STATE OF WISCONSIN

IN SUPREME COURT

Case No. 20AP765-OA

WISCONSIN LEGISLATURE,

Petitioners,

v.

Secretary-Designee ANDREA PALM, JULIE WILLEMS VAN DIJK and NICOLE SAFAR, In Their Official Capacities as Executives of Wisconsin Department of Health Services,

Respondents.

AFFIDAVIT OF JULIE WILLEMS VAN DIJK IN SUPPORT OF RESPONDENTS' RESPONSE TO PETITION FOR ORIGINAL ACTION

STATE OF WISCONSIN)
) ss.
COUNTY OF DANE)

I, Julie Willems Van Dijk, being first duly sworn, on oath, states as follows:

1. I am the Deputy Secretary of the Wisconsin Department of Health Services (DHS). Since March 16, 2020, I have been the DHS leader of the unified command structure at the State Emergency Operations Center (SEOC). I have over 30 years of experience in the field of public health, including seven years as the Marathon County Health Officer.

2. SARS-CoV-2, the virus that causes coronavirus disease 2019 ("COVID-19"), represents a grave global health emergency with significant potential to produce a high number of deaths. DHS has listed SARS-CoV as a Category I

communicable disease at Wis. Admin. Code ch. DHS 145, Appendix A.

3. Individuals with COVID-19 report a wide range of symptoms including fever, cough, shortness of breath or difficulty breathing, repeated shaking with chills, muscle pain, headache, fatigue, sore throat, nausea, vomiting, and diarrhea.

4. While most people with COVID-19 recover, infection can lead to severe disease requiring hospitalization, intensive care, and mechanical ventilation. The risks of severe complications are highest for older persons and individuals with pre-existing health conditions such as diabetes or cardiovascular disease.

5. SARS-CoV-2 is a novel virus, meaning it has never been observed or studied before. Details about the virus's rate of spread and its effects are still largely unknown, which makes it incredibly important to be highly cautious in dealing with the current situation. What we do understand at this point is that SARS-CoV-2 is notable for its high level of virulence and transmissibility. In addition, unlike seasonal influenza, because SARS-CoV-2 is a novel virus, no one has developed immunity to the virus except for possibly some of those who have already contracted COVID-19. The immune response, including duration of immunity, to SARS-CoV-2 is not yet understood.

6. This combination of factors creates the potential for a rapid surge in infections, an enormous number of overall infections, and a correspondingly high number of deaths. According to the SEOC Daily Situation Report (with data compiled from the World Health Organization, the Centers for Disease Control, and DHS) for April 21, 2020, the date this case was filed, there were 2,397,216 confirmed cases of COVID-19 worldwide and 162,956 deaths, including 776,093 cases and 41,758 deaths in the United States and 4,620 cases and 242 deaths in Wisconsin. By April 26, 2020, the number of cases and deaths in the United States had risen to 895,766 and 50,439, with 5,911 cases and 272 deaths in Wisconsin. These numbers continue to rise every day.

While the number of confirmed cases in Wisconsin has grown significantly over the past week, this is due in part to an increase in testing; the percentage of tests that has come back positive has remained mostly stable. The number of cases confirmed through testing does not reveal the full scope of infected individuals in Wisconsin.

7. While most people with COVID-19 will not require hospitalization, we know from experiences around the world, in the United States, and in Wisconsin that COVID-19-related hospitalizations can put an enormous strain on hospitals and in particular on Intensive Care Units (ICUs). In Wisconsin, roughly 1 in 4 confirmed cases of COVID-19 has required hospitalization, and roughly 1 in 4 of those patients admitted to the hospital have required intensive care. Based on Centers for Disease Control (CDC) estimates, the length of time patients spend in the hospital varies from 8 days for a non-ICU stay, to 10 days for an ICU stay with no ventilator, to 16 days for an ICU stay with a ventilator. Thus, each day that new patients are hospitalized adds significantly to the existing burden on hospitals treating COVID-19 patients.

8. Overall, Wisconsin has a total of about 1,400 ICU beds, 860 intermediate care beds, 7,300 medical/surgical beds, and 1,900 negative flow isolation rooms for a total of 11,543 beds. Under normal circumstances, more than half of these beds are occupied at any given time. If the demand for COVID-19-related hospitalization exceeds local capacity, patients could potentially be transferred to hospitals below capacity. However, if transfer is not possible, rationing of care will occur, including rationing ventilators. Hospitals that have exceeded their capacity to treat patients due to COVID-19 will be unable to treat other conditions such as heart failure or trauma from vehicular accidents. If a hospital's supply of Personal Protective Equipment (PPE) is limited or exhausted, healthcare workers will be at a significant risk of contracting COVID-19, further limiting the healthcare system's capacity to treat new cases.

9. A rapid surge in COVID-19 not only strains the healthcare system but can also result in the loss of critical workforce. If workers in critical sectors become sick or need to isolate due to exposure, the results could include inadequately staffed hospitals, nursing homes, emergency medical services (EMS) agencies, police forces, fire services, utility infrastructure, and other critical services. The introduction of COVID-19 into a workplace can lead to rapid spread of the virus in a short period of time, thus jeopardizing the ability of a workplace to function.

10. Public health experts refer to "containment" as a strategy for responding to communicable diseases such as COVID-19. Containment involves identifying all cases of disease and isolating affected patients and all people who have had close contact with infected individuals. The objective of containment is to prevent continued transmission within a population and keep the disease burden low. Successful containment of a disease such as COVID-19 that is rapidly creating many cases, however, requires rapid scaling in public health infrastructure in order to prevent community transmission.

11. DHS first observed community spread of COVID-19 in Wisconsin on or about March 15, and we continue to see community spread of COVID-19 in Wisconsin. Community transmission has been observed throughout the state.

12. When containment is not possible, mitigation strategies become necessary. COVID-19 has spread at such a rapid rate around the globe and within the United States that mitigation measures have been widely implemented. These measures, also termed non-pharmaceutical interventions, involve actions to reduce person-to-person contact and often include closures and dismissals of schools and universities, restrictions or bans on mass gatherings, and distancing within workplaces through remote work or closure of nonessential businesses. The goals of mitigation are to slow acceleration of cases in the community, reduce peak demand on hospitals, decrease cases overall, and reduce the associated health impact and deaths while also

building capacity in the healthcare and public health systems to transition to containment.

13. Transmission of the virus is possible regardless of where individuals are gathered and regardless of whether the individuals have obvious symptoms of COVID-19. Experience and research have shown that seemingly healthy individuals can spread the virus to others before symptoms manifest. These newly infected individuals can, in turn, infect people with whom they come into contact. In this way, gatherings of any sort can lead to numerous people becoming exposed to and infected with the virus in a short period of time before any infection is confirmed among the individuals involved. Accordingly, effective mitigation requires eliminating gatherings to the greatest extent feasible.

14. To illustrate the effects of mitigation on reducing the risk of disease transmission, consider the following example. Before mitigation measures were implemented in Wisconsin, a typical infected patient had 5 or more contacts. If each of those contacts has 5 contacts, and each of those contacts has 5 contacts, and so on, we would see 125 possible cases after 1 month and 15,625 possible cases after two months from one infected patient. With adherence to the current mitigation measures, most people only have significant contact with their immediate family. If an infected patient only has 3 contacts and so on, we would see 27 possible cases after 1 month and 729 cases after two months. In reality, the current mitigation strategies often made these numbers even smaller if all members of the family are able to fully stay at home, as the chain of transmission is broken by not seeing other people.

# of contacts for each case and their contacts	**1 month**	**2 months**
3	27	729
5	125	15,625

15. Multiple countries in Europe and Asia have implemented "stay at home" orders to reduce the impact from COVID-19. In the United States as of April 20, 2020, at least 316 million residents across 42 states, the District of Columbia, and Puerto Rice were under stay at home orders.

16. Disease modeling has informed decisions throughout the United States and across the globe to implement mitigation measures. There is a body of evidence supporting mitigation interventions. Each mitigation measure has an underlying evidence base derived from previous outbreaks. The CDC has summarized recommended mitigation measures based on the degree of community transmission. The mitigation measures adopted in Wisconsin to date are consistent with these CDC recommendations.

17. The COVID-19 pandemic evolved quickly in Wisconsin and required rapid action. While Wisconsin was the sixth state in the nation to have a COVID-19 patient, that first case was diagnosed on February 5 and recovered with no known transmission to others. Wisconsin's next two COVID-19 cases were reported on March 9. In response, Wisconsin took the following actions:

a. On March 12, Governor Evers declared a public health emergency (8 total COVID-19 cases);

b. On March 13, the Governor ordered the closure of schools state-wide beginning March 18 (Emergency Order # 1, 19 total COVID-19 cases);

c. On March 16, the Governor ordered DHS Secretary-designee Andrea Palm to issue a ban on gatherings of more than 50 people (Emergency Order #4, 47 total COVID-19 Cases);

d. On March 17, the Governor ordered Secretary-designee Palm to issue a ban on gatherings of more than 10 people (Emergency Order #5, 72 total COVID-19 cases);

e. On March 18, the Governor ordered Secretary-designee Palm to issue a ban on the size of childcare centers (Emergency Order #6, 106 total COVID-19 cases); and

f. On March 20, Emergency Order #5 was updated to further clarify the ban on gatherings larger than 10 people (Emergency Order #8, 206 total COVID-19 cases).

18. The "doubling rate" refers to the time (expressed in days) it takes for the number of confirmed cases to double. During this period in early March, DHS was comparing the doubling rate in Wisconsin of 3.4 days to doubling rates in other countries, including Italy, and seeing that we were on a trajectory to experience similar scenarios as those experienced in other parts of the world. Attached to this affidavit as Exhibit A is a true and correct copy of a report dated March 26, 2020, titled "COVID-19 Modeling by the Wisconsin Department of Health Services" ("March 26 Modeling Report"). The March 26 Modeling Report contains the data and analyses that DHS was relying on in the period before March 24. These projections showed that the number of cases and deaths in Wisconsin could reach: 1,200 cases by March 25 resulting in 10-87 deaths; 5,000 cases by April 1 resulting in 100-350 deaths; 22,000 cases by April 8 resulting in 440-1,500 deaths.

19. Other analyses shared with DHS around March 22, 2020 indicated that COVID-19 cases would exceed hospital capacity within days or weeks and that, without the imposition of effective mitigation strategies in the next two or three days, healthcare demands would exceed capacity. Initiating robust mitigation strategies, such as a shelter in place order, was necessary to immediately reduce the doubling time and its catastrophic consequences.

20. During this same time, DHS was consulting regularly with healthcare organizations around the state who were preparing their own models and expressing concern that the number of cases and associated hospitalizations could quickly exceed their capacity,

particularly their ICU bed capacity and ventilator capacity, by late April or mid-May without taking further mitigation actions immediately.

21. Given what the data was showing about the exponential growth of the virus in Wisconsin, there was a window of only two to three days for significant mitigation measures to be imposed that would avoid an unsustainable surge of cases. Accordingly, on March 24, 2020, Secretary-designee Palm signed Emergency Order Number 12 ("First Safer at Home Order"). At the time, there were 457 confirmed cases of COVID-19 in Wisconsin. The First Safer at Home Order mandated significant mitigation measures throughout the State of Wisconsin to slow the spread of COVID-19 in the State and save lives. At least nine other states had imposed similar orders as of March 23. By March 26 that number, which included Wisconsin, was 21.

22. On March 16, even before the First Safer at Home Order, the State Emergency Operations Center (SEOC) moved to level 1, its highest level, thereby calling into action all state agencies to respond to the emergency. The Governor's emergency declaration also authorized the Adjutant General to call to active duty Wisconsin's National Guard forces. As of April 27, more than 1,000 soldiers and airmen have been called to active duty to assist with the State's COVID-19 response. Since March 16, DHS has been working with staff across state government to coordinate the response to the COVID-19 pandemic. There are approximately 92 staff members working 12- to 14-hour days within the SEOC every day of the week. Staff members represent a wide variety of skill sets including public health physicians, epidemiologists, public health educators, statisticians, logistics specialists, project managers, National Guard servicemembers who have been trained to conduct specimen collection or nursing assistant duties, human resource specialists, IT professionals, procurement and accounting staff, and more. Even more state employees are responding to the emergency while working remotely. The scope of this effort is enormous and includes, but is not limited to:

a. The National Guard's work assisting with testing, providing care at isolation facilities and in healthcare settings, managing the warehousing of necessary medical supplies, and the transportation of testing specimens;

b. The Department of Administration is providing critical project management support to various task forces, helping with staffing augmentation, providing necessary IT support, and overseeing funding and procurement matters;

c. The Department of Children and Families has provided essential support to surge childcare facilities serving essential healthcare workers and first responders;

d. The Wisconsin Economic Development Corporation has been working with private sector employers to provide guidance on making essential workplaces safe for workers and citizens;

e. The Department of Natural Resources has provided security at isolation facilities; and

f. The Department of Corrections has worked with DHS and the Wisconsin National Guard to enhance infection control within correctional institutions, screen employees for COVID-19, and prepare isolation areas within institutions for inmates who test positive of COVID-19.

23. The SEOC created ten taskforce teams to focus on the immediate response needs including, but not limited to: isolation facilities; hospital surge planning; PPE procurement and logistics; laboratory capacity and specimen collection; data analytics; health care worker childcare; contact tracing and surveillance; elections; mortuary affairs; and future operations. The Safer at Home order not only was necessary to reduce the doubling time of the virus to flatten

the curve, but it also allowed time to ramp up systems necessary to respond to rising hospitalization rates and to prepare for containment strategies. The SEOC is also coordinating, including through daily briefings, with the local Emergency Operation Centers in Wisconsin, which are now fully operational throughout the state. Although each local public health agency in Wisconsin has authority over its jurisdiction, in the context of a pandemic, these local health agencies work in close coordination with DHS. Throughout all of this, DHS is working to rapidly build up infrastructure, such as testing and contract tracing capacity, to prepare for the State's transition away from mitigation strategies.

24. DHS and the SEOC must respond regularly to requests ranging from simple demands for information or equipment to complex emergencies requiring immediate action. For example:

> a. The SEOC will often be informed that residents at a long-term care facility have tested positive for COVID-19. In these situations, requests are often made for PPE, testing of residents and staff, and additional staffing resources due to numerous staff that are in isolation or fearful to return to work. The SEOC must immediately mobilize personnel to address the situation by bringing together all of the relevant state (e.g., DHS, Wisconsin Emergency Management, Wisconsin National Guard and others) and local parties (e.g., Local Emergency Management, local public health, facility leaders, healthcare partners, and others). The following specific situation illustrates the urgency of this process. One long-term care facility contacted the SEOC at 1:00 pm on a Saturday to report they had one resident who died of COVID-19, another was infected, and numerous others who were exposed and in isolation. Staff were afraid to come to work as there was very limited PPE on hand and the

facility manager did not think the evening or night shift would report for duty. Wisconsin National Guard members were deployed to the facility and provided care for the next three days, beginning with the night shift.

b. Similarly, the SEOC has responded to requests involving outbreaks in local county jails and at various worksites across the state. To stem the tide of disease transmissions, testing resources are often dispatched within a day or two of the requests. When communities experience sudden surges in reported cases that exceed their local capacity to conduct contact tracing, they contact DHS/SEOC for additional contact tracing staff.

c. Even simple resource requests can be challenging at the SEOC. Because PPE, especially N-95 respirator masks and gowns, are in such short supply, the SEOC has had to establish policies for how to allocate these limited supplies and maintain an emergency cache that can be used when smaller healthcare facilities, such as Assisted Living Facilities or Group Homes that contact the SEOC to report they have a COVID-19 positive resident and they have no PPE for their workers, requiring the SEOC to route necessary resources to those facilities.

25. There are documented cases of COVID-19 in nearly every county in Wisconsin. Given the nature of COVID-19 and how it spreads, it is counterproductive to implement a mitigation strategy in a non-uniform fashion across the state. First, it is important to consider that the healthcare systems in different parts of the state have different capacities. In parts of the state that are only served by one critical access hospital, a surge in COVID-19 cases will quickly overwhelm the system. Second, people from different parts of the state will inevitably move through different counties. Just one infected person can seed the

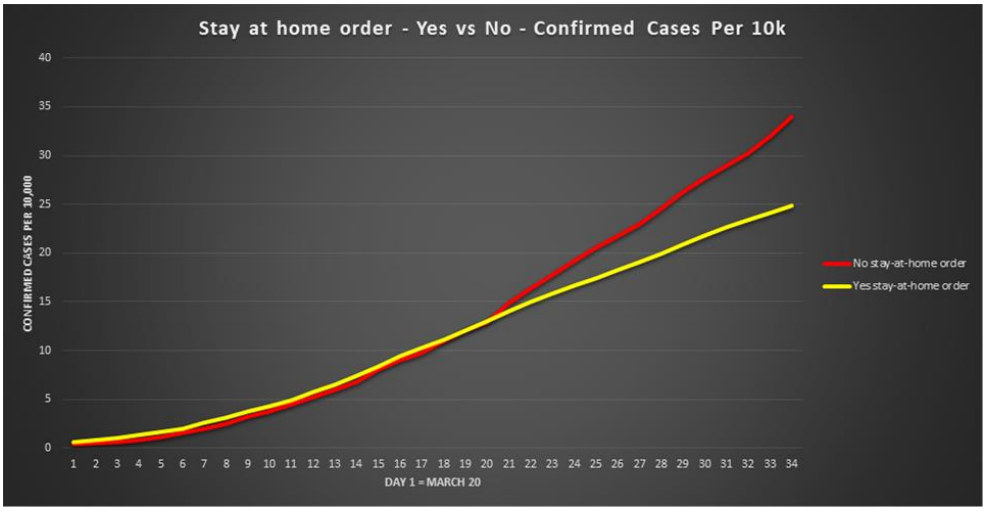
virus in a community and thereby cause new surges. Indeed, the fact that cases have been discovered throughout the state demonstrates that the virus does not respect state or county borders. The fact that some counties in Wisconsin have a low number of confirmed cases is likely a product of the First Safer at Home order's success and does not mean that those places are not susceptible to an outbreak.

26. A recent example of how a situation can change rapidly is Brown County. On April 11, 2020 Brown County had 60 positive COVID-19 cases, an indication that Safer at Home was having positive effects. Just two weeks later, on April 26, 2020, they had 776 cases—largely due to spread of the virus at several essential businesses that remained open under the Safer at Home order. Since March 20, 2020, DHS has received reports of 127 outbreaks in nursing homes, assisted living facilities, community-based residential facilities, jails and detention centers, and essential businesses. The Brown County example, and the incidence of outbreaks generally, illustrate that keeping the disease burden low while allowing for the operation of a limited number of essential businesses is a challenge and that broadly opening up other businesses before containment strategies are in place could compound this problem. Moreover, if locations throughout the state experience simultaneous strains on hospital capacity, the ability of other parts of the state to absorb that burden is diminished.

27. In Wisconsin, it appears that the First Safer at Home Order has been successful in "flattening the curve." On April 8, 2020, we observed 2,756 cases and 99 deaths overall in the State, and our doubling time for cases had increased nearly fourfold from 3.4 days during the period between March 3 and 15 to 12.4 days. So far, no hospitals in the State have exceeded capacity. While early models of the virus's spread are less reliable the further out they project, those models showed that, by April 8, Wisconsin would have seen 22,000 cases which would have resulted in 440-1,500 deaths. Therefore, we estimate that the First Safer at Home order saved between 300 and 1,400 lives by April 8th. University of Wisconsin researchers at the Global Health

Institute estimate that the First Safer at Home order decreased cases by 55,000 and deaths by 2,200 by its original expiration date on April 24.

