

The background features a light blue grid of hexagons. A central dark blue banner contains the council's name and tagline. Surrounding the banner are various white hexagons, each containing a colorful icon: three people, a DNA helix, a clock, the state capitol dome, a train and car, test tubes, an electric car, a house with leaves, a document with gears, a graduation cap, a molecular structure, and a map of Massachusetts.

MASSACHUSETTS
HIGH TECHNOLOGY COUNCIL

Dedicated to Growth... Committed to Action

COVID-19 Back-to-Work Planning Briefing

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Have assembled a team of experts to help operationalize the White House “Opening America” framework

Executive Summary: The War on COVID-19

- **Global cases & deaths continue to rise. Mitigation efforts have led to some level of “flattening”, but with severe economic consequences**
 - The US new daily cases are beginning to decline, but still account for 1/3 of global daily new cases
 - MA new daily cases still high, but are seeing frequent periods of declining. Hospital ICU beds only ~54% filled
 - JP Morgan estimating Q2 GDP down ~40% QoQ. MA unemployment ~2x the GFC, with low income workers particularly hard hit
- **Determining when to re-open is dependent on modeling out “supply and demand”**
 - Key supply considerations include availability of beds and healthcare workers (taking into account burden of other illness/need) and therapeutic availability and effectiveness
 - Key demand considerations include a manageable current new case trajectory (“flattened curve”), confidence in ability to track case counts, and anticipated effectiveness of segmentation & worker safeguards
- **If reopening causes a demand imbalance, risk a rolling lockdown scenario**
 - 1918 Spanish Flu data warns of opening too early or with too little preparation – could result in a second, larger spike in cases than the first
 - Spain re-opened once COVID-19 cases reached 20% of their prior peak, but was still too soon – cases rapidly rose and Spain was forced to shut again
- **Critical to design a “back-to-work” plan that does not overload hospitals and keeps people safe**



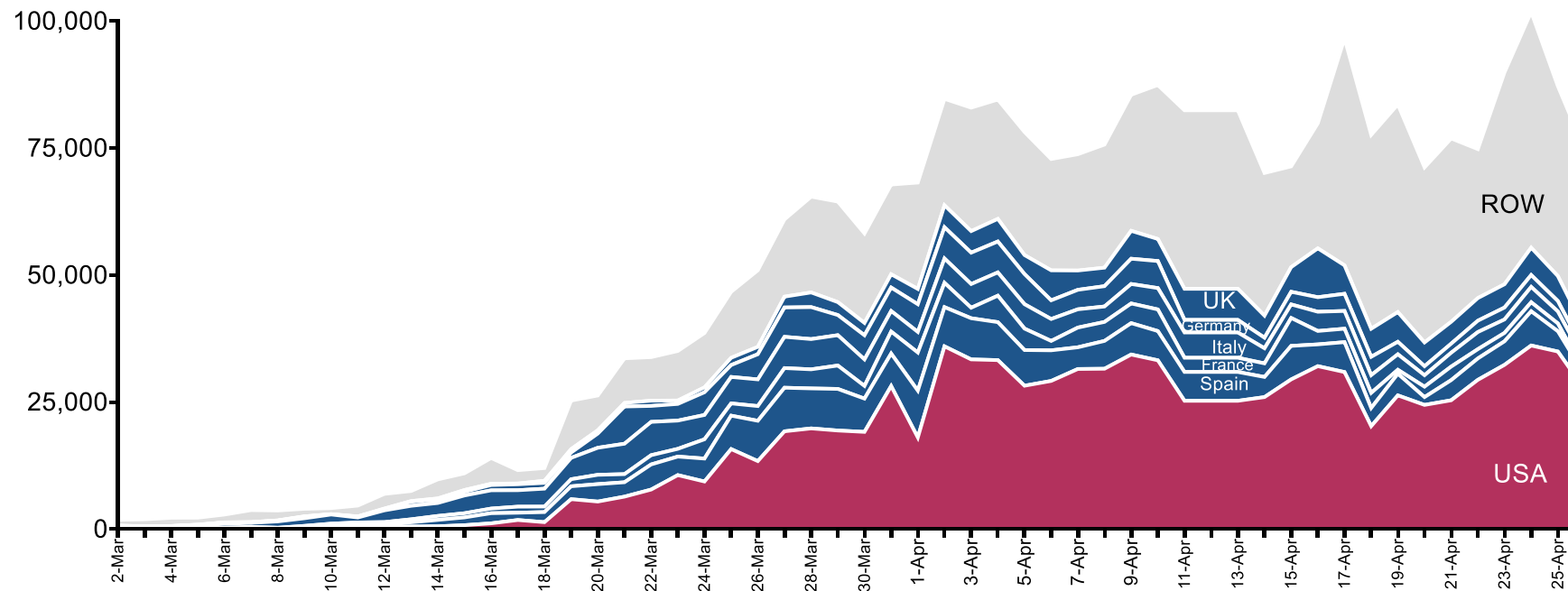
We can defeat COVID-19 by implementing: (1) strategic population segmentation, (2) effective therapeutic treatments and longer term a vaccine, (3) full adoption of R_0 reduction protocols

Contents

- **Summary COVID-19 History & Economic Impact**
- Timing: *When* to Return to Work
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Global COVID-19 Cases Update

Daily New Cases (Area of Chart = Total Cases)



3,057,957
global cases

212,056
global deaths

988,469
US cases

56,253
US deaths

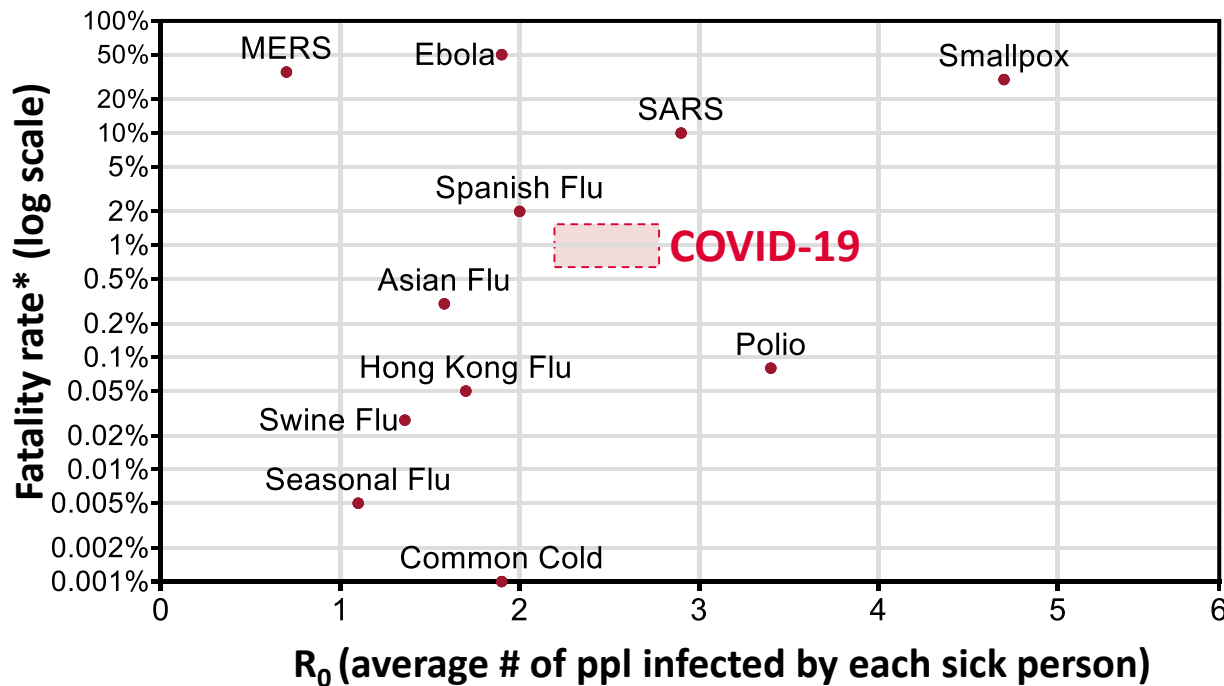
56,462
MA cases

3,003
MA deaths

Global cases and deaths continue to rise. The US may be in early stages of “flattening” & Europe cases declining, but the rest of the world is still experiencing growth

Why is COVID-19 so serious?

Fatality Rate v. R_0



- Fundamental issue: COVID-19 has a **high fatality rate** and a **high R_0** (high rate of infection)
- Additionally, COVID-19 has a **high rate of hospitalization** (~10%+), which combined with high rate of spread creates **large tax on hospital capacity**
- Finally, COVID-19 is **indiscriminate**, causing serious long term health consequences in all ages
- In order to return to work, need to adopt policies & procedures to **reduce R_0**

COVID-19 has a high spread & high rate of hospitalization / death – to return to work, need to adopt policies & procedures to reduce spread (R_0)

Economic Impact of Shutdowns

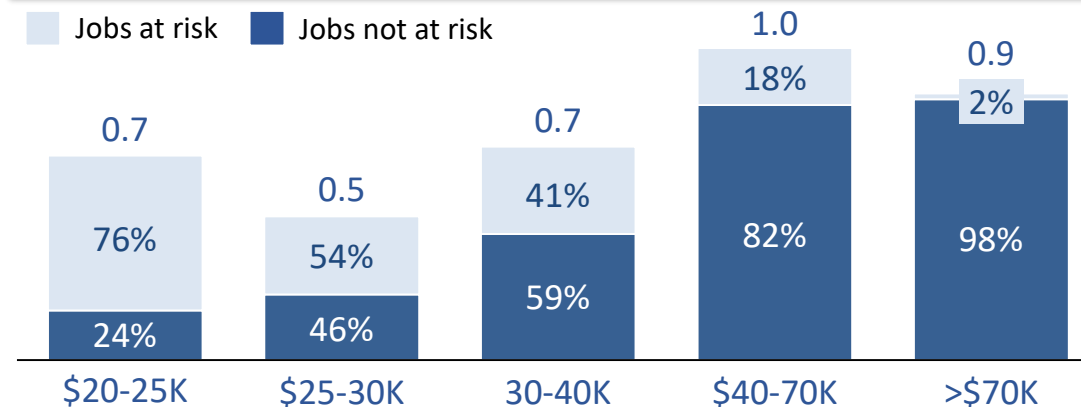
JP Morgan projecting US GDP to be down 40%
QoQ in Q2; EU GDP to be down 45-55% QoQ

	Real GDP			Real GDP					
	% over a year ago			% over previous period, saar					
	2019	2020	2021	4Q19	1Q20	2Q20	3Q20	4Q20	1Q21
United States	2.3	-7.7	6.2	2.1	-10.0	-40.0	23.0	13.0	12.0
Canada	1.6	-6.9 ↓	1.9 ↓	0.3	-10.0 ↓	-30.0 ↓	12.0 ↑	5.0	4.0
Latin America	0.6	-4.5 ↓	2.4 ↑	-0.6	-5.0 ↓	-24.4 ↓	12.0	4.2 ↑	3.0 ↑
Western Europe	1.3	-7.1 ↓	6.9 ↑	0.4	-14.1 ↓	-46.6 ↓	81.3 ↑	7.8 ↑	4.4 ↑
Euro area	1.2	-7.1 ↓	6.7 ↑	0.5	-15.0	-45.0 ↓	75.0 ↑	7.0 ↑	4.5 ↑
Germany	0.6	-6.6 ↓	6.8 ↑	0.1	-12.0 ↑	-45.0 ↓	75.0 ↑	6.0 ↑	5.0 ↑
France	1.3	-8.9 ↓	7.0 ↑	-0.2	-15.0	-55.0 ↓	100.0 ↑	8.5 ↑	4.0 ↑
Italy	0.3	-8.8 ↓	5.5 ↑	-1.2	-20.0	-40.0 ↓	55.0 ↑	8.0 ↑	4.0 ↑
Spain	2.0	-8.1 ↓	5.5 ↑	1.7	-15.0	-45.0 ↓	55.0 ↑	9.0 ↑	5.0 ↑
Norway	2.4	-4.4 ↓	6.6 ↑	0.7	-16.5 ↓	-33.2 ↓	68.1 ↑	5.3 ↑	3.3 ↑
Sweden	1.3	-4.0	5.5 ↑	0.6	-9.2 ↑	-33.2 ↓	50.8 ↑	5.1 ↑	5.6 ↑
United Kingdom	1.4	-8.0 ↓	8.0 ↑	0.1	-10.5 ↓	-59.3 ↓	119.9 ↑	12.6 ↑	3.6 ↑

MA Unemployment approaching 2x+ '09 levels

'09 Peak	2/29/2020	3/7/2020	3/14/2020	3/21/2020	3/28/2020	4/4/2020	4/11/2020
5.7%	2.3%	2.1%	2.1%	2.3%	5.2%	8.7%	10.1%

MA Job Vulnerability by Income Band



Mitigation efforts are having a significant impact on the economy, and impact is most severe
in low income workers

COVID-19 History & Economic Impact: Summary

- Global **cases and deaths continue to rise**. The US & Europe may be in the **early stage of “flattening,”** but the rest of the world is still experiencing growth
- COVID-19 is particularly serious because of its **high hospitalization & death rate** and **high rate of spread (R_0)**. Unmitigated spread can quickly overwhelm hospitals
- While mitigation efforts are contributing to the early curve “flattening,” they will have a dramatic economic impact in the U.S., with some analysts forecasting **Q2 GDP declines 2-3x that of the great depression**
- **Workers earning less than \$40K/year** and employed by **small businesses** are most vulnerable



Mitigation efforts are aiding in the fight against the virus, but are also having a significant impact on the economy, and impact is most severe in low income workers

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Determining When to Reopen

Supply

- Availability of supply inputs: **beds, HC workers**
- Timeline & supply of **therapeutic options**
- System readiness for policies to reduce R_0 (e.g., **testing, tracing, PPE capacity**)

Demand

- Current **new case trajectory** manageable / “curve flattening”
- Confidence in ability to **track cases**
- **Model** projecting anticipated hospital burden based on # **ppl returning to work & projected spread**

Case Studies



China Return to Work

- Waited until **new cases practically eradicated**. Since then, new cases returned, but at much lower rates
- Firm workplace rules, rigorous testing, travel restrictions
- Comprehensive smartphone tracking



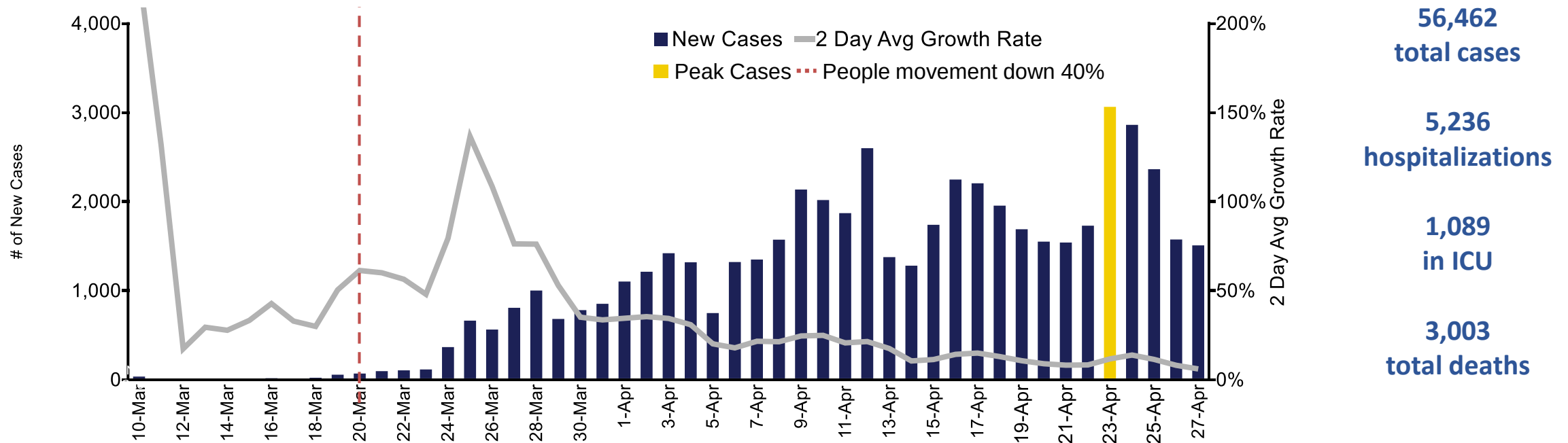
Spain Return to Work

- Waited until **new cases ~20% of peak**
- Handed out **10M masks and 1M+ testing kits**
- Allowing **non-essential construction, manufacturing** to return to work
- New cases since rose to ~80% peak levels, requiring immediate scale back – **opened too soon**

Need to model out supply and demand and reopen with a buffer on total capacity utilization

Massachusetts COVID-19 Cases

of new cases have been declining the past week; growth rate has slowed since people movement slowed

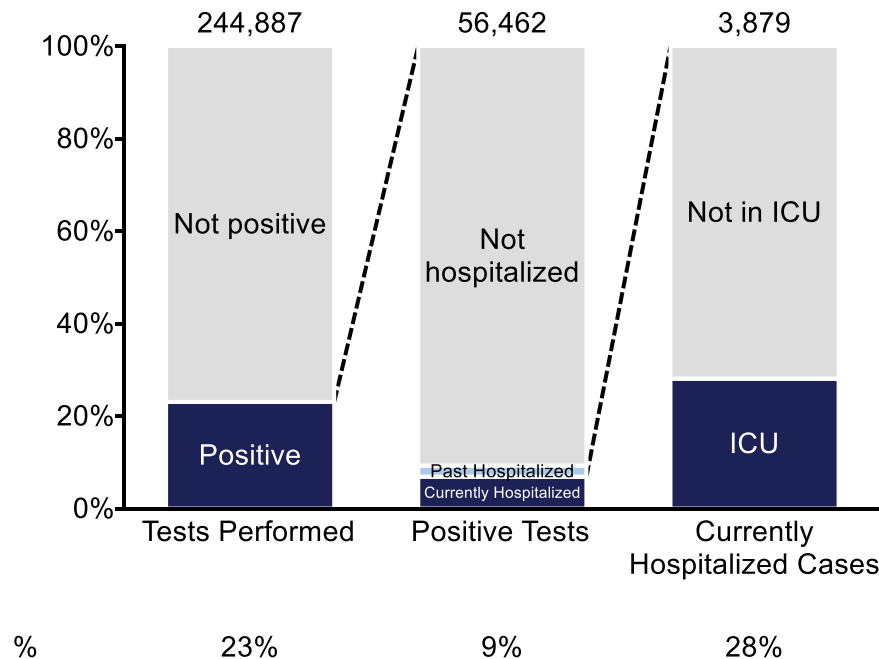


MA growth rate has dramatically slowed since stay-at-home mitigation efforts, and new cases / day may be in early stages of declining

