

COVID-19: The Path Forward



As a healthcare architect and planner with a bent towards systemic thinking and innovation, I can't help considering the long-term effects of the challenges currently impacting healthcare systems across the world and imagining how healthcare environments might change in response over the coming years.

Healthcare capital investment projects take a long time to plan, finance, design and build, so the time is now to begin thinking through these impacts—and to begin preparing for what could be our “new, new normal” as we emerge from this current crisis. Much as Sept. 11 was a bellwether event for the design of airports, COVID-19 is likely to radically alter healthcare delivery in the years to come, and with that, the physical facilities that support that care. Here are several ideas we must all consider.

Motivation from financial crisis

A dramatically new financial calculus has emerged, as the grave socioeconomic impacts of “flattening the curve” become clearer. A *Harvard Business Review* article titled “[Understanding the Economic Shock of Coronavirus](#),” published March 27, describes the unprecedented financial situation developing around the globe. To the degree that the lack of surge capacity and flexibility within our healthcare system infrastructure is implicated in contributing to the harsh restrictions to economic activity that have been put in place to slow this pandemic, we simply cannot be caught flat-footed in this way again.

When we recover from the current crisis, as we eventually will, there should be a great deal of political will to avoid a similar experience in the years to come. “Raising the line,” or the emergency capacity and flexibility of the infrastructures that support our healthcare systems, will require spending to

buttress them in significant and transformative ways.

Evolving planning parameters

Right now, healthcare systems across the country and around the world are temporarily modifying their existing facilities to accommodate capacities and types of patients that were not anticipated when they were designed.

Though newer facilities have been designed with much more flexibility, both related to patient acuity and infectious patient isolation, older facilities are less likely to enjoy those advantages. In the near term, retrofitting our existing healthcare facility assets—both new and old—to provide more ready flexibility might be the most obvious change in investment priorities that we are likely to see.

More significantly, however, the lack of overall surge capacity within healthcare systems has presented the most pressing challenges. Almost daily, we are hearing about plans to leverage convention centers, hotels, and dormitories to accommodate patient volumes in the coming weeks and months. Solving our capacity problems won't be easy, nor will it be limited to simply building more intensive care and other inpatient units.

Scientific and technical advances of recent years, such as telehealth and safer disease treatment that can occur at home or at lower-acuity care sites, should be implemented to the maximum extent possible.

Population health management services should be expanded and socioeconomic factors mitigated, lowering both susceptibility to poor outcomes and overall dependence on strained healthcare systems. Overall, wellness and disease prevention should be our first line of defense. These measures will reduce the strain on our highest acuity care sites, thereby creating some excess capacity without requiring additional capital investments.

That said, these measures alone will not solve our need to maintain substantial additional surge capacity to better prepare for future pandemics.

Additionally, with many infectious patients needing isolation from other patient populations as well as access to intensive care, the type and configuration of hospital infrastructure also will need to adapt.

With an ever-expanding world population and increasing density in cities around the world, new diseases that continue to emerge will test our preparedness, and additional capacity able to handle future pandemics will be needed—but hopefully not all the time.

Infrastructure funding

With the overall impact to our economy and society from COVID-19 fresh in mind, constructing and equipping hospitals to accommodate excess surge capacity may be considered within a different financial calculus than has previously been imagined.

Political will could develop at the federal level to support new investments in our healthcare infrastructure. Similar to the Hill-Burton Act, passed in 1946 in the shadow of World War II, the federal government could determine that an influx of funding is warranted to support hospital construction and modernization, leading to improved system capacity, resiliency, and flexibility in preparation for future crises.

As good stewards of their communities' resources, and under financial pressure to drive down costs even as healthcare consumer expectations rise, healthcare systems are normally quite fiscally conservative with regard to infrastructure investments. They aim to build, as nearly as possible, only the appropriate amount of infrastructure needed to adequately serve their patient populations, with a nominal capacity margin meant to ensure that facilities are always available to serve incoming patients under normal circumstances.

However, the cost of original construction of new healthcare facilities represents only a small fraction of the overall life cycle cost of such facilities. As such, "overbuilding" some amount of space to support surge

preparedness may take on a new luster—especially if federal dollars become available to support construction of surge-adaptable facilities.

Designing for inpatient and ICU surge capacity

Surge-ready space can be built into hospital infrastructure in relatively economical ways by thoughtfully considering capacity-driven adaptation needs in proactive ways.

Designing outpatient facilities to be inpatient ready

- Facilities designed to accommodate outpatient uses, but that are attached to an inpatient chassis, can be built to hospital life safety and basic construction type specifications, enabling their quick and code-compliant conversion to inpatient uses.
- Uses that occupy larger open areas, such as rehabilitation or open office space, would facilitate quick conversion to inpatient uses by leveraging prefabricated flexible wall systems to build out these open areas when needed.
- Inpatient-capable MEPT systems could be integrated into such facilities, designed to ramp up to serve inpatient needs in these cases through rapid deployment of temporary head-end equipment such as medical gas tanks and emergency generators.

