COVID-19 Modeling
November 24, 2020

Presentation available at: dfr.vermont.gov
12 Million+ U.S. Cases

November 24, 2020

1 Million Cases  99 Days  7 Million Cases  27 Days
2 Million Cases  43 Days  8 Million Cases  20 Days
3 Million Cases  28 Days  9 Million Cases  13 Days
4 Million Cases  15 Days 10 Million Cases  10 Days
5 Million Cases  17 Days 11 Million Cases  6 Days
6 Million Cases  23 Days 12 Million Cases  6 Days

Source: Johns Hopkins University, November 24, 2020
Over 26% of all US Covid-19 Cases Have Been Reported in November

Source: Johns Hopkins University, November 23, 2020
Forecasted 50% increase in new cases over the next four weeks

Estimated 254,000 Cases (7-Day Avg.)

Source: Johns Hopkins University Data & Oliver Wyman Forecast Model - November 24, 2020
COVID-19 & Holidays

Memorial Day
Fourth of July
Labor Day
Halloween
Thanksgiving
Out-of-State Visitors to Vermont 2019 vs 2020

Estimate of visitors uses 7-day average # mobile devices from out of state.

College Graduations
Memorial Day
Fourth of July
Labor Day
Indigenous Peoples Day
Thanksgiving

11/23/2020
Chart: State of Vermont • Source: Safegraph • Created with Datawrapper
Thanksgiving Weekend 2019
Travel to/from Vermont

Source: SafeGraph (Travel measured from Wednesday, November 27, 2019 to Sunday December 1, 2019)
Thanksgiving 2020

Three Key Assumptions

How many people are coming to Thanksgiving infected with COVID-19?
- Level of active cases in the community
- Level of active cases where guests are visiting
- Number of guests at Thanksgiving

How many additional people will be infected during Thanksgiving?
- Length of time guests will visit unmasked
- Amount of space in home and dining area
- Average ventilation in personal residence

Number and size of Thanksgiving dinners in Vermont?
- Census data on number of Vermont households
- Research on the average Thanksgiving dinner size
- Surveys on 2020 Thanksgiving plans
Thanksgiving 2020

If Vermonters travel and gather for Thanksgiving consistent with the Ohio State University Medical Center national survey, then

In the days following Thanksgiving we could see an additional:

- ~3,200 to ~3,800 new infections (detected and undetected)
- ~40 to ~50 resulting new hospitalizations

These estimates are accounting solely for the Thanksgiving holiday and are in addition to the cases that will occur otherwise during this time.

Source: Department of Financial Regulation Thanksgiving Analysis (Oliver Wyman collaborated)
Vermont Thanksgiving Possible Amplification

- New Detected Cases
- OW Projected New Cases w/o Holiday
- Projected Thanksgiving Cases (38% Scenario)

Thanksgiving
U.S. Hospitalization Growth

Individuals Hospitalized with Covid-19 in US

- 60,000 Hospitalized
- 84,000 Hospitalized

Source: Raw data from COVID Tracking Project—November 23, 2020
U.S. Covid-19 Deaths

Individuals Hospitalized with Covid-19 in US

Source: Raw data from COVID Tracking Project - November 23, 2020
Regional Case Growth

12.68% Increase in New Confirmed Cases

Positive Cases Nov. 10th to Nov. 16th

Positive Cases Nov. 17th to Nov. 23rd

Sources: State Health Departments & CTV National News (Quebec)
Northeast Case Growth By Week Since March 16, 2020

Sources: State Health Departments & CTV National News (Quebec)
Northeast Case Growth By Week Since October 12, 2020

Sources: State Health Departments & CTV National News (Quebec)
Forecasted 42% increase in new cases over the next four weeks

Source: Johns Hopkins University Data & Oliver Wyman Forecast Model - November 23, 2020 (New England & New York)
Regional Map as of November 23

New York & New England Ranking by Active Case Per Million

1) Allegany (NY): 12,280
2) Providence (RI): 12,004
3) Bristol (MA): 9,678
4) Chemung (NY): 9,632
5) Essex (MA): 9,580
6) Kent (RI): 9,557
7) Erie (NY): 9,238
8) Bristol (RI): 8,850
9) Dukes (MA): 8,833
10) Washington (VT): 8,777
Sustained week-over-week viral growth in Washington & Orange Counties
Vermonters With Confirmed Cases by Week

Week (Tuesday to Monday)

Number of Confirmed Cases

Sources: Vermont Department of Health (week calculated as Tuesday to Monday)
Age of VT COVID Cases