MA Hospitalization Rate & Capacity Data

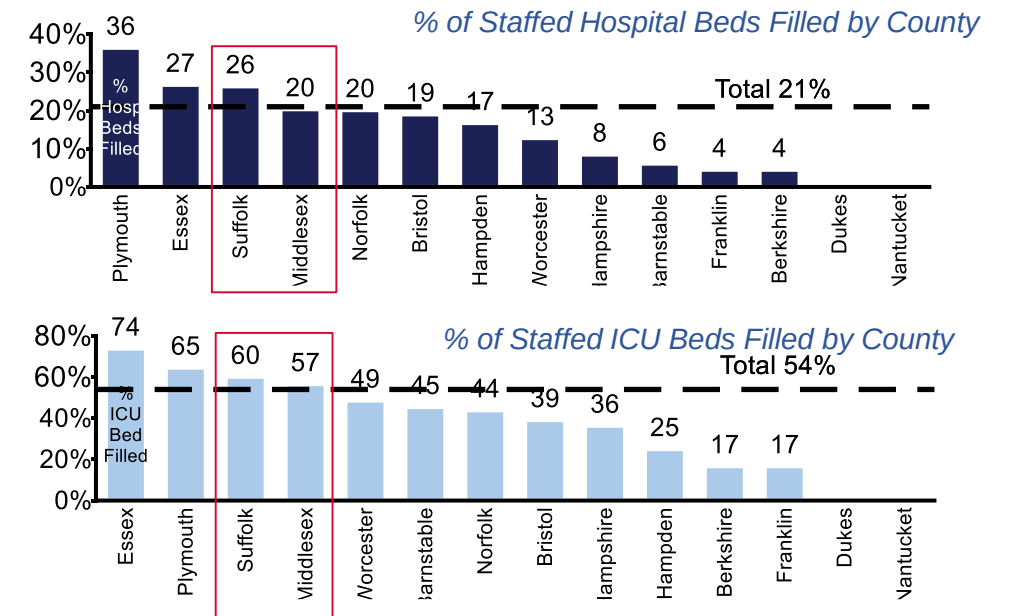
~21% of hospital beds and ~54% of ICU beds occupied with COVID-19 patients

MA Case Counts as of 4/27*



5,236 hospitalizations

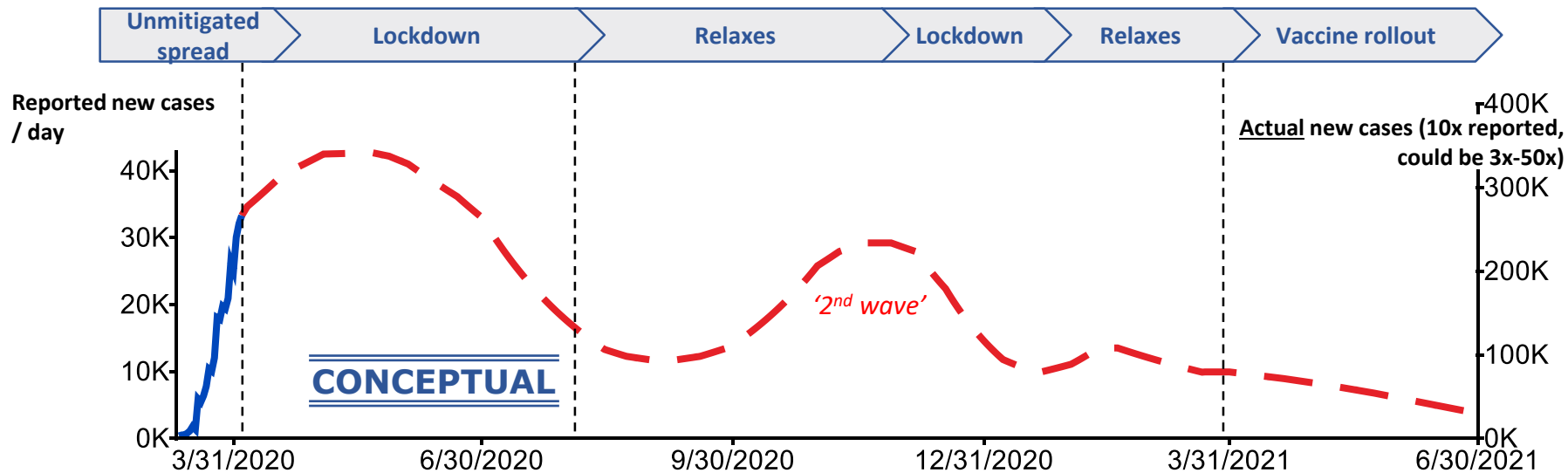
1,089 in ICU



Approximately ~9% of positive cases in MA hospitalized
~21% of hospital beds and ~54% of ICU beds are currently filled by COVID-19 patients

Critical to “Avoid the W”

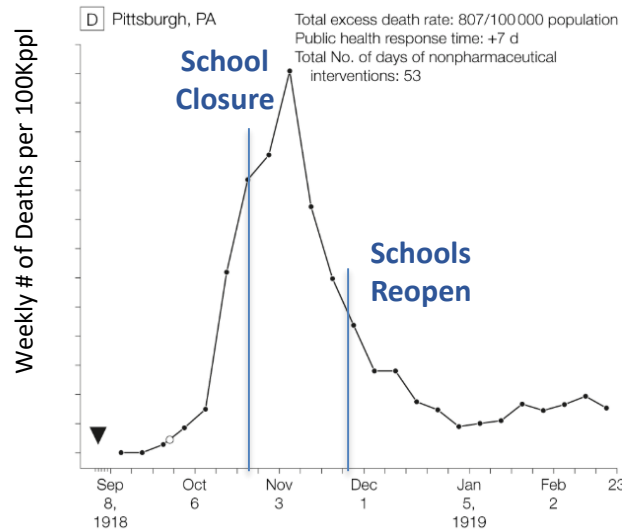
What we need to prevent:



Sub-optimal public health approach creates the bad/bad box of ineffective lockdowns and high burden on healthcare systems – creating wider, deeper “U” or “W” that only ends with vaccine

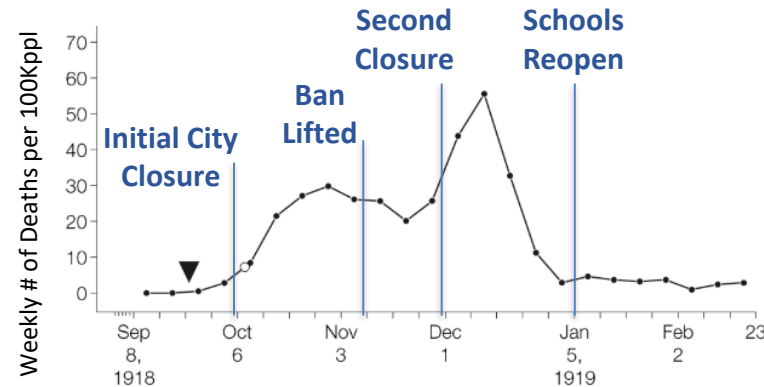
1918 Spanish Flu Precedent

Philadelphia – too late to shut, overwhelmed



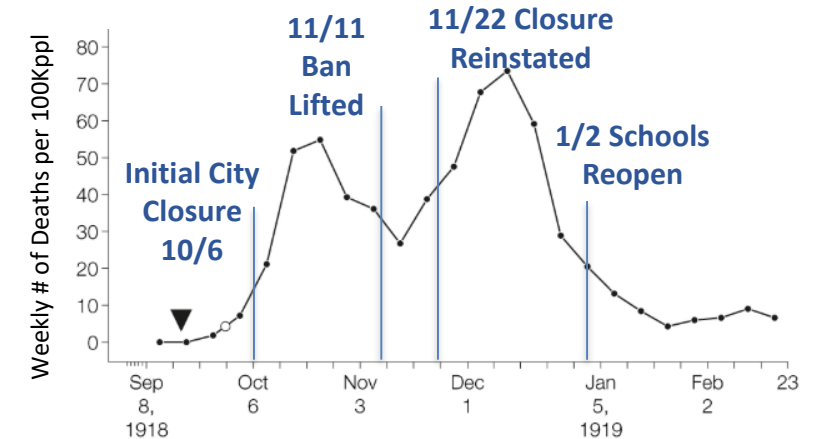
- Philadelphia **acted too late** to curb the death rate – after **waiting until after a massive parade** to close the city, the virus overwhelmed hospitals
- But because initial rate so high, **no second peak**

St. Louis – reopened too early



- St. Louis **acted early** to curb the death rate – but **opened too soon**, causing a **second spike much higher than the first**

Denver – reopened with too little public guidance



- Denver **acted early** to curb the death rate – but **opened with too little public guidance**, causing a **second spike with similar magnitude as first**
 - After initial closure was lifted, **the public thronged the streets by the thousands**, and new cases rapidly spiked to rates higher than previous

City closures & social distancing highly effective if instituted early – but second waves are likely and can be worse than the first if proper measures not taken before re-opening

When to Return to Work: Summary

- **Building a dynamic hospital capacity / demand model** based on current infection rate and system readiness for reopening critical to determining when to return to work
- MA new daily cases still trending **around peak**, although have shown signs of “flattening.” Managing hospital capacity well so far, with **ICU beds only ~54% filled** with COVID-19 patients
- However, **critical to not reopen too soon** – a demand imbalance could lead to a second peak more severe than the first, as evidenced by St. Louis’ re-opening during the 1918 Spanish Flu



Need to focus on developing policies and protocols to keep hospital capacity balanced with demand and minimize the risk of another lockdown

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The Key 3 Steps to Achieve Hospital Balance & Worker Safety

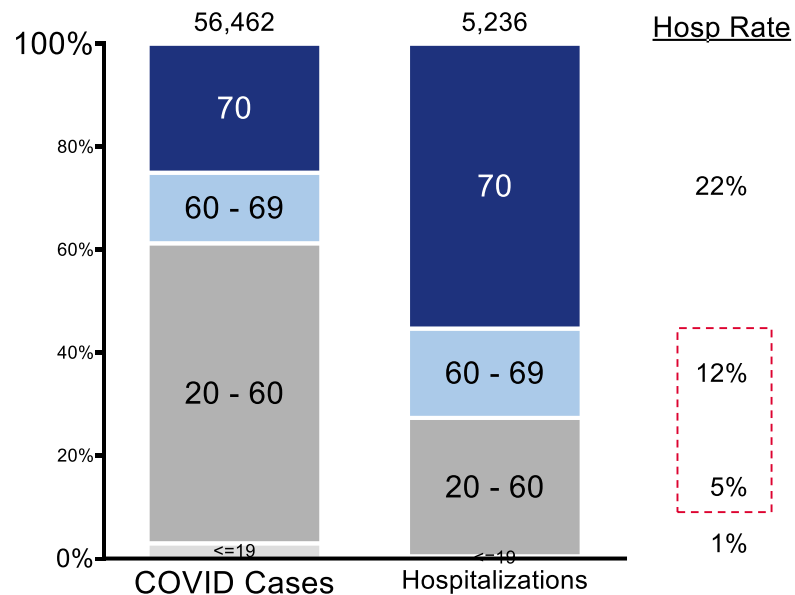
Segmentation: Sequence segments returning to work according to risk to lower hospitalization rate

Effective Therapeutics: While waiting for vaccine, implement effective treatments to curb hospitalization rate & fatality rate

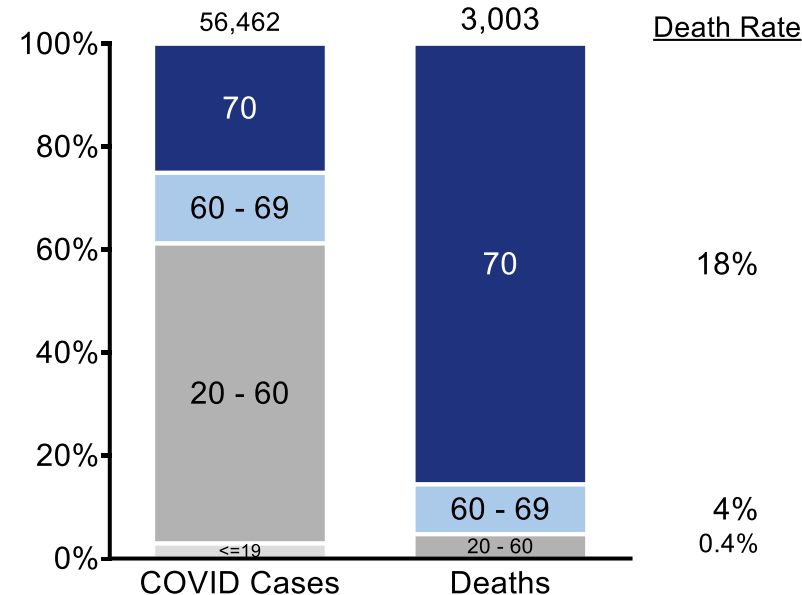
Reduce R_0 : Implement policies & procedures to reduce the rate of spread

The Age Funnel

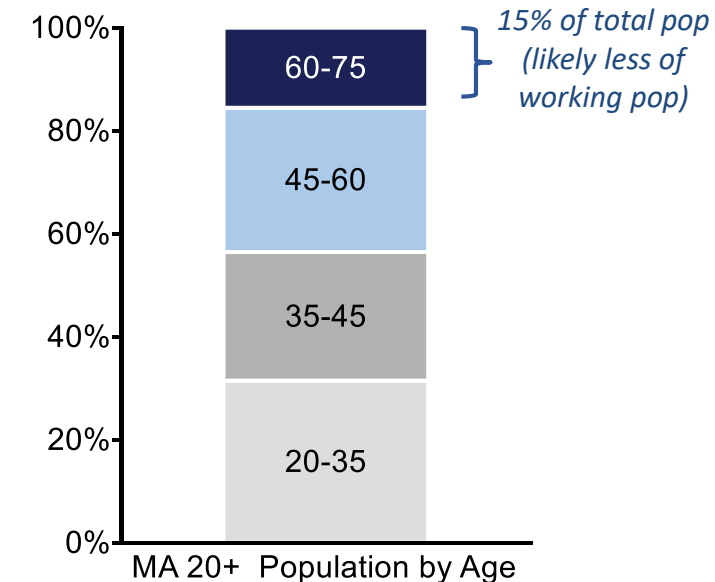
MA Hospitalization Rate by Age



MA Death Rate by Age

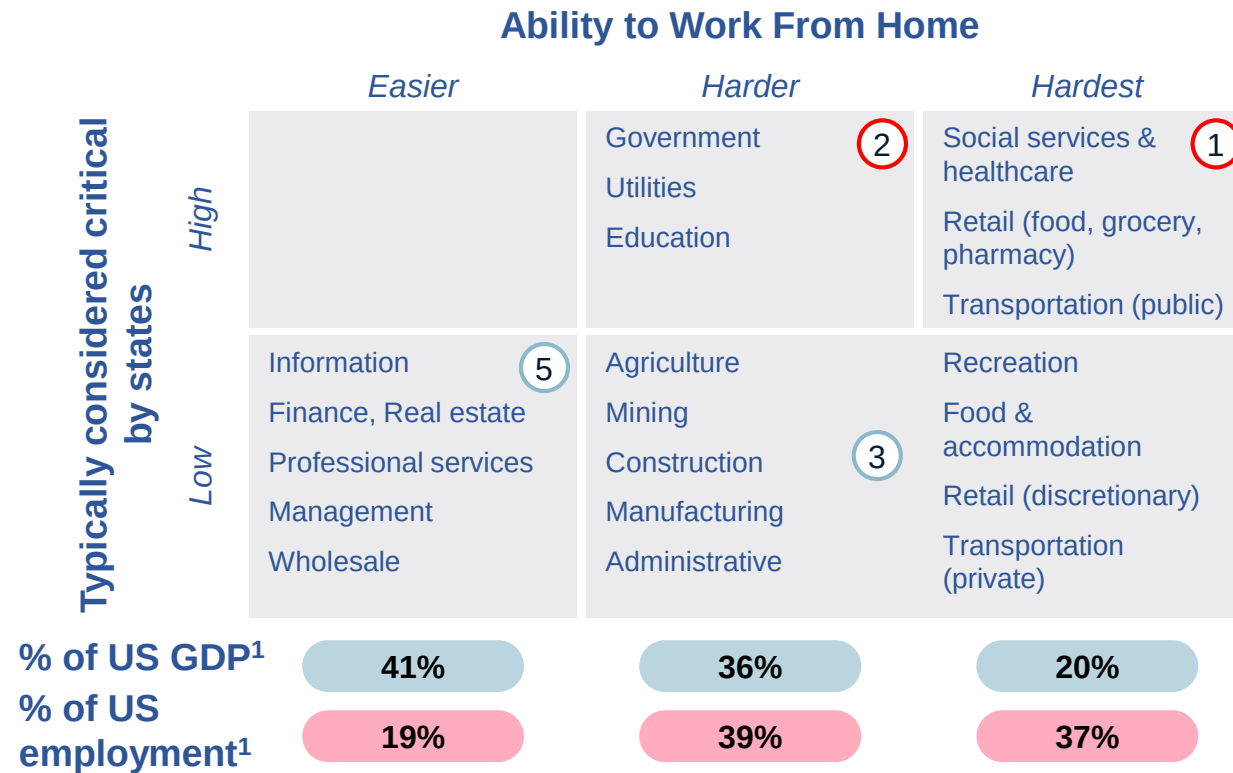


MA Pop. by Age



Excluding those aged 60+ from initial return to work segment may greatly reduce the hospital burden without affecting a large portion of the working population

