Anatomy of an Outbreak: Part 2

Early lessons from the front lines and a pivot to Phase 2

March 26, 2020

Presented by
Advisory Board Executive Insights

Today's Research Expert

Christopher Kerns

Vice President, Executive Insights

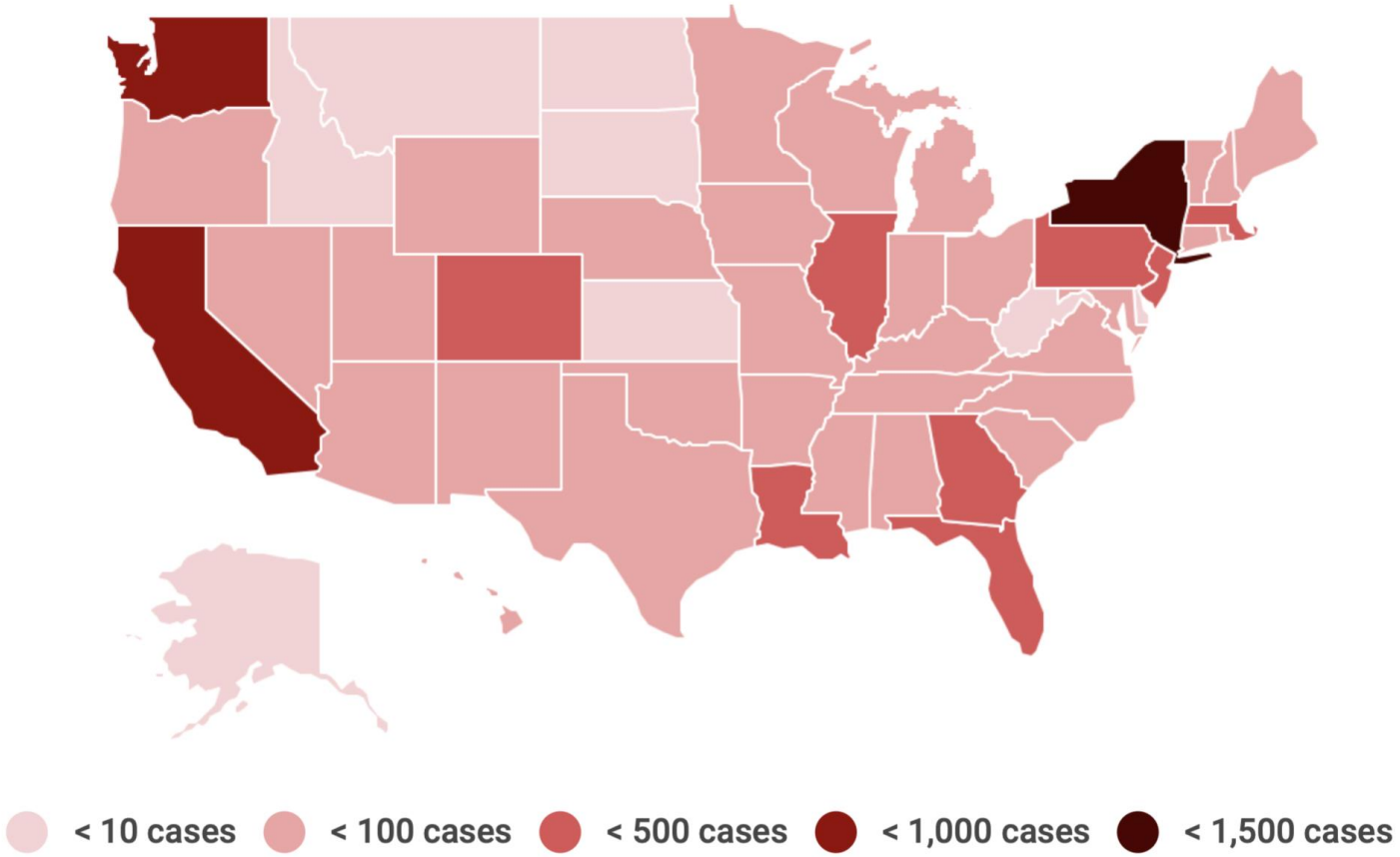
Christopher oversees all senior executive research at Advisory Board, and is responsible for developing the research perspective, official point of view, and overall Advisory Board message to executives from across the health care sector.

KernsC@advisory.com

@CD_Kerns

What a difference a week makes

Coronavirus cases as of March 18, 2020, eight days ago



Current COVID-19 cases

At least 5,881 cases

50 states reporting cases

At least 107 deaths

Estimate of possible effects

96 million cases

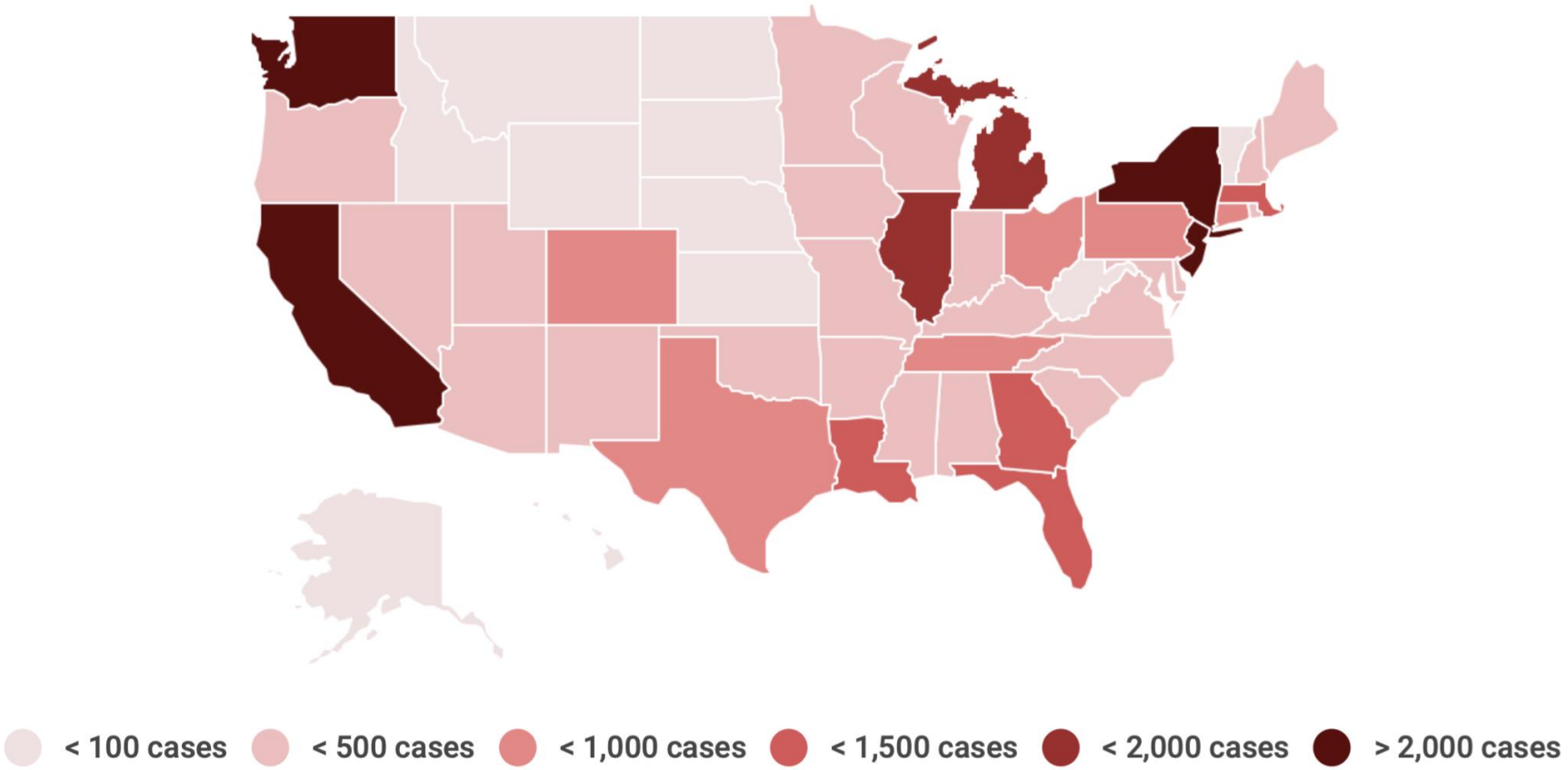
4.8 million hospitalizations

480,000 deaths

Source: "Coronavirus Disease 2019 (COVID-19) in the US," CDC, March 18, 2020. "One slide in a leaked presentation for US hospitals reveals that they're preparing for millions of hospitalizations as the outbreak unfolds," Business Insider, February 27th, 2020.

