

# How Hospitals and Health Care Systems Can Prepare for the COVID-19 Pandemic (Boston Consulting Group, 3/16)

**Sanjay B. Saxena, MD, Senior Partner and Managing Director, Boston Consulting Group (BCG); Josh Hilton, MD, Partner and Managing Director, BCG; Brett Spencer, MD, Partner and Managing Director, BCG; Amika Porwal, Health Care Knowledge Expert, BCG**

**Contact:** Sanjay Saxena [Saxena.Sanjay@bcg.com](mailto:Saxena.Sanjay@bcg.com)

**What is the message?** Hospitals and other actors in the health system have pathways to ensure supply of labor, supplies, and space, while avoiding being overwhelmed by demand for care.

**What is the evidence?** BCG's experience working with health providers in multiple contexts.

**Timeline:** Submitted: March 14, 2020; accepted after revisions: March 15, 2020

**Cite as:** Sanjay B. Saxena, Josh Hilton, Brett Spencer, Amika Porwal. 2020. How Hospitals and Health Care Systems Can Prepare for the COVID Pandemic. *Health Management, Policy and Innovation* (HMPI.org), volume 5, Issue 1, special issue on COVID-19, March 2020.

## Preparing for the Pandemic

Healthcare providers are on the front lines of the COVID-19 fight. The virus is formidable, and the numbers are daunting. CDC scenarios suggest 2.4 million to 21 million Americans could require hospitalization [1], and based on the experience in China, roughly 5% of them will require critical care [2]. That's 120,000 to 1 million people, while current US ICU bed capacity (including all types) stands at about 100,000 [3], with 60% to 80% occupancy rates [4]. Even in a moderate scenario, we face a shortage of critical care beds.

Hospitals and healthcare systems face a second challenge, which is just as alarming. They must take care of critically ill patients while keeping their own staff safe and healthy. This could prove to be an overwhelming combination for some.

Much has been written about the necessity of “bending the curve” so that our national healthcare capacity isn't overwhelmed by simultaneous peak demand. But the fact is, dealing with an epidemic of this speed and scale will require solutions both on the supply and demand side of the equation. Making sure we have the needed capabilities in place is just as critical—if not more so—than reducing the demand for care. Moreover, managing our way through the COVID-19 crisis will not be an individual effort, but a team undertaking that will require collaboration across systems, regions, and public agencies.

## Ensuring Supply

Hospitals and health systems must develop innovative solutions to prepare for the likely constraints in labor, supplies, and space that are on the near-term horizon. It bears remembering with respect to all three that, while we are treating COVID-19, other diseases do not take a holiday. The normal pressures and stresses on hospitals, clinicians, and the healthcare system will continue.

**Labor.** To date, much of the supply or capacity discussion has focused on masks, ventilators, and ICU beds, which are critical considerations (see below), but the most critical piece of the equation is the healthcare workforce—not only physicians and nurses, but those in any patient-facing function (technicians, patient registration, and transport, for example), those in critical support functions (such as environmental services), and those with hard-to-replace skills.

Chinese health authorities and the World Health Organization reported in late February that more than 3,300 health workers in China had been infected with COVID-19. There were at least 18 reported deaths of medical workers, including nurses and doctors who died not only because of infection but also from cardiac arrest and other conditions resulting from severe fatigue [5].

In the US regions experiencing the first wave of cases in, including Seattle and the Northern California Bay Area, nurses and physicians already report feeling exhausted.

No one knows how long the epidemic will last. Hospital and healthcare leaders should start to plan now for a prolonged period of unusual demand. For many institutions, this will involve working with organized labor leaders to ensure that, while everyone is careful to meet health and safety requirements, administrators have flexibility in these uncharted conditions.

Hospitals have several well-known bottleneck services, such as diagnostic care, specialty care, and ICUs, that are scarce assets in normal times and critical in a pandemic situation. These need particular attention to limit risk to staff and special strategies to make sure they stay up and running. Specialty labor should typically be managed differently from generalist staff and reserved for the most critical efforts, since losing these skills will have an outside effect on the whole care delivery system.

