MASSACHUSETTS
HIGH TECHNOLOGY COUNCIL
Dedicated to Growth... Committed to Action

The War on COVID-19: Testing Update

The War on COVID-19 Roadmap

Hospital Balance & Safe Return to Economic Activity
- Need to keep hospital demand in balance with supply of beds & workers
- Need to bring economy back to normal
- Need to maximize safety
- Need to avoid a second lockdown

Segmentation
Implement segmentation model, sequencing segments returning to work

Treatment
Identify and rapidly deploy effective therapeutic treatments and longer-term a vaccine

Reduce R_T
Implement policies & procedures to reduce the rate of spread

Co-living
Develop guidelines for high risk segments living with segments returning to work

Enablers
Develop guidelines for back-to-school (including childcare) and transportation

Therapeutics
While waiting for vaccine, implement effective treatments to curb hosp. rate

Vaccine
Accelerate vaccine development & prepare for deployment at-scale

Workplace Norms
Develop workplace norms to minimize reoccurrence

Testing & Tracing
Develop massive testing & tracing plan to be used to identify & contain virus spread
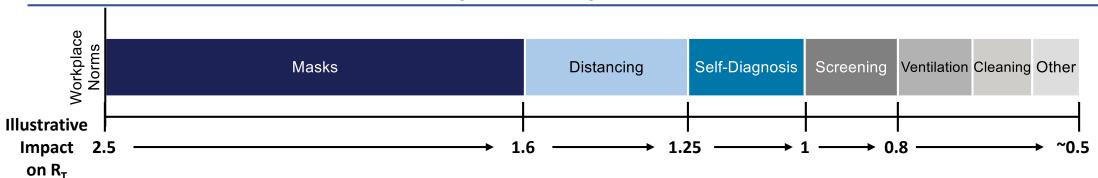
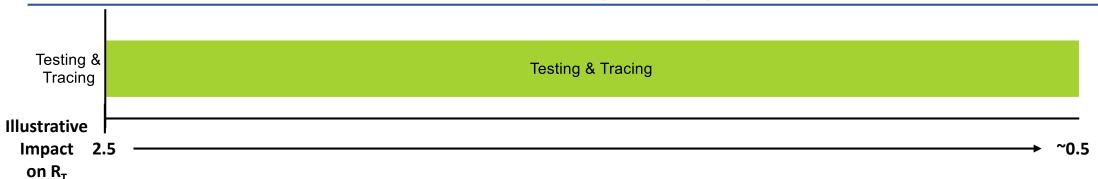**Focus of follow up on Reducing Rt through (i) workplace norms and (ii) testing & tracing**

Source: Bain Capital Partners analysis

2

Reducing R_T Summary Thought Model

RECALL - May   **CONCEPTUAL**

Impact of Workplace Norms

Workplace Norms

| Masks | Distancing | Self-Diagnosis | Screening | Ventilation | Cleaning | Other |

Illustrative Impact on R_T

2.5 → 1.6 → 1.25 → 1 → 0.8 → ~0.5

Impact of Testing & Tracing

Testing & Tracing

Testing & Tracing

Illustrative Impact on R_T

2.5 → ~0.5

Workplace norms and a robust testing & tracing strategy can each independently significantly reduce R_T

Source: Bain Capital Partners analysis

3

Testing: Timeline of Solutions

RECALL - May

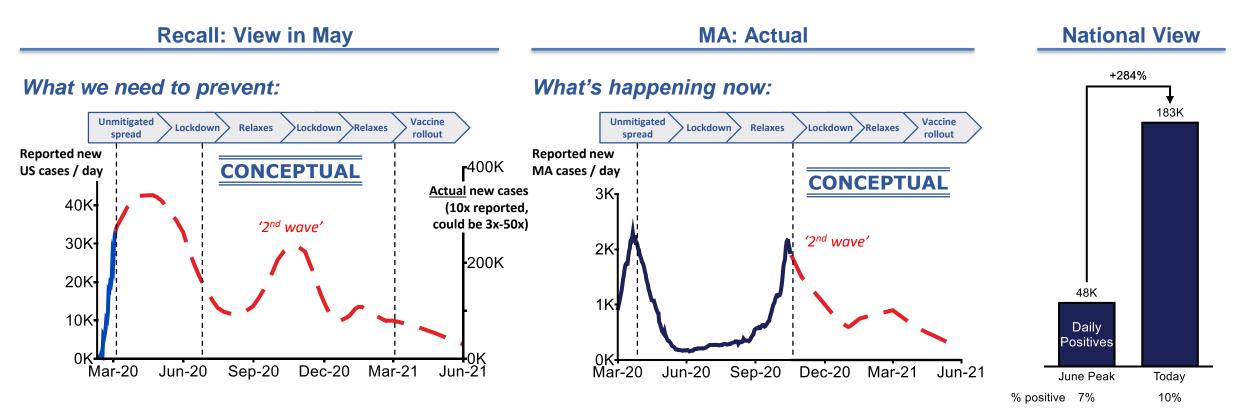More expensive & difficult →→→ Less expensive & easy

