

# D1-9. The Pandemic's Impact on the Future of Healthcare Design



Thank you to our sponsor:



Wednesday, October 27, 2021

10:30 am – 11:45 am

**A'21**  
**MN**



**AMY**  
KALAR

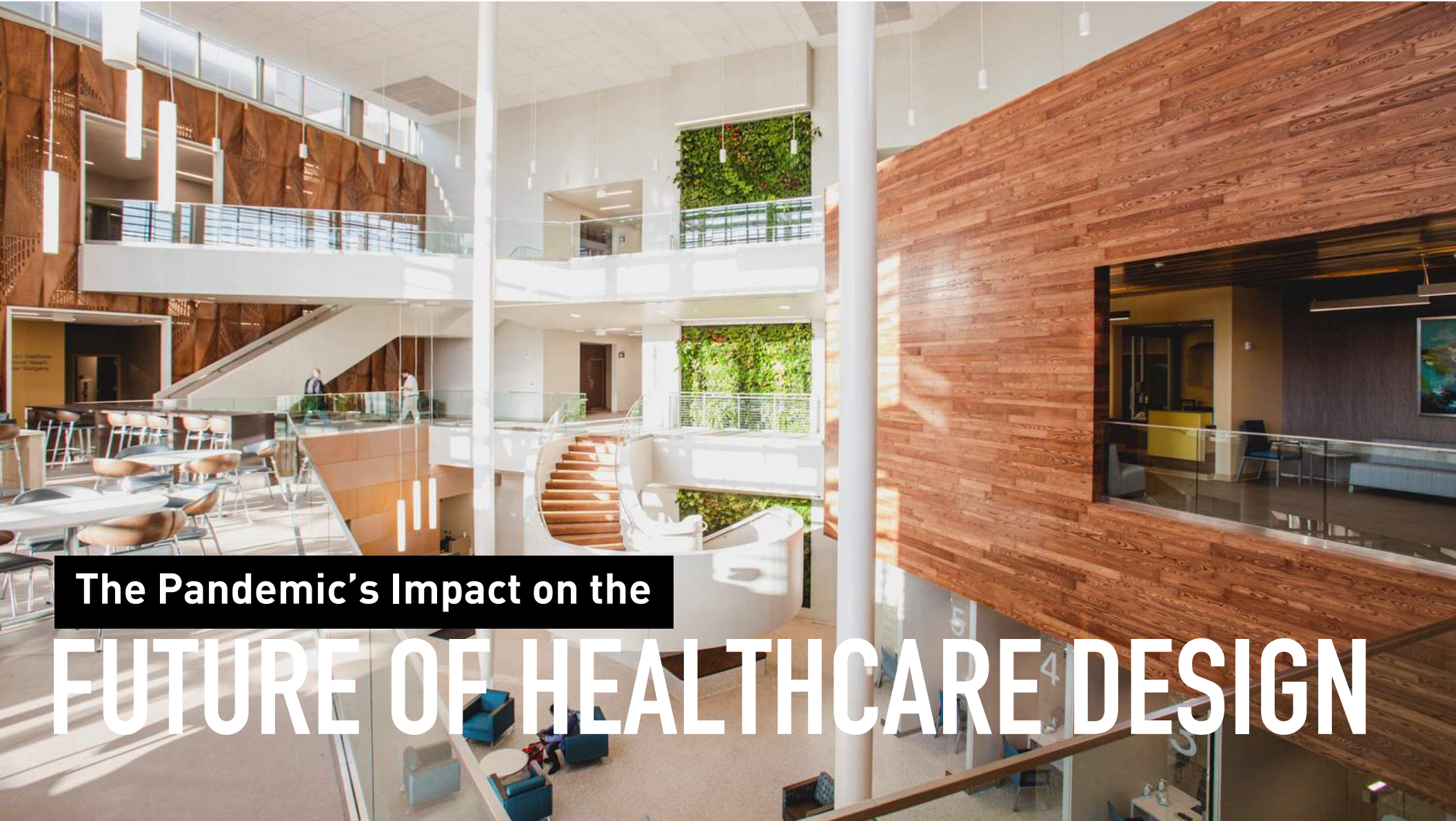


**AMY**  
MEES



**JIM**  
LUPIDI

**DANIS**



The Pandemic's Impact on the

# FUTURE OF HEALTHCARE DESIGN

# LEARNING OBJECTIVES

**1. Understand trends** that have either emerged or grown as a result of the pandemic which are impacting the delivery of healthcare, such as telehealth, provider burn-out, and public behavior

**2. Discuss design impacts** resulting from these trends and how they must continue to evolve in the future.

**3. Explore opportunities and innovations in construction** that have evolved as a result of the pandemic, such as modular/prefab construction and pop-up buildings.

**4. Review case study** of an existing ICU and how it evolved throughout the pandemic, and draw from it's conclusion on how to better prepare for the future.

WHY

# CURRENT TRENDS

# ENDEMIC WORKER SHORTAGE

## PROJECTIONS FROM 2017

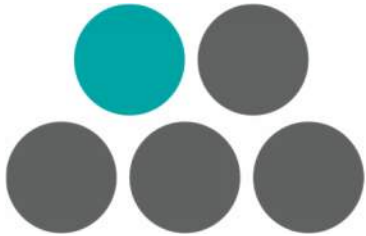
Figure 1. Healthcare Occupations With Projected Supply Gaps Through 2025

Occupation	Growth	New job openings by 2025	Expected workforce gap by 2025
Home health aides	32%	423,200	-446,300
Nursing assistants	16%	407,396	-95,000
Medical and clinical lab technologists	13%	49,400	-58,700
Medical and lab technicians	18%	60,717	-40,000
Nurse practitioners	30%	51,445	-29,400
Physicians and surgeons, all other	16%	102,970	-11,000

Citation: Demand for Healthcare Workers Will Outpace Supply by 2025: An analysis of the US Healthcare Labor Market - Mercer



# PANDEMIC-INDUCED BURNOUT



Nearly 1 in 5 have  
quit their jobs



46% of say the pandemic has  
negatively impacted their mental  
health and their personal lives



79% of say they've been  
affected by the shortage

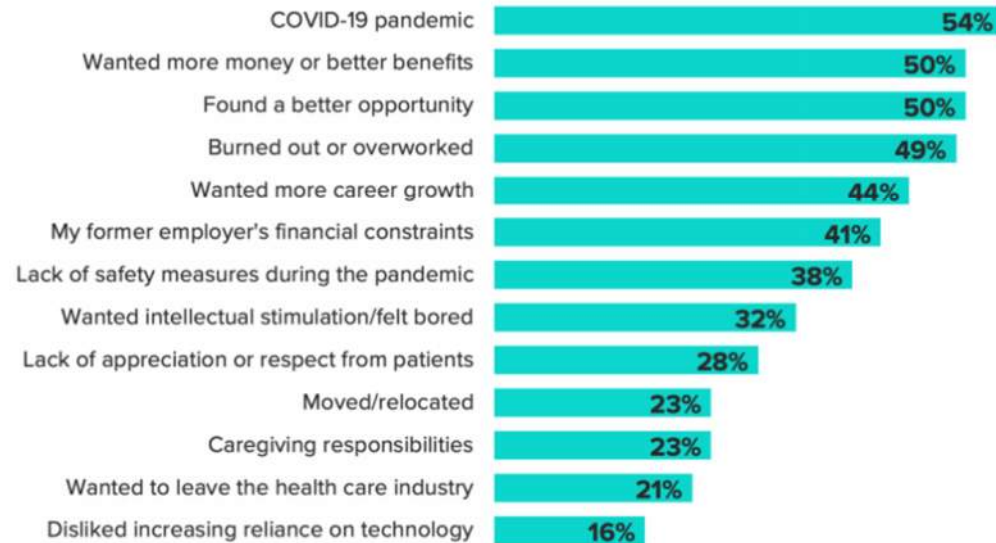




# PANDEMIC-INDUCED BURNOUT

## Pandemic Is a Top Reason Medical Workers Were Laid Off or Quit Since Early 2020

Health care workers said the following reasons are why they quit or were laid off since mid-February 2020:



MORNING CONSULT

Poll conducted Sept. 2-8, 2021, among 268 U.S. health care workers who have been laid off or quit their jobs since Feb. 15, 2020, with a margin of error of +/-6%.



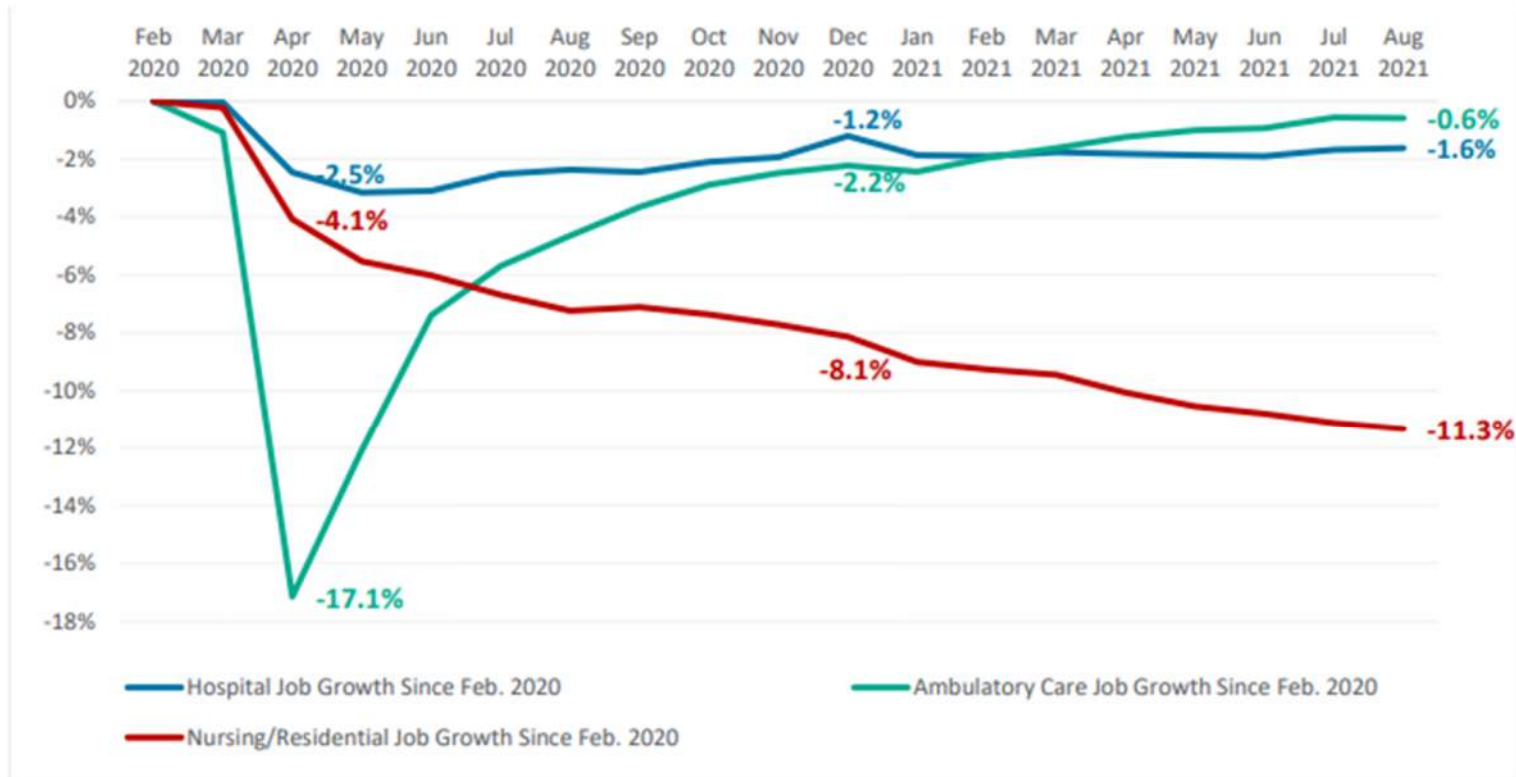
# PANDEMIC-INDUCED BURNOUT

As the situation escalates, nurses are leaving hospital settings or the profession altogether in record numbers. The sustained and extreme demands of caring for unvaccinated, hospitalized patients are taking their toll. A recent AACN survey of more than 6,000 acute and critical care nurses quantified the impact of the past 18 months on the profession:

- 92% of nurses surveyed said they believe the pandemic has depleted nurses at their hospitals and, as a result, their careers will be shorter than they intended
- 66% feel their experiences during the pandemic have caused them to consider leaving nursing
- 76% say that people who have yet to be vaccinated threaten nurses' physical and mental well-being
- 67% believe taking care of patients with COVID-19 puts their own families' health at risk



# ENDEMIC WORKER SHORTAGE

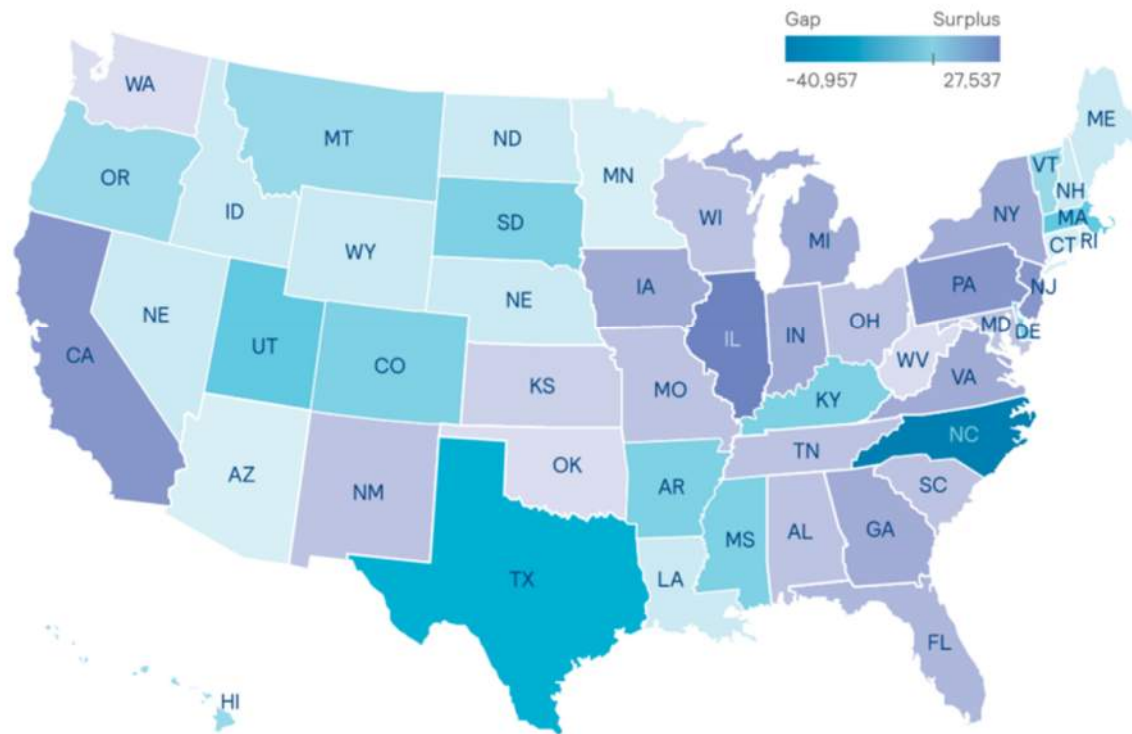


Source: Altarum analysis of monthly BLS Current Employment Statistics data.