Additionally, the impact of environmental services and ability to clean and put spaces and equipment back into service quickly should receive greater attention. Hospital room turnover is an operational constraint in many systems under normal conditions; the impacts of delays here will be amplified significantly with this pandemic. There is significant opportunity for innovation around the training and deployment of workers to keep sites, spaces, and equipment operational.

Providers should consider taking steps related to modularization, staff flexibility, and staff support.

- With respect to modularization, hospitals and health systems can configure care teams in a “pod-like” way. Conventional wisdom says that to drive efficiency within the nursing staff by varying staffing and using travel nurses. In a pandemic, this actually increases risk to the whole staff. Providers should consider instead organizing shifts so that affected “pods” can be temporarily removed from the system without affecting the whole workforce. The

location of COVID and non-COVID pods is a related issue (see below).

- To increase staff flexibility and ensure efficient patient flow, providers should cross-train patient-facing functions against the possibility of quarantines and school closures that affect significant portions of the workforce making it difficult or impossible for staff to get to the hospital. Affected functions may include patient registration, triage, cafeteria, and environmental services staff. Take a critical look at outsourced functions and determine which hospital-hired staff can fill in as back-up capacity. If an outsourced function goes down, can the facility continue to function? Develop rapid credentialing capabilities so that x-ray technicians and nurses that work outside the hospital can be called in if necessary.
- Viruses don't keep normal hours; hospital and health system staff are going to need support. Consider commissioning non-critical staff to provide childcare for critical patient-care staff. Ensure caregivers are practicing at the top of their license: the highest-level skills should be assigned where they are really needed while caregivers with lower-level skills take care of other patients and provide services within their competence.

The landscape of available testing platforms and the volume of tests available continues to evolve weekly as diagnostic manufacturers, commercial labs, and private labs bring new technologies and approaches online. The turnaround time for each testing approach should be a key consideration for health systems as they plan where and how to deploy what they have access to. Making critical decisions—whether triage or clinical—in the emergency department and ICU will require the fastest tests possible to ensure efficient management of operations and effective management of patient care.

As our colleagues from BCG recently wrote, the supply of masks, gowns, and other personal protective equipment is another major issue. We estimate clinicians caring for COVID-19 patients can easily go through hundreds of masks a month. Medtech industry executives estimate that Asia produces up to 50% of N95 masks, plus raw materials and fabrics for N95 masks manufactured elsewhere, as well as a large majority of isolation gowns. These supply chains are at risk. Several Asian and European countries have placed export controls on “protective apparel,” including masks, gowns, gloves, and drapes. Nonwoven polypropylene fabrics used as inputs to make N95 masks are in short supply [6].

Products used to treat acute viral illness will experience a short-term jump in demand due to COVID-19 admissions. Examples include IV fluids, IV pumps, IV catheters, and respiratory

disposables. IVD diagnostic tests for flu, respiratory diseases, and COVID-19 also will see increased demand. While many pharma and medtech supply chains have been able to largely meet demand to date from existing inventory, providers need to fully understand their supply chains and identify the top products facing potential supply issues, with a perspective on the next few months, taking into account potential more-aggressive infection scenarios [6].

The surge of cases in northern Italy has focused attention on ensuring adequate ventilator supply. The need is critical given the number of COVID-19 cases that require prolonged mechanical ventilation. Last month, the Center for Health Security at Johns Hopkins estimated the United States has a total of 160,000 ventilators available for patient care, plus at least another 8,900 in the national stockpile [7]. However, unlike hospital beds, there is no definitive count of ventilators in any given region. In the event of a significant surge in cases, there is currently no easy way for health officials to know the supply that they can mobilize from hospitals in less affected areas or from such sources as freestanding ambulatory surgical centers, transport vents, and pediatric vents.

One potential solution is for systems to work out plans for community pooling of capital equipment resources such as infusion pumps and ventilators to meet shifting demand. This could involve physically moving equipment to current centers of high demand—from Minneapolis to Seattle, for example—and then back again, or elsewhere, as the spread of the disease warrants. While there are number of issues surrounding their application in this situation, utilizing home ventilators may also be part of the solution.