The Industry Funnel

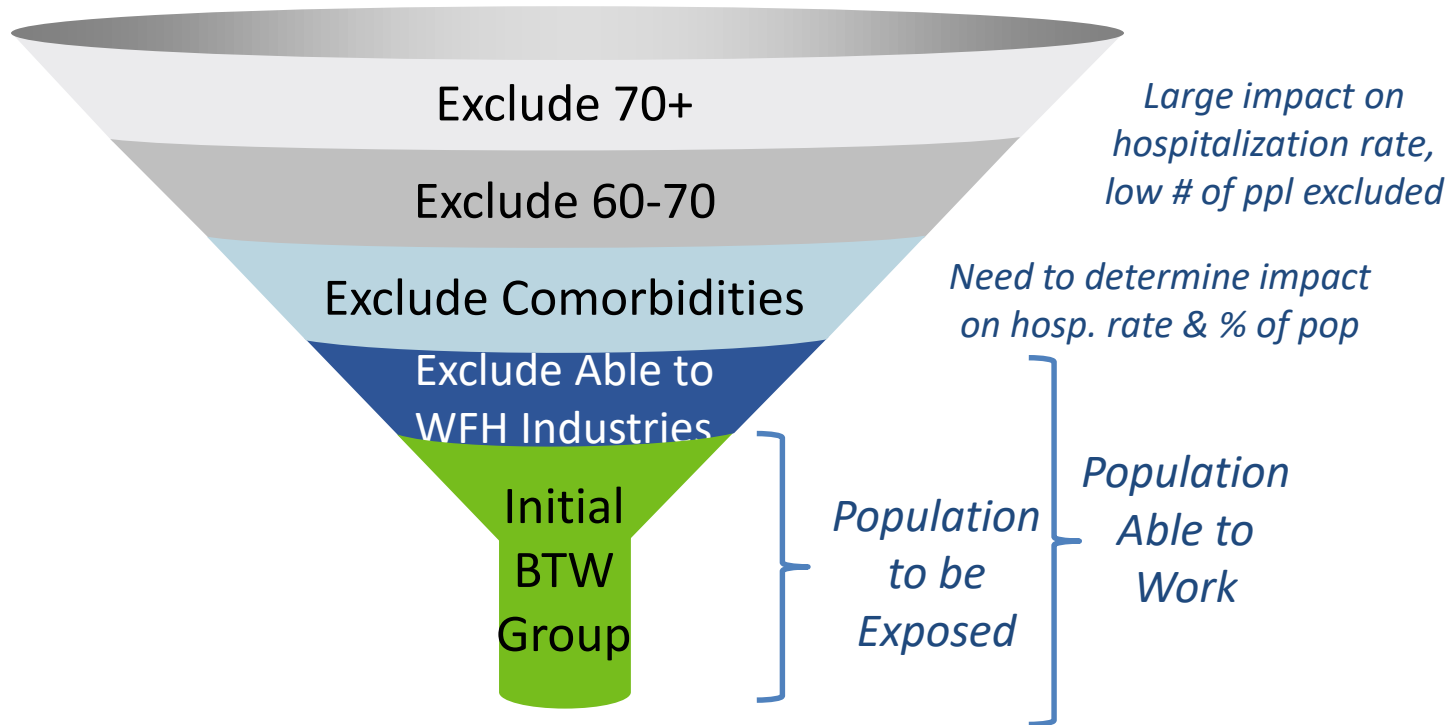


Need to Determine How To Group & Sequence Sector Reopening

- 1 Critical sectors that cannot work from home –** will be harder to safeguard, but may need to be part of first wave
- 2 Critical sectors with some ability to WFH –** may be able to encourage portions to continue remote work
- 3 Less critical sectors that cannot work from home –** Less critical, so possible to delay, but may need to be part of initial wave
- 4 Less critical sectors able to work from home -** encourage these sectors to continue working from home where possible

Possible to phase industries returning to work by criticality and ability to continue working from home

Comprehensive “Funnel Framework”



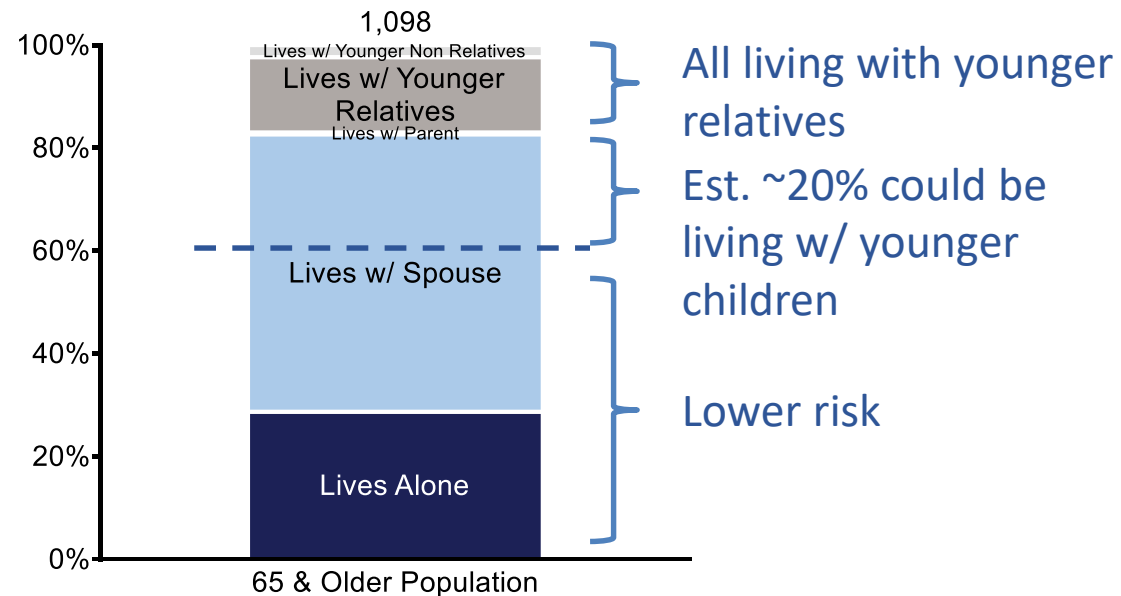
Other Considerations

- **Returning population's exposure to excluded population:** how many excluded ppl will still be exposed by household members returning to work?
- **Nursing Homes:** how to deal with isolated high-risk populations interacting with workers?
- **Workforce enablers: (childcare / education)** – need enough capacity to support segment returning to work

A handful of key segmentation decisions can greatly reduce the hospitalization rate while still enabling large portions of the economy to restart

Other Considerations: Families with At-Risk Relatives

MA 65+ Population Living Situation



Strategies for At-Risk Individuals with Family Members Returning to Work

- Encourage workers living with at-risk individuals to strictly adhere to all policies and procedures
- **In hot spots**, could consider setting up **alternative housing for at-risk individuals**

Up to ~40% of 65+ population could be living with individuals returning to work. To manage these at-risk populations, may need to set up alternative living arrangements in hot spots

Other Considerations: Education

Reopening Schools

← Earliest to Open

→ Latest to Open



Reopened schools in low-risk areas outside Tokyo



Reopening kindergartens and primary schools



Considering reopening schools to graduating students



Schools opening potentially next school year

Action

Many regions with low case count, but limited risk for children themselves

Opening after a month in lockdown, disinfecting schools twice a day

Oldest students can keep masks on, but still risk of asymptomatic transmission

Opening after bars, cinemas, and restaurants

Risks / Mitigation

Key Considerations

- Schools should consider **risk to children themselves** (likely low) and their **transmission to others** (higher)
- Criticality for economic activity a concern, school reopening often a **prerequisite to parents returning to work**
- Transpiration and child care also necessary preconditions to allowing people to return to work, **will need mitigating safety measures**

Reopening schools and child care precondition to returning to work, but carries key risks. Will also need plan for other key enablers (e.g., transportation)

The Key 3 Steps to Achieve Hospital Balance & Worker Safety

Segmentation: Sequence segments returning to work according to risk to lower hospitalization rate

Effective Therapeutics: While waiting for vaccine, implement effective treatments to curb hospitalization rate & fatality rate

Reduce R_0 : Implement policies & procedures to reduce the rate of spread

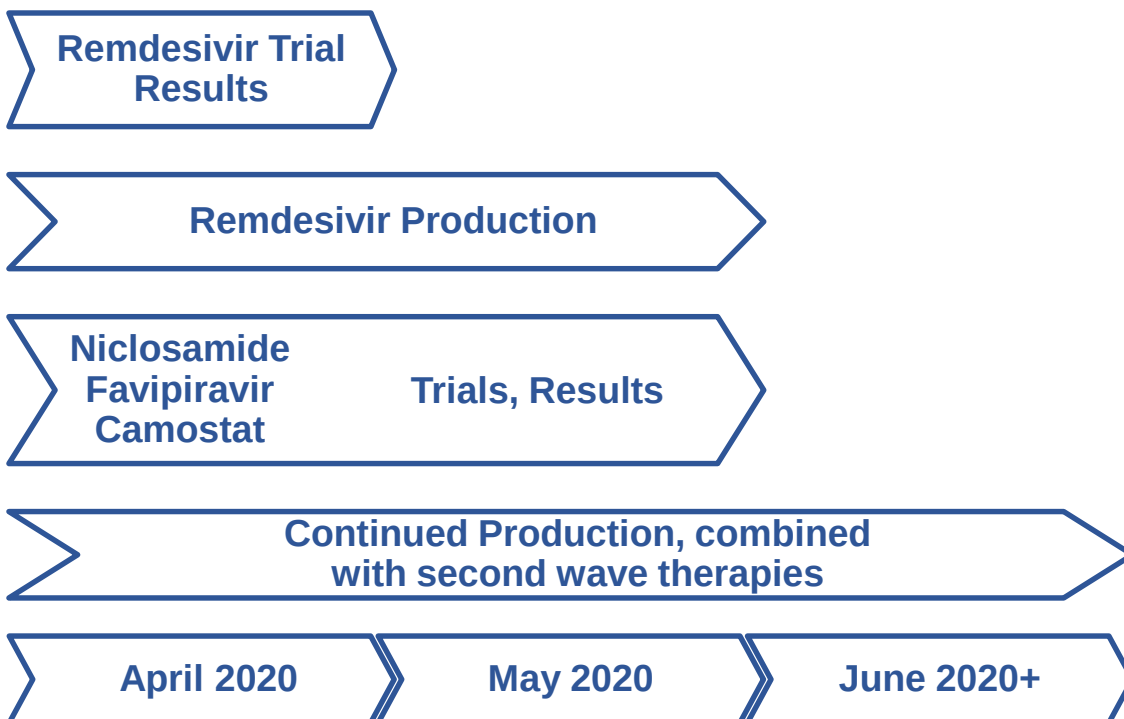
Types of Solutions & Timeline

	First Wave “Repurposed” Therapeutics	Second Wave New Therapeutics	Third Wave Vaccines
Use Case	Acute remediation	Prevent and treat	Long-term cure
Drug Candidates	• Remdesivir • Niclosamide • Favipiravir	• Human antibodies – Monoclonal and polyclonal • New compounds targeting essential viral proteins	• Inactivated virus particles • Live-hybrid viruses • RNA-based vaccines – Moderna, CureVac, BioNTech
Challenges	• Dose likely higher than existing use cases, supply limited	• FDA approval timelines are usually 30 days for testing, 3-6 months for approval	• Unknown if vaccines will need to be seasonal (like influenza) or durable long-term (like measles)
	April-June 2020	July-September 2020	April 2021-April 2022+

Therapeutics in development, but vaccine 18+ months away

First Wave – “Repurposed” Therapeutics

Repurposed Therapeutic Development Timeline



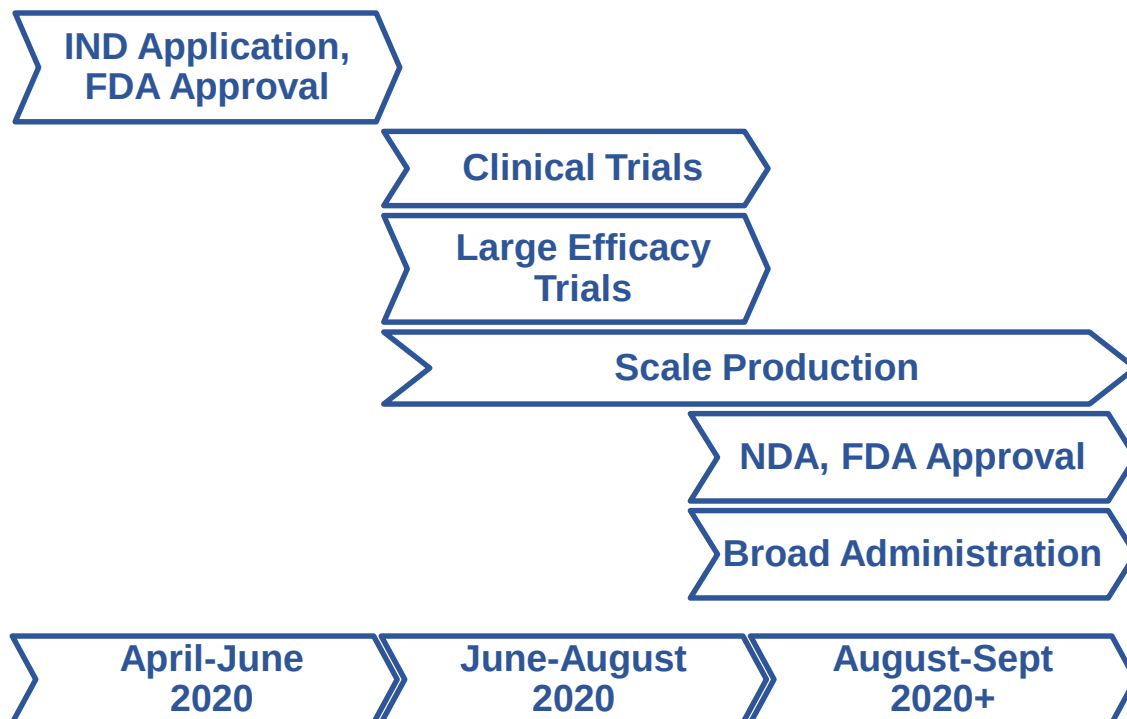
Example Early Candidates Progress

	 GILEAD	FUJIFILM
US Status	Under development (Ebola, SARS)	Investigational (influenza) *approved in Japan
Use Case	Treatment	Treatment
Earliest Trial End Date	May 2020	March 2020
Initial Clinical Evidence	Positive outcomes on clinical improvement in global program	Positive results on viral load and clinical recovery in Chinese trials

With rapid FDA approval and ramped production will be available in next six to nine weeks, but limited to acute remediation

Second Wave – New Therapeutics

New Therapeutic Development Timeline



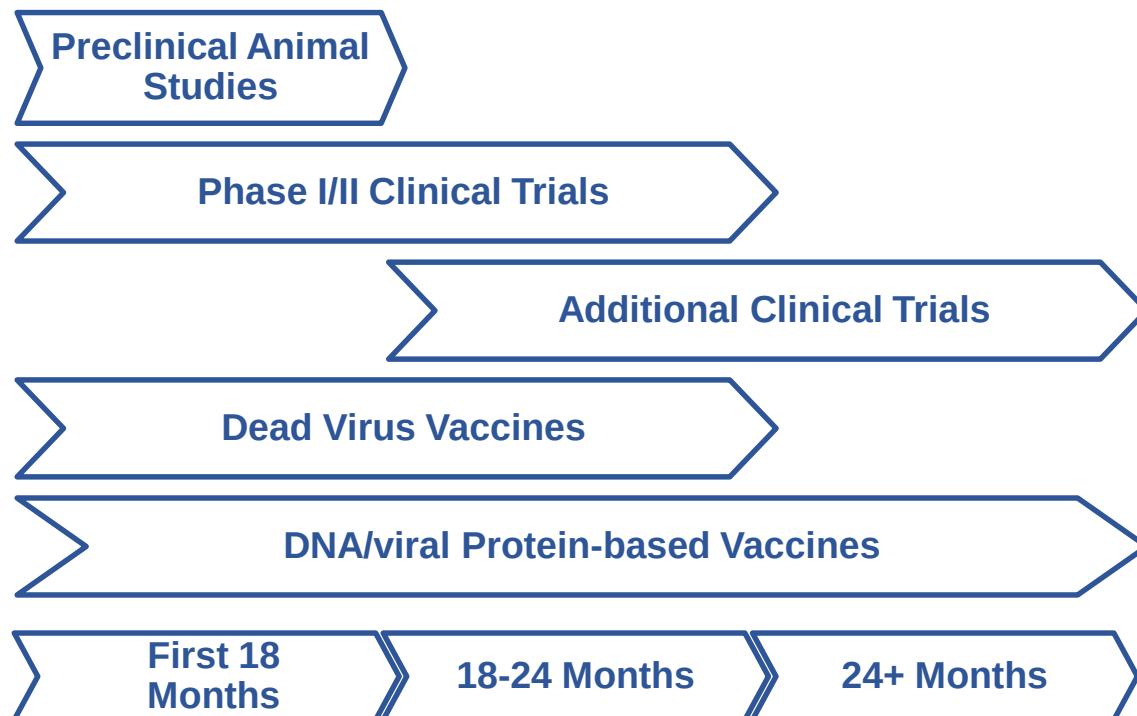
Example Early Candidates Progress

Compound	Monoclonal antibodies	Polyclonal antibodies
Developers	VIR Biogen REGENERON	Takeda CELLTRION
Description	Isolated antibodies from SARS survivors, GE mice	Hyperimmune globulin isolated from survivor plasma
Target Trial Start Date	June-August 2020	September 2020
Additional Research	Can prevent short-term and treat COVID-19 patients	9 candidates profiled already

**With regulatory flexibility and ramped production,
may be available by late summer 2020, but still not a cure**

Third Wave - Vaccines

Vaccine Development Timeline



Example Early Candidates Progress

Type	RNA	DNA/Viral
Developers	 messenger therapeutics 	
Country		
Development Phase	Preclinical - Clinical Ph I	Preclinical - Clinical Ph II
Clinical Trial Dates	March 2020 – June 2021	April 2020 – November 2020

Vaccine likely to take 18+ months to develop

VACCINES

Vasudev Bailey, PhD @vasudevbailey
Zoe Guttendorf @zoeguttendorf

Vaccine	Company	Platform	Stage	Description	Location
1. mRNA-1273	 Moderna	RNA	Phase I-First Patient Dosed	First to dose a human in the US. Vaccine consists of a synthetic strand of mRNA designed to elicit an immune response to produce antibodies against SARS-CoV-2	
2. Ad5-nCoV	 CanSino Bio	Non-Replicating Viral Vector	Phase I	Benefits from previous success in the Ebola virus (time to market ~3 years). The vaccine being developed is based on viral vectors (adenoviruses) to deliver antigens to express the SARS-CoV-2 spike protein	
3. ChAdOx1 nCoV-19	 University of Oxford	Non-Replicating Viral Vector	Phase I/II	Enrolling 500+ individuals to test its vaccine candidate, which uses a non-replicating virus to deliver RNA into cells.	
4. LV-SMENP-DC	 Shenzhen Geno-Immune Medical Institute	Lentiviral	Phase I/II	Begun early testing of its vaccine candidate. The vaccine uses a lentiviral vector to deliver Covid-19 minigenes to modify dendritic cells and activate T cells.	
5. BCG Vaccine	Research Group, Netherlands	Live Attenuated Virus (LAV)	Phase II/III	Repurposing the BCG vaccine, originally for TB, to fight SARS-CoV-2 in healthcare workers at high risk of infection. 1,000 individuals will be enrolled across 8 hospitals to receive the vaccine or placebo.	
6. BCG Vaccine	 Murdoch Children's Research Institute	Live Attenuated Virus (LAV)	Phase II/III	The BRACE trial will conduct a randomized, multi-center study of the TB vaccine in 4,000 healthcare workers across Australia.	

