Exploring the Untapped Nexus of Ethics and Health Facility Design

UT Southwestern Medical Center

Project: Memorial Sloan Kettering Cancer Center, Perkins Eastman w/ Ennead Architects

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Note: The faculty have no relevant financial relationships with commercial interests to disclose

Learning Objectives

- Review the historical basis of healthcare design's historical influences and its current state related to shaping healthcare outcomes.
- Understand how the built environment can help resolve the conflicting obligations of isolation for disease mitigation and the need for socialization and autonomy.
- Demonstrate the increasing impact the built environment is having on healthcare as a dimension of duty of care.
- Evaluate an emerging decision framework to address the concerns identified by the evidence.

Project: Cedars-Sinai Advanced Health Sciences Pavilion; HOK

Central Thesis

Our understanding of the role the environment plays in shaping us and our interactions has expanded immensely. Researchers have examined the profound effect social and environmental factors can have on behavior and decision-making.

Yet, design choices in the built healthcare environment raise substantive bioethical issues that demand the attention of bioethicists and ethical inquiry.

The built environment is a parameter of care and must be considered alongside the others.

Sources: *Appiah, KA. Experiments in Ethics (The Mary Flexner Lectures). Boston, MA: Harvard University Press; 2008.*

Ogien, Ruwen. Human Kindness and the Smell of Warm Croissants: An Introduction to Ethics. Columbia University Press. Chichester, New York. 2011: 131-180.

Project: *Duke Student Wellness Center; Duda|Paine Architects*

Sources: Anderson, D. Hercules, W., Teti, S, The Bioethics of Built Health Care Spaces. Hastings Center Bioethics Forum Essay, Weblink, 13 Jan 2021. Accessed 12 Nov 2022.

Hercules W, Anderson D, Teti S, Deemer D. Architecture and bioethics. Health Facilities Management Magazine. Weblink. 5 Feb 2022. Accessed 12 Nov 2022.

Anderson, D., Teti, S, Hercules, W., Deemer D. The Bioethics of Built Space: Health Care Architecture as a Medical Intervention. Hastings Center Report, Weblink, 27 Apr 2022. Accessed 12 Nov 2022.

Environmental Factors Affecting Outcomes:

- Form
- Unit layout
- Floor material
- Room features
- Medical equipment visibility
- Nature
- Lighting
- Music

Source: Jamshidi S, Parker JS, Hashemi S. The effects of environmental factors on the patient outcomes in hospital environments: A review of literature. Frontiers of Architectural Research. 2020 June; 9(2):249-263. https://doi.org/10.1016/j.foar.2019.10.001

Project: Children's Hospital of Philadelphia, Buerger Center for Advanced Pediatric Care; CannonDesign;

Ethical Issues in Healthcare Design

Just as medicine is using ethical awareness to encourage and empower clinicians, healthcare architecture can benefit from a bioethics lens.

Some of the better firms involve frontline healthcare professionals in design decisions, but doing so is not required, and *there is no regulatory structure to consider the kinds of issues raised here.*

Project: Lucile Salter Packard Children's Hospital at Stanford; Perkins&Will, HGA

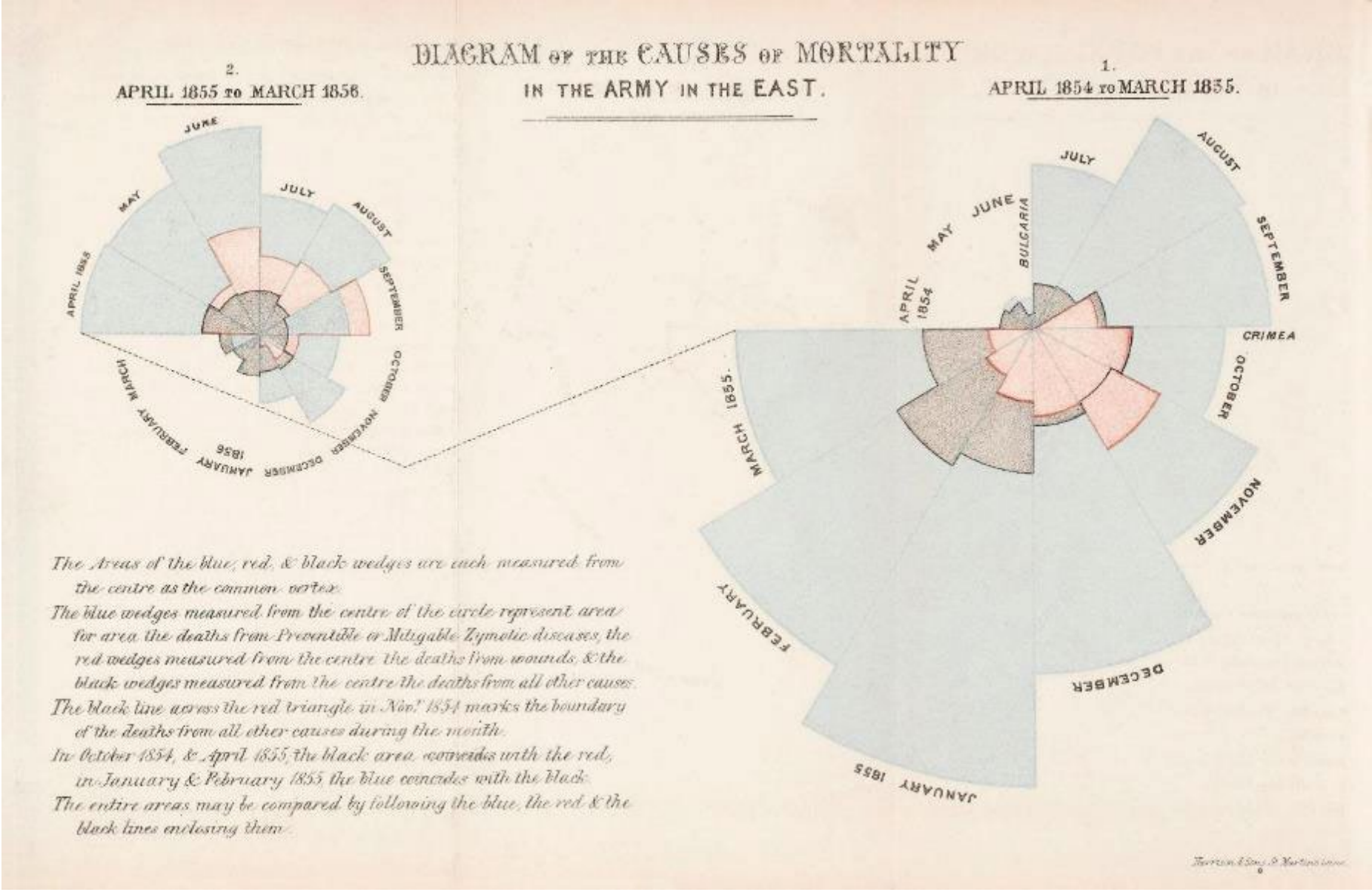
Healthcare Design's Impact on Bioethics

"On the night of May 10, 1941, with one of the last bombs of the last serious raid, our House of Commons was destroyed by the violence of the enemy, and we have now to consider whether we should build it up again, and how, and when."

