

# Session 4: Part 2

## *The Future of Healthcare*



Oklahoma Association of Healthcare Engineers  
2019 Fall Regional Event

October 11, 2019



# The Future of Healthcare

## 1. MACRO TRENDS

- Virtual Telemedicine
- Solving the Problem of Overworked Clinicians
- Continued Drive for Value

## 2. CONSTRUCTION TRENDS

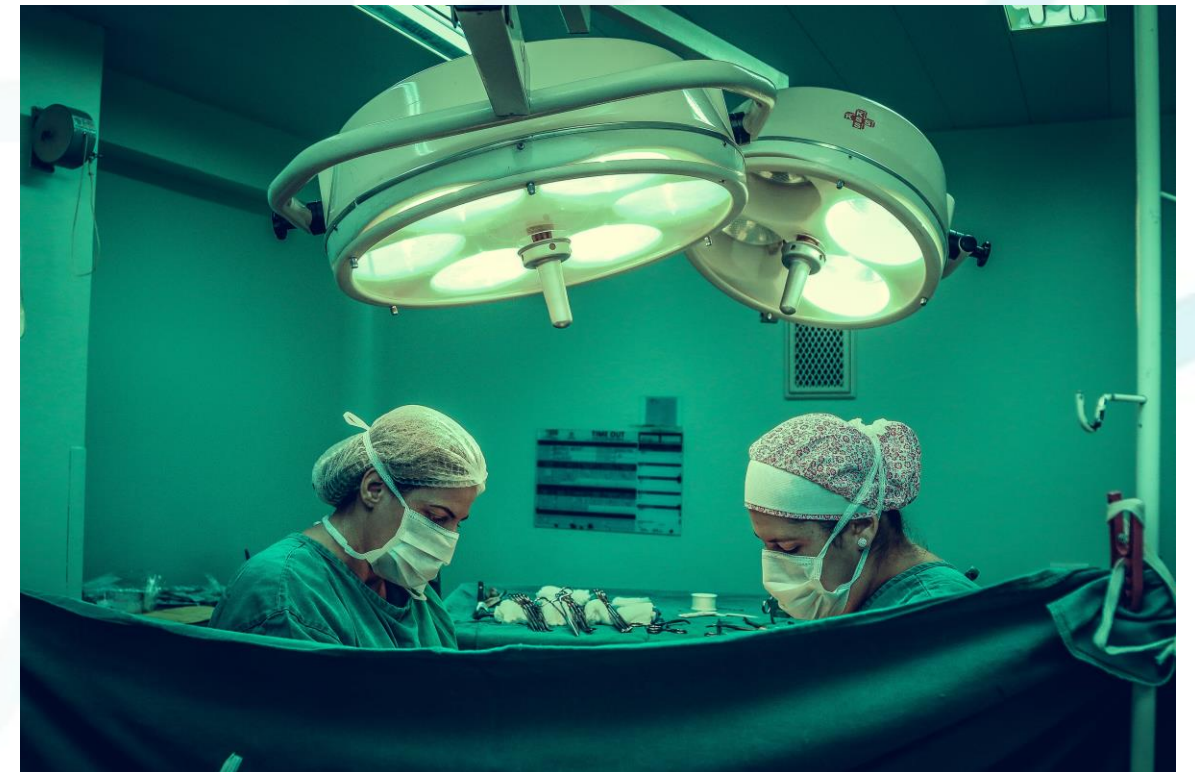
- Lack of Skilled Trade Labor
- Integrated Design and Construction

## 3. EVIDENCE-BASED RESEARCH TRENDS

- Case Study 1: Clemson Operating Room Simulation Study
- Case Study 2: Critical Access Hospital Study by HFG + KU Health and Wellness Program in the School of Architecture

## 4. WHAT IS THE FUTURE OF HEALTH CARE DESIGN

- On-Stage / Off-Stage Design
- Patient Centered Care and Other Topics





# Macro Trends



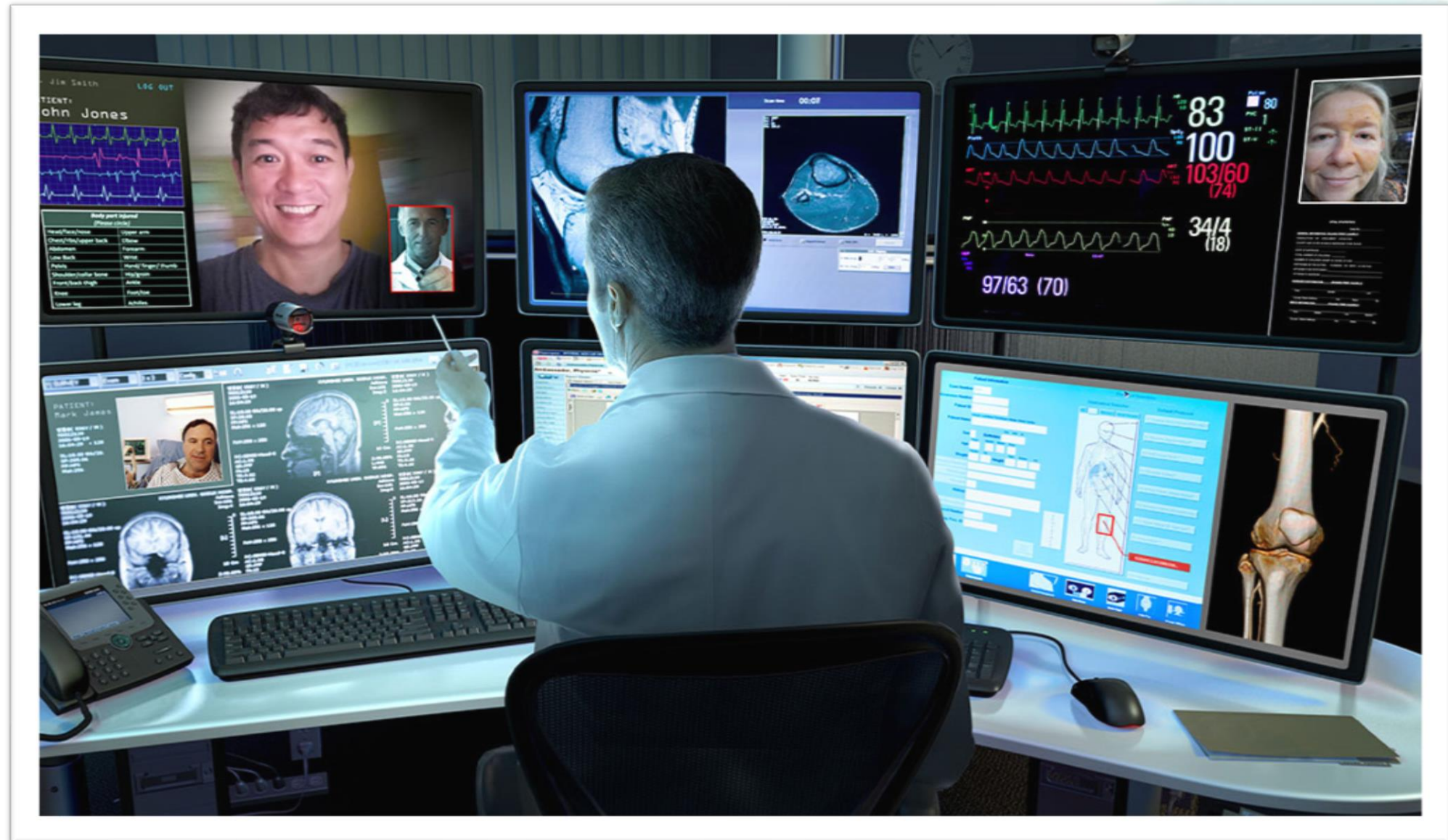
# Virtual Telemedicine



*Virtual Care Center at Mercy*



# Virtual Telemedicine



Kaiser-Permanente: 50% of patient encounters are virtual

# Solving the Problem of Overworked Clinicians

- Electronic Medical Records not always working well
- Shortage of 100,000 physicians
- Loss of autonomy related to the explosion of data





# Solving the Problem of Overworked Clinicians



# Solving the Problem of Overworked Clinicians

- Electronic Medical Records not always working well
- Shortage of 100,000 physicians
- Potential Solutions:
  - More mid-level providers
  - More virtualization
  - Fewer in-person encounters
  - Spaces designed to give respite and relieve stress and drive for efficiency and collaboration





# Continued Drive for Value

- The “Drive for Value” as opposed to “Fee for Service” is here to stay
- Healthcare is asking the question, “How do we keep people well?”
- Social Determinants and Health
  - Homelessness leads to more frequent, more expensive healthcare
  - Lower socioeconomic status leads to poorer quality food



