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ADAPTABILITY AND FLEXIBILITY

How Flexible Healthcare Infrastructure Will Be Key to Fighting COVID-19

HMC Architects HEALTH-CARE

Faced with an insurmountable burden due to the COVID-19 pandemic, healthcare systems have experienced an unpreceded impact to their bottom-line operating expenses and have stretched abilities to provide care to their patients.

The impacts were so significant that the American Health Association (AHA) reported that hospital systems have collectively lost over $200 billion from March through May and are estimated to lose up to $350 billion through the end of 2020.

During this time period, lost revenue from elective procedures, additional costs for staff training and overtime, and the costs of additional personal protective equipment (PPE) to protect staff have placed our health providers in a vulnerable spot.

HMC Architects has specialized in the planning and design of healthcare spaces for the last 80 years. Through the lens of research, we are exploring the pandemic as an opportunity to learn, reinvent, and most importantly help our clients amid this crisis, and their financial hardship.

As part of this ongoing research effort, we are committed to sharing our findings with the industry on five main areas of Technology, Adaptability and Flexibility, Regulatory/ Budgetary/Institutional Impacts, Space Needs Restructuring, and Impact to Wellness/ Mental Health. In this article, we are discussing Adaptability and Flexibility as it relates to the healthcare sector.

FLEXIBILITY AND ADAPTABILITY

Providing flexibility of design within healthcare spaces is a key goal for planners and operators that need to respond to evolving practices, medical equipment changes, and the existential crisis of COVID-19.

Hospital campus designs have traditionally been built around a central core of buildings developed over decades, making them difficult to adapt to modern care and infrastructure needs due to low floor-to-floor heights, tight column grids, and older mechanical, electrical, and plumbing (MEP) or information technology (IT) systems that cannot be modified easily or economically. Continuous operations of core functions within older parts of a healthcare facility also presents challenges to modifying departments and rooms.

Nursing units and patient rooms have traditionally been designed for a specific programmatic need or acuity level. For example, a medical-surgical patient room serves a specific segment of patients without the ability to convert to a higher use, such as

UHS Corona Emergency Department, HMC Architects

intensive care unit (ICU) care. Further, they have been constrained by minimum room size, clearances, gas services, and air change needs. The compartmentalization of units that limit size by function is a significant factor that limits future adaptability.

Emergency departments are similarly constrained and a challenge to remodel given their 24/7 full-time use. The recent impact of surging COVID patients and their screening has required departments to rethink strategies for triaging patients outside the facility. As surge volumes cause some facilities to place patients in corridors, procedure rooms, or other spaces that were not designed for that purpose, they are also rethinking how to separate infectious patients from non-infectious patients and families in the department and in waiting rooms.

While medical office buildings are not as constrained by hospital regulations, stricter MEP requirements, and hours of use, they too are challenging to adapt given hard wall construction and integration of services within the walls.

What the pandemic has revealed so far is that air quality and negative pressure capable MEP systems are key to managing airborne diseases and must be evaluated for their ability to switch on and off based on specific health requirements

So, how do these spaces, departments, and their related services accommodate change to be flexible and adaptable going forward?

Flexibility and adaptability of healthcare spaces, now more than ever, needs to be planned from the beginning. The following are strategies to consider:

- “Modular planning” - rooms that utilize standard dimensions that allow conversion to a different room type.
- The development of optimal column grids that can accommodate various programmatic room types.
- Larger infrastructure pathways for future technologies that are not currently required.
- Movable, demountable partitions that can be reorganized into different spaces.
- Providing “soft” spaces, such as administrative offices and conference rooms, adjacent to diagnostic rooms to accommodate growth.
- Build in surge capacity within the emergency department to convert conference and office space to accommodate patients.
- Convertible MEP systems that can flex between positive and negative air pressurization.
- Acuity adaptable spaces that can accommodate different levels of care.
- Flexible circulation that can allow for separating infectious areas from non-infectious ones.

During the pandemic we saw the following changes and impacts to patient care facilities:

OUTPATIENT FACILITIES

> Ambulatory care centers will be designed and constructed with the anticipation that inpatient use may be required in the future.

Short Term

- A significant shift to telehealth due to the temporary closure of outpatient clinics – some facilities saw an 80 percent shift during the height of the pandemic and have a goal of reducing that to 50 percent.
- Use of outpatient centers as COVID treatment and testing facilities.
- Under the "Hospitals without Walls" initiative, Centers for Medicare and Medicaid Services (CMS) relaxed certain conditions of participation (CoPs) and provider-based rules for hospital operations. This allows hospitals to screen patients at off-site locations and furnish inpatient and outpatient services at temporary expansion sites.
- Inpatient services – when moved off-site – are primarily housed in ambulatory surgery centers which are better equipped to offer the full complement of inpatient needs, such as access to medical gas, medications, and clean supplies.
- Outpatient surgery centers will be allowed to treat patients with other critical needs—such as serious injuries, cancer, or heart attacks—unrelated to COVID-19, allowing hospitals to conserve scarce resources and reduce the risk of infection to these patients.
- Patient temperature and symptom screening upon arrival. This is sometimes done remotely via a QR code to scan at entry.
- Ambulances will be allowed to transport patients to outpatient surgery centers, community mental health centers, federally qualified health centers, physician's offices, and urgent care facilities.