28. DHS compared data related to COVID-19 cases in states where orders like the First Safer-at-Home order were implemented to data from states that did not issue such orders. This comparison showed a significant difference in the number and growth of cases in states with and without Safer at Home orders.



29. When considering whether to extend the First Safer at Home order, DHS leaders reviewed disease modeling for Wisconsin, conducted by DHS in coordination with researchers at Johns Hopkins University, provided to DHS on April 10, 2020. Attached to this affidavit as Exhibit B is the report, titled "Johns Hopkins Modeling WI COVID-19 – GOAL" ("Johns Hopkins Report"). This paper indicated that allowing the First Safer at Home order to expire would have produced a surge in cases that would exceed hospital capacity in the state. In the absence of the robust mitigation measures imposed by the First Safer at Home Order, the researchers noted that, by May 1, total hospitalizations in Wisconsin would have reached 94,200 with 22,600 ICU stays and 15,820 patients requiring ventilators. With Safer at Home in place for one month, these estimates were reduced to 13,100 hospitalizations with 4,800 ICU stays and 3,360 patients requiring ventilators for the same time period;

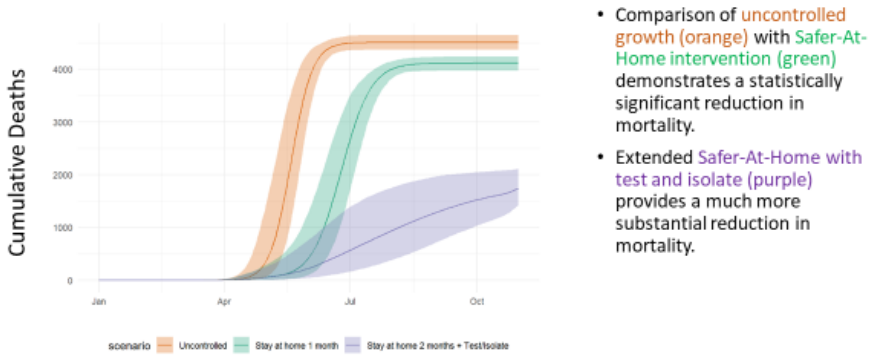
however lifting the order after one month would result in a resurgence of cases, with peak hospitalizations exceeding 90,000 with 36,700 ICU stays and 25,690 patients requiring ventilators. In fact, the Johns Hopkins model indicated that resurgence will occur whenever the Safer at Home order is lifted unless aggressive containment strategies, including extensive testing and contact tracing, are in place. At the moment, Wisconsin is still building its capacity to implement those aggressive containment strategies.

30. DHS relied on the Johns Hopkins Report to guide its decision to issue Emergency Order Number 28 ("Second Safer at Home Order"). DHS was confronted with the reality that the state lacked the critical infrastructure to implement successful containment measures and that easing the current mitigation efforts would lead to a shortening of the virus's doubling rate and a corresponding surge in infections. The virus has and will continue to place enormous burdens on the economy and society and, prior to the First Safer at Home Order, threatened to send thousands of critically ill patients to hospitals that would be unable to treat them. Without the ability to successfully contain the virus in the state, a surge in infections will undo progress that has been made toward slowing the spread of the virus and increase the likelihood that mitigation measures will need to be re-imposed in the future, perhaps for extended periods of time. While exceptions to mitigation measures are necessary to allow for essential operations and for people to safely stay at home, each exception comes with the risk of undermining the goals of mitigation. The Brown County surge over the past two weeks is evidence of this risk. DHS has crafted its response to the pandemic to allow for essential operations while ensuring that the disease burden does not overwhelm our healthcare system.

31. DHS staff have continued to conduct additional modeling to predict the effect of mitigation and containment strategies using software from and under the guidance of the Johns Hopkins research team. Simulations of Wisconsin's outbreak were conducted under different scenarios, including: Uncontrolled growth, Safer-At-Home through

April 24, and Safer-At-Home through May 26 with testing and isolation. Results are depicted in the table and graphic below.

Four measures of the burden (with 95% confidence intervals) of the COVID-19 outbreak on Wisconsin, through Oct 1, 2020, under three intervention scenarios.			
Burden measure	**Uncontrolled**	**Safer At Home to April 24**	**Safer At Home to May 26 + Test/Isolate**
Deaths	4,500 (4,400, 4,600)	4,100 (4,000, 4,200)	1,500 (1,000, 2,000)
Hospitalization, Cumulative	45,100 (44,700, 45,500)	41,100 (40,500, 41,500)	15,900 (11,400, 21,000)
Hospitalization, Peak Capacity	16,400 (13,400, 17,700)	10,800 (8,800,11,700)	1,600 (1,200,2,500)
ICU, Peak capacity	7,300 (6,200, 7,800)	4,900 (4,000, 5,300)	800 (600, 1,100)



These results indicate that Wisconsin's current path—two months of Safer at Home with the development of testing, tracing, and isolation—will result in approximately 2,600 lives saved by October 1 as compared to allowing the First Safer at Home order to expire. In addition, this approach protects Wisconsin from overwhelming its ICU and ventilator resources.

32. As of April 25, 2020, all of the Midwestern states except Iowa (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin) have stay at home orders in place. Illinois' order is in place until May 31, Michigan's until May 15,

Minnesota's until May 5, and Indiana's and Ohio's until May 1. Michigan and Indiana, like Wisconsin have closed school for the remainder of the current school year.

33. Public health experts typically predicate movement from a posture of mitigation to one of containment on a number of criteria, often termed "triggers" or "gating criteria". The purpose of these criteria is to ensure mitigation is not lifted prematurely, which could result in a large spike in cases that overwhelms health care resources, undermining the significant progress we have made with our current mitigation measures.

34. For example, the President of the United States has released a proposed phased approach ("Opening Up America Again") for states to transition away from mitigation strategies. Attached to this affidavit as Exhibit C is a true and correct copy of a summary of the Opening Up America Again Guidelines released by the White House. The President's proposed approach identifies three gating criteria that should be observed before any phased transition away from mitigation begins: (1) Symptoms: downward trajectory of influenza-like illnesses (ILI) reported within a 14-day period and downward trajectory of covid-like syndromic cases reported within a 14-day period; (2) Cases: downward trajectory of documented cases within a 14-day period or downward trajectory of positive tests as a percent of total tests within a 14-day period (with flat or increasing volume of tests); and (3) Hospitals: treat all patients without crisis care AND robust testing in place for at-risk healthcare workers, including emerging antibody testing. Common gating criteria recommended by health experts is summarized in the table below. Attached to this affidavit as Exhibit D is a true and correct copy of the proposal released by the American Enterprise Institute titled "National Coronavirus Response: A Road Map to Reopening" ("Road Map to Reopening"). Attached to this affidavit as Exhibit E is a true and correct copy of the proposal released by Resolve to Save Lives titled "Box it In."

	Cases	***Health care preparedness***	***Other***
Opening up America Again (whitehouse.gov)	Downward trajectory in cases for within 14 day period. -Or- Downward trajectory of positive cases as percent of total tests over 14-day period	Treat patients without crisis care -And- Robust testing program in place for healthcare workers	Downward trajectory in influenza-like-illness within 14 day period -Or- Downward trajectory covid-like syndromic within a 14 day period
Road Map to Reopening	Sustained reduction in cases for 14 day period	Hospitals able to treat all patients without crisis standards of care	Able to test all people with COVID-19 symptoms -And- State able to conduct active monitoring of confirmed cases and contacts
Box It In	Decreasing cases in the context of increasing testing (or stable testing with decreasing positivity) for at least 14 days -And- Decreasing numbers and proportions of cases not linked to a source case (goal less than 3 unlinked cases per 2-week period) -And- Steady decrease in ILI in syndromic surveillance for at least 14 days -And- Decline in deaths for at least 14 days -And- Decreasing health care worker infections such that infections are now rare	Ability – including staffing – to double number of patients treated in intensive care units from current census -And- Ability – including staffing – to screen large numbers of symptomatic patients safely (e.g., outdoor tents, drive through) -And- Sufficient PPE for all health care workers even if cases double -And- Sufficient face masks to provide to all patients seeking care even if cases double -And- More discharges than admissions for COVID-19 to ensure at least baseline capacity in general health services, including through expansion of telemedicine for Covid-19 and usual care -And- Health care facilities enforce policies and redesign to minimize possibility of exposure at triage and all other locations	All cases interviewed for contact elicitation -And- Contacts elicited for at least 90% of cases -And- 100% of symptomatic contacts and others with symptoms undergo testing within 12 hours of identification of symptoms -And- Enough hand sanitizer to place at entry and strategically placed in buildings including workplaces -And- Designated facilities for non-hospitalized COVID infected people who can't be safely cared for at home (e.g., because of space constraints, homelessness, medically vulnerable household members, or otherwise) -And- Demonstrated ability to convey physical distancing recommendations that change behavior in most residents

35. In places like Wisconsin that have successfully prevented large surges in COVID-19 through implementation of successful community mitigation strategies, there is a high risk for subsequent cycles of transmission until an effective vaccine is developed and widely distributed. "Second waves" of the COVID-19 epidemic are likely because, after the initial outbreaks are brought under control, a high proportion of the population remains susceptible to the virus.

36. We must do everything we can to reopen our state as soon as we safely and responsibly can. We also know that businesses need some clarity so they can begin to plan how they can make customers feel safe, how they can make their businesses safe for employees, and how they can implement appropriate social distancing. Reopening our economy is going to take careful preparation and planning to ensure that our businesses, our workers, and we as consumers can be confident in reopening. Governor Evers, DHS and the Wisconsin Economic Development Corporation (WEDC) have unveiled the "Badger Bounce Back plan," a scientifically-informed, phased approach that Wisconsin can use to transition toward discontinuation of social distancing measures. The phased approach is based, in part, on the framework described in Road Map to Reopening, and the three phases described in the President's Opening up America Again proposal and consists of three phases that follow the lifting of the Safer at Home order:

a. ***Phase 1*:** Lifting some restrictions while implementing widespread testing and containment strategies with continued infection control and physical distancing measures. Examples of restrictions that would be lifted include opening restaurants, removal of retail restrictions, partially opening non-essential businesses and reopening childcare centers and K-12 schools;

b. ***Phase 2*:** Based on sustained progress toward the Gating Criteria, lifting more restrictions while implementing widespread

testing and containment strategies with continued infection control and physical distancing measures. Examples of restrictions that would be lifted include allowing mass gatherings of up to 50 people, opening bars, completely opening non-essential businesses and considering opening post-secondary institutions.

c. ***Phase 3:*** Based on sustained progress toward the Gating Criteria, lifting most restrictions while implementing widespread testing and containment strategies with continued infection control. Deploying medical countermeasures, including vaccines and therapeutics, as they become available.

37. DHS, in coordination with local health departments throughout the state, is assessing relevant data related to COVID-19 on a daily basis to determine when the State can safely begin a phased transition away from the Safer at Home mitigation strategies. Moreover, DHS is taking steps now that will enable the state to transition away from mitigation measures as quickly and safely as possible. These efforts include, but are not limited to: Investigating local outbreaks at long-term care facilities, jails, and other congregate settings where the risk is high; working with hospitals to expand surge capacity and constructing an alternative care facility in Milwaukee; working to acquire PPE to prevent healthcare worker infections and protect patients; working to acquire PPE decontamination systems to reuse PPE; working to acquire ventilators to prepare for a surge of patients who require breathing support; working to expand testing capacity in order to identify cases and prevent onward transmission; establishing isolation facilities for persons who are infected but do not require hospitalization; implementing more robust infection and control measures in congregate settings; and implementing technology options and expanding the public health workforce to conduct more contact tracing.

38. Under the Badger Bounce Back plan, decisions to move from one phase to another are guided by data that shows progress toward the gating criteria and core responsibilities identified below.

39. The Badger Bounce Back plan calls for making progress toward satisfying the following gating criteria: (1) Symptoms: downward trajectory of influenza-like illnesses (ILI) reported within a 14-day period AND downward trajectory of COVID-19-like syndromic cases reported within a 14-day period; (2) Cases: downward trajectory of positive tests as a percent of total tests within a 14-day period; and (3) Hospitals: treat all patients without crisis care AND robust testing programs in place for at-risk healthcare workers, with decreasing numbers of infected healthcare workers. These criteria are nearly identical to the gating criteria identified in the President's Opening Up American Again proposal.

40. In addition to making progress toward these gating criteria, the Badger Bounce Back plan aims to move toward achieving other goals or core responsibilities as the State prepares to phase away from the Safer at Home orders. These goals are just that, goals, not requirements. The plan allows the state to move to Phase 1 even without meeting all of the following goals: (1) Testing: Every Wisconsin resident who has symptoms of COVID-19 can get a lab test, with capacity for 85,000 tests conducted per week or approximately 12,000 tests per day; (2) Tracing: increase the State's contact tracing efforts by hiring additional staff to make sure everyone is contacted and has what they need to safely isolate; (3) Tracking: Build on existing surveillance systems (such as those used to track influenza) and other available metrics to track the spread of COVID-19 and the health care system's ability to respond to surges and to report on the Wisconsin Gating Criteria and other related metrics to keep everyone informed about how we are doing.

41. Other needs involved in preparing for this phased approach include procuring PPE and other necessary supplies to support health care and public safety agencies; supporting surge capacity of our healthcare system; working

with employers to guide them in steps to take to create safe workplaces; working with long-term care facilities to protect the health and safety of our most vulnerable neighbors; and monitoring conditions and immediately taking steps to respond to any COVID-19 disease resurgence by restarting phases or returning to earlier phases, depending on the severity.

42. While progress toward these criteria and goals is achievable, it is important to understand that the State is not currently prepared to move away from mitigation without risking an overwhelming surge of COVID-19 cases. Currently, Wisconsin's metrics measuring symptoms and cases do not show statistically significant progress toward the gating criteria identified in the Badger Bounce Back plan or the President's Opening Up America Again proposal. Criteria to evaluate hospital capacity are currently under discussion with hospital partners. In addition, the state is still building the capacity to expand testing for COVID-19 and conduct contact tracing. As of April 25, Wisconsin's current laboratory capacity is 10,937 tests per day; however, we are only testing 2,000–3,000 people per day. In order to test more people, DHS is reaching out to healthcare providers to help them understand the public health rationale for expanded testing, working to strengthen a fragile supply chain, and procuring adequate PPE necessary for conducting the tests. Given we are facing a global pandemic where all nations and states want to dramatically increase testing, the supply chain issues for testing reagents and PPE are particularly challenging. In addition to getting more people tested, the state is also working on increasing our contact tracing capacity to quickly follow up on all newly identified cases. Many local health departments have been overwhelmed by the number of cases and the state has added surge capacity by training 300 staff to supplement local case tracing resources. We anticipate that having 1,000 contact tracers in place would be appropriate to adequately follow up with cases in a timely manner to contain the spread of the virus. In addition, we are investigating technological options to increase timeliness and quality of case tracing.

43. Calls to begin reopening businesses immediately do not account for the risk of increasing spread of the virus and the current gaps in containment capacity in the state. While the risk of disease transmission can be mitigated in some workplace settings, it is not possible to completely eliminate the risk. This risk exists in particular in places like workplace restrooms, break rooms, cafeterias, and other common areas, and in places where workers travel after leaving work. Without proper containment capacity, once transmission begins in a newly reopened business, it can quickly evolve into a community-wide problem. Again, the current situation in Brown County is evidence of this.

44. WEDC has been and continues to work with businesses in the state on guidance for the safe operation and/or reopening of businesses. This includes promoting safe environments for workers and for customers. This work is critical for a successful transition away from mitigation measures.

45. DHS continues to assess the situation in the state and adjust its response to the pandemic. On April 27, 2020, another Emergency Order (Emergency Order #34) was issued that modified some restrictions on businesses in the state. Attached to this affidavit as Exhibit F is a true and correct copy of Emergency Order #34.

46. The Badger Bounce Back plan does not require that there be no possibility of ongoing transmission of the virus in the state before mitigation can be lifted. Instead, it proposes to prolong mitigation long enough to build up the State's capacity for testing and tracing to respond to new cases that will inevitably occur as restrictions are lifted. Reopening the State at any point in the near future will come with some risk of increased spread of the virus. Data regarding the status of COVID-19 cases in Wisconsin must inform decisions about our transition away from mitigation if we are to avoid a life-threatening surge of cases.

Julie Willems Van Dijk

Julie Willems Van Dijk

Subscribed and sworn to before me
this 28th day of April, 2020.

JEFFREY SIMMONS

Notary Public, State of Wisconsin
My Commission expires: PERMANENT

COVID-19 Modeling by the Wisconsin Department of Health Services
March 26, 2020

Background

In the early stages of a pandemic, estimating how the disease will spread is essential for identifying appropriate containment strategies (e.g. mass gathering bans, social distancing orders) and planning for medical surge capacity. This type of modeling is especially valuable in Wisconsin's current situation where testing for the disease is very limited (due to scarce testing supplies) and thus disease surveillance is limited.

Several early mathematical models raised concerns about the burden of the COVID-19 pandemic in Wisconsin. For example, COVID ACT NOW [1] predicts, assuming no action, that Wisconsin will experience 125,000 hospitalizations by April 28 and ultimately 117,000 Wisconsin deaths. The goal of our modeling was to conduct our own analysis to assess whether the growth of Wisconsin's cases is consistent with such catastrophic results.

The objective of this analysis is to estimate the total number of COVID-19 cases (clinical cases) in Wisconsin during the early phases of the Pandemic. Clinical cases means cases that will most likely be diagnosed and treated in our public health and healthcare system.

Methods

Exponential growth

Since there is no way to accurately forecast the exact number of COVID-19 cases over an extended period, a variety of epidemiologic models predict estimated cases by capturing the dynamic aspects of disease transmission, clinical progression, and healthcare system assets. These models vary in methodological details and predictions, but share one simple feature: **exponential growth during an early phase**[2].

Using the Wisconsin Electronic Disease Surveillance System (WEDSS), we modeled the growth of the number of confirmed COVID-19 cases. Our data revealed an exponential growth over a period from March 3 – 15 with a doubling time of 3.4 days. This is consistent with doubling times observed worldwide[3].

It is important to note that since there is a lag between the disease onset date and the lab confirmation date, the number of confirmed cases posted on the DHS 'Outbreaks in Wisconsin' web site[4] is necessarily less than or equal to the number of cases.

Duration of the exponential growth phase

Since we do not have a clear understanding of the disease parameters (i.e. incubation period, infectious phase, etc.) we cannot know how long the exponential growth period will last. Different reported models[5] suggest that exponential growth will continue until more than one percent of the population is

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[1] https://covidactnow.org/state/WI

[2] From a paper by Marc Lipsitch, "It is well known that these counts increase exponentially in the initial phase of an epidemic."

[3] https://www.forbes.com/sites/startswithabang/2020/03/17/why-exponential-growth-is-so-scary-for-the-covid-19-coronavirus

[4] https://www.dhs.wisconsin.gov/outbreaks/index.htm

[5] For example, https://alhill.shinyapps.io/COVID19seir/

infected. Other countries have experienced exponential growth over a 3-week period with doubling times comparable to that currently seen in Wisconsin.