Clinicians may also need to consider strategies to negate or delay the need for mechanical ventilation [8]. Case reports from Wuhan suggest that the use of BiPAP or continuous positive airway pressure (CPAP) equipment may delay the need for intubation and reduce ventilator demand [9]. Unlike ventilators which are difficult to procure, home CPAP machines could be readily obtained for hospital use and, if proven clinically effective, they could buy critical time for some patients in the event of acute ventilator shortages. Developing and deploying non-invasive ventilation strategies for COVID-19 should incorporate lessons learned so far from this pandemic as well as treatment effectiveness in prior influenza cases, such as H1N1.

**Space.** We have to assume that beds in hospitals, ICUs, and isolation wards will soon be at a premium. This puts a premium on planning.

Physical spaces must operate at the top of their license as well, which means using ICU beds only for the critically ill, and not for isolation, and promptly moving patients who no longer require intensive care to other sites. Management must think about all spaces in the health system and how they can be best used, including routine clinics, ambulatory care centers, and urgent care facilities. Underused hotels, which may be available due to lower travel, can present an option for extra capacity, especially for patients with noncritical conditions.

Providers may also want to investigate modularizing physical locations to separate COVID from non-COVID patients and staff. They should begin exploring HVAC strategies for creating more negative pressure wards that keep germs from spreading, as Evergreen Hospital in Kirkland, Washington, which had the country's first fatal case of COVID-19, has done.

Virtual ICUs, in which intensive care specialists provide care remotely, and modular or mobile clean rooms, which expand critical capacity quickly, could be important parts of the space solution for many providers.

## Managing Demand

The implications of an overwhelmed healthcare system, in which resource rationing may become necessary, can impose both operational and ethical dilemmas. This has already become an issue in Italy and other places. Providers won't be able to address demand on their own; they will require support from government leaders and health authorities. They will also need to work with these authorities on containment measures.

Here are some ways in which hospitals and health systems can help manage demand.

**Steer New COVID Cases to the Best Diagnostic or Treatment Place.** The first step will be about putting sick people in the right care setting. Patients understandably will be anxious, even panicked, but the experience of other countries shows that many cases are mild or non-life threatening. Providers should develop strategies for keeping worried but mild-symptomatic people out of hospitals using digital and decentralized triage approaches. For example, Singapore has actively directed patients looking for testing away from primary care sites to designated testing centers, which preserves both precious delivery capacity and scarce infection prevention supplies.

Telemedicine, using both formal and informal consumer video and social media platforms, can help guide patient decision-making in the early stages of illness or when symptoms are mild. Hospitals should investigate using local clinics and urgent care centers as designated triage sites. EMS staff can be trained to manage community populations and keep noncritical patients at home, or take them to designated triage facilities, rather than bring them to the hospital.

**Use Diagnostic Resources Effectively.** Health systems need guidelines for their lab facilities on what constitutes essential and nonessential priorities. Clinicians and the public both need clear information and communication on where to go for care and when and what and will be tested and when. Communications need to be carefully coordinated between hospitals and health systems and local and regional health authorities. Rapid deployment of digital tools and telemedicine solutions, temporary relaxation of rules for quicker digital engagement, and upskilling of personnel who can use these tools can all help. Larger systems can work to increase staffing capacity and hours at urgent care centers as a first point of contact for less critical cases.

**Actively Manage Non-COVID Needs.** Other diseases will compete for attention, capacity, and resources, even as providers move to deprioritize nonessential care and procedures. Managements and clinicians will need to make decisions on this balance daily, or even hourly. Within larger systems, providers can allocate hospital space by moving lower acuity patients out of higher acuity settings. Across systems, regional bodies can analyze where excess capacity exists and consider grouping patients in facilities by acuity level. They can also investigate activating additional capacity by reopening recently closed hospitals and hotels, as occurred in Kirkland, or by using nearby military bases.

## Addressing Other Factors

Many of the supply and demand moves suggested above could push the envelope of current legal and regulatory guardrails. Governments and policy makers will need to develop guidance on how to think about these in context of doing what's right for the patient in unprecedented times. Providers, which have more immediate concerns, should not spend their time second guessing what to do or limiting innovation. The declaration of a national emergency should help, not only by freeing up resources but also by allowing the Secretary of HHS and other federal agencies to bypass certain regulations and provide more flexibility for hospitals and physicians.