"We shape our buildings, and afterwards our buildings shape us."

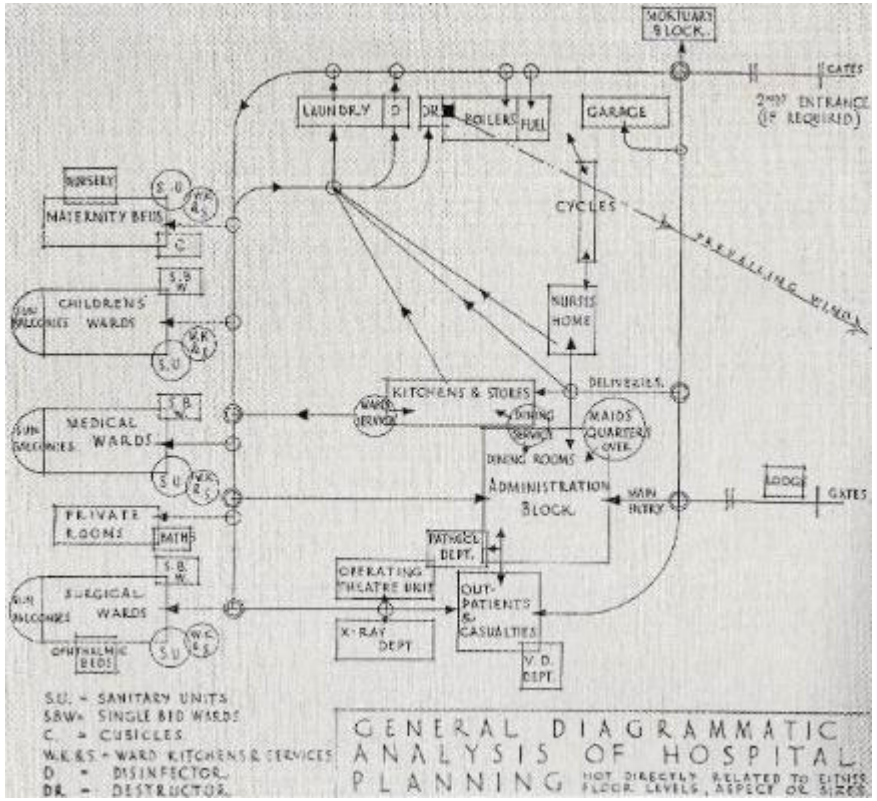
Source: *"Churchill and Commons Chamber". Living Heritage, Architecture of the Palace. https://www.parliament.uk/about/living-heritage/building/palace/architecture/palacestructure/churchill/. 10/1943. Accessed 12 Nov 2022.*

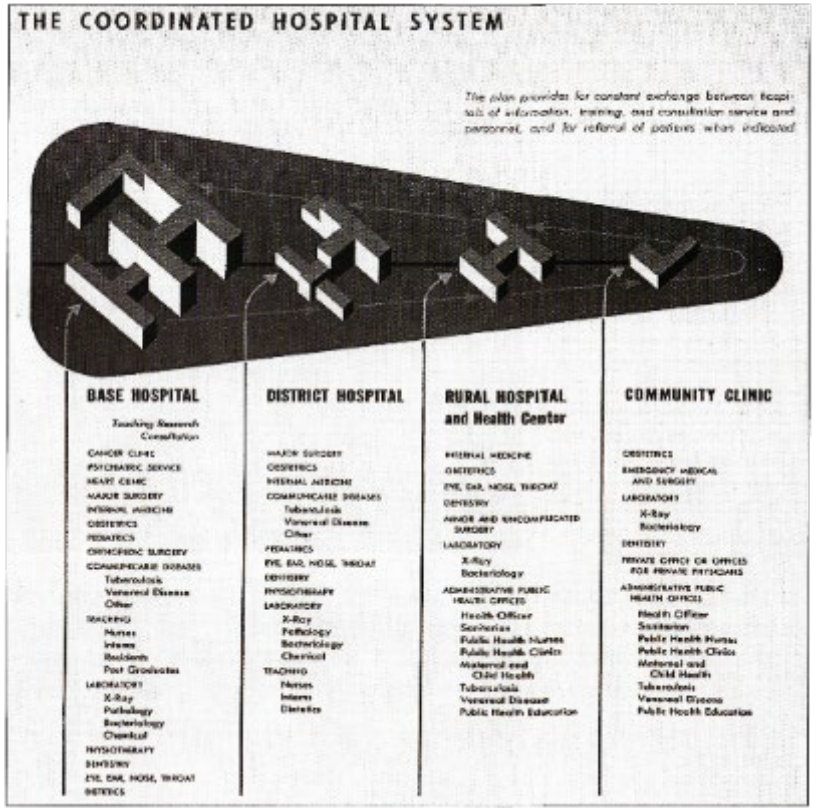
Historical Perspective



Source: *Nightingale, F. Diagram of the Causes of Mortality in the Army in the East. Notes on Matters Affecting Health, Efficiency, and Hospital Administration of the British Army. pg. 311. Harrison & Sons, London, 1858.*

Historical Perspective





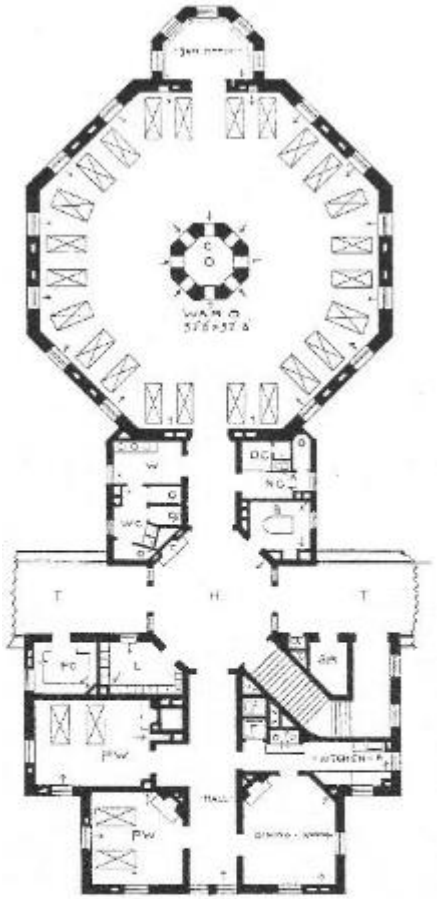


Fig. 189 (a) Floor plan of the first floor (longitudinal section north and south), octagon ward, Johns Hopkins Hospital.

C	central ventilating chimney, 8'0" × 8'0"	VL	ventilator for linen closet and clothes room, 14" diameter
BC	boiler iron cylinder, 6'0" diameter	Co	corridor
AC	accelerating steam coils	PT	pipe tunnel
VWC	vent pipe from water closet, 24" diameter	B	basement floor
V	ventilator for water closet bath room and lavatory, 32" diameter	D	main floor
		S	second floor
VS	ventilator for special wards, 42" diameter	G	attic floor
		DC	chimney damper
		S	smoke pipe

Source: Curry, John Michael. The Fourth Factor: A Historical Perspective on Architecture and Medicine. The American Institute of Architects' Academy of Architecture for Health. 2007. pgs. 138, 159. ISBN: 978-57165-018-4.