Coronavirus cases in the United States

Current as of March 25, 2020



Current COVID-19 cases

At least 59,502 cases

30,811 cases in New York

At least 804 deaths

Estimate of possible effects

96 million cases

4.8 million hospitalizations

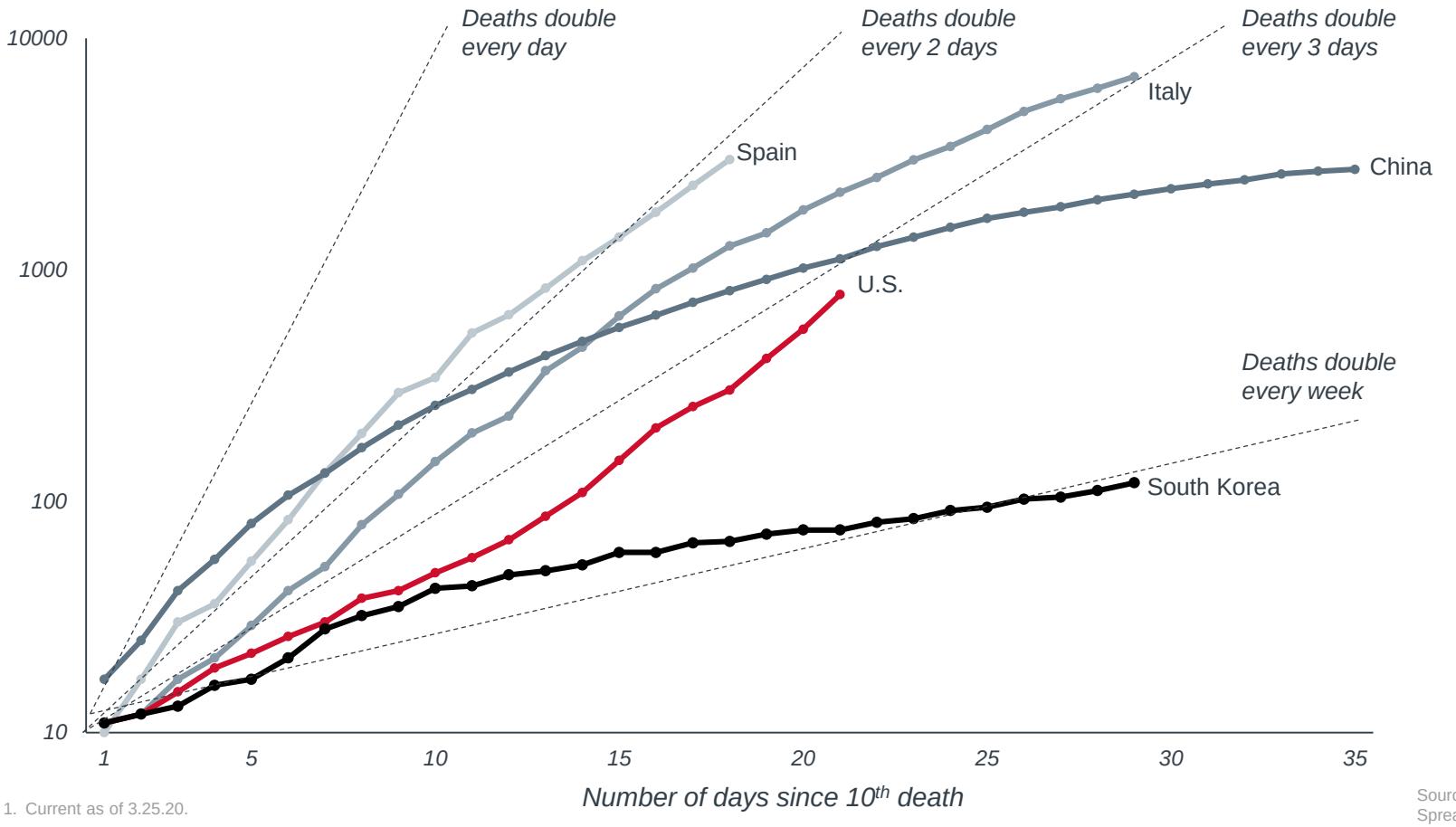
480,000 deaths

Source: "Coronavirus Disease 2019 (COVID-19) in the US," CDC, March 25, 2020. "One slide in a leaked presentation for US hospitals reveals that they're preparing for millions of hospitalizations as the outbreak unfolds," Business Insider, February 27th, 2020.

Advisory Board interviews and analysis.

U.S. COVID-19 mortality rates far from leveling off

Cumulative number of deaths, by number of days since 10th death[1]



Key factors that influence death rates across countries

- Proportion of elderly people within population
- Deployment of widespread testing and tracing
- Extent and speed of containment measures

1. Current as of 3.25.20.

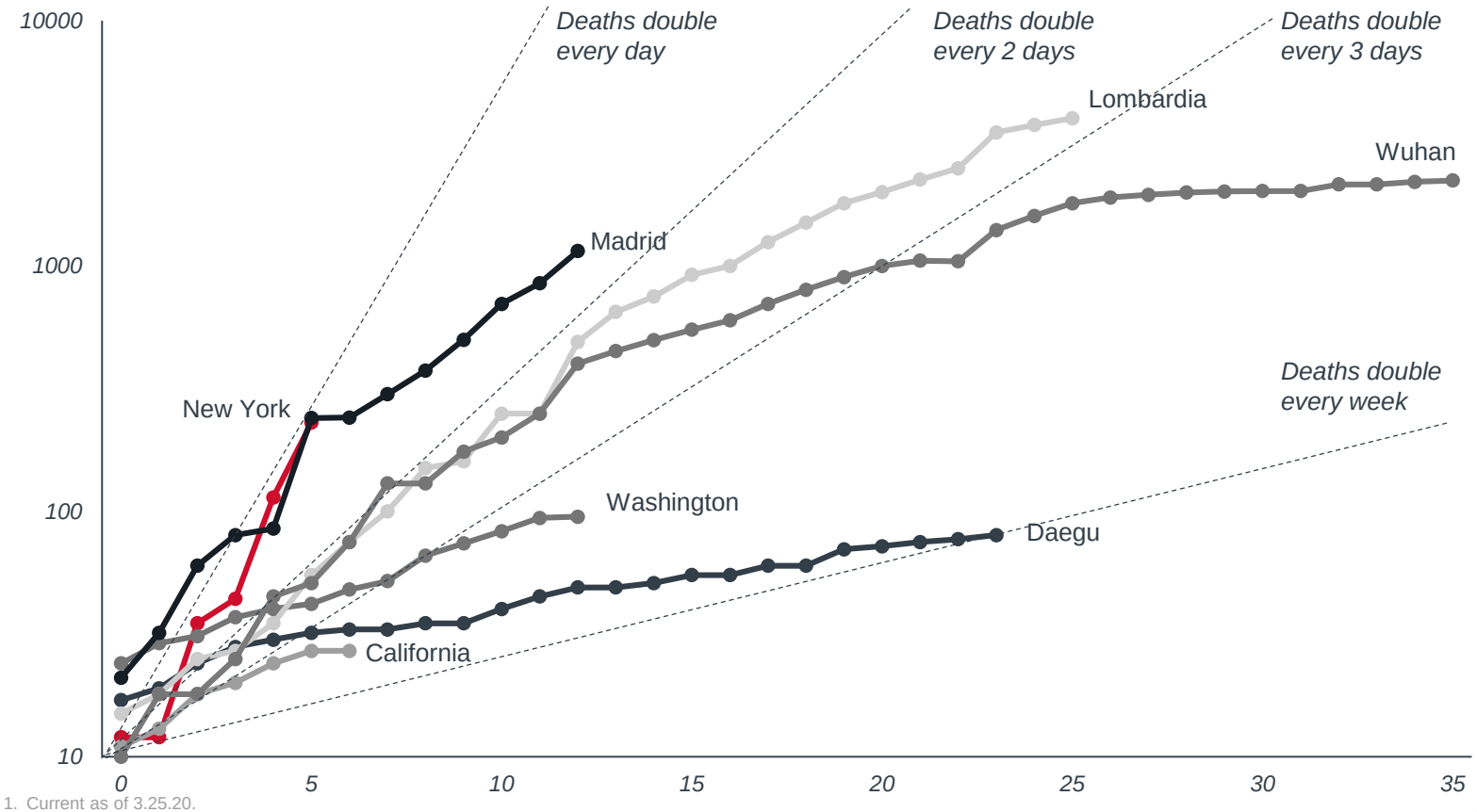
Source: Bernard S et al., Coronavirus Tracked: The Latest Figures as the Pandemic Spreads, Financial Times, 2020; COVID-19 Coronavirus Pandemic, Worldometer, 2020.

Advisory Board interviews and analysis.

New York mortality rate outpacing other regions worldwide

Death toll almost doubling every day

Cumulative number of deaths, by number of days since 10th death[1]



Country/ Region	Total deaths/Mil.	Median Age (years)
Lombardia	400	44.7
Wuhan	201	NR[2]
Madrid	176	41
Italy	113	45.4
Spain	73	42.7
Daegu	32	NR[2]
NYC	23	36.9
WA (state)	13	38.3
NY (state)	12	39.0
South Korea	2	41.8
U.S.	2	38.2
China	2	37.4
California	0.7	36

1. Current as of 3.25.20.
2. Not reported.

Source: Bernard S et al., Coronavirus Tracked: The Latest Figures as the Pandemic Spreads, Financial Times, 2020; COVID-19 Coronavirus Pandemic, Worldometer, 2020.

Advisory Board interviews and analysis.