Since we do not know how long exponential growth will continue in Wisconsin, we believe it is important not to underestimate its duration.

Case fatality rate

Descriptions of the severity of the COVID-19 pandemic have focused on the case fatality rate (CFR) which is **the proportion of diagnosed cases that result in death**. For example, the CFR reported in Italy is 7.7%[6]. However, interpreting the CFR is complicated for several reasons. The reported CFR certainly does not include mild or asymptomatic cases that were not confirmed by a laboratory test. Furthermore, applying a published CFR to all estimated cases (including asymptomatic), as opposed to the number of cases severe enough to be identified would substantially **overestimate** the total number of deaths. And finally, there is a time lag from the initial infection to death. Given an unambiguous definition of a COVID-19 case, dividing the number of deaths by the number of cases can substantially **underestimate** the CFR.

Taking into account that the COVID-19 definition changed over time, as well as the criteria for testing cases, we cannot predict a case fatality rate with high confidence. Therefore, based on our records of confirmed cases, our forecast focuses on the most severe cases and we chose a range of CFR, 2-7% based on reported literature[6].

Results

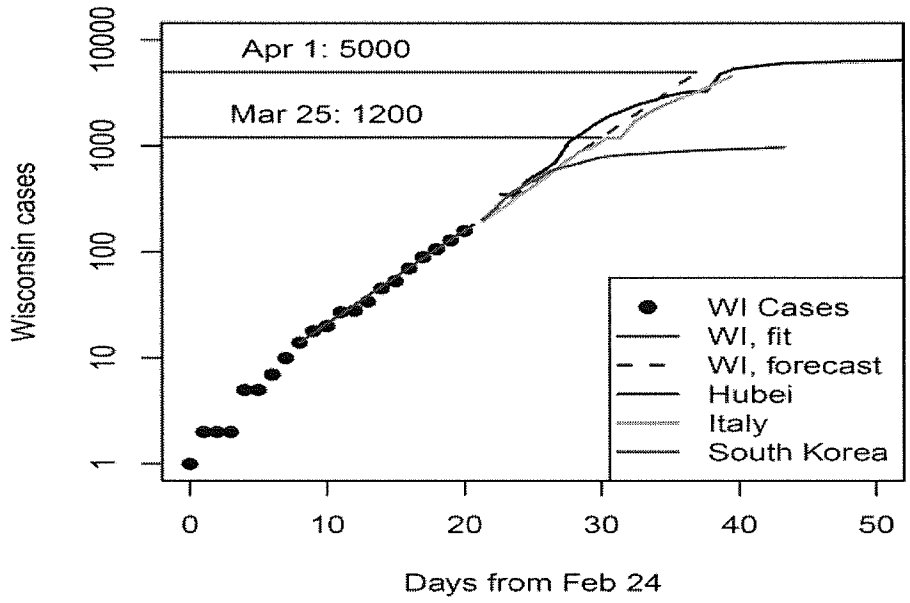
Forecast of the number of clinical cases

We estimated the number of COVID-19 clinical cases, N, using

$$N = 106 \times 2^{t/d}$$

where 106 is the total number of clinical cases based on onset date reported on or before March 13 (our reference date), $d = 3.4 \pm 0.3$ is the estimated doubling time, and t is the number of days from March 13. This model predicts case counts of about 1,200, 5,200, and 22,000 on March 25, April 1, and April 8, respectively. Importantly, this model projects the number of people infected with COVID-19, i.e. those who would test positive if they were tested. At current time, due to testing capacity constraints, the number of positive test results received are less than the number of people infected with COVID-19.

[6] https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30110-8/



Wisconsin cases and near term forecast

Table 1. Near term forecasting of Wisconsin morbidity and consequent mortality due to COVID-19.

Model	Doubling time (days)	Weeks from 3/18/2020 Morbidity (Deaths)		
		By 03/25	By 04/01	By 04/08
Wisconsin cases	3.4	1,200 (9.4-87)	5,000 (100-350)	22,000 (440-1,500)
No intervention (worst case)	2	6,800 (140-470)	77,000 (1,500-5,400)	NA (interventions in place)
Hubei province (best case)	6.4	390 (7.8-27)	830 (17-58)	1,800 (38-120)

The projections are reasonably alarming but less catastrophic than what we have seen in other models. In an earlier analysis, we posted a more conservative estimate case count of 585 for March 25 using a doubling time of 6.4, but we experienced 707, therefore ruling out the conservative model. Ultimately, this conservative model estimated 2,700 **clinical cases** by April 8. Based on our experience, the above analysis used a shorter doubling time of 3.4 days. While we still do not know precisely how many cases we will have by April 8, all models predict that it will strain our healthcare systems, based on our current estimates of how many people will experience serious disease and the current number of hospital beds available and ICU capacity. Importantly, these projections describe the number of clinical cases (i.e. people who became symptomatic and presented in a clinical setting) by the set intervals (03/25, 04/01, and 04/08) projected to die from COVID-19, without further intervention. It does not represent the number of people projected to die from COVID-19 by the set intervals.

Summary

We explored global data on the COVID-19 pandemic and projected morbidity and mortality for Wisconsin's population. We concluded that this pandemic presents an urgent concern. We find that the growth rate of COVID-19 cases at this early phase of the pandemic in Wisconsin is consistent with serious consequences during the next two weeks.

WISCONSIN DEPARTMENT *of* HEALTH SERVICES

Johns Hopkins Modeling WI COVID-19 - GOAL

Dr. Shaun Truelove simulated six scenarios representing the impact of interventions on Wisconsin's COVID-19 outbreak, based on methodology developed by Johns Hopkins University Infectious Disease Dynamics group. The goal is to extract information useful for making decisions about policy and resource allocation.

BACKGROUND

The Johns Hopkins University Infectious Disease Dynamics (JHU-IDD) methods have been adopted by FEMA for decision-making. These methods are based on models that have proven successful for understanding the impact of nonpharmaceutical interventions during the 1918 influenza pandemic. The JHU-IDD methods apply models and parameters that are perhaps the most widely used for understanding the COVID-19 pandemic.

Nonetheless, there is no quantitative method for forecasting the COVID-19 outbreak over a six-month period; the JHU-IDD report states that its collection of scenarios is "not a forecast." Our objective in reviewing the JHU-IDD report is to

- **Identify features in these scenarios that may be useful in decision-making.**
- **Identify support for these features from independent work so that they can be used in decision-making.**

SUMMARY

We identified five important results in the JHU-IDD report. We feel that these results have been, or will soon be, supported by independent research or calculation.

1. The simulations predict that Wisconsin's interventions (school closing, Safer-At-Home order) are having an impact.

   The JHU-IDD scenarios suggest that, without interventions, Wisconsin would experience at least threefold excess deaths and a sixfold higher number of patients needing beds than Wisconsin hospitals can provide. To study this independently, we compared the initial period of the outbreak to the current period (early April) of the outbreak. Our analysis demonstrates a substantial reduction in the case growth rate (i.e., an increase in the doubling time) beginning in mid-late March following the implementation of public health interventions in Wisconsin. While we cannot definitively establish a cause-effect relationship, many studies reported a slowing of the growth rate in communities or countries after interventions.

2. The timing of a substantial late peak will be determined by the lifting of the Safer-At-Home order and comprehensive testing.

   The JHU-IDD presents scenarios during which the Safer-At-Home order persists for one, two, and three months, but no follow-up testing and isolation. Each of these scenarios

exhibits a similarly shaped and substantial peak that **would dramatically overflow hospital resources**. As stated above, we find the existence of this late substantial peak very credible based on independent peer-reviewed research that describes influenza outbreaks. The UW-Madison agent-based model will serve as an independent estimation of the magnitude of this late peak.

3. The intervention scenarios suggest that we should think of our outbreak in terms of two plans: a plan for acute challenges to hospital capacity and a plan to suppress or mitigate a second wave.

   The demand on hospital resources over time can be substantially different between scenarios. The simulations suggest that we should express our conclusions in terms of short- and long-term plans. All scenarios suggest that demand will exceed hospital resources in the short term, and highlight the need for a long-term plan to suppress a substantial later peak.

4. The outbreak will strain Wisconsin hospital capacity during April.

   JHU-IDD statewide and county-level projections suggest that patients will exceed bed capacity in mid-April or early May. We find short-term resource capacity to be a significant concern based on independent short-term modeling of confirmed cases (cases that have been or will ultimately be confirmed as COVID-19). We note that the JHU-IDD scenarios suggest a more significant number of cases than does the Washington Institute for Health Metrics and Evaluation (IHME) model. We strongly prefer the JHU-IDD scenarios based on our independent calculations.

5. Comprehensive testing is an important tool for suppressing or delaying the substantial second component

   With comprehensive testing and isolation, the magnitude of the number of cases in Wisconsin will be below the threshold of hospital capacity. We find this credible based on South Korea's success in testing and isolation. We also find this result credible as long as, given time to prepare before lifting of the Stay-At-Home order, Wisconsin can develop comprehensive testing and isolation operations.

RESULTS

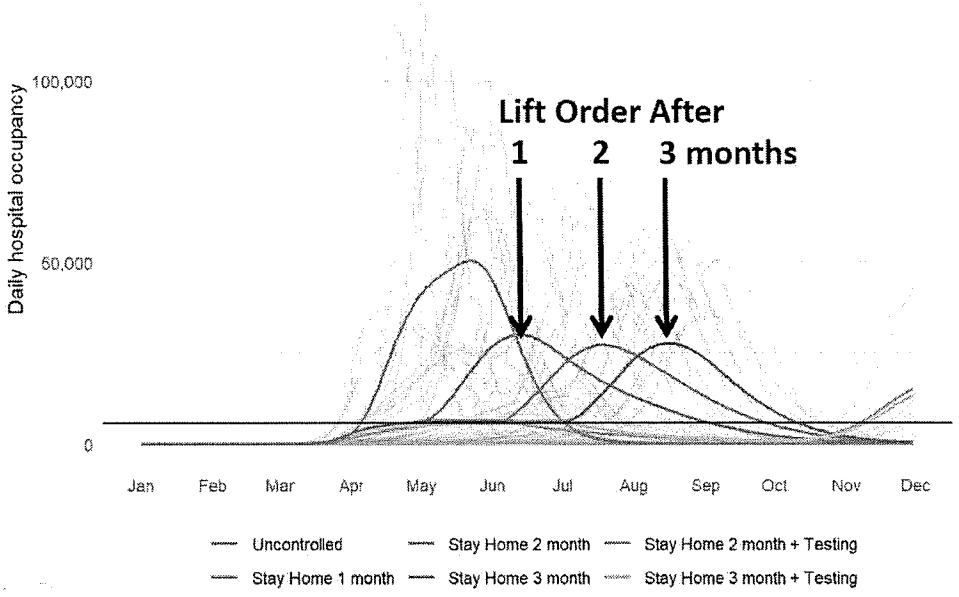
We provide additional detail to support each of the five results.

1. The simulations suggest that Wisconsin's interventions (school closing, Safer-At-Home order) are having an impact.

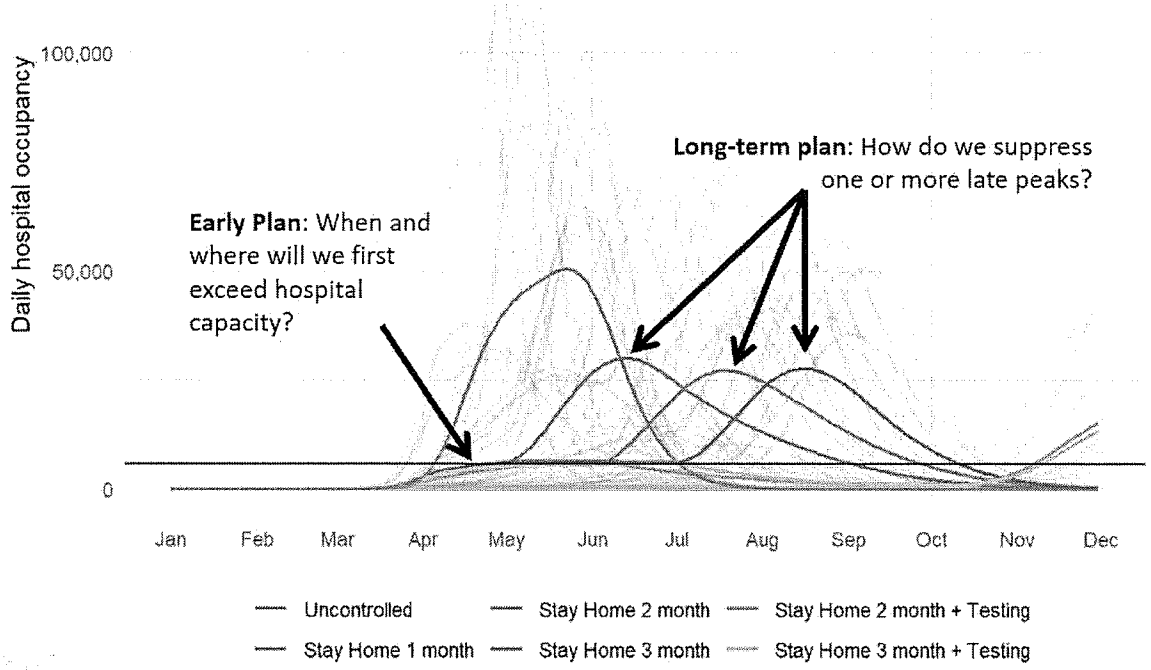
   Under the uncontrolled scenario, the JHU-IDD simulation suggests 7,500 deaths by May 1 and a maximum hospital bed occupancy of 94,000. In contrast, five scenarios that include the Safer-At-Home order suggest 2,400 or fewer deaths. We are confident with this conclusion because we have independently compared the growth rate of the epidemic before school closings and after the Safer-At-Home order. We find that the growth rate of the epidemic has slowed.

2. The timing of a substantial second peak will be determined by the lifting of the Safer-At-Home order and comprehensive testing.

   We identified, on their figure, the peaks that occur following lifting of the Stay-At-Home order after one, two, or three months, but without comprehensive testing. We find the existence of these peaks, as well as the timings, to be credible based our understanding of the current literature. We await comparison with the UW-Madison model.



3. The intervention scenarios suggest that we should think of our outbreak in terms of two plans: a plan for acute challenges to hospital capacity and a plan to suppress or mitigate a second wave.



The figure above shows the complex structure of hospital occupancy time series. Each of the six dark lines represents the hospital occupancy over time for a scenario, described in the legend. Each scenario has a peak, and each will have a second wave, even though the diagram only shows the second peaks starting to emerge for three of the scenarios. "Stay Home" refers to the Safer-At-Home order while "Testing" refers to intensive testing and isolation, similar to that implemented in South Korea. Under testing and isolation, all symptomatic cases are tested and all cases testing positive are isolated. Contact tracing is also implemented, and the close contacts of all individuals testing positive are also tested and isolated if testing positive.

While the uncontrolled outbreak (orange line) has one substantial, relatively early, peak, the three "Stay Home" curves have an initial plateau and a substantial later peak, and the two "Stay Home + Testing" curves have one early, relatively modest peak through October. The simulations suggest that we should express our conclusions in terms of short- and long-term plans. All scenarios suggest that demands will exceed hospital resources in the short term and the scenarios collectively highlight the need for a long-term plan to suppress a substantial late peak.

4. The outbreak will strain Wisconsin hospital capacity during April.

   The JHU-IDD intervention scenarios suggest that hospital capacity will be exceeded during April (Table 1). The JHU-IDD report provides county-level predictions of the dates on which ICU capacity will be exceeded (Table 2).

Peak Hospital Occupancy in Period		
Stay Home 1 month	**13,100**	100- 73,600
Stay Home 2 month	**11,900**	100- 71,700
Stay Home 2 month + Testing	**10,100**	100- 66,100
Stay Home 3 month	**13,800**	200- 77,400
Stay Home 3 month + Testing	**11,400**	100- 74,900
Uncontrolled	**94,200**	3,700-255,300

Table 1. Maximum demand for hospital occupancy

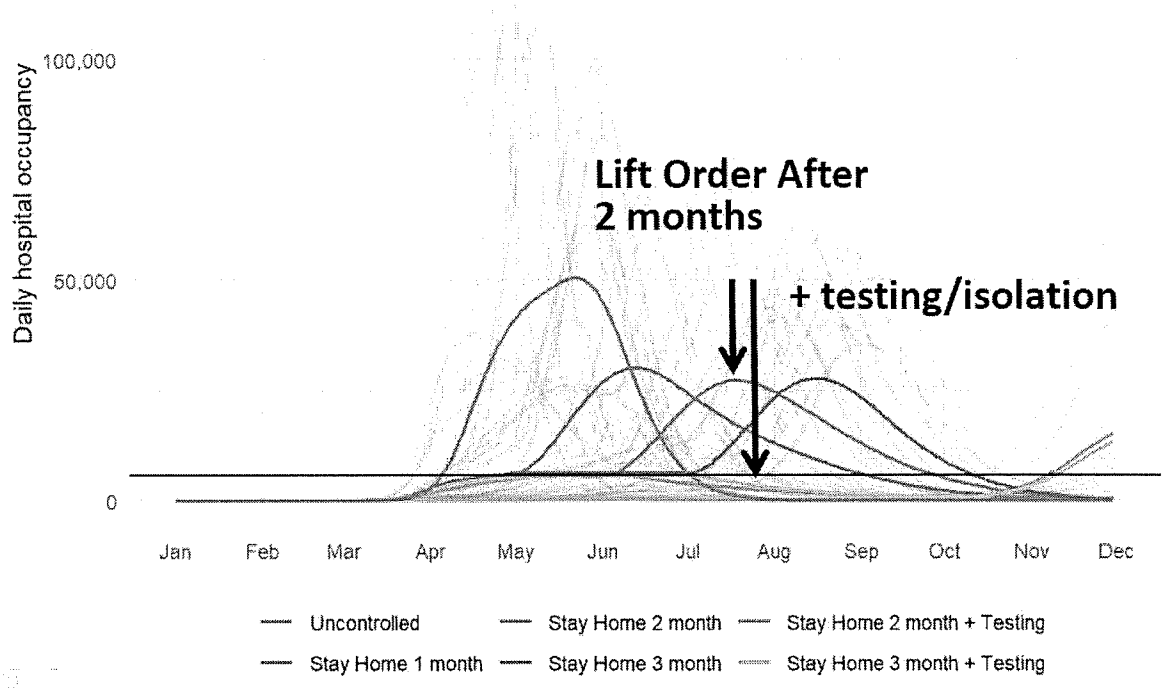
Table 2. JHU-IDD forecasts, by county, of the date on which resource capacity will be exceeded under Scenario 2.

County	Date ICU capacity exceeded.
Kenosha	April 29
Racine	May 6
Waukesha	May 6
Dane	May 11
Milwaukee	May 21

While we cannot independently confirm long-term projections, preliminary calculations based on short-term projections suggest that we should proceed with the JHU-IDD projections.

5. Comprehensive testing is an important tool for suppressing or delaying the substantial second component

   We are most impressed by the predictions associated with comprehensive testing. In the figure below we identify the second wave peak that is expected after a two-month Safer-At-Home order is lifted, as well as the same stay-at-home scenario complemented with aggressive testing and isolation. The two scenarios predict extraordinarily different consequences with respect to hospital capacity overages, cumulative cases, and death by Dec 1.