There may be ways to extend or improve the efficiency of care through greater community or regional collaboration. While such initiatives are certainly being contemplated by governments and health departments, individual health systems should also be actively thinking about how to collaborate or partner with others on the front end of this crisis. Pooling resources is complicated requires management multiple issues set of issues, among them:

- Access to medical records and systems by nonemployees
- Sharing nursing pools if nurses are not trained on another hospital's systems
- Communication to employees in pooled groups such as via email and phone
- Sharing ventilators and pumps of different brands, which can require training on how to use them

The allocation of resources in such arrangements can be challenging as well. Keeping track of how many beds, patients, or nurses are in any given location, and communicating to the front lines about where to send people, depending on the severity of their conditions, becomes a task with dynamics similar to emergency dispatch.

## Looking Forward

All that said, the risk mitigation and planning that healthcare providers undertake now will undoubtedly have positive effects on their readiness for this and any future pandemics. The US health system and other stakeholders have the resources they need to respond well. We all must use those resources effectively and in a coordinated manner, both as individuals and as parts of the system.

## References

[1] Fink, S. Worst-Case Estimates for U.S. Coronavirus Deaths. The New York Times. 2020 March 13. Available from:

<https://www.nytimes.com/2020/03/13/us/coronavirus-deaths-estimate.html?referringSource=articleShare>

[2] Specht, L. What does the coronavirus mean for the U.S. health care system? Some simple math offers alarming answers. Statnews. 2020 March 10. Available from:

<https://www.statnews.com/2020/03/10/simple-math-alarming-answers-covid-19/>



[3] American Hospital Association [Internet]; c2020 [cited 2020 March 14]. Available from: <https://www.aha.org/statistics/fast-facts-us-hospitals>

[4] Wunsch, H., Wagner, J., Herlim, M., Chong, D., Kramer, A., Halpern, S. ICU Occupancy and Mechanical Ventilator Use in the United States. *Critical Care Medicine* [Internet]. 2013 December [cited 2020 March 14]. Available from: [https://journals.lww.com/ccmjournal/Abstract/2013/12000/ICU\\_Occupancy\\_and\\_Mechanical\\_Ventilator\\_Use\\_in\\_the.6.aspx](https://journals.lww.com/ccmjournal/Abstract/2013/12000/ICU_Occupancy_and_Mechanical_Ventilator_Use_in_the.6.aspx)

[5] Su, A. Doctors and nurses fighting coronavirus in China die of both infection and fatigue. *The LA Times*. 2020 February 25. Available from: <https://www.latimes.com/world-nation/story/2020-02-25/doctors-fighting-coronavirus-in-china-die-of-both-infection-and-fatigue>

[6] Farber, A., Aylor, B., Rosenberg, B., Danger, T., and Schulze, U. Critical Priorities for Pharma and Medtech in Response to COVID-19. Boston Consulting Group external publication. 2020 March 11. Available from: <https://www.bcg.com/publications/2020/coronavirus-critical-priorities-pharma-medtech-response.aspx>

[7] Wan, W., Cha, A., Sun, L. This is the coronavirus math that has experts so worried: Running out of ventilators, hospital beds. *The Washington Post*. 2020 March 13. Available from: <https://www.washingtonpost.com/health/2020/03/13/coronavirus-numbers-we-really-should-be-worried-about/>

[8] Hick, J. L., D. Hanfling, M. K. Wynia, and A. T. Pavia. Duty to Plan: Health Care, Crisis Standards of Care, and Novel Coronavirus SARS-CoV-2. *NAM Perspectives*. Discussion paper. National Academy of Medicine. 2021 [cited 2-2- March 14] Washington, DC. Available from: <https://doi.org/10.31478/202003b>

[9] Wang, D., B. Hu, C. Hu, F. Zhu, X. Liu, J. Zhang, B. Wang, H. Xiang, Z. Cheng, Y. Xiong, Y. Zhao, Y. Li, X. Wang, and Z. Peng. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA* [Internet]. 2020 [cited 2020 March 14]. Available from: <https://doi.org/10.1001/jama.2020.1585>