*Trial sponsor

Source: FDA, WHO, company websites, news. Available upon request.

Effective Therapeutics



Vaccine Candidates

41

Currently in early development (preclinical)

SARS-CoV-2 vaccines currently in clinical trials

Entity	Vaccine	Clinicaltrials.gov#	Stage	Phase
University of Oxford	ChAdOx1 nCoV-19	NCT04324606	Recruiting	Phase I
CanSino Biologics Inc.	Ad5 Vectors	NCT04313127	Active, not recruiting	Phase I
CanSino Biologics Inc.	Ad5 Vectors	NCT04341389	Recruiting	Phase II
Sinovac	Inactivated virus vaccine	NCT04352608	Recruiting	Phase I/II
Symvivo Corporation	Bifidobacterium vector	NCT04334980	Not yet recruiting	Phase I
NIAID	mRNA-1273	NCT04283461	Recruiting	Phase I
Inovio	DNA	NCT04336410	Recruiting	Phase I

How to Accelerate Therapeutic Development

Rapid FDA Approval

Investigational New Drug Review

- **Issue:** Companies must wait 30 days after submission to implement trials
- **Solution:** FDA should ask relevant questions before receiving IND, allow trial initiation **immediately**

New Drug Application (NDA)

- **Issue:** FDA review of an NDA typically takes 3-6 months
- **Solution:** FDA communicate daily with relevant companies, complete NDA review **within 1 week**

Commentary

Government action can turbo charge vaccine and therapeutic development & deployment

Government Funding

Purchase Guarantees

- **Issue:** Insufficient PPE including gloves, gowns, masks, and N95s
- **Solution:** Provide companies financial guarantees above market prices, regulatory relief

Test and Trace Funding

- **Issue:** Hospitals, others lack supplies to conduct fastest tests
- **Solution:** Provide funding guarantees for viral testing and serological test to detect antibodies

What we can do to help:

- Encourage **frequent communication** between FDA & companies & push for **rapid FDA approval**
- Provide **financial stability** to companies scaling production
- Help U.S. plants be **ready and able to produce** therapeutic candidates

Scale Production

Scaling Existing Production

- **Issue:** Individual companies cannot produce enough of emerging therapies
- **Solution:** Facilitate manuf. of promising candidates by other U.S. drug cos

Free Up U.S. Plant Capacity

- **Issue:** Need capacity to scale treatments prior to approval
- **Solution:** FDA should approve new plants for the production of other medicines

**New therapies and vaccines months to years off,
but targeted government action can accelerate development**

The Key 3 Steps to Achieve Hospital Balance & Worker Safety

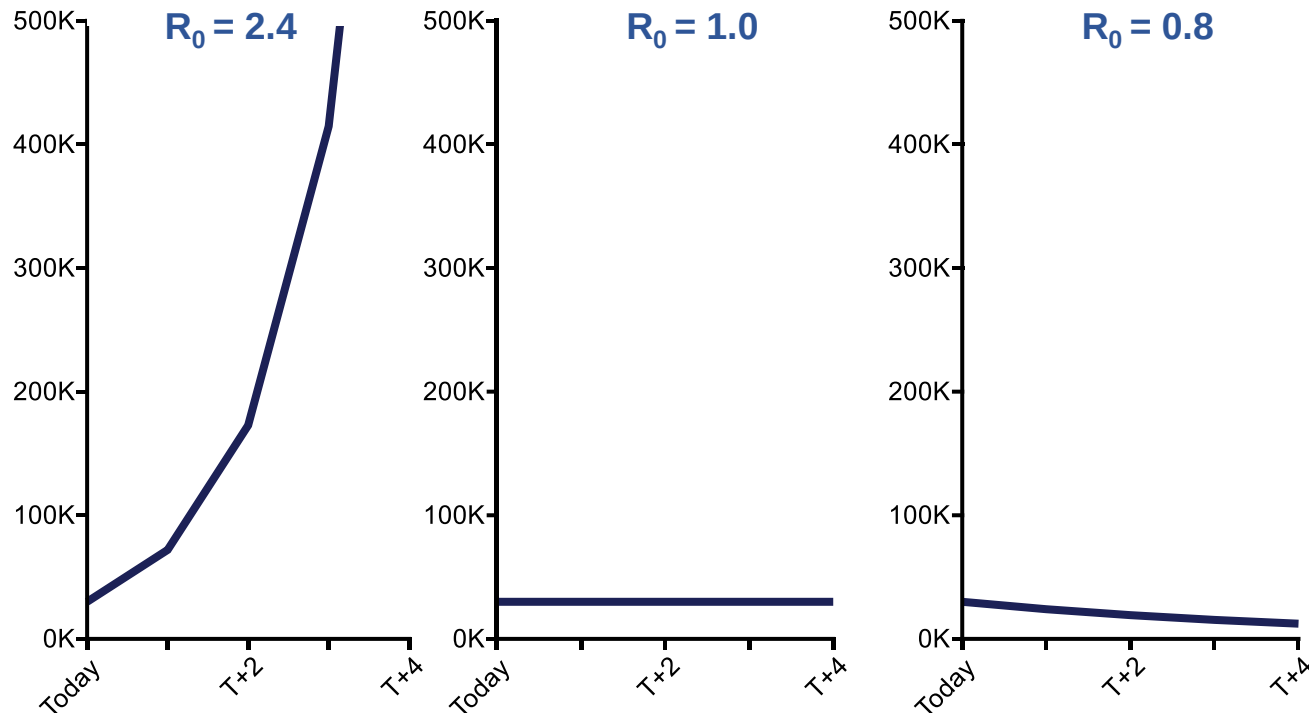
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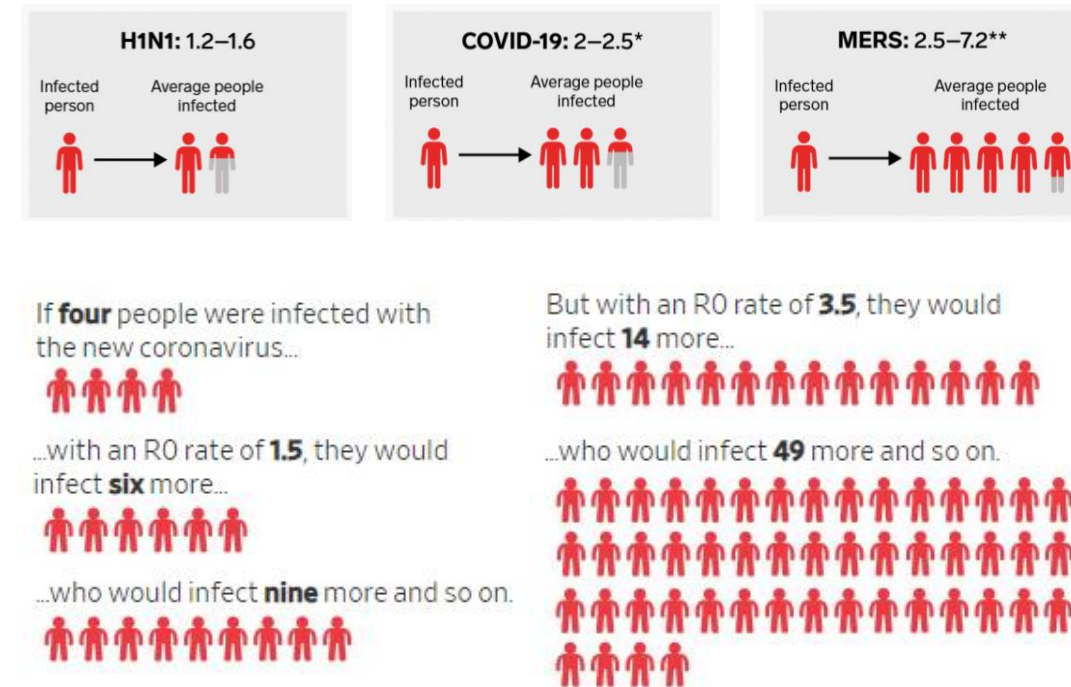
Reduce R_0 : Implement policies & procedures to reduce the rate of spread

Reducing R_0 : Why It Matters

MA New Cases Under Different R_0



Visualizing R_0



Lower spread can significantly reduce the number of daily new cases, despite greater population exposure

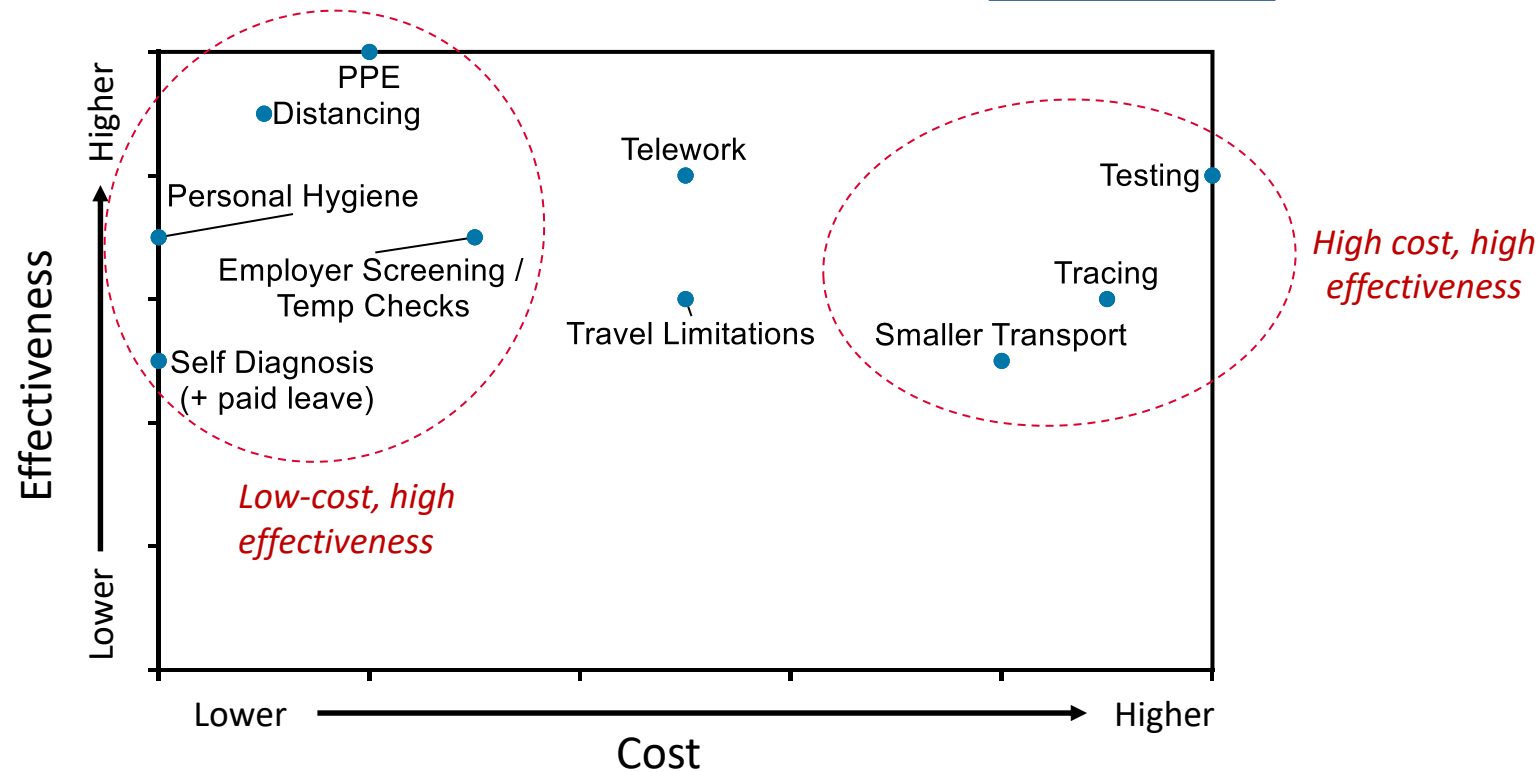
Potential Policies to Reduce R_0

Less Expensive More Expensive	Group A	PPE / Masks	Mandated mask & PPE use
		Personal Hygiene	Frequent hand washing or sanitizing. Avoid touching eyes, nose and mouth. Good respiratory hygiene
		Self-Diagnosis	Comprehensive check-list of symptoms each worker considers before leaving home
		Distancing / No Large Groups	Social distancing at work where possible. Staggered shifts and lunch times
		Workspace Cleaning	Frequent workplace deep cleaning. Hygiene zones with mandatory sanitization checkpoints in between
		Employer Screening	Temperature measurement and symptom screening upon entry
		Re-designing Workspace	Re-modeling of workspace to ensure greater spacing between employees. Improved air filtration and ventilation. Touch-free handles and interfaces
	Group B	Telework	Encourage telework where possible
		Travel limitations	Discourage travel unless absolutely necessary. Before traveling, ensure virus levels low at home & destination
		Smaller Transport Methods	Limit use of mass transit when possible. Encourage carpooling or deploy corporate vans where hygiene easier
		Tracing	Team of ~5,000 tracers in MA conducting manual interviews with positive cases and alerting and quarantining those who were in contact with a positive case
		Testing	6-10 centralized testing centers in MA performing 100K tests a day

Large variety of possible strategies to help reduce R_0 – should begin with most effective & lowest cost, but will likely need higher cost effective measures as well (testing, tracing)

Framework for Possible Policies

CONCEPTUAL



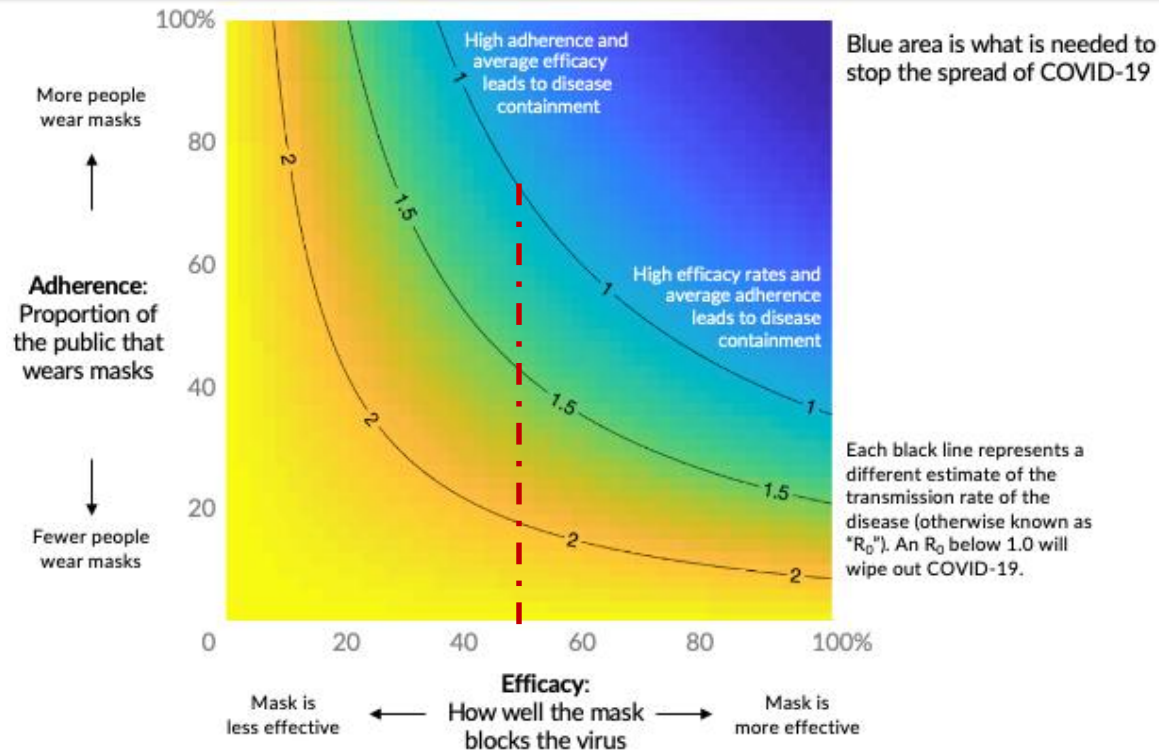
Large variety of possible strategies to help reduce R_0 – should begin with most effective & lowest cost, but will likely need higher cost effective measures as well (testing, tracing)

Potential Policies to Reduce R_0

- Group A: Masks, Self-Diagnosis and Employer Screening
- Group B: Testing & Tracing

Theoretical Effectiveness of Masks & PPE

Theoretical Mask Use Impact on R_0



Key Considerations

- **Adherence:** Higher adherence, even with less effective masks, can greatly reduce R_0 . Consider making PPE **mandatory**
- **Supply & Efficacy:** Is there adequate supply of the necessary level of efficacy? (i.e., easy to supply cloth masks but lower efficacy)

Mean % Filtration Efficiency of Various Masks

Note: Data based on Bacteriophage MS2 (23 nm in diameter) - COVID-19 virus particles are ~125 nm in diameter

Scarf	100% Cotton Masks	Tea Towel	Surgical Masks	N95
49%	51%	72%	89%	95%+

Widespread use of masks, even lower quality cloth masks, can have a significant impact on R_0

Self-Diagnosis

Daily Symptom Checklist

Symptom	% of Cases w/ Symptom
Fever	64%
Sinus Pain	50%
Cough	46%
Altered sense of smell	44%
Expectoration	32%
Stuffy nose	25%
Chills	18%
Fatigue	18%
Sore throat	13%
Headache	13%
Difficulty breathing	11%
Joint or muscle pain	10%
Diarrhea	6%
Vomiting	3%