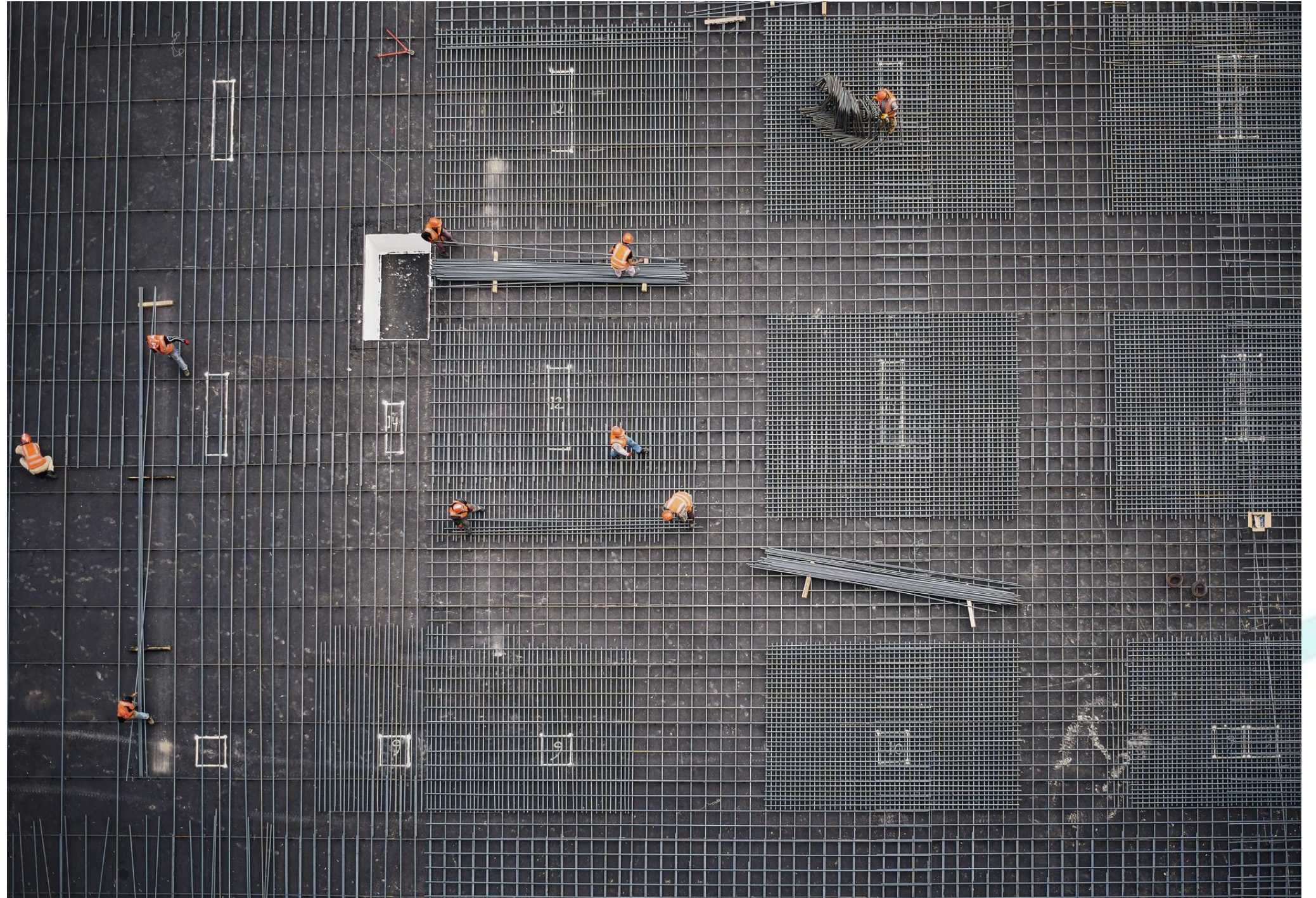
# Continued Drive for Value

- Community Partnerships
- Healthcare providers thinking about how to “bend the curve” on homelessness, poverty and food insecurity as a way to reduce healthcare cost.
- Continued push for Wellness
  - We spend just under 20% on healthcare – how are we spending the other 80%?





# Construction Trends





# Lack of Skilled Trade Labor

- Trends:
  - More integrated approaches to design and construction
  - Drive towards pre-fabrication
  - Quality and control conditions
- Pressures:
  - Pressure to speed product to market
  - Healthcare construction is more complex than ever





# Lack of Skilled Trade Labor

This is the desire of the market:



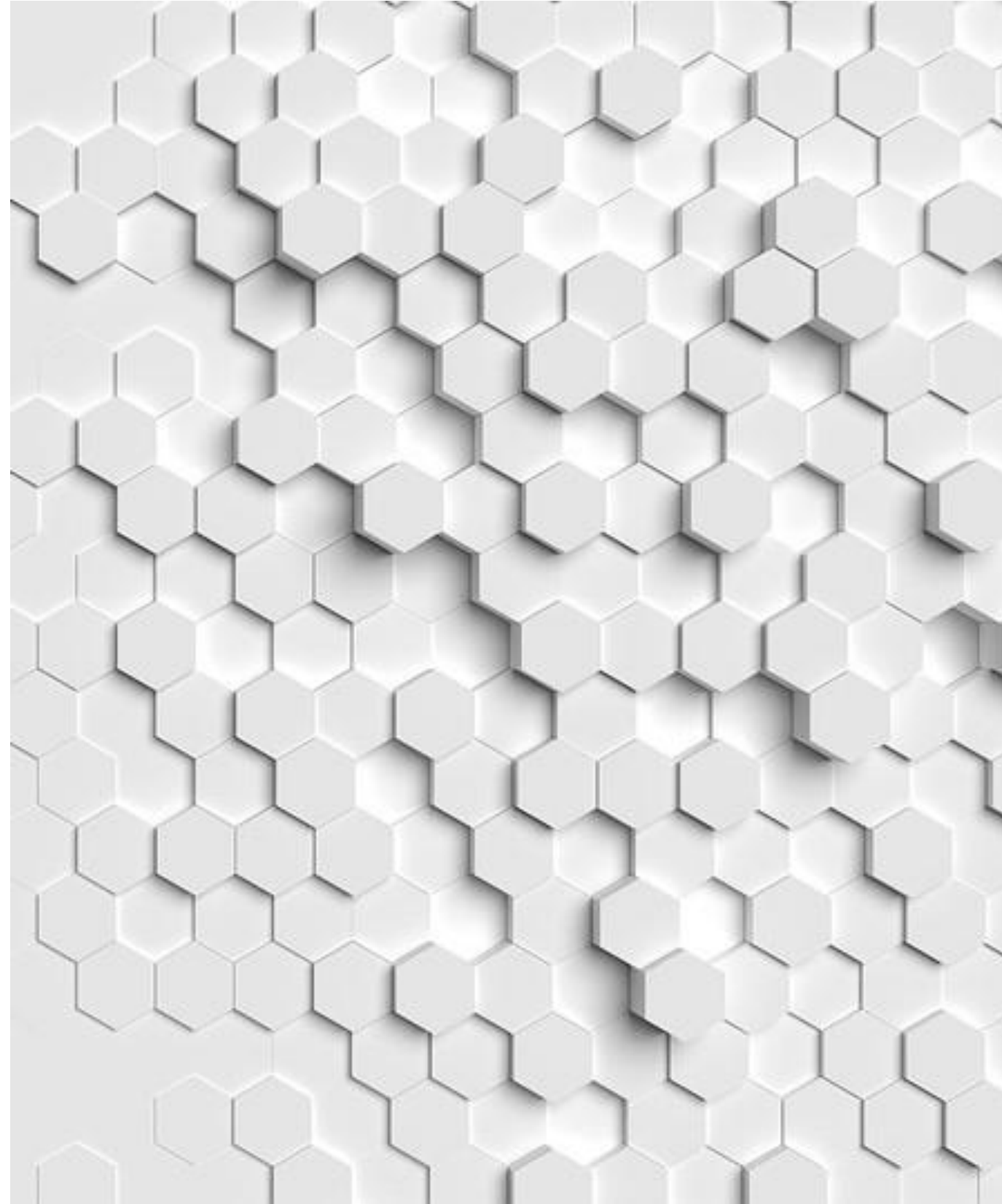
# Lack of Skilled Trade Labor

- We are still building like it is 1981.
- The time is ripe for transformation.
  - Integrated Building and Design processes – “Design Assist” – “IPD”
  - Pre-fabrication
  - Lean Design and Construction Practices
  - Time to make being a “tradesman” a sought-after vocation





## Evidence-Based Research Trends



# Case Study 1: Clemson Operating Room Simulation Study

*DISRUPTING FROM THE INSIDE OUT TO CREATE DYNAMIC HUMAN-CENTERED OPERATING ROOM ENVIRONMENTS*

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 Center for Biomedical Ethics and Society Vanderbilt  
 University Medical Center (VUMC)