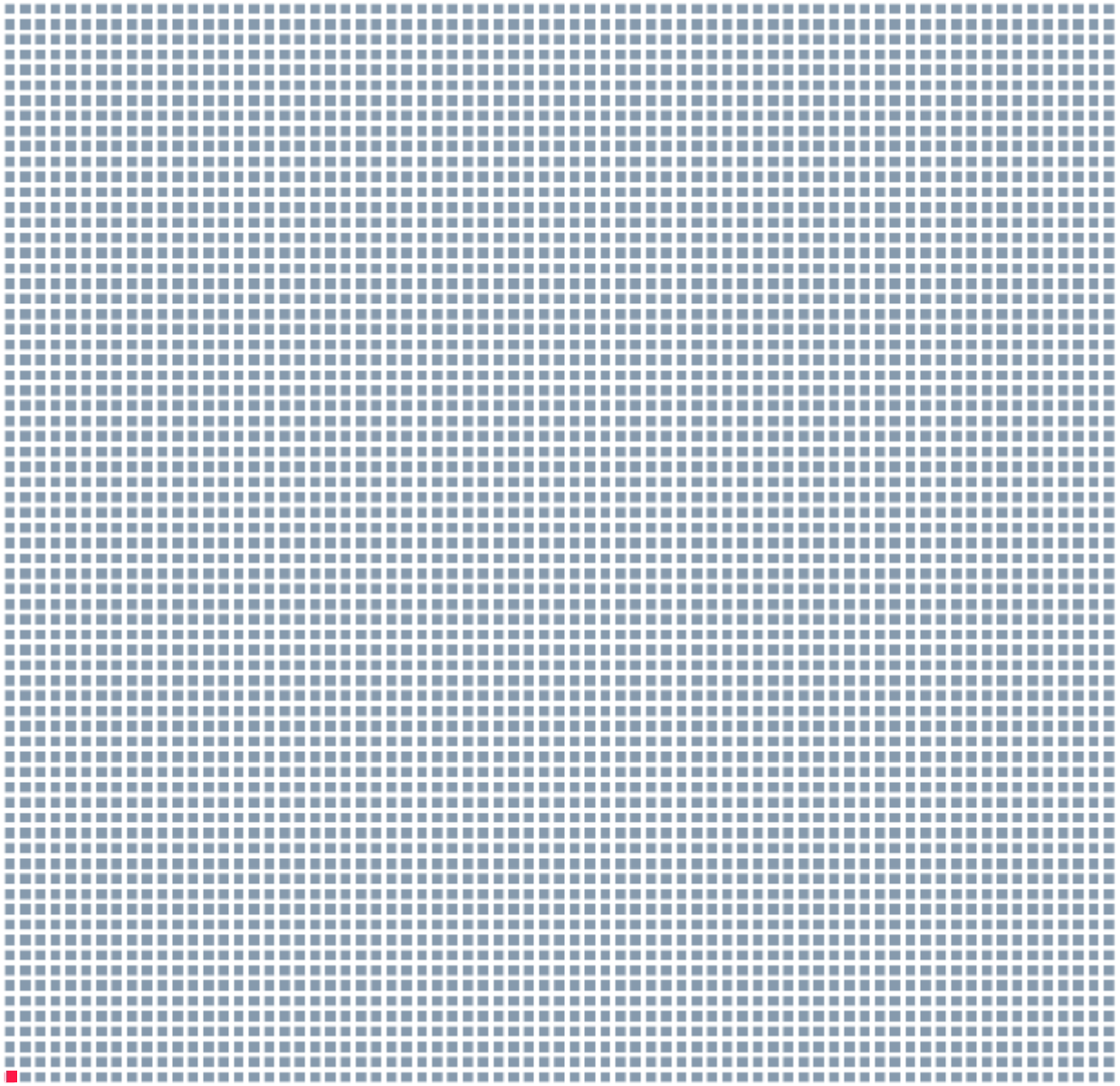
Thompson, John D., Goldin, Grace. The Hospital: A Social and Architectural History. Yale University Press, New Haven & London, 1975. pg. 190. ISBN: 0-300-0-1829-0

Healthcare Design as an Architectural Specialty

- The American Institute of Architects (AIA) was founded in 1857 in New York.
- The Academy of Architecture for Health (AAH) was officially chartered by the American Institute of Architects in 1945 as a response to the demand for federal funds to support hundreds of post-war hospitals, and regulatory oversight.
- The Veterans' Administration proposed that hospital architects be screened for competency.
- Federal financial support for the hospital building boom ended in the 1980s, and so did the federal regulations.
- State Departments of Health assumed regulatory authority over hospital design and construction, and each adopted various but disparate model building codes.
- The AIA's AAH then adopted the task of centralizing minimum requirements for hospital construction into a model code, which may be adopted by individual states.
- The American Hospital Association developed a special interest organization related to the management of healthcare facilities – the American Society for Healthcare Engineering.
- The American College of Healthcare Architects (ACHA) launched in 2000 as a response to demonstrate individual competence in healthcare architecture that was legally defensible and professionally sound.
- The Center for Health Design became the joint knowledge repository for several professional organizations, and subsequently launched its certification in Evidence-based Design (EBD) with its EDAC credential.

Sources: "A Brief History of the AIA's Programs on Health Facilities". American Institute of Architects

Hercules W. correspondence with American Institute of Architects, Oct 2020.



~29,000,000 Peer-Reviewed Research Publications in PubMed

vs.

5,692 Publications in Center for Health Design Knowledge Repository

Sources: MEDLINE, PubMed, and PMC: How are they Different? National Library of Medicine. Weblink. Accessed 4 Jan 2023

Knowledge Repository, Center for Health Design. Weblink. Accessed 4 Jan 2023.

State of Research

"One can look at evidence-based design (EBD) in a narrow context as focusing only on research affecting the built environment or, in a more expansive context, as research coming from the neurosciences or Lean design or a number of healthcare system research initiatives designed to improve patient outcomes."