Short-Term

• Centralized testing through a handful of large diagnostic companies

• 6-10 centralized testing centers

• Existing HC infrastructure used whenever possible

• Production ramped to ~100K/day

Medium-Term

• Frequent saliva-based testing administered once a week

• 10 centralized testing centers continue to process tests, each able to process ~100K/day

• Production ramped to ~1M tests/day

Long-Term

• Universal at-home testing kits

• Saliva-based

• Cheap & easy to administer

Should work towards a more universal at-home testing program (infeasible today given technology and capacity constraints)
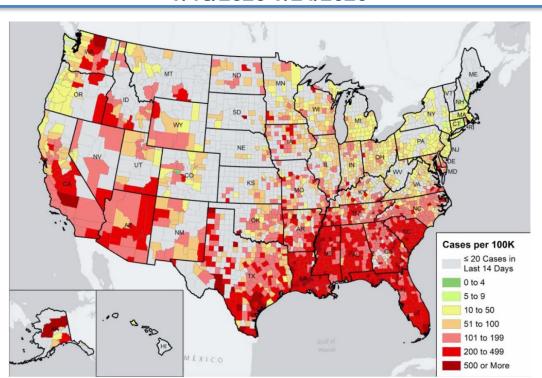
Reminder: Critical to "Avoid the W"

Recall: View in May

What we need to prevent:

| Unmitigated spread | Lockdown | Relaxes | Lockdown | Relaxes | Vaccine rollout |

Reported new US cases / day

CONCEPTUAL

Actual new cases (10x reported, could be 3x-50x)

'2nd wave'

MA: Actual

What's happening now:

| Unmitigated spread | Lockdown | Relaxes | Lockdown | Relaxes | Vaccine rollout |

Reported new MA cases / day

CONCEPTUAL

'2nd wave'

National View

+284%

183K

48K

Daily Positives

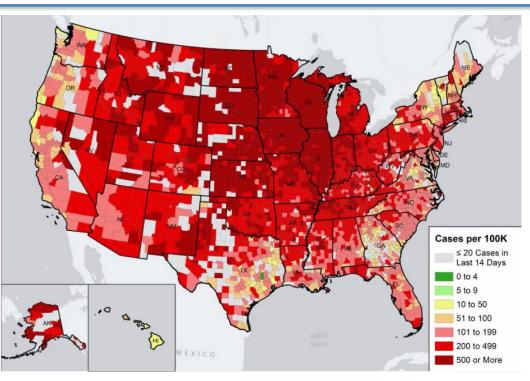| June Peak | Today |

% positive   7%   10%

Sub-optimal public health approach can create wider, deeper "U" or "W" that only ends with vaccine; United States and MA currently seeing fall wave with higher reported cases than previous peak

Current Surge
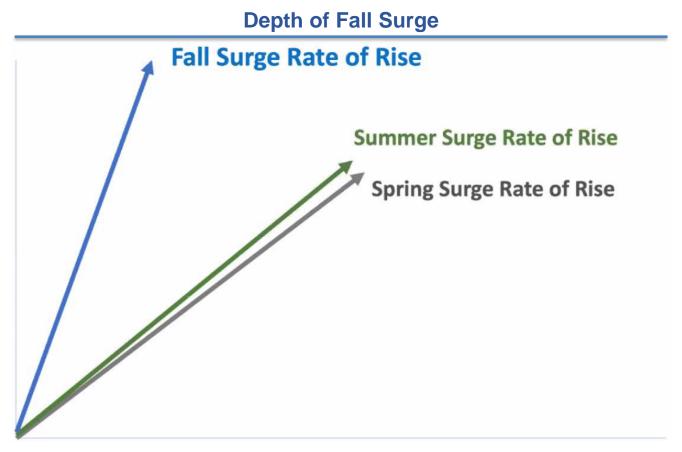
New Cases per 100K
7/18/2020-7/24/2020

New Cases per 100K
11/07/2020-11/13/2020

Cases well above July highs across almost every region in the United States including Massachusetts

Current Surge

Depth of Fall Surge

Fall Surge Rate of Rise

Summer Surge Rate of Rise

Spring Surge Rate of Rise

Superimposing rate of case rise showing significant difference between the prior surges and the Fall