# ENDEMIC WORKER SHORTAGE

Figure 3. Registered Nurses – Projected Workforce Gaps and Surpluses by 2025 (by State)



Citation: Demand for Healthcare Workers Will Outpace Supply by 2025: An analysis of the US Healthcare Labor Market - Mercer



Georgia's August University  
Medical center has seen up to  
20-30 resignations a week...



# BUILDING RESILIENCY



**Worker Shortage**



**Burnout**



**Policy & System  
Level Changes**



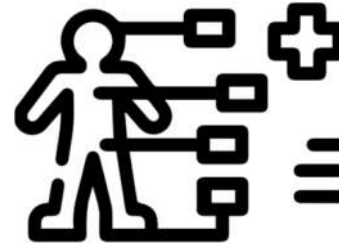
# TYPES OF TELEHEALTH



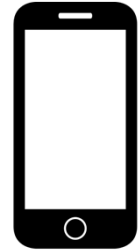
**Live Video**



**Asynchronous**



**Remote Patient  
Monitoring**



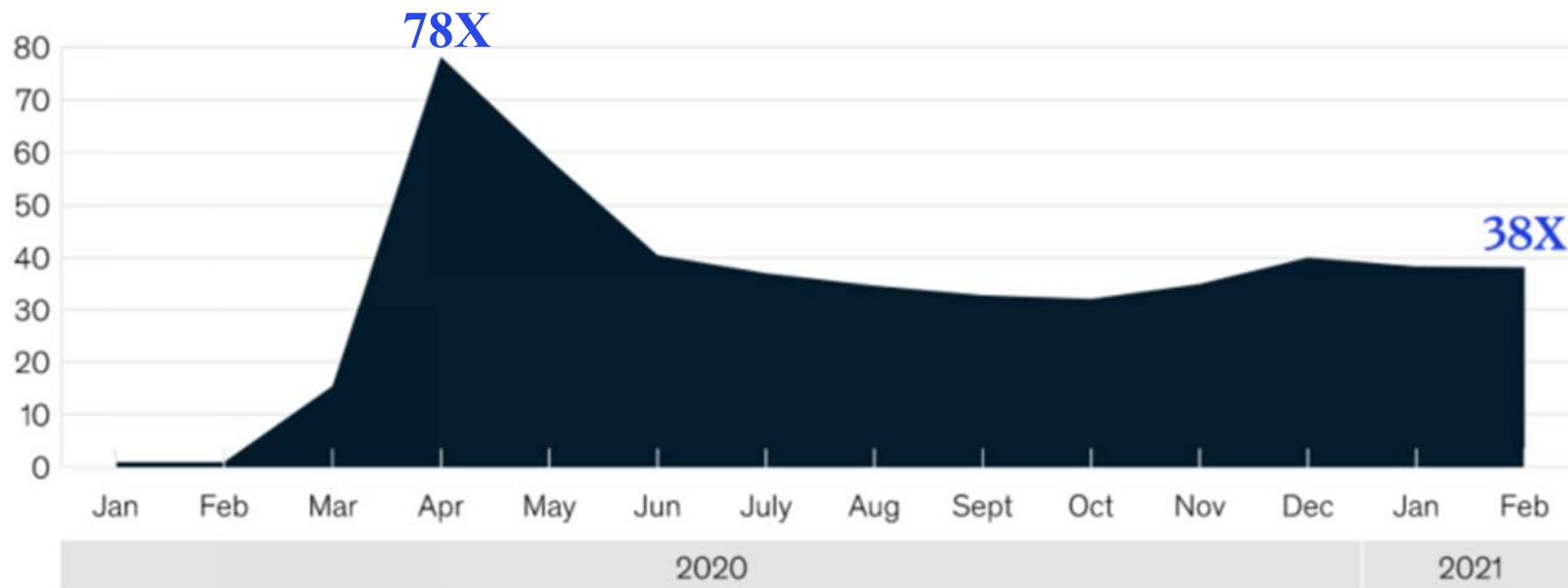
**Mobile Health**



# TELEHEALTH USE

Growth in telehealth usage peaked during April 2020 but has since stabilized.

Telehealth claims volumes, compared to pre-Covid-19 levels (February 2020 = 1)<sup>1</sup>



<sup>1</sup> Includes cardiology, dental/oral, dermatology, endocrinology, ENT medicine, gastroenterology, general medicine, general surgery, gynecology, hematology, infectious diseases, neonatal, nephrology, neurological medicine, neurosurgery, oncology, ophthalmology, orthopedic surgery, poisoning/drug tox./comp. of TX, psychiatry, pulmonary medicine, rheumatology, substance use disorder treatment, urology. Also includes only evaluation and management visits; excludes emergency department, hospital inpatient, and psychiatry inpatient claims; excludes certain low-volume specialties.  
Source: Compile database; McKinsey analysis

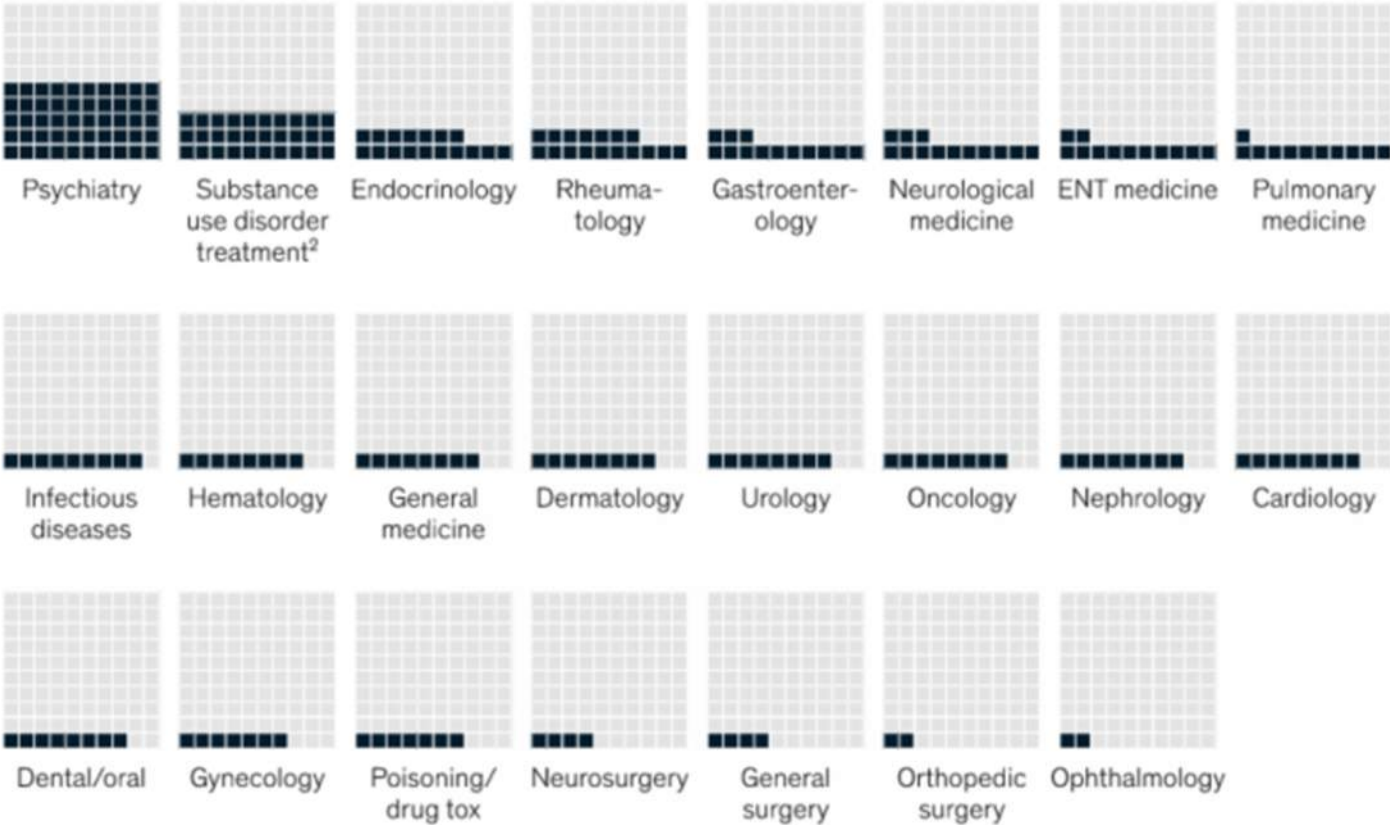




# TELEHEALTH USE

Substantial variation exists in share of telehealth claims across specialities.

Share of telehealth of outpatient and office visit claims by specialty (February 2021<sup>1</sup>), %



# TELEHEALTH USE

PATIENTS

**78%**

**Satisfied with their care**

**40%**  
**Continue to  
use  
telehealth**

**46%**  
**Safety**

**80%**  
**Receive the same  
level of care**

**86%**  
**Easier to  
get care**

# TELEHEALTH USE

## PHYSICIANS

**84%**

**Currently offering virtual visits**

**57%**

**Prefer to  
continue  
offering  
virtual care**

**60%**

**Easy to use**

**50%**

**Improved  
satisfaction**

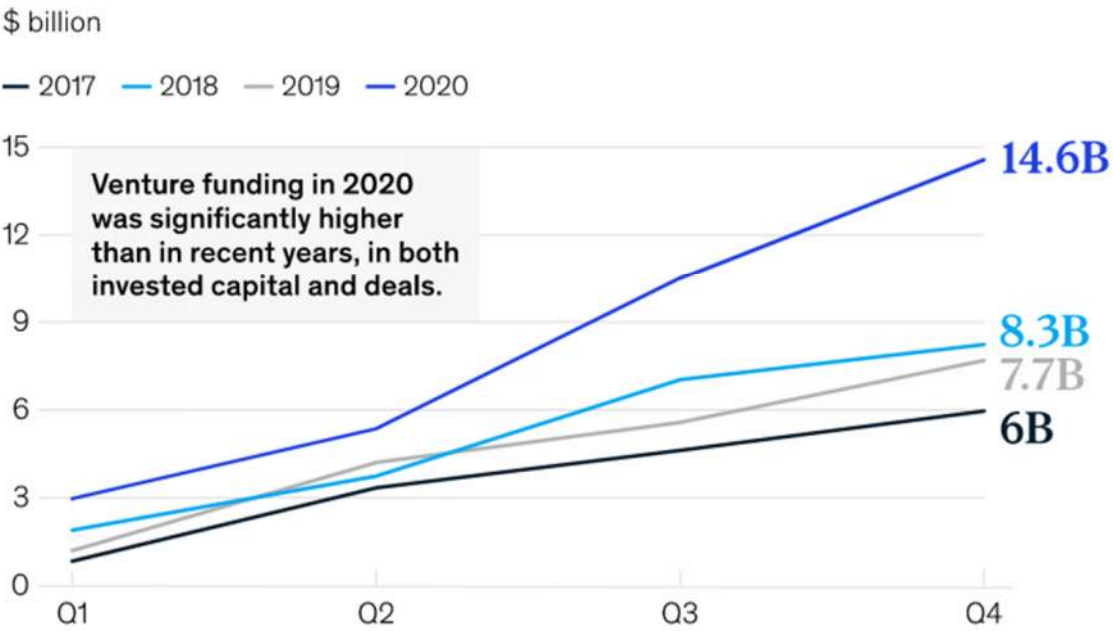
**68%**

**Would like  
to increase  
use**

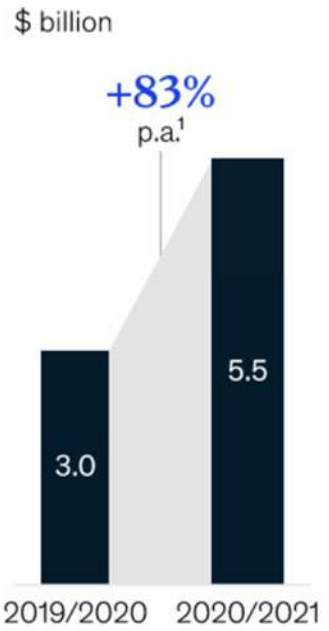
# TELEHEALTH INVESTMENT

Investment in digital health and the revenues of telehealth players almost doubled compared to 2019.