QUESTIONS OR CONCERNS

1. Are the short-term hospital capacity calculations provided by JHU-IDD overly pessimistic; IHME predictions do not suggest this level of concern and we are no are longer seeing substantial growth in the number of new cases each day?

   Based on the last few days, the count of new daily cases has levelled, but not for enough days to declare a trend. We have technical concerns about using either IHME or current counts for forecasting hospital capacity. We feel the possibility exists that both underestimate case counts in Wisconsin. Regarding IHME, it relies heavily on the idea that Wisconsin's outbreak will follow the trend experienced by other regions. If Wisconsinites were more responsive than other regions to a "Safer at Home" type of directive, the curve will be more flat, which will result in more days of high admissions, and a stronger rebound when the directive is lifted. Given that the result of under-estimating cases is more Wisconsinites losing their lives, it seems prudent to be cautious.

Regarding daily case counts, we cannot rule out the possibility that current case counts reflect the confirmation process rather than growth of the epidemic. Until we can resolve these technical concerns we prefer to rely on JHU-IDD projections.

2. What value of R0 (the basic reproduction number; the number of cases directly generated by one case in a population where all individuals are susceptible to infection) is being used for simulations?

   Our simulations were based on R0 drawn from a uniform distribution between 2 and 3. Interventions reduce R0 to prescribed distributions of extents. We discussed the choice of SEIR (a statistical model based on a Susceptible, Exposed, Infected and Recovered population) parameters, based on both R0 and the serial interval, with Shaun Truelove. Briefly, our choice of R0 and serial interval must be matched with each other and with the population. Shaun expressed concern about applying the new R0 to Wisconsin, but we agreed that we will study the effect of varying R0 on our five conclusions once we are running the simulations ourselves.

SUMMARY OF HOSPITAL RESOURCE CAPACITY RESULTS FOR TWO PLANS

Table 3. Projected counts of hospital occupancy and ICU capacity at peak, as well as cumulative deaths and infections.
We provide counts for two periods: Plan 1 = Acute, through May 1 and Plan 2= Peak, which varies by scenario.
Scenarios are 1) Uncontrolled, 2) Safer-At-Home, 1 month, 3) Safer-At-Home, 2 months, 4) Safer-At-Home, 2months + Test/isolate, 5) Safer-At-Home 3, months, and 6) Safer-At-Home, 3months + Test/isolate

	Period[1]		Hospital Occupancy[1]		ICU Capacity[2]		Ventilator Need[3]		Cumulative Deaths[1]		Cumulative Infections[1]	
Scenario	Plan 1	Plan 2	Plan 1	Plan 2	Plan 1	Plan 2	Plan 1	Plan 2	Plan 1	Plan 2	Plan 1	Plan 2
1	1-May	5/1-7/1	94,200	182,000	22,600	86,900	15,820	60,830	7,500	43,200	1,977,400	3,271,300
2	1-May	5/1-7/1	13,100	90,400	4,800	36,700	3,360	25,690	2,200	21,900	422,900	2,684,200
3	1-May	7/1-9/1	11,900	87,400	4,500	41,000	3,150	28,700	2,100	25,900	373,800	2,311,800
4	1-May	9/1-12/30	10,100	34,200	3,600	7,800	2,520	5,460	1,600	10,000	311,300	954,500
5	1-May	7/1-9/1	13,800	73,300	5,200	34,700	3,640	24,290	2,400	20,000	423,200	2,472,800
6	1-May	9/1-12/30	11,400	30,800	4,400	9,200	3,080	6,440	2,100	8,900	360,400	849,100

[1] From JHU-IDD report Table 1, which provides total number of cases within the specified time interval, but does not include ICU or Ventilators.

[2] From JHU-IDD report Tables 2-7, which provide ICU "daily peak capacity" through the end of the specified period up to Oct 1.

[3] Ventilator estimates are estimated based on the percent of ICU cases that were under ventilations in the US (Seattle 70%)

GUIDELINES

OPENING UP AMERICA AGAIN

Proposed State or Regional Gating Criteria

(Satisfy Before Proceeding to Phased Opening)

SYMPTOMS

Downward trajectory of influenza-like illnesses (ILI) reported within a 14-day period

AND

Downward trajectory of covid-like syndromic cases reported within a 14-day period

CASES

Downward trajectory of documented cases within a 14-day period

OR

Downward trajectory of positive tests as a percent of total tests within a 14-day period (flat or increasing volume of tests)

HOSPITALS

Treat all patients without crisis care

AND

Robust testing program in place for at-risk healthcare workers, including emerging antibody testing

*State and local officials may need to tailor the application of these criteria to local circumstances (e.g., metropolitan areas that have suffered severe COVID outbreaks, rural and suburban areas where outbreaks have not occurred or have been mild). Additionally, where appropriate, Governors should work on a regional basis to satisfy these criteria and to progress through the phases outlined below.

Core State Preparedness Responsibilities

TESTING & CONTACT TRACING

- ✓ Ability to quickly set up safe and efficient screening and testing sites for symptomatic individuals and trace contacts of COVID+ results
- ✓ Ability to test Syndromic/ILI-indicated persons for COVID and trace contacts of COVID+ results
- ✓ Ensure sentinel surveillance sites are screening for asymptomatic cases and contacts for COVID+ results are traced (sites operate at locations that serve older individuals, lower-income Americans, racial minorities, and Native Americans)

HEALTHCARE SYSTEM CAPACITY

- ✓ Ability to quickly and independently supply sufficient Personal Protective Equipment and critical medical equipment to handle dramatic surge in need
- ✓ Ability to surge ICU capacity

PLANS

- ✓ Protect the health and safety of workers in critical industries
- ✓ Protect the health and safety of those living and working in high-risk facilities (e.g., senior care facilities)
- ✓ Protect employees and users of mass transit
- ✓ Advise citizens regarding protocols for social distancing and face coverings
- ✓ Monitor conditions and immediately take steps to limit and mitigate any rebounds or outbreaks by restarting a phase or returning to an earlier phase, depending on severity

Proposed Phased Approach

BASED ON **UP-TO-DATE DATA** AND READINESS

MITIGATES RISK OF RESURGENCE

PROTECTS THE MOST VULNERABLE

IMPLEMENTABLE ON **STATEWIDE OR COUNTY-BY-COUNTY** BASIS AT GOVERNORS' DISCRETION

Guidelines for All Phases: Individuals

CONTINUE TO PRACTICE GOOD HYGIENE

- ✓ Wash your hands with soap and water or use hand sanitizer, especially after touching frequently used items or surfaces.
- ✓ Avoid touching your face.
- ✓ Sneeze or cough into a tissue, or the inside of your elbow.
- ✓ Disinfect frequently used items and surfaces as much as possible.
- ✓ Strongly consider using face coverings while in public, and particularly when using mass transit.

PEOPLE WHO FEEL SICK SHOULD STAY HOME

- ✓ Do not go to work or school.
- ✓ Contact and follow the advice of your medical provider.

> Continue to adhere to State and local guidance as well as complementary CDC guidance, particularly with respect to face coverings.

Guidelines for All Phases: Employers

Develop and implement appropriate policies, in accordance with Federal, State, and local regulations and guidance, and informed by industry best practices, regarding:

- ✓ Social distancing and protective equipment
- ✓ Temperature checks
- ✓ Testing, isolating, and contact tracing
- ✓ Sanitation
- ✓ Use and disinfection of common and high-traffic areas
- ✓ Business travel

Monitor workforce for indicative symptoms. Do not allow symptomatic people to physically return to work until cleared by a medical provider.

Develop and implement policies and procedures for workforce contact tracing following employee COVID+ test.

Phase One

FOR STATES AND REGIONS

THAT SATISFY THE GATING CRITERIA

Phase One

INDIVIDUALS

ALL VULNERABLE INDIVIDUALS* should continue to shelter in place. Members of households with vulnerable residents should be aware that by returning to work or other environments where distancing is not practical, they could carry the virus back home. Precautions should be taken to isolate from vulnerable residents.

All individuals, **WHEN IN PUBLIC** (e.g., parks, outdoor recreation areas, shopping areas), should maximize physical distance from others. Social settings of more than 10 people, where appropriate distancing may not be practical, should be avoided unless precautionary measures are observed.

Avoid **SOCIALIZING** in groups of more than 10 people in circumstances that do not readily allow for appropriate physical distancing (e.g., receptions, trade shows)

MINIMIZE NON-ESSENTIAL TRAVEL and adhere to CDC guidelines regarding isolation following travel.

*See Appendix 1 for Definition of Vulnerable Individuals

EACH PHASE OF THIS GUIDANCE ADDRESSES THOSE ASPECTS OF DAILY LIFE FOR WHICH RESTRICTIONS REMAIN APPROPRIATE DUE TO COVID.

Phase One

EMPLOYERS

Continue to **ENCOURAGE TELEWORK**, whenever possible and feasible with business operations.

If possible, **RETURN TO WORK IN PHASES.**

Close **COMMON AREAS** where personnel are likely to congregate and interact, or enforce strict social distancing protocols.

Minimize **NON-ESSENTIAL TRAVEL** and adhere to CDC guidelines regarding isolation following travel.

Strongly consider **SPECIAL ACCOMMODATIONS** for personnel who are members of a **VULNERABLE POPULATION.**

EACH PHASE OF THIS GUIDANCE ADDRESSES THOSE ASPECTS OF DAILY LIFE FOR WHICH RESTRICTIONS REMAIN APPROPRIATE DUE TO COVID.

Phase One

SPECIFIC TYPES OF EMPLOYERS

SCHOOLS AND ORGANIZED YOUTH ACTIVITIES (e.g., daycare, camp) that are currently closed should remain closed.

VISITS TO SENIOR LIVING FACILITIES AND HOSPITALS should be prohibited. Those who do interact with residents and patients must adhere to strict protocols regarding hygiene.

LARGE VENUES (e.g., sit-down dining, movie theaters, sporting venues, places of worship) can operate under strict physical distancing protocols.

ELECTIVE SURGERIES can resume, as clinically appropriate, on an outpatient basis at facilities that adhere to CMS guidelines.

GYMS can open if they adhere to strict physical distancing and sanitation protocols.

BARS should remain closed.

EACH PHASE OF THIS GUIDANCE ADDRESSES THOSE ASPECTS OF DAILY LIFE FOR WHICH RESTRICTIONS REMAIN APPROPRIATE DUE TO COVID.

Phase Two

FOR STATES AND REGIONS WITH NO EVIDENCE OF A REBOUND AND THAT SATISFY THE GATING CRITERIA A SECOND TIME

Phase Two

INDIVIDUALS

ALL VULNERABLE INDIVIDUALS should continue to shelter in place. Members of households with vulnerable residents should be aware that by returning to work or other environments where distancing is not practical, they could carry the virus back home. Precautions should be taken to isolate from vulnerable residents.

All individuals, **WHEN IN PUBLIC** (e.g., parks, outdoor recreation areas, shopping areas), should maximize physical distance from others. Social settings of more than 50 people, where appropriate distancing may not be practical, should be avoided unless precautionary measures are observed.

NON-ESSENTIAL TRAVEL can resume.

Phase Two

EMPLOYERS

Continue to **ENCOURAGE TELEWORK**, whenever possible and feasible with business operations.

Close **COMMON AREAS** where personnel are likely to congregate and interact, or enforce moderate social distancing protocols.

NON-ESSENTIAL TRAVEL can resume.

Strongly consider **SPECIAL ACCOMMODATIONS** for personnel who are members of a **VULNERABLE POPULATION.**

EACH PHASE OF THIS GUIDANCE ADDRESSES THOSE ASPECTS OF DAILY LIFE FOR WHICH RESTRICTIONS REMAIN APPROPRIATE DUE TO COVID.

Phase Two

SPECIFIC TYPES OF EMPLOYERS

SCHOOLS AND ORGANIZED YOUTH ACTIVITIES (e.g., daycare, camp) can reopen.

VISITS TO SENIOR CARE FACILITIES AND HOSPITALS should be prohibited. Those who do interact with residents and patients must adhere to strict protocols regarding hygiene.

LARGE VENUES (e.g., sit-down dining, movie theaters, sporting venues, places of worship) can operate under moderate physical distancing protocols.

ELECTIVE SURGERIES can resume, as clinically appropriate, on an outpatient and in-patient basis at facilities that adhere to CMS guidelines.

GYMS can remain open if they adhere to strict physical distancing and sanitation protocols.

BARS may operate with diminished standing-room occupancy, where applicable and appropriate.

EACH PHASE OF THIS GUIDANCE ADDRESSES THOSE ASPECTS OF DAILY LIFE FOR WHICH RESTRICTIONS REMAIN APPROPRIATE DUE TO COVID.

Phase Three

FOR STATES AND REGIONS WITH NO EVIDENCE OF A REBOUND AND THAT SATISFY THE GATING CRITERIA A THIRD TIME

Phase Three

INDIVIDUALS

VULNERABLE INDIVIDUALS can resume public interactions, but should practice physical distancing, minimizing exposure to social settings where distancing may not be practical, unless precautionary measures are observed.

LOW-RISK POPULATIONS should consider minimizing time spent in crowded environments.

Phase Three

EMPLOYERS

Resume **UNRESTRICTED STAFFING** of worksites.

EACH PHASE OF THIS GUIDANCE ADDRESSES THOSE ASPECTS OF DAILY LIFE FOR WHICH RESTRICTIONS REMAIN APPROPRIATE DUE TO COVID.

Phase Three

SPECIFIC TYPES OF EMPLOYERS

VISITS TO SENIOR CARE FACILITIES AND HOSPITALS can resume. Those who interact with residents and patients must be diligent regarding hygiene.

LARGE VENUES (e.g., sit-down dining, movie theaters, sporting venues, places of worship) can operate under limited physical distancing protocols.

GYMS can remain open if they adhere to standard sanitation protocols.

BARS may operate with increased standing room occupancy, where applicable.

EACH PHASE OF THIS GUIDANCE ADDRESSES THOSE ASPECTS OF DAILY LIFE FOR WHICH RESTRICTIONS REMAIN APPROPRIATE DUE TO COVID.

Appendix

Vulnerable Individuals

1. Elderly individuals.

2. Individuals with serious underlying health conditions, including high blood pressure, chronic lung disease, diabetes, obesity, asthma, and those whose immune system is compromised such as by chemotherapy for cancer and other conditions requiring such therapy.

National Coronavirus Response

A ROAD MAP TO REOPENING

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MARCH 28, 2020

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Contents

Executive Summary

This report provides a road map for navigating through the current COVID-19 pandemic in the United States. It outlines specific directions for adapting our public-health strategy as we limit the epidemic spread of COVID-19 and are able to transition to new tools and approaches to prevent further spread of the disease. We outline the steps that can be taken as epidemic transmission is brought under control in different regions. These steps can transition to tools and approaches that target those with infection rather than mitigation tactics that target entire populations in regions where transmission is widespread and not controlled. We suggest measurable milestones for identifying when we can make these transitions and start reopening America for businesses and families.

In each phase, we outline the steps that the federal government, working with the states and public-health and health care partners, should take to inform the response. This will take time, but planning for each phase should begin now so the infrastructure is in place when it is time to transition.

The specific milestones and markers included in the report for transitioning our responses are judgments based on our current understanding, with the goal of facilitating an effective path forward. The epidemic is evolving rapidly, and our understanding of best responses will evolve as well. The broad set of tasks described here requires and will receive high-level, ongoing attention, and it should be updated and refined as additional evidence, context, and insights about the epidemic become available.

To gradually move away from a reliance on physical distancing as our primary tool for controlling future spread, we need:

1) Better data to identify areas of spread and the rate of exposure and immunity in the population;
2) Improvements in state and local health care system capabilities, public-health infrastructure for early outbreak identification, case containment, and adequate medical supplies; and
3) Therapeutic, prophylactic, and preventive treatments and better-informed medical interventions that give us the tools to protect the most vulnerable people and help rescue those who may become very sick.

Our stepwise approach depends on our ability to aggregate and analyze data in real time. To strengthen our public-health surveillance system to account for the unprecedented spread of COVID-19, we need to harness the power of technology and drive additional resources to our state and local public-health departments, which are on the front lines of case identification and contact tracing. Finally, we must expand our investments in pharmaceutical research and development into COVID-19 and promote the rapid deployment of effective diagnostics, therapies, and eventually a vaccine.

Slow the Spread in Phase I. This is the current phase of response. The COVID-19 epidemic in the United States is growing, with community transmission occurring in every state. To slow the spread in this period,[1] schools are closed across the country, workers are being asked to do their jobs from home when possible, community gathering spaces such as malls and gyms are closed, and restaurants are being asked to limit their services. These measures will need to be in place in each state until transmission has measurably slowed down and health infrastructure can be scaled up to safely manage the outbreak and care for the sick.

State-by-State Reopening in Phase II. Individual states can move to Phase II when they are able to safely diagnose, treat, and isolate COVID-19 cases and their contacts. During this phase, schools and businesses can reopen, and much of normal life can begin to resume in a phased approach. However, some physical distancing measures and limitations on gatherings will still need to be in place to prevent transmission from accelerating again. For older adults (those over age 60), those with underlying health conditions, and other populations at heightened risk from COVID-19, continuing to limit time in the community will be important.

Public hygiene will be sharply improved, and deep cleanings on shared spaces should become more routine. Shared surfaces will be more frequently sanitized, among other measures. In addition to case-based interventions that more actively identify and isolate people with the disease and their contacts, the public will initially be asked to limit gatherings, and people will initially be asked to wear fabric nonmedical face masks while in the community to reduce their risk of asymptomatic spread. Those who are sick will be asked to stay home and seek testing for COVID-19. Testing should become more widespread and routine as point-of-care diagnostics are fully deployed in doctors' offices.

While we focus on state-by-state reopening of activities in a responsible manner and based on surveillance data, we note that states may move forward at a county or regional level if these conditions vary within the state and that coordination on reopening among states that share metropolitan regions will be necessary.

Establish Immune Protection and Lift Physical Distancing During Phase III. Physical distancing restrictions and other Phase II measures can be lifted when safe and effective tools for mitigating the risk of COVID-19 are available, including broad surveillance, therapeutics that can rescue patients with significant disease or prevent serious illness in those most at risk, or a safe and effective vaccine.

Rebuild Our Readiness for the Next Pandemic in Phase IV. After we successfully defeat COVID-19, we must ensure that America is never again unprepared to face a new infectious disease threat. This will require investment into research and development initiatives, expansion of public-health and health care infrastructure and workforce, and clear governance structures to execute strong preparedness plans. Properly implemented, the steps described here also provide the foundation for containing the damage that future pathogens may cause.

Phase I: Slow the Spread

Goals

The goal of Phase I is to save lives by:

1) Slowing the transmission of SARS-CoV-2 across the United States by reducing the effective reproduction number of infections,

2) Increasing testing capacity to accommodate the ability to test everyone with symptoms and their close contacts, and

3) Ensuring the health care system has the capacity to safely treat both COVID-19 patients and others requiring care.

A successful Phase I will allow for a significant relaxation of physical distancing measures and a progression to Phase II, when more targeted, case-based interventions are possible.

Stay-at-Home Advisories

The trigger for issuing a stay-at-home advisory[6] in a US state is when case counts are doubling every three to five days[7] (based on the current New York experience) or when state and local officials recommend it based on the local context (for example, growth on track to overwhelm the health system's capacity).

