Anatomy of an Outbreak: Part 2
Early lessons from the front lines and a pivot to Phase 2

March 26, 2020
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

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

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

Cumulative number of deaths, by number of days since 10th death

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

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

Cumulative number of deaths, by number of days since 10th death

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

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

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


2. Not reported.
Study concludes longer-term suppression strategy needed
Mitigation strategy may not be sufficient to prevent more than 1M U.S. deaths

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

March 16, 2020

Mitigation strategy

- Slow the spread ($R_0 > 1$) 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

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

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)

8X

Minimum additional capacity needed to prevent 1.1-1.2M deaths

18+

Estimated number of months before a vaccine will be available


1. Reproduction number (average number of secondary cases each generates).
‘Flatten the Curve’ to fight COVID-19

Protective measures slow the spread allowing providers to treat more people

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 to¹:

- 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.

Ready to absorb the shock?

Average hospital occupancy by state

- Atlanta: 77.4%
- New York City: 74.6%
- Chicago: 57.4%
- Los Angeles: 59.2%
- San Francisco: 55.1%

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
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

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

<table>
<thead>
<tr>
<th>Country</th>
<th>Beds per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>34.7</td>
</tr>
<tr>
<td>Germany</td>
<td>29.2</td>
</tr>
<tr>
<td>Italy</td>
<td>12.5</td>
</tr>
<tr>
<td>France</td>
<td>11.6</td>
</tr>
<tr>
<td>South Korea</td>
<td>10.6</td>
</tr>
<tr>
<td>Spain</td>
<td>9.7</td>
</tr>
<tr>
<td>Japan</td>
<td>7.3</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>6.6</td>
</tr>
<tr>
<td>China</td>
<td>3.6</td>
</tr>
<tr>
<td>India</td>
<td>2.3</td>
</tr>
</tbody>
</table>

ICU beds per 100,000 people aged 60 and older

<table>
<thead>
<tr>
<th>City</th>
<th>Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everett, WA</td>
<td>54</td>
</tr>
<tr>
<td>Fort Meyers, FL</td>
<td>57</td>
</tr>
<tr>
<td>Sioux Falls, SD</td>
<td>58</td>
</tr>
<tr>
<td>Chicago, IL</td>
<td>211</td>
</tr>
<tr>
<td>Reno, NV</td>
<td>214</td>
</tr>
<tr>
<td>Lubbock, TX</td>
<td>242</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Spectrum Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete lock down</td>
<td>Enact roadblocks and end public transit, prohibit more than one member of the household from leaving every two days, allow only one entrance and exit for a community where people are checked for masks and fevers, create isolation wards. Seems effective in China for now.</td>
</tr>
<tr>
<td>Extreme monitoring</td>
<td>Widespread testing, immediate isolation of positive cases and their contacts. Require those who are exposed to stay home, enforced by GPS tracking and heavy fines. Health screening in public places. Avoids massive lock downs, but difficult to implement.</td>
</tr>
<tr>
<td>Wide-spread social distancing</td>
<td>Request or mandate that the public stays home, close schools and businesses, prohibit large public gatherings, implement travel restrictions. Level of stringency varies by country.</td>
</tr>
<tr>
<td>“Surgical interdiction”</td>
<td>Isolate only the most vulnerable—the elderly, people with health conditions. Bolsters the economy but extremely difficult to contain spread of virus.</td>
</tr>
<tr>
<td>Do nothing</td>
<td>Cases would likely overwhelm the health care system and kill millions</td>
</tr>
</tbody>
</table>

Considered by
Netherlands, UK
US, Western Europe
South Korea
Hubei Province, China
### Overview of global COVID-19 response strategies

**Updated March 25, 2020**

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

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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...

<table>
<thead>
<tr>
<th></th>
<th>Mar 13-15</th>
<th>Mar 16-19</th>
<th>Mar 20-22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large crowds</td>
<td>59%</td>
<td>79%</td>
<td>92%</td>
</tr>
<tr>
<td>Mass transit</td>
<td>55%</td>
<td>75%</td>
<td>87%</td>
</tr>
<tr>
<td>Public places</td>
<td>30%</td>
<td>54%</td>
<td>72%</td>
</tr>
<tr>
<td>Small gatherings</td>
<td>23%</td>
<td>46%</td>
<td>68%</td>
</tr>
</tbody>
</table>

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
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

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


WE CANNOT LET THE CURE BE WORSE THAN THE PROBLEM ITSELF

President Donald Trump, Twitter

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

Senator Joe Manchin, D-WV
The economy responds to suppression strategies
An exceptionally rapid market reaction to locking down economic activity

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.

**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

**S&P 500 performance**

- Estimated drop in U.S. GDP in second quarter of 2020
- Record number of jobless claims in the first week following national social-distancing measures enacted following outbreak, up from 228K the prior week
- Exceptionally rapid market reaction to locking down economic activity

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

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

### 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

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


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Advisory Board interviews and analysis.
### Snapshot from the battlefield

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

#### DATA SPOTLIGHT

<table>
<thead>
<tr>
<th>Demand in New York shortly expected to exceed capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>87,000 Projected additional beds needed in New York state</td>
</tr>
<tr>
<td>23,000 Projected ventilator shortage in New York</td>
</tr>
<tr>
<td>10% Estimated increase in number of cases per day at New York Presbyterian Hospital¹</td>
</tr>
</tbody>
</table>

#### 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**

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1. As of March 24th.

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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


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*

|                     | Initial nursing workforce
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Loss in nursing</td>
<td>4-8</td>
</tr>
<tr>
<td>workforce due to</td>
<td></td>
</tr>
<tr>
<td>COVID-19 infection</td>
<td></td>
</tr>
<tr>
<td>Loss in nursing</td>
<td>10-12</td>
</tr>
<tr>
<td>workforce due to</td>
<td></td>
</tr>
<tr>
<td>calling-out</td>
<td></td>
</tr>
<tr>
<td>Remaining workforce</td>
<td>80-86</td>
</tr>
<tr>
<td>available</td>
<td></td>
</tr>
<tr>
<td>Additional workforce needed to return to baseline</td>
<td>14-20</td>
</tr>
<tr>
<td>Additional workforce needed in moderate scenario</td>
<td>~60</td>
</tr>
<tr>
<td>Additional workforce needed in severe scenario</td>
<td>~255</td>
</tr>
</tbody>
</table>

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.

# 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.
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.
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.**

# 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
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 LTACHs¹ 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

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¹. Long-Term Acute Care Hospitals.

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


CASE EXAMPLE

**Tesla, Medtronic engage in talks to produce ventilators**

- 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

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)

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

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

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 POC¹

<table>
<thead>
<tr>
<th>Early EUA test</th>
<th>Cepheid’s POC test</th>
</tr>
</thead>
<tbody>
<tr>
<td>210 Minute detection time</td>
<td>45 Minute detection time</td>
</tr>
<tr>
<td>110 Compatible systems installed in the U.S.</td>
<td>5,000 Compatible systems installed in the U.S.</td>
</tr>
</tbody>
</table>

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 TAT² and substantial install-base allows for greater processing capacity

¹  More information available in Advisory Board interviews and analysis.

²  More information available in a comparison of first test to receive EUA against rapid POC.


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Advisory Board interviews and analysis.
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

| Ordered delays 24 states | Recommended delays 11 states, DC | Monitoring 15 states |

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?
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
- 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

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

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

Supply shortages

Restrictive testing guidelines

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

Three existing drugs in the spotlight

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

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)
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

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.

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.

To learn more about these scenarios and review questions for pressure testing your strategy, visit advisory.com/covid-19
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](http://advisory.com/covid-19)
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