Study concludes longer-term suppression strategy needed

Mitigation strategy may not be sufficient to prevent more than 1M U.S. deaths

March 16, 2020

Impact of non-pharmaceutical interventions to reduce COVID-19 mortality and healthcare demand

Introduced by: Imperial College COVID-19 Response Team

2.2M Predicted number of deaths in the U.S. in the absence of control measures (no action by the government and individuals to curb spread of COVID-19)

Mitigation strategy

Slow the spread (R_0[1]>1) in order to reduce peak healthcare demand and protect high-risk groups

- Case isolation at home
- Voluntary household quarantine
- Social distancing of individuals over 70

8X Minimum additional capacity[2] needed to prevent **1.1-1.2M deaths**

Suppression strategy

Reduce overall number of cases to low levels (R_0<1) in order to eliminate human transmission

- Case isolation at home
- Voluntary household quarantine
- Social distancing of entire population
- Closure of schools and universities

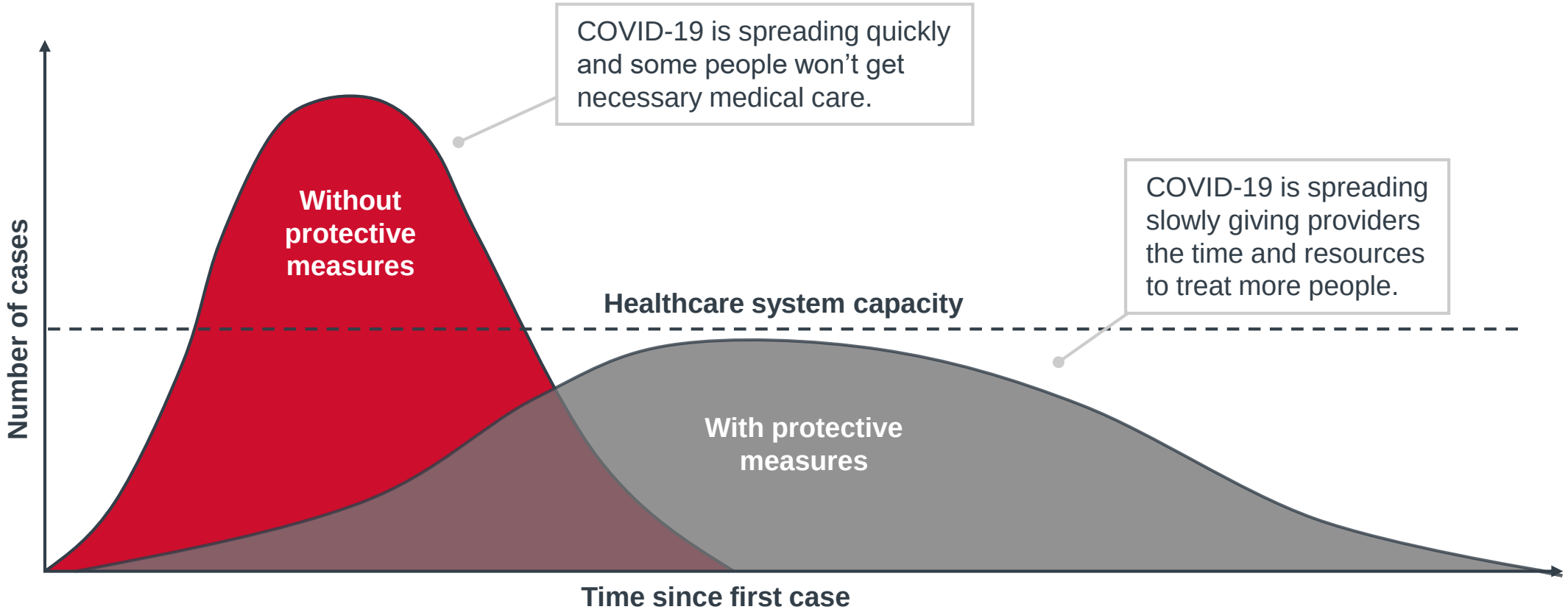
18+ Estimated number of months before a vaccine will be available

1. Reproduction number (average number of secondary cases each generates).
2. Med/surg and ICU capacity.

Source: Ferguson N, Laydon D, et al, "Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand," Imperial College COVID-19 Response Team, March 16, 2020.

‘Flatten the Curve’ to fight COVID-19

Protective measures slow the spread allowing providers to treat more people



Source: Qualls, Noreen, et al. “Community Mitigation Guidelines to Prevent Pandemic Influenza — United States, 2017.” MMWR. Recommendations and Reports 66, no. 1 (2017): 1–34. https://doi.org/10.15585/mmwr.rr6601a1.

Advisory Board interviews and analysis.

Trump Administration declares a national emergency

CMS activates blanket waivers

COVID-19 outbreak declared a national emergency

The Trump Administration declared the COVID-19 outbreak a national emergency on Friday, March 13, 2020.

Allows HHS to waive or modify certain Medicare, Medicaid, and CHIP requirements under Section 1135 of the Social Security Act.

CMS activates blanket waivers to help the health care industry respond to and contain the spread of COVID-19.

Blanket waivers aim to[1]:

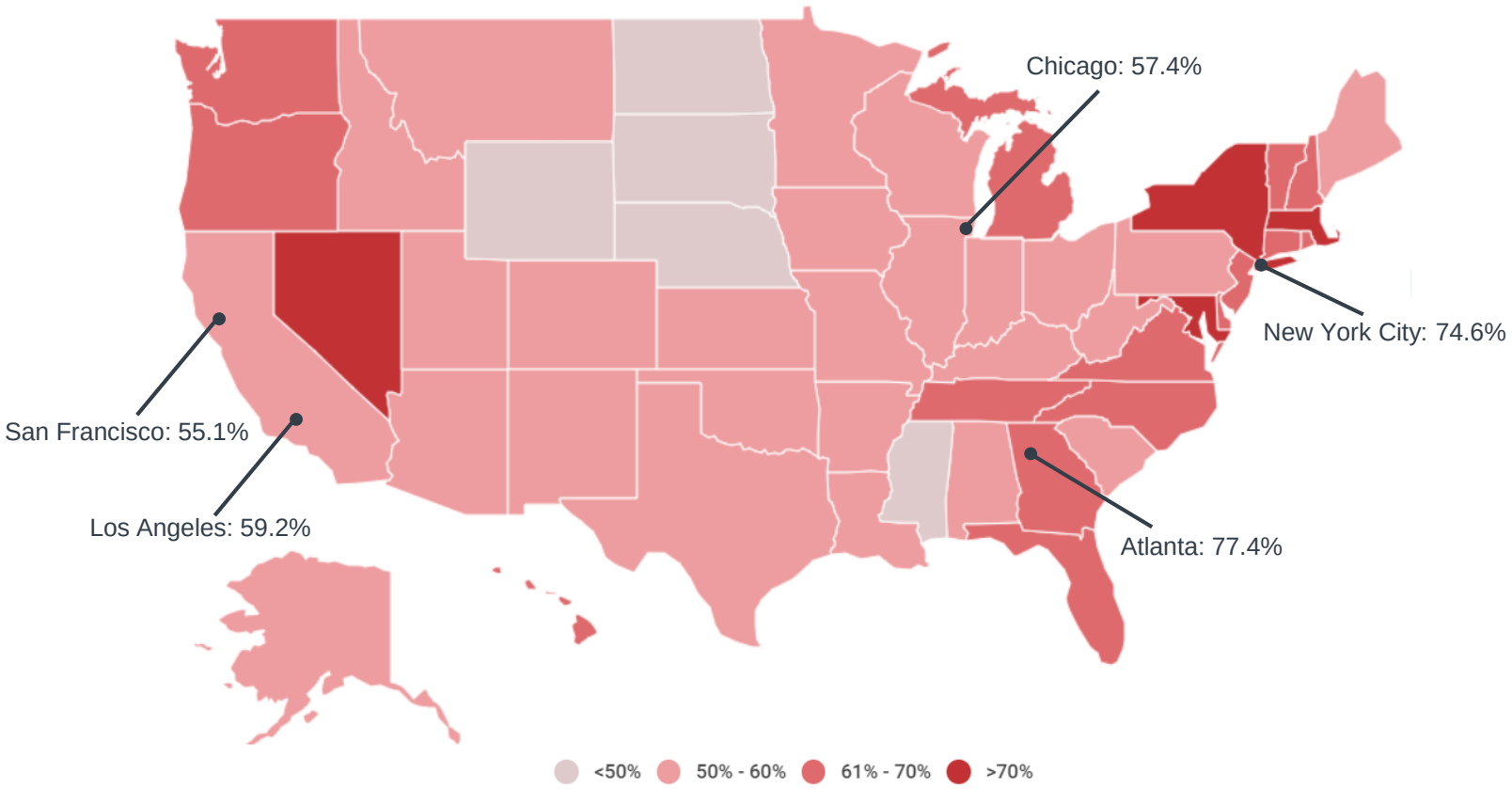
- **Maximize and flex acute and post-acute care capacity**
  - Allowing hospitals to move patients between units
  - Waiving bed size and LOS limitations at CAHs
  - Waiving SNF 3-day rule, LTCH 25-day ALOS requirement
- **Increase and flex provider supply**
  - Expediting Medicare's provider enrollment process
  - Waiving out-of-state provider licensure requirements
  - Expanding reimbursement for telehealth services
- **Reduce regulatory burden**
  - Streamlining process for DME replacement requests
  - Providing relief on home health reporting requirements

1. For a full description of each waiver, please see the COVID-19 Emergency Declaration Health Care Providers Fact Sheet.

Source: "COVID-19 Emergency Declaration Health Care Providers Fact Sheet." Centers for Medicare & Medicaid Services, March 13, 2020.

Ready to absorb the shock?

