease Modeling estimates, originally published Nov 17)*

We are entering a period of considerable uncertainty in the current situation. Because changes in healthcare-seeking behavior are typical over major holidays, the hospitalization rates for COVID-19 over the Thanksgiving week may not accurately reflect disease transmission that occurred just before. At the same time changes in test-seeking behavior may also impact case counts over that same time period.

Our estimates for $R_e$ for eastern and western Washington show that, as of November 15, cases were growing exponentially. If transmission has not declined subsequent to November 15 then we would expect to see continued exponential growth in cases and hospitalizations (red projection in Figure 7). If changes in behavior subsequent to November 15 result in reductions in transmission as large as those observed in March (blue projection in Figure 7) then we would expect to start to see a leveling off of

admissions towards the end of November. As of November 20, observed hospitalization admissions fit both scenarios equally well. This projection does not take into account the additional potential reductions in hospitalizations due to changes in health care seeking behavior that may occur over the week of Thanksgiving.

Hospital occupancy can be expected to increase at an even faster rate than hospital admissions when hospital admissions are in a period of increasing growth (as more COVID-19 patients would be admitted each day than can be discharged). In this situation we project that the number of beds occupied by COVID-19 patients could double every 2 weeks. Increasing prevalence in the general population is also likely to lead to hospital staff shortages due to infection or the need to quarantine, further reducing hospital capacity. Washington hospitals have already reduced non-urgent procedures to increase capacity, and their ability to further surge capacity is unclear.

## Key inputs, assumptions, and limitations of the IDM modeling approach

We use a COVID-specific transmission model fit to testing and mortality data to estimate the effective reproductive number over time. The key modeling assumption is that individuals can be grouped into one of four disease states: susceptible, exposed (latent) but non-infectious, infectious, and recovered.

- For an in-depth description of our approach to estimating $R_e$ and its assumptions and limitations, see the most recent technical report on the modeling methods. The estimates this week and going forward use the updated method in that report, which results in some statistically-insignificant retrospective changes to $R_e$ relative to our previous report.
- In this situation report, we use data provided by Washington State Department of Health through the Washington Disease Reporting System (WDRS). **We use the WDRS test, hospitalization, and death data compiled on December 6, and to hedge against delays in reporting, we analyze data as recent as November 2л across the state.** This relatively conservative hedge against lags is in response to reports of ~~increasing test delays~~.
- Estimates of $R_e$ describe average transmission rates across large regions, and **our current work does not separate case clusters associated with known super-spreading events from diffuse community transmission.**
- Results in this report come from data on testing, confirmed COVID-19 cases, and deaths (see previous WA State report for more details). Also as described previously, estimates of $R_e$ are based on an adjusted epi curve that accounts for changing test availability, test-positivity rates, and weekend effects, but all biases may not be accounted for.
- This report describes patterns of COVID transmission across Washington state, but it does not examine factors that may cause differences to occur. The relationships between specific causal factors and policies are topics of ongoing research and are not addressed herein.

## Collaboration notes

The Institute for Disease Modeling (IDM), Microsoft AI For Health, the University of Washington, and the Fred Hutchinson Cancer Research Center are working with WA DoH to provide support for regional modeling of case, testing, and mortality data across Washington State to infer effective reproduction numbers, prevalence, and incidence from data in the Washington Disease Reporting System. Modeling and analysis for the report are led by WA DoH and are based on models developed by IDM and advanced by Microsoft to better represent the state. This collaboration has evolved alongside the science, data systems, and analysis behind the models, and it reflects the ongoing commitment of all parties involved to improve our understanding of COVID-19 transmission and to support WA DoH in its

public health mission. This collaboration and its outputs will continue to evolve as scientific frontiers and policy needs change over time.

These reports were previously published on the IDM InfoHub. Going forward, as of December, 9, 2020, new reports will be published on the DOH website. IDM will continue to provide technical assistance for the reports, as part of this collaboration.