The trigger for issuing a recommendation to step down from a stay-at-home-advisory back to "slow the spread" is when the number of new cases reported in a state has declined steadily for 14 days (i.e., one incubation period) and the jurisdiction is able to test everyone seeking care for COVID-19 symptoms.

Thresholds for Action

Trigger to Begin to "Slow the Spread." The trigger to implement nationwide "slow the spread" measures[2] in Phase I is the existence in multiple geographic locations around the country of confirmed cases that cannot be traced back to other known cases ("community spread").[3] This trigger has already been reached in the United States.

Trigger to Move to Phase II. To guard against the risk that large outbreaks or epidemic spread could reignite once we lift our initial efforts to "slow the spread," the trigger for a move to Phase II should be when a state reports a sustained reduction in cases for at least 14 days (i.e., one incubation period); *and* local hospitals are safely able to treat all patients requiring hospitalization without resorting to crisis standards of care[4]; *and* the capacity exists in the state to test all people with COVID-19 symptoms, along with state capacity to conduct active monitoring of all confirmed cases and their contacts.[5]

Steps Required in Phase I

Maintain Physical Distancing. Each state must maintain community-level physical distancing measures[8] until the threshold for moving to Phase II is met. These Phase I measures include:

- Closing community gathering spaces such as schools, shopping centers, dining areas,

museums, and gyms statewide (places where people congregate indoors);

- Promoting telework for nonessential employees statewide;
- Urging the public to limit unnecessary domestic or international travel;
- Canceling or postponing meetings and mass gatherings;
- Shutting dining areas but encouraging restaurants to provide takeout and delivery services if possible;
- Issuing stay-at-home advisories in hot spots where transmission is particularly intense (i.e., when case counts are doubling in a city or locality every three to five days); and
- Monitoring community adherence to physical distancing and stay-at-home advisories, adjusting risk messaging as appropriate, and identifying alternative incentives for compliance if needed.

Increase Diagnostic Testing Capacity and Build Data Infrastructure for Rapid Sharing of Results. Same-day, point-of-care diagnostic testing (widely available in outpatient settings) is crucial for identifying cases, including those with asymptomatic and mild infections. To move from community-wide interventions that focus on large populations to case-based interventions that target and isolate individual people who are infected, capacity should be sufficient to test:

1) Hospitalized patients (rapid diagnostics are needed for this population);
2) Health care workers and workers in essential roles (those in community-facing roles in health and public safety);
3) Close contacts of confirmed cases; and
4) Outpatients with symptoms. (This is best accomplished with point-of-care diagnostics in doctors' offices with guidelines that encourage widespread screening and mandated coverage for testing.)

We estimate that a national capacity of at least 750,000 tests per week would be sufficient to move to case-based interventions when paired with sufficient capacity in supportive public-health infrastructure (e.g., contact tracing).[9] In conjunction with more widespread testing, we need to invest in new tools to make it efficient for providers to communicate test results and make data easily accessible to public-health officials working to contain future outbreaks.

Ensure Functioning of the Health Care System. Ensure sufficient critical-care capacity[10] in hospitals to be able to immediately expand capacity from 2.8 critical-care beds per 10,000 adults to 5–7 beds per 10,000 adults in the setting of an epidemic or other emergency, allowing for regional variation.[11] This target is a minimum, must be adequate for the current and forecasted level of demand, and must be accompanied by adequate staffing. Regional variation in capacity reflecting local needs is acceptable.

Expand access to ventilators in hospitals from 3 per 10,000 adults to a goal of 5–7 ventilators per 10,000 adults.[12] This target does not include transport or anesthesia machines. This target is a minimum, must be adequate for the current and forecasted level of demand, and must be accompanied by adequate staffing. Regional variation in capacity reflecting local needs is acceptable.

Maintain access to acute-care hospital beds of at least 30 per 10,000 adults.[13] Facilities should have a plan, in the case of a surge in hospital demand, for how the beds would be rapidly flexed from more discretionary uses (e.g., elective procedures) and adequately staffed, with access to adequate supplies of oxygen and other medical supplies.

This health care functioning target would also be met if critical-care and ventilator capacity does not expand to that level but COVID-19 incidence is maintained or falls meaningfully below the state's capacity to meet critical-care demand. These capacity targets can also be partially met through the availability of ample mobile health care infrastructures (supported and perhaps maintained by federal or state governments) that can be distributed and set up on short notice to hot areas with surge capacity needs.

Increase Supply of Personal Protective Equipment. The Centers for Disease Control and Prevention (CDC) recommends, at a minimum, N95 respirators for hospital staff expected to have direct contact with COVID-19 patients, plus disposable procedural or surgical masks for all other clinical personnel in any health care setting.[14] The supply chain should be able to reliably distribute sufficient N95 masks, gloves, and other personal protective equipment to protect health care workers from infection.

Implement Comprehensive COVID-19 Surveillance Systems. The move toward less restrictive physical distancing could precipitate another period of acceleration in case counts. Careful surveillance will be needed to monitor trends in incidence. A high-performing disease surveillance system should be established that leverages:

1) Widespread and rapid testing at the point of care using cheaper, accessible, and sensitive point-of-care diagnostic tools that are authorized by the Food and Drug Administration (FDA);

2) Serological testing to gauge background rates of exposure and immunity to inform public-health decision-making about the level of population-based mitigation required to prevent continued spread in the setting of an outbreak; and

3) A comprehensive national sentinel surveillance system, supported by and coordinated with local public-health systems and health care providers, to track the background rate of infection across states and identify community spread while an outbreak is still small and at a stage in which case-based interventions can prevent a larger outbreak.

ILINet, the surveillance system for influenza-like illness in the United States, is a potential model for SARS-CoV-2 surveillance. To enable rapid and more effective detection and case management, SARS-CoV-2 surveillance will also benefit from data sharing and coordination with health care providers and payers. The CDC should convene an intergovernmental task force, with outside experts as needed and input from states and the health care community, to develop and support a new national surveillance system and data infrastructure for tracking and analyzing COVID-19.

Massively Scale Contact Tracing and Isolation and Quarantine. When a new case of COVID-19 is diagnosed, the patient should be isolated either at home or in a hospital, depending on the level of care he or she requires. Current CDC guidelines recommend seven days of isolation.[15] Home isolation can be enforced using technology such as GPS tracking on cell phone apps. Also, the close contacts of confirmed cases (as defined by the CDC[16]) should be quarantined and monitored daily for 14 days. Monitoring of international travelers is also recommended.[17]

To scale these interventions to accommodate thousands of daily cases and tens of thousands of daily contacts, public-health infrastructure will need to be dramatically scaled up throughout the country, in coordination with the improving capacity of health care providers to prevent, diagnose, and treat COVID-19 cases.

The task force should also be charged with developing and overseeing an initiative to:

1) Surge the existing public-health workforce to conduct case finding and contact tracing;

2) Enable rapid reporting to state, local, and federal health authorities, through the public-health

workforce and electronic data sharing from health care providers and labs; and

3) Develop and field a technological approach to enable rapid data entry, reporting, and support for isolation, quarantine, and safe community-based treatment of affected individuals.

Offer Voluntary Local Isolation and Quarantine. Comfortable, free facilities should be provided for cases and their contacts who prefer local isolation, quarantine, and treatment away from home. For example, a member of a large household may wish to recover in a hotel room that has been repurposed rather than risk infecting family members. Isolation and quarantine away from home should not be mandatory or compelled by force.

The Federal Emergency Management Agency is the lead agency tasked with coordinating with state and local jurisdictions to stand up appropriate isolation and quarantine facilities. Field hospitals, dormitories, hotels, and military barracks may be appropriated for this purpose.

Encourage the Public to Wear Masks. There is emerging evidence that asymptomatic and presymptomatic transmission of COVID-19 is possible,[18] which complicates efforts to pursue case-based interventions. To reduce this risk during Phase I, everyone, including people without symptoms, should be encouraged to wear nonmedical fabric face masks while in public.[19]

Face masks will be most effective at slowing the spread of SARS-CoV-2 if they are widely used, because they may help prevent people who are asymptomatically infected from transmitting the disease unknowingly. Face masks are used widely by members of the public in some countries that have successfully managed their outbreaks, including South Korea and Hong Kong.[20] The World Health Organization (WHO) recommended members of the public use face masks in the event of a severe influenza pandemic.[21]

However, personal protective equipment should continue to be reserved for health care workers until supplies are sufficient for them and abundant. For this reason, right now members of the general public should opt to wear nonmedical fabric face masks when going out in public. The CDC should issue guidelines on the proper design of such nonmedical fabric face masks. Consumers may be able to fashion these masks themselves using available washable materials, or they may become available in the consumer marketplace.

Trigger for Moving to Phase II

A state can safely proceed to Phase II when it has achieved all the following:

- A sustained reduction in cases for at least 14 days,
- Hospitals in the state are safely able to treat all patients requiring hospitalization without resorting to crisis standards of care,[22]
- The state is able to test all people with COVID-19 symptoms, *and*
- The state is able to conduct active monitoring of confirmed cases and their contacts.[23]

Phase II: Reopen, State by State

In Phase II, the majority of schools, universities, and businesses can reopen. Teleworking should continue where convenient; social gatherings should continue to be limited to fewer than 50 people wherever possible. Other local restrictions should be considered, such as those that limit people from congregating in close proximity.

High-contact settings such as schools should continue to review and implement physical distancing measures with guidance from the CDC and input from local officials. Health officials should recommend increased social hygiene measures and cleaning of shared surfaces.

For older adults (those over 60 years old), those with underlying health conditions, and other populations at heightened risk from COVID-19, it should still be recommended that they limit time in the community during Phase II. This recommendation may change if an effective therapeutic becomes available.

We need to consider these activities on a coordinated, regional basis through multistate cooperation. While state and local governments maintain sovereignty over issues related to their public-health response, coordination based on regions that cross state boundaries will be crucial. Large states with multiple urban areas and rural regions may implement reopening at a regional level. States that share major metropolitan areas (for example, New York, New Jersey, and Connecticut) should assure that the conditions for reopening these areas are met across the relevant state boundaries.

Goals

The goals of Phase II are to:

1) Lift strict physical distancing measures in a concerted and careful fashion,
2) Allow the vast majority of businesses and schools to open, and
3) Continue to control SARS-CoV-2 transmission so we do not revert back to Phase I.

The adoption of these Phase II measures will require a careful balance. We will need to constantly reevaluate the implementation of these measures based on available surveillance data, and we will need to be ready to adjust our approach over time according to the epidemiology of local, national, and global spread. This is especially true as we transition from one phase to the next.

Thresholds for Action

Trigger to Lift Physical Distancing Measures. Once the criteria for the transition from Phase I to Phase II have been met and we begin to move away from the "slow the spread" period, leaders at the state level should begin an incremental easing of physical distancing measures. This should be done gradually and should be paired with increased surveillance for new cases. State officials should make decisions about the selection and timing of restrictions to lift based on their local contexts. Restrictions should be eased gradually, with sufficient time between each adjustment to carefully monitor for resurgence of transmission.

Trigger for Returning to Phase I, "Slow the Spread." As physical distancing is gradually eased, surveillance will be essential for quickly identifying an increase in cases in the state. A state should revert to Phase I and continue "slow the spread" if a substantial number of cases cannot be traced back to known cases, if there is a sustained rise in new cases for five

days, or if hospitals in the state are no longer able to safely treat all patients requiring hospitalization.

Trigger for Moving to Phase III. Once a vaccine has been developed, has been tested for safety and efficacy, and receives FDA emergency use authorization,[24] or there are other therapeutic options that can be used for preventive or treatment indications and that have a measurable impact on disease activity and can help rescue very sick patients, states can move to Phase III.

Steps Required in Phase II

Implement Case-Based Interventions. Using the public-health capacities developed in Phase I, every confirmed case should be isolated either at home, in a hospital, or (voluntarily) in a local isolation facility for at least seven days, or according to the latest CDC guidance. People awaiting test results should be advised to quarantine until their results are returned.

The close contacts of confirmed cases should be traced and placed under home or central quarantine, with active daily monitoring for at least 14 days, or according to the latest CDC guidance. Diagnostic tests should be immediately administered to any close contacts who develop symptoms.

Begin to Relax Physical Distancing Measures. General physical distancing precautions should still be the norm during Phase II, including teleworking (as much as possible), maintaining hand hygiene and respiratory etiquette, wearing a mask in public, regularly disinfecting high-touch surfaces, and initially limiting social gatherings to fewer than 50 people. These recommendations should be augmented through technological solutions to understand physical distancing behaviors and adjust risk messaging as needed. This should be accomplished through partnerships with the private sector, with careful attention paid to preserving privacy and avoiding coercive means to encourage compliance.

As children return to school and daycare (i.e., high-contact settings) and people return to high-density workplaces, leaders of these organizations should continue to review and implement physical distancing measures based on guidance from the CDC for schools and businesses.[25]

Special Care for Vulnerable Populations. While easing of physical distancing is taking place, highly vulnerable populations,[26] such as individuals older than age 60 and those with compromised immune systems or compromised lung and heart function, should continue to engage in physical distancing as much as possible until a vaccine is available, an effective treatment is available, or there is no longer community transmission. Special attention should be paid to long-term-care facilities and nursing homes.[27] These facilities will need to maintain high levels of infection prevention and control efforts and limit visitors to prevent outbreaks.

If a treatment or prophylactic, such as a monoclonal antibody,[28] becomes available, high-risk and vulnerable populations should be prioritized to receive it, to both protect those individuals and reduce the likelihood of an increase in severe illnesses and additional patient surge in hospital intensive care units (ICUs).

Accelerate the Development of Therapeutics. Therapeutics play an important role in caring for those who are sick. Accelerating the research, development, production, and distribution of safe and effective therapeutics is a top priority. With effective development strategies and early investments in commercial-scale manufacturing, a successful therapeutic could receive emergency use authorization or approval as early as the summer or fall, if trials demonstrate that it meets either standard.

Therapeutics can serve a number of roles. First, they can serve as a prophylaxis to help prevent infection in those at greatest risk of infection, such as front-line health care workers, or those at risk of bad outcomes, such as individuals with preexisting health conditions and those who are immunocompromised. Such a treatment could include a recombinant

antibody that can target the virus surface antigens. As an example, researchers successfully developed such a therapeutic against Ebola. These antibody drugs can also be used to treat early infection or as a postexposure prophylaxis.

Other therapeutics might include antiviral drugs that target features of how the virus replicates. These drugs can be used to treat people who are critically ill or earlier in the course of disease for those at risk of developing a complication. Antiviral drugs can also be used as postexposure prophylaxis, depending on their safety profile. Postexposure prophylaxis and products that shorten the duration and intensity of viral shedding may affect the effective reproduction number only modestly. In addition, immune-modulating treatments may prove to be helpful in mitigating severe lung complications in some patients. A number of promising drugs are in early and mid-stage development.

At a minimum, the optimal profile for a therapeutic that will affect the risk from future spread is one that meaningfully reduces the risk of death or severe disease and perhaps prevents the onset of symptoms or progression to severe disease in those exposed. Oral administration at the outpatient level would be ideal, but alternative administration requirements (e.g., infusion and jet injections) could also be scaled, with sufficient planning.

While private industry has already organized a large task force to share information and capabilities to rapidly advance promising therapies, we need a commensurate focus by federal agencies to make sure the best possible resources are brought to this mission. Federal agencies should join organized efforts already underway in the private sector.

Identify Those Who Are Immune. Serology is a method used to identify evidence of immunity in someone who has recovered from infection. With accurate and widely available serological testing, we can identify people who are immune and therefore no longer vulnerable to infection. While we need to better understand the strength of the immune response in mild cases and how long people remain immune from reinfection, we know there is a period where most people will have sufficient antibodies to offer protection. People who are immune could:

1) Return to work,

2) Serve in high-risk roles such as those at the front lines of the health care system, and

3) Serve in roles that support community functioning for people who are still physically distancing (e.g., the elderly who continue to quarantine at home).

To use serology in this way, serological assays are needed and should be widely available, accurate, rapid, and low cost. Such assays have already been developed by researchers, but they have not yet been fully validated and are not available at scale.

A task force comprised of senior leaders from the CDC, the Biomedical Advanced Research and Development Authority, the National Institute of Allergy and Infectious Diseases, the Department of Defense (DOD), the FDA, academia, and key private-sector groups (e.g., serological manufacturing companies) should be tasked to oversee the development, production, distribution, data collection, serological survey designs, and analytics for use of serology at scale.[29]

Trigger for Moving to Phase III

Once a vaccine has been developed, has been tested for safety and efficacy, and receives FDA emergency use authorization,[30] states can move to Phase III.

Phase III: Establish Protection Then Lift All Restrictions

Once a robust surveillance sentinel system is in place, coupled with widespread point-of-care testing and a robust ability to implement tracing, isolation, and quarantines—and this is supported by the availability of therapeutics that can help mitigate the risk of spread or reduce serious outcomes in those with infections—or alternatively a vaccine has been developed and tested for safety and efficacy, we can enter Phase III. The availability of these technologies (and eventually a safe and effective vaccine) will have economic and social benefits, in addition to health benefits.

Goals

The goals of safe and effective technologies for controlling transmission are to:

1) Prevent infection;

2) Treat those with early disease to prevent bad outcomes;

3) Provide a prophylaxis for those exposed to infection to prevent them from developing disease or reduce its severity;

4) In the case of a vaccine, build population-level immunity to the virus in order to reduce illness and death and stop or greatly slow spread; and

5) Enable the lifting of all physical distancing measures.

Thresholds for Action

Trigger to Begin Manufacturing Scale-Up and Vaccine or Therapeutic Prioritization Planning. As soon as a vaccine or therapeutic looks promising in pivotal clinical trials (i.e., it has been shown to be safe and looks like it will also be effective),[31] the US government should work with industry to begin planning for mass manufacturing, distribution, and administration. New provisions enacted under the recently passed Coronavirus Aid, Relief, and Economic Security Act allow for large-scale manufacturing of promising therapies, in advance of approval, to help make sure there will be adequate supply available for mass distribution, should a product demonstrate that it is safe and effective and win regulatory approval.

Trigger for Switch Toward Mass Vaccination. Once availability of a vaccine or therapeutic is able to meet demand, vaccination can expand beyond priority groups. The CDC, state public-health agencies, and vaccine developers should work together to plan for and execute mass vaccination of large populations in the US. This planning can begin before Phase III because preparation can be made regardless of vaccine availability.

Steps to Take in Phase III

Vaccine or Therapeutic Production. Once a safe and effective vaccine or therapeutic has been licensed, it will need to be quickly manufactured at scale. The Public Health Emergency Medical Countermeasures enterprise,[32] in coordination with pharmaceutical

companies and other private-sector stakeholders, should continue to plan for and implement mass production capable of quickly meeting US demand.

Vaccine or Therapeutic Prioritization—When Supply Is Still Limited. The CDC, the National Institutes of Health, the Office of the Assistant Secretary for Preparedness and Response, the DOD, and other stakeholders should revise prior influenza vaccine prioritization guidance to apply specifically to COVID-19.[33] The new prioritization guidance for the COVID-19 vaccine should identify priority groups for targeted distribution when a safe and effective vaccine starts to become available. The guidance should be transparent and explain the reasoning for priorities, including the populations in which the vaccine was studied, and should be a phased approach that expands to additional priority groups as vaccine availability expands. The guidance should be reflected in COVID-19 payment policies implemented by the Centers for Medicare & Medicaid Services (CMS) and private insurers, with treatment available at no cost to individuals who meet the priority guidance and a mechanism for reimbursement for individuals who are uninsured.