Total venture funding for digital health companies, by year



Total annual revenues



<sup>1</sup> p.a., per annum.  
 Source: Adriana Krasniansky et al., "H1 2021 Digital Health Funding: Another Blockbuster Year...In Six Months," Rock Health, July 2021, rockhealth.com; McKinsey virtual health vendor database



# TELEHEALTH BENEFITS

- Time
  - » Less time off work
  - » Shorter visits = more patients
- Comfort
- No travel/transportation req'd
- Improved outcomes
- Cost savings
- Expanded access



# LACK OF ACCESS - TECHNOLOGY

- Difficulty accessing online portals
  - » Skill level
  - » Confusion
  - » Language Barriers
  - » Lack of access to devices
- Broadband access
- Reimbursement
- Medical Errors
- Patient Privacy
- Licensing
- Loss of personal connection



Photo by Jacob Lund Photography from Noun Project



# LACK OF ACCESS - PHYSICAL



# PUBLIC BEHAVIOR



**Vaccination Impacts**



**Masking**



**Social Distancing**





**DESIGN**  
**IMPACTS**

# ACUITY ADAPTABILITY



BUILDINGS



DEPARTMENTS



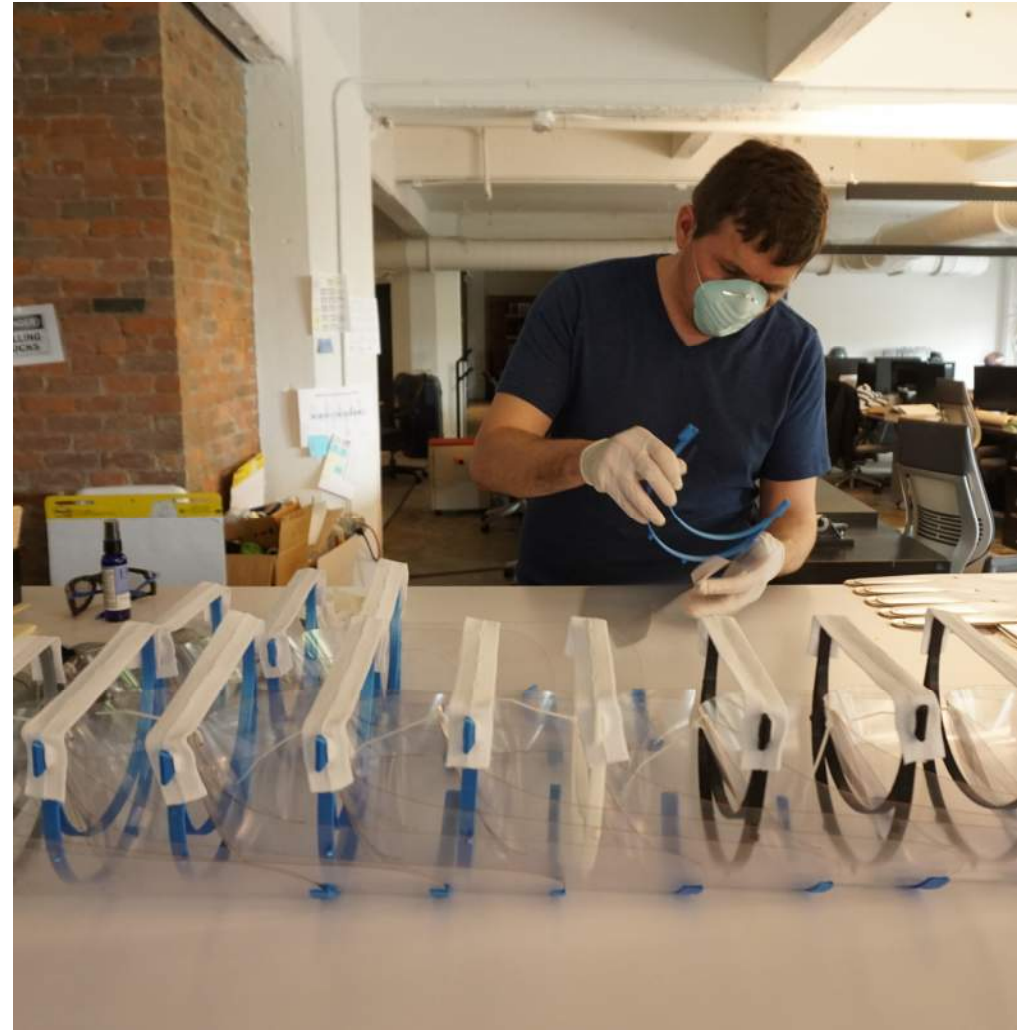
SOFT SPACE

ROOMS



# SMALL SCALE

- PPE easily accessible
- Hand sanitizer everywhere
- Plexiglass barriers
- Touchless as much as possible; pre-registration and/or touchless check-in
- Paper towels, no blowers
- Increased scrutiny of infection control strategies



# SMART INTERIORS



**DIGITAL  
FABRICATION**



**WEARABLE  
TECHNOLOGY**



**TECHNOLOGY IN  
PATIENT ROOMS**



**TOUCH-FREE  
CONTROLS**



**ANTI-MICROBIAL  
MATERIALS**



# MEDIUM SCALE

- Longer queuing or waiting in cars
- Larger vestibules for screening, or outdoor space
- Changes to HVAC
- Technology advances
  - » Some increases in SF (ie. IT and server space)



# LARGE SCALE

- Technology advances
  - » Reduction in overall facility SF due to telehealth
- Drive thru clinics and testing sites
- Segregation:
  - » Sick and well patients
  - » Staff and patient flows



# MIXED FLOWS

## LEGEND

- Patient Space
- Patient Support
- Staff Space
- Staff Support
- Waiting/Public
- Patient Corridor
- Staff Corridor
- Mixed Circulation

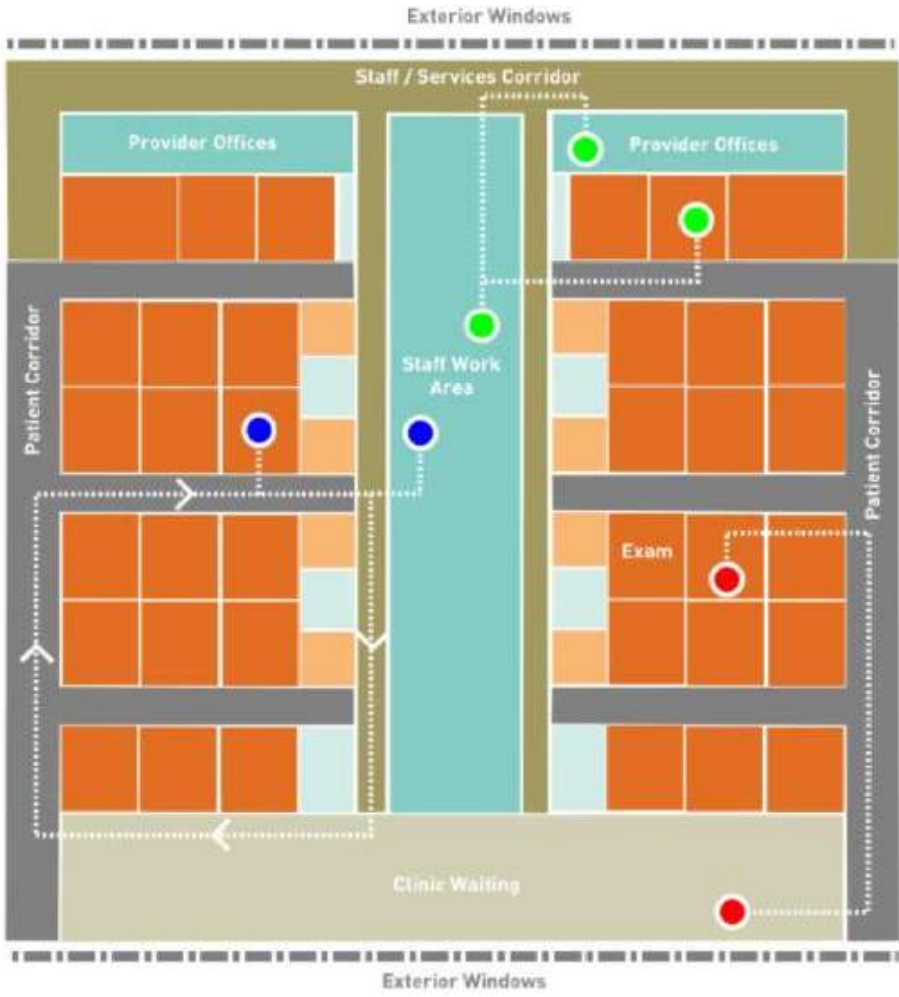
- Patient
- Staff
- Physician / Provider



# SEGREGATED FLOWS

LEGEND

- Patient Space
- Patient Support
- Staff Space
- Staff Support
- Waiting/Public
- Patient Corridor
- Staff Corridor
- Mixed Circulation



- Patient
- Staff
- Physician / Provider





**CONSTRUCTION**  
**INNOVATION**



**UNPRECEDENTED  
ESCALATION**



**SUPPLY  
CHAIN  
DISRUPTION**



**SKILLED LABOR  
SHORTAGE**



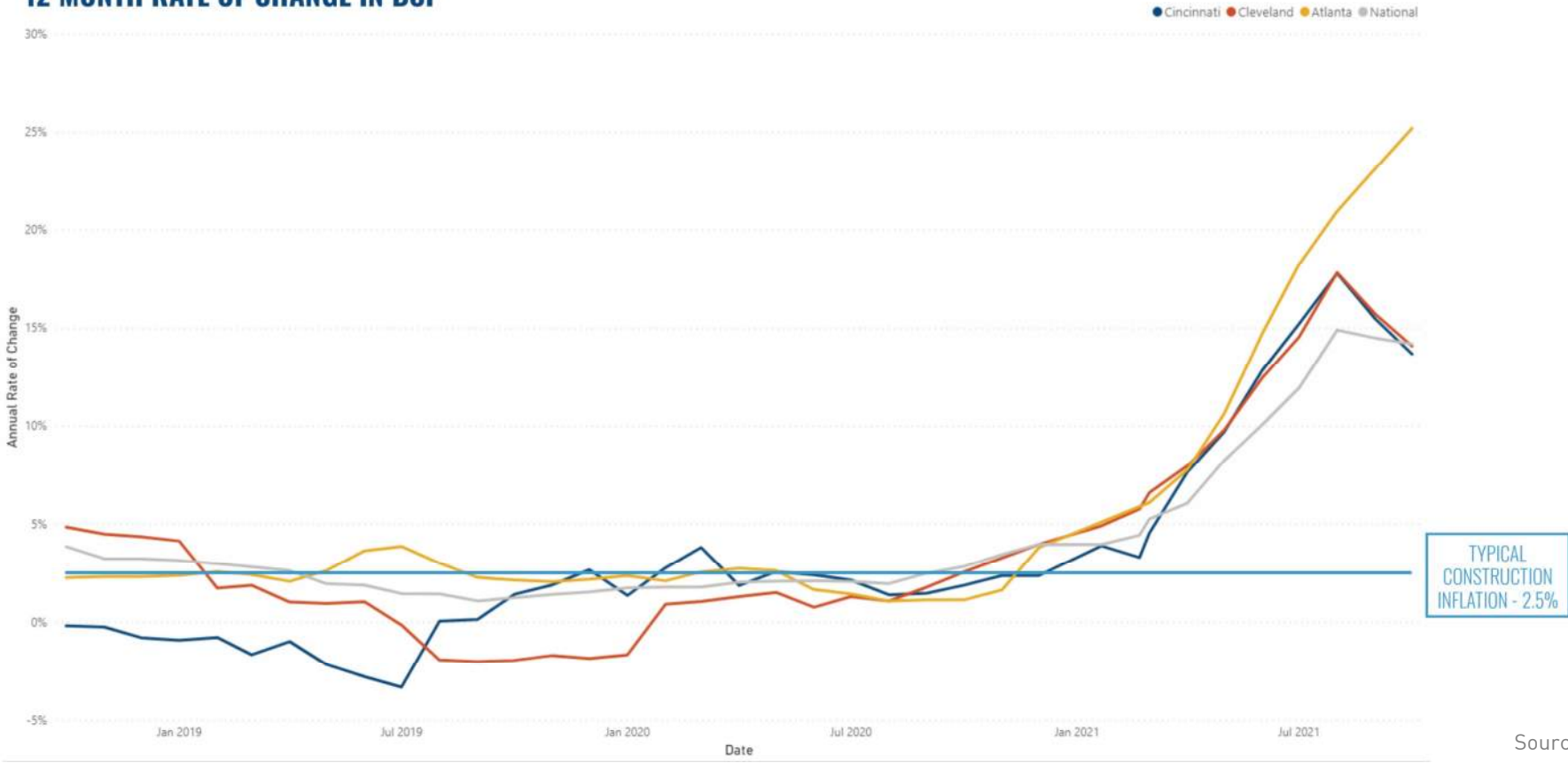
**INDUSTRIALIZED  
CONSTRUCTION**



# CHALLENGES

## UPRECEDENTED PRICE ESCALATION

12 MONTH RATE OF CHANGE IN BCI



Source: ENR

# CHALLENGES

## SUPPLY CHAIN DISRUPTION

Material	Pre-Pandemic Normal	Current	Material	Pre-Pandemic Normal	Current
Structural Steel	6-8 weeks	20-24 weeks	Insulated Metal Panels	10-12 weeks	24-30 weeks
Chillers	14-16 weeks	8-20 weeks	Custom Air Handling Units	18-20 weeks	24-36 weeks
Steam Boilers	12-16 weeks	21-23 weeks	Electrical Transfer Switches	16-18 weeks	30-35 weeks
Variable Air Volume Boxes	6-8 weeks	8 weeks	Steel Joist	8-10 weeks	38-40 weeks
Emergency Generators	16-20 weeks	44-46 weeks	Metal Decking	4-6 weeks	38-44 weeks
Packaged RTUs	10-12 weeks	6-20 weeks	Curtain Wall / Glazing	4-6 weeks	7-8 weeks
Terrazzo Epoxy Coatings	3-5 weeks	6-8 weeks	Roofing Polyiso Board	1-2 weeks	35-40 weeks
Hygienic Tubing	8-10 weeks	40-44 weeks	Roofing Sheet Metal	4-6 weeks	8-12 weeks
PVC-Plastic Piping / Fittings	1 week	4-6 weeks	Solid Core Doors	8-10 weeks	20 weeks
Unit Substations	12-14 weeks	38-44 weeks	Lighting Fixtures	4-6 weeks	4-12 weeks
Distribution Switchgear	12-14 weeks	16-36 weeks	Pump Packages	6-8 weeks	8-10 weeks
Distribution Switchboards	12-14 weeks	24-40 weeks	Cast Stone Special Shapes/Panels	8-10 weeks	8-9 weeks
Mineral Wool	4-6 weeks	26-30 weeks	Wall Protection and Specialties	4-6 weeks	1-8 weeks
Cooling Towers	12-14 weeks	18-20 weeks	Reinforcing Steel	3-5 weeks	5-7 weeks



# CHALLENGES

## SKILLED LABOR SHORTAGE

**1**  
**MILLION+**  
SKILLED LABOR WORKERS  
LOST DURING INDUSTRY  
SHUT DOWN LAST YEAR



Source: US Chamber

# CHALLENGES

## HEALTHCARE CONSTRUCTION BOOM



**2%**  
INCREASE  
PROJECTED  
THIS YEAR



**6%**  
INCREASE  
IN 2022

# SOLUTIONS AND IDEAS

## EARLY INTEGRATED TEAM APPROACH

DANIS

### INTEGRATED TEAM APPROACH

#### 01 PLAN

##### PLAN PHASE

Aligning an integrated team early around a project execution plan.