**VANDERBILT UNIVERSITY**

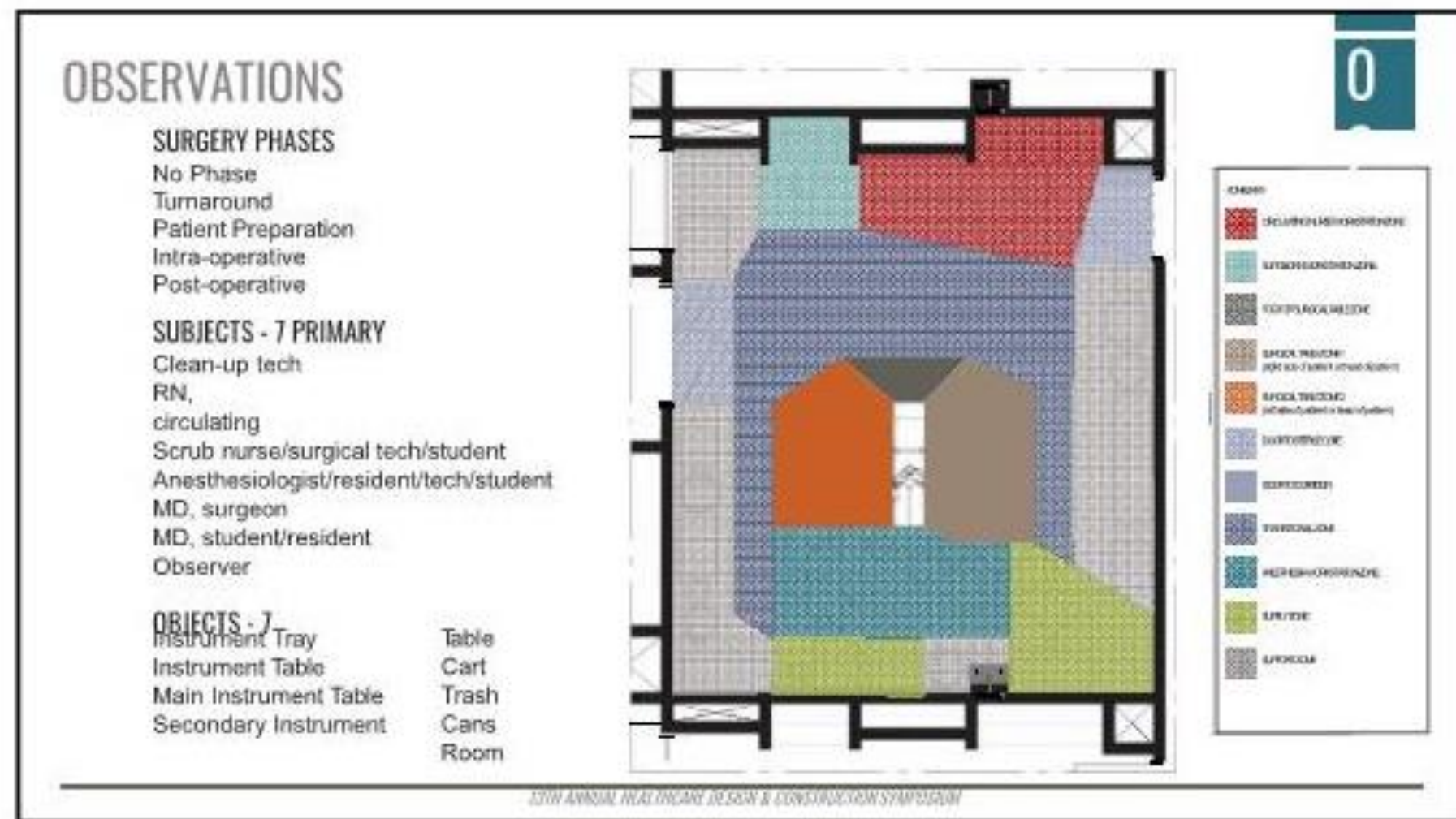
**MEDICAL CENTER**

13TH ANNUAL HEALTHCARE DESIGN & CONSTRUCTION SYMPOSIUM



# Case Study 1: Clemson Operating Room Simulation Study

➤ Observation



# Case Study 1: Clemson Operating Room Simulation Study

## ➤ Observation

**OBSERVATIONS**

**02**

**FLOW DISRUPTIONS**  
Usability  
Layout  
Environmental hazard  
Equipment failure  
Interruptions

**DOOR OPENINGS**  
Door to Sterile Core  
open Door 1 Corridor  
open Door 2 Corridor  
open



2019 ANNUAL MEETING DESIGN & CONSTRUCTION SYMPOSIUM

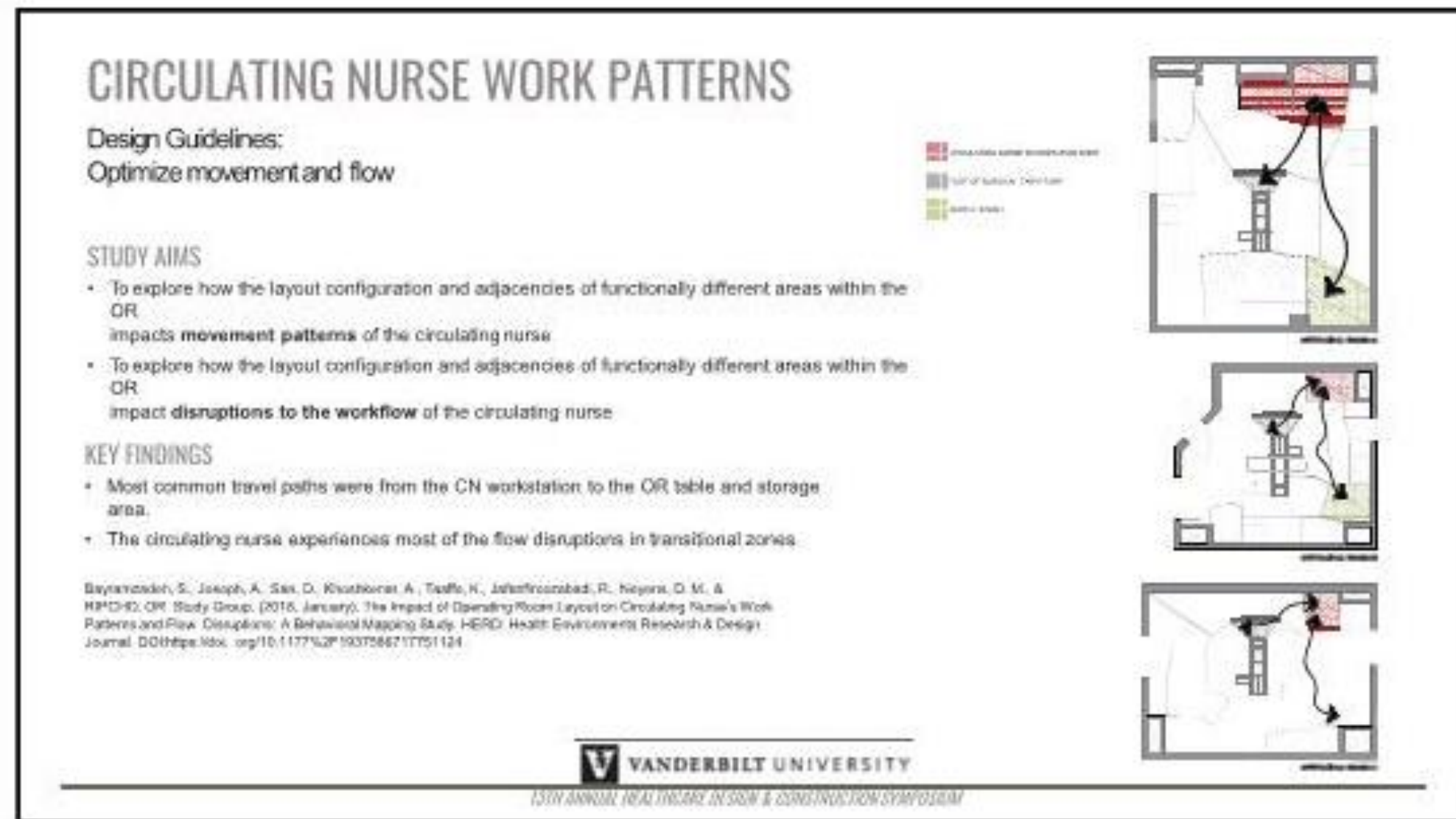


➤ Testing Sizing and Layout



# Case Study 1: Clemson Operating Room Simulation Study

## ➤ Work-Flow Analysis





# Case Study 1: Clemson Operating Room Simulation Study

## ➤ Surgical Case Flow Disruptions

### SURGICAL FLOW DISRUPTIONS


**Design Guidelines:**  
Reduce disruptions  
Optimize movement and flow

**STUDY AIMS**

- Explore how minor and major flow disruptions are related in terms of the people involved, tasks performed and OR traffic, as well as the location of FDs and other environmental characteristics of the OR that may contribute to these disruptions.
- Understand how layout and traffic affects the occurrences of both minor and major flow disruptions during surgery

**KEY FINDINGS**

- Minor flow disruptions that occurred while performing equipment-related activities were related to increases in major flow disruptions.
- An increase in minor disruptions in the transitional zone that connects the CN workstation zone with the foot of the surgical table was slightly related to an increase in the rate of major flow disruptions.
- The number of transitions between OR zones and the overall density or crowdedness in the OR significantly impacted the occurrence of any type of flow disruption.