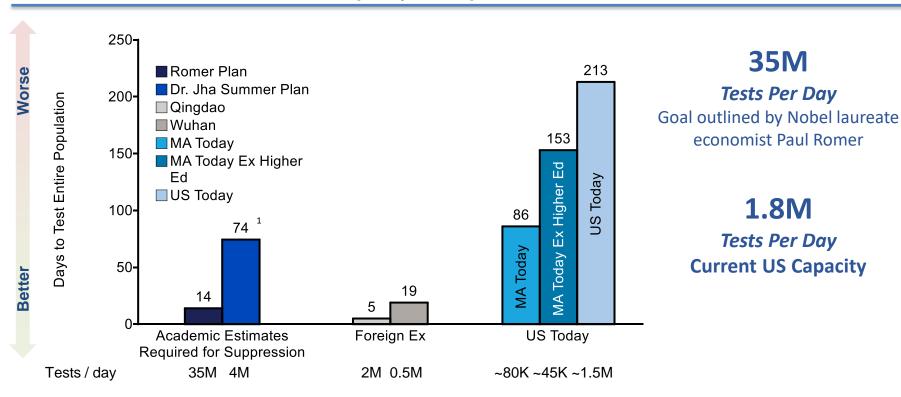# Thoughts from Dr. Deborah Birx, November 20th, 2020

This Fall surge is different from the Spring or Summer Surge

- This Surge is **deeper** and rising more rapidly than seen previously

- This Surge is **broader** involving more counties simultaneously

- This Surge is **longer** in duration – nearly twice as long so far from initiation of rapid spread to plateau

- The pattern of rapid increasing cases, to hospitalizations to fatalities is being replicated across the USA beginning with the Northern Plains

- Key to stopping and preventing future surges is proactive testing – finding the asymptomatic silent spread before the vulnerable become infected

- Colleges that proactively tested – a minimum of weekly and isolated the asymptomatic cases infected less than 1% of the student body and those that are testing as the USA symptomatic focus and contact tracing infected 10% of the student body

- Testing needs to be increased 10X to be able to both test for asymptomatic and symptomatic infections

Testing Capacity Targets in Context

Current Capacity vs. Expert Recommendation

35M
Tests Per Day
Goal outlined by Nobel laureate economist Paul Romer

1.8M
Tests Per Day
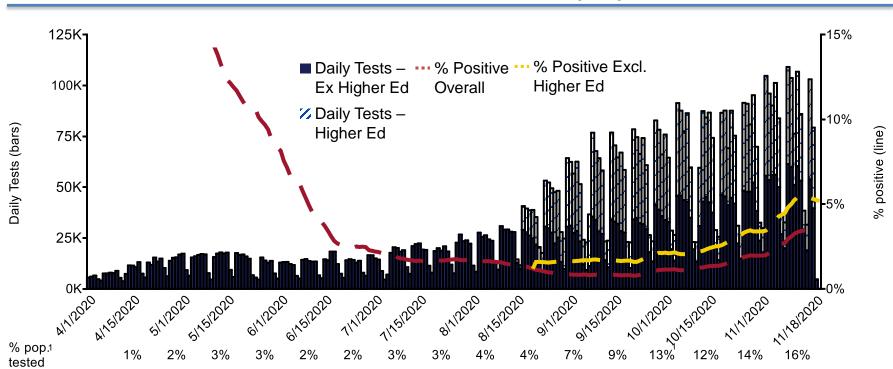**Current US Capacity**

Massachusetts COVID-19 Testing Capacity

Massachusetts Tests Performed By Day

34,664
estimated active cases

917
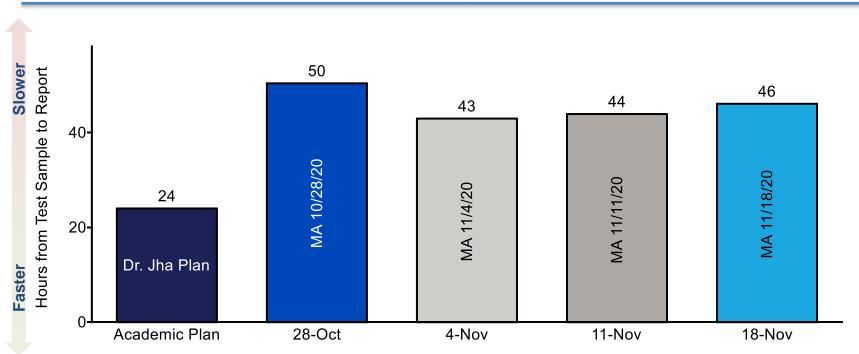**in hospital**

181
in ICU

1.9 days
Average turnaround time

Tests have increased to ~70K per day including higher education;
Higher ed tests have grown dramatically, non-Higher Ed tests near 45k / day