#### 02 CREATE

##### CREATE PHASE

Collaborative design approach that yields maximum value while advancing designs under target costs and on schedule.

#### 03 BUILD

##### BUILD PHASE

Execution of the client's vision, target cost, and schedule.



# SOLUTIONS AND IDEAS

## DESIGN ASSIST PARTNERS

### BEYOND MEP, MUST INCLUDE:

- Envelope
- Structure
- Select Interior Assemblies



**SECURES LABOR EARLY**

**SECURES MATERIALS EARLY**

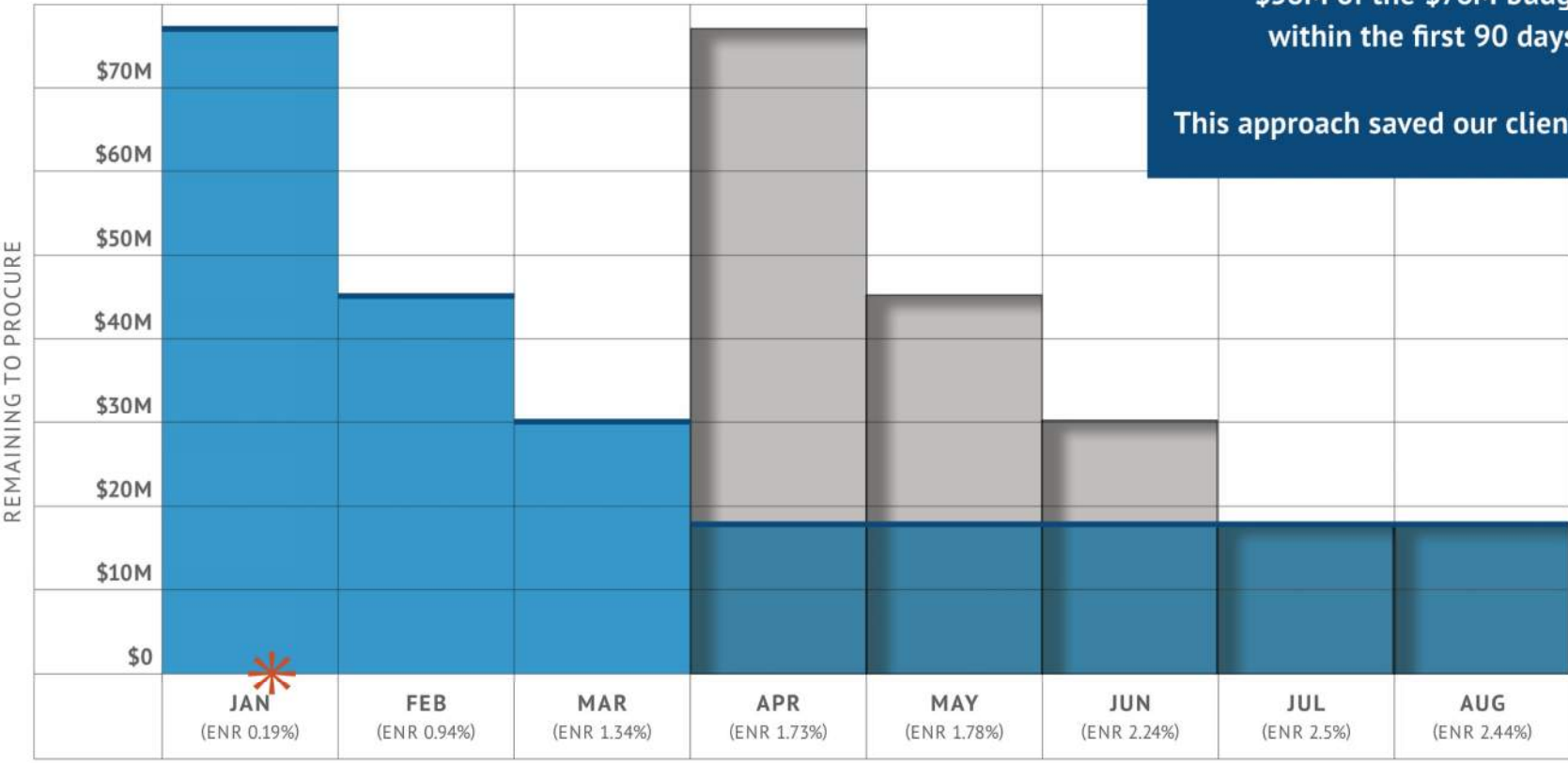




# SOLUTIONS AND IDEAS

## DESIGN ASSIST PARTNERS CASE STUDY

**INNOVATIVE APPROACH**  
 Danis' innovative and extensive approach secured **\$58M of the \$76M budget** within the first 90 days.  
 This approach saved our client **\$1.6M.**



\* JAN 19<sup>TH</sup> BOARD APPROVAL    ■ DANIS' RAPID PROCUREMENT SCHEDULE    ■ ORIGINAL PROCUREMENT SCHEDULE (APR-AUG)





# SOLUTIONS AND IDEAS

TARGET VALUE DELIVERY

**INTEGRATED TEAM  
ALIGNMENT IS CRITICAL**

**LEVERAGE CREATIVITY &  
INNOVATION TO SOLVE CHALLENGES**

# **SOLUTIONS AND IDEAS**

## **INDUSTRIALIZED CONSTRUCTION HOW**

**IC MASTER  
PLAN**

**PROCURE  
DESIGN ASSIST  
PARTNERS**

**DESIGN & IC  
INTEGRATION**



# SOLUTIONS AND IDEAS

## DESIGN ASSIST PARTNERS

### BEYOND MEP, MUST INCLUDE:

- Envelope
- Structure
- Select Interior Assemblies



**SECURES LABOR EARLY**

**SECURES MATERIALS EARLY**

**ENABLES INDUSTRIALIZED CONSTRUCTION**



# SOLUTIONS AND IDEAS

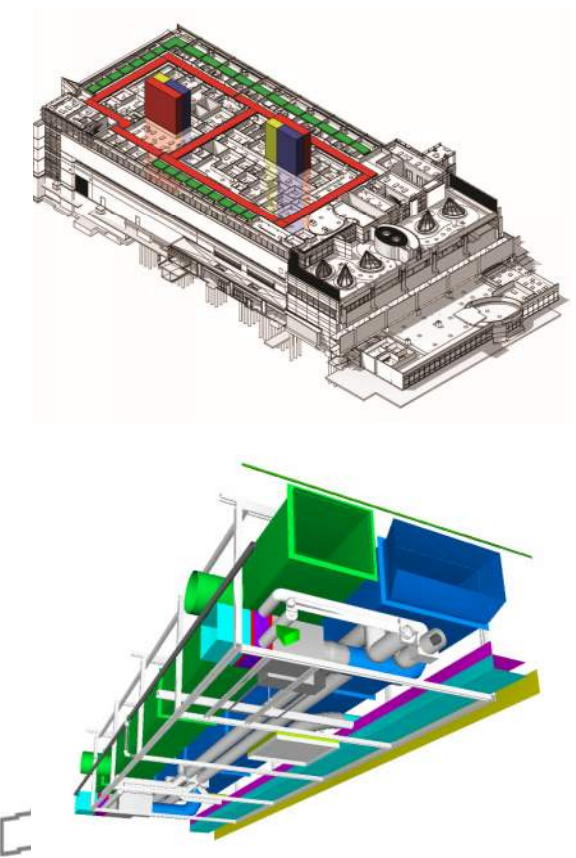
## INDUSTRIALIZED CONSTRUCTION WHY

VALUE	PRE-PANDEMIC TRADITIONAL PREFAB	PANDEMIC IC MASTER PLAN
Schedule	●	●
Better Quality	●	●
Safer	●	●
Weather Conditions	●	●
Critical Activities Simultaneously		●
Better Trade Coordination		●
Less Waste		●
Labor Shortage		●
Escalation Hedging		●
Cost Savings - Avoidance		●
Multi-Trade Assemblies		●
Supply Chain - Early Procurements		●