Average hospital occupancy by state



DATA SPOTLIGHT

80%

Common heuristic for full occupancy

60.7%

U.S. aggregate hospital occupancy

36.8%-73.4%

Variation in occupancy from least (WY) to most (NY) heavily occupied state

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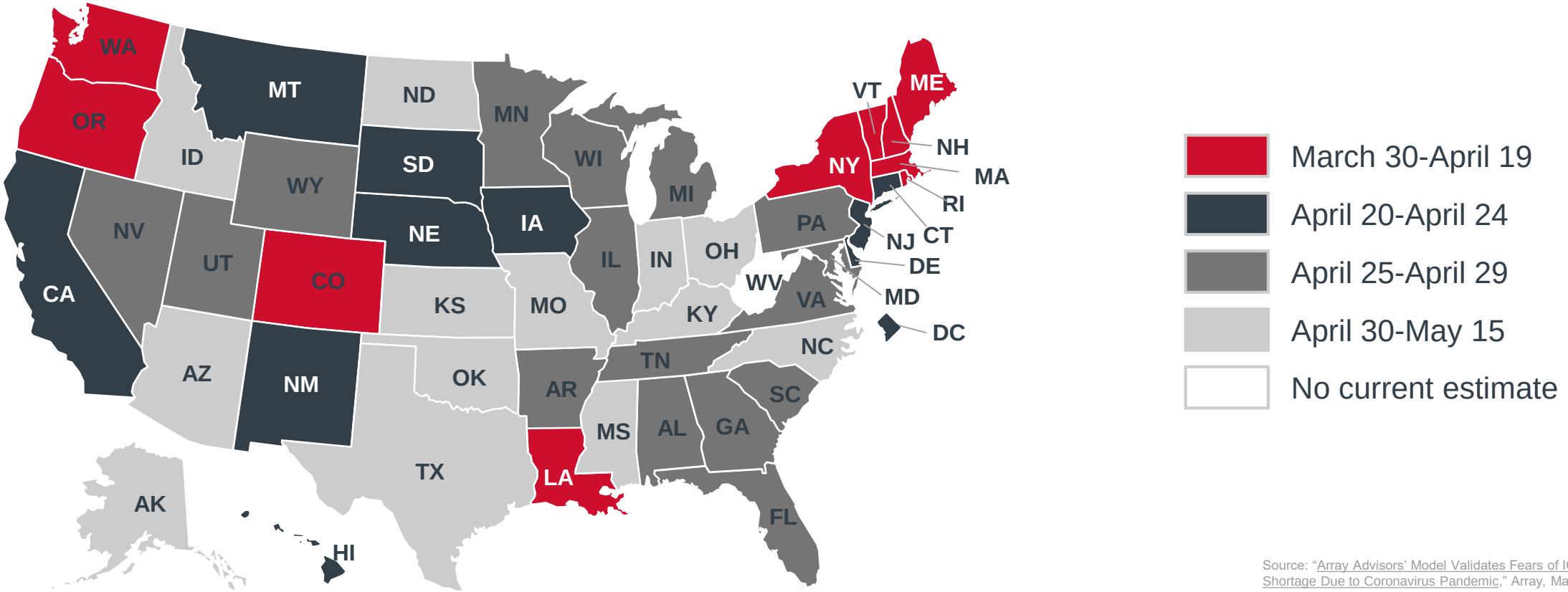
ICU bed shortages expected nationwide

New model projects rolling shortages will begin across April and May

Array Advisors' projection of ICU bed shortages and initial shortage dates

Updated March 16, 2020

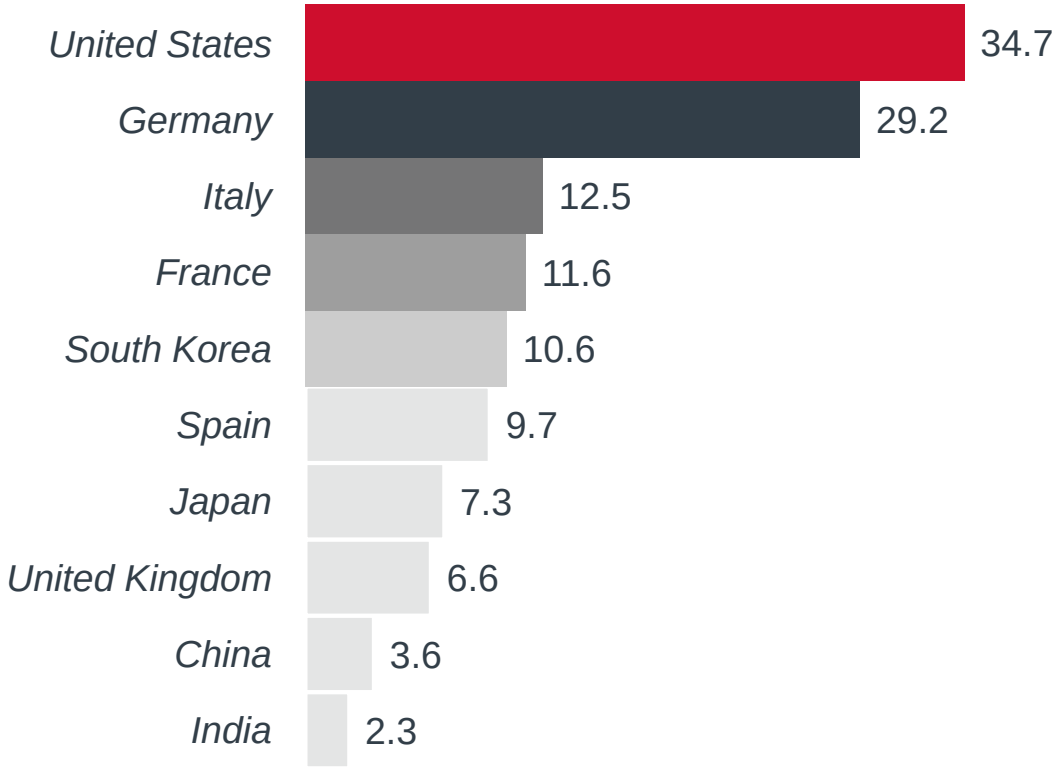


Source: "Array Advisors' Model Validates Fears of ICU Bed Shortage Due to Coronavirus Pandemic," Array, March 16, 2020.

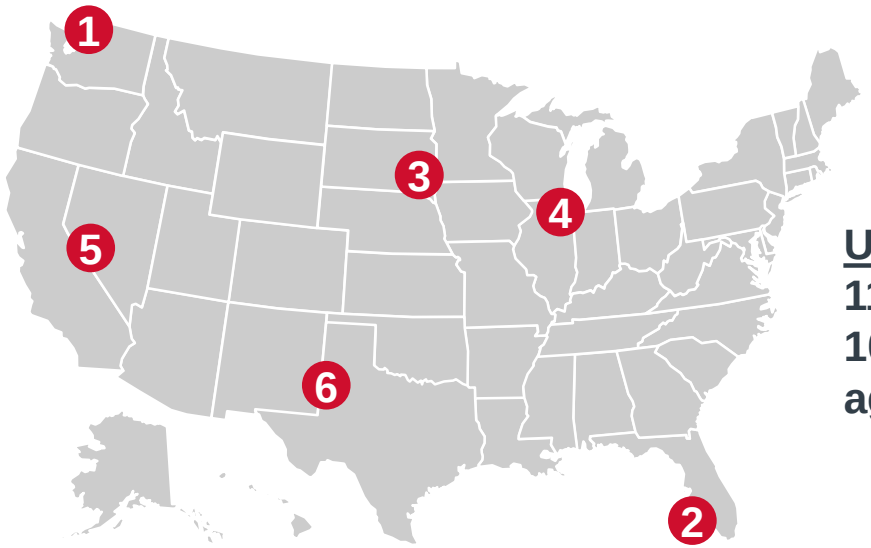
Overall U.S. ICU capacity greater than most countries

But geographic bed distribution leaves many areas with severe shortage

Total number of critical care beds per 100,000



ICU beds per 100,000 people aged 60 and older



U.S. average
116 ICU beds per 100,000 people aged 60 and older

Less prepared	1 Everett, WA 54 beds	2 Fort Meyers, FL 57 beds	3 Sioux Falls, SD 58 beds
More prepared	4 Chicago, IL 211 beds	5 Reno, NV 214 beds	6 Lubbock, TX 242 beds

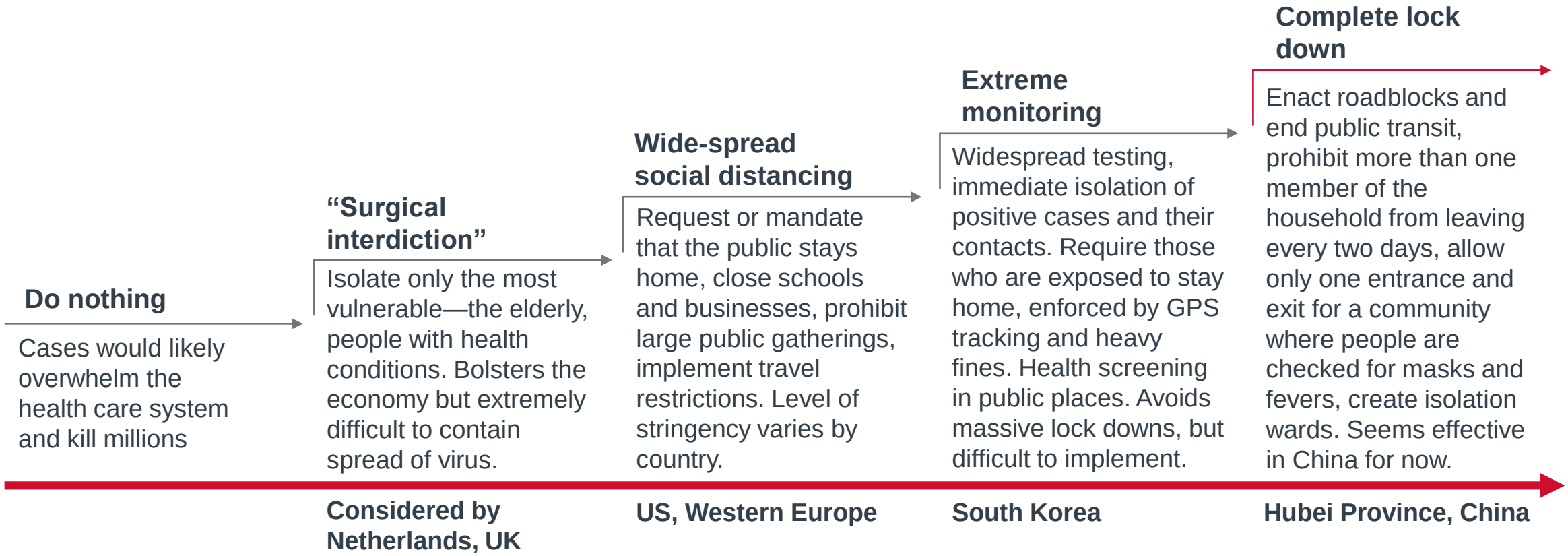
Source: McCarthy N, "The Countries With The Most Critical Care Beds Per Capita," Statista, March 12, 2020; McGinty M et al., "Older Coronavirus Patients Face Looming ICU Bed Shortage," The Wall Street Journal, March 24, 2020.