- Jain Malkin

Academy of Architecture for Health
an AIA Knowledge Community

The American Institute of Architects

THE CENTER FOR HEALTH DESIGN®

ACADEMY of ARCHITECTURE for HEALTH FOUNDATION

ASHE
Optimizing health care facilities

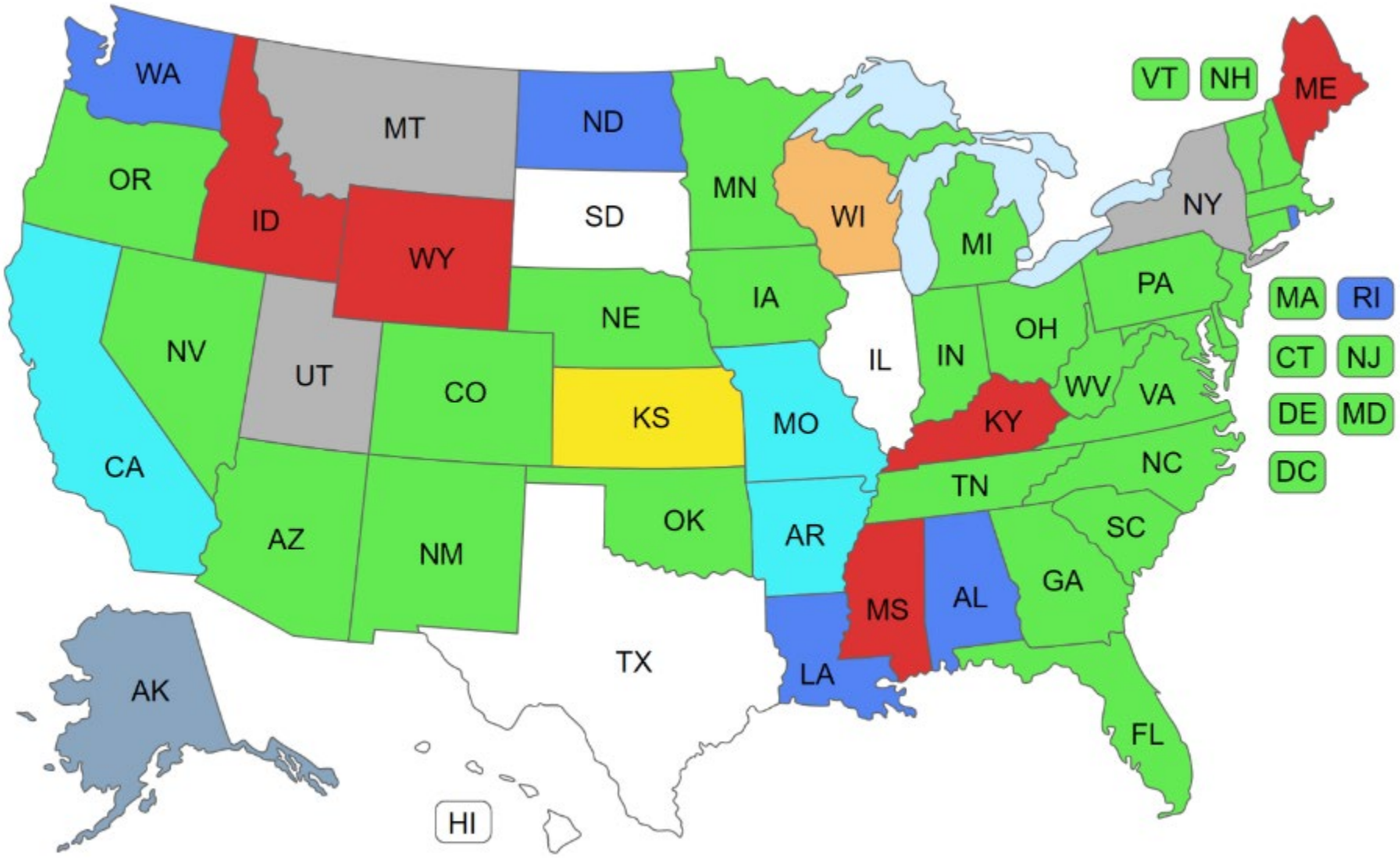
NIHD Nursing Institute for Healthcare Design
INSPIRING AND EDUCATING NURSES

FGI

RESEARCH·DESIGN connections

Sources: Malkin, Jain. A Visual Reference for Evidence-Based Design. Ch 1. Center for Health Design; 1st Edition 30 March 2008. ISBN-13: 978-0974376363.

State of Regulation



KEY

2018	
2014	
2010	
2006	
2001	
1996–97	
Equivalency*	
HVAC only	

**Guidelines* may be applied as an equivalency to state rules.

Source: Adoption of the FGI Guidelines, Facility Guidelines Institute. Weblink. Accessed 4 Jan 2023.

Global Focus on Public Health in Architecture

1. The International Union of Architects Public Health Group (FR) had received support from the UIA General Assembly to make an international commitment to public health and to declare 2022 The Year of Design for Health, urging all UIA Member Sections to encourage architects and their clients to use evidence-based design to promote health in buildings and cities.
2. The American Institute of Architects (USA) has made various similar public proclamations related to design and health beyond hospitals.
3. Salus and the Royal College of Physicians (UK) continue to study the intersection of human and planetary health by design.

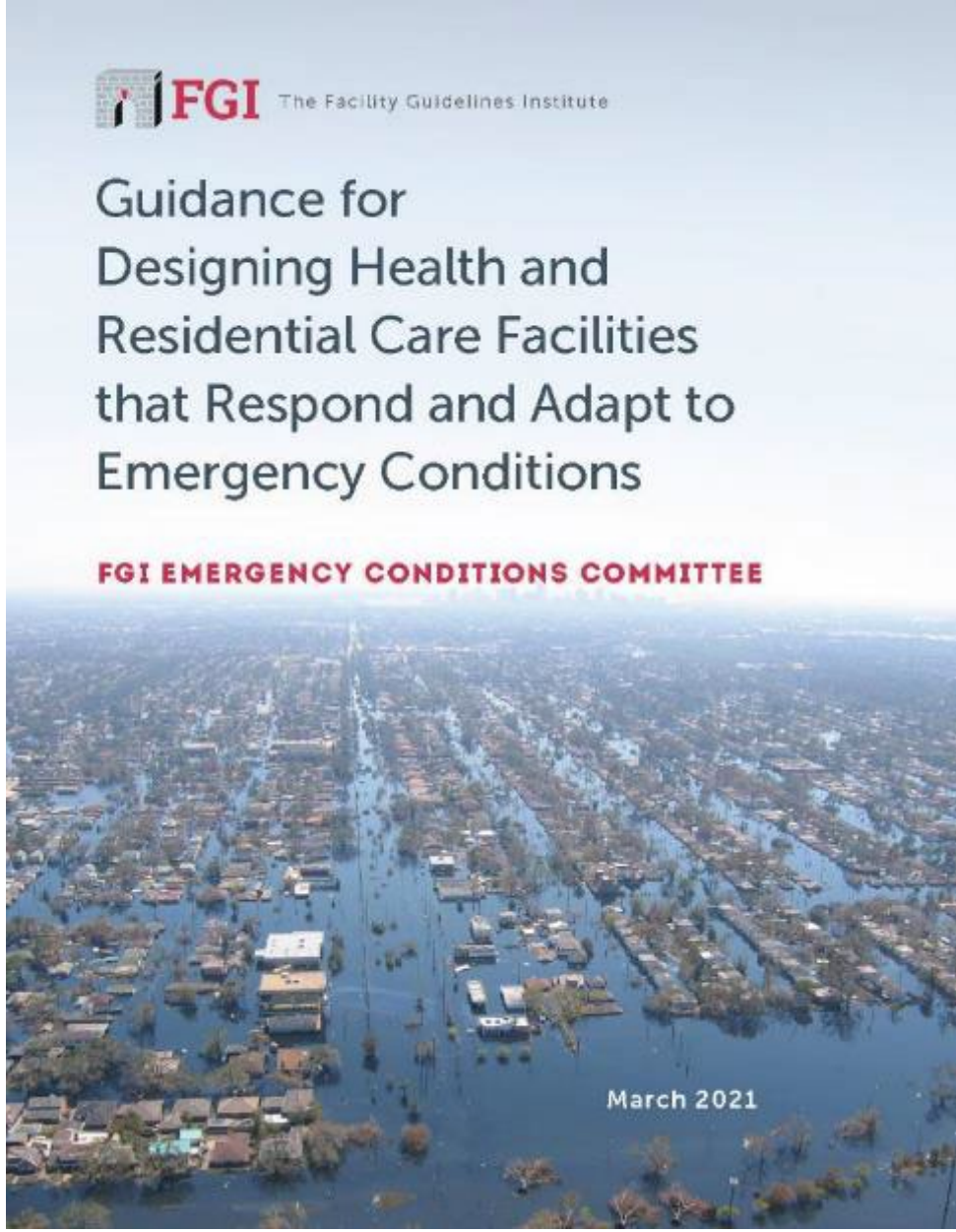
Source(s): 2022: UIA Year of Design for Health. International Union of Architects Public Health Group. Weblink Accessed 12 Nov 2022.