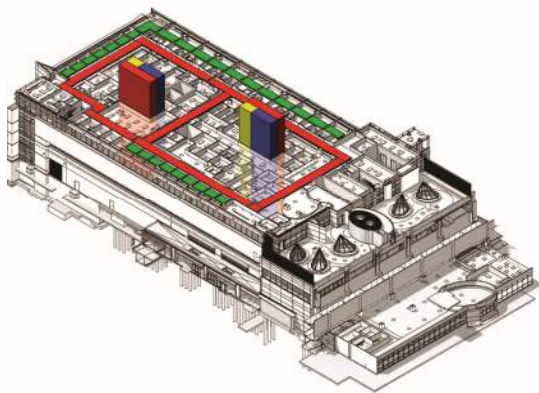
# SOLUTIONS AND IDEAS

## INDUSTRIALIZED CONSTRUCTION MEPF HORIZONTAL RACKING



# SOLUTIONS AND IDEAS

## INDUSTRIALIZED CONSTRUCTION MEPF HORIZONTAL RACKING



# SOLUTIONS AND IDEAS

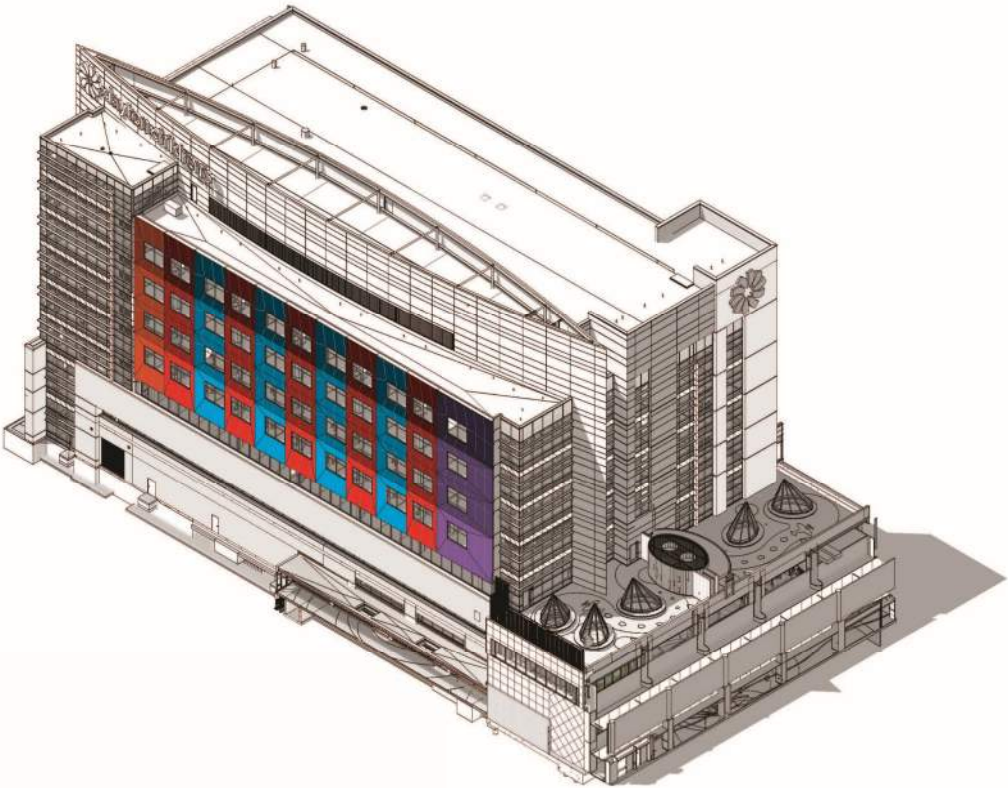
## INDUSTRIALIZED CONSTRUCTION UNDERSLAB UTILITIES





# SOLUTIONS AND IDEAS

## INDUSTRIALIZED CONSTRUCTION EXTERIOR WALL ASSEMBLIES



# SOLUTIONS AND IDEAS

## INDUSTRIALIZED CONSTRUCTION SOFFIT ASSEMBLIES



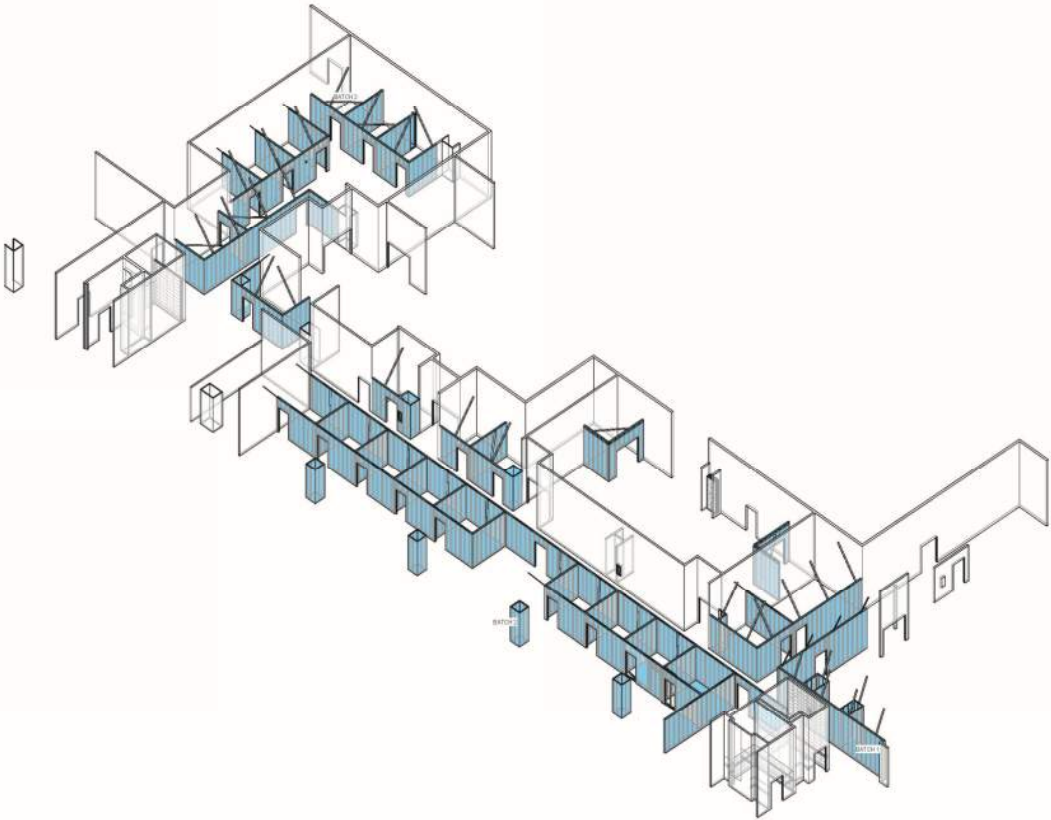
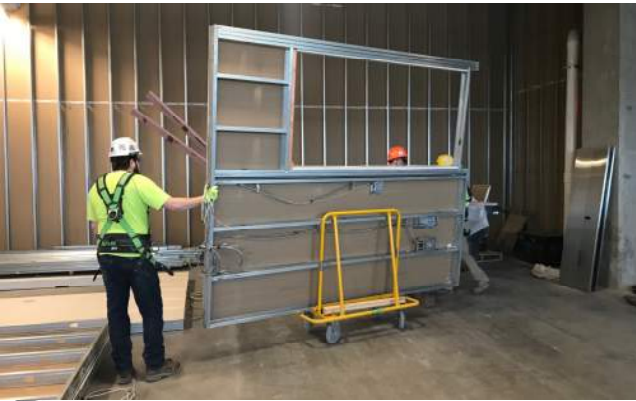
# SOLUTIONS AND IDEAS

## INDUSTRIALIZED CONSTRUCTION HEADWALL ASSEMBLIES



# SOLUTIONS AND IDEAS

## INDUSTRIALIZED CONSTRUCTION MULTI-TRADE INTERIOR WALL ASSEMBLIES



# SOLUTIONS AND IDEAS

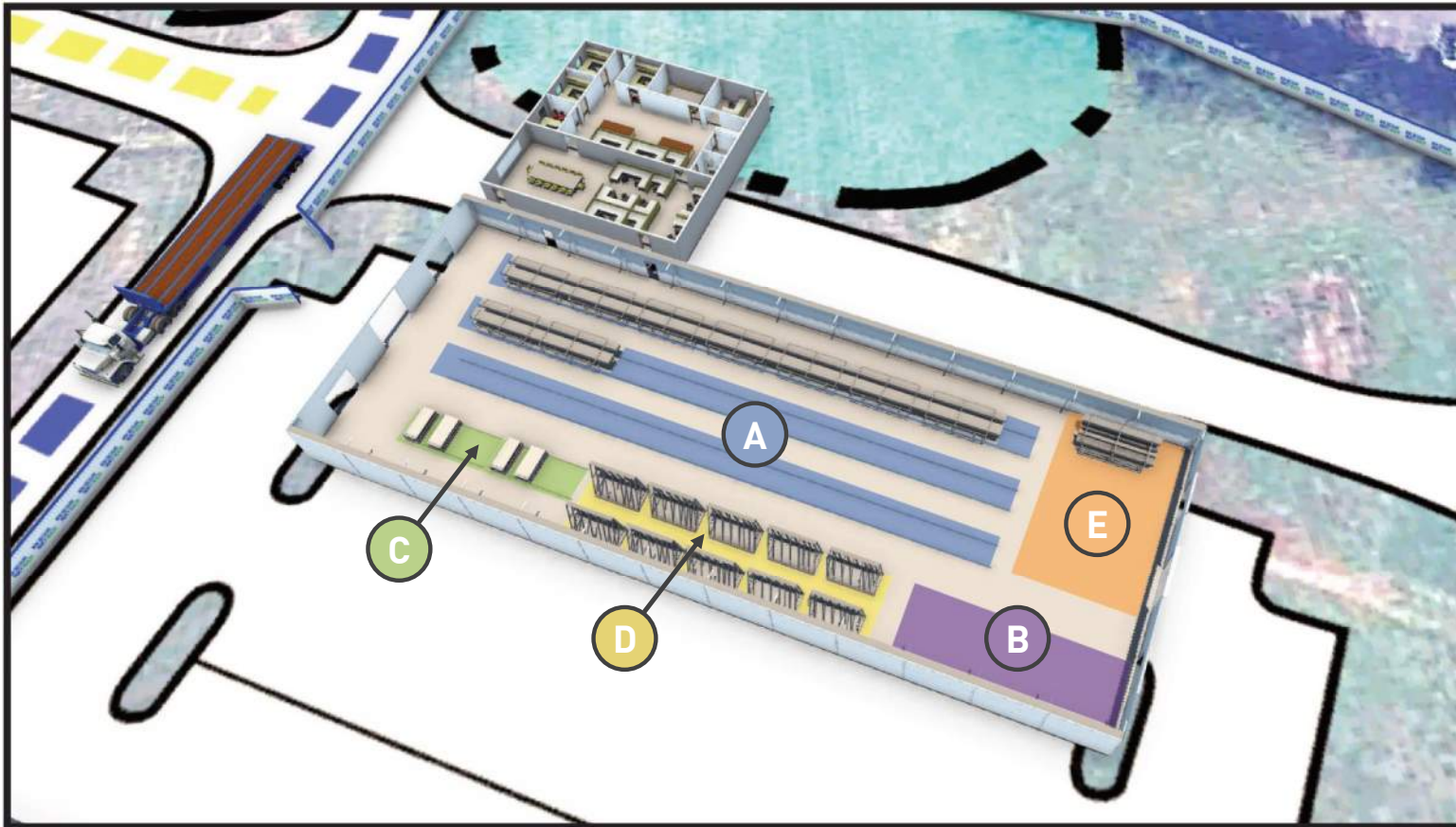
## ON-SITE INDUSTRIALIZED CONSTRUCTION WHY

VALUE	PRE-PANDEMIC TRADITIONAL PREFAB	PANDEMIC IC MASTER PLAN	PANDEMIC ONSITE IC CENTER
Schedule	●	●	●
Better Quality	●	●	●
Safer	●	●	●
Weather Conditions	●	●	●
Critical Activities Simultaneously		●	●
Better Trade Coordination		●	●
Less Waste		●	●
Labor Shortage		●	●
Escalation Hedging		●	●
Cost Savings - Avoidance		●	●
Multi-Trade Assemblies		●	●
Supply Chain - Early Procurements		●	●
Keep Workers Local			●
Sustainable			●
Guarantees Manpower			●
Vaccine			●
Eliminate Trucking Shortage & Delays			●
AHJ Approval			●
Removes Shipping Limiters			●
Level Management			●
Enhanced Level Skilled Trades			●
Allows More Innovation to Happen			●



# SOLUTIONS AND IDEAS

## ON-SITE INDUSTRIALIZED CONSTRUCTION HOW



- A** **LINE 1-3** Main Corridor, Mini, and Vertical Shaft Racks
- B** **BUILD SPACE** Full Scale Mock-ups and Soffits
- C** **WALL JIGS** Interior and Exterior Wall Assemblies
- D** **A-FRAMES** Multi-Trade Interior Walls & Headwalls
- E** **FINISHED ASSEMBLIES**

# SOLUTIONS AND IDEAS

## INDUSTRIALIZED CONSTRUCTION EXECUTION

- FACILITY & TOOLING
- TECHNIQUES
- METRICS FOR CARE
- TAKT SCHEDULING
- SOLUTIONS & VALUE ADD



# CASE STUDY



# UNIVERSITY OF KENTUCKY PAVILION A

## 12<sup>TH</sup> FLOOR MICU FIT OUT



# GUIDING PRINCIPLES

PATIENT ACCESS &  
PRIORITY CARE



ACADEMIC MISSION



INTEGRATION OF  
CLINICAL SERVICES



EFFICIENCY



FLEXIBILITY



IMAGE



# GUIDING PRINCIPLES

PATIENT ACCESS &  
PRIORITY CARE



ACADEMIC MISSION



INTEGRATION OF  
CLINICAL SERVICES



EFFICIENCY



FLEXIBILITY



IMAGE

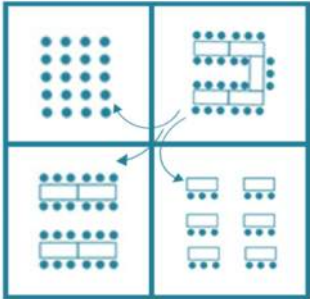


# COMPONENTS OF FLEXIBILITY

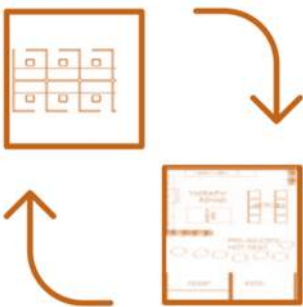
VERSATILITY



MODIFIABILITY



CONVERTIBILITY



SCALABILITY



## PANDEMIC PROMPTS FLEXIBLE DESIGN

\*SOURCE: The Center for Advanced Design Research and Evaluation (CADRE) produced "FLEX: a study of flexibility in outpatient setting"



# PAVILION A: INCORPORATED PROGRAM ADAPTABLE SPACES

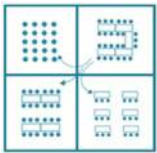
## VERSATILITY



### FAMILY AMENITIES

- Consult Room
- Hospitality Room
- Waiting Rooms

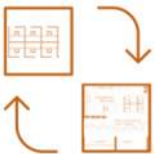
## MODIFIABILITY



### STAFF AMENITIES

- CLASSROOMS
- BREAK ROOMS

## CONVERTIBILITY



### STAFF AMENITIES

- CARE TEAM STATIONS
- RESIDENT WORK ROOMS

## SCALABILITY



### PATIENT OR STAFF AMENITIES

- BUMP OUT SPACE
  - LAB, OT/PT, DON/DOFF

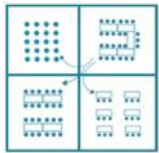


# PAVILION A: EXPAND FLEXIBLE THINKING?



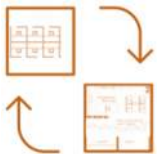
## VERSATILITY

- PALLIATIVE CARE ROOMS
- FAMILY/CONNECTING ROOMS
- WAITING ROOM/BUSINESS CENTER



## MODIFIABILITY

- RESIDENT WORKROOMS BECOME LABS IF NEEDED
- WORKROOMS CAN BE MODIFIED FOR INCREASED STAFF



## CONVERTIBILITY

- LOCKER ROOMS CONVERT TO DON/DOFF ROOMS
- DOUBLE OCCUPANCY
  - ADD GASES



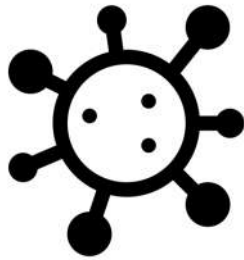
## SCALABILITY

- CREATE ANTE ROOMS
- MINOR RENOVATIONS TO INCORPORATE NEW SERVICES



**DESIGN**  
**OPPORTUNITIES**

# DESIGN OPPORTUNITIES



## BOLSTERING RESISTANCE TO PATHOGENS

- touch free controls
- anti-microbial finishes
- enhanced cleaning



## SAFETY AND ACCESS CONTROL

- ante rooms
- equipment and supply
- use of technology
- Increased visibility





# DESIGN OPPORTUNITIES



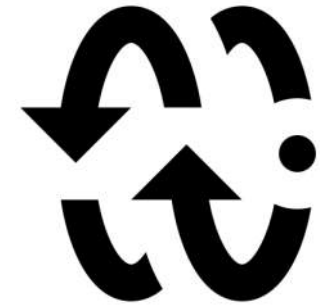
## BUILDING SYSTEMS

- hepa filter
- medical gases
- Supply



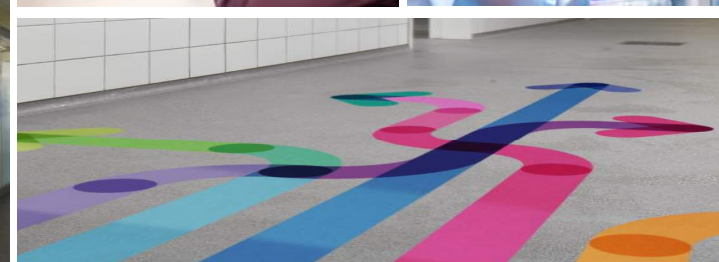
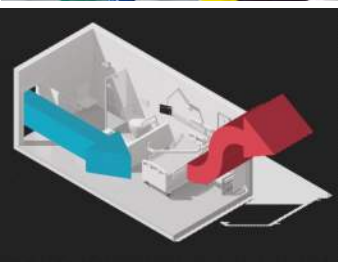
## PATIENT & STAFF SUPPORT