Joseph, A., Kivshina, A., Taffo, K., Catipole, K., Mackay, H., & Dayaratne, S. (2018, August 29). Minor flow disruptions, traffic-related factors and their effect on major flow disruptions in the operating room. *BMJ Quality & Safety*, 27-31. <https://doi.org/10.1136/bmjqs-2018-027557>

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15TH ANNUAL HEALTHCARE DESIGN & CONSTRUCTION SYMPOSIUM

# Case Study 1: Clemson Operating Room Simulation Study

## ➤ Infection Control Analysis

02

### BACTERIAL LOAD SAMPLING

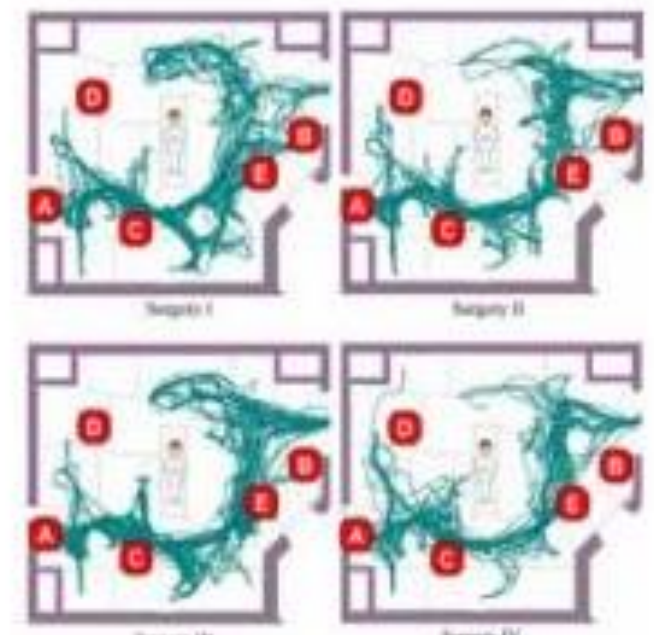
**Design Guidelines:**  
Minimize surface and airborne contamination

**STUDY AIMS**

- Understand how the movement of the patient, equipment, materials, staff and OR door openings affects OR microbial loads at various locations
- Offer evidence-based guidelines for OR workflow design.

**KEY FINDINGS**

- Analysis of the air sampling data did not demonstrate differences by location in the bacterial load.
- Higher traffic areas in the OR have a higher microbial load than the lower traffic areas.
- The number of door openings did not have a significant impact.
- All hierarchical regression models of the settle plate CFU identified the sampling timeframe as significant.



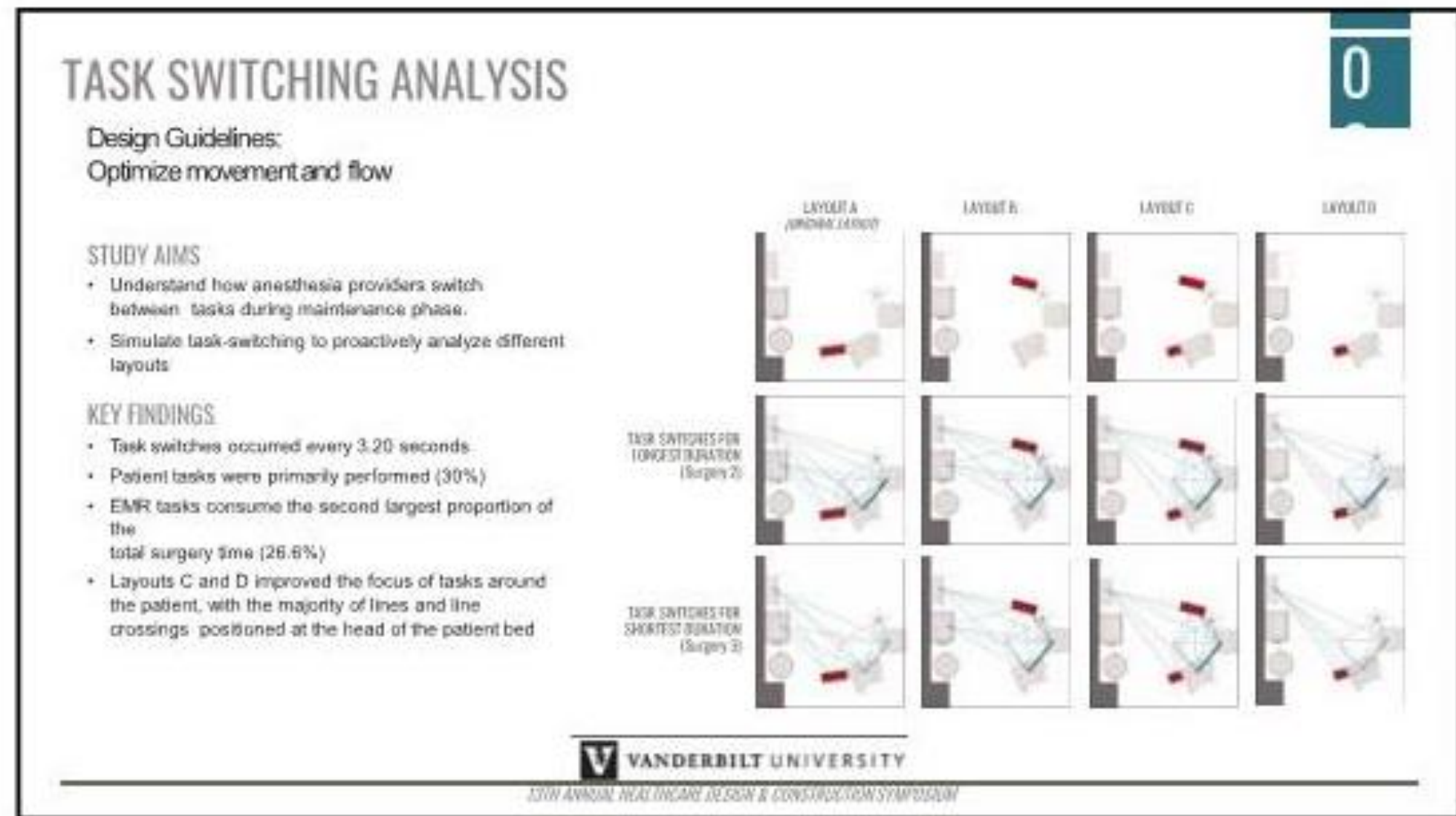
Tsai, K., B. Lee, Y. Farand, L. Fredendall, D. San, C. Salgado, D. Shvorn, A. Roshkier, and S. Reeves. 'The influence of traffic, area location, and other factors on operating room microbial load,' in review with Infection Control and Hospital Epidemiology.

