COVID-19 Modeling
May 22, 2020
Goal: Develop multiple forecasting perspectives
- Oliver Wyman – Helen Leis and Bruce Hamory
- Columbia University – Professor Jeffrey Shaman, Ph.D.
- Northeastern University – Professor Alessandro Vespignani, Ph.D.
- University of Washington – Institute for Health Metrics and Evaluation (IHME)
- UVM – Larner College of Medicine – Department of Microbiology & Molecular Genetics – Translational Global Infectious Disease Research (TGIR) Group – John Hanley, PhD

Forecasting is imprecise:
- Focus on the near term: Forecasting is much less predictable the further out you model
- Focus on ranges rather than specifics: Forecasts are represented as a range of possible outcomes (i.e., likely, best & worst)
- Consistent refinement: Continually updating with new data and new assumptions
- Appropriate Perspective: Ultimately forecasts are developed for planning purposes and are not representative of definitive outcomes

Ultimate Purpose of Forecasting:
- Phase 1: Medical Surge Planning
- Phase 2: Support Restart Vermont and Monitor Key Trends
- Phase 3: Regional Modeling to Support Restart Vermont and Continue Monitoring Key Trends
Positive Trend: Actual Results Are Better Than Forecasts

Confirmed Cases vs. Projections

Sources: Oliver Wyman (OW) May 13, 2020 Model & Vermont Department of Health
Time Until Confirmed Cases Double

Source: Vermont Department of Health and Department of Financial Regulation Forecast
Vermont’s Doubling Rate: 46 Weeks

Source: Johns Hopkins University
Mobility Data:

- Continued adherence to social distancing
- Increase in mobility with warming weather

Source: Descartes Labs – May 18 2020
RESTART VERMONT

Metrics to Monitor

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

**Percent of Emergent Care Visits for COVID-19 like illness and Influenza Diagnosis**

Syndromic Surveillance from 13 of 14 Vermont Hospitals and 2 Urgent Care Centers

Source: Vermont Department of Health
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% of open ICU beds

Source: Vermont Department of Health
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

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Source: Vermont Department of Health
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
Restart Vermont: First Four Turns of the Spigot

Source: Vermont Department of Health
Regional Monitoring: Previous 7-Day Experience

Positive Cases Prior 7-Days (May 13-20)

Deaths Prior 7-Days (May 13-20)

Source: Johns Hopkins University & USA FACTS
Regional Monitoring: Drive Time from the State House

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<th>Drive from State House</th>
<th>~Total Cases</th>
<th>~Active Cases</th>
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<td>80,000</td>
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</tbody>
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Source: Johns Hopkins University and ESRI Services
Regional Monitoring: New COVID-19 Cases (May 13 - 20)

Source: Johns Hopkins University GitHub Repository