Advisory Board interviews and analysis.

How countries are tackling the pandemic

A variety of measures have been considered to stem the flow of cases

Spectrum of COVID-19 government suppression efforts



Advisory Board interviews and analysis.

Overview of global COVID-19 response strategies

Updated March 25, 2020

Jurisdiction	Cases	Fatality rate	Schools	Work from home	Restaurants	Contact tracing	Testing
Italy	67,176	10%	Closed	General public	Closed	No	Limited
United Kingdom	8,167	5%	Open to key employees' kids	Mandated, essential workers exempt	Closed	No	Limited, only serious symptoms
Netherlands	5,585	5%	Closed	Encouraged, essential workers exempt	Closed	Only travellers	Limited, only serious symptoms
Mainland China	81,661	4%	Reopening	Was regionally mandated, has relaxed	Closed	Yes, invasive	Limited, only serious symptoms
Japan	1,193	4%	Closed for one month	Encouraged, essential workers exempt	Open	Only travellers	Limited
India	562	2%	Closed	General public	Closed	No	Limited, only serious symptoms
United States	59,502	1%	Closed	Encouraged, essential workers exempt	Varies by state	No	Limited, only serious symptoms
South Korea	9,137	1%	Open	Mandated for vulnerable persons	Open	Yes, invasive	Aggressive
Israel	2,030	0%	Closed	Encouraged, essential workers exempt	Closed	Yes, invasive	Limited, only serious symptoms

S Montanari, An infectious disease expert explains why herd immunity probably won't work in the fight against coronavirus, *Business Insider*, Mar 20, 2020; B J Cowling and W W Lim, They've Contained the Coronavirus. Here's How, *New York Times,* Mar 13, 2020; Fighting the Coronavirus Pandemic, East Asian Responses - Singapore: Anticipation, Swab Tests and Intrusive Contact Tracing, *Institut Montaigne,* Mar 24, 2020; M Fisher and C Sang-Hun, How South Korea Flattened the Curve, *New York Times*, Mar 23, 2020.

Will working from home get the job done?

The US has opted for a social distancing approach

Evidence suggests social distancing can mitigate the spread of the virus and slow its transmission

A majority of Americans report that they are engaging in social distancing by avoiding…

	Mar 13-15	Mar 16-19	Mar 20-22
Large crowds	59%	79%	92%
Mass transit	55%	75%	87%
Public places	30%	54%	72%
Small gatherings	23%	46%	68%

But psychological barriers persist due to…

- Confusing and conflicting messaging from officials and social media
- A desire to feel agency and American cultural ideals of individual liberty
- The lack of an analogous situation to create a frame of reference and understand outcomes
- The mental trauma associated with long-term isolation and uncertainty

Source: Centre for Evidence-Based Medicine, What is the evidence for social distancing during global pandemics?, March 2020. Gallup, Americans Step Up Their Social Distancing Even Further, March 2020

Advisory Board interviews and analysis.

Is the cost of the cure too high?

As number of cases grows, so too do fears of economic devastation

Concerns that recession—and associated health consequences—are more deadly than virus

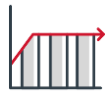
Trump states he would like to “have the country opened up and just raring to go by Easter”

White House aides discussing ways to encourage business to reopen and healthy Americans to return to work after current 15-day period

“WE CANNOT LET THE CURE BE WORSE THAN THE PROBLEM ITSELF”

President Donald Trump, Twitter

Argument that what’s best for public health is what’s best for long-term economic health



The economy likely will not be able to rebound until cases of COVID-19 are significantly repressed

The surge in cases due to loosening restrictions could collapse the health care system, harming all citizens, not just those affected by the virus

“You can throw all the money at Wall Street you want to…people are afraid to leave their home.”

Senator Joe Manchin, D-WV

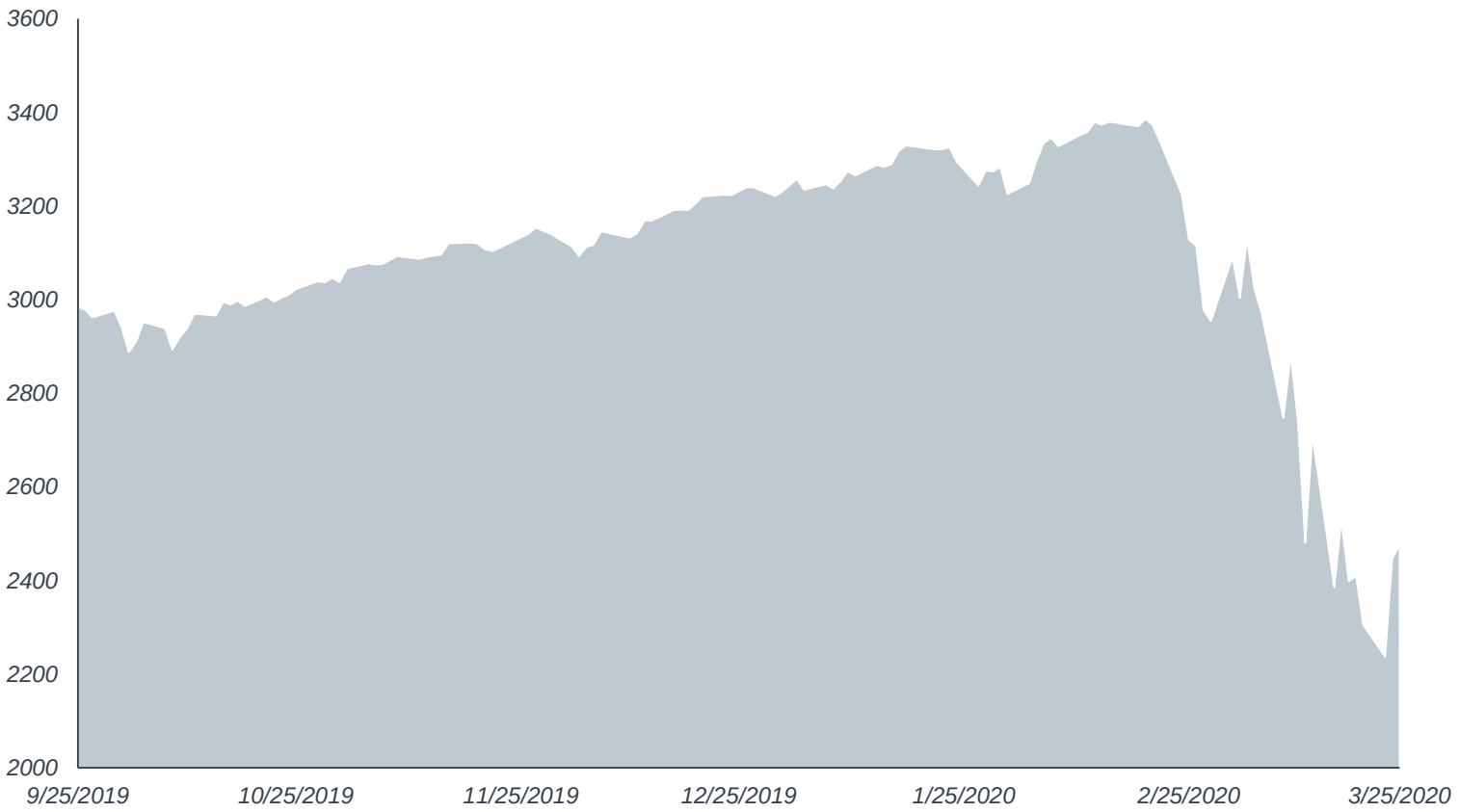
Source: New York Times, Coronavirus Recession Looms, Its Course ‘Unrecognizable’, March 2020.

Advisory Board interviews and analysis.

The economy responds to suppression strategies

An exceptionally rapid market reaction to locking down economic activity

S&P 500 performance



3.3 million

Record number of jobless claims in the first week following national social-distancing measures enacted following outbreak, up from 228K the prior week

12%-24%

Estimated drop in U.S. GDP in second quarter of 2020

Source: "S&P 500 (^GSPC)," Yahoo Finance, 2020; : CNN, Goldman Sachs predicts 2.25 million Americans filed initial unemployment claims this week, the highest on record, March 2020.

CARES Act addresses COVID-19 impact

Senate signals approval for funding levels requested by provider groups

Easing the economic impact on providers from COVID-19 treatment and lost revenue

- Includes $100 billion for eligible health care providers[1] for health care related expenses or lost revenue attributable to COVID-19
- Removes Medicare sequester from May 1, 2020 through December 31, 2020
- Provides a 20% add-on payment for Medicare inpatient services
- Delays Medicaid DSH payment reductions through November 30, 2020
- Provides funding for health extenders from May 22, 2020 to November 30, 2020

Expanding access to testing and treatment for COVID-19 patients

- Requires private plans to cover preventive measures, any vaccines, and diagnostic testing related to COVID-19
- Increases access to telehealth services, allows for telehealth services prior to reaching a deductible
- Provides funding to support telemedicine and broadband access to rural areas of the United States
- Prioritizes FDA to accelerate approval review process for certain drugs
- Protects certain medical supplies, diagnostic tests, and respiratory protective devices under a national emergency

1. Includes public entities, Medicare or Medicaid enrolled suppliers and providers, for-profit entities, and not-for-profit entities in the US that provide diagnoses, testing, or care for individuals with possible or actual cases of COVID-19.