**VANDERBILT UNIVERSITY**  
2019 ANNUAL HEALTHCARE DESIGN & CONSTRUCTION SYMPOSIUM



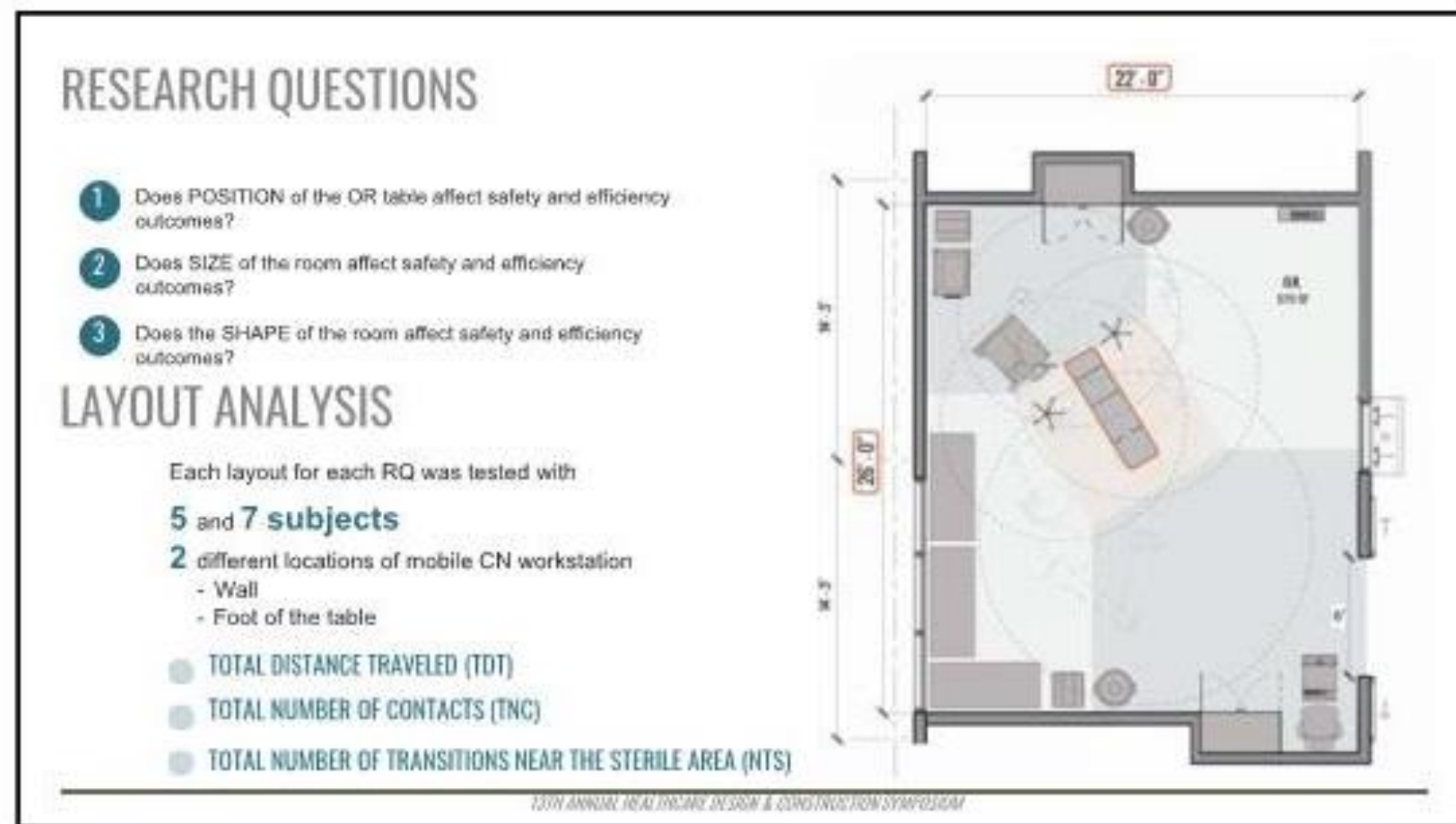
# Case Study 1: Clemson Operating Room Simulation Study

## ➤ Task Switching Analysis



# Case Study 1: Clemson Operating Room Simulation Study

- The Optimal Sizing and Layout of an OR





# Case Study 2: Critical Access Hospital Study by HFG + KU School of Architecture Health and Wellness Program

Current Research looking at areas of recently designed CAH hospitals to study outcomes and for elements of commonality and what has worked and what continues to need to be improved