Acuity-flexible patient rooms

- More commonly in use already, acuity-adaptable rooms may become the default preference for all hospital rooms, with many more patient units designed to support flexible uses including their deployment as infectious disease isolation units.
- By incorporating appropriate bed clearances, medical gases, HVAC provisions, and other code-driven enhancements necessary for acuity-adaptable rooms, hospitals can drive down life-cycle costs related to converting facilities to serve the ever-changing medical and surgical needs of their patient populations, including the increased need for ICU

support that we are witnessing with COVID-19.

- By incorporating such things as anterooms, enhanced patient visualization strategies, highly durable materials, augmented technology, enhanced HVAC flexibility, unidirectional material flow and sterilization capabilities, patient units will be better prepared to handle future spikes in infectious patient volume, specifically.

Designing for low-acuity extended stays

Hospital administrators are already challenged to find facilities able to receive patients who no longer require the services of a hospital but who do need long-term rehabilitation or skilled nursing care. These facilities could be unable to accommodate patients recovering from novel viruses such as COVID-19, not knowing if they may remain infectious and, therefore, a risk to other residents.

Related, additional low-acuity hospital capacity may also need to be augmented, as these patients' stays could be extended.

A need for more low-acuity hospital inpatient beds might also be realized in the future simply due to our aging population. With more seniors needing more acute care services, skilled nursing could become more commonly integrated into hospital settings.

Careful planning can accommodate both potential eventualities, and life-cycle cost analyses may prove that these are good investments over the long term, knowing what we know now.

To accommodate low-acuity patient surges, patient rooms could be designed to accommodate two patients, when needed, by building them slightly larger and by outfitting each room with excess medical gas outlets, lighting controls, and electrical and data connections.

Maintaining safety, starting at the ED

Emergency departments, the point of entry for many patients seeking to gain

access to medical care, may introduce new design parameters, as well, including:

- Entry and triage sequences that more quickly and easily allow infectious patients to be separated from other ED patients and families
- More discreet and sub-divided waiting areas, leveraging contemporary audiovisual and other interactive technologies to maintain line-of-sight and communication pathways
- Additional infection control measures, including augmented mechanical systems
- Separate pathways to intensive care units, to minimize cross-contamination
- Full compliance with inpatient regulatory standards, rather than ambulatory standards.

Ambulatory and clinical facility impacts

Finally, ambulatory care sites, urgent care centers, and primary care practices may all experience the impact of new design thinking related to inpatient surge capacity, as well:

- Future ambulatory care facilities may be designed to function in acuity-adaptable ways, allowing health systems to deploy them as low-acuity community hospitals when they need to accommodate surging volumes of higher acuity or infectious patients at their main inpatient care sites.
- Urgent care sites may be outfitted with drive-through windows or exterior-access exam rooms, to permit infectious or “worried-well” patients to be tested in a socially distanced manner, while still allowing patients to gain access to an in-person care provider.
- Exam rooms in all of these facilities may be more flexibly designed to accommodate both in-person visits and telehealth services, with an integrated, ergonomically correct provider work area incorporated.

History as prologue

Having previously taught a graduate course in the history of healthcare

architecture within the Kent State University Elliot Program for Healthcare Design, I have a keen understanding of the radical transformation that healthcare facility design has witnessed over the past few centuries.

Following the arc of innovation in the profession it serves, I would offer that radical transformation within healthcare architecture as a result of our collective experience with COVID-19 is not only plausible but also highly likely.

We live in a rarefied moment in history where access to phenomenally powerful medical care is taken for granted in much of the First World. The Spanish Flu of 1918 occurred before we had become accustomed to our modern-day sense of relative safety from the horrifying impacts of infectious diseases. Penicillin was not discovered until 1928. The COVID-19 challenge is laying bare how much we count on that sense of safety for the health not only of our bodies but also of our communities, economies, and society at large.

Our hospitals and other care sites stand in physical, ever-present testimony to that safety. Capacity limitations pervasive within healthcare infrastructure around the globe have been uncovered by COVID-19 and must be addressed. Innovation and transformative design thinking within the healthcare architecture community, in partnership with our inspiring clients, will play a crucial role in restoring our collective sense of safety over the coming years through improvements to that infrastructure.

In the meantime, I am grateful for, and inspired by, the dedication, creativity, collaboration, and care that I am seeing every day among our healthcare system client partners as they rise to this current challenge. I anticipate that they will emerge that much stronger and more resolved to do their best to care for their communities through any additional future challenges that may come. Stay safe out there, and thank you for all you do.

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