Anatomy of an Outbreak:
COVID-19 and the U.S. Health Care Delivery System

March 19, 2020
Today’s Research Expert

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*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.

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@CD_Kerns
## Tracking the spread

Two months after the first reported death, COVID-19 has circled the globe

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 11, 2020</td>
<td>Chinese government reports first death due to new virus that began spreading in late 2019</td>
</tr>
<tr>
<td>Jan 30, 2020</td>
<td>WHO declares global emergency</td>
</tr>
<tr>
<td>Feb 1, 2020</td>
<td>Cases reported in Japan, South Korea, India, the Philippines</td>
</tr>
<tr>
<td>Feb 24-27</td>
<td>Kuwait, Bahrain, Iraq, Afghanistan, Oman, Brazil, Norway, Romania, Greece, Georgia, Pakistan, North Macedonia report cases</td>
</tr>
<tr>
<td>Mar 19, 2020</td>
<td>&gt;217,000 reported cases, &gt;8,900 deaths worldwide</td>
</tr>
<tr>
<td>Jan 13, 2020</td>
<td>The first case outside of China is confirmed in Thailand</td>
</tr>
<tr>
<td>Jan 31, 2020</td>
<td>Russia, Spain, Sweden, UK confirm first cases</td>
</tr>
<tr>
<td>Feb 14-21, 2020</td>
<td>First cases reported in Egypt, Iran, Israel as the virus spreads to the Middle East</td>
</tr>
<tr>
<td>Feb 28, 2020</td>
<td>Nigeria, Lithuania, Wales report first cases</td>
</tr>
<tr>
<td></td>
<td>The US reports its first death, near Seattle</td>
</tr>
</tbody>
</table>

Coronavirus cases in the United States
Current as of March 18, 2020

- At least 5,881 cases
- 50 states reporting cases
- At least 107 deaths

Current COVID-19 cases

Estimate of possible effects
- 96 million cases
- 4.8 million hospitalizations
- 480,000 deaths

Ready to absorb the shock?

Average hospital occupancy by state

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

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

Advisory Board interviews and analysis.
Current occupancy rates for states and largest cities

<table>
<thead>
<tr>
<th>State</th>
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<tbody>
<tr>
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<td>80%</td>
<td>TN</td>
<td>63%</td>
<td>WV</td>
<td>57%</td>
<td>ND</td>
<td>42%</td>
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<td>MD</td>
<td>74%</td>
<td>FL</td>
<td>62%</td>
<td>KY</td>
<td>57%</td>
<td>SD</td>
<td>41%</td>
</tr>
<tr>
<td>NY</td>
<td>73%</td>
<td>NC</td>
<td>62%</td>
<td>NM</td>
<td>57%</td>
<td>WY</td>
<td>36%</td>
</tr>
<tr>
<td>NV</td>
<td>72%</td>
<td>MI</td>
<td>61%</td>
<td>IN</td>
<td>56%</td>
<td>ME</td>
<td>56%</td>
</tr>
<tr>
<td>MA</td>
<td>71%</td>
<td>PA</td>
<td>61%</td>
<td>WI</td>
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<td>MT</td>
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<td>OK</td>
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</tr>
<tr>
<td>CT</td>
<td>67%</td>
<td>OH</td>
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<td>KS</td>
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<tr>
<td>NH</td>
<td>67%</td>
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<td>NE</td>
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<tr>
<td>GA</td>
<td>66%</td>
<td>TX</td>
<td>60%</td>
<td>NE</td>
<td>50%</td>
<td>LA</td>
<td>49%</td>
</tr>
<tr>
<td>HI</td>
<td>66%</td>
<td>CA</td>
<td>60%</td>
<td>AR</td>
<td>50%</td>
<td>IA</td>
<td>49%</td>
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<tr>
<td>VT</td>
<td>66%</td>
<td>MO</td>
<td>59%</td>
<td>OR</td>
<td>64%</td>
<td>MS</td>
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<tr>
<td>NJ</td>
<td>66%</td>
<td>AL</td>
<td>59%</td>
<td>RI</td>
<td>65%</td>
<td>VA</td>
<td>64%</td>
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<td>DE</td>
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<td>AK</td>
<td>58%</td>
<td>VA</td>
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<table>
<thead>
<tr>
<th>City</th>
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<tbody>
<tr>
<td>Baltimore</td>
<td>76.4%</td>
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<tr>
<td>Seattle</td>
<td>75.7%</td>
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<tr>
<td>Charlotte</td>
<td>75.4%</td>
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<tr>
<td>New York</td>
<td>74.2%</td>
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<tr>
<td>Boston</td>
<td>73.8%</td>
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<tr>
<td>Atlanta</td>
<td>73.3%</td>
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<tr>
<td>DC</td>
<td>72.1%</td>
</tr>
<tr>
<td>Nashville</td>
<td>71.5%</td>
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<tr>
<td>Minneapolis-</td>
<td></td>
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<tr>
<td>St. Paul</td>
<td>69.9%</td>
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<tr>
<td>Orlando</td>
<td>68.5%</td>
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<tr>
<td>Dallas-Fort</td>
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<tr>
<td>Worth</td>
<td>67.1%</td>
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<tr>
<td>Denver</td>
<td>67.0%</td>
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<tr>
<td>Portland</td>
<td>67.0%</td>
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<tr>
<td>Houston</td>
<td>66.1%</td>
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<tr>
<td>Detroit</td>
<td>65.3%</td>
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<tr>
<td>San Diego</td>
<td>65.0%</td>
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<tr>
<td>Tampa-St.</td>
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<td>Petersburg</td>
<td>63.5%</td>
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<tr>
<td>Philadelphia</td>
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<td>San Antonio</td>
<td>62.5%</td>
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<td>Phoenix</td>
<td>61.1%</td>
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<tr>
<td>Chicago</td>
<td>61.1%</td>
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<tr>
<td>Riverside-San</td>
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<tr>
<td>Bernardino</td>
<td>60.6%</td>
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<tr>
<td>LA</td>
<td>58.8%</td>
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<tr>
<td>Miami</td>
<td>58.8%</td>
</tr>
<tr>
<td>St. Louis</td>
<td>57.5%</td>
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Many regions lacking capacity treat the influx of patients
Millions expected to be hospitalized for coronavirus infection