Source: Emergency Appropriations for Coronavirus Health Response and Agency Operations, Senate Appropriations; March 25, 2020.

Advisory Board interviews and analysis.

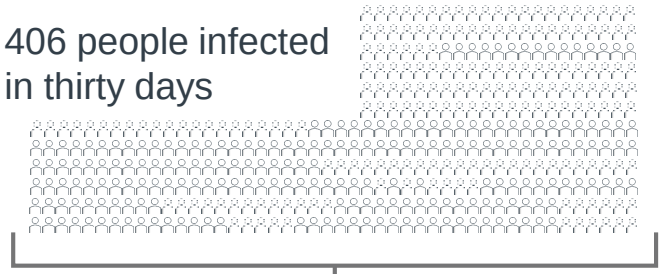
Will lifting social distancing create a tsunami of new patients?

Will social distancing buy health systems enough time?

Normal behavior

2.5 people infected in five days

406 people infected in thirty days



50% less exposure

1.25 people infected in five days

15 people infected in thirty days

75% less exposure

0.625 people infected in five days

2.5 people infected in thirty days

Impact on health systems

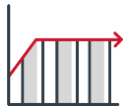
- Surge of patients requiring hospital admissions and need for intensive care
- Increasing demand for supplies, ventilators, and PPE
- Growing need for staff to care for influx of patients and relieve current workforce

Source: Signer, Robert A.J, Ph.D, University of California, San Diego

South Korea's agile response effectively "flattens the curve"

Proactive, widespread testing crucial to success… but are tactics transferable?

South Korea's successful strategy



1 Immediate intervention

Government urged companies to develop testing kits for mass production within one week of first case.

2 Safe, widespread testing and identification

Officials rapidly opened 600 testing centers, 50 drive-through stations, and numerous kiosks to test patients for COVID-19. Buildings use thermal cameras and temperature checking to identify people with fevers.

3 Tracing and isolation

"Contact tracing" used to retrace patients' movements and find, test, and isolate people who came in contact with positive patients. People receive emergency alerts whenever new cases are discovered nearby.

Challenges to adopting South Korea's model

Political restraint

President Trump is already considering lessening social isolation measures

Public trust and compliance

Social trust is lower in Western countries, such as the U.S., than in South Korea

It may already be "too late"

As case loads have risen exponentially, some U.S. cities, such as Los Angeles, have given up on contact tracing for COVID-19

Source: Fisher M, Sang-Hun S, "How South Korea Flattened the Curve," The New York Times; Dolan J, Mejia B, "L.A. County Gives Up on Containing Coronavirus, Tells Doctors to Skip Testing of Some Patients," Los Angeles Times.

Advisory Board interviews and analysis.

Snapshot from the battlefield

New York hospitals struggle to manage COVID-19 volume long before peak

DATA SPOTLIGHT

Demand in New York shortly expected to exceed capacity

87,000 Projected additional beds needed in New York state

23,000 Projected ventilator shortage in New York

10% Estimated increase in number of cases per day at New York Presbyterian Hospital[1]

Frontline care delivery challenges mounting

- Shortage of PPE, especially masks
- Clinician concerns about contracting COVID-19
- Shortage of ventilators
- Shortage of fentanyl, other medications used for intubation and sedation
- Unclear role of post-acute care in COVID-19

Source: Smith, C, "COVID-19 Updates from Dr. Smith," Columbia University Irving Medical Center, https://columbiasurgery.org/news/covid-19-update-32420; Bachman B, "NewYork-Presbyterian casts wide net in search of equipment as coronavirus shortage looms," The New York Times, https://nypost.com/2020/03/25/newyork-presbyterian-casts-wide-net-in-search-of-equipment-as-coronavirus-shortage-looms/; Lee E, "Nurses Share Coronavirus Stories Anonymously in an Online Document," The New York Times, https://www.nytimes.com/2020/03/25/business/media/coronavirus-nurses-stories-anonymous.html; Widdicombe L, "The Growing Chaos Inside New York's Hospitals," The New Yorker, https://www.newyorker.com/news/our-local-correspondents/shits-really-going-to-hit-the-fan-inside-new-yorks-overburdened-hospitals; Gonen Y, et al., "Frontline NYC Medical Staffers Describe Daily Battle at Struggling Hospitals," The City, https://thecity.nyc/2020/03/nyc-medical-staffers-describe-hospital-coronavirus-struggles.html.

1. As of March 24th.

Advisory Board interviews and analysis.

New York's sweeping executive order

Increasing labor supply

- Allows nurses, NPs, PAs, and other allied health professionals licensed in other states to immediately practice in the state of New York
- Allows APPs to practice autonomously within their medical education
- Relaxes medical malpractice laws
- Decreases provider documentation requirements
- Removes current working hour limits for physicians
- Grants graduates of foreign medical schools with one year of general medical education to practice in the state of New York
- Allows students to volunteer in hospitals for school credit without clinical affiliation agreements in place

Increasing bed capacity

- Mandates elective procedures in hospitals, ASCs, office-based surgery centers, and diagnostic imaging centers to be canceled and beds used to increase state capacity
- Allows hospice beds to be used for inpatient beds in facilities with dual licenses
- Extends licenses for emergency medical center and trauma providers for an additional year

Improving testing capability

- Expands licenses for providers to administer COVID-19 tests

Conserving pharmaceuticals

- Limits prescribing of hydroxychloroquine or chloroquine except when written as prescribed for an FDA-approved indication, or as part of a state-approved COVID-19 clinical trial

Source: No. 202.10: Continuing Temporary Suspension and Modification of Laws Relating to the Disaster Emergency; New York State; March 23, 2020.

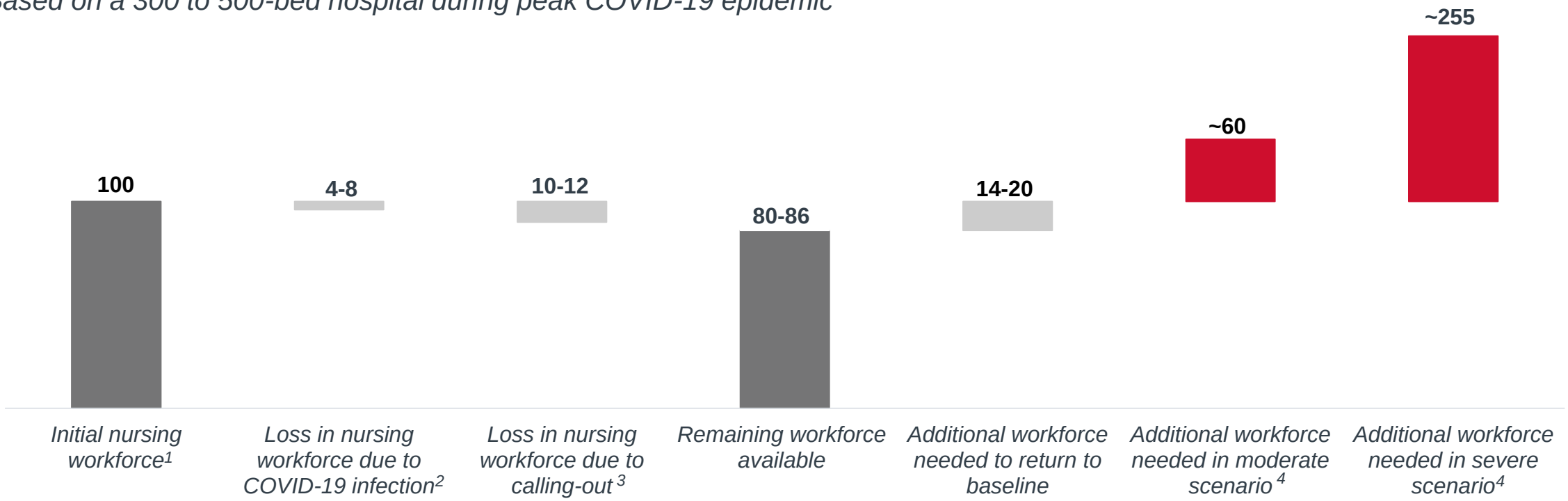
Advisory Board interviews and analysis.

Nursing supply critical part of capacity to admit patients

Some markets more limited by workforce constraints than bed constraints

Nursing demand from a moderate and severe COVID-19 scenario

Based on a 300 to 500-bed hospital during peak COVID-19 epidemic



1. Assuming a full workforce is staffed at 80% bed capacity, and the workforce is measured in full time equivalents.
2. Assuming a 3.8% health care personnel infection rate, based off infection rates of China on February 24th, 2020 and adding up to an additional 4% due to unprotected exposure.
3. Assuming a call-out rate of 10-12% due to inability to care for COVID-19 patients due to caregiver child needs, personal health, etc.
4. Assumes all hospitals and health systems have even distribution of COVID-19 patients.

Source: "COVID-19 Crisis: US Healthcare Provider and Payer Preparedness," McKinsey & Company, March 17, 2020.

Advisory Board interviews and analysis.

Table stakes strategies to expand capacity for COVID-19

Redirect patient demand

Postpone all elective procedures
Delay elective surgeries to free up bed capacity, staff availability, and conserve PPE and other resources.

Repurpose beds for additional ICU capacity
Repurpose surgical beds (e.g., PACUs, ORs) for additional ICU capacity and set protocol for isolating different patient populations.

Ramp up telehealth capabilities
Move initial COVID screenings to virtual visits to prevent unnecessary exposure.

Reallocate staff

Redeploy all available MDs across medical units
Reallocate surgeons, anesthesiologists, and outpatient providers to acute care.

Upskill RNs to work in ICU
Tap other care teams to backfill RN roles in non-acute settings.

Move non-clinical staff with clinical backgrounds into care roles.

Locate all available supplies

Source PPE donations
Reach out to community businesses to source PPE by donation.