Calculated as the 14-day rolling median of the age of confirmed positives.
Forecasted 41% increase in new cases over the next four weeks
Vermont Hospital & ICU Forecast

Forecasts Assume 3% Hospitalization & ICU Rate

Source: Oliver Wyman Forecast Model - November 23, 2020
Vermont Hospital Capacity Forecast

Forecasts Assume 3% Hospitalization

- Hospitalizations (7-day Avg)
- Projected Hospitalizations (7-day Avg)
- In-Hospital Medical/Surgical Bed Capacity (7-day Avg)
- Anticipated Medical/Surgical Capacity

Source: Oliver Wyman Forecast Model - November 23, 2020
RESTART VERMONT

Reopening Metrics

1. Syndromic Surveillance
2. Viral Growth & Reproductive Rates
3. Percentage of New Positive Tests
4. Hospital & Critical Care Bed Capacity
Data Point 1: Syndromic Surveillance

- **Summary:** Percentage of visits with COVID-19 like illness and Influenza diagnosis
- **Warning Flag:** Percentage of visits exceeding 4% for multiple consecutive days

Source: Vermont Department of Health—November 24, 2020

*Data from UVMHN may be incomplete or delayed*
Data Point 2: Viral Growth and Reproductive Rates

- **Summary**: Case growth measured by daily, 3-day, 7-day, and effective reproductive rate ($R_t$)
- **Warning Flags**: Sustained viral growth that would lead to <30% open ICU beds

Source: Vermont Department of Health—November 24, 2020
Data Point 3: Percentage of New Positive Tests

- **Summary:** Percent of tests resulting in a new positive case
- **Warning Flags:** New positives represent >5% of daily results

Source: Vermont Department of Health—November 24, 2020
Data Point 4: Hospital & Critical Care Beds

- **Summary:** Number of occupied and unoccupied medical surgical and ICU beds
- **Warning Flags:** Reduction in ICU open beds to less than 30%

Source: Vermont Department of Health—November 24, 2020
Vermont Testing

Source: Vermont Dept. of Health—November 24, 2020; results reported to VDH daily

*Data from UVMHN may be incomplete or delayed
Vermont Flu Vaccine Data
Note: Due to delays in data reporting flu vaccination data is underreported*

*Data from UVMHN incomplete or delayed; underreported by 25-33%

Source: Vermont Department of Health & ADS; Immunization Registry; Measured from July 1 to November 15, 2019 & 2020
K-12 & Higher Education Update
Covid-19 Cases in K-12 Public Schools Across Northern New England

Vermont
110 Cases (+36)
74 Schools (+22)

New Hampshire
574 Cases (+71)
248 Schools (+34)

Maine
313 Cases (+20)
126 Schools (+8)

Source: VT and NH K-12 Dashboards; ME public reporting
Vermont Higher Education Restart
Weekly Covid-19 Testing Among Students

212,703 Total Tests

Source: Vermont Colleges and Universities (presentation switched to Tuesday on September 22, 2020)
Vermont Higher Education Restart
Weekly Covid-19 Positives Among Students

228 Total Cases

Source: Vermont Colleges and Universities (presentation switched to Tuesday on September 22, 2020)
# Northern New England Higher Education Update

<table>
<thead>
<tr>
<th>State</th>
<th>Total Tests</th>
<th>Positives</th>
<th>Positivity Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Hampshire*</td>
<td>421,355</td>
<td>706</td>
<td>0.14%</td>
</tr>
<tr>
<td></td>
<td>+16,469</td>
<td>+122</td>
<td></td>
</tr>
<tr>
<td>Maine*</td>
<td>144,513</td>
<td>218</td>
<td>0.12%</td>
</tr>
<tr>
<td></td>
<td>+11,789</td>
<td>+60</td>
<td></td>
</tr>
<tr>
<td>Vermont</td>
<td>212,703</td>
<td>228</td>
<td>0.11%</td>
</tr>
<tr>
<td></td>
<td>+17,013</td>
<td>+54</td>
<td></td>
</tr>
</tbody>
</table>

* Includes NH & ME colleges & universities that publicly provide COVID-19 testing data.
Vermont Higher Education Restart
Institution Data as of November 24, 2020