Mass Vaccination or Therapeutic Distribution—When Supply Is Abundant. The CDC should work with state and local health officials, health care providers, CMS and health insurers, and other public-health stakeholders to create a national plan for how mass vaccination will be carried out across the country. This plan should identify who will administer vaccinations, where vaccines will be offered, and how data will be collected on vaccination rates, as well as possible adverse events from the vaccine. Indemnification of vaccine developers and manufacturers should also be considered. Congress could enact legislation to support a process for compensation of any individual who has an adverse event from the vaccine, which requires medical care.

Global Vaccine Scale-Up and Vaccination. The CDC, the US Agency for International Development, the State Department, and other US stakeholders should continue to work with WHO and other international organizations and national leaders to plan for how the US will assist other countries (particularly low- and middle-income countries) with obtaining vaccine and implementing mass vaccination. Support from the United States and higher-income nations will be critical for controlling the virus globally and saving lives around the world, as well as reducing the impact that future waves of the pandemic may have on the US population.

Serological Surveys to Determine Population Immunity. One key input for understanding the population at risk is the fraction of the population who have recovered and are protected against reinfection. If a sufficiently high fraction of the population has become immune either through natural recovery or vaccination, remaining restrictions can be lifted. The CDC should be the lead agency for coordinating ongoing serological surveys.

Phase IV: Rebuild Our Readiness for the Next Pandemic

The COVID-19 pandemic has exposed serious gaps in our nation's pandemic preparedness. COVID-19 will not be the last public-health emergency to threaten American society. We must invest in the scientific, public-health, and medical infrastructure needed to prevent, detect, and respond to the next infectious disease threat.

Develop Vaccines for Novel Viruses in Months, Not Years. In response to COVID-19 and in preparation for the next previously unidentified health threat ("Disease X"[34]), the United States should lead the way by setting an ambitious goal of rapidly developing medical countermeasures for novel or unknown threats in months, not years. A dedicated strategy, program, and funding will be needed to create the ability at existing agencies within the US Department of Health and Human Services and DOD to quickly develop flexible platforms and countermeasures for any type of novel pathogen.[35] This strategy should include supporting flexible manufacturing capacity to scale up production to a global level in an emergency.

Modernize and Fortify the Health Care System. We must improve our hospital-bed and ICU capacity to accommodate large surges of patients through public-private partnerships, for example, by enhancing the Hospital Preparedness Program[36] and the Public Health Emergency Preparedness Cooperative Agreement[37] and emphasizing preparedness in federal health care programs (e.g., the CMS[38] and the Department of Veterans Affairs[39]). We must also expand the supply chain of personal protective equipment and further the development of crisis standards of care. To reduce future burdens on our critical-care systems, we must also support our primary and community care capabilities to identify populations at elevated risk, detect cases early, and manage them at home or in the community more effectively. Health care payers have been implementing payment reforms to support better screening and population health management. Emergency supplemental payments to health care providers in the current pandemic and future health care payments should be linked to establishing better surge capacity for severe cases and stronger capabilities to partner with public-health authorities to contain outbreaks and reduce the burden on hospitals.

Establish a National Infectious Disease Forecasting Center. Given the important role of infectious disease modeling in supporting public-health decision-making, we should increase our nation's capacity to use infectious disease modeling[40] to support public-health decision-making by establishing a national infectious disease forecasting center. This permanent federal institution would function similarly to the National Weather Service, providing a centralized capability for both producing models and undertaking investigations to improve methods used to advance basic science, data science, and visualization capabilities. It would also provide decision support to public-health agencies based on modeling and analytic results.

Governance. We need to move away from a decentralized system that promotes unequal implementation of preparedness measures across the nation and toward a more coordinated execution of response. We should develop clear and effective plans for the implementation of public-health measures such as quarantine and the unification of actions made by state and local health departments. Outbreaks are matters of regional—and more typically national—concern. Preparedness for public-health emergencies should be elevated as a function in the White House, with a coordinating function analogous to the director of national intelligence.

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About the Authors

Scott Gottlieb is a resident fellow at the American Enterprise Institute and was the Food and Drug Administration commissioner from 2017 to 2019. He serves on the boards of Pfizer Inc. and Illumina.

Mark McClellan, who directs the Duke-Margolis Center for Health Policy, was commissioner of the Food and Drug Administration from 2002 to 2004. He is an independent board member at Alignment Health Care, Cigna, Johnson & Johnson, and Seer. He is a co-chair of the Health Care Payment Learning and Action Network and receives advisory fees from Arsenal Capital, CRG, and Mitre.

Lauren Silvis is a senior vice president at Tempus Inc. and was previously the deputy director of the Food and Drug Administration's medical device center and the agency's chief of staff from 2017 to 2019.

Caitlin Rivers is an epidemiologist and assistant professor at the Johns Hopkins Center for Health Security.

Crystal Watson is a health security expert and assistant professor at the Johns Hopkins Center for Health Security.

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COVID-19

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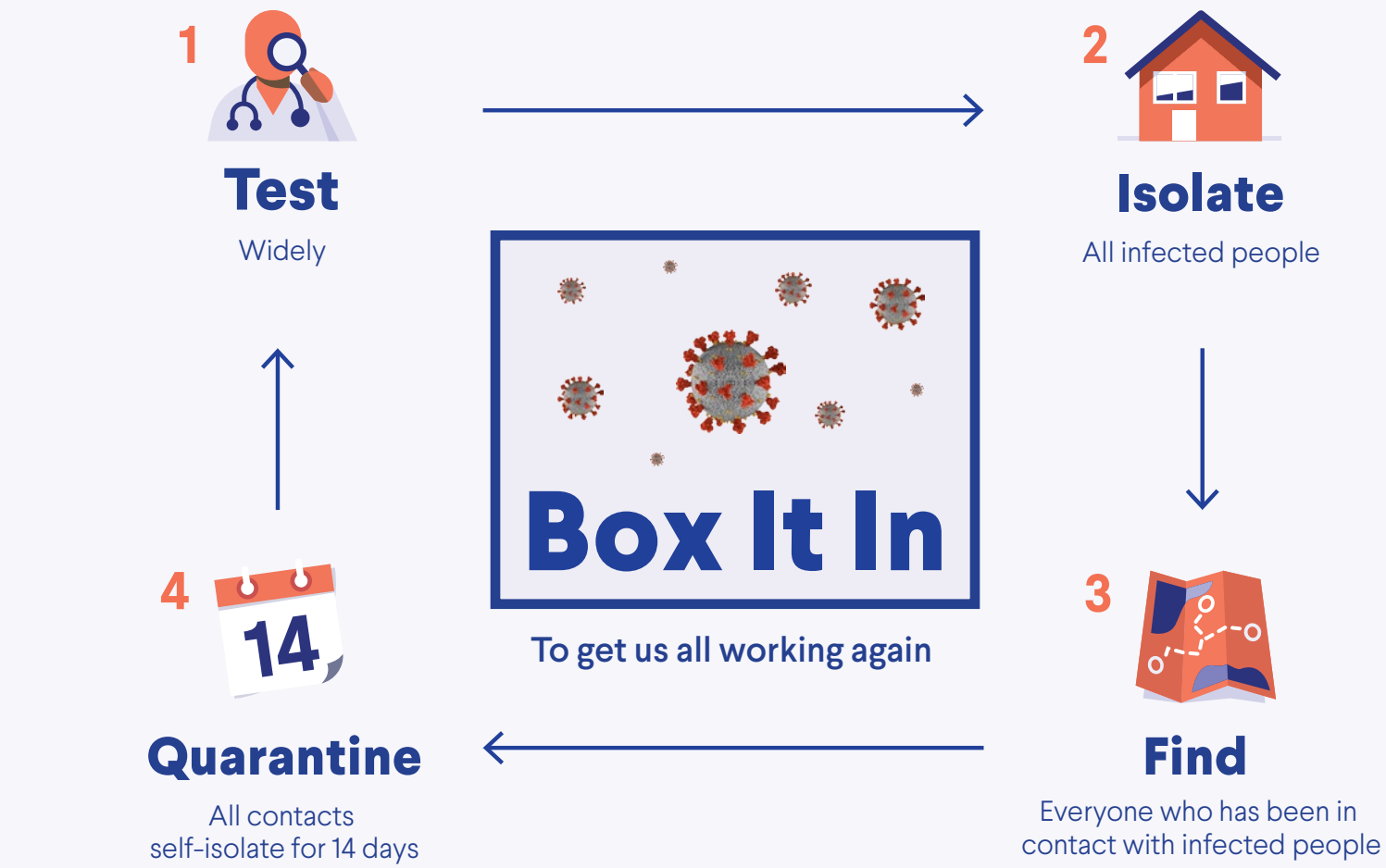

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Executive Summary

Within months of emerging,[1] the novel coronavirus SARS-CoV-2 had circled the globe, forcing much of the world's population into hiding[2] and shutting economies and travel.[3] This withdrawal slowed the explosive spread of the virus to "flatten the curve" of new infections.

But sheltering in place is just a strategic retreat. We're trapped in our homes, wrapped in our fears, isolated in our stressed hospitals—and **in order to go back out, we need to box the virus in.**

Many thoughtful approaches for responding to Covid-19 have been proposed.[4,5,6,7,8] We benefit from these contributions, as we do from the experiences of states and cities around the country and nations around the world that are responding effectively to the pandemic.

Based on this shared knowledge and drawing on our own experience in the U.S. and globally, here we detail the next step. After flattening the curve, the next step is to box the virus in by implementing **four essential actions**. All four are crucial; if any one is lacking, the virus can escape and spread explosively again. Success requires urgent expansion of our public health capacity.

1. **Expand and prioritize testing.** We must make rapid diagnostic tests widely available to swiftly identify newly infected people. This report outlines the priorities for testing and approximate numbers of tests needed in different scenarios. Serological testing, which can guide society-wide decision-making, may also make it easier for immune people to reenter the work force but won't replace widespread testing for the virus itself.
2. **Isolate infected people to prevent disease spread.** We must support every infected person so the virus stops with them, regardless of the setting. Those who do not require hospitalization but cannot safely be cared for in their homes will need safe and attractive housing until they are no longer infectious. Hospitals must safely care for and isolate patients and reduce health care workers' risk of infection. And the nation's 15,000 nursing homes need to take extraordinary action to prevent and stop spread of the virus among their 1.3 million residents.[9]
3. **Identify contacts who infected people may have exposed.** To get ahead of the pandemic, we must trace the contacts of infected people and warn them of their exposure. Just as governments provide hurricane warnings so people can protect themselves and their families, the public sector must warn individuals who have been exposed to the coronavirus so they don't spread the infection. For this unprecedented effort, we need to build an army of contact tracers, address the public's concerns about confidentiality and privacy, and adopt technologies to improve efficiency—although new digital tools are likely to supplement but not supplant traditional public health processes.
4. **Quarantine contacts.** People who came into contact with infected people and may have been infected themselves are the leading edge of the pandemic. We must provide them with wraparound services so they can quarantine at home for two weeks and keep the virus from spreading to others. Although some

people can easily stay home and work or attend school remotely, others will require special supports, including temporary housing if requested and required. We must ensure that medical and social services are readily available so these quarantined individuals can be tested and isolated at the first sign of illness.

The physical distancing measures we've taken to suppress the pandemic have been hugely disruptive, and we are all impatient to resume economic and social activity. We must reopen cautiously: vigilant of new outbreaks, prepared to shelter again if needed, and hopeful that science will yield new vaccines or treatments. We must also lay the groundwork for a safer, more cohesive response to future pandemics. Until there is a vaccine, we will be stuck until we take rapid steps to box in Covid-19, and only public health can guide us there.

KEY RECOMMENDATIONS

1. Testing

1.1 Increase the number of diagnostic tests available

1.2 Reduce test result turnaround time

1.3 Prioritize testing for the groups for which testing will make the most difference in improving outcomes and reducing infections

1.4 Determine if antibodies are protective and expand serological testing

2. Isolation

2.1 Make hotels, dormitories, or other facilities that are safe and attractive available for people who cannot safely isolate in their homes

2.2 Prevent transmission in hospitals by rapidly finding and effectively isolating all infected patients and implementing a hierarchy of infection prevention policies and programs

2.3 Implement wide-ranging preventive measures in nursing homes to prevent introduction of the virus and reduce transmission between vulnerable residents and staff.

2.4 Adopting similar policies in congregate care facilities and reducing their populations to a level that is safer for residents and staff

3. Contact tracing

3.1 Massively expand contact tracing capacity at the local, state and federal levels

3.2 Support person-to-person contact tracing to make it more efficient and effective, including through the development and evaluation of supportive technologies

3.3 Support contact tracing by having trusted leaders and popular figures explain why it is so important for cases to help warn their contacts, and why contacts must quarantine until infection is ruled out

4. Quarantine

4.1 Provide services and support to people so they can quarantine as comfortably as possible

4.2 Provide ready access to telehealth services and care when needed

5. Prevention

5.1 Invest in public health at the national and global levels to tamp down the Covid-19 pandemic and to reduce the risk of future epidemics and pandemics.

Introduction

In the first phase of the coronavirus pandemic, communities that were unable to box the virus in resorted to basic, but battle-tested, public health social measures such as physical distancing to reduce transmission of the virus, and these measures have slowed its spread. This has come at great cost to economies, but these measures have averted an even more catastrophic loss of life.

Hundreds of countries that have closed their borders and billions of individuals who are shut in their homes are wondering what comes next. This is a public health emergency, and public health can guide the way forward.

Although sheltering in place reduces spread of the virus, it does not alter the underlying conditions that can allow Covid-19 to spread explosively if we resume normal activities. To re-open our societies, we must box the virus in by taking the four necessary actions detailed in this report.

We can measure our progress against specific, measurable targets.[10] When we meet these targets, we can begin to gradually lift restrictions, loosening the faucet of normal economic and social activity. Significant deterioration of any of the measures should trigger reintroduction of some restrictions, tightening the faucet of activity until the situation is again under control.[11]

Having a clear plan does not diminish its difficulty. We need real-time, accurate data to track the virus. The people enlisted to find and respond to cases, clusters, and outbreaks swiftly and successfully must be highly trained and well supervised. Building this system will require leadership and a nationwide effort — the health of our people and the wealth of our economy depend on it.

Countries around the world are responding to the pandemic and we can learn from each other's experiences. The genius of private industry will make new technologies available to increase the efficiency and efficacy of our efforts.

This moment calls for a clear-eyed appraisal of our circumstances and an evidence-based response. The pathogen, not politics, will set the terms of this battle. To open our society before we've boxed in the virus would condemn us to another explosive epidemic, another retreat into our homes, another crushing blow to the economy.

1 Expand and Prioritize Testing

In order to contain the virus and control the Covid-19 pandemic, we need to know who is infected. This will require testing, testing, and more testing.[12] We need to increase the number of diagnostic tests available, increase processing speed, prioritize, and expand into serological testing.

With widespread, rapid testing, people who show symptoms can quickly determine if they are infected and isolate to protect their families and communities. Health care workers who become ill can be tested and avoid infecting patients and other health workers. Nursing home residents who become ill can be quickly isolated to avoid spreading the virus to others who are highly vulnerable to severe disease.

The crucial nature of testing

Without prompt, accessible, and well-targeted testing, the virus will open new lines of attack, create new clusters and spread illness, death, and economic dislocation.

There are two types of testing: testing for the virus, which identifies people who have current viral infection and are able to spread disease to others, and serological testing, which identifies antibodies showing that a person has been infected at some point in time. Testing for the virus includes low-volume, point-of-care tests that can be used in health centers and for outbreak control, medium-volume hospital-based testing, and high-volume testing, generally provided by commercial laboratories. There are different tests for different purposes and different contexts, and tests will have different roles at different stages in our efforts to box the virus in and stop the pandemic.

There should be capacity to test every person with suspected COVID-19 disease and particularly all with pneumonia, every sick health care worker, every ill person in nursing homes and other congregate facilities (including jails and shelters), contacts, and people in clusters of disease that could be Covid-19. Ideally, unless Covid-19 isn't present in a community, testing would cover all patients hospitalized for any reason, any outpatient with symptoms of the disease, people working in health care or other essential roles, and close contacts of confirmed cases. In the suppression phase, testing will help find and respond rapidly to new cases and clusters to facilitate reopening society, as well as conduct ongoing surveillance at nursing homes and hospitals and among essential workers.

Estimates vary as to the precise growth in diagnostic testing that is needed. As of early April, fewer than 150,000 people were being tested each day in the U.S., with backlogs of several days.[13] The minimum number of tests that need to be done per day will depend on the stage of the epidemic and number of outbreaks, hospitalization rates, number of cases and contacts identified, and decisions about the frequency and extent of testing in nursing homes, hospitals, and essential services. Compared to mid-April 2020, just meeting the need for the highest priority tests would require testing capacity to increase by a factor of 3, and testing on a wider scale as recommended by some could increase the need by a factor of 30 or more (Annex 1).

Actions to increase testing

The federal government needs to ensure that production of tests meets the need for ongoing, widespread testing. Both public and private labs need to accelerate processing. In addition to testing at health care facilities, communities also need to diversify modes of testing, such as drive-through tests.

Ultimately, we must test even more broadly to learn more about presymptomatic and asymptomatic transmission and establish and then hone a new national surveillance system for the virus. We also need to provide repeat testing of cases and contacts to identify when it is safe for people to return to society. A voluntary registry could be established (for example, using the infrastructure of immunization registries available in every state) to identify people who have recovered or who have antibodies to the virus.

Serological testing?

Serological testing identifies people who have or who have had Covid-19. People who test positive for antibodies, but negative for active infection, may have some level of immunity. If they are found to be protected from repeat infection, they could aid in response activities and return to work sooner than others.

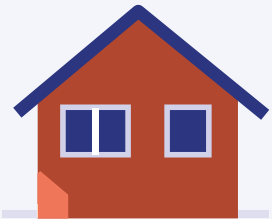
Serological assays tests should be widely available, accurate, rapid, and low cost. These tests have already been developed by researchers, with some receiving FDA approval for emergency use, but have not yet been validated. Serological tests will be negative at the early stages of infection, before antibodies have had a chance to develop, so they need to be performed in conjunction with virus testing for active infection. Although people who recover from infection may have some immunity to Covid-19, the strength and duration of this immunity are still uncertain. Whether antibodies are protective, and, if so, for how long immunity lasts, is one of the most important questions to be answered in the coming weeks and months.

SUCCESS STORY: GERMANY

Germany tested large numbers of people earlier than any other European country, and is testing at one of the highest per capita rates in the world by including people with minimal or no symptoms as well as those with more severe illness; the country is also implementing anti-body testing.[14]

Widespread testing with timely results has also been a critical component of successful containment strategies in South Korea, Singapore and China.

Doctor at a Coronavirus Test Station, Germany Nürtingen



2 Isolate Infected People

We must swiftly isolate people with Covid-19 to reduce transmission of the virus and to prevent its introduction into environments at risk for outbreaks. We can stop spread of the virus if we isolate infected people and prevent spread of infections at home, in hospitals where our front-line workers and patients are otherwise at risk, and in congregate facilities where populations are particularly vulnerable.