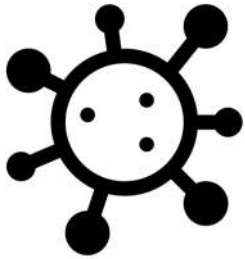
- access to resources
- respite
- remote monitoring, eICU



## PROCESSES AND FLOW

- donning and doffing
- equipment storage and access
- traffic patterns





### BOLSTERING RESISTANCE TO PATHOGENS

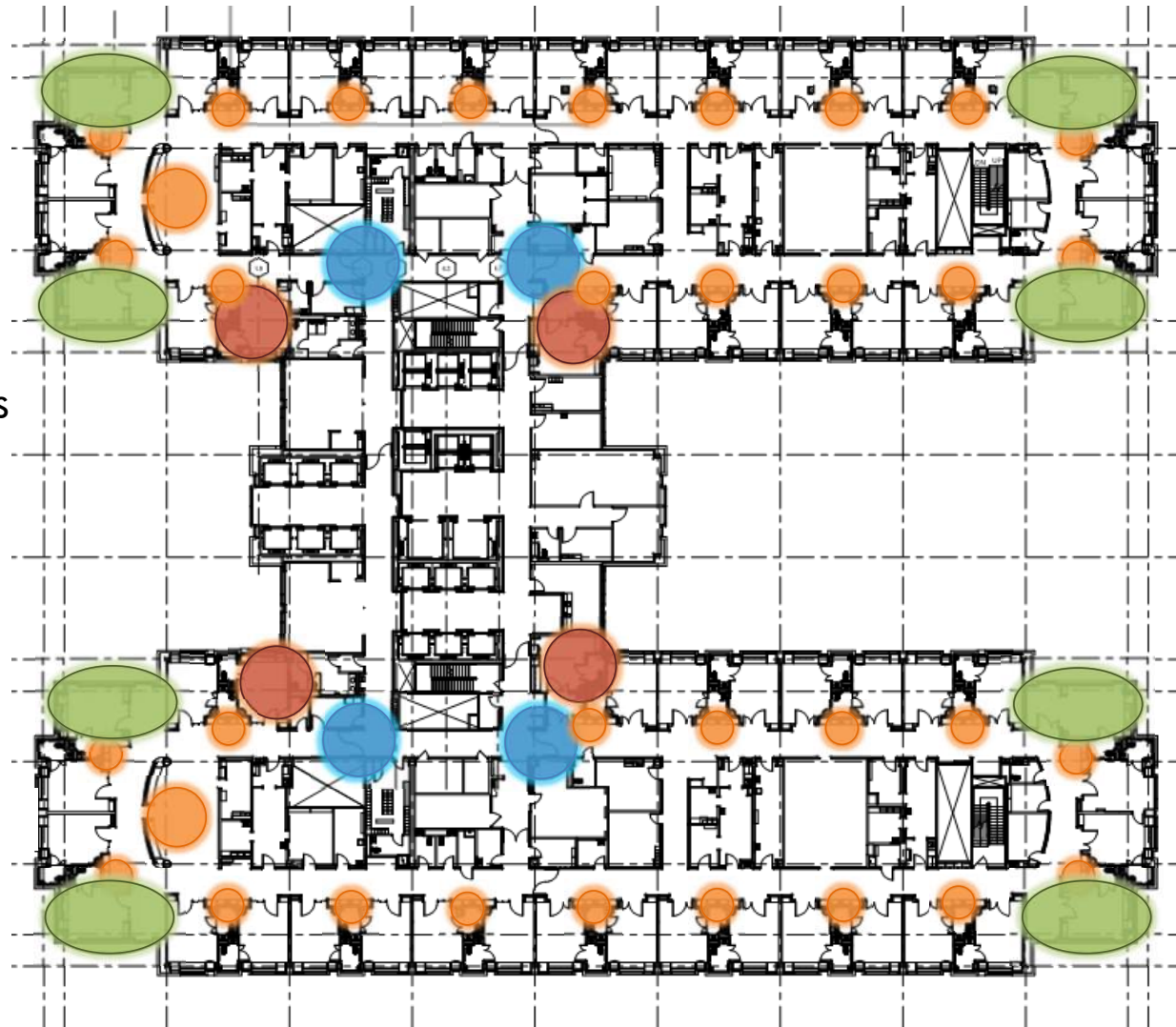
- touch free controls 
- enhanced cleaning
- anti-bacterial finishes, non-porous surfaces

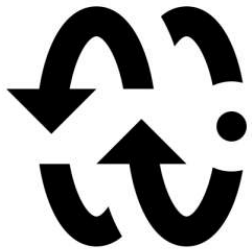
### CONTROL OF PATHOGENS

- ante rooms 
- don/doff at the patient room 
- remote monitoring 

### AREAS THAT COULD FLEX

- ante rooms 
- don/doff at the patient room 



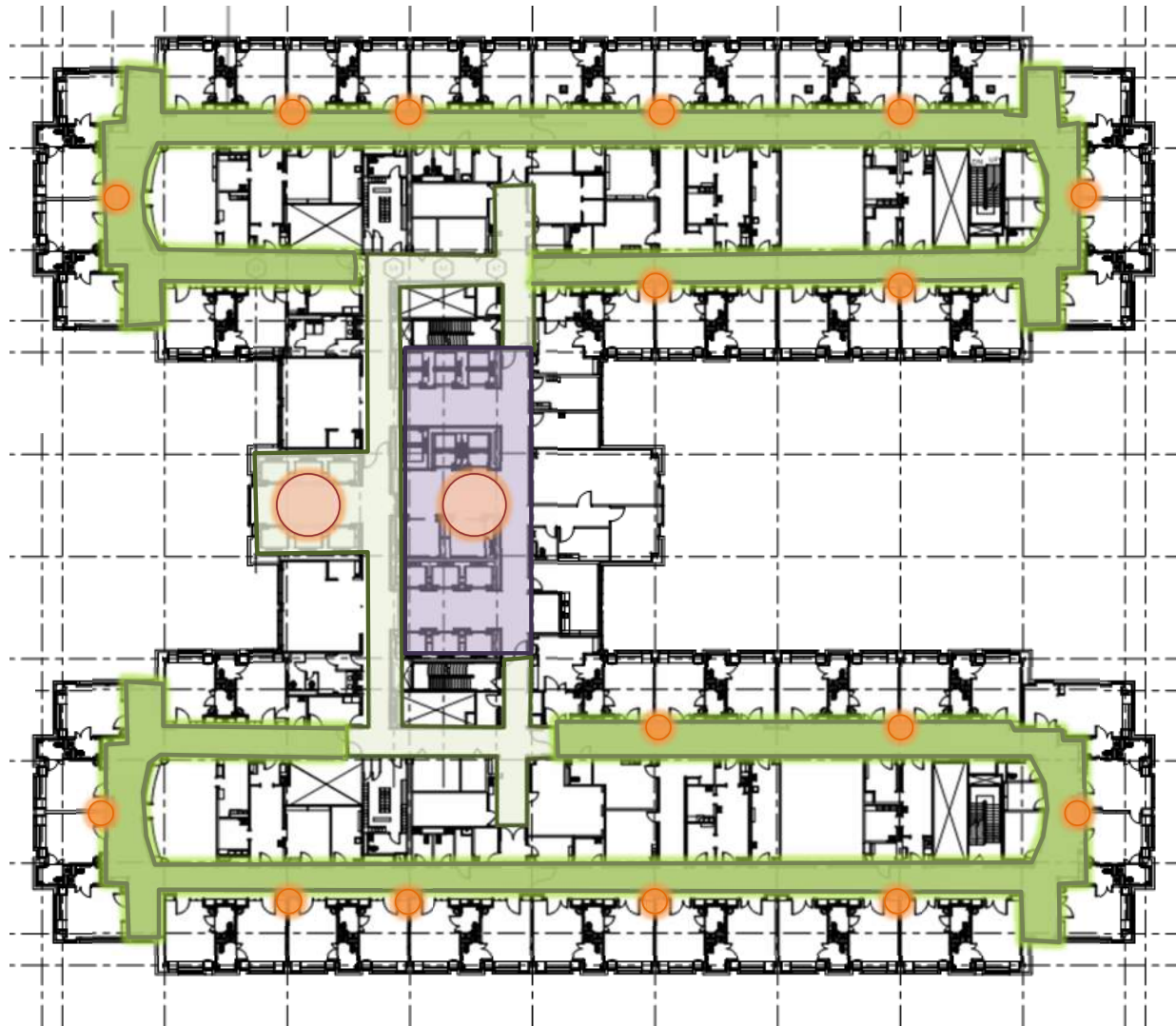


### PROCESSES AND FLOW

- equipment storage and access
  - corridor PPE cabinets on 11<sup>th</sup> and 5<sup>th</sup> floor 
- traffic patterns  
- donning and doffing




### AREAS THAT COULD FLEX

- corridor function
  - equipment & supply storage 
  - traffic patterns
    - separate in/out flows 
- donning and doffing, next slide 





#### SAFETY AND ACCESS CONTROL

- patient visibility
  - windows at corridor charting 
  - glass doors into patient rooms
    - ICU rooms 
  - windows in wood doors
    - Progressive and acute rooms
- remote monitoring 





#### BUILT-IN SAFETY AND CONTROL

- ability to lock down each unit
  - Limit access to units
  - aiphones





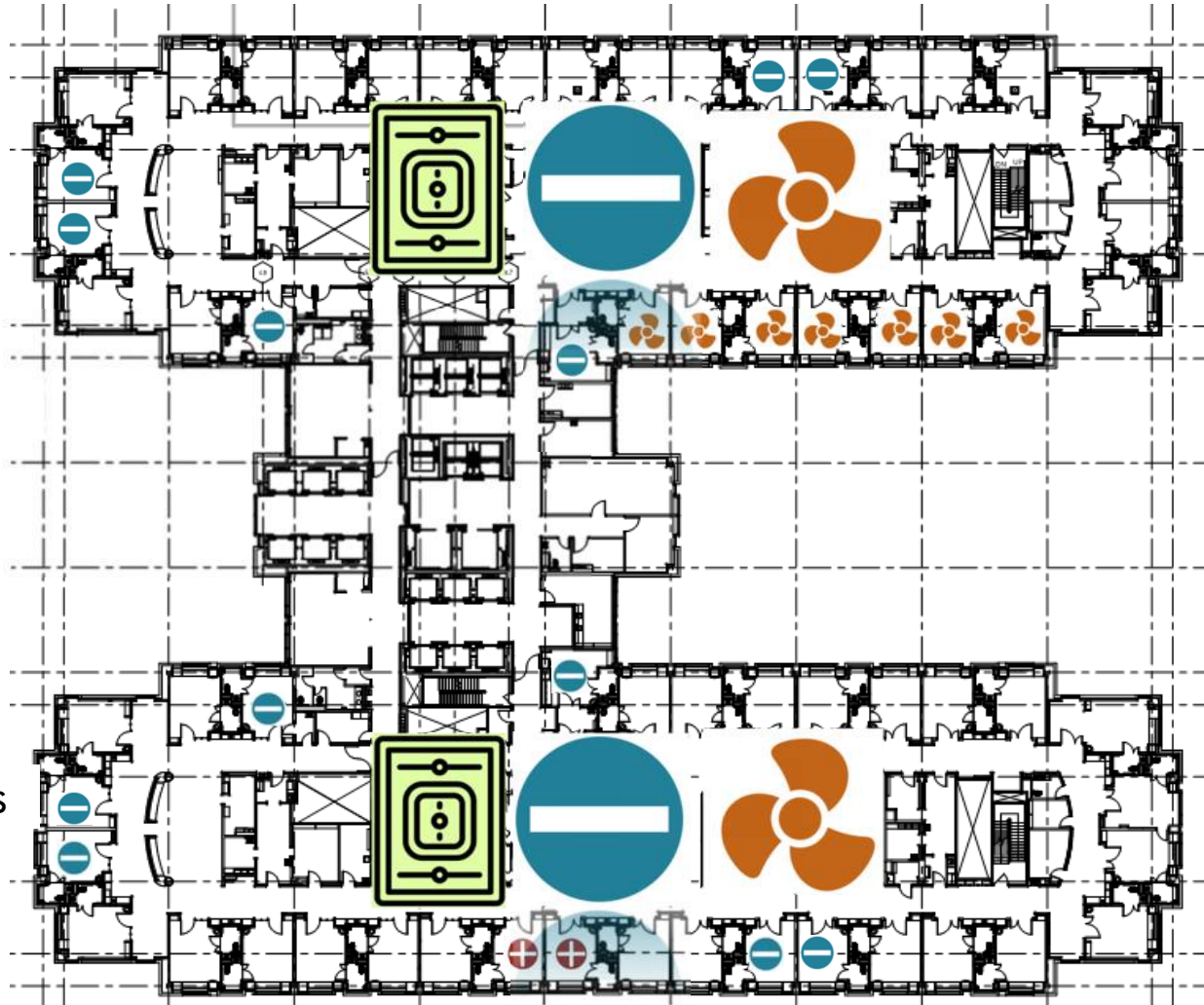


### BUILDING SYSTEMS AND EQUIPMENT

- negative isolation rooms 
- positive pressure rooms 
- additional exhaust or outside air, 5<sup>th</sup> floor adaptation 
- all rooms in Pav A meet FGI guidelines for critical care with number of med gas & electrical outlets 