<table>
<thead>
<tr>
<th>College / University</th>
<th>Total Tests</th>
<th>Student Positives</th>
<th>Employee Positives</th>
<th>Dashboard / Public Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middlebury College</td>
<td>13,580</td>
<td>5</td>
<td>2</td>
<td><a href="https://www.middlebury.edu/office/midd2021/covid-reporting-dashboard">https://www.middlebury.edu/office/midd2021/covid-reporting-dashboard</a></td>
</tr>
<tr>
<td>University of Vermont</td>
<td>138,024</td>
<td>92</td>
<td>14</td>
<td><a href="https://www.uvm.edu/returntocampus/uvm-weekly-testing-report">https://www.uvm.edu/returntocampus/uvm-weekly-testing-report</a></td>
</tr>
<tr>
<td>Norwich University</td>
<td>16,470</td>
<td>15</td>
<td>1</td>
<td><a href="https://www.norwich.edu/news/psa">https://www.norwich.edu/news/psa</a></td>
</tr>
<tr>
<td>Northern Vermont University</td>
<td>5,331</td>
<td>10</td>
<td>1</td>
<td><a href="https://www.northernvermont.edu/nvu-during-covid-19">https://www.northernvermont.edu/nvu-during-covid-19</a></td>
</tr>
<tr>
<td>Castleton University</td>
<td>1,403</td>
<td>3</td>
<td>0</td>
<td><a href="https://www.castleton.edu/covid-19-coronavirus-updates/covid-19-test-results/">https://www.castleton.edu/covid-19-coronavirus-updates/covid-19-test-results/</a></td>
</tr>
<tr>
<td>Saint Michael's College</td>
<td>9,489</td>
<td>79</td>
<td>0</td>
<td><a href="https://www.smuvt.edu/return-to-campus/">https://www.smuvt.edu/return-to-campus/</a></td>
</tr>
<tr>
<td>Sterling College</td>
<td>212</td>
<td>0</td>
<td>0</td>
<td><a href="https://sterlingcollege.edu/coronavirus-2019/">https://sterlingcollege.edu/coronavirus-2019/</a></td>
</tr>
<tr>
<td>Champlain College</td>
<td>17,959</td>
<td>11</td>
<td>0</td>
<td><a href="https://view.champlain.edu/champlain-college-covid-19-testing-dashboard">https://view.champlain.edu/champlain-college-covid-19-testing-dashboard</a></td>
</tr>
<tr>
<td>Bennington College</td>
<td>6,962</td>
<td>3</td>
<td>0</td>
<td><a href="https://www.bennington.edu/covid-19-updates-and-information">https://www.bennington.edu/covid-19-updates-and-information</a></td>
</tr>
<tr>
<td>Vermont College of Fine Arts</td>
<td>165</td>
<td>0</td>
<td>0</td>
<td>Does not have a public dashboard at this time</td>
</tr>
<tr>
<td>Vermont Law School</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>Remote learning for Fall 2020 - Some students using campus facilities</td>
</tr>
<tr>
<td>Landmark College</td>
<td>2,390</td>
<td>3</td>
<td>2</td>
<td><a href="https://www.landmark.edu/student-life/health-counseling-wellness/covid-19/covid-19-dashboard">https://www.landmark.edu/student-life/health-counseling-wellness/covid-19/covid-19-dashboard</a></td>
</tr>
<tr>
<td>Albany College of Pharmacy</td>
<td>150</td>
<td>1</td>
<td>0</td>
<td><a href="https://www.acphs.edu/health-safety">https://www.acphs.edu/health-safety</a></td>
</tr>
<tr>
<td>Totals</td>
<td>212,703</td>
<td>228</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

Note: Goddard College & Community College of Vermont are remote for Fall 2020
## Active Outbreaks in Long Term Care Facilities

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>COVID-19 Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rutland Health &amp; Rehab</td>
<td>41</td>
</tr>
<tr>
<td>Rutland</td>
<td></td>
</tr>
<tr>
<td>Four Seasons Care Home</td>
<td>38</td>
</tr>
<tr>
<td>Northfield</td>
<td></td>
</tr>
<tr>
<td>Berlin Health &amp; Rehab</td>
<td>7</td>
</tr>
<tr>
<td>Berlin</td>
<td></td>
</tr>
<tr>
<td>Valley Vista</td>
<td>7</td>
</tr>
<tr>
<td>Bradford</td>
<td></td>
</tr>
<tr>
<td>Averill Place</td>
<td>4</td>
</tr>
<tr>
<td>Barre</td>
<td></td>
</tr>
<tr>
<td>Residence at Quarry Hill</td>
<td>3</td>
</tr>
<tr>
<td>South Burlington</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Vermont Department of Health - November 23, 2020 (reporting Monday through previous Sunday); ‘Active’ defined as less than 28 days since most recent case’s specimen collection date or illness start date (whichever is later)