Challenges

Although many questions about Covid-19 remain unresolved, early reports suggest that intra-family transmission is a significant source of disease spread, which points to the importance of finding safe ways to isolate infected individuals.[15]

In the early response to Covid-19, health systems in the U.S. and globally have failed to protect their front-line staff from infection. A preliminary CDC report of Covid-19 cases among U.S. health care personnel showed that at least 10,000 were sickened during two months of the pandemic, and in states with more complete reporting, healthcare workers represented 11 percent of total reported cases in that time period.[16]

Among those sickened by Covid-19, the elderly and people with pre-existing conditions are at much high risk of developing severe illness. The approximately 1.5 million Americans living in the nation's 15,000 nursing homes[17] are particularly vulnerable. By mid-April, more than 2,500 nursing homes reported cases and more than 3,800 staff and residents had died, a number that has been increasing rapidly.[18] In some areas, nursing homes accounted for nearly half of Covid-19 deaths.[19] Without extraordinary preventive measures, nearly all such facilities could have an outbreak, killing 300,000 residents or more.

Other congregate facilities that house large groups of people together (including shelters, jails, and prisons) are also at great risk for rapid disease transmission. In Cook County Jail, Illinois, more than 500 detainees and correction officers tested positive by mid-April.[20]

Actions needed

People with Covid-19 whose symptoms do not merit hospitalization must isolate at home if they can do so safely. But for the one in five Americans who live in a multigenerational household,[21] others who share a dwelling with medically vulnerable people, people who are homeless, and those who wish to avoid infecting their family members, isolating at home is not the best option.

Each community must therefore make hotels, dormitories, or other facilities that are safe and attractive available for these cases to isolate.

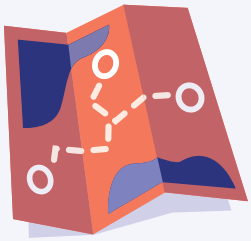
Hospitals must adopt policies to prevent transmission by rapidly finding and effectively isolating all infected patients. The CDC has released detailed guidance for healthcare facilities which include reorganizing services, implementing engineering and administrative controls, optimizing use of personal protective equipment, and implementing measures to safely triage and manage patients.[22] No health care worker should get infected.

Nursing homes must also take a wide range of actions to prevent introduction of the virus. Following recommendations from the CDC[23] and others,[24,25] they should adopt physical distancing; closely monitor residents; restrict access to visitors and nonessential personnel; train staff on infection prevention and audit their performance; screen staff and residents regularly for illness—and ensure they have paid leave so they can stay home if they are sick. CDC has created a checklist of policies to adopt. Further extraordinary action may be required, such as testing all staff and residents weekly or daily and physically separating those who are infected.

Other congregate care facilities need to adopt similar measures and should reduce their populations to a level that is safer for residents and staff.

SUCCESS STORY: SINGAPORE

Singapore has been largely able to protect health care workers from infection thanks to smart and rigorously adopted policies. The country had cause to be prepared: during the outbreak of severe acute respiratory syndrome (SARS) in 2003, health care workers accounted for 41 percent of Singapore's infections. The country first published an Influenza Pandemic Preparedness Response Plan in 2005, and its hospitals regularly train for this type of scenario. The country also built a stockpile of personal protective equipment sufficient to cover all front-line health care workers for several months. And during the response to Covid-19, hospitals reorganized into modular teams that rotate together, reducing exposure among them.[26,27] Experts have also credited health care workers' scrupulous adoption of surgical masks, hand hygiene, and other standard procedures, which have protected them from infection even under circumstances that otherwise put them at high risk of infection.[28] Through April, the country counted only a handful of infections among its health care workers, and most or possibly all of these may have occurred in the community, outside of health care facilities.



3 Trace Contacts

We must rapidly and comprehensively trace contacts of people with Covid-19. When exposed people enter quarantine, they interrupt the chain of transmission, which is key to controlling the pandemic.

Contacts of every case must be identified and notified quickly. For this to occur, a massive expansion of contact tracing capacity is needed. Given the size and mobility of the U.S. population and the extend of Covid-19 spread, this will be a monumental task.

How contact tracing works

Contact tracing is a basic public health activity and an essential tool for epidemic response. Contact tracing can prevent a single case from becoming an outbreak and an outbreak from becoming an epidemic. The idea behind contact tracing is simple. In an epidemic, infection isn't passed from one person to another in a simple chain; it spreads more as if in a web. If just one chain of transmission in this web is missed, the virus can continue to spread through the community.

Contact tracing is time- and human-resource intensive. It requires conducting detailed interviews with every confirmed or presumptive case of Covid-19, detailing their activities hour by hour through the entire infectious period, and recalling everyone they were in contact with during that time. These contacts must then be contacted, interviewed, and, if needed, tested and, if infected, their contacts in turn identified and contacted.

This process continues until the end of any possible transmission chain has been reached. Additionally, all contacts need to self-monitor and report daily on symptoms and temperature for 14 days after their last contact with an infected person.

Building an army of contact tracers

Some communities have begun building contact tracing operations[29]; we need a nationwide effort with key roles for federal, state, and local public health as well as many governmental and non-governmental organizations. With a coordinated approach, we can then identify and locate people who have been in contact with those who are infected, support them in quarantine, and offer testing as needed.

Contact tracing is a skill. It requires technical knowledge, people skills, and access to resources to help find, and support, index cases (the patient whose contacts are being traced) and their contacts. Supportive, expert supervision is essential to success.

The number of contact tracers needed in the U.S. will be large – as many as several hundred thousand. The number needed will depend on the number of cases that need to be traced, the efficiency of the process, and the level of participation of patients and their contacts. (See Annex 2.) The number of cases will be determined by the extent to which people shelter in place and physically distance to flatten the epidemic curve, infection control in hospitals, nursing homes, and other places where people congregate, and the effectiveness of the contact tracing process itself.

Building public support

The success of the process hinges on the public's level of participation. Officials and cultural figures should support this process by explaining why it is so important for cases to help warn their contacts, and why contacts must quarantine until infection is ruled out. Because many people are unfamiliar with the contract tracing process, their fears must be allayed in order to stop the pandemic.

When done correctly, contact tracing addresses confidentiality and privacy concerns while allowing governments to take appropriate protective action. The name of the index case is never revealed to a contact. In certain circumstances, index patients may prefer to notify their contacts directly – but public health must ensure that this has been done correctly and promptly. Cases as well as their contacts must be treated as the VIPs of the program – because they deserve this, because it's the right thing to do, and because doing so increases the likelihood that the chain of transmission will stop with them.

Accordingly, contract tracing programs should include services for those in isolation or quarantine to make the experience safe and as least disruptive as possible. This may entail providing accommodations if a person's home circumstances are not safe (such as an ill patient living with vulnerable household members), medical and social services, food, and offsetting lost wages.

Emerging technologies

New and emerging technologies cannot replace traditional contact tracing.[30] South Korea and Singapore have integrated mobile phone apps into their contact tracing strategies. The exact results and importance of these strategies is still being defined, and should not provide a false sense of security. It is possible, particularly in crowded locations where spread of the virus has been confirmed (e.g., a workplace or church) that mobile alerts and public maps can help people know that they may have been exposed. Location trackers to identify if a case or contact has left their place of isolation or quarantine are being used in some places, although the acceptability and effectiveness of this approach remains to be determined. If patients and their contacts see the process as punitive, patients who are mildly ill may not come forward and patients who do may not list all their contacts. During the 2014-2016 Ebola outbreak in West Africa, Sierra

Leone made the mistake of having police guard contacts in their homes, leading to stigma, social hardship, corruption, under-reporting of contacts, and likely prolonging their outbreak by many months.

Other modern electronic tools can make the traditional contact tracing experience more efficient and effective. These include workflow support, call center technology, assistance finding phone and email contact information for cases and contacts, support to help people with infections remember their contacts and their locations, and support for contacts to monitor their health daily and get help they need. Although these technologies have great potential, they are not yet widely available.

However, digital products that promise to provide individuals with an alert on their phone if they have been in close proximity to an individual who has tested positive for the virus raise privacy concerns and have not yet been validated as feasible, accurate, or useful.

Once we implement comprehensive contact tracing, we can support patients and their contacts and prevent outbreaks from becoming epidemics. Until we have a safe and effective vaccine, contact tracing will be crucial to stopping chains of transmission and enabling us to reopen our society and economy as swiftly and safely as possible.

SUCCESS STORY: WUHAN CITY, CHINA

In Wuhan, China, there were 1,800 contact tracing teams of five people each at the height of their outbreak, roughly one disease detective per 1000 residents.[31] Nationally, China has tracked more than 720,000 contacts, isolating those who became infected.[32] This has been critical to stopping the spread of disease. After 11 weeks of near-total lockdown, Wuhan's ability to reduce local transmission to near zero has enabled it to start reopening its society and economy.[33]

South Korea and Singapore have also used contact tracing very effectively to stop the epidemic in its tracks.[34]

4 Quarantine Contacts

To control Covid-19, we must ensure that contacts of people with confirmed or suspected infection are quarantined. This will keep the virus from spreading to others if they develop either symptomatic or asymptomatic infection.

The incubation period for Covid-19 is approximately five days on average, but symptoms can take as long as two weeks to develop.[35] Infected people can spread infection to others during presymptomatic or asymptomatic periods. Anyone with symptoms can be contagious.[36]

Unlike SARS, in which patients became more infectious over the first 7-10 days of illness, patients with Covid-19 have high quantities of virus before symptoms develop and at the outset of their symptomatic illness, and this quantity appears to decrease after the first week of illness. This pattern is both a reason Covid-19 is so infectious and an urgent call to action to ensure quarantine of all exposed people.[37]

How quarantine works

Quarantining people who have been exposed to Covid-19 for 14 days breaks the chain of transmission. This is more restrictive than shelter-in-place orders for the general population, which permit limited travel outside the home for essential needs such as buying food, obtaining medicine, or receiving urgent health care services. True quarantine entails complete separation from everyone outside the immediate household and, for safety, separation from older and medically vulnerable people within households. No travel outside the home is allowed; food and other necessities must be delivered. This is also different from a community-wide quarantine, more properly called ***cordon sanitaire***, as was imposed to prohibit all travel into or out of Wuhan, China during the peak of that city's epidemic.

If there are additional exposures during the quarantine period (for example, another family member becomes ill), the quarantine period needs to be extended until 14 days after the latest possible exposure. An emerging best practice is testing quarantined contacts for presence of the virus on two occasions toward the end of their quarantine period and obtaining negative results before releasing them from quarantine.

Support for people in quarantine

Although almost all of the U.S. population has been asked to shelter in place and otherwise observe physical distancing, compliance varies greatly among communities, illustrating challenges adhering to quarantine.[38] Some people can easily shift to telework, but others cannot.

Many people will experience at least some distress due to the lack of social interaction and fear of possible impending illness.

It is essential to provide services and support to infected patients and people under quarantine so that they will adhere to the requirements. This can include provision of food, laundry, and pharmacy services; supplies such as hand sanitizer, masks, and thermometers; free access to high-speed internet, laptops, and even streaming entertainment and educational services. Students may need specialized support to be able to maintain their coursework.

Other resources to support those in isolation or quarantine include provision of cleaning supplies and trash removal; daily check-in phone calls; and a hotline for counseling, information, social services, and medical support. There needs to be ready access to telehealth services and care if needed, with immediate testing and isolation in the event the quarantined person or anyone else in the household develops Covid-19 symptoms.

Forward-looking governments have provided stipends or government-reimbursed payments from employers to compensate for lost wages, and additional child or elder care for dependents. Because the individual may be living in close quarters with a medically vulnerable person, people in quarantine need to be offered voluntary relocation to a safe and appealing location.

In a well-functioning program, most – and ideally all – new cases arise among contacts who have been quarantined. For this to occur, nearly all cases need to be found, all contacts identified, all identified contacts quarantined, and all quarantined contacts, particularly those with symptoms, tested. This is the essence of the Box It In strategy – creating a closed loop so that each wave of infections results in fewer and fewer secondary infections, boxing in the virus and opening more space in society for safe movement.

SUCCESS STORIES: SINGAPORE, TAIWAN, AND SOUTH KOREA

Jurisdictions seeking to successfully manage quarantine activities can look to places such as Singapore, Taiwan, and South Korea, which have established strong support systems for people in quarantine.[39] Some governments have set policies to support home delivery services for people quarantining at home, including engagement with neighborhood committees and volunteer groups. In South Korea, provinces and cities designate lodgings or other facilities as "living and treatment support centers" for isolation of individuals with suspected symptoms; this concept can also be used when home quarantine of contacts is not feasible.[40]

Conclusion

By implementing physical distancing, communities slowed transmission of Covid-19 — but did not change the underlying conditions that enable the virus to spread explosively if normal activity is resumed. In spite of the devastation the pandemic has already caused, it is likely that only a small proportion of the population has been exposed; the vast majority of people remain without immunity to the pathogen. The drastic, life-saving actions we've taken were necessary, but amount to little more than hiding inside. We have yet to even begin building our defenses. With strategic, swift, large-scale action, we can get ahead of the virus and take the offensive.

There are important plans and blueprints for responding to the Covid-19 pandemic (Annex 3). This report outlines our next step in the battle, a step which must be guided by core public health principles and practice. The four actions outlined in this report — test, isolate, trace, and quarantine — are necessary to box Covid-19 in, and each is essential for success. If any part of the box is weak, the virus will escape.

We have the resources to build the world's strongest public health system, one that can curb this pandemic and effectively respond to future ones. In 2018, the U.S. spent just $286 per person on public health activities, but nearly 40 times that – more than $11,000 per person – on health care.[41] We must correct this imbalance and invest in protection in the U.S. and globally.

Covid-19 has also illustrated how vulnerable individuals and society are and how important it is to address the underlying health and social conditions that facilitate deadly spread of the virus. We must work to end healthcare associated infections, strengthen primary care, improve health care efficiency including through telemedicine, make medical records interoperable and, when appropriate, accessible for public health action. We must increase individual and community resilience and address not only access to and continuity of care but also the quality of care, the value of care, and the actual health benefit we receive for the public health and health spending we dedicate. All of this will help control Covid-19 and make our society stronger and healthier in the process.

As long as any country is at risk of an outbreak, no country is safe. There are nearly 10,000 life-threatening gaps in disease preparedness worldwide.[42] We know where these gaps are, how to fill them, and what this will cost. And we now know, from this painful tragedy, the devastating health and economic costs of our collective failure to prepare. Future microbial threats are inevitable. What's not inevitable is that we remain so woefully unprepared for them. We must fill the health protection gaps and demand accountability for demonstrating that this is being done.

The Covid-19 pandemic is the most devastating health disaster of our lifetimes. But it is also a once-in-a-lifetime opportunity to repair parts of our health care, public health system, and society that are broken. Public health has the tools to stem this crisis — and must guide us to a new, safer world of stronger global collaboration and solidarity.

GLOSSARY

Covid-19. The name of the disease caused by the novel coronavirus, SARS-CoV-2, and is short for "Coronavirus Disease 2019." (Source: WHO)

Close contact. A person who has been within 6 feet of a person infected with the virus for a prolonged period of time or has had direct contact with the infected person's secretions. (Source: CDC)

Contact tracing. The process of identifying, assessing, and managing people who have been exposed to a contagious disease to prevent onward transmission. (Source: WHO)

Containment. Preventing the spread of disease in early stages of transmission through measures such as early detection and isolation of cases, and contact tracing and quarantine. (Source: WHO)

Cordon sanitaire. A measure preventing anyone from leaving a defined geographic area, such as a community, region, or country infected by a disease to stop the spread of the disease.

Coronavirus. A family of viruses that cause illness ranging from the common cold to more severe diseases, such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). The novel coronavirus recently discovered has been named SARS-CoV-2 and it causes COVID-19. (Source: WHO)

Drive-through testing. Individuals remain in their vehicles, and medical staff in protective gear come to administer the swab test and the swabs are sent to a laboratory for testing.

Suppression. Reducing and maintaining low levels of disease transmission through intermittent loosening and tightening of public health social measures, detection and isolation of cases, and contact tracing and quarantine.

Flattening the curve. Slowing a virus' spread to reduce the peak number of cases and related demands on hospitals and infrastructure (Source: CDC). The objective is to delay the epidemic, reduce the peak and "buy time" to build health capacity.

Isolation. Separating sick people with a contagious disease from those who are not sick. (Source: CDC)

Mitigation. Minimizing the epidemic impact, delaying the outbreak peak and reducing the peak number of cases in order to reduce strain on the healthcare system. Achieved largely through public health social measures and specific treatments and vaccines, if available.

Pandemic. An epidemic that has spread over several countries/continents, usually affecting a large number of people. (Source: CDC)

Physical distancing (previously and sometimes still referred to as social distancing). Measures taken to reduce person-to-person contact in a community, with a goal to stop or slow

the spread of infection. Measures can include working from home, closing offices and schools, cancelling events, and avoiding public transportation.

Public health and social measures (PHSMs). Actions, apart from getting vaccinated and taking medicine, that people and communities can take to help slow the spread of pandemic illnesses. PHSMs are also known as community mitigation strategies. PHSMs are among the best ways of controlling pandemic flu when vaccines are not yet available (CDC).

Quarantine. Separating persons who are well and may have been exposed to infection from other persons during the incubation period of an illness. (Source: CDC)

SARS-CoV-2. The name of the novel coronavirus that causes Covid-19 disease. SARS stands for Severe Acute Respiratory Syndrome. Prior to this name, it was called 2019-nCoV.

Serological testing. Testing for antibodies to a pathogen indicating prior infection, which may or may not result in immunity from future infection.

Stay at home or shelter in place. All residents must remain at their place of residence, except for essential activities (buying food and taking care of the health and safety of themselves or anyone in their household, including pets), essential businesses (health care; delivering food, mail, picking up garbage; and maintaining electrical systems etc, and essential government functions).

Annex 1

MORE TESTING, BETTER PRIORITIZED

Until there is much more widespread availability of testing, we need to prioritize. The highest priority are people who should be tested in all communities whenever the virus is present. These include:

- Outpatient, emergency department, and hospitalized patients with suspected Covid-19, and, ideally, all patients who are hospitalized (to prevent spread within hospitals, provide appropriate care, and facilitate enrollment in clinical trials)
- Health care workers with symptoms of Covid-19 (to provide prompt care, prevent further spread in hospitals, and monitor progress reducing risk to health care workers)
- People within clusters of illness consistent with Covid-19, especially if this occurs in a congregate facility such as a nursing home (to identify and stop outbreaks)
- Individuals with symptoms consistent with Covid-19 who reside in congregate facilities such as nursing homes, shelters, prisons, and jails (to prevent outbreaks)
- Contacts of cases
- A systematic sample of outpatients, to track trends of infection

Currently, about one million people in the United States are being tested for active infection per week. Just to meet the highest priority testing needs requires testing approximately three times as many people. The minimum number of tests needed will be even larger if tests aren't prioritized appropriately either by geography or risk group.

As more resources become available, others can be tested, including essential workers and others in areas such as transportation, food supply, and facility maintenance. Doing so, particularly if testing is conducted on people without symptoms, would require an additional 10-fold increase in testing capacity (approximately 30-fold above current levels). And unlimited testing of various groups, many of whom could require weekly tests, would further increase that need. (This calculation does not account for the number of tests required for a testing-on-demand approach, nor, on the other hand, for the number of people with past infection who may not require testing for the virus itself.) Whether this is a sensible approach remains to be seen.

