Key Outcomes
As of 2/22/2021, the census has declined to 167.

This is the first time the census has decreased to the level of the peak of the summer surge.
Regional Hospital Census

Similar levels of occupancy across the state.

A slight uptick is noticed in region 5.

Source: https://public.tableau.com/profile/oregon.health.authority.covid.19#!/vizhome/OregonCOVID-19HospitalCapacity/BedAvailabilitybyRegion
As of 2/22, of the 501 occupied ICU beds, 47 (9%) are filled with COVID patients.

### Oregon Adult Census
As of: 22-Feb-21

<table>
<thead>
<tr>
<th>Region</th>
<th>ICU</th>
<th>Non-ICU</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>2</td>
<td>15%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>3</td>
<td>11%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>4</td>
<td>16%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>5</td>
<td>0%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>6</td>
<td>5%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>7</td>
<td>7%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Total</td>
<td>9%</td>
<td>3%</td>
<td>4%</td>
</tr>
</tbody>
</table>

### COVID as percent of Occupied ICU

Source: [https://public.tableau.com/profile/oregon.health.authority.covid.19#!/vizhome/OregonCOVID-19HospitalCapacitySummaryTables_15965754787060/HospitalizationbySeveritySummaryTable](https://public.tableau.com/profile/oregon.health.authority.covid.19#!/vizhome/OregonCOVID-19HospitalCapacitySummaryTables_15965754787060/HospitalizationbySeveritySummaryTable)
New Cases per Capita

Case decline has flattened.

Oregon has the 2\textsuperscript{nd} lowest current rate of cases in the US and the 4\textsuperscript{th} lowest cumulative count of cases (behind HI, VT, ME).

Source: http://91-divoc.com/pages/covid-visualization/
New Cases per Capita

The highest level of cases in the country are pretty scattered. South Carolina, New York, and Rhode Island have highest rates in the US.

Source: https://globalepidemics.org/key-metrics-for-covid-suppression/
Test positivity decline has flattened out. The rate is now at 3.4% for week beginning 2/21.

There was an apparent drop in testing during the winter storm.

Hospitalization Rate

The hospitalization rate per case has dropped to 4.3% in the most recent data.

Note: the most recent 8 weeks of data do change as data about cases and hospitalizations are added.

Statewide Forecast
Vaccine Rates by Age

Older age groups are starting to have disproportionately higher vaccination rates.

As of week of 2/16, over 40% of people age 80 and over 20% for people age 70 and over have received a first dose.

Long Term Model-Vaccine Volume

This chart shows the number of first doses by week.

The decrease in actuals is primarily due to a higher proportion of doses for second doses than previous periods but may also reflect supply and scheduling delays during winter storm.

This chart shows the assumption used about how quickly the variant would spread in Oregon.

The B117 variant is assumed to be 32% more transmissible than the main strain. That increases the R from 3.08 to 4.02.

Source: Projections by OHSU
Winter storm is expected to provide a week of decreased transmissions.

The risk levels framework (RLF) is beginning to trigger policy based reductions in effectiveness.

Values needed to prevent spread for fast and slow variant growth are shown.

Note: The effectiveness needed to maintain $R=1$ is not adjusted for vaccine. This will be incorporated next week.
Scenarios:

**Variant**
- a) Fast (ie. UK)
- b) Slow (ie. Germany)

**Fatigue:**
- a) Fatigue w/RLF- Maintain Risk Levels Framework
- b) Fatigue cycle w/o RLF – Allow for relaxation of RLF policies

**Vaccine:**
- a) Fast (136k per week by June 1)
- b) Slow (94k per week by June 1)
Long Term Model-Census Forecast

This scenario reflects:

- Fast variant
- Fatigue cycle (w/RLF)
- Fast vaccine

Model: The OHSU state hospital census forecast is an SIR model that includes traditional assumptions about first transmission (2/1/2020), doubling rate (5 days), days from exposure to admissions (12 days), length of stay (8 days, 13 days for ICU), and recovery period (14 days). It has an innovative feature which is that it includes a factor that moderates transmission rates which is called policy effectiveness. The factor

Source: OHSU COVID Forecast Model
Long Term Model-Herd Chart

This chart shows the number of people in each of four categories:

- Susceptible
- Infected
- Vaccinated
- Both (infected then vaccinated)

Labeled data points are the percent not susceptible on the 1st day of each month.

Source: OHSU COVID Forecast Model
Review of Leading Indicators
Survey of Behaviors in Oregon

Several metrics show signs of decreased prevention:
- Visiting shops is up
- Time w/Other outside HH is up
- Leaving house for work/school is up
- Restaurant/Bar is up
- Mask use is down

Large events remains low.