Potential Policy & Considerations

- **Mandate employees / students certify** (via smartphone app / website for example) they are not experiencing **any** of the listed symptoms
- **Incentivize adherence** with paid sick leave policies
- Provided adherence is high, **self-certification could detect a significant amount of symptomatic cases**, including mildly symptomatic cases
- Recent studies suggest **true number of asymptomatic cases quite rare (2-6%)**, suggesting **meticulous and accurate daily symptom surveying** and self-reporting can be **highly affective in lowering R_0**

Meticulous and accurate daily symptom surveying and self-reporting can be highly effective in lowering R_0

Employer Screening

Example Employer Screening Case Studies

- **Wuhan, China** – all arriving employees must submit to at least **four temperature checks daily**
- **Amazon** – using **thermal cameras** at its operations facilities to screen workers for fevers
- **Some grocery stores** are using **non-contact forehead infrared thermometers** to temperature test associates as they arrive for work
- **Colorado** – governor announced **temperature checks at workplaces** will be part of reopening plan

Potential Considerations

- **Not effective at reducing R_0 on its own:** only **64% of cases present with fever**, and carriers are contagious in the period of time before fever manifests. Will need to be combined with other norms & screening measures
- **Implementation could be challenging:** will require additional PPE and thermometers that could be difficult to acquire
- **Medical information will have to be safely stored:** all temperatures taken should be treated as confidential medical information and stored as such

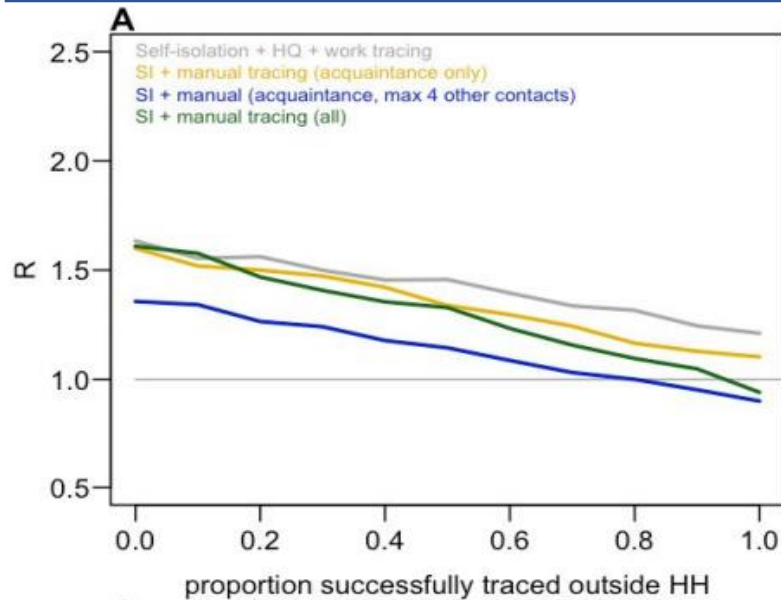
Temperature checks and other employer screening are useful tools when used in combination with other policies

Potential Policies to Reduce R_0

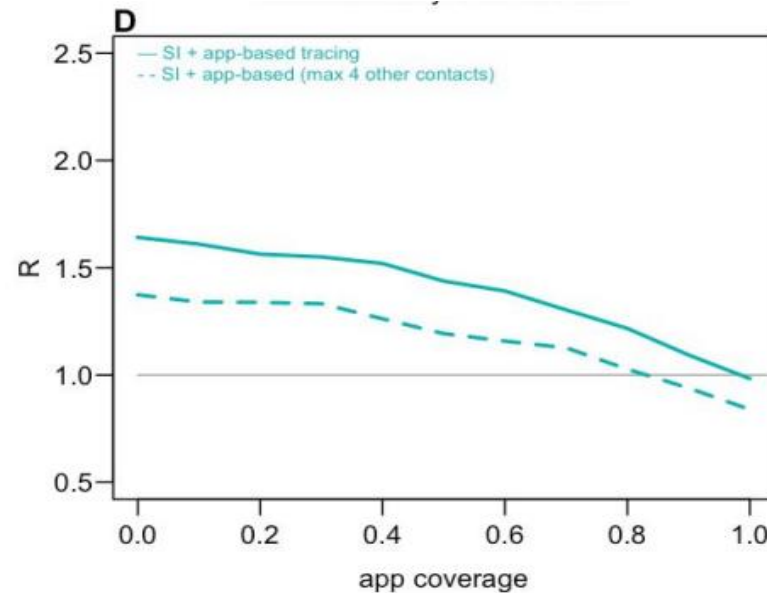
- Group A: Masks, Self-Diagnosis and Employer Screening
- Group B: Testing & Tracing

Combined Testing & Tracing Program Effectiveness

Impact of Testing & Manual Tracing



Impact of Testing & App-Based Tracing



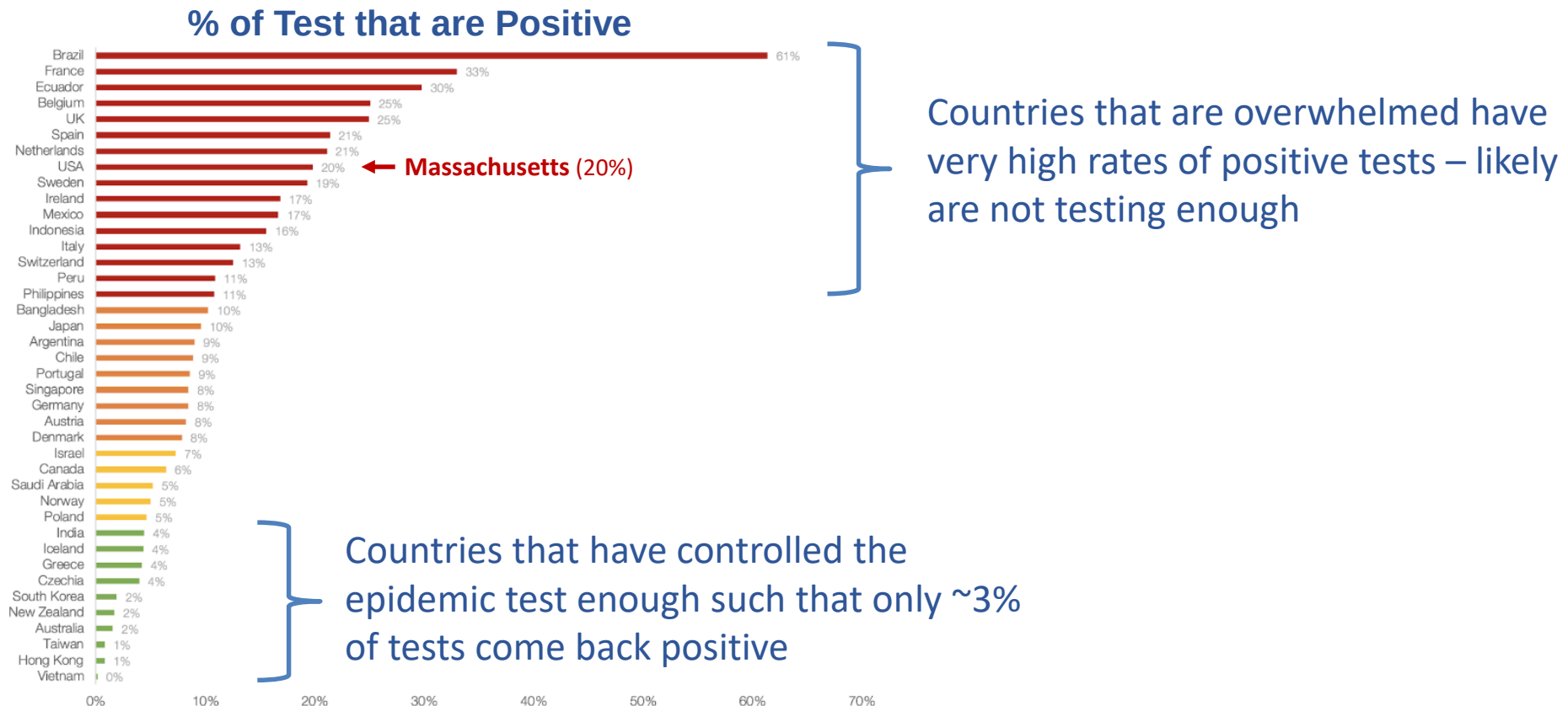
Study Conclusions

- **Self-isolation** of symptomatic cases alone: reduces R_0 by **32%**
- **Household quarantine + self-isolation** reduces R_0 by **37%**
- **Self-isolation + app-based tracing** reduced R_0 by **44%**
- **Self-isolation + manual tracing of all known contacts** reduces R_0 by **57%**
- **Self-isolation + manual tracing of all contacts** reduces R_0 by **67%**

Testing and tracing strategies can *more than double* the impact on R_0 of self-isolation alone

Three important factors to a testing & tracing strategy: (1) how many infected are ID'd and isolated, (2) how many contacts are traced and quarantined, and (3) how quickly each is done

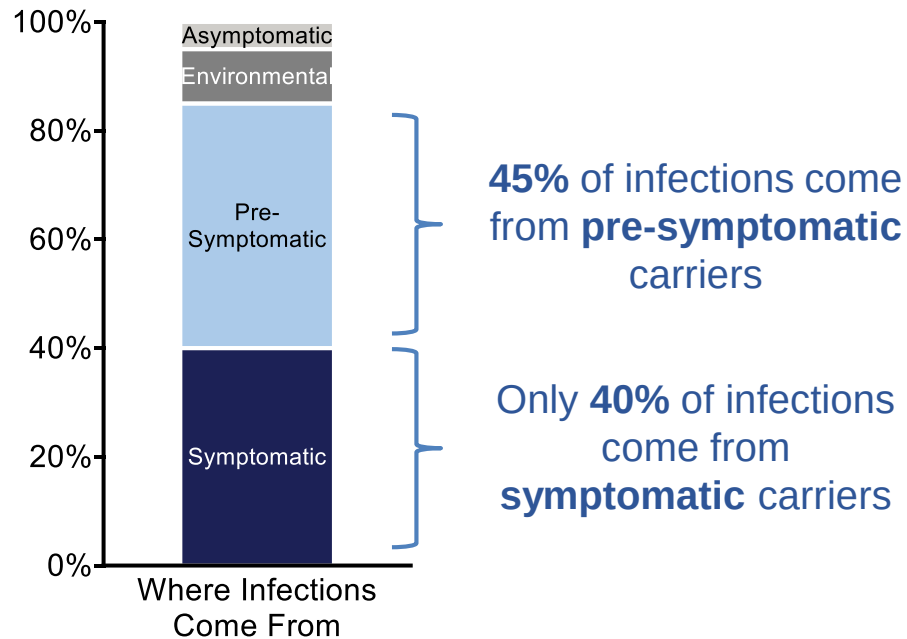
The Importance of Prolific Testing



**The countries that have contained the pandemic only find ~1-3% positive cases during testing
~20% of MA cases come back positive – need to significantly increase level of testing**

The Importance of Tracing

Estimated COVID-19 Transmission Sources



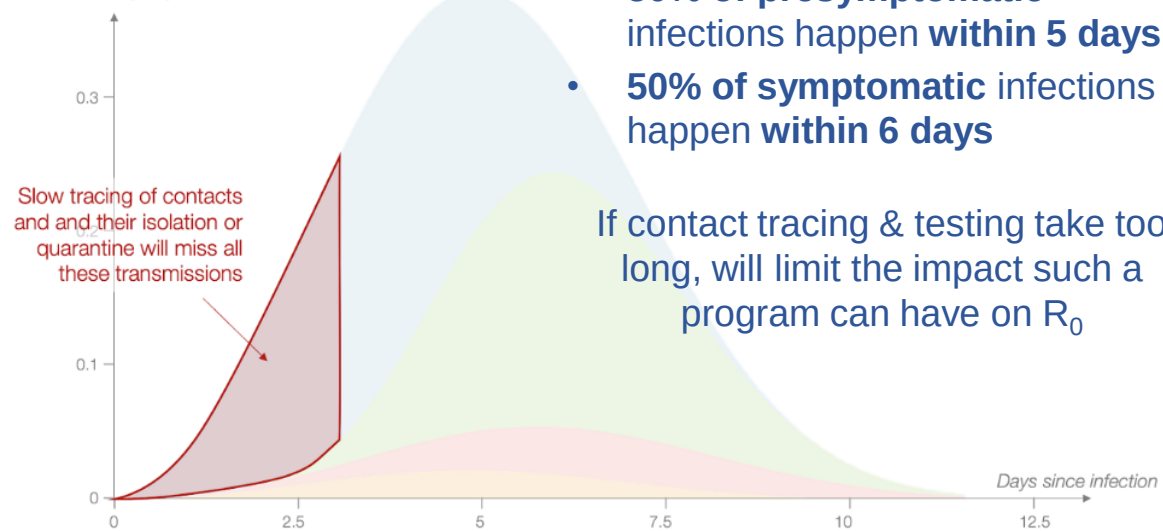
- If you **only test and isolate people with symptoms**, you can reduce R_0 by **40% at most** – this will not be effective enough on its own
- If you also **trace contacts and test them**, possible to also catch the pre-symptomatics, **reducing R_0 by up to 85%**

Recent research suggests ~45% of infections are caught from pre-symptomatic carriers
If only test symptomatic individuals, can only reduce R_0 by 40%. But a combined testing & tracing program that catches asymptomatic carriers can reduce R_0 by up to 85%

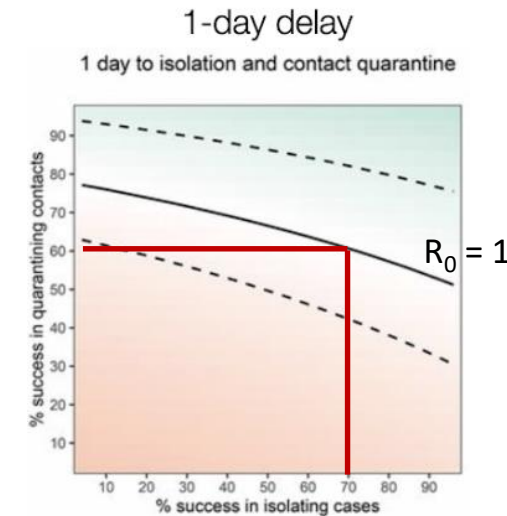
The Importance of Speed

How Quickly Infections Happen

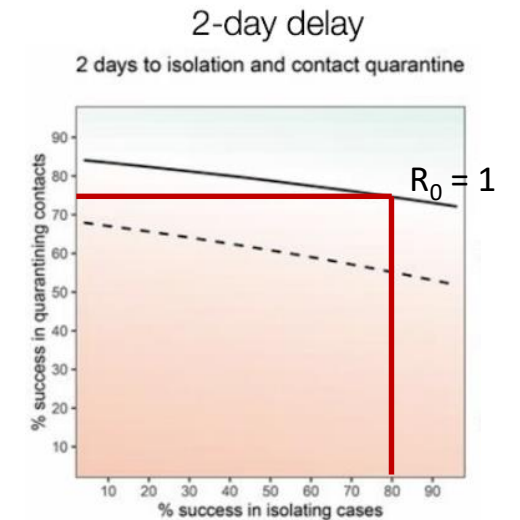
Number of new infections
caused by day



Testing & Tracing Speed v. Impact on R_0



If testing & tracing happens within 1 day, only need to successfully isolate **70% of cases & 60% of infected contacts** to reduce R_0 below 1



But if takes 2 days to test & trace, will need to successfully isolate **80% of cases & 75% of infected contacts** to reduce R_0 below 1

Speed is vital – the larger the delay between onset and successfully testing & tracing, the lower the impact on R_0 . Need a program that can successfully test & trace 70-80% of contacts within 2 days

Testing: Who to Test

Possible Testing Plans

	MA Today	Bare Bones	Minimal	Moderate	Goal Expansive	Universal
Population Tested		Those with strong symptoms, other causes ruled out in hot spots	Those with strong symptoms	Those with mild symptoms	Those with mild symptoms + contacts traced	Everyone every week
# Tests Required / day in MA		~10K / day <i>Current testing capacity</i>	~20K / day ~1,500 positives @ 8% detection rate	~50K / day ~1,500 positives @ 3% detection rate	~100K / day ~1,500 positives @ 3% detection rate + 30 contacts/positive	~1M / day ~7M residents ÷ 7 days a week
Cost ¹		~\$6M / month	~\$12M / month	~\$30M / month	~\$60M / month	~\$600M / month
% Pop. Tested						
Example Countries						

Need to prioritize who to test today and make testing as efficient as possible, while working to increase capacity to ~100K/day

Testing: How to Test

Case Study: Drive-Thru Testing

- **South Korea** has set up drive-through testing centers. Tests take 10 minutes and **results texted to you the next day**. Able to test ~10ppl/hour
- At this point, **all 50 U.S. states** have also adopted drive-through testing centers. However, currently can take **up to a week to get results**

Other Potential Testing Locations



Drive-Thru



Pharmacy



At Work



Hospital /
Urgent Care
Center

Should utilize current healthcare infrastructure to make testing **widely available** and **easy to access**

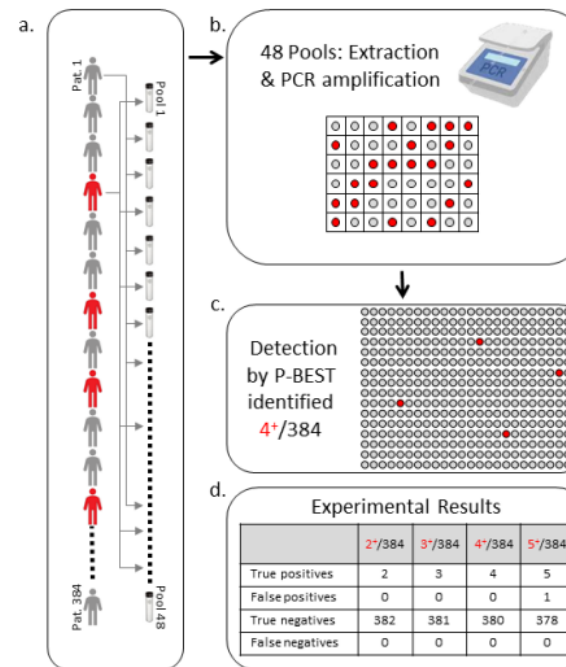
Goal is to make testing easy and quick, in order to test & track as many individuals as possible within the first 2 days of exposure

Making Testing More Efficient: Test Pooling Case Study

Stanford's Test Pooling

- In early testing, Stanford **pooled samples into groups of 9-10** and tested the group
- Of the 292 groups pooled, only two came back positive – further analysis showed that one person in each group was positive
- Concluded **pooling can make mass testing far more efficient**, but only works when **prevalence is low**