### BUILT-IN ADDITIONAL SYSTEM CONTROLS

- ability to switch entire tower to negative isolation 
- 12<sup>th</sup> floor ability to open to outside air 



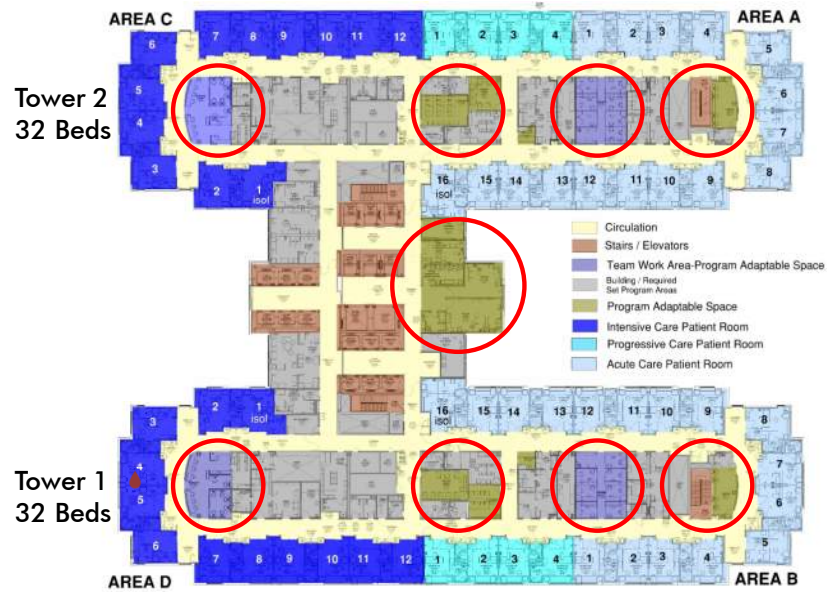


**PATIENT AND STAFF SUPPORT**

- Program adaptable space
- access to resources
- respite
- remote monitoring
- eICU

**AREAS THAT COULD FLEX**

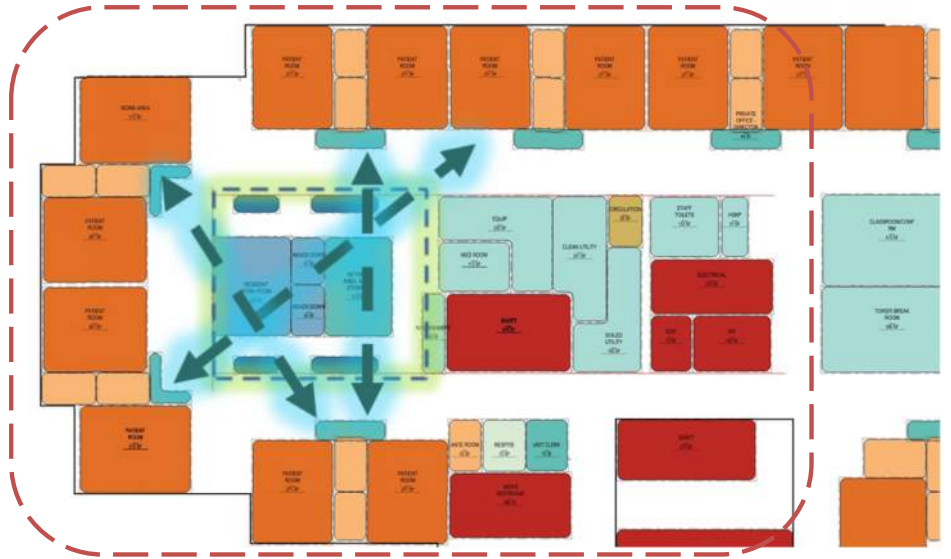
- create more staff respite on the unit



# EXAMPLES OF DESIGN OPPORTUNITIES

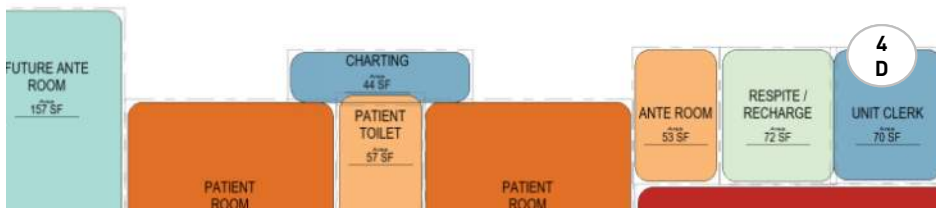
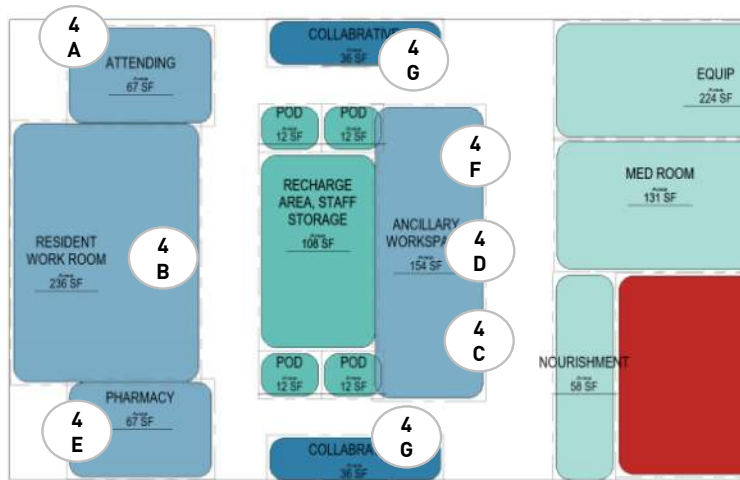
# DESIGN OPPORTUNITIES: **WORKSPACE WITH HIGH VISIBILITY**

 PATIENT     STAFF     STAFF SUPPORT     BLDG STRUCTURE





# 12<sup>th</sup> FLOOR MICU: SPACE PROGRAM – DETAIL ON WORKROOM



## PROGRAM ELEMENTS:

### • Workrooms (4 per floor)

- Provider Team - 11 PER WORKROOM

4 A Attending | Fellow: 2 workspaces per workroom

4 B Residents: 7 workspaces per workroom

4 C Nursing Care Tech: 1 workspaces per workroom

4 D Unit Clerk: 1 per tower

- Consultative Team - 5 PER WORKROOM

4 D RT: 2 workspaces per workroom

4 E Pharmacist: 2 workspaces per workroom

4 F Pharm Tech: 1 workspaces per workroom

- Open Workstations or Collaborative Space – 4/WR

4 G Open : 4 workspaces per workroom

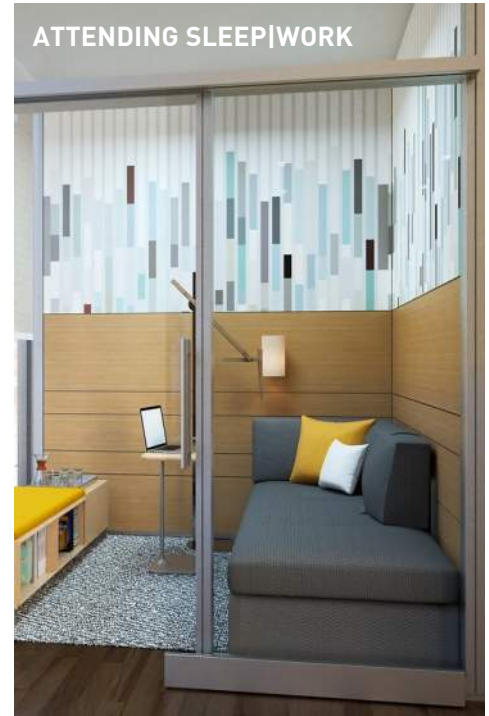


## DESIGN OPPORTUNITIES: **WORKSPACE WITH HIGH VISIBILITY**



 **WORKROOMS**

# DESIGN OPPORTUNITIES: STAFF RESPITE, BREAK, AND STORAGE



Respite allows one to rejuvenate. Respite is also a brief escape from a difficult situation. It promotes solitude and individual time to reflect and organize one's thoughts and feelings. Respite is essential to one's wellness, and respite spaces are essential to the healthcare environment.

Healthcare systems promote healing and wellness, and provide extra services to promote health, healthy lifestyles, and spaces to make patients feel healthier and fresh. Respite Spaces are one of these spaces. Essential elements of respite spaces can include shielding that gives a sense of security, components that promote relaxation and free-flowing ideas, along with objects that create appeal or comfort.



## STAFF RESPITE

# DESIGN OPPORTUNITIES: STAFF RESPITE, BREAK, AND STORAGE



## TYPE OF RESPITE (AND QTY)

- 1 COMMUNAL BREAK ROOM (2)
- 2 LACTATION ROOM (2)
- 3 SMALL RECHARGE (2)
- 4 GROUP RECHARGE/STORAGE (4)
- 5 SMALL RECHARGE/SHOWER (2)
- 6 ATTENDING | FELLOW WORK/SLEEP (1)

12<sup>TH</sup> FLOOR MICU: STAFF RESPITE LOCATIONS



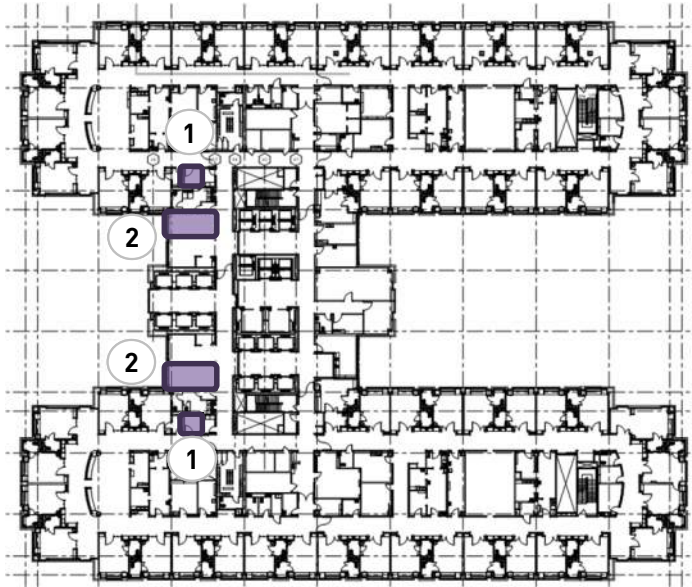
“where occupants of the facility may go to **recharge and refocus**”

Graham, L., & Fain, C. (2007). “Places of Respite”: Designing Healing Experiences for Staff, Patients, and Visitors in Healthcare Facilities. *International Journal of the Humanities*, 5(4).



“It was found that staff break areas are more likely to be used if they are in **close proximity to nurses’ work areas**, if they have **complete privacy** from patients and families, and if they provide opportunities for individual privacy as well as socialization with coworkers.”

# DESIGN OPPORTUNITIES: PRIVATE SPACES



Private Space for staff and family consultation.

The design will provide opportunities for private consult rooms in waiting area to prompt dying with dignity conversations and provide space for private conversations between the staff and the patient's families.

Palliative care is an interprofessional specialty as well as an approach to care by all clinicians caring for patients with serious and complex illness and is an essential component of comprehensive care for critically ill patients from the time of ICU admission. It is important to provide private spaces that promote DIGNITY, COMFORT, and SERENITY.