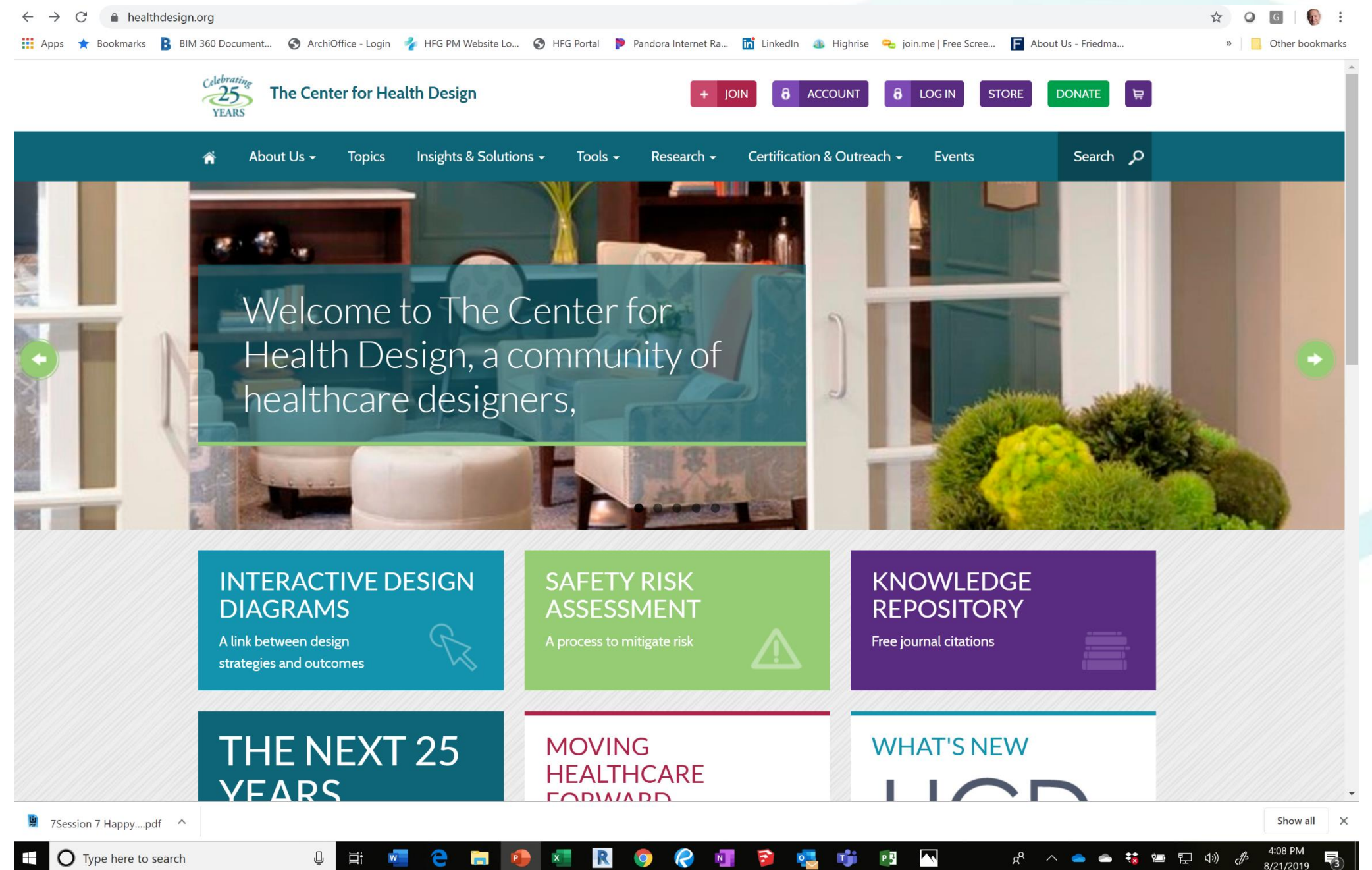


HFG ARCHITECTURE



# Other Resources

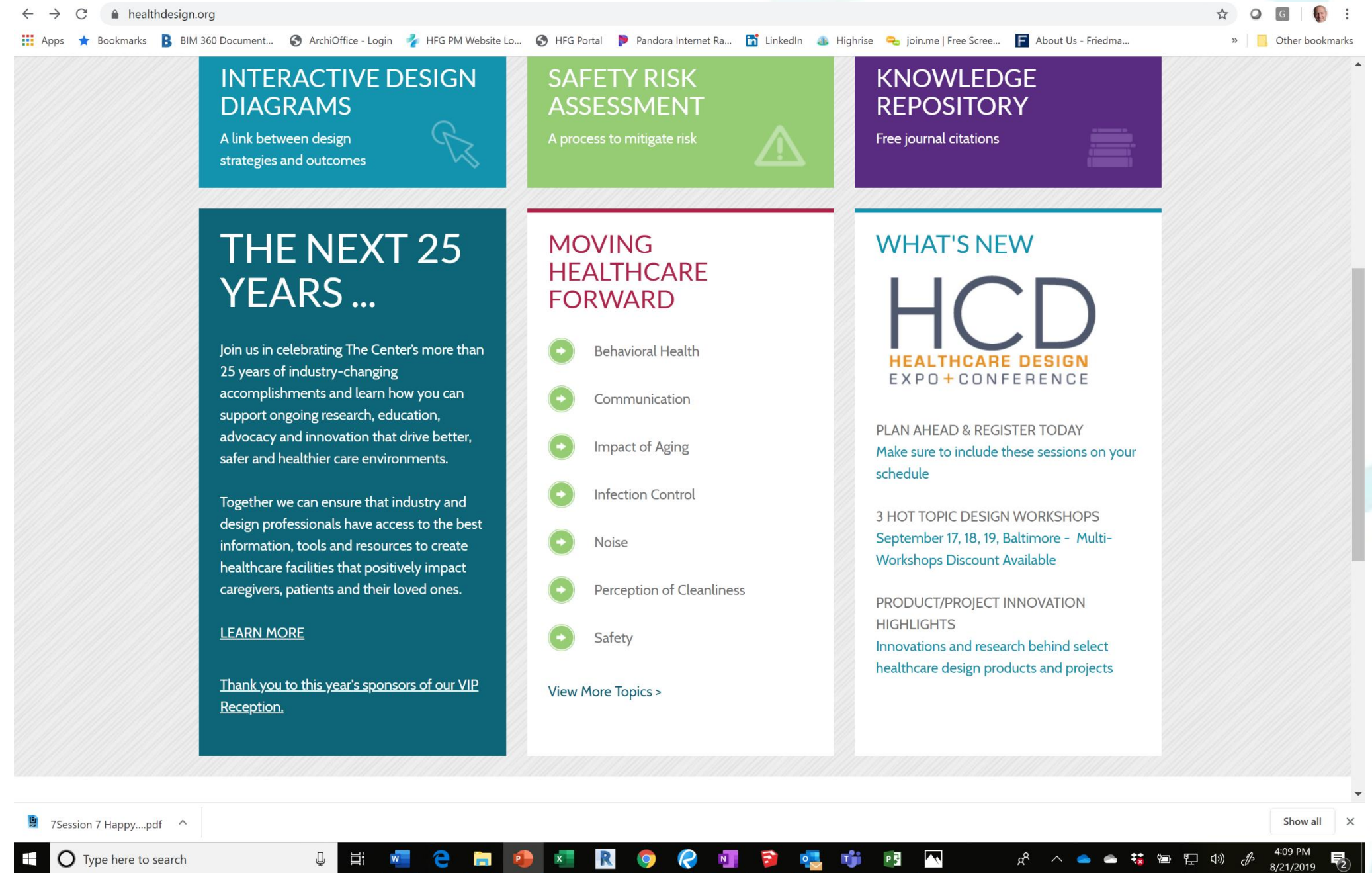
- Many sources of good research into elements of healthcare environments
- Healthdesign.org





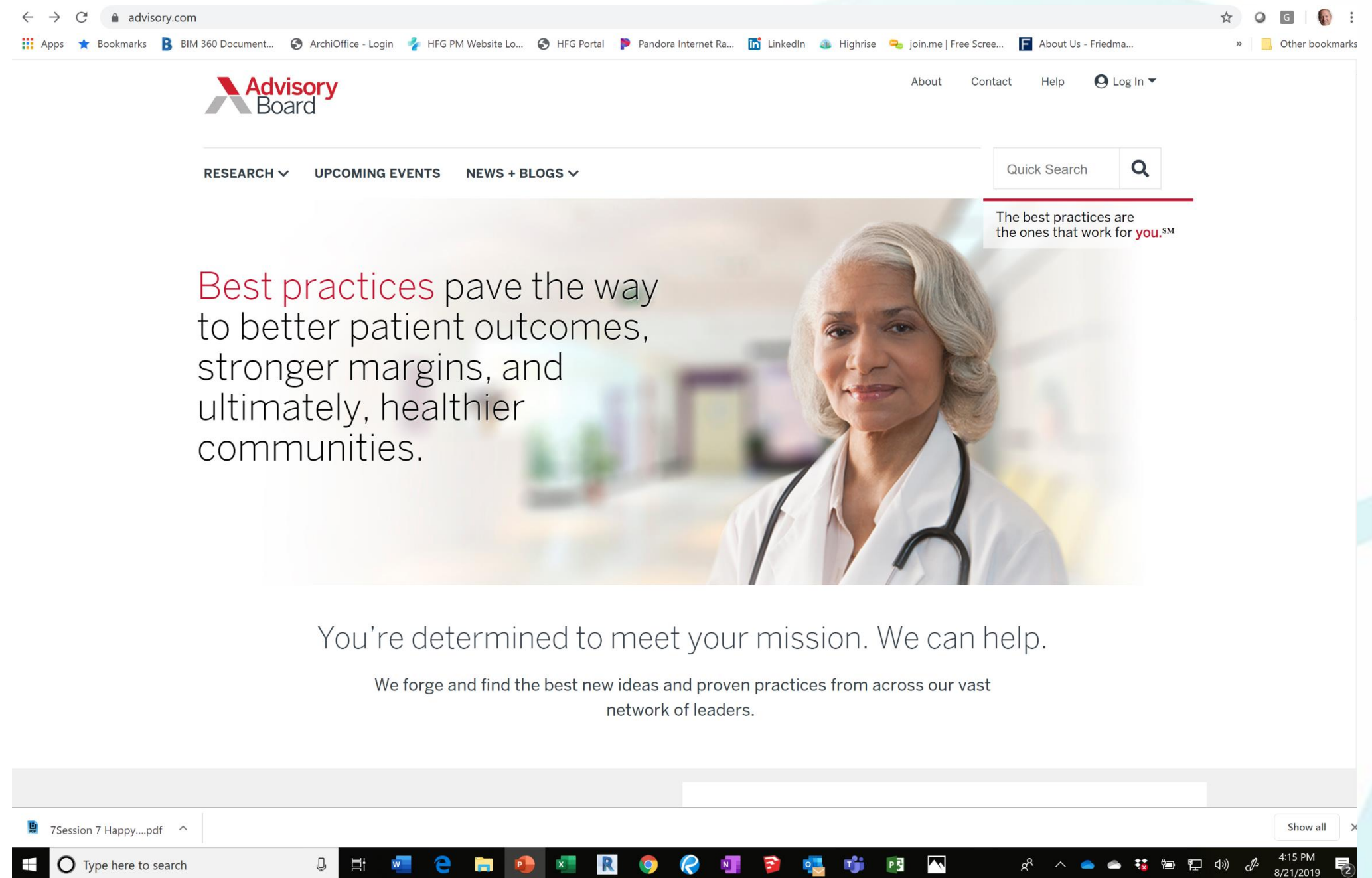
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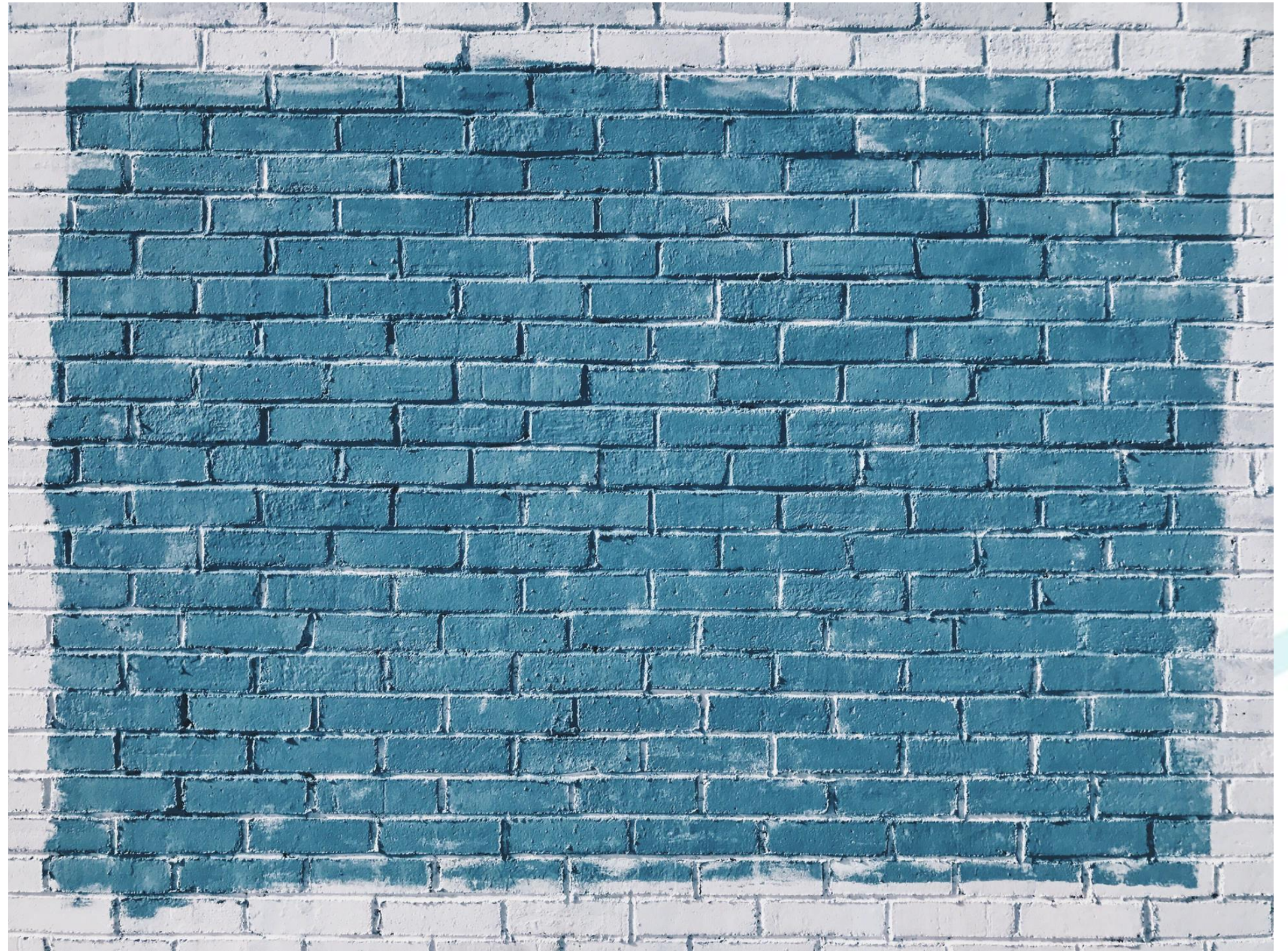
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- Advisory Board at Advisory.com





