COVID-19 MODELING
May 8, 2020
Overview
Presentation Updated Through May 8, 2020

• **Goal**: Develop multiple forecasting perspectives
  - Oliver Wyman – Helen Leis
  - 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
Positive Trend: Actual Results Are Better Than Forecasts

Confirmed Cases vs. Projections

Sources: Oliver Wyman (OW) April 24, 2020 Model & Vermont Department of Health
Mobility Data Indicates Strong Social Distancing Adherence

Vermont

Northern New England

Source: Descartes Labs – May 4, 2020
Vermont: Time Until Confirmed Cases Double

Source: Vermont Department of Health and Department of Financial Regulation Forecast
United States: Weeks Until Confirmed Cases Double

Vermont doubling at 12-week rate
3rd slowest rate in the country
Northeast: Weeks Until Confirmed Cases Double

Source: Johns Hopkins University
Restart Vermont Modeling

**Scenario One (orange line):** Back to normal except school closure.

**Scenario Two (pink line):** Resume non-essential work for about 50% of the workforce.

**Scenario Three (green line):** Resume non-essential work for about 50% of the workforce & additional transmissibility reduction (masks, behavioral changes, contact tracing & testing).

**Scenario Four (blue line):** “stay at home” continued.

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Source: Dr. Alessandro Vespignani – Laboratory for the Modeling of Biological & Socio-technical Systems
**Metrics to Monitor**

**Data Point 1: Syndromic Surveillance**
- % of emergency visits with either COVID-19 like illness or flu diagnosis
- Important for tracking possible outbreaks and/or significant rise in case growth in near real time

Warning Flag:
- Sustained trend up over several days and/or percentage of visits exceeding 4% for multiple consecutive days

**Data Point 2: Viral Growth & Reproductive Rates**
- Case growth measured by daily, 3-day, 7-day, and effective reproductive rate ($R_t$)
- Indicates whether virus is growing or declining

Warning Flags:
- $R_t$ of >1.1
- Sustained growth rate indicating $V_t$ to exceed 70% of ICU beds over 14-days
Metrics to Monitor

Data Point 3: Percentage of New Positive Tests
• % of tests resulting in a new positive case
• Gives context that Vt. is testing a wide sample of individuals

Warning Flags:
• Percent positives tests in excess of 8%

Data Point 4: Hospital & Critical Care Beds
• Number of occupied and unoccupied medical surgical and ICU beds
• Indicates hospital resource capacity for critically ill COVID patients

Warning Flags:
• Exceeding 70% of hospital capacity