**COVID-19 effect on average annualized hospital occupancy rates**

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>New York</strong></td>
<td>293,097</td>
<td>61,062</td>
<td>586,195</td>
<td>74.2%</td>
<td>86.90%</td>
<td>76.9%</td>
<td>99.6%</td>
</tr>
<tr>
<td><strong>Los Angeles</strong></td>
<td>194,985</td>
<td>40,622</td>
<td>389,970</td>
<td>58.8%</td>
<td>72.6%</td>
<td>61.7%</td>
<td>86.5%</td>
</tr>
<tr>
<td><strong>Chicago</strong></td>
<td>139,345</td>
<td>29,030</td>
<td>278,691</td>
<td>61.1%</td>
<td>73.4%</td>
<td>63.7%</td>
<td>85.7%</td>
</tr>
</tbody>
</table>

1. Assuming hospitalizations spread proportionally across the United States.
2. Assuming there will be roughly 4.8 million COVID-19 hospitalizations.
3. A moderate scenario predicts roughly 1 million COVID-19 hospitalizations.

Source: "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.
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

‘Flatten the Curve’ to fight COVID-19
Protective measures slow the spread allowing providers to treat more people

COVID-19 is spreading quickly and some people won’t get necessary medical care.

COVID-19 is spreading slowly giving providers the time and resources to treat more people.

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 ($R_0 > 1$) 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 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).

[Insert program name 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 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.

U.S. playing catch up on COVID-19 testing
Despite reactive measures, ability to administer mass testing remains unclear

Barriers to comprehensive testing in the U.S.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Intervention</th>
<th>Capacity estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who should get tested?</td>
<td>CDC expanded qualifying criteria</td>
<td>76K COVID-19 tests given in the US as of 3/18</td>
</tr>
<tr>
<td>Where to get tested?</td>
<td>Health systems and retail venues added drive-through test sites</td>
<td>47 Drive-through test sites set up in 12 states by FEMA</td>
</tr>
<tr>
<td>Who can run the tests?</td>
<td>FDA relaxed requirements for EUA¹; government partnered with Quest, LabCorp</td>
<td>2,000 Commercial labs permitted to perform tests as of 3/15</td>
</tr>
<tr>
<td>Do we have sufficient testing capacity?</td>
<td>Government approved Roche, Thermo Fisher tests; invoked Defense Production Act to manufacture critical supplies</td>
<td>400K Weekly supply of Roche’s testing kits to approved labs</td>
</tr>
<tr>
<td>How do we communicate results?</td>
<td>Newly-approved AMC and private labs rapidly ramped up capacity</td>
<td>20,000 Expected daily testing capacity at LabCorp by end of March</td>
</tr>
</tbody>
</table>


¹. Emergency Use Authorization.
Relaxing definition of “acceptable” PPE
Time to harness your inner MacGyver

Creative “solutions” to the PPE shortage

Finding new sources:
- Procure masks, gloves, and gowns from non-traditional sources like Amazon and eBay
- Order PPE (e.g., N-95 respirators) from companies who supply goggles/masks to construction workers
- Use expired equipment from inventory or emergency stockpiles