Recent COVID-19 Sample Pooling Study



- A recent study showed pooling samples in groups up to 48 samples/group preserved **accuracy** (all positives identified, with no false negatives)
- Group recommends pooling methods for asymptomatic carriers (e.g., in expected low prevalence groups) – can make such **testing far more efficient**

Research still emerging, but may be possible to pool samples in groups of 10-50, significantly increasing testing efficiency (able to run 100K pooled tests in the same time as 10K individual tests)

What Tests to Use: Viral Testing Overview

Key Considerations

How it works: Viral genetic information extracted using swab and amplified in a machine using PCR

What it detects: If you **currently** have COVID-19

Average cost: TBD

Pros

- Detects current infection
- High throughput
- Inexpensive
- Can collect at home

Cons

- Slow results
- Requires many swabs, limited reagents
- High throughput machines require trained technicians

Testing Companies & Capacity

Key Companies

- Abbott Molecular
- BD
- BioGX
- Cepheid
- DiaSorin Molecular

- Hologic
- LabCorp
- NeuMoDx
- PerkinElmer
- Quest Diagnostics

- Full List in Appendix*
- Quidel Corporation
 - Roche Molecular Systems
 - Thermo Fisher Scientific

Sample High Throughput Machines / Products

Company	Abbott	BD / BioGX	Cepheid	Hologic	NeuMoDx	Roche	Thermo Fisher	Labs incl. Quest, LabCorp, etc.
Machine / Product	m2000	BDMax	GeneXpert Infinity	Panther Fusion	288 Molecular	COBAS 8800	TaqPath	Lab Developed Tests
Daily Capacity	470	360	>2,000	1,150	864	4,128	752	>200

Ideal for combination testing and tracing program because of ability to detect infection in real time

What Tests to Use: Antibody Testing Overview

Key Considerations

How it works: Samples blood, test device detects antibodies created by body to fight virus

What it detects: If you **previously** had COVID-19

Average cost: TBD

Pros

- Can identify previous infections
- Takes seconds to test
- Doesn't require swabs
- Can detect previous asymptomatic cases

Cons

- Antibodies slow to develop
- Unclear how protected those with antibodies are
- Program based on antibody testing could encourage ppl to catch virus
- False positives

Testing Companies & Accuracy

Companies

- Abbott
- BioMedomics Inc
- Bioperfectus Technologies
- Cellex
- Decombio
- Biotechnology
- DeepBlue Medical
- Innovita
- Premier Biotech
- Sure Biotech
- UCP biosciences
- VivaChek Biotech
- Wondfo Biotech
- SD Biosensor
- Biolidics Limited
- Biomedomics
- Epitope Diagnostics

Full List in Appendix

Sample Test Specificity

Company	BioMedomics	Bioperfectus	DecomBio	DeepBlue	Innovita	
Specificity	87%	95%	90%	84%	96%	
Company	Premier	Sure	UCP	VivaChek	Wondfo	Epitope
Specificity	97%	100%	98%	95%	99%	90%

Ideal for identifying percentage of population that has been infected, but less ideal for testing/tracing

What Tests to Use: Saliva v. Nasal Testing

Nasal or Throat Swabs

- Currently **most broadly administered** test
- **Recommended by the CDC**
- **Invasive** (involves a long Q-tip-like swab stuck up the nose or into the back of the throat)
- Can take **1-5 hours** to run the test
- Requires **a trained professional to administer**
- Can have a **false-negative rate of ~30%+**

Saliva Tests

- **Recently received FDA** emergency use authorization
- **Minimally invasive** (simply spit into vial)
- Can be **reliably self-administered**
- Requires **less PPE and personnel** to administer
- Not enough information to determine accuracy, but recent studies estimate **~90% to ~95% as effective as nasal or throat swabs**

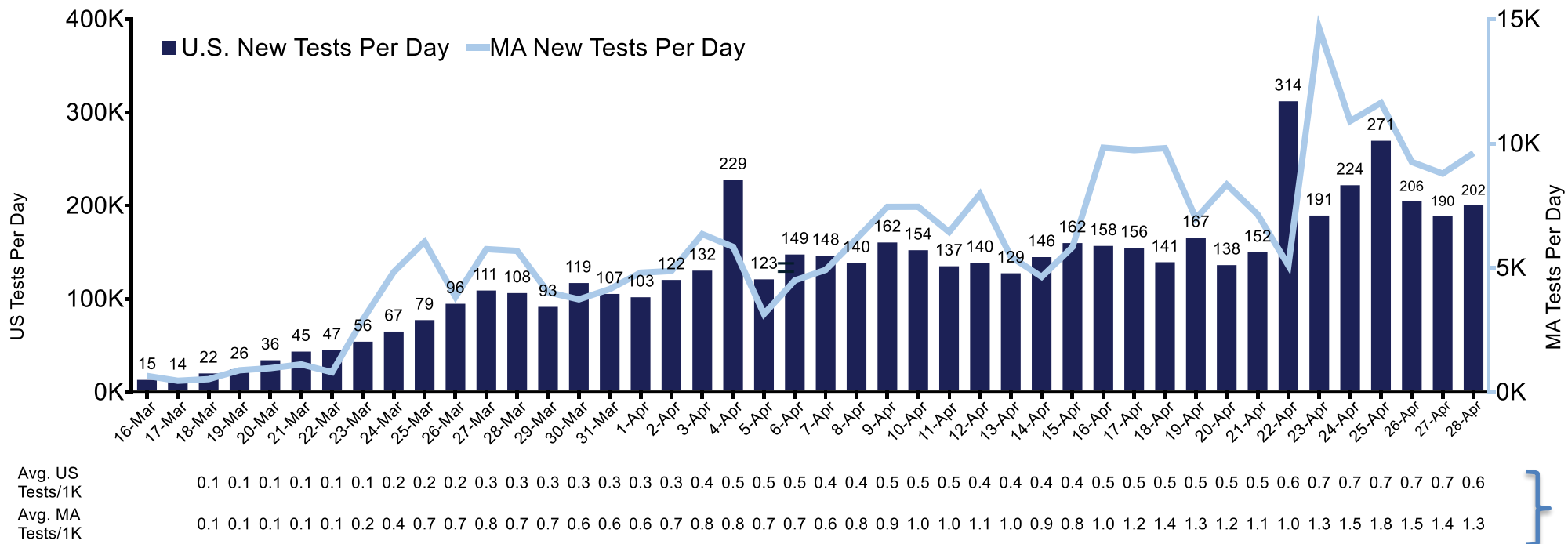
Other Emerging Options

- **DNA test** that can deliver results in 40 minutes using CRISPR
- **Take-home test** – FDA recently authorized the first take-home kit; receive kit with doctor approval and mail back

Should keep track of emerging testing technologies and focus on options that make the testing process as easy and quick as possible while retaining accuracy

Current Testing Capacity

New Tests Per Day

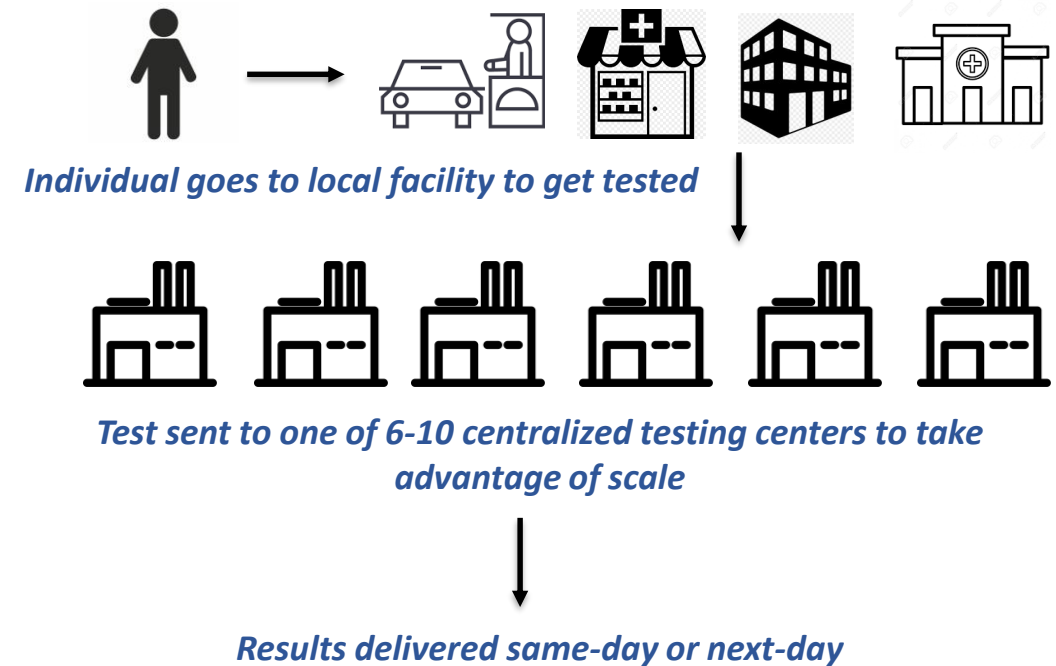


**MA Testing capacity higher than rest of the US on a per capita basis,
but both need to expand dramatically to reach goals of 30M national tests / week**

Building the Necessary Testing Capability

Proposed Rapid Centralized Solution

- MA **contracts directly** with a large/multiple large diagnostics company(s) who can handle 100K+ tests/day
- Provider sets up **6-10 centralized testing centers** to take advantage of scale and ramps up ability to perform **100K tests/day**
- In addition to centralized facilities, **utilize current healthcare infrastructure** and local facilities (hospitals, urgent care clinics, pharmacies, etc.)
- Diagnostics companies require **6-8 weeks** to ramp production – vital to set up contracts **as soon as possible**



Given shortage of testing capacity, Massachusetts should rapidly explore avenues to secure capacity

Testing: Timeline of Solutions

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)

Contact Tracing: Five Key Questions

1. Who Qualifies as a Contact?

Identifying who should be traced and their risk category

2. What Procedures Should Contacts Follow?

Isolation and self-assessment based on risk level

3. How Many Contacts Do You Need to Trace?

Extensive tracing of 70-90% of contacts needed to slow spread

4. How Many Investigators Do You Need?

Thousands of investigators needed to trace 70-90% of contacts

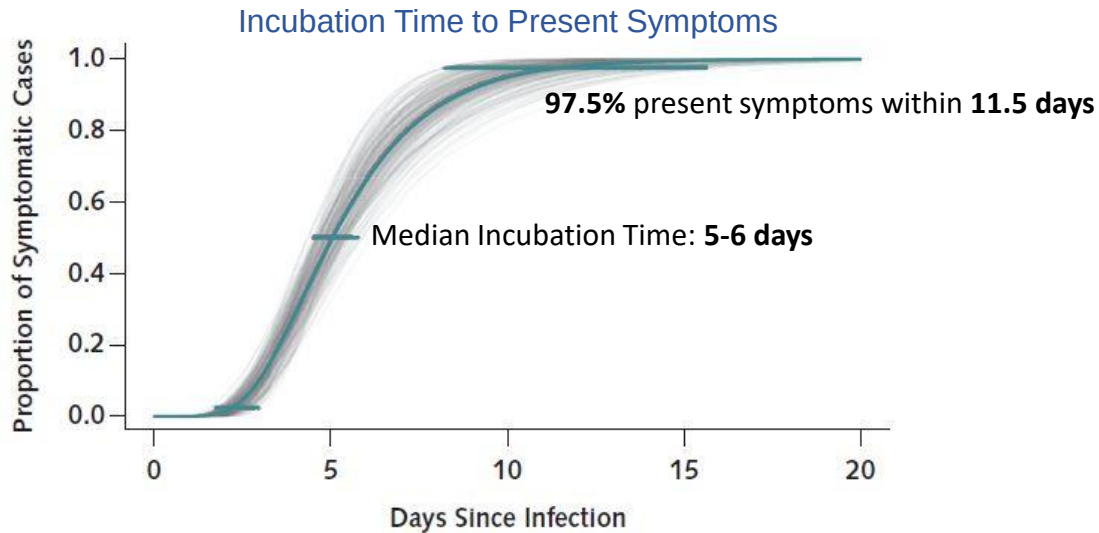
5. How Do You Use Technology to Help?

Digital tracing can increase efficacy considerably

Contact tracing necessary to slow spread and will require large manual and digital effort

Who Qualifies as a Contact?

How Far Back to Trace



- Median incubation period is 5-6 days, full range up to 14 days
- Need to track all contacts from previous **two weeks**
- Should **trace & group contacts** into high, medium, and low risk buckets

Example Case Study: Canadian Classification System

High	Medium	Low
<i>Close contact</i>	<i>Non-close contact</i>	<i>Transient interactions</i>
• Provided direct care without PPE • Lived with infected person (e.g., family) • Prolonged contact within 6 feet of person • Direct contact (e.g. sneezed on)	• Provided direct care with PPE • Prolonged contact but not within 6 feet of person	• Walking by the case • Briefly in same room • Exposure for less than 15 minutes

Need to isolate and test family members, those in contact >15 minutes closer than 6 feet

What Procedures Should Contacts Follow?

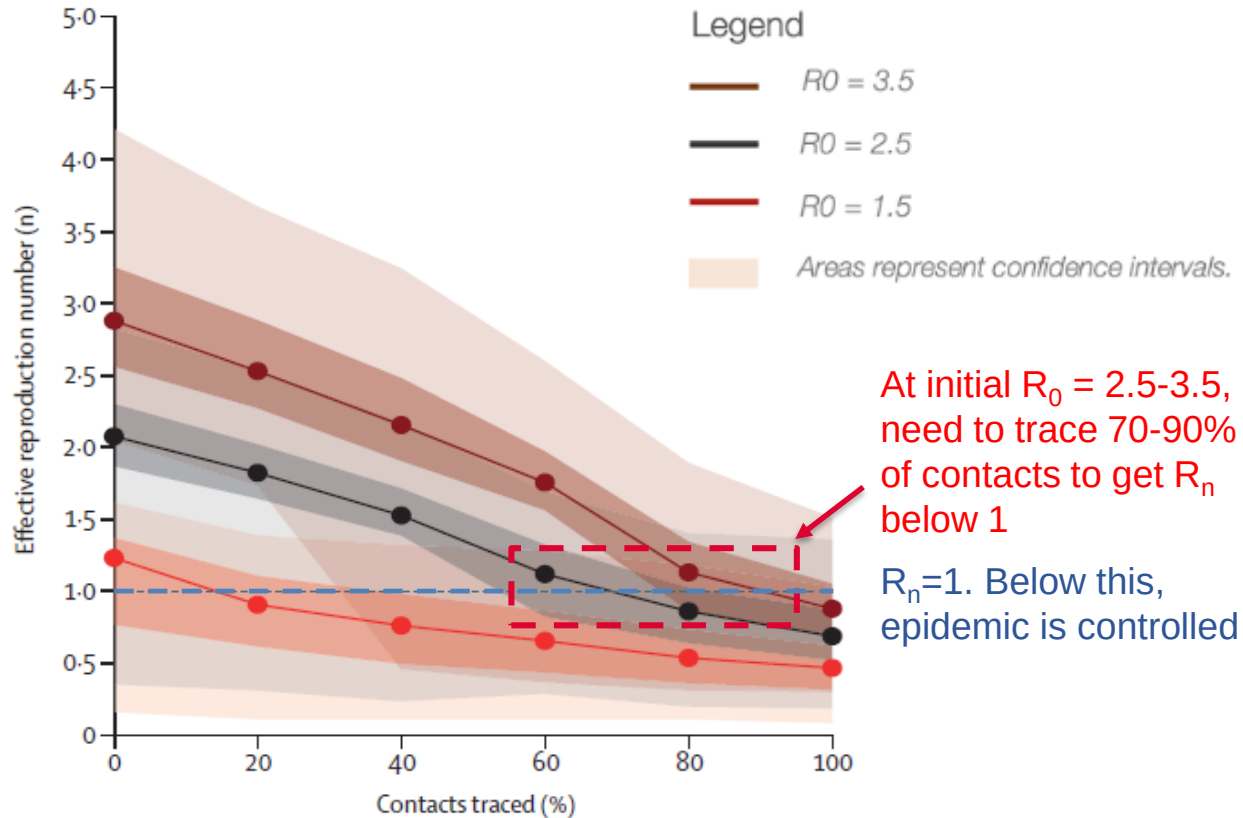
Example Case Study: Canadian Guidelines

	High Risk	Medium Risk	Low Risk
Example	Family Member	Provided direct care while wearing PPE	Walked by on street
Procedures	- Quarantine at home for 14 days after exposure - Practice good hand hygiene and respiratory etiquette - Self-monitor for symptoms such as fever or cough - Record temperature daily	- Self-monitor for symptoms such as fever or cough - Avoid close contact with individuals at higher risk for severe illness - Follow actions recommended for entire population	Follow actions recommended for entire population

Need to determine policies & procedures for contacts to follow based on risk level. Should only high risk contacts be self quarantined, or should medium risk contacts be quarantined as well?

How Many Contacts Do You Need to Trace?