# DESIGN OPPORTUNITIES: eICU, TECHNOLOGY, AND PATIENT CARE

**BEDSIDE PATIENT CARE**



**REMOTE PATIENT CARE**



**NEARBY PATIENT CARE**



## **TECHNOLOGY CONSIDERATIONS:**

Technologies will be reviewed to enhance the patient care environment with the goal of reducing the physical interaction between the patient and the caregiver, decrease alarm fatigue, minimize the workflow, and reduce operational costs. These enhancements could include the following:

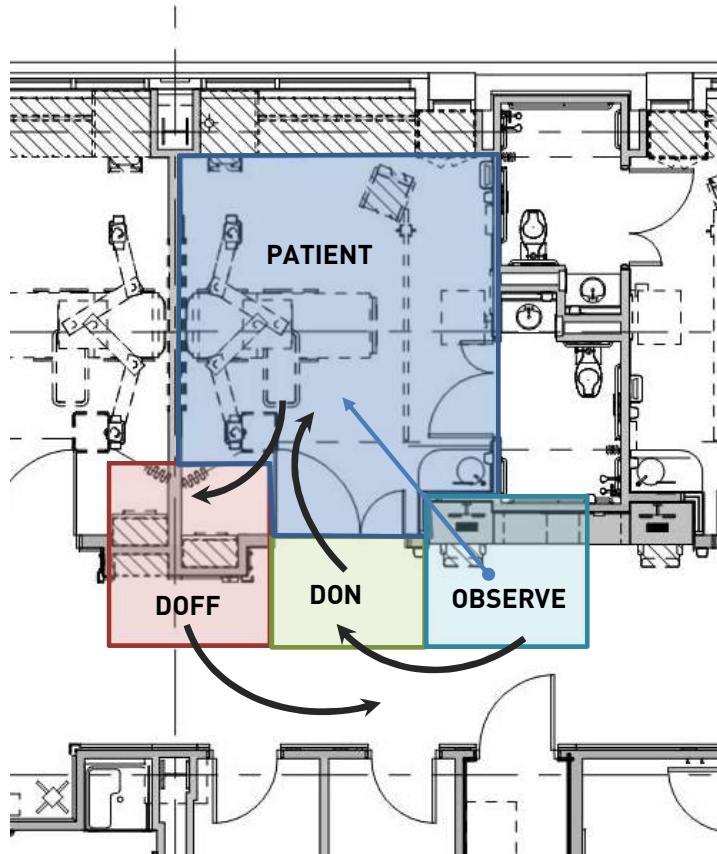
- Patient Monitoring and Ventilators could be operated outside the room if necessary.
- Ventilators could have the ability to be reviewed anywhere within the hospital remotely.
- EICU and the Video monitoring system will be reviewed for effectiveness and redundancies.
- Nurse call, Patient Monitoring, and Ventilator alarm review.
- Digital Patient Information Boards with interfaces to clinical and nurse call systems



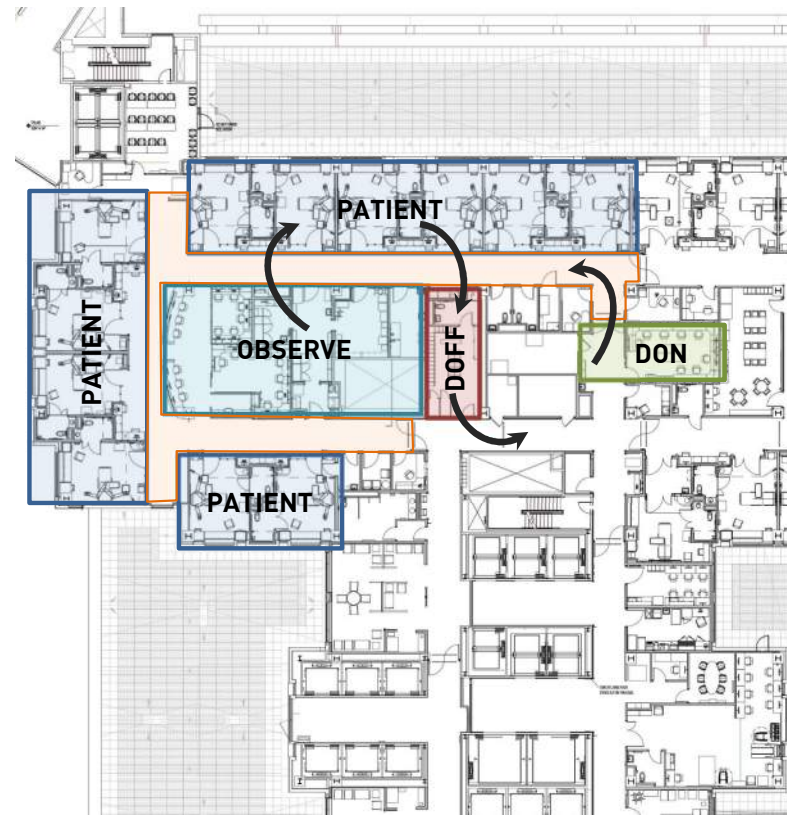
# FLEXIBLE SCALABLE SCENARIOS

Process and Flows

PPE - Donning/Doffing  
Supply Delivery and Removal Flow  
Access to resources



**DONNING AND DOFFING  
AT THE PATIENT ROOM**



**DONNING AND DOFFING  
HALF TOWER SCENERIO**

# DESIGN OPPORTUNITIES: FLEXIBLE CORRIDOR



**VERSATILITY**



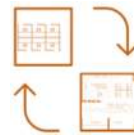
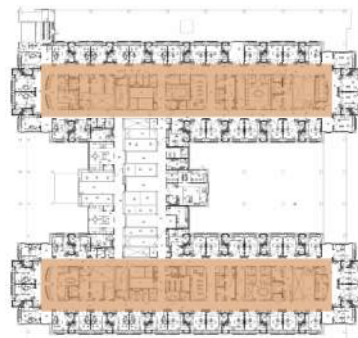
**MODIFIABILITY**



**CONVERTIBILITY**



**SCALABILITY**



## CONVERTIBILITY

Adapts a space for new a use while keeping the base building the same. Planning is required for future changes. Convert or change the 3'-0" flex zone.

Today PPE cabinet...  
next year storage cabinet...  
following year equipment

## WHY A FLEXIBLE CORRIDOR

- Creates flexible use of the corridor for a future crisis
- Use of flexible, removable modular casework solutions to provide space in corridor for medical equipment during crisis
- Continue remote monitoring
- Expanded use of the corridor for rounding or collaboration

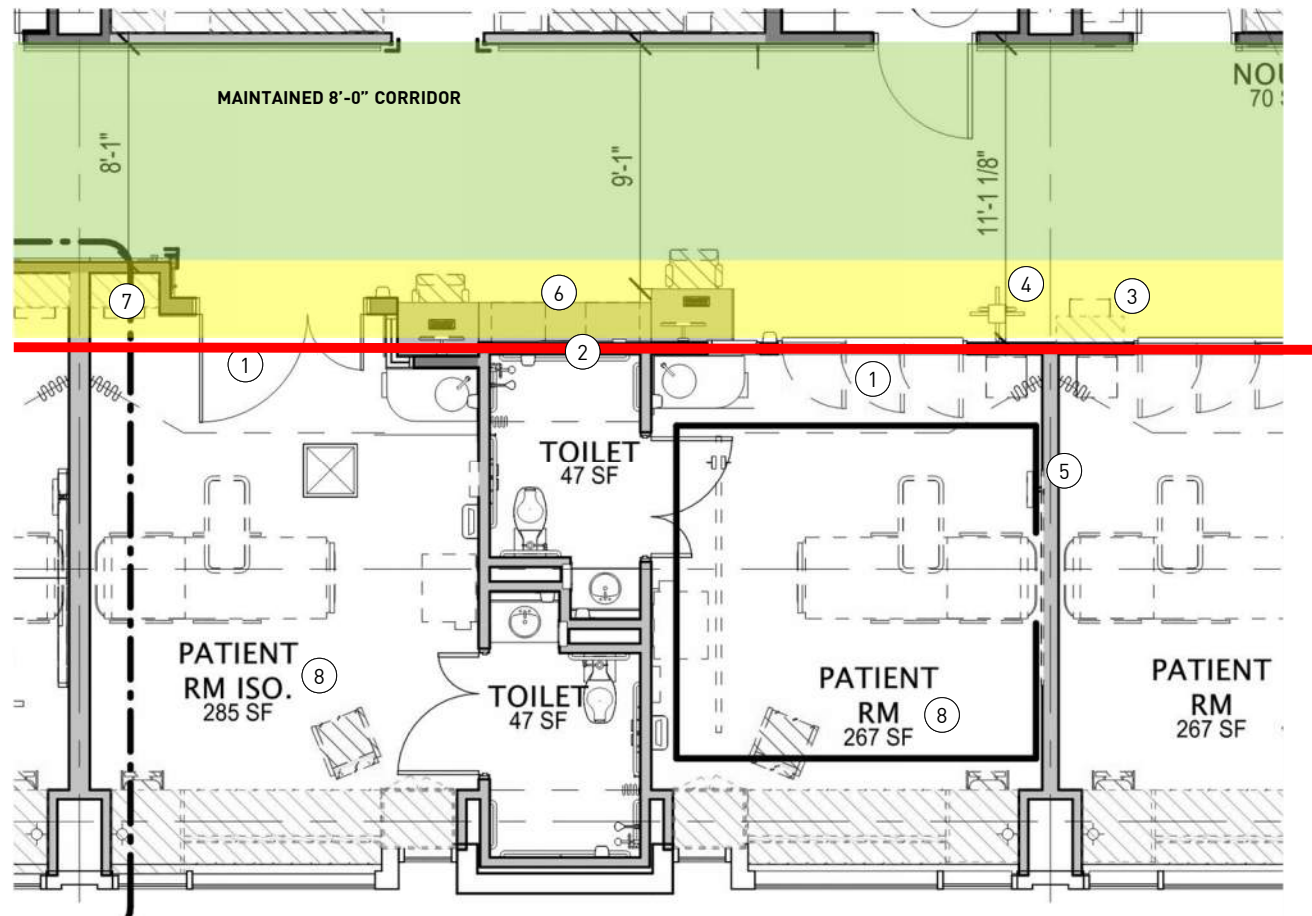




## DESIGN OPPORTUNITIES: FLEXIBLE CORRIDOR

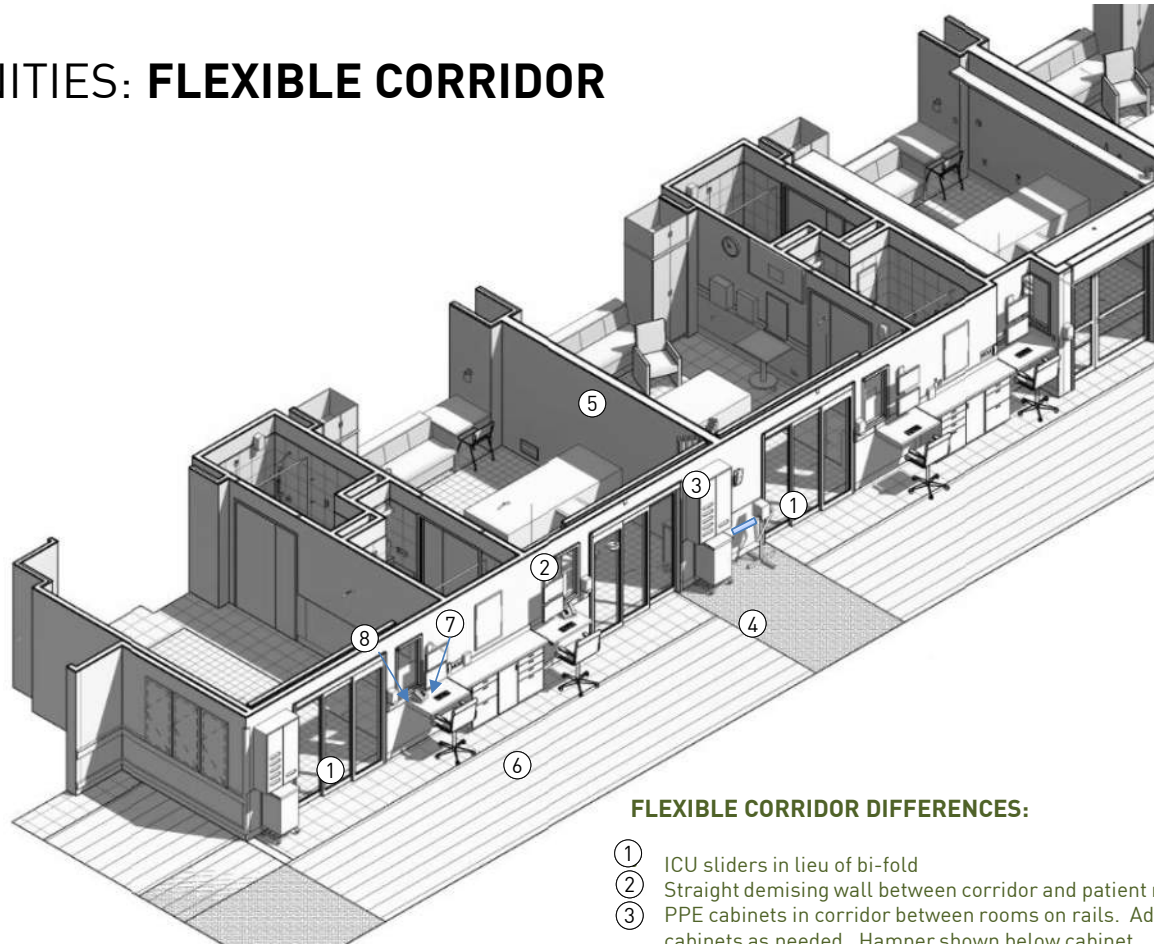
### FLEXIBLE CORRIDOR DIFFERENCES:

- ① Change to ICU sliders in lieu of bi-fold
- ② Straight demising wall between corridor and patient rooms
- ③ PPE cabinets in corridor between rooms on rails. Add additional cabinets as needed. Hamper shown below cabinet.
- ④ Additional Equipment outside room
- ⑤ Modular headwall with removable panels and access into headwall. Provide controls in corridor.
- ⑥ Decentralized Nurse Station casework on rails. Flexible.
- ⑦ Lose storage cabinet inside room
- ⑧ Patient Rooms are 18 SF smaller. Minimum critical care room is 250 SF



# FLEXIBLE CORRIDOR

# DESIGN OPPORTUNITIES: FLEXIBLE CORRIDOR



**ISOMETRIC VIEW | FLEXIBLE CORRIDOR**

## FLEXIBLE CORRIDOR DIFFERENCES:

- ① ICU sliders in lieu of bi-fold
- ② Straight demising wall between corridor and patient rooms
- ③ PPE cabinets in corridor between rooms on rails. Add additional cabinets as needed. Hamper shown below cabinet.
- ④ Additional equipment outside room. Could convert later
- ⑤ Modular headwall with removable panels and access into headwall. Possible to provide controls in corridor.
- ⑥ Decentralized Nurse Station casework on rails. Flexible. We can add lockers here or whatever storage is needed
- ⑦ Double Monitors at decentralized workstation
- ⑧ Window into patient room



**KEY**  
**TAKE-AWAYS**

## IN SUMMARY

1. The pandemic is the perfect opportunity to **drive innovation** in both design and construction.

2. Changes at the **system and policy level** are necessary to make a lasting impact.

3. It is time to move beyond traditional design-build and prefab to **Industrialized Construction.**

4. **Flexibility and acuity adaptability** through multiple facets will be even more important going forward.

5. Fully understand your client's **operational flows** through observation and gemba walks.

6. Use a **data-driven process** to support your recommendations.



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**THANK YOU.**