Extending useful life:
- Align protocols with new CDC guidelines for surgical masks vs. N-95, L1/2 vs. L3/4 gowns
- Re-stitch elastic on old surgical masks
- Modify protocols so clinicians change PPE less frequently
- Introduce some washable cloth protective gowns

Prioritizing PPE:
- Delay/cancel elective surgeries
- Encourage telehealth visits

CASE EXAMPLE
Providence St. Joseph Health
Not-for-profit, 51-hospital health system • Renton, WA

- Hospital will run out of critical PPE (e.g., face shields, masks)
- Infection control and quality experts designed prototype face shields using office supplies and other on-hand materials:
  - Marine-grade vinyl, industrial tape, foam, and elastic
- Purchased supplies from local craft stores and Home Depot
- 20 administrative staff members at their headquarters volunteered, formed an assembly line, and built 500 new face shields
- Next steps:
  - Order more raw materials from wholesale suppliers and build more shields
  - Test another prototype facemask from surgical wrap material

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- Encourage telehealth visits

Providers getting creative with ventilator supply

Explore both federal and internal options

What to demand of the government

- **Release and distribute national ventilator stockpile**
  - Pentagon released (on 03/17) 2,000 ventilators (Still need to work through distribution process)
  - US has a stockpile of about **10,000 ventilators** according to Vice President Mike Pence
- **Free up manufacturing capacity** to produce more ventilators through a national mandate
  - President Trump announced (on 03/18) that he will invoke the **Defense Production Act**, which could speed up and expand the US’ supply of medical supplies and equipment (e.g., ventilators), *but will only use if needed*

Strategies to implement in the interim

- **Purchase additional ventilators, if possible, ahead of local demand**
- **Establish regional inventory-sharing database** to balance local supply and demand
- **Work with state or federal government to redeploy local manufacturing lines** to make new ventilators and other critical equipment
- **Use 3D printers to make ventilator parts and respirator valves**
- **Use anesthesia machines as ventilators**
- **Build simpler versions of ventilators** (not as complex with fewer modes of ventilation)
- **Fix broken ventilators; use expired ventilators**
- **Cancel/delay elective surgeries**

The front line in the fight against COVID-19
How hospitals can help nursing facilities prevent an outbreak

SNFs are particularly vulnerable to COVID-19

- High-risk, elderly patient population
- Low staff-to-patient ratios
- Predominantly unlicensed staff
- High turnover rates, nearly 52% as opposed to 15% in hospitals

Three strategies hospitals can use to support SNFs

1. **Provide additional advanced clinician support**
   - Mobilize SNFist program to offer clinical expertise for SNF patients and staff
   - Ask your SNF partners about their need for staffing assistance, including additional RN support, or telehealth

2. **Facilitate infection prevention training** for SNF staff, or invite SNF staff to internal hospital trainings on COVID-19 prevention

3. **Share infection prevention guidelines** with post-acute partners
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

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

Acting creatively to rapidly expand staffing
Early ideas from Advisory Board members

Within the Organization

Relax “top of license”
- For all the effort in keeping folks top of license, deploy teams as utility players flexing up and down; this includes blurring specialty lines and location silos

But – be creative on non-clinical
- The one exception on top of license would be finding anything non-clinical that can be shifted away from clinical staff to non-clinical staff and volunteers

Beyond the Organization

Evaluating staffing across regions
- Leveraging existing partnership infrastructures (i.e. ACOs, CINs, and health plan collaboration) to track available staff across organizations

Revisiting retirees and students
- Asking to delay currently announced retirees, reviewing last two years of retirement, and evaluating local school capacity to help

Drafting staff from closed business
- As schools, sports teams, and colleges shut down, drafting trained medical personal into health system and physician practice roles

Three options for “extra” staff
1. Deploy to front line
2. Backfill other roles to free that staff to front line
3. Help train/coach/educate staff taking on new tasks

Acknowledging beyond the organization options require additional legal/regulatory steps
Taking care of staff
Early ideas from Advisory Board members

Sleep

Hotel capacity
- Acknowledging that many hotels are currently under-capacity, evaluating options to let staff rest/sleep in nearby hotels

Dorms
- For AMCs but also organizations close to academic facilities, leveraging dorms that have been emptied with school closures/shift to virtual learning

Food

Partnering with local restaurants
- Setting up delivery of food with local restaurants currently being impacted to support staff working above and beyond

Stress

Providing support for caregiving
- Child care or other primary care responsibilities are coming up as a critical issue; looking for ways to help address capacity needs (or help staff carve time to address needs)

Stagger shifts for commute, caregiving
- Recognizing larger community impact, stagger shifts at non-traditional times to avoid high volume commute times and to try and help create at home caregiving flexibility
Establish clear COVID-19 communication channels for staff
Five tips for executives

1. **Give staff a consistent source of COVID-19 truth**
   - Send messages from the *same person/email address*
   - Send messages at a *consistent cadence* – even when there’s no “new” news to report
   - Link to *centralized page* of resources on intranet