Impact of Tracing on Reproduction Rate (R_n)



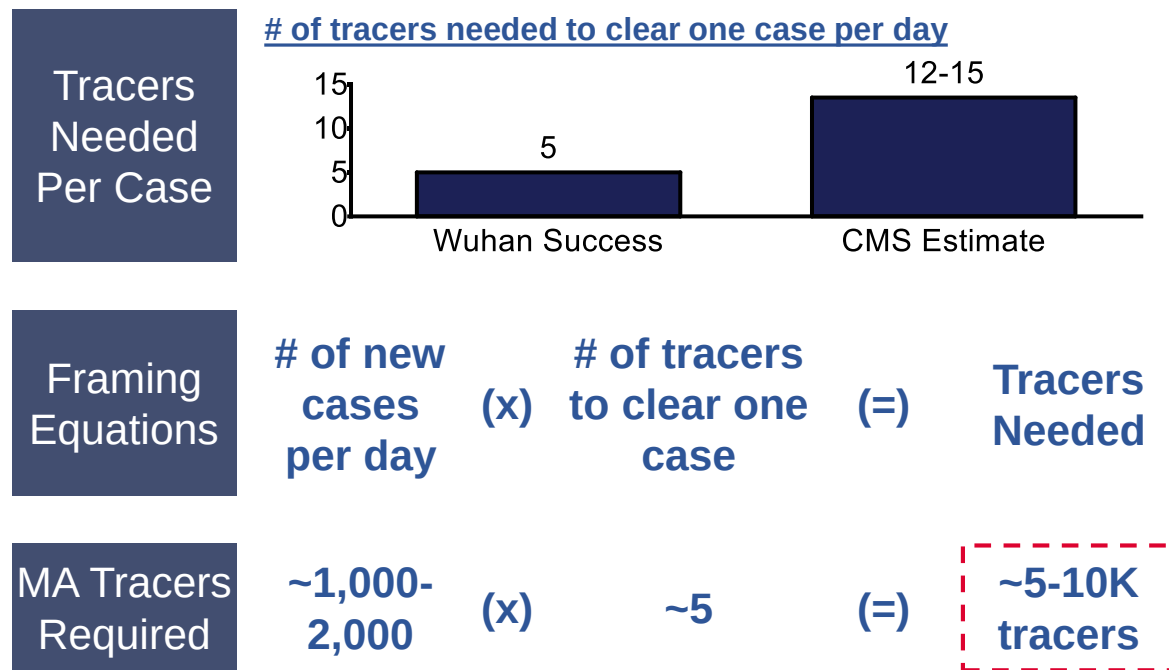
Key Considerations

- Tracing required varies depending on **basic reproduction number** (R_0) of COVID-19 without remediating efforts
- If R_0 is 2.5, need to trace 70% of contacts to control epidemic – studies estimate **20 people per case**
- If R_0 is 3.5, need to trace 90% of contacts to control epidemic – studies estimate **30 people per case**
- Additional measures taken to help lower R_0 will reduce burden on exactness in contact tracing

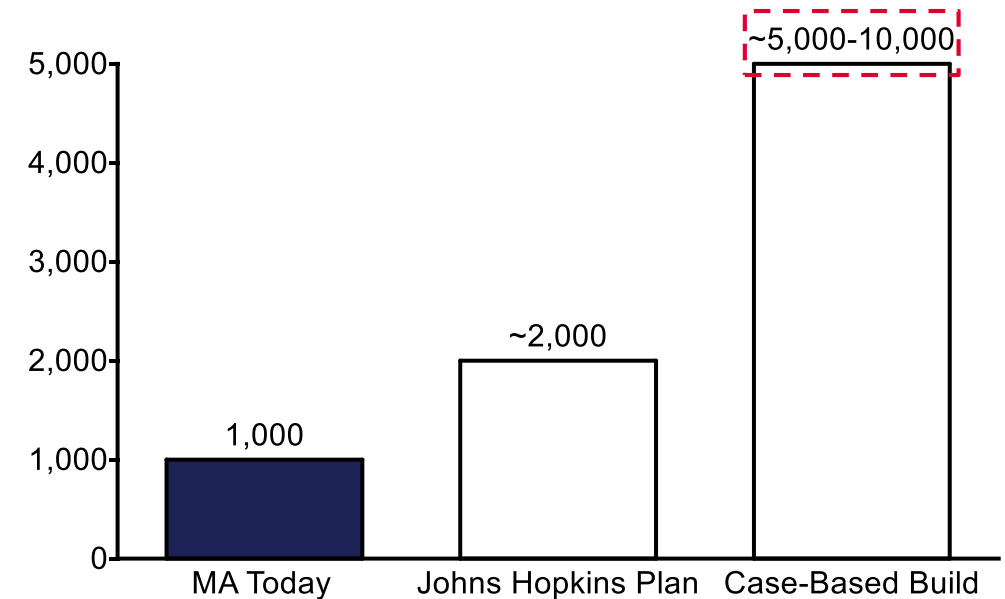
Will likely need to trace and isolate 20-30 closest contacts of each positive case as fast as possible

How Many Investigators Do You Need?

Case-Based Manual Tracers Estimate



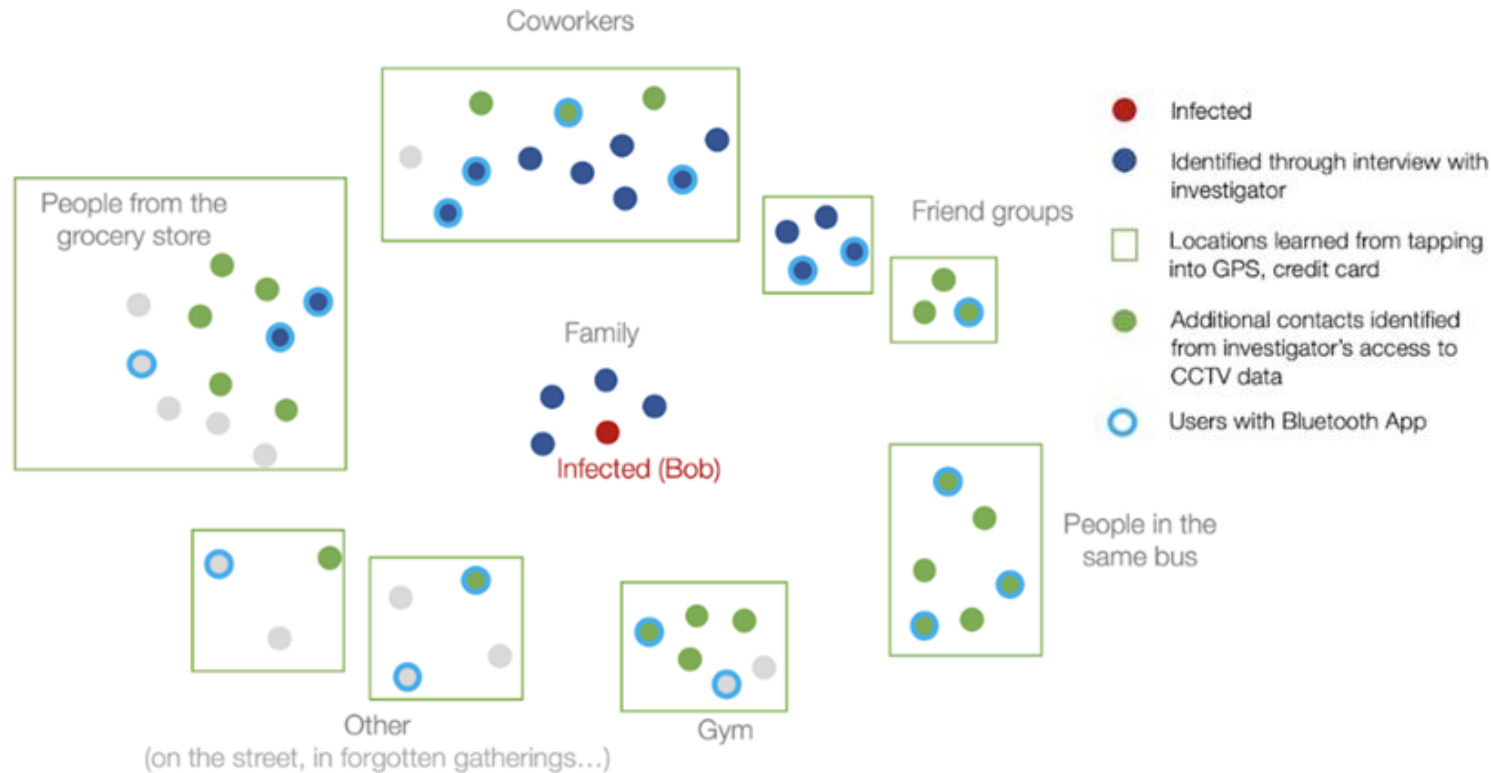
Scale of Manual Tracers Needed in MA



MA may need up to ~5-10K contact tracers

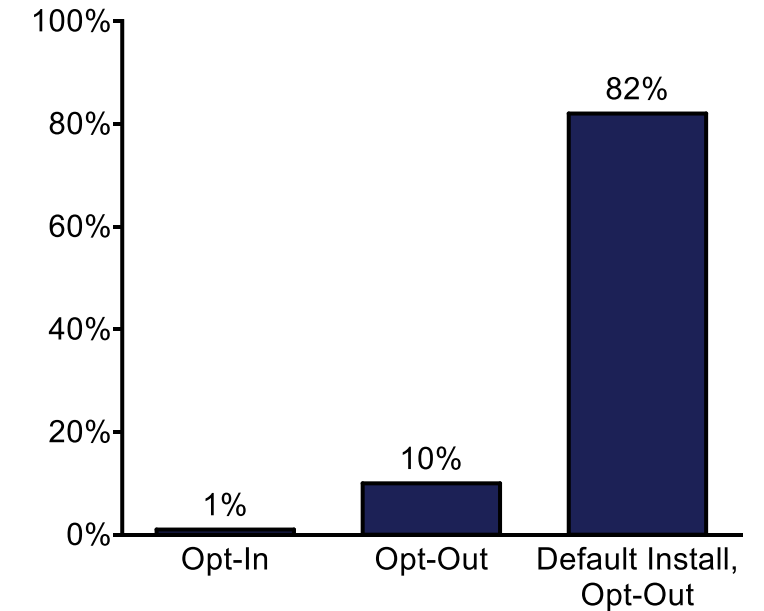
How Do You Use Technology to Help?

Illustrative Contacts Identified through Manual Interview and Digital Tracing



Opt-In vs. Opt-Out Bluetooth App

Share of contacts sent to investigators



Will be difficult to identify 70-90% of contacts with manual tracing alone. Digital tracing can help manual tracers identify far more contacts, particularly with opt-out Bluetooth apps

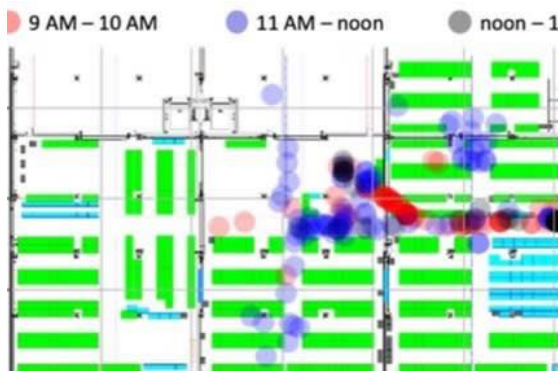
Range of Digital Tracing Options

		Decentralized Centralized			
		Google and Facebook	Europe	South Korea	China
Description	Policy	Alerts users if they've been in contact with a positive case	App that uses central servers to alert contacts of positive cases	Government publishes detailed reports about confirmed cases	Traced residents who left Wuhan, involuntary quarantine
	Technology Used	iPhone and Android devices, Bluetooth	Bluetooth, central servers, cell phone data	Cellphone data, credit-card transactions, security footage	Phone and location data, travel history, drones, security footage
Date Deployed		In development	In development by consortium of institutions & companies	Traced residents in February, gave access to local officials March 4th	Lockdown of Wuhan January 23 rd , traced residents soon after
Success		NA	N/A	Average of 30 cases a day	0 reported new cases
Opt-In/Voluntary?		✓	✓	✗	✗
Information Disclosed	Age and gender	✗	✓	✓	✓
	Travel history	✗	✓	✓	✓
	Address & location	✗	✓	✓	✓
	Contacted persons	✗	✗	✓	✓

Digital tracing can be highly effective, but privacy concerns a key issue

Workplace Digital Tracing: Example Case Study

Exposure Heat Map – Locix App



Each dot represents a spot where two workers passed each other within 6ft

- Locix building a tool designed to **track where people have been at work within a few centimeters**
- Other proposed solutions (e.g., Microshare) may involve workers **wearing badges, key rings or wristwatches embedded with inexpensive Bluetooth beacons** to effectively trace populations without universal smartphone adoption

Example Solutions

Devices Used



Smartphone app



Badges, key rings, and wristbands



Smartphones, IoT sensors, asset trackers, appliances

Technology Used



Companies are building surveillance tools to monitor spread of coronavirus inside offices

Testing & Tracing: Summary

- Testing and tracing can have a **large impact on reducing R_0** (up to ~2x more effective than self-isolating alone)
- In order to be effective, testing & tracing programs need to capture ~70% of contacts within 1-2 days. MA leading the way in the US on tracing (have already assembled a team of ~1000 tracers), but will likely **need ~5-10x more tracers** to accomplish this
- To accurately capture all cases & test contacts, will need **~100K tests/day**. MA capacity slowly ramping (achieving ~10-15K / day currently). Need to **rapidly explore avenues** to performing ~100K tests / day, as **ramping will likely take ~6-8 weeks post-contract**



Although testing / tracing can have a significant impact on reducing R_0 , that impact will be constrained by the time it takes to build up capacity, and the cost associated with large-scale efforts

Legal Feasibility of New Workplace Norms

Key Legal Questions & Considerations

- How to make sure on-site temperature testing, symptom screening, and storing information are **compliant with HIPAA and the ADA?**
- Can compliance with **health & safety guidelines be conditions of employment?** How to deal with employees that refuse to comply?
- How to ensure a **non-discriminatory implementation** of policies and protocols?
- How to implement changes and protocols with a **unionized workforce?**
- How to deal with **potential negligence & lawsuit risk** related to new outbreaks and/or deaths?

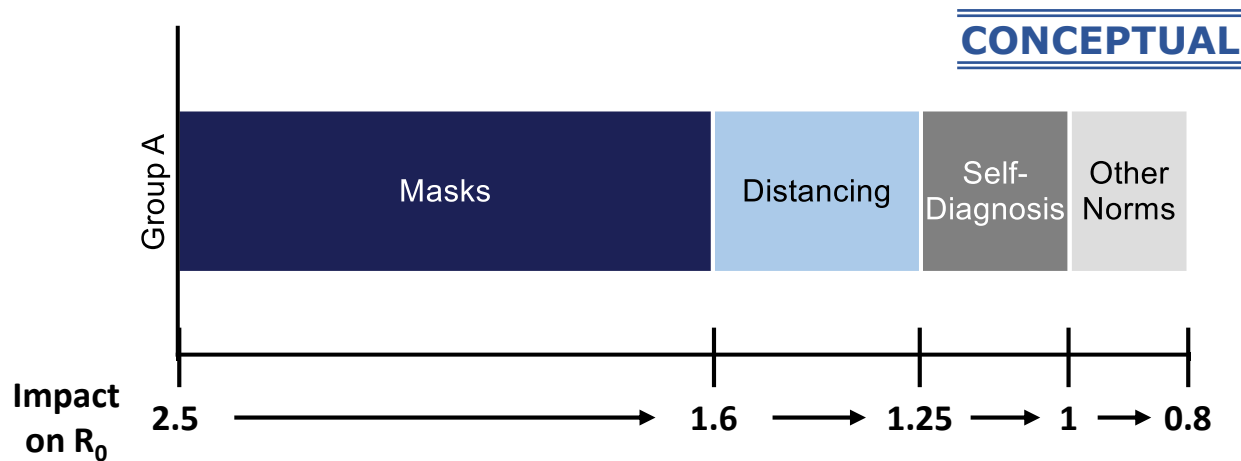
Ropes & Gray Emerging Principles

- Afford employees a **safe working environment** by adopting and enforcing scientifically-based work rules & providing appropriate supplies & support
- Align work rules & practices with **guidelines from the cognizant federal, state, and local authorities**
- Comply with federal, state, and local **laws and regulations**
- Respect the special requirements of **disability rights laws**, including as they apply to **comorbidity**
- Cooperate with state and local **public health departments**
- To the greatest extent possible, **keep private the health and social information** of individual employees

Several legal considerations to implementing new workplace norms. Key questions are (1) what the state should mandate, (2) consistent implementation, and (3) how to provide legal guidance for SMBs

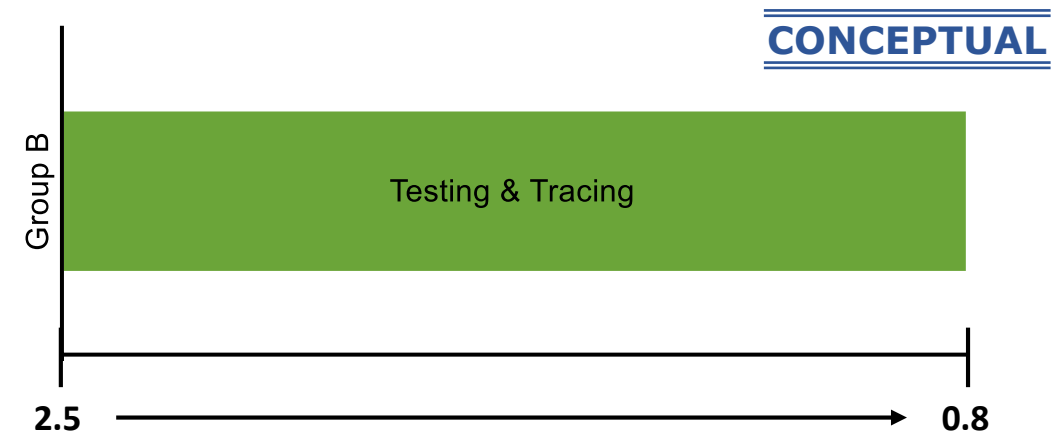
Reducing R_0 Summary Thought Model

Impact of Low Cost, Highly Effective Policies



- Near-perfect implementation of low cost, highly effective policies such as universal mask wearing, distancing and self-diagnosis can reduce R_0 enough on their own

Impact of High Cost, Highly Effective Policies



- Near-perfect implementation of a robust testing & tracing program (~100K tests/day, 5-10K tracers + digital tracing) can reduce R_0 enough on its own

Each group of policies could theoretically reduce R_0 enough on their own to reopen the economy. A combination approach could keep the same level of reduction with less-than-perfect implementation

The War on COVID-19

Timing & Hospital Capacity Constraint Model

Build a dynamic hospital capacity / demand model based on current infection rate and system readiness

Segmentation

Implement segmentation model, sequencing segments returning to work according to risk and ability to safeguard

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

Treatment

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

Therapeutics

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

Vaccine

Accelerate vaccine development & prepare for deployment at-scale

Reduce R_0

Implement policies & procedures to reduce the rate of spread

Workplace Norms

Develop workplace norms to minimize reoccurrence

Testing & Tracing

Develop massive testing & tracing plan to be used to identify & contain virus spread