# Design Trends





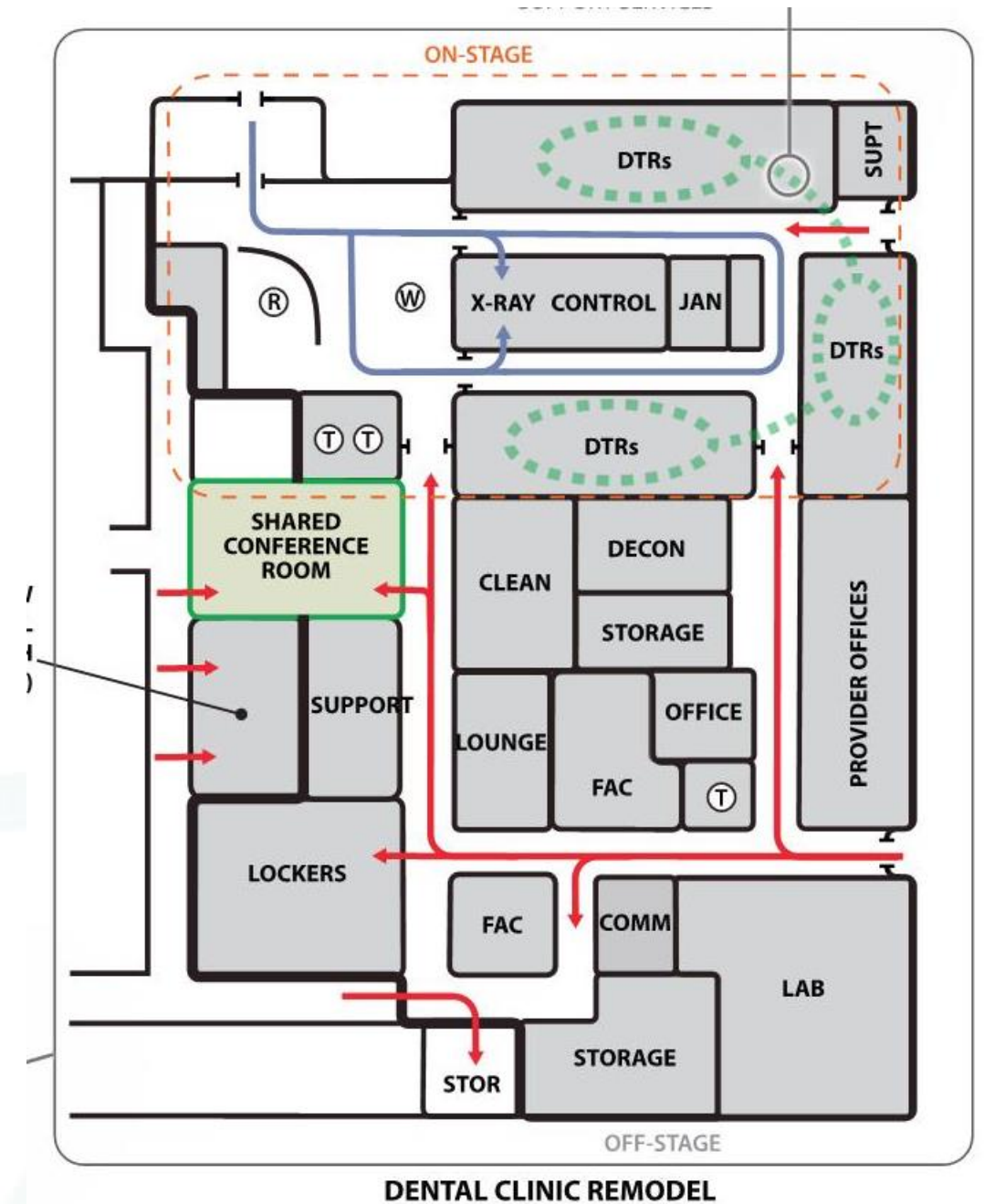
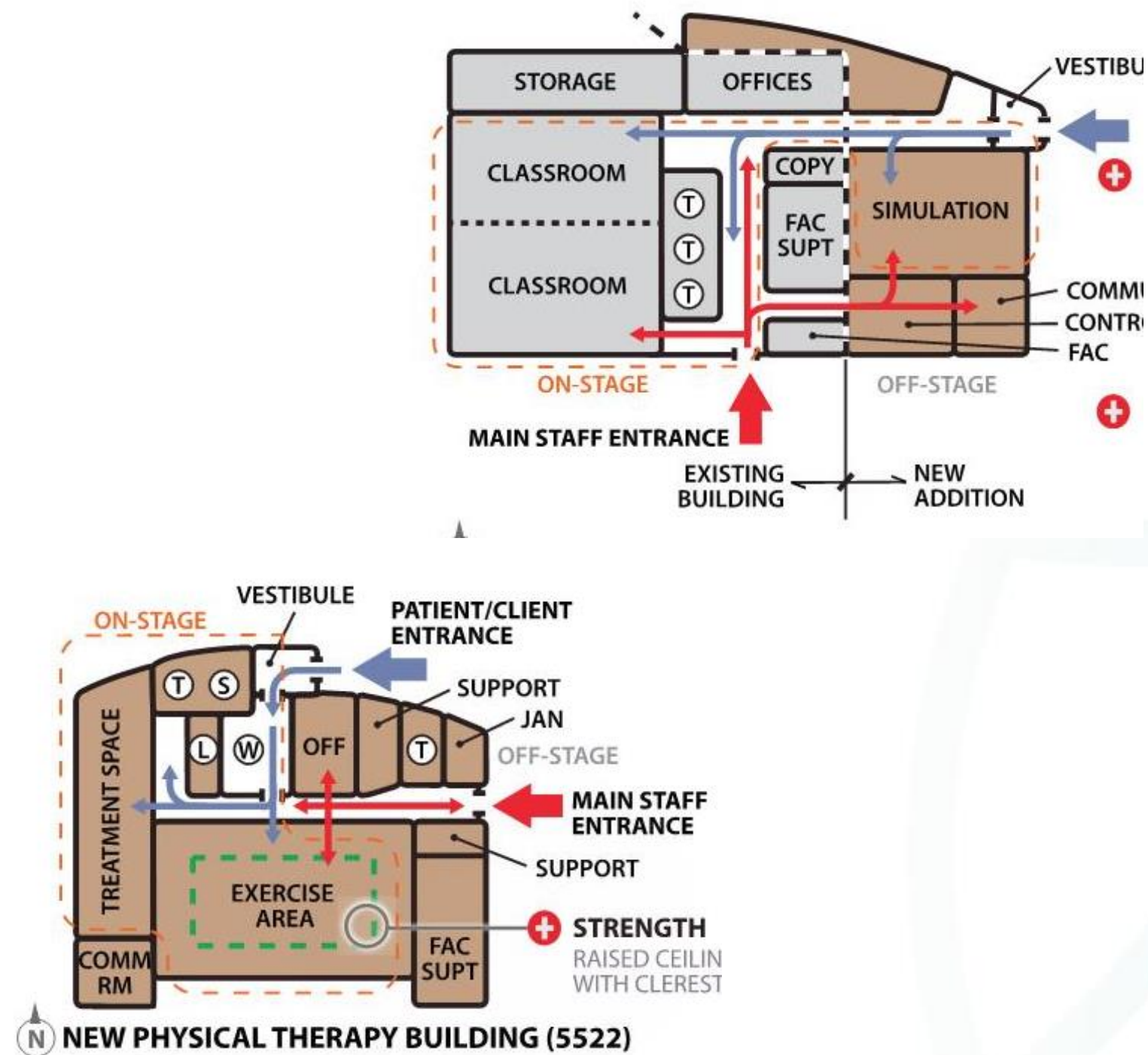
# On-Stage / Off-Stage Design

- Creates ability for staff to work out of the flow





# On-Stage / Off-Stage Design



## LEGEND

- |                               |                  |
|-------------------------------|------------------|
| (R) RECEPTION                 | (S) SHOWER       |
| (W) WAITING                   | (L) LOCKERS      |
| (T) TOILET                    | NEW CONSTRUCTION |
| → PATIENT/CLIENT CIRCULATION  | RENOVATED SPACE  |
| → STAFF/LOGISTICS CIRCULATION | SHARED SPACE     |
| → AMBULANCE ACCESS            |                  |
| - - - ON-STAGE                |                  |

# Patient Centered Care – Biophilia and other “touchy-feely” topics architects are known to promote

Article 1 – How Architects ruined healthcare - <https://www.theglobeandmail.com/opinion/article-how-architects-ruined-healthcare/>

OPINION

## How architects ruined healthcare

JOSHUA LANDY

CONTRIBUTED TO THE GLOBE AND MAIL  
PUBLISHED MAY 24, 2019

22 COMMENTS

Joshua Landy is a practising critical care physician and the co-founder of Figure 1.