Access all available ventilators
Use ventilators past their shelf life.

Possibility of using sleep apnea and CPAP machines to supplement ventilators.

Advisory Board interviews and analysis.

Emerging ideas to expand capacity

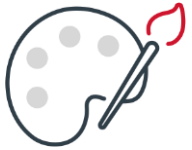
Ready your list of licensed clinical retirees and medical/nursing students to join the workforce

Many states' emergency declarations allow for expedited license renewals and temporary emergency licenses to expand workforce capacity.

Brainstorm alternative sites of care

Create criteria for places that can be repurposed as sites of care, including proximate hotels, dorm beds, and gyms.

Partner with non-acute sites of care, including LTACHs, for additional bed space.



Source childcare for clinical staff to reduce no-shows

Organize small group or individual childcare to align with social distancing recommendations.

Create alternative PPE substitutions to fill supply chain gaps

Though efficacy is unknown, consider homemade fabric masks and face shields made from repurposed supplies as last resort.

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The center of the outbreak: Nursing homes

DATA SPOTLIGHT

Nursing homes and COVID-19

147 Number of nursing homes with reported cases

27 Number of states that have at least one case in a nursing home

39 Percentage of nursing homes with deficiencies related to spread of infection

Major nursing home outbreaks in several U.S. states

Washington

First major outbreak in a skilled nursing facility; **37 deaths** have been linked to the facility.

Illinois

One nursing home outside of Chicago reported **46 positive cases** among residents.

Louisiana

An independent living provider in New Orleans has reported **six COVID-19 deaths.**

Source: "Coronavirus Cases Surge At Nursing Homes as Workers Battle 'Almost Perfect Killing Machine,'" Washington Post, March 21, 2020; Simmerman, John. "Lambeth House Resident, Another Retired Doctor, Dies in Coronavirus Outbreak." *NOLA.com*, 21 Mar. 2020, www.nola.com/news/coronavirus/article_fed9538e-6b70-11ea-827f-db045f504c38.html; "Press Release CMS Announces Findings at Kirkland Nursing Home and New Targeted Plan for Healthcare Facility Inspections in Light of COVID-19." *CMS*, 2020. "Data Note: How Might Coronavirus Affect Residents in Nursing Facilities?," KFF, March 13, 2020.

Advisory Board interviews and analysis.

Preventing the spread of COVID-19 in nursing facilities

How skilled nursing facilities and hospitals can prevent and manage outbreaks

What nursing facilities can do:

Infection control: Follow CDC guidelines

- Work with upstream partners when possible to gain additional infectious disease expertise

Admissions: Information gathering is key

- Work with referral partners to ensure safe transitions, document any signs of infection
- Monitor patients for symptoms early and often

Emergency planning: Prepare for cases

- Evaluate capacity to manage COVID-19 patients in a separate wing or building

What hospitals can do:

Avoid discharging COVID-19 patients to skilled nursing facilities and long-term care providers

- Consolidate positive cases in as few settings as possible

Communicate with downstream partners:

- Check what patient types they're accepting
- Ensure facilities are following CDC guidelines

Support post-acute partners**:**

- Collaborate on emergency preparedness
- Share staff and expertise

Advisory Board interviews and analysis.

Focus throughput efforts on COVID-negative patients first

Hospital systems should rely heavily on home-based supports

COVID-19 negative patients

Utilize waivers to transition patients to post-acute facilities quickly:

Use LTACHs[1] as an ICU release valve

Additional ventilator and bed capacity; critical care expertise

COVID-19 positive patients

Home health agencies: Some are accepting COVID patients, but limitations in safety and service availability remain.

Alternative treatment sites: King County, WA recently purchased a motel to exclusively serve as a recovery center for COVID-19 patients.

Safer at home: Discharge patients directly home *when at all possible*

- Lower risk of infection from other patients
- Prevents spread of disease in other facility-based settings
- Less resource intensive

1. Long-Term Acute Care Hospitals.

Source: "Kent Motel to Serve as Quarantine Site for Coronavirus Patients," accessed at https://komonews.com/news/coronavirus/kent-motel-to-serve-as-quarantine-site-for-coronavirus-patients.

Advisory Board interviews and analysis.

Weighing the government's response…

…And private sector volunteerism

Federal government's main supply levers

Defense Production Act of 1950

Directs private companies to shore up national defenses during wartime, natural disasters, and domestic emergencies

Strategic National Stockpile

U.S.' largest supply of medical supplies and pharmaceuticals for use in a public health emergency

Tesla, Medtronic engage in talks to produce ventilators

CASE EXAMPLE

- FDA issued new guidance on ventilator manufacturing
- Automakers allowed to repurpose production lines, increase supply
- Tesla and Medtronic engaged in discussions to create state-of-the-art ventilators
- Tesla likely to help with fan production, specialized engineering

Private sector faces significant manufacturing challenges

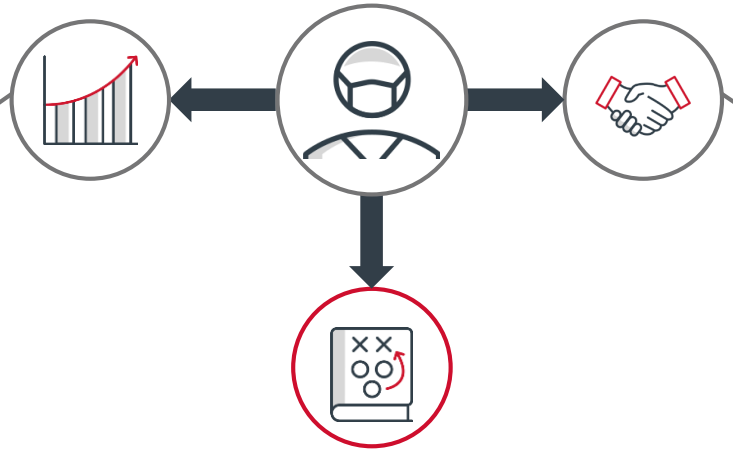
- Overreliance on foreign parts
- Necessary training for technicians
- "Clean room" environments
- Time to retool existing plants

Source: Tucker E, "What exactly is the Defense Production Act?," Military Times, March 19, 2020; "Strategic national stockpile," Office of the Assistant Secretary for Preparedness and Response; Muller J, "Wartime manufacturing muscle might not solve ventilator shortage," *Axios,* March 20, 2020.

Advisory Board interviews and analysis.

Manufacturers, private sector stepping up in PPE shortage

Despite these efforts, providers still face an uphill battle



Manufacturer capacity

- **3M** increased global output of N95 masks to 100 million per month
- **Honeywell** plans to produce millions of N95 masks and add 500 new jobs to ramp up production
- **Prestige Ameritech** aims to make one million masks per day (up from 250,000)

So what's the problem?

1. Increased manufacturer capacity likely insufficient to meet anticipated demand
2. New entrants will run into barriers: raw materials in shortage, price gouging, unclear distribution process

Private sector involvement

- **Apple** donating 2 million masks to the Trump administration and 1 million to CA
- **Facebook** donating 720,000 masks
- **Hanes** plans to make up to 6 million masks per week (not N95 quality)
- Designer **Christian Siriano** plans to make a few thousand masks per week
- **Los Angeles Apparel** hopes to produce 300,000 masks per week

Source: Kavilanz P, "3M CEO: Our medical masks should not be showing up in stores," CNN Business; Graham J, "IBM and Honeywell sign on with White House to help fight COVID-19," USA Today; Nguyen T, "Health care workers are running out of face masks. They're asking people to donate," Vox; Fried I, "Non-medical business giants help hospitals facing supplies shortage," Axios; Bitker J, Swan R, "Facebook, Flexport among Bay Area companies donating medical equipment," San Francisco Chronicle; Abrams R, et al., "Governments and Companies Race to Make Masks Vital to Virus Fight," The New York Times; Friedman V, Testa J, "Christian Siriano and Dov Charney Are Making Masks and Medical Supplies Now," The New York Times; Hufford A, "New Manufacturers Jump Into Mask Making as Coronavirus Spreads," The Wall Street Journal.

Point-of-care tests offer promise of speed and scale

Approximate detection time drops from hours to minutes

Rapid point-of-care testing options available and expanding

California-based Cepheid (3/21) and Mesa Biotech (3/24) received emergency use authorization (EUA) from FDA for rapid molecular diagnostic tests

Comparison of first test to receive EUA against rapid POC[1]

	Early EUA test	*Cepheid's POC test*
Minute detection time	210	45
Compatible systems installed in the U.S.	110	5,000

Implications for COVID-19 testing efforts

Expanded access to testing

POC test does not require high-complexity labs nor specialized med techs to run

More equitable testing process

Communicating results during same visit removes reliance on patient portals

Isolate COVID-19 hotspots faster

Faster TAT[2] and substantial install-base allows for greater processing capacity