Appendix

Testing Companies and Organizations, References

- 3D Medicines
- Abbott
- Aculabs, Inc.
- Anatolia Geneworks
- ARUP Laboratories
- A*STAR, Tan Tock Seng Hospital of Singapore
- Assure Tech
- Atila BioSystems
- AusDiagnostics
- Autobio Diagnostics
- Avellino Lab
- Bako Diagnostics
- Baptist Hospital Miami Pathology/Laboratory Medicine Lab
- Becton Dickinson
- Becton Dickinson, BioGx
- Beijing Decombio Biotechnology
- Beijing Diagreat Biotechnologies
- Beijing Kewei Clinical Diagnostic Reagent
- Beijing O&D Biotech
- Beroni Group
- BGI
- Bidesix
- BioMedomics
- BioMérieux
- BioMérieux/BioFire Defense
- Bioneer
- BioReference Laboratories
- Boston Children's Hospital Infectious Diseases Diagnostic Laboratory (IDDL)
- BTNX
- Cellex
- Centers for Disease Control and Prevention
- Cepheid
- CerTest BioTec
- Chembio Diagnostics
- Children's Hospital of Philadelphia Infectious Disease Diagnostics Laboratory
- CirrusDx Laboratories
- Co-Diagnostics
- Core Technology
- Credo Diagnostics Biomedical
- DiaCarta
- Diagnostic Solutions Laboratory
- DiaSorin Molecular
- Diatherix Eurofins
- Diazyme Laboratories
- Eachy Biopharmaceuticals
- Euroimmun/PerkinElmer
- Exact Sciences
- Fosun Pharma USA
- Fulgent Genetics/MedScan Laboratory
- Genetic Signatures
- Genetron
- GenMark Diagnostics
- Genomica/PharmMar Group
- GenoSensor
- Gnomegen
- Gold Standard Diagnostics
- Guangzhou Wondfo Biotech
- Hackensack University Medical Center (HUMC) Molecular Pathology Laboratory
- Hangzhou AllTest Biotech
- Hangzhou Biotest Biotech
- Hangzhou Clongene Biotech
- Hangzhou Testsealabs Biotechnology
- Healgen Scientific
- Hologic
- InBios International
- Innovita (Tangshan) Biological Technology
- Integrated DNA Technologies/Danaher
- Integrity Laboratories
- Ipsum Diagnostics
- Jiangsu Macro & Micro-Test Med-Tech
- JN Medsys
- Kogene Biotech
- Korvalabs
- Laboratory Corporation of America
- LGC, Biosearch Technologies
- Lifeassay Diagnostics
- Luminex
- Maccura Biotechnology
- Massachusetts General Hospital
- Mayo Clinic Laboratories
- Medical Systems Biotechnology
- Mesa Biotech
- Mount Sinai Labs
- Nanjing Liming Bio-products
- NanoResearch
- Nantong Diagnos Biotechnology
- NeuMoDx Molecular
- Nirmidas Biotech
- Northwestern Medicine Diagnostic Molecular Laboratory
- Novacyt/Primerdesign
- NY State Department of Health (performed at Wadsworth Center and New York City Department of Health and Mental Hygiene, Public Health Laboratories)
- Orig3n
- Ortho Clinical Diagnostics
- Osang Healthcare
- PathoFinder
- PCL
- PerkinElmer
- Phamatech
- Promedial
- Qiagen
- Quest Diagnostics
- Quidel
- Rendu Biotechnology
- Roche
- Rutgers University Clinical Genomics Laboratory
- ScienCell Research Laboratories
- SD Biosensor
- Seegene
- Sentinel Diagnostics
- Shanghai Fosun Long March Medical Science/Shanghai Fosun Pharmaceutical
- Shenzhen Landwind Medical
- Snibe Diagnostics
- SolGent
- Sonic Healthcare
- Specialty Diagnostic (SDI) Laboratories
- Stanford Health Care Clinical Virology Laboratory
- SureScreen Diagnostics
- Suzhou Kangheshun Medical Technology
- Systaaq Diagnostic Products
- Telepoint Medical Services
- Thermo Fisher Scientific
- Tianjin Beroni Biotechnology
- TIB Molbiol Syntheselabor
- United Biomedical
- University of North Carolina Medical Center
- Vela Diagnostics
- Viracor Eurofins
- Vision Medicals
- VivaChek Biotech (Hangzhou)
- Yale New Haven Hospital Clinical Virology Laboratory
- YD Diagnostics
- Zhejiang Orient Gene Biotech
- Zhengzhou Fortune Bioscience
- Zhongshan Bio-Tech
- Zhuhai Encode Medical Engineering
- Zhuhai Livzon Diagnostics

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https://www.cepheid.com/en_US/systems/GeneXpert-Family-of-Systems/GeneXpert-Infinity

<https://investors.hologic.com/press-releases/press-release-details/2020/Hologics-Molecular-Test-for-the-Novel-Coronavirus-SARS-CoV-2-Receives-FDA-Emergency-Use-Authorization/default.aspx>

https://www.neumodx.com/wp-content/uploads/2019/03/NeuMoDx_288_Spec_Sheet_R2.pdf

<https://www.ibj.com/articles/roche-begins-shipping-emergency-approved-covid-19-tests-across-country>

<https://www.thermofisher.com/us/en/home/clinical/clinical-genomics/pathogen-detection-solutions/coronavirus-2019-ncov/genetic-analysis/taqpath-rt-pcr-covid-19-kit.html> (94 specimens in 3 hours)

White House Return to Work Framework

BACKUP

Gating Criteria

Symptoms

- Downward trajectory of flu and COVID-19 like illnesses reported within a 14-day period

Cases

- Downward trajectory of positive test rates or documented cases within a 14-day period

Hospitals

- All patients treated without crisis care
- Testing program for healthcare workers in place



Individuals

- **Vulnerable individuals** shelter in place
- Others should **maximize distance** in public, avoid groups of >10 people, wear PPE in public



Employers

- **Encourage telework**
- Close **common areas**
- Minimize non-essential travel
- Certain venues (bars, schools) should **remain closed**

Phase One

Phase Two

Phase Three

- **Vulnerable individuals** shelter in place
- Others should **maximize distance** in public, wear PPE
- Can resume non-essential travel

- **Encourage telework**
- Close **common areas**
- Provide accommodations for vulnerable populations
- Restricted venues (bars, schools) can **reopen** with limited capacity

- **Vulnerable individuals** can resume public interactions
- Others should minimize time spent in crowded environments, wear PPE in public
- Visits to **senior care facilities and hospitals can resume**
- Large venues can operate under limited distancing protocols
- Bars may operate with increased occupancy

Intermittent Work Phasing Option

BACKUP

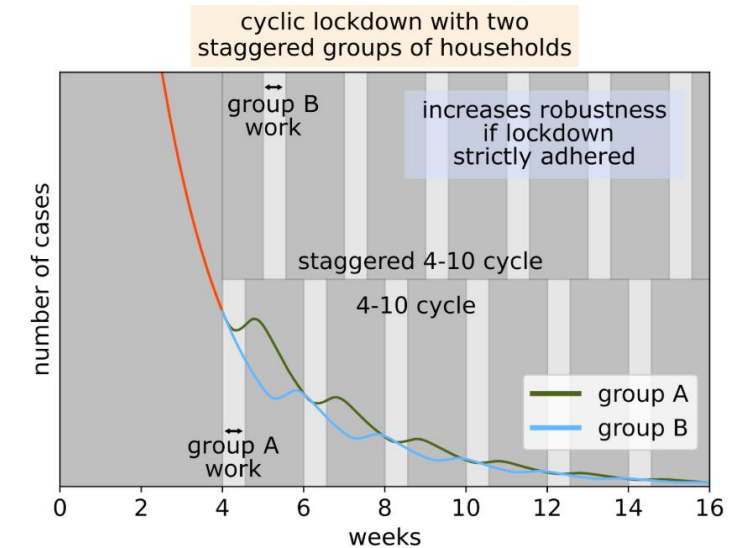
To reduce risk of second wave, could begin by phasing groups in cycles of 4 work days and 10 lockdown days

Those infected at work reach peak infectiousness during lockdown days

day 1	day 2	day 3	day 4	day 5	day 6	day 7			day 13	day 14	day 15
work	work	work	work	lockdown	lockdown	lockdown			lockdown	lockdown	work
infected	latent	latent	becoming infectious	infectious	infectious	infectious			not infectious	not infectious	

infection on first day

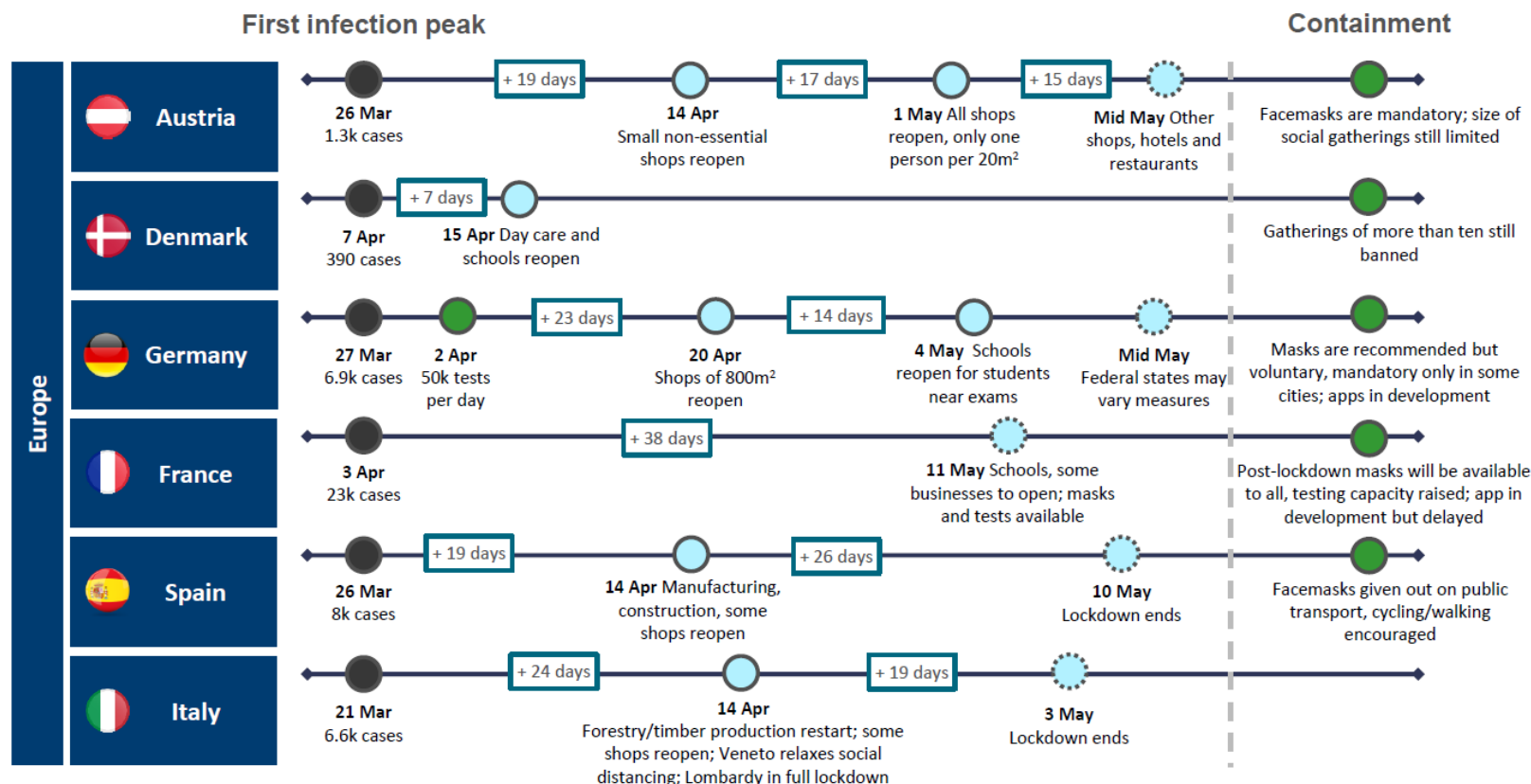
Potential Impact



Could explore alternative back-to-work phasing to help reduce healthcare burden while allowing groups to return part-time earlier, potentially before system fully ready

European Timelines

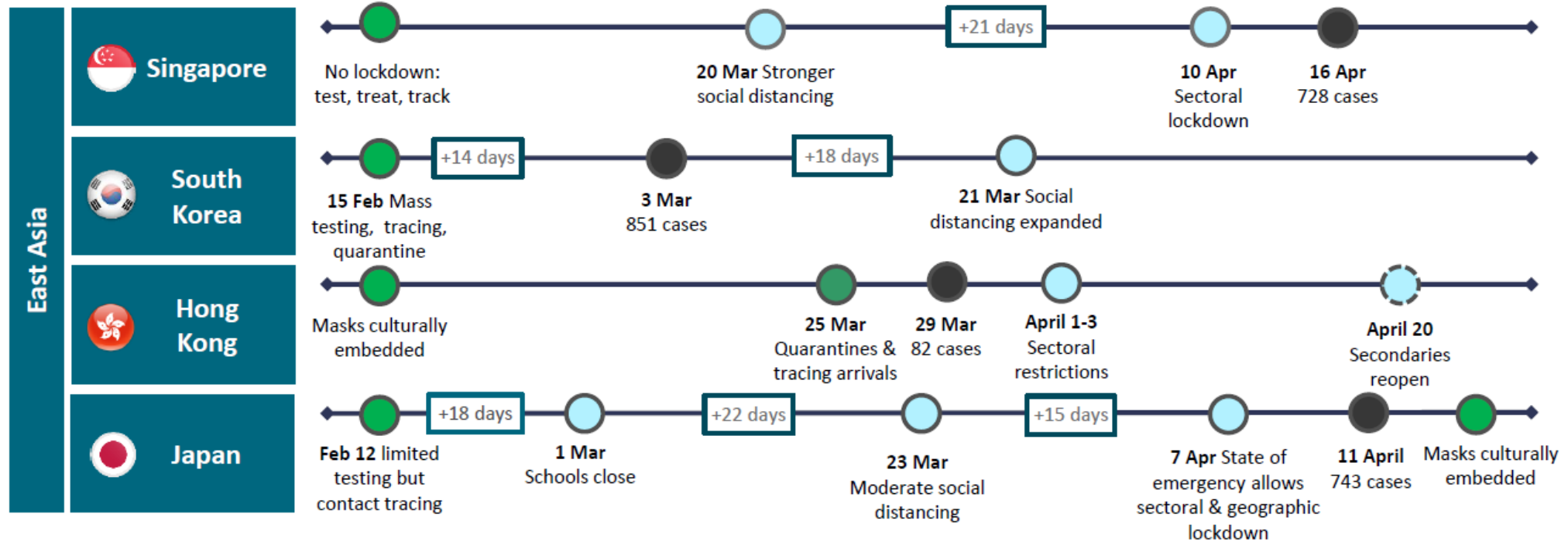
BACKUP



European countries are starting to ease, but containment strategies appear limited, risking acceleration of the virus. This may mean a return to lockdown

East Asia Timelines

BACKUP



East Asia countries are strongly emphasizing containment (masks, testing and tracing), which has enabled most countries to avoid full lockdowns and keep infection spikes below western peers

Reimagining Support Services: Workforce Redeployment BACKUP

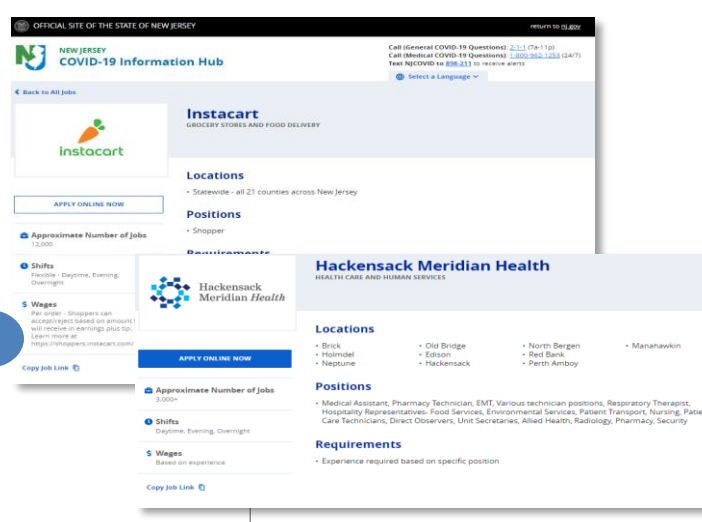
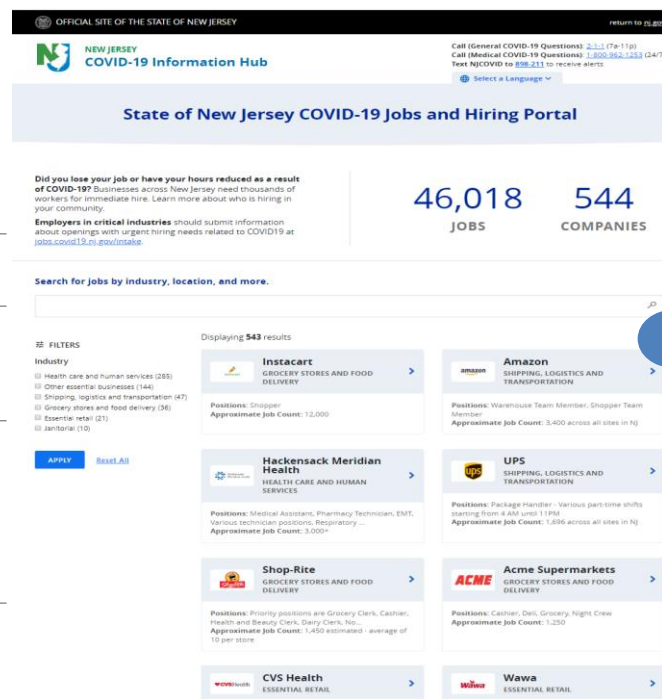
New Jersey State Platform Example

Employer intake form

Ability to search by industry, location, role

Ability to filter main site by industry

Compressed employer cards to allow for viewing more per page; employers still listed in order of total # of posts



Employer details pages

Clicking on employer card on main site takes users to details page; able to see overview of all postings per employer and navigate to employer's website (or send email)

Future releases may allow users to explore an employer's postings by role/location (in contrast to current site, where all of Hackensack's hospital postings are listed together, without specific wage data, # postings per role, locations per role, etc.)

How it works

Job posting platform, featuring postings by employers whose **labor needs are spiking due to COVID-19**, hosted by NJ Economic Development Authority

No matching service, purely 'bulletin board' style.

Outcomes so far

Job posts: 540+ employers posted 46,000+ jobs on the site as of 2 April

Visitors and clicks: Site had ~340K unique visits in its first 10 days, with ~20K aggregate clicks on "Apply Now" buttons

New Jersey has set up a 'bulletin-board' style platform to help match unemployed with new labor needs