The main lobby of the Credit Valley Hospital in Mississauga. The rise of patient-centred care means that among the open spaces and familiar coffee shops, there's little sign of the technical aspects of medical care.

TIBOR KOLLEY/THE GLOBE AND MAIL

- “So if Physicians across the country are reporting record levels of burnout, we might ask if hospitals are the problem?”
- “If you’ve been to a hospital that was built or renovated in the last decade, you know the aesthetic. Muted pastels, potted plants, and plenty of places for patients and their families to occupy themselves. “
- “Many people, when they walk in the ground floor, they say they don’t feel like they’re in a hospital,” bragged one planner. “It’s a grand space, the lobbies, the circular openings through the lower levels, nothing says ‘hospital’ there.”
- “Bromley notes that ‘architects built few conference rooms and lounges, leaving little room for physicians and nurses to congregate.’”



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TIBOR KOLLEY/THE GLOBE AND MAIL

- “Several of the administrators and architects speak glowingly of “the Disneyland concept,” where all the messy parts are hidden “to generate a seamless fantasy world.”
- “Let’s be clear. Healthcare that does not look like healthcare is not healthcare — it is a sort of theatre created to distract an audience of anxious patients. It doesn’t serve their interests. It’s a funhouse mirror vision of patient-centred care, where it’s more important to pretend you’re not sick than to be properly treated.”

# Patient Centered Care – Biophilia and other “touchy-feely” topics architects are known to promote

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- “Business teamwork studies, including [one by, ahem, the Disney Institute](#), recognize that collegiality between colleagues is a necessary ingredient for team success.”
- “I remember one of my attendings once saying, as he flipped a series of switches in vain seeking a light to illuminate the patient’s bed from above, that people who design hospitals should be punished by being treated in them.”



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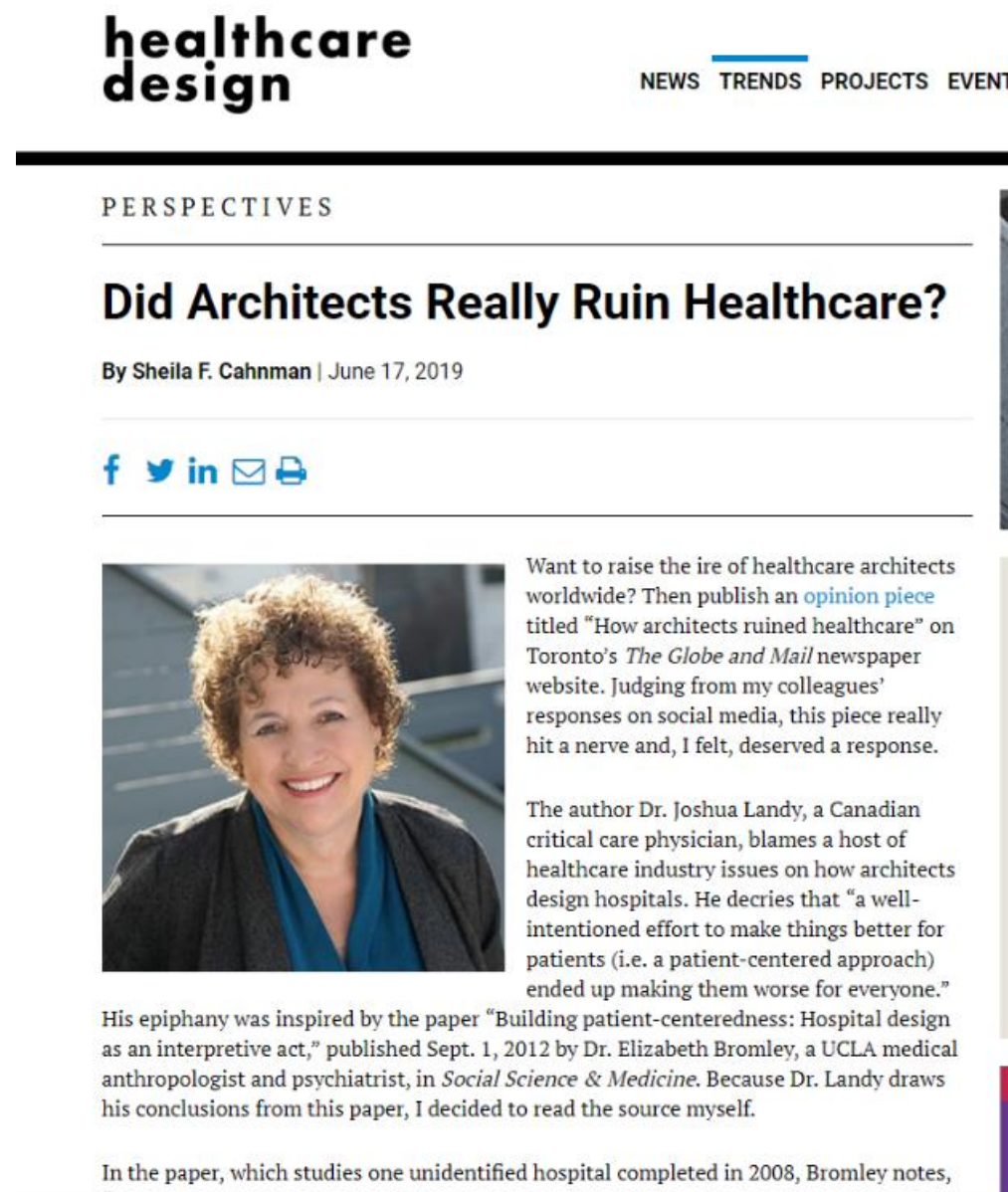
- Article 2 – Did Architects really ruin Healthcare - <https://www.healthcaredesignmagazine.com/trends/perspectives/did-architects-really-ruin-healthcare/>



- “Want to raise the ire of healthcare architects worldwide? Then publish an [opinion piece](#) titled “How architects ruined healthcare” on Toronto’s *The Globe and Mail* newspaper website. Judging from my colleagues’ responses on social media, **this piece really hit a nerve...**”
- “This particular hospital administration chose to hyper-prioritize patient-centeredness through the “Disney Effect” of all clinical spaces being off-stage.
- “Citing this one 10-year-old study, Dr. Landy states in his op-ed that “Modern hospitals are specifically designed to eliminate collegiality.”

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- Article 2 – Did Architects really ruin Healthcare - <https://www.healthcaredesignmagazine.com/trends/perspectives/did-architects-really-ruin-healthcare/>



- “Instead, I see today’s healthcare designers and clients **seeking a more balanced, research-based approach**, recognizing patient-centered care means bringing caregivers closer to patients and that supporting a team-based approach is the future of healthcare...”
- “Apparently, Dr. Landy isn’t familiar with the studies that have shown **the healing effect of nature, positive distractions, and family support in reducing patient pain and anxiety**, which ultimately could improve patients’ medical conditions.”



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- Article 2 – Did Architects really ruin Healthcare - <https://www.healthcaredesignmagazine.com/trends/perspectives/did-architects-really-ruin-healthcare/>



- “One intriguing issue I found is his op-ed was the comment that physically hiding the “messy part” of healthcare devalues medical professionals.”
- “Understanding staff psychology is an important factor in hospital design, especially as their own health and well-being is threatened. **Longer hours, increased documentation requirements, and the stress of ever more medically complex patients are contributing to staff burnout.**”
- “Despite Dr. Landy’s strident tone, **as healthcare designers we need to listen** to and unbundle the concerns of **all constituents**, especially as medicine transforms.”

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- “Finally, Dr. Landy asks, ‘Is this place built to make us healthy—or to distract us from thinking about our health?’ I don’t believe the two are mutually exclusive. People, process, and place must all support care delivery, the patient’s recovery and emotional well-being, and family involvement in a balanced approach....”





# Contact Information

Oklahoma Association of Healthcare Engineers

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