1: Defined as total tests performed in the previous 14 days / total population
Source: Mass.gov; as of November 18, 2020

10

Massachusetts COVID-19 Test Turnaround Time

Massachusetts Testing Turnaround Time

Slower ↑

Faster ↓

Hours from Test Sample to Report

Academic Plan	28-Oct	4-Nov	11-Nov	18-Nov
24 (Dr. Jha Plan)	50 (MA 10/28/20)	43 (MA 11/4/20)	44 (MA 11/11/20)	46 (MA 11/18/20)

Reactive vs. Proactive Testing

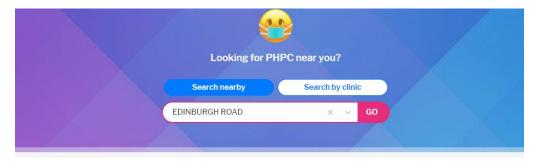| Reactive Symptomatic Testing	Proactive Asymptomatic "Surveillance" Testing

Reactive Symptomatic Testing

- **Majority of people tested today are symptomatic**

- Most test are PCR tests with 24 hour to 7 day turnaround time

- Massachusetts testing <1% of population daily (when excluding Higher Ed) today, similar statistics in rest of the United States

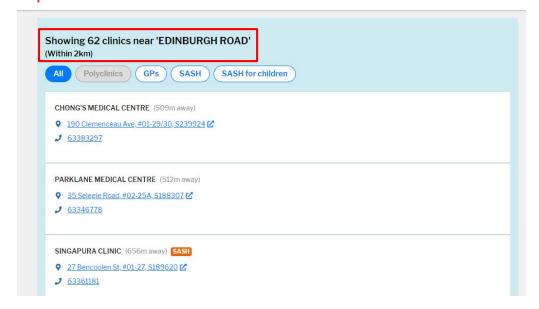**Proactive Asymptomatic "Surveillance" Testing**

- Test large numbers including **asymptomatic people to monitor virus spread**

- Can use less accurate and less expensive tests
  - Multiple tests can solve accuracy problem, and can follow-up on false positives with PCR

- Test a large portion of the population daily (~10%)

- Previous successful examples of surveillance testing were used in Qingdao and Wuhan which tested their entire populations after outbreaks in 5-19 days

Developing infrastructure for rapid, low-cost "surveillance" testing helpful to monitor outbreaks, stop the spread, and prevent the next pandemic
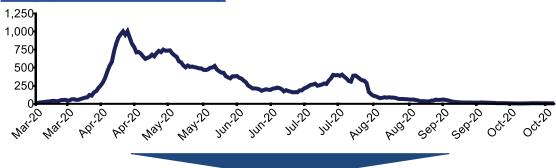
Testing: Singapore Case Study

Singapore Testing Capacity

- After SARS-CoV outbreak of 2002 Singapore opened 900+ public health preparedness clinics (PHPCs)
- These clinics are being used to deploy free to consumers, convenient, and rapid PCR tests

Singapore Cases Per Day

Existing infrastructure allowed Singapore to bend the curve with rigorous testing and tracing

Testing: Qingdao and Wuhan Case Studies

Qingdao Testing Center	Qingdao Testing Plan

Rapid Increase in Collection Capacity
- 4,000 sample collection points staffed by 10,000 medical workers open from 6 a.m. to midnight
- Imported healthcare workers from neighboring cities
- Used QR codes to increase throughput of registration
- Medics sent door-to-door to collect from those with limited mobility

Testing Efficiency
- Samples were sent to labs in five neighboring cities
- Samples were pooled in groups of 10
  – If any are positive all 10 people told to isolate

China able to test city of 11 million in under a week with rapid scaling of collection capacity and test pooling

The War on COVID-19: Current Testing and Future Testing Strategy and Protocols

- Testing capacity has increased but is **far short** of the level required to achieve substantial mitigation or suppression of the virus
- Major progress has been made on vaccines, but the increased spread of the virus will cause further significant economic damage because it will take **6-12 months for the vaccines to be successfully implemented**
- The federal government and state and local governments should develop a **systematic, expanded testing regime** to surveil the asymptomatic population to mitigate and suppress the viral spread
  - Utilize **multiple testing modalities**
  - Develop **public private partnerships** to increase testing capacity
  - Educate, encourage, and make it easier for citizens to be tested
  - Develop a financing plan so testing is available to **all citizens**
  - Increase contact tracing capabilities
- Federal, state, and local governments should develop **long-term testing infrastructure** to be prepared to suppress any potential new virus-based pandemic
  - Testing centers
  - Testing modalities
  - Information systems
  - Contact tracing systems