Long Term

- Centralized management protocols for facilities to ensure pandemic-compliant operations and cleaning and maintenance protocols to ensure consistency across the enterprise.
- Patient and visitor temperature and symptom screening upon arrival.
- Continuation of high-percentage utilization of telehealth, requiring institutions to think critically about workflow, scheduling, and provider accommodations throughout the normal business day.
- Ambulatory care centers will be designed and constructed with the anticipation that inpatient use may be required in the future. This would include things like providing access for temporary emergency power, access to medical gasses, larger rooms to accommodate stretcher-bound patients, or the ability to provide negative pressure isolation rooms.
- Redesign or refurbishment of typical exam rooms to flex between exam/treatment and telehealth.
- The creation of telehealth "cubbies" to provide dedicated spaces for virtual care.
- Limiting the number of visitors to one or two supporting family members.
- Greater focus and implementation of touchless technologies, especially in the intake process. Include cell phone scanning, real-time location systems (RTLS), and "self-rooming" technologies.

> Reducing or eliminating on-floor waiting and family areas, and implementing just-in-time notification systems, to minimize infection risk.

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CONVERSION OF MEDICAL-SURGICAL TO INTENSIVE CARE UNIT

Short term

- The temporary conversion of medical-surgical rooms for use as a COVID ward.
- Providing portable high efficiency particulate air (HEPA) filtration units through a window to change air quality and flow.
- Increased use of PPE and storage needs on the floor.
- Increased signage identifying controlled risk areas.
- Adjustments to MEP systems to change to negative air pressurization.
- The temporary relaxation of codes and licensing requirements to transition to infectious disease units.
- Designation of floors or regions as separate infectious areas within the hospital, with limited access.

Long Term

- A strong IT backbone to support increased telehealth and other home-health solutions.
- Higher degree of acuity-flexibility planned for key rooms. For example, medical-surgical rooms designed to be ICU-capable or post-anesthesia care unit (PACU) rooms designed to be medical-surgical capable.
- All waiting areas and public spaces converted to negative pressure or 100 percent exhaust.
- Conversion of heating, ventilation, and air conditioning (HVAC) systems serving inpatient units to become full isolation wings in cases of emergent need.
- Community-coordinated disaster preparedness plans requiring healthcare organizations to have a joint plan of action if mass triage and care coordination is required in future.
- Acuity-adaptable room designs that can accommodate any level of care within the facility
- Reduction or elimination of on-floor waiting and family areas and implementation of just-in-time notification systems, to minimize infection risk.

> Higher degree of emergency planning is in place to convert exterior spaces such as parking lots or parking garages into mobile care units.

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EMERGENCY DEPARTMENTS

Short term

- Implementation of exterior pods or tents to screen patients.
- Limitation on the number of visitors with a patient.
- Separation of infectious patients in the waiting rooms.
- Designation of infections areas, or pods, within the department for separation.
- Modifications of air systems to negative pressurization.
- Patients moved from crowded emergency rooms, to off-site locations to be evaluated by emergency health care providers using telemedicine.
- If state law allows, physician assistants and nurse practitioners can order tests and medications that may have previously required a physician's order.
- Certified registered nurse anesthetists will no longer have to work under the supervision of a doctor, freeing up physicians to focus more on patients and less on supervising.

Long Term

- Procurement of modular or mobile structures that can be rolled out to the community on an as-needed basis to perform mass-triage.
- Higher degree of emergency planning is in place to convert exterior spaces such as parking lots or parking garages into mobile care units. Redesigning permanent site circulation and running utilities to these future locations so mass conversion can occur quickly and seamlessly.
- Exterior portals for screening of patients that consider negative pressure air and PPE equipment stores.

FRONT DOOR ENTRY/ WAITING CONFIGURATION

Short term

- Implementation of exterior pods or tents to screen patients.
- Limitation on the number of visitors with a patient and access points.
- Separation of infectious patients in lobby spaces by screening or social distancing.
- Modifications of air systems to negative pressure if possible.

Long term

- Increased space in lobby waiting areas to perform additional screening and PPE equipment storage.
- Pre-admission testing areas placed adjacent to the lobby to screen out patients for infections.
- Permanent infrared camera screening before entry into the facility.
- Reduction or elimination of waiting and family areas, and implementation of just-in-time notification systems, to minimize infection risk.

CONVERSION OF MEP SYSTEMS TO ADD CAPACITY AND FLEXIBILITY

Short term

- Temporary negative exhaust and HEPA filtration through windows.
- Switching to 100 percent outside air is capable in most buildings by turning off economizers.
- Switching over building management system (BMS) systems for negative pressure. This may not be as easy in hospitals.
- Turning off filtration system for improved air flow.
- Adjusting humidity-optimal set point to modify and improve quality and volume of air.

Long Term

- 100 percent outside air strategy versus recirculation.
- Convertible systems for negative and positive air pressurization.
- Enhanced BMS systems to control or modify air requirements.
- Incorporation of displacement ventilation to change the fluid dynamics of air movement from low to high versus pushing microbes down.
- Marginally increase medical gas pipe sizing to allow increased capacity for multiple patient use at headwall locations.

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