Design and Health. American Institute of Architects. Weblink. Accessed 12 Nov 2022.

Recovery, renewal & rediscovery: Planning a climate-smart healthcare system. Salus / Royal College of Physicians. Weblink. Accessed 12 Nov 2022.

Design Community's Inter-disciplinary Response

- 121 well-intentioned contributors in a consensus process
- Some conclusions may be informed by research, but most are based on professional experience
- 716-page white paper to guide future code development
- Safety, Harms, & Hazards focus
- Proactive supplement to CMS' Emergency Preparedness rule



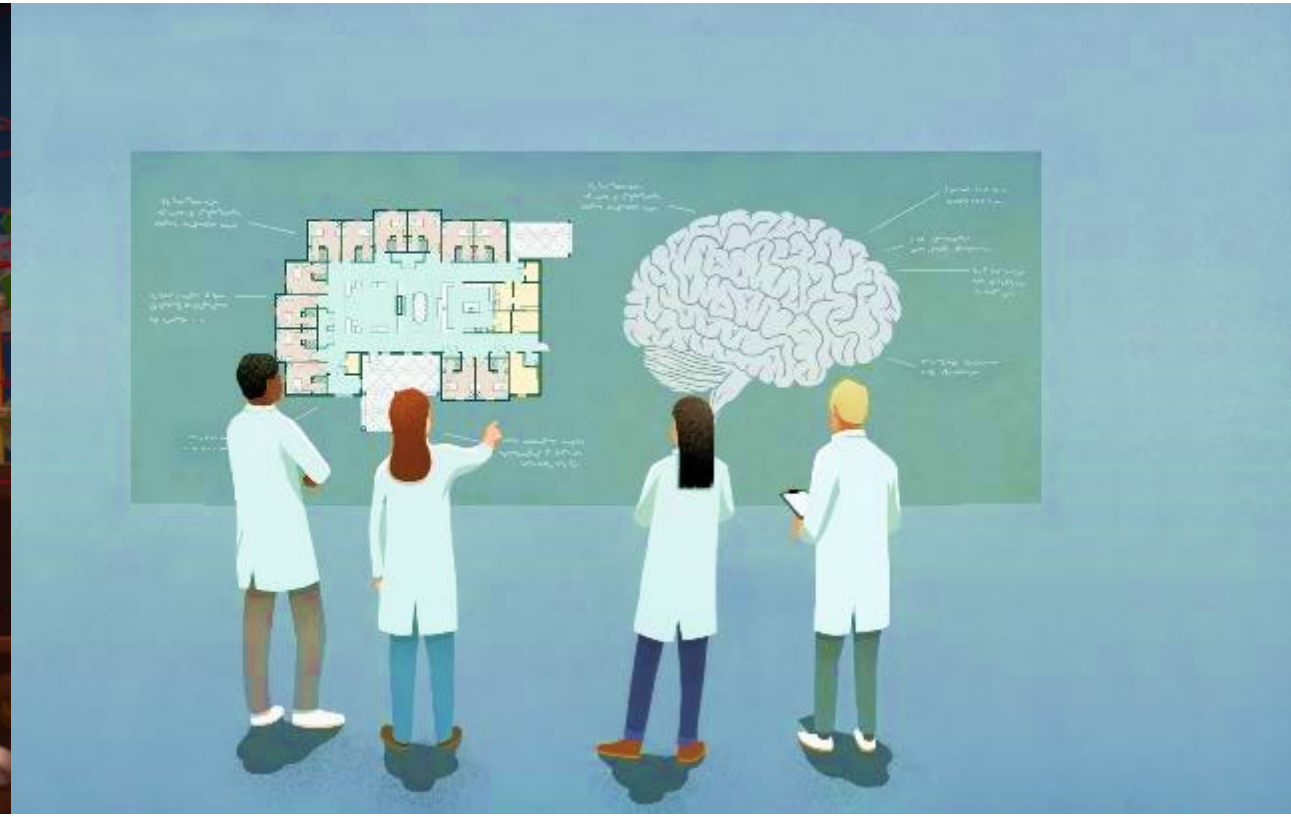
Source: FGI Emergency Conditions Committee; "Guidance for Designing Health and Residential Care Facilities that Respond and Adapt to Emergency Conditions"; Facilities Guidelines Institute; Weblink; 31 Mar 2021. Accessed 12 Nov 2022.

Implications of Facility Alterations

- Facility changes are enormously *expensive*
- Lessons from California SB-1953
- Code changes drive minimum compliance, *not transformation*
- Practical implementation results > 10 years

Project: Indiana University Health Campus Transformation; HOK

Two Types of Ethical Issues



Incidental

- Nursing home deaths
- Hand-washing
- ICU room placement

Deliberate

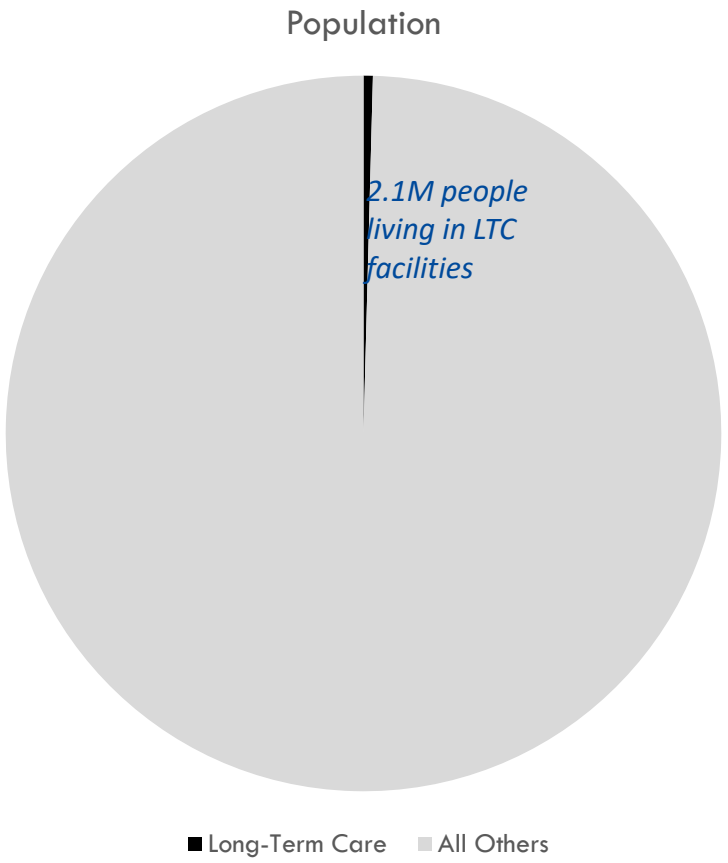
- Floor patterns
- Villages and immersive settings
- Research