Source: https://delphi.cmu.edu/covidcast/export/?signalType=value
Leading Indicators Comparison

Metrics have bounced back from winter storm reductions but still remain below pre-Freeze levels.

Note: the list of indicators in this chart has changed from previous weeks to focus on higher performing indicators.

Source: MEI from https://www.dallasfed.org/research/mei.aspx, DEX from https://github.com/COVIDExposureIndices/, SDI from https://data.covid.umd.edu/ (Details in slide notes)
COVID Symptoms

Symptoms continue to decline.

Other western states showing similar decreases.

Source: https://covidcast.cmu.edu/
Hotline calls are low but there is a slight uptick in the last week.

Source: OHSU COVID Connected Care Center Data, Screening calls make up ~50% of total calls at the center.
Policy Issues
Oregon is in the >=90% category. Most states are now in this category and suggests most administration issues have been resolved.

Oregon has vaccinated 13.4% of population as of 2/22. Oregon ranks 30th in the US.

Source: https://covid.cdc.gov/covid-data-tracker/#vaccinations
Oregon Risk Levels

No changes in map since last week.

Clackamas and Washington reported to move to “Moderate”

Oregon Risk Levels are applied at the county level. To create a statewide “average” risk level, a risk level score is calculated as the population weighted average of the counties (Extreme=3.5, High=2.5, Moderate=1.5, Lower=0.5)

By this aggregated measure, the state has moved into “High” and is close to crossing into “Moderate”

B117 in US

The B.1.1.7 strain is increasing quickly across the US. It now represents 15 percent of tested samples.

That is the second 5 point increase in one week.

No update for the variant in OR this week as sequenced samples have not been incorporated into analysis datasets yet.

Appendix
Risk Level “High” New Activities

Eating and Drinking Establishments: Indoor dining allowed. Takeout highly recommended. Indoor capacity: not to exceed 25% maximum occupancy or 50 people, whichever is smaller. Outdoor dining allowed. Outdoor capacity: 75 people (from 50) maximum. Indoor and outdoor seating: 6 people per party and per table maximum, limit 2 households. 11:00 p.m. closing time

Faith Institutions, Funeral Homes, Mortuaries, Cemeteries: Indoor Capacity: Maximum 25% occupancy or 150 (from 100) people total, whichever is smaller. Outdoor Capacity: 200 (from 150) people maximum

Indoor Entertainment Establishments (includes aquariums, indoor theaters/arenas/concert halls, indoor gardens, indoor museums, indoor entertainment activities of any kind): Capacity: Maximum 25% occupancy or 50 people total, (from 6) whichever is smaller. 11:00 p.m. closing time.

Indoors Recreation & Fitness (includes gyms, indoor K-12 Sports, indoor collegiate sports, fitness organizations, indoor recreational sports, indoor pools): Capacity: Maximum 25% occupancy or 50 people total whichever is smaller (from 6)

Long-Term Care: Inside and outside visitation allowed (from outside only)

Offices: Recommend remote work if able (from required)

Outdoor Entertainment Establishments (includes zoos, outdoor gardens, outdoor aquariums, outdoor theaters/stadiums): Max 75 people (from 50)

Outdoor Recreation & Fitness (includes outdoor gyms, outdoor fitness organizations, outdoor K-12 Sports, outdoor collegiate sports, outdoor recreational sports, outdoor pools, outdoor parks and hiking trails, outdoor campgrounds): Maximum 75 people (from 50)

Social and At-Home Gathering Size (Outdoor): Maximum 8 people (from 6)

Source: https://coronavirus.oregon.gov/Pages/guidance.aspx
Risk Level “Moderate” New Activities

**Eating and Drinking Establishments:** Indoor dining allowed. (No takeout highly recommended). Indoor capacity: not to exceed 50% (from 25%) maximum occupancy or 50 people, whichever is smaller. Outdoor dining allowed. Outdoor capacity: 300 people (from 75) maximum. Indoor and outdoor seating: 8 people (from 6) per party and per table maximum, no household limit (from 2). 11:00 p.m. closing time

**Faith Institutions, Funeral Homes, Mortuaries, Cemeteries:** Indoor Capacity: Maximum 50% (from 25%) occupancy or 150 (from 100) people total, whichever is smaller. Outdoor Capacity: 250 (from 200) people maximum

**Indoor Entertainment Establishments** (includes aquariums, indoor theaters/arenas/concert halls, indoor gardens, indoor museums, indoor entertainment activities of any kind): Capacity: Maximum 50% occupancy (from 25%) or 100 people total, (from 50) whichever is smaller. 11:00 p.m. closing time.

**Indoors Recreation & Fitness** (includes gyms, indoor K-12 Sports, indoor collegiate sports, fitness organizations, indoor recreational sports, indoor pools): Capacity: Maximum 50% occupancy (from 25%) or 100 people total, (from 50) total whichever is smaller.