1. Point of care.
2. Turnaround time

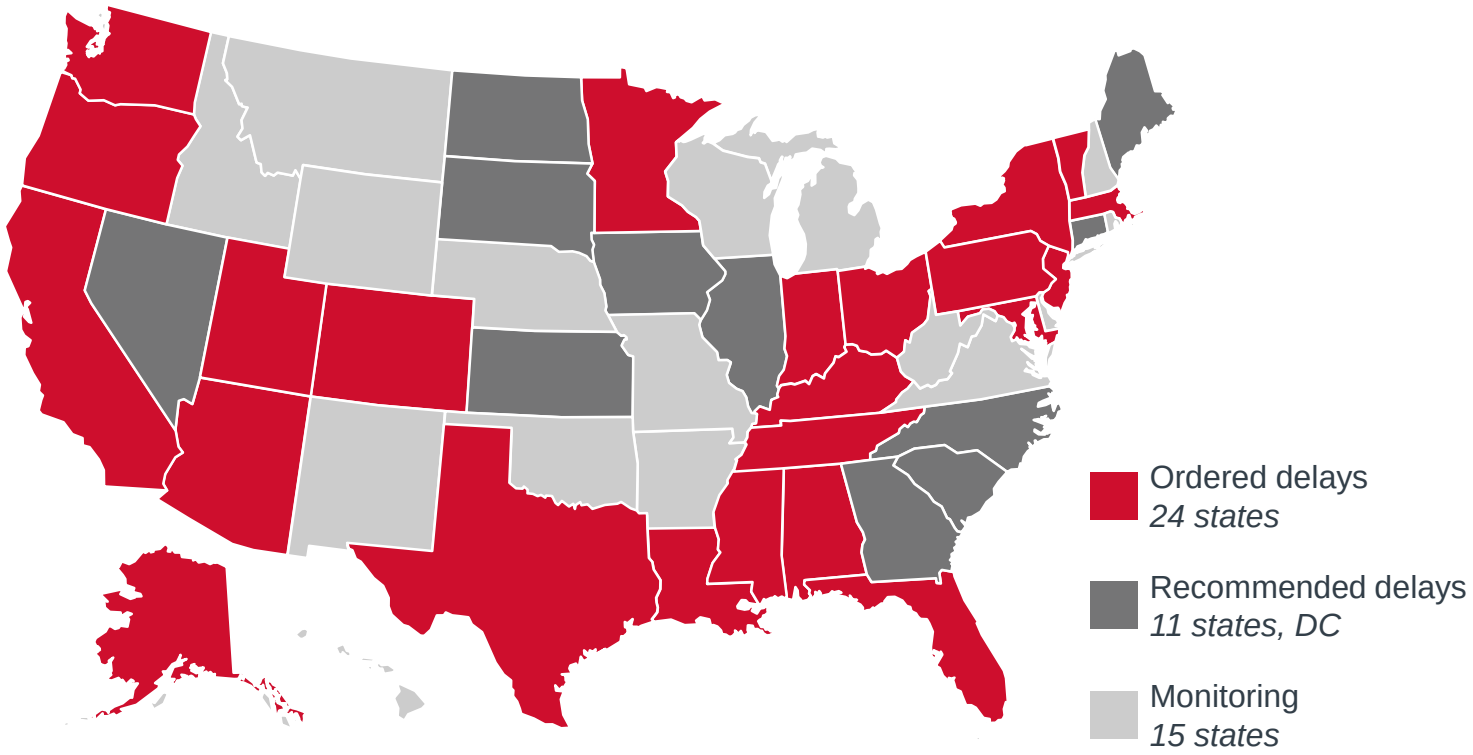
Source: "Cepheid Coronavirus Assay First Point-of-Care Test to Get FDA Emergency Use Authorization", *360Dx*, March 21, 2020; "cobas SARS-CoV-2: Qualitative assay for use on the cobas 6800/8800 Systems", *FDA*, March, 2020.

Elective surgeries canceled to create capacity

But providers face practical challenges with shifting resources, staff, or patients

States with mandates to cancel or delay elective surgeries

As of March 25, 2020



NEXT STEPS

Short terms options for ASCs

Close; shift resources and staff to hospitals

What can practically move locations? Physicians and staff? Large items like beds?

Off-load non-COVID patients from hospitals

What resources do ASCs need to care for these patients? Food services? Supplies?

Prepare for COVID patients as hospitals max out capacity

What resources do ASCs need to care for COVID patients and protect staff?

Advisory Board interviews and analysis.

PPE shortage creates ripple effect for testing access

Broad testing remains an elusive goal

Lack of supplies prevents test administration

- FEMA secured 60,000 tests on Tuesday from the market; has not yet enacted DPA[1]
- Providers report critical shortages in both test kit materials and PPE required to administer
  - Ideal protection includes gloves, gowns, N-95 respirators or facemasks, and eye masks
- Providers forced to ration scarce supplies to protect frontline workers as COVID-19 patient volume grows

Supply shortages

Health officials adjust testing guidelines

- Hard-hit states—including New York, California, and Maryland—advise conserving tests for health care workers and/or severely ill; White House coronavirus task force echoed this message
- New stance contrasts previous containment efforts to identify and diagnose community cases
- As a result, mild cases continue to go undiagnosed, exacerbating community spread

Restrictive testing guidelines

Unmet need for **broad-base testing** to identify COVID-19 hotspots, prevent community spread, and limit volume surges into hospitals

Source: "Testing Swabs Run In Short Supply As Makers Try To Speed Up Production", *NPR*, March 18,2020; Schumaker E and Allen K, "Doctors say COVID-19 tests available, but some can't be administered due to mask shortage", *ABC News*, March 19, 2020; "Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings", CDC, updated March 19, 2020; Johnson C et al., "In hard-hit areas, testing restricted to health care workers, hospital patients", *Washington Post*, March 21, 2020.

1. Defense Production Act.

Anti-malarial and anti-viral drugs—a best first bet?

While more readily available, overall impact on COVID-19 unclear

Three existing drugs in the spotlight

Chloroquine: anti-malarial drug

Hydroxychloroquine: related anti-malarial drug (also approved to treat lupus and rheumatoid arthritis)

Remdesivir: experimental antiviral drug, previously studied (but never approved) to treat Ebola

In absence of robust data, current understanding is limited

- Safety and efficacy data based on small-scale clinical trials and anecdotal evidence
- Larger clinical trials just beginning in Washington, New York (and globally)

Unchecked adoption leads to early harm

1. **Unintended consequences for patient safety**

   Patients may self-medicate, leading to irreversible side effects (blindness, heart problems) or death

2. **Drug shortages from bulk ordering**

   Health systems and physician groups race to stockpile chloroquine and hydroxychloroquine

3. **Overwhelming demand creates access restrictions**

   Gilead suspended compassionate access to remdesivir – now only available via clinical trials

Advisory Board interviews and analysis.

Questions linger about the cost of COVID-19

Early estimates on health system finances

$2800

Average loss of revenue per COVID-19 case

$6,000- $8,000

High end of loss of revenue per COVID-19 case depending on payer mix

Early estimates on insurer finances

$13B

Low-end initial estimate of the cost of COVID-19 claims

$251B

High-end initial estimate of cost of national COVID-19 claims

Key factors that will impact the health care industry's finances

- Severity of the pandemic
- Amount of additional government support
- Amount of dropped employer-sponsored insurance enrollment due to job losses
- Lower premium income from economic downturn
- Lower investment due to interest rate decline and market crashes
- Amount of procedural volume that is lost or delayed due to COVID-19

Source: Report: Hospitals face massive losses on COVID-19 cases even with proposed increase in federal reimbursement, Strata Decision Technology, March 24, 2020; U.S. Health Insurer Medical Loss Ratios will be Elevated in 2020 Following Strong 2019, Fitch Ratings, March 12, 2020; Covered California Releases the First National Projection of the Coronavirus (COVID-19) Pandemic's Cost to Millions of Americans with Employer or Individual Insurance Coverage, Covered California, March 24, 2020.

Coronavirus scenario planning guide

12 situations hospital leaders should prepare for

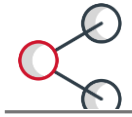
FACILITY CAPACITY & SUPPLIES

1. Demand surge stresses capacity across inpatient units, with deepest strains in critical care.
2. Shortages of testing supplies impede ability to accurately diagnose patients and contain virus spread.
3. Local stores of prevention protection supplies are depleted, limiting the ability of hospitals to contain virus spread and protect workers.

STAFF CAPACITY & RESILIENCE

4. Pronounced staff shortages among both clinical and non-clinical personnel limit effective capacity.
5. Staff across the organization experience stress, anxiety, and burnout.
6. Rapidly changing conditions necessitate that staff receive essential training and frequent, accurate updates.

To learn more about these scenarios and review questions for pressure testing your strategy, visit **advisory.com/covid-19**



COMMUNITY COORDINATION

7. Emergent issues require swift coordination with other providers in the local health care ecosystem—especially primary care and post-acute care providers.
8. Facility access for visitors and suppliers must be carefully managed to prevent virus spread.
9. Concerned patients overwhelm access points across the system, limiting ability to identify and treat infected patients.
10. Uninfected yet vulnerable populations with chronic conditions will experience gaps in care management—and underestimate their virus risk.

FINANCIAL MANAGEMENT

11. A disruption in the supply of drugs and other non-virus-related medical supplies—combined with sudden labor shortages—rapidly increases operating expenses.
12. Sudden margin pressures and a broader economic downturn threaten medium-term financial sustainability.

Your top resources for COVID-19 readiness

CDC and WHO Guidelines

Compiles evidence-based information on hospital and personnel preparedness, COVID-19 infection control recommendations, clinical guidelines, and case trackers

Coronavirus scenario planning

Explores twelve situations hospital leaders should prepare for and helps hospital leadership teams pressure test the comprehensiveness of their preparedness planning efforts and check for blind spots

Managing clinical capacity

Examines best practices for creating flexible nursing capacity, maximizing hospital throughput in times of high demand, increasing access channels, deploying telehealth capabilities, and engaging clinicians as they deal with intense workloads

How COVID-19 is transforming telehealth—now and in the future

Explores how telehealth is being deployed against COVID-19 and essential next steps for telehealth implementation

To access the top COVID-19 resources, visit **advisory.com/covid-19**

Advisory Board interviews and analysis.

Meet **our experts**

Christopher Kerns

Vice President, Executive Insights

Christopher oversees all senior executive research at Advisory Board, and is responsible for developing the research perspective, official point of view, and overall Advisory Board message to executives from across the health care sector.

KernsC@advisory.com

@CD_Kerns

655 New York Avenue NW, Washington DC 20001
202-266-5600 | **advisory.com**