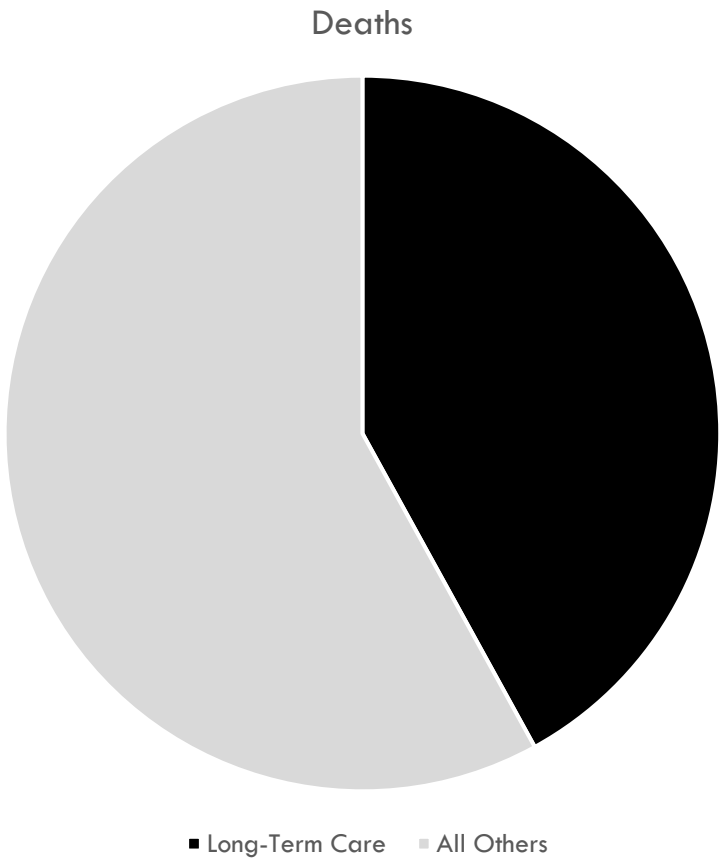
Accidental / Incidental Findings

New knowledge can engender new responsibilities

Long-Term Care Facilities and COVID

Differential Impact of COVID-19



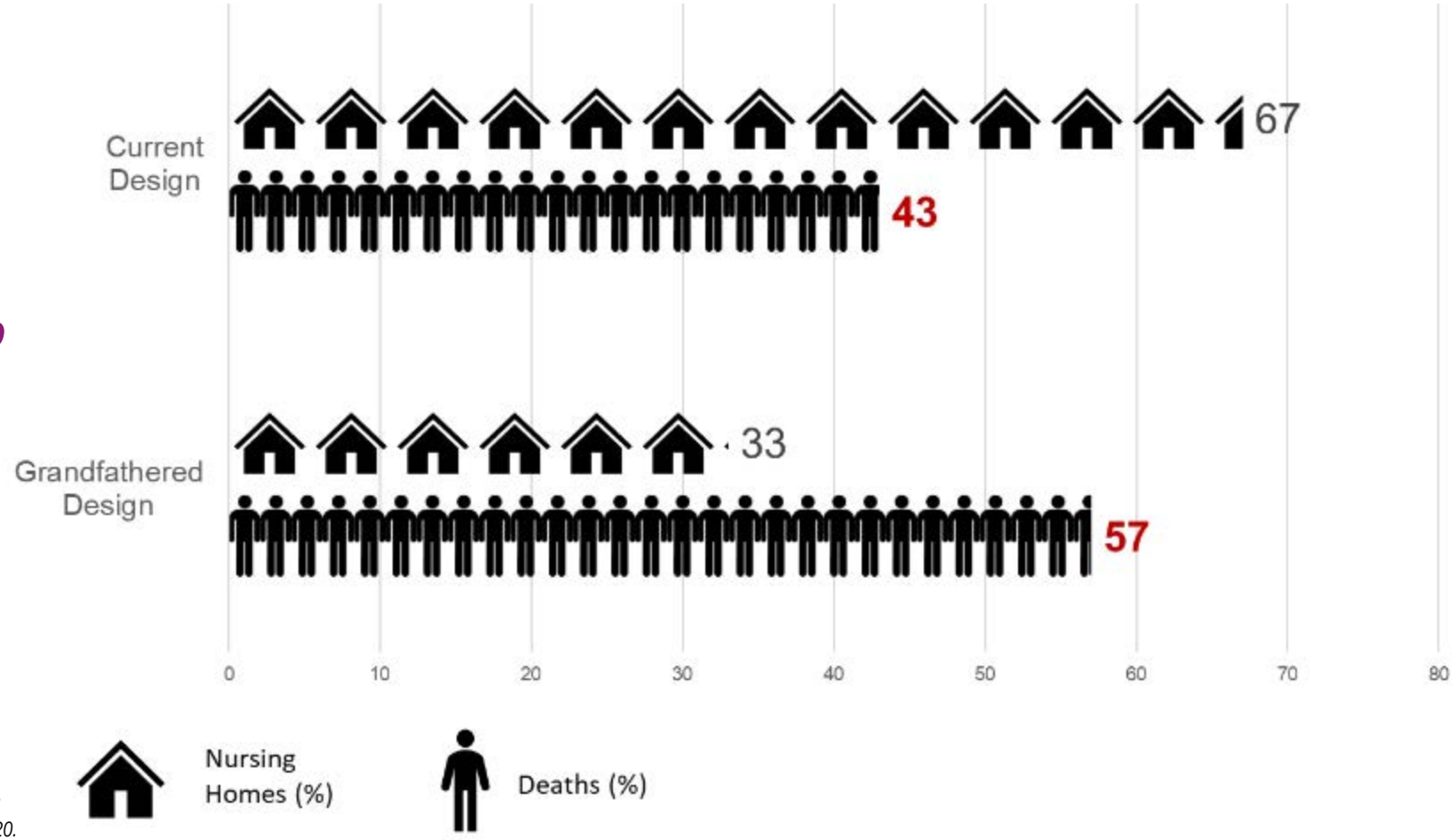


Source: Girvan G, Roy A. Nursing Homes & Assisted Living Facilities Account for 38% of COVID-19 Deaths. FreeOP. 7 May 2020. Weblink. Accessed 12 Nov 2022.

Long-Term Care Facilities and COVID

Deadly Cost of Delay – Comparing Canadian Nursing Home Upgrades

Living in a Canadian nursing home grandfathered into the 1972 design standard nearly doubled the risk of death due to COVID-19.



Source: Pedersen K, Mancini M, Wolfe-Wylie W. Ontario nursing homes have had 22 years to do safety upgrades. COVID-19 reveals deadly cost of delay. CBC. 9 Jun 2020. Weblink. Accessed 12 Nov 2022.