**Outdoor Entertainment Establishments** (includes zoos, outdoor gardens, outdoor aquariums, outdoor theaters/stadiums): Max 150 people (from 75)

**Outdoor Recreation & Fitness** Outdoor full-contact sports allowed (from limited to for adult/club/youth sports with guidance requirements. Outdoor full-contact sports allowed for K-12 with submitted plan.) Maximum 150 people (from 75)

**Indoor shopping / Retail:** 75% max capacity (from 50%), Curbside pick-up encouraged.

**Social and At-Home Gathering Size (Indoor):** Maximum 8 people (from 6).

**Social and At-Home Gathering Size (Outdoor):** Maximum 10 people (from 8).

Source: https://coronavirus.oregon.gov/Pages/guidance.aspx
The model has changed to include fatigue with the Risk Levels Framework as a policy to limit growth.

Source: OHSU COVID Forecast Model
Long Term Model: Population w/First Dose

This is the schedule used by the model for the percent of population w/first dose by week and age group.

Source: OHSU COVID Forecast Model
Long Term Model-Specs

Key Assumptions

1) Vaccine schedule follow “slow” schedule with prioritized age groups
2) Vaccine acceptance rate (75%)
3) Lagged affect on protection (2 weeks until vaccinated have protection)
4) Efficacy of vaccine (54% at first dose, 95% after second dose at 24 days)
5) Fear and Fatigue cycle of intervention effectiveness estimated with sinusoidal function (approx. 12 weeks due to severity of fall surge)
6) Ascertainment rate- True infected are estimated to be 3.5 times larger than cases.
7) Variant is 32% more transmissible and follows “fast” virus share schedule

Source: OHSU COVID Forecast Model
OHSU Model-Methodology

OHSU COVID Forecast Model

The OHSU model is built on a standard SIR framework by which individuals move between Susceptible, Infected, and Recovered compartments. The model is calibrated using statewide hospital census levels reported by state sources. Hospital census is used opposed to case counts, because they avoid inconsistencies in testing from affecting infection estimates.

To convert the hospital census into the number infected, the model uses empirically estimated (and literature reviewed) assumptions about various parameters of hospitalization for COVID. In particular it uses an assumption for the percent of cases needing hospitalization, time to hospitalization (from infection), percent of cases using the intensive care unit (ICU), and the length of stay for ICU and non-ICU admissions. The underlying speed of the virus spread is based on assumptions about parameters of the virus absent interventions to prevent spread. Based on literature reviewed estimates, the model uses a 5 day doubling period which combined with a 14 day recovery period equates to an R-nought of 3.08. The hospitalization rate parameter is based on hospitalized individuals per case. In order to convert cases to infections, the ascertainment rate, based on CDC surveillance studies of 3.5 is applied. The model uses assumptions about the date of first case in Oregon to start the virus spread process.

The model produces an intervention effect which represents how much slower than expected the virus is growing. This approach is described in a paper which describes how to implement optimal control theory to epidemiologic problems (Lawley, 2010). The approach introduces a parameter that reflects that effectiveness of policy (or spread prevention behaviors in general) and shows that it can be estimated through maximum likelihood. The intervention effectiveness parameter also provides a mechanism for projected future policy changes. The intervention effect is estimated on a weekly level and thus uses 7 days of worth of census levels for each data point. Due to the complexity of the model, a closed form measure of uncertainty is not available and unfortunately, simulation based measures have not yet been developed.

The model incorporates vaccination rates by removing people from the susceptible compartment and adding them to the recovered compartment. This is done by using state reports of the number of people receiving a first dose on certain dates and then using assumptions about the efficacy (measured as a percent) and the number of day until it is reached. Previously infected individuals are assumed to be vaccinated in proportion to their relative share of the population. The model also uses assumptions about the length of time to second dose (based on current vaccines in use) and the percent of individuals who may decline second doses. For future projections, the model uses as expected vaccine volumes, from various sources, age priority assumptions stated in official documents, and an estimate for the percent of people who ultimately accept vaccination.

The model adjusts the hospitalization rate (per case) assumption to reflect the population that has been vaccinated. The adjustment does not account for the age profile of previously infected individuals. It also does not account for the specific conditions of the individuals vaccinated. If higher risk people are more likely to be vaccinated in each age group, it may tend to underestimate the reduction in the hospitalization rate that results.

The model incorporates virus variants by adjusting the underlying transmission rate of the virus in circulation. As stated above, the model starts with an R-nought of 3.08 and uses estimates from genetic sequencing to determine the share of virus of variant with different transmission rates. It then uses a weighted average as the current R-nought of the virus. The model uses projections about the share of the virus, and the transmission rate of variants, to project future transmission rates.

References: