CRTKL ON THE FRONT LINES OF CRISIS RESILIENCY





Short term solutions: Exploring alternative care sites and conversion issues to consider

Adventist HealthCare White Oak Medical Center Silver Spring, MD

AN ARCHITECT'S VIEW

The job of an architect is to design buildings, create space, and improve experiences. Our responsibility, however, is to protect the health, safety and welfare of the people that use our buildings. These are the very things that have come under attack with the dawn of the Coronavirus (COVID-19). Some areas have been impacted more than others, but the fallout from the virus has impacted everyone around the world in one way or another. We hope to learn from our friends in China, Italy and South Korea on how to best prepare for the worst as infection rates are spiking, causing a crippling surge on healthcare systems as we reach capacity. The somber truth of the matter is that if we are unable to treat the sick, patients will become sicker and mortality rates will increase.

What are hospital facilities doing to prepare right now? What are best practices to prepare for the unknown scope of what's to come? What are short-term solutions to address capacity issues? Are pandemics considered when hospitals are designed? You bet they are. As a healthcare designer, I want to weigh in.

We hope that all the measures individuals are taking to manage their health for the sake of themselves and others will "flatten the curve," but as creative problem solvers, we are hoping to enter the conversation at the right time to be most impactful.

6,146 hospitals in the US are preparing for a pandemic. Source: AHA



THE CAPACITY ISSUE **EXPLAINED BY A HEALTHCARE DESIGNER**



5% of patients directed to an ICU



50% of those patients required a medical ventilator

Source: The New England Journal of Medicine

Before we jump in to solutions, let's first touch on why there's a hospital bed shortage and what that actually means. When we talk about capacity, we are talking about hospital space, available equipment, and trained staff.

If the demand continues to increase as some models *predict*, we suspect that bed capacity could reach its peak and many fear we will run out of ICU beds. A study, reported by The New England Journal of Medicine, concluded that only five percent of patients were directed to an ICU and half of those patients required a medical ventilator. The models indicate, however, that without flattening the curve, many more will contract the virus and that could cripple the healthcare system as it stands today. As infection rates spike, hospitals will be forced to absorb

Some ask why the need for ventilators and ICU beds? The COVID-19 virus is a lower respiratory infection causing fluid to build up in the lungs. Ventilators are used to help patient's patients breathe by pushing air in the lungs and

forcing the fluid out, while at the same time removing carbon dioxide. In severe cases, the virus could cause pneumonia, acute kidney failure, or acute heart failure. In such case, an ICU would be necessary with the right level of equipment and care team, comprised of intensivists, critical care nurses, respiratory therapists and other health care professionals. The team could also include infectiousdisease specialists, critical-care specialists, cardiologists and pulmonologists. As elective surgeries decrease as recommended by COVID-19 task force teams around the nation, there will be more nurses, and physicians and facilities available to help with the potential surge.

the critically ill and move less-acute patients to other types of rooms or facilities. Here's how that will break down.

In a hospital there are usually **three levels** of care when it comes to patient beds, or patient rooms. The most

acute and first level of care is the ICU. These rooms are If the ICU is full, the less acute patients in that unit would large and equipped to monitor patient vital signs, assist roll down intermediate care. Intermediate care patients patient breathing, pump blood or deliver nutrition and/ would step down to general acute care. If capacity is or medication. The equipment and monitoring systems reached, the least critical patients would be deferred to are connected to emergency power with UPS backup, and another facility or even non-traditional sites of care. As multiple medical gas services will support patient care. neighboring facilities reach capacity, they would send them to the next county or state, and the cycle repeats. You can The second level of care is referred to as Step-Down Units see how the ripple effect could impact not only the most (also commonly referred to as intermediate care units populated cities but also surrounding communities.

or transition care units). The third level of care, the most common in hospitals for the lowest acuity patients, is referred to as general acute care medical-surgical units.



Source: https://www.stern.nyu.edu/om/faculty/armony/research/StepDownUnit.pdf

Tied to 20-35% of hospital operating costs*

LEVEL 3 General

General **Acute Care**

Smallest footprint Least equipped

LEVEL 2 **Step Down** Unit

Step Down Unit

Bed size same as ICU Equipped for heavy monitoring Less personnel demand

WHAT ARE WE DOING **RIGHT NOW?**

Over the past decade there have been indications that the general inpatient bed demand was going down while the need for ICU beds was increasing as our population was aging with more complicated care needs. Many hospitals have moved toward the use of flexible, universal rooms that allow various levels of care to happen in the same room type with little modifications, a big advantage in the event of a pandemic like we're seeing today.

As architects and planners, work closely with clinical leadership to plan for disaster preparedness. We design spaces and manage operational flows for forward triage ahead of the emergency department. We can creatively use spaces that exists within hospitals to serve as patient care spaces. We can help activate and bring spaces online as part of the local hospital team, and we can also look for other solutions like adaptive reuse to solve the problem if patient volumes exceed the capacity of current facilities.

Here are a few examples.



The US Department of Defense is known for disaster planning. With the U.S. Army Corps of Engineers, CRTKL completed the 767,000-square-foot San Antonio Military Medical Center (SAMMC) project, now the largest Department of Defense inpatient facility and home to the DoD's only Level 1 Trauma Center and Global Burn Center of Excellence. The building includes inpatient facilities, a new E.D., and the DoD's first Blackhawk-friendly rooftop helipad. With a mass casualty strategic plan in place, the adjacent 5000-car garage was designed to have taller floor-to-floor heights to accommodate temporary staging and mobilization in case of emergencies.



In Poughkeepsie, New York, our client Nuvance Health is preparing for the potential surge at their <u>Vassar Brothers</u> Medical Center. CRTKL designed a new 696,440-SF addition that will house 290 private patient rooms with a new emergency department and other key spaces to modernize the existing facility. The project is currently under construction, but with the COVID-19 crisis looming, the design and construction team was asked to bring the E.D. online ahead of the overall facility. Temporary occupancy and separate flows into the existing hospital will help manage triage, testing and treatment.

Maryland is also seeing cases rise and is planning for additional bed and treatment facility capacity, and the state has asked Adventist Health and other local health systems to help answer the call to prepare for the worst. In 2019, Adventist HealthCare Washington Adventist Hospital relocated within its previous service area, from Takoma Park, MD to the White Oak section of



Montgomery County with a new 472,947 SF acute care acceleration of construction of the new facility, OneEQ and medical campus designed by CRTKL. Future vertical is currently advising their client in the Pacific Northwest how to strategically mobilize a temporary, mobile army expansion was planned for additional bed floors, and subsequent to the occupancy construction began. The surgical hospital (MASH) tent. concrete has been poured on two levels and, at the recent request of state healthcare authorities, a third level is now There's no one-size-fits-all solution here and our current being added to bring additional beds online early. Our situation is evolving day by day. But it's important to know which levers to pull when it's time to make a decision and team has mobilized to design the fit-out of those floors, and the beds will be online July 2020. In addition to the how the design community can help.



The US population of 75 + will grow by 5 million people in the next 5 years

Source: Marcus & Millichap



In 2034, older adults are projected to outnumber kids for the first time in US history

Source: US Census



SHORT TERM SOLUTIONS: EXPLORING ALTERNATIVE CARE SITES AND CONVERSION ISSUES TO CONSIDER



Currently over 400 Hotels with 100+ rooms that are for sale in the US

Source: CoStar

There are many creative people around the world trying to solve this problem, and CRTKL designers are among them. We have a multidisciplinary approach to helping our clients solve their problems, which in many cases aren't confined to architectural solutions. We draw from expertise in hospitality, retail, residential, commercial and health to challenge standard approaches by looking for creative mashups. If beds are what we need, then what other typology could be transformed to accommodate the pressing?

- Hotel to Hospital-Repositioning hotels from luxury to healing.
- Shopping Center Healthcare-Assets in the heart of our communities become places of healing.
- Residential Healthcare- Rethinking home health.
- Convening for Care- How to transform open event spaces into emergency care facilities.

While these ideas solve the space constraint problem, it's important to analyze what it would take for them to operate as healthcare spaces, especially from a systems and equipment perspective. Eric Granzow, P.E., F.P.E., LEED AP, HFDP, CEM provided input relative to the mechanical and electrical issues we may face. Eric is an Associate Principal with Specialized Engineering Solutions (SES) and is one of 20 elected board members for ASHRAE Standard-170, a group that provides guidance on ventilation requirements for healthcare facilities.



9,300 retail stores closed in 2019 creating opportunities for other uses in shopping centers

Source: Business Insider

"In the case of alternate care sites, you would not want to mix COVID-19 patients and noninfected patients because you risk cross contamination. It is too hard to isolate the airborne pathogens without the more advanced HVAC systems," Granzow shares. "There are, however, portable recirculating air units that can be connected to HEPA filtration that will pull the airborne virus, which is





in droplet form or is attached to a particulate out of the air. Additional UV systems that ionize the air, inactivati viruses, may also be a solution, although that has not b tested for this specific virus."

Even though the CDC is not mandating negative airflow it is still good practice to move air in a negative way to protect the care team, other patients, and staff. In the of hotels, most corridors are supplied with fresh air and guest rooms have individual in-wall units managing the flow of air in and out of the room.

If we can manage the case load, these alternate care sites can be used for the lower acuity patients that don't need access to ventilators or higher levels of care. However, if we are planning for an emergency setting, we will want to make extra provisions. For example, medical gasses and suction would be provided by portable cylinders and mobile equipment. Other equipment, for example, requires back up power with an emergency generator:

GUEST / INPATIENT FLOORS

е	•	Patient Bed
ing	•	Patient Monitoring: Acute care physiologic
been		monitoring system, Pulse Oximeter, Apnea Monitor-
		measures heart rhythms (EKG), blood pressure, body
		temperature, oxygen and carbon dioxide levels in the
W,		blood, respiratory rate and your breathing efficiency.
case d e	•	Infusion Pump: Delivers IV medicines and fluids
	•	Crash Cart: Emergency resuscitation equipment including a defibrillator, resuscitation bag for manual airflow, airway intubation devices, and medication



WHAT IS **NEXT?**

Pandemics are nothing new. COVID-19, however, is a transformative event that has us all wondering how long it will last and what our world will look like post-crisis. We all hope a vaccine and a cure will be found quickly and that the measures outlined above will not be needed. At some point, we will return to life outside the home and beyond self-quarantines, as we long for social exchanges, face-to-face commerce, and other interactions we took for granted. Perhaps we will enter our communities with a greater focus on healthy lifestyle choices. During this crisis we can dream of a better and healthier future as we hit the reset button.

The goal of our health providers is not only to treat us, but to make us more conscious about the choices we make which impact our individual and community health. What we are witnessing with quarantines and shelter in place orders is proof that we're all in this together. It's proof that our actions affect others. It's proof that communities can work together for the greater good.



Jim Henry, AIA, NCARB, EDAC

Senior Vice President

Jim Henry is leading both the wellness initiative and the global healthcare practice of CRTKL. His extensive portfolio brings nearly 20 years of architectural experience reflecting his commitment to designing physical environments that enrich lives and promote the humanistic principles he strongly values. Jim is an award-winning architect with recognition both in leadership and design. He strives to bring visionary leadership and design to every project opportunity. His ability to help deliver award winning projects that exceed the client's expectations are a reflection of his ability to connect big ideas and clients vision with his passion for great design.

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