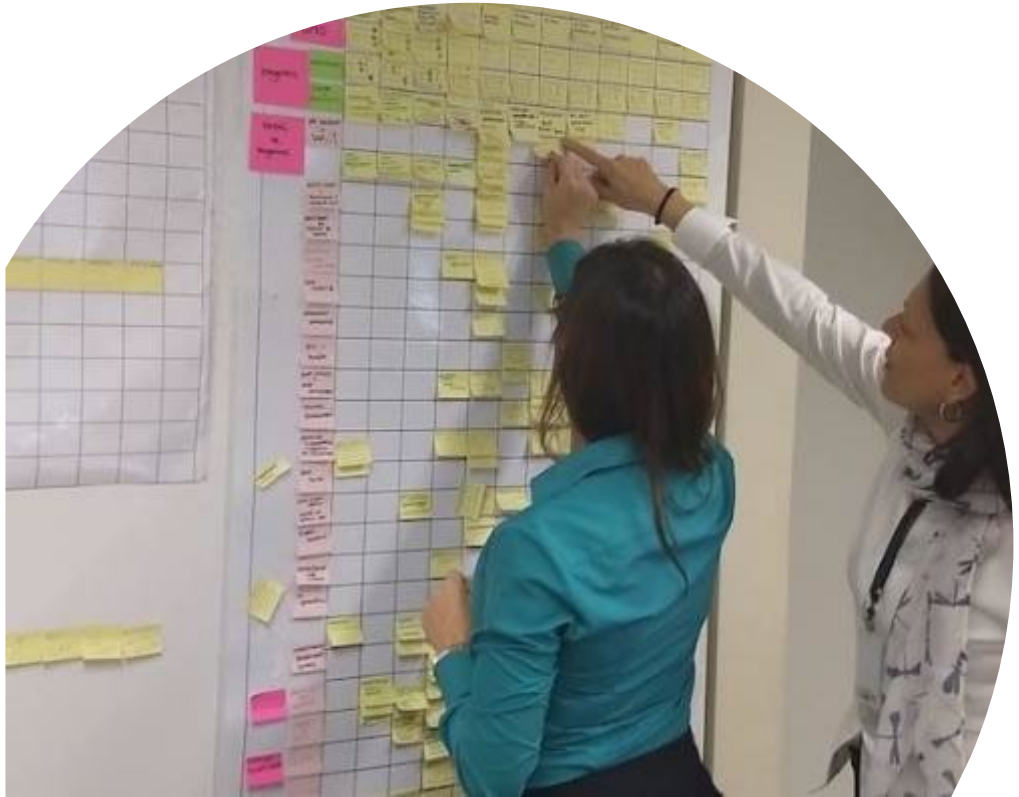
Deliberate Efforts to Alter Behavior and Exert Control with the Built Environment

New ways of doing things doesn't obviate existing obligations

Emergent Issues and the Built Environment

- When the built environment doesn’t meet the needs of its users, patchwork solutions may lead to ethical lapses.
- Moving I.V. pumps outside the patient’s room may lower exposure risk to staff, and/or minimize use of scarce PPE.
- However, positioning drips at the bedside ensures patients are closely monitored

Image: Stowe Lock Teti

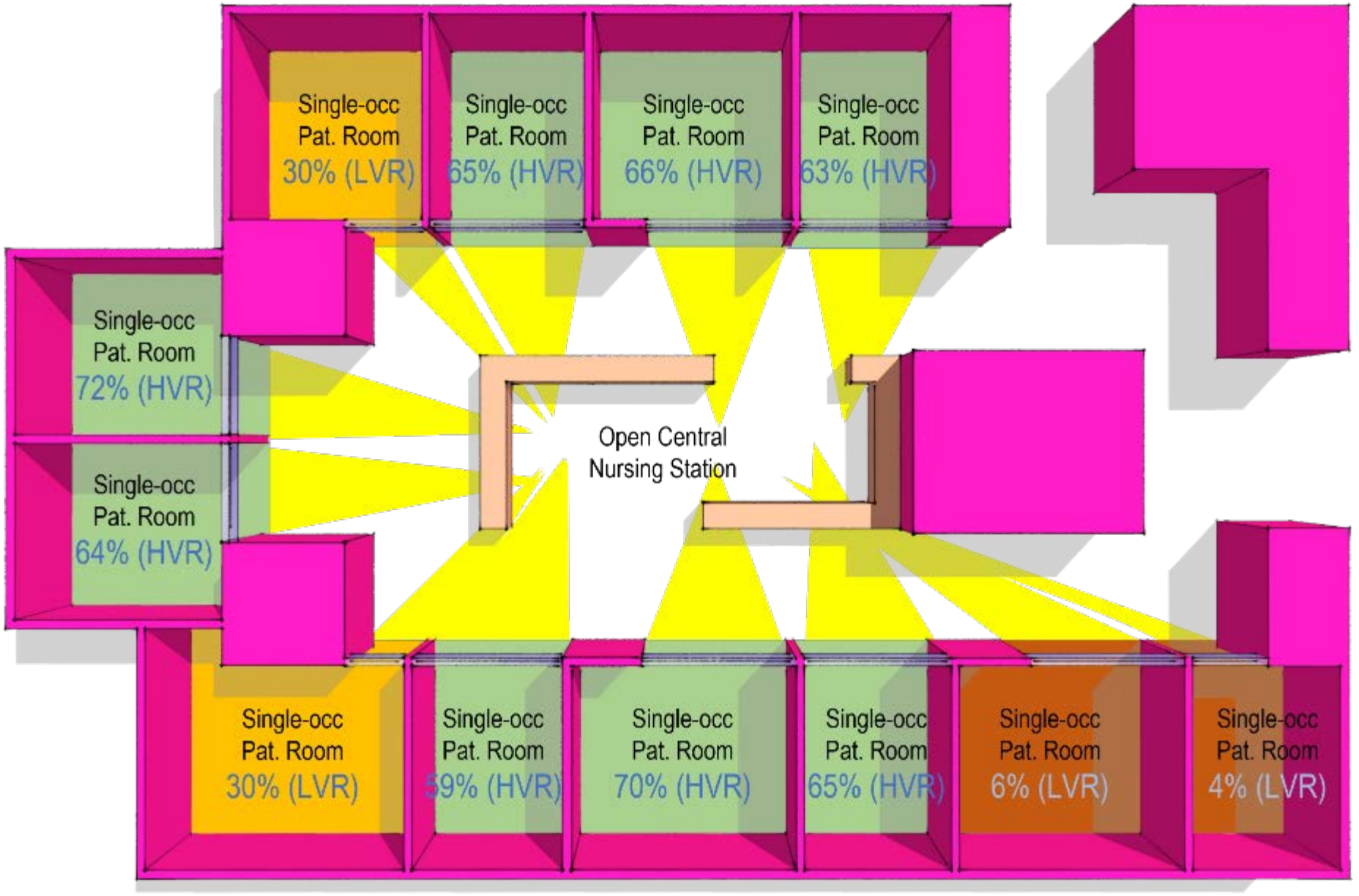


Carefully Consider Alterations to Standard Work Protocols

- Existing practices are the product of an evolution to organize and simplify.
- We need to be aware of the effect of the built environment, particularly when we are trying to develop solutions like those we've seen during COVID-19.