2. **Minimize non-essential emails**
   - **Centralize** the decision to send any org-wide emails that aren’t about your COVID-19 response
   - **Consolidate** any essential non-COVID-19 messages

3. **Field and respond to rumors**
   - **Set up a channel** for fielding staff rumors. Options:
     - Dedicated phone line or survey where staff can share rumors anonymously
     - “What’s the buzz?” council with frontline staff representatives from across the org
   - **Regularly publish answers** to FAQs

4. **Make yourself virtually accessible**
   - **Establish regular virtual office hours**
   - **Hold virtual town halls**

5. **Share your gratitude personally and often**
   - **Acknowledge** the challenges and uncertainty staff are navigating
   - **Recognize** the sacrifices team members are making
   - **Emphasize staff health and safety** as much as patient/family health and safety
Three things to do NOW to preempt clinician burnout

Build your organization’s “stop doing” list

• Press *pause* on as many initiatives as possible. Ask:
  – Can we push this [project, meeting, report, training] out 8 weeks?
  – If not: what’s the bare minimum we must do? Who absolutely has to be involved – and who can we release?

• Tell staff what is okay to de-prioritize

Double-down on supporting the emotional health of managers

• Remember: frontline managers have a *disproportionate impact* on both daily operations and the emotional health of their staff
• Make sure you have:
  – A *dedicated forum* for managers to share concerns
  – The list of things managers can *stop doing* so they can better support their teams

Be ready to capture and share moments of greatness

• Ensure leaders know where to *send stories* about how staff are rising to the challenge: Directly to the CEO? To a dedicated email inbox?
• *Share these stories* every chance you have:
  – Tell a *90-second story* in every team meeting about how staff are supporting patients/families/each other
  – Highlight the *wide variety of teams/departments contributing* to the response
Key questions for executives

- Do we have the bed capacity, quarantine capabilities, supplies, and emergency staffing plans we need to care for a spike in COVID-19 in our community?

- Do we have the appropriate channels in place to distribute organization-wide communication? How can we get in front of myths and misleading buzz?

- What should we be doing to educate our community and how? Do caregivers know how to care for sick family members?

- How can we be prepared to support and engage staff members so that they can take care of a COVID-19 outbreak in the community? Are there any non-traditional measures we should take to limit stress on staff members?

- Do we need to change protocols for patient visitation and facility access? How can we most effectively screen patients, visitors, and staff members coming into the hospital?

- How can we minimize unnecessary ED visits and admissions? Are there telehealth capabilities we can deploy to minimize the spread of disease and prevent additional staff exposure?
Coronavirus scenario planning guide
12 situations hospital leaders should prepare for

<table>
<thead>
<tr>
<th>FACILITY CAPACITY &amp; SUPPLIES</th>
</tr>
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<tbody>
<tr>
<td>1. Demand surge stresses capacity across inpatient units, with deepest strains in critical care.</td>
</tr>
<tr>
<td>2. Shortages of testing supplies impede ability to accurately diagnose patients and contain virus spread.</td>
</tr>
<tr>
<td>3. Local stores of prevention protection supplies are depleted, limiting the ability of hospitals to contain virus spread and protect workers.</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>STAFF CAPACITY &amp; RESILIENCE</th>
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<tbody>
<tr>
<td>4. Pronounced staff shortages among both clinical and non-clinical personnel limit effective capacity.</td>
</tr>
<tr>
<td>5. Staff across the organization experience stress, anxiety, and burnout.</td>
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<tr>
<td>6. Rapidly changing conditions necessitate that staff receive essential training and frequent, accurate updates.</td>
</tr>
</tbody>
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<thead>
<tr>
<th>COMMUNITY COORDINATION</th>
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<td>7. Emergent issues require swift coordination with other providers in the local health care ecosystem—especially primary care and post-acute care providers.</td>
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<td>8. Facility access for visitors and suppliers must be carefully managed to prevent virus spread.</td>
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<td>9. Concerned patients overwhelm access points across the system, limiting ability to identify and treat infected patients.</td>
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<td>10. Uninfected yet vulnerable populations with chronic conditions will experience gaps in care management—and underestimate their virus risk.</td>
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<th>FINANCIAL MANAGEMENT</th>
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<td>11. A disruption in the supply of drugs and other non-virus-related medical supplies—combined with sudden labor shortages—rapidly increases operating expenses.</td>
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<td>12. Sudden margin pressures and a broader economic downturn threaten medium-term financial sustainability.</td>
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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

Learning from previous outbreaks and disasters
Analyzes the lessons learned from previous viral outbreaks like H1N1 and the pandemic flu, and outlines how to prepare for the health impacts of a disaster

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

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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.

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