Serological tests can help better understand the proportion of people who experience only mild or no illness and more accurately determine case fatality ratios; because it seems likely that people with prior infection will have at least some resistance to reinfection, they may be able to more confidently reenter society and aid in reopening efforts.

One interesting proposal has been to test everyone every two weeks for active infection. Although interesting, this proposal is not practical in the near future. The United States does not

have enough diagnostic tests, materials, or the capacity to administer that many; even if we did, this might not be the best use of resources.

Laboratory tests are just one part of an ecosystem of care. Accurate testing requires supplies, equipment, safe testing facilities, training and supervision to ensure quality of the sample collection process, improved collection of information on the people being tested (because without complete information, those with positive tests may not be able to be promptly notified of their result), laboratory information systems which connect with health care providers and public health agencies, and more. And, of course, testing is just one of four crucial components to boxing in Covid-19: without isolation, contact tracing, and quarantine of contacts, testing itself will make little or no difference in the spread of the pandemic.

ANNEX 2

CONTACT TRACING IS KEY TO SAFELY REOPENING

Once we have sufficiently controlled the Covid-19 pandemic to allow us to safely start reopening our society and economy, our ability to detect and tamp down fresh outbreaks will be essential to remaining open. Tracing and quarantining contacts of all cases is the best approach to prevent an isolated case from spreading into the community.

We will require thousands of people to properly conduct contact tracing activities at the level needed to effectively close chains of disease transmission and prevent new cases. As noted in this report, contact tracing is time- and human-resource dependent. Exactly how many people we need and for how long will depend on four factors:

1. The number of new cases detected per day
2. How many people each case may have exposed (e.g., fewer during sheltering in place, more during resumption of usual activities)
3. The efficiency of the contact tracing process
4. The degree of public support for and participation in contact tracing by cases and their contacts.

The number of people who are infected and the number of people they were in contact with while potentially infectious is the most important factor in determining how many contact tracers need to be deployed. There are potential efficiencies to contact tracing. For example, during the 2014-2016 Ebola outbreak, several states in the U.S. established digital interfaces (web, app) for returning travelers to report their status daily. Where resources allow, public health agencies can call each contact each day; where and when resources are limited, an online system might capture the status of the vast majority of people in quarantine, leaving the public health system to reach out to those who have not reported their status and those who report symptoms or a need for assistance.

The ability to locate contacts and their willingness to be interviewed, quarantined, and to report their status daily is another key factor; the more time this takes, the more contact tracers will be needed. Because people may find the contact tracing process to be inconvenient, it is essential to make easy for people to participate and ensure privacy and confidentiality. Excellent training, strong people skills, and supportive and expert supervision of contract tracers is essential for success. Public education campaigns will be important to inform people about what the process entails, what it means if someone is identified as a contact, and the importance of participation to controlling the pandemic and keeping society open.

Although we have some information about infectivity and are learning more daily, we need to know more about how often casual contact spreads infection. For example, if a brief interaction with a store clerk is unlikely to transmit infection, less time is needed to assess incidental

contacts and more time on the close contacts. If asymptomatic people infected with the virus commonly spread it, contact tracing becomes much more challenging.

Emerging evidence suggests that most people with SARS-CoV-2 infection do not spread it to anyone else, but that in some instances it spreads widely (e.g., during choir practice where singing can spread infection, or, potentially, from contaminated surfaces). Investigating these occurrences, which may include "superspreading" events, requires highly specialized skills, and may be assisted by newer technologies. If most contact tracing will require an army of contact tracers, investigating and stopping spread during these large-scale events requires the elite troops of contact tracing – experienced disease detectives from the Centers for Disease Control and Prevention and state and local health departments. This is a separate workforce which should advise on more routine contact tracing but be available to deploy immediately any time there is a potential superspreading event.

The number of contact tracers needed has been the subject of considerable discussion. In Wuhan, China, there were 9,000 contact tracers for a population of 11 million, or roughly one per 1,000. In Singapore, with a case rate more than 50 times lower than the rate in Wuhan, there have been approximately 1,000 contact tracers for a population of 5.6 million, or 1 per 5,600 population. Above a certain case rate, contact tracing becomes both overwhelming and inefficient, since there are so many potential sources and exposures.

For a hypothetical population of 1 million with 40 new cases per day, 8 contacts per case, and moderately strong efficiency gains and good participation by cases and contacts, the number of tracers needed might be on the order of 300. Nationally at this case rate, this would translate into approximately 100,000 contact tracers and their supervisors. Singapore is identifying 30-40 contacts per case, a rate that, with this incidence, would require at least 300,000 contact tracers. This estimate does not include additional staff and organizations needed to provide for the housing, support, and services for cases being isolated and contacts being quarantined, nor the staff for more intensive investigations as described above. This is a theoretical number which should be adjusted based on actual experience. If contact tracing and other measures are successful in controlling the pandemic, then new cases could decline over time; however, it is critically important to maintain capacity for these activities in the event of rebound outbreaks and increases in new cases.

Annex 3:

PROPOSED STRATEGIES FOR RESPONDING TO COVID-19

Report	Recommendations					Triggers for reopening	Workforce needs	Role of technology
	Testing / case identification	Isolation	Contact tracing	Quarantine	Additional			
Watson C, Cicero A, Blumenstock J, Fraser M. (2020). A National Plan to Enable Comprehensive COVID-19 Case Finding and Contact Tracing in the US. Johns Hopkins Center for Health Security and Association of State and Territorial Health Officials, Retrieved from https://bit.ly/2wNsNlW	Make rapid diagnostic tests readily available for all symptomatic cases or those with a reasonable suspicion of COVID-19 exposure Make serological testing widely available	Isolate infected individuals at home or, as necessary and on a voluntary basis, in healthcare facilities or dedicated isolation facilities	Build capacity to identify all epidemiologically meaningful contacts of individuals who have been clinically confirmed as having COVID-19, warn them of potential exposure, and link them to public health officials, diagnostic services, or self-isolation information and services	Quarantine exposed contacts in their homes (or other dedicated facilities, if home is not an option) for 14 days after their last exposure to the case, monitoring for symptoms until diagnostic results show they are not infected or are beyond incubation period of the virus			Employ 100,000 (paid or volunteer) contact tracers, managed by state and territorial public health departments in coordination with local and tribal health departments, at a cost of $3.6 billion over one year of full-time employment	New technologies may assist in diagnosis and information-sharing between labs and public health agencies; identifying and listing epidemiologically meaningful contacts; helping patients track their symptoms and aggregating the data for population-level monitoring

Report	Recommendations					Triggers for reopening	Workforce needs	Role of technology
	Testing / case identification	Isolation	Contact tracing	Quarantine	Additional			
Gottlieb, S, Rivers, C, McClellan, M, Silvis, L, and Watson, C. (2020, March 29). National coronavirus response: A road map to reopening. American Enterprise Institute, Retrieved from https://bit.ly/2XF1t4g	Make same-day, point-of-care diagnostic testing widely available for hospitalized patients, health care workers and workers in essential roles, close contacts of confirmed cases, and outpatients with symptoms, at a total estimated volume of 750,000 tests nationwide per week Create a task-force of senior leaders from government and private industry to oversee the development, production, distribution, data collection, serological survey designs, and analytics for use of serology at scale in the US. CDC should coordinate serological surveys globally Create a comprehensive national sentinel surveillance system, supported by and coordinated with local public-health systems and health care providers, akin to ILINet, the surveillance system for influenza-like illness	Fortify supply chains to reliably distribute sufficient N95 masks, gloves, and other personal protective equipment to protect health care workers from infection. Led by FEMA, and in coordination with state and local jurisdictions, provide comfortable, free facilities for cases and their contacts who prefer local isolation, quarantine, and treatment away from home After re-opening, every confirmed case should be isolated either at home, in a hospital, or (voluntarily) in a local isolation facility for at least seven days, or according to the latest CDC guidance, and people awaiting test results should be advised to quarantine until their results are returned	Trace close contacts of confirmed cases as defined by the CDC (those who were within 6 feet of a Covid-19 case for a prolonged period of time; had direct contact with infectious secretions of a Covid-19 case)	Close contacts of confirmed cases as defined by the CDC should be quarantined and monitored daily for 14 day Monitoring of international travelers is also recommended	Maintain physical distancing precautions after reopening including teleworking (as much as possible), maintaining hand hygiene and respiratory etiquette, wearing a mask in public, regularly disinfecting high-touch surfaces, and initially limiting social gatherings to fewer than 50 people Encourage the public to war nonmedical fabric face masks, preserving PPE for health care workers while supplies remain scarce Shield highly vulnerable populations, such as individuals older than age 60 and those with compromised immune systems or compromised lung and heart function, and prioritize this group for treatment with new therapies Take a variety of actions in preparation for production and distribution of new therapies or vaccines, and to better prepare for the next pandemic	Reopening should only occur once a state (a) reports a sustained reduction in cases for at least 14 days; (b) local hospitals are safely able to treat all patients requiring hospitalization without resorting to crisis standards of care; (c) the state has capacity to test all people with COVID-19 symptoms and; (d) and to monitor all confirmed cases and their contacts.	Scale up public-health infrastructure throughout the country, in coordination with the improving capacity of health care providers to prevent, diagnose, and treat COVID-19 cases Surge the existing public-health workforce to conduct case finding and contact tracing	Develop and field a technological approach to enable rapid data entry, reporting, and support for isolation, quarantine, and safe community-based treatment of affected individuals Home isolation can be enforced using technology such as GPS tracking on cell phone apps

Report	Recommendations					Triggers for reopening	Workforce needs	Role of technology
	Testing / case identification	Isolation	Contact tracing	Quarantine	Additional			
Emanuel, Z, Tanden, N, Spiro, T, Conner, A, DeGood, K, Simpson, E, Rapfogel, N, and Calsyn, M. (2020, April 3). A National and State Plan To End the Coronavirus Crisis. Center for American Progress, Retrieved from https://ampr.gs/2XFdJlp	Expand testing until we can test the sick and the healthy, a level that will be guided by conditions on the ground State and local public health agencies should conduct surveillance testing of a representative sample of households to monitor disease spread If sheltering in place is significantly extended, serological testing may be necessary to clear people to go back to work	Ensure health care workers have sufficient personal protective equipment, estimated to include 300 million N95 respirator masks Provide essential workers in non-medical fields with personal protective equipment and paid sick leave Fund states to establish living and treatment support centers similar to South Korea's to isolate confirmed and suspected cases on a voluntary basis and provide kits that include toiletries, masks, a thermometer, and medicine In coordination with TSA, airlines, train and bus operators, and metropolitan mass transit systems should take measures to restrict travel by symptomatic passengers, ensure physical distancing, regularly sanitize their vehicles, and run at no greater than 50 percent capacity	Manual contact tracing by itself will not be effective in stopping transmission, and technological solutions will be necessary for instantaneous contact tracing		Implement a consistent national physical distancing policy for 45 days starting April 5 Prohibit non-essential travel during the period of physical distancing, and monitor compliance using aggregate mobile phone data CDC should issue guidelines on the use of non-medical face masks	A state must be able to (a) suppress transmission to a rate of 20 new cases per million people per day, and show it is declining (b) make a Covid-19 diagnostic test available to every resident of the state who has a fever, and every member of a household of a positive case (c) conduct instantaneous contact tracing to limit any outbreaks (d) provide every front-line health care worker with PPE (e) Put a robust surveillance system in place that allows the state to accurately verify the number of new cases	Expand contact tracing teams of state and local health agencies to follow up on contact tracing conducted using newly developed technologies Expand CDC teams who can deploy to emerging hotspots	The federal government could fund a trusted, public health nonprofit organization, to develop a technology to notify people who were proximate to a person with Covid-19, as identified by use GPS, Bluetooth, cell tower, and Wi-Fi network data, as long as a series of additional protections are instituted

Report	Recommendations					Triggers for reopening	Workforce needs	Role of technology
	Testing / case identification	Isolation	Contact tracing	Quarantine	Additional			
Romer, P. (2020, March 24). Simulating Covid-19: Part 2. Retrieved from https://paulromer.net/covid-sim-part2/ and Romer P and Shah R. (2020, April 2). Testing is Our Way Out. Wall Street Journal, Retrieved from https://on.wsj.com/3bkRYvi	As testing capacity expands, offer it to health care workers and non-medical essential workers such as police, and then critical workers including grocery clerks and sanitation staff Ultimately achieve testing capacity to randomly select 7% of the population for testing each day (22.2 million people) Implement serological testing to determine when workers can return to the labor force	Those who test positive go into quarantine						Develop a diagnostic test that returns results within minutes

Report	Recommendations					Triggers for reopening	Workforce needs	Role of technology
	Testing / case identification	Isolation	Contact tracing	Quarantine	Additional			
Siffarth D and Weyl EG. (2020, April 8). Why We Must Test Millions a Day. Edmond J. Safra Center for Ethics, Harvard University, Retrieved from https://bit.ly/34GMisQ and Hart V, Siddarth D, Cantrell B, Trtikov L, Eckersley P, Langford J, Leibrand S, Kakade S, Latta S, Lewis D, Tessaro S, and Weyl G. (2020, April 3). Outpacing the Virus: Digital Response to Containing the Spread of COVID-19 while Mitigating Privacy Risks. Edmond J. Safra Center for Ethics, Harvard University, Retrieved from https://bit.ly/3aeviv6	Test the entire U.S. population once every three to four days, requiring almost 100 million tests per day With contact tracing leveraging Bluetooth-based apps, the number of necessary tests could be reduced to 30 million tests per day. With near-universal adoption of a high-precision tracing technology that allowed immediate, accurate identification of 75% of infected contacts, the number of tests could be further reduced to 2.5 million per day.		Consider "peer warning systems" in which people tell each other they may have been exposed and to come in for testing				Under one scenario, the authors assume employment of 100,000 contact tracers, at an annual cost of $5 billion. The authors offer a range of costs for the entire program, from $30 billion to $500 billion.	Under this plan, technologies are necessary to reduce the number of required tests.

Notes

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State of Wisconsin
Department of Health Services
Tony Evers, Governor
Andrea Palm, Secretary

EMERGENCY ORDER #34
Interim Order to Turn the Dial

WHEREAS, in December, 2019, a novel strain of the coronavirus was detected, now named COVID-19, and it has spread throughout the world, including every state in the United States;

WHEREAS, on January 30, 2020, the World Health Organization declared COVID-19 to be a Public Health Emergency of International Concern;

WHEREAS, on March 12, 2020, Governor Tony Evers declared a public health emergency and directed all agencies to support efforts to respond to and contain COVID-19 in Wisconsin;

WHEREAS, on March 13, 2020, President Donald Trump proclaimed a National Emergency concerning COVID-19;

WHEREAS, as of April 26, 2020, 2,810,325 people around the world have tested positive for COVID-19, including 928,619 in the United States and 5,911 in Wisconsin;

WHEREAS, COVID-19 is present throughout Wisconsin, with people testing positive for COVID-19 in 66 of 72 counties as of April 26, 2020;

WHEREAS, on March 24, 2020, I, Andrea Palm, Secretary-designee of the Wisconsin Department of Health Services, issued Emergency Order #12, Safer at Home Order (hereinafter "Safer at Home Order"), requiring that everyone in Wisconsin stay at their home or place of residence except in limited circumstances;

WHEREAS, on April 16, 2020, I modified and extended the Safer at Home Order to allow businesses new opportunities to get back to work and added new measures to keep employees and customers safer;

WHEREAS, on April 20, 2020, I issued the Badger Bounce Back, outlining a plan to turn the dial down on the Safer at Home Order with progressively less-restrictive phases triggered when we, as a state, meet the gating criteria and make progress towards our core public health responsibilities;

WHEREAS, the administration is constantly working to identify and promote creative ways to get Wisconsin back to business without risking the important progress we have made in flattening the curve and fighting the spread of COVID-19;

WHEREAS, in collaboration with the Wisconsin Economic Development Corporation, the public health experts at the Department of Health Services, and leaders and innovators in the business community, the Department has identified areas where Wisconsin can turn the dial now; and

WHEREAS, in accordance with Section 3 of Emergency Order #31, Badger Bounce Back, this order reduces restrictions on certain businesses or sectors in a manner that is anticipated to have a minimal impact on the state's ability to make progress towards its core responsibilities and meet its gating criteria.

NOW THEREFORE, I, Andrea Palm, Department of Health Services Secretary-designee, by the authority vested in me by the Laws of the State, including but not limited to Section 252.02(3), (4), and (6) of the Wisconsin Statutes, order the following:

1. **Minimum Basic Operations.** Minimum Basic Operations is defined by Section 14 of Emergency Order #28, Safer at Home Order, and shall additionally include the following:

    a. **Curb-side drop-off.** Minimum Basic Operations may include customer curb-side drop-off of goods or animals for the purpose of having those goods or animals serviced, repaired, or cared for by the business. Staff within the business or facility must be limited to one person in a room or confined space at a time, including a car or truck. Services must be paid for on-line or by phone. Drop-offs and pick-ups must be scheduled ahead of time to ensure compliance with Social Distancing Requirements as defined in section 16 of the Safer at Home Order. Customers are not permitted in the business or facility. The business may not require a signature by the customer. Suppliers to non-essential businesses and supply chains for non-essential businesses are non-essential and shall only operate under Minimum Basic Operations to provide goods or services to other non-essential businesses operating under this section.

    b. **Outdoor recreational rentals.** Minimum Basic Operations may include rental of recreational equipment including but not limited to boats, kayaks, canoes, paddle boats, golf carts, snowmobiles, and ATVs. Staff within the business or facility must be limited to one person in a room or confined space at a time, including a car

or truck. Rentals must be paid for on-line or by phone. The business must schedule pick-up and drop-off ahead of time to ensure compliance with Social Distancing Requirements as defined in section 16 of the Safer at Home Order. Customers must remain outside the business or facility. Rented equipment must be cleaned after each use. Suppliers to non-essential businesses and supply chains for non-essential businesses are non-essential and shall only operate under Minimum Basic Operations to provide goods or services to other non-essential businesses operating under this section.

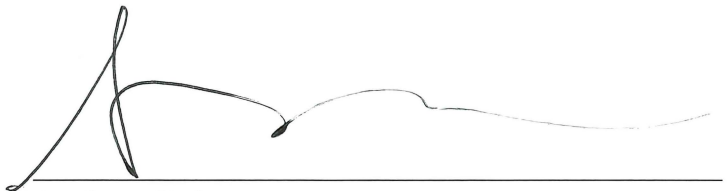
c. **Car washes.** Entirely automatic car washes and self-service car washes may open for service. High-touch surfaces must be cleaned between each use if possible, or as frequently as practicable.

2. **Safer at Home and Badger Bounce Back remains in effect.** Emergency Orders #28 and #31 remain in effect and are modified only by the specific additions described in this Order.

3. **Duration.** This Order shall become effective at 8:00 a.m. on Wednesday, April 29, 2020. This Order shall remain in effect for the duration of the Safer at Home Order.

4. **Severability.** If any provision of this Order or its application to any person or circumstance is held to be invalid, then the remainder of the Order, including the application of such part or provision to other persons or circumstances, shall not be affected and shall continue in full force and effect. To this end, the provisions of this Order are severable.

5. **Supremacy.** This Order supersedes any local order that is in conflict with this order.



Andrea Palm
Secretary-designee
Department of Health Services
State of Wisconsin

04/27/2020
Date