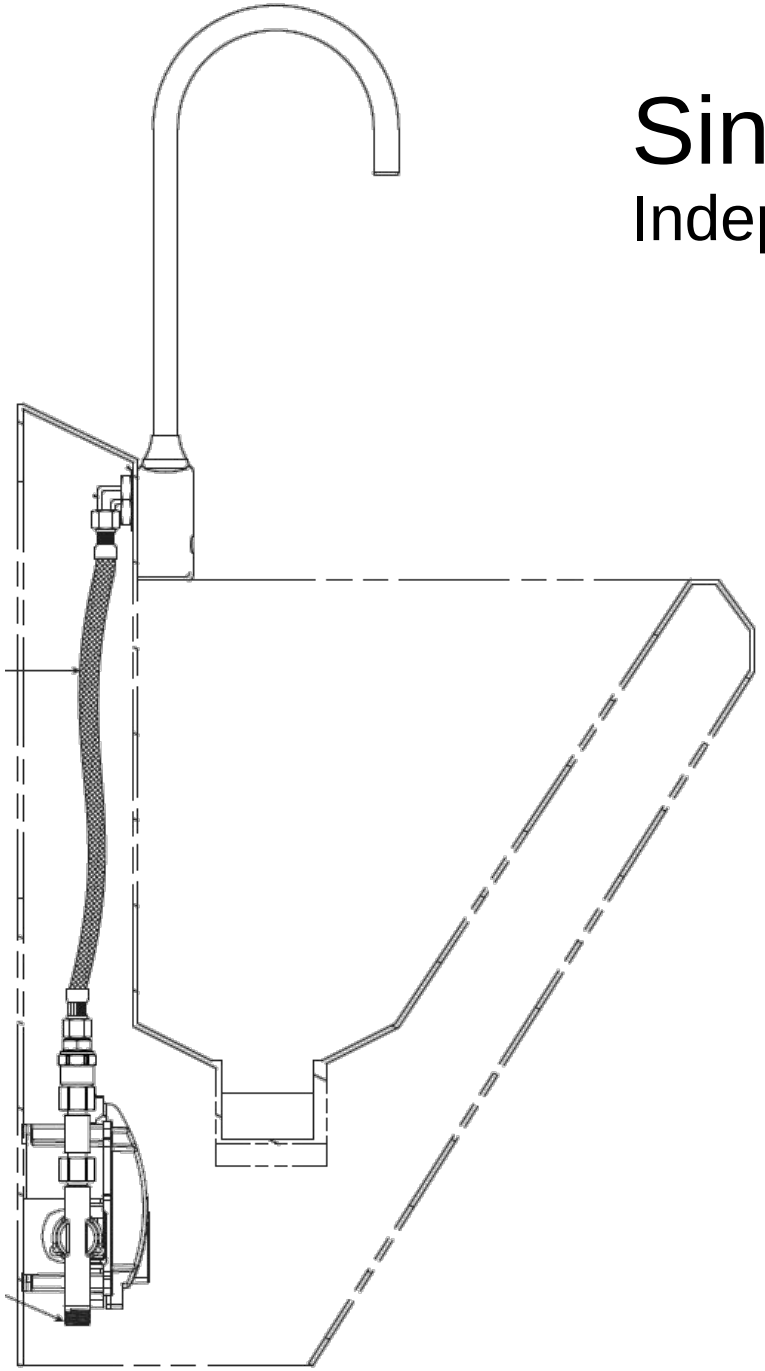
Differential Outcomes:

Assigning the sickest patients (APACHE >30) to a low visibility room resulted in a **28% *higher*** mortality rate.



Sources: Leaf DE, Homel P, Factor PH. Relationship between ICU design and mortality. Chest. 2010 May;137(5):1022-1027. doi: 10.1378/chest.09-1458.

Lu Y, Ossman, MM, Leaf D, Factor PH. Patient Visibility and ICU Mortality: A Conceptual Replication. Health Environments Research and Design. Volume: 7 issue: 2, page(s): 92-103.



Sink Availability:

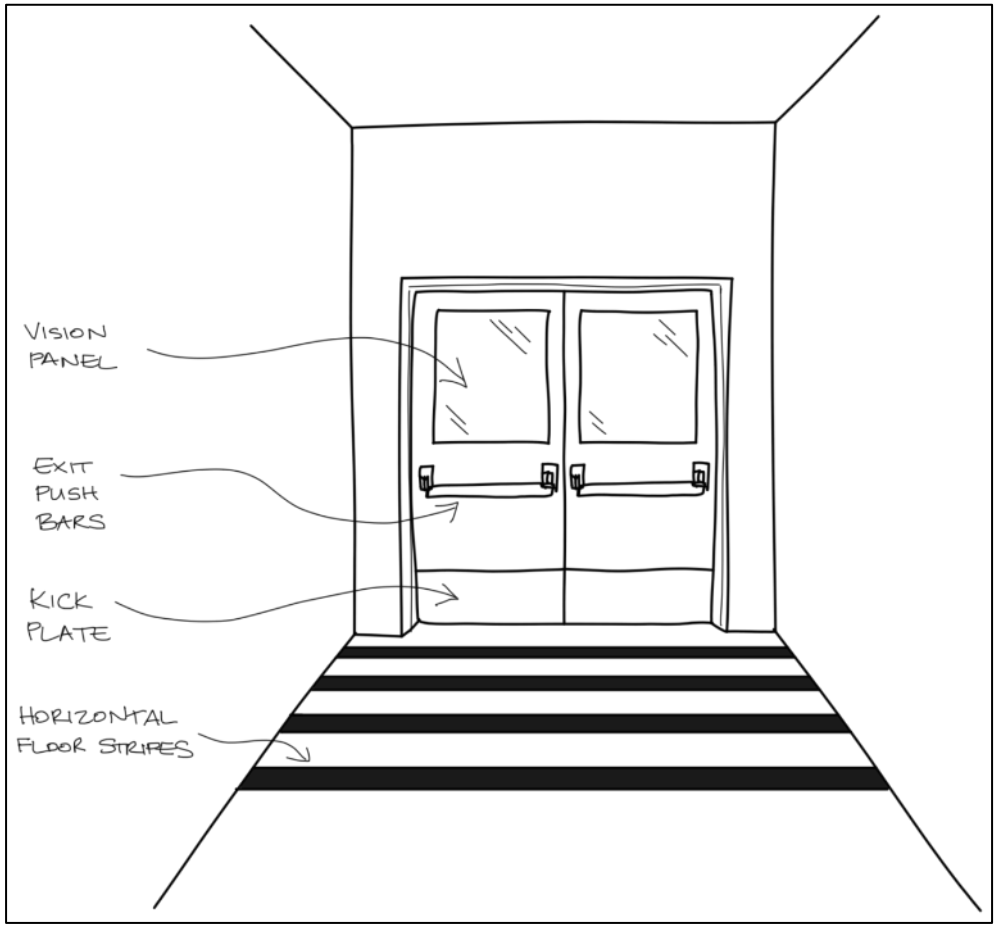
Independent Predictor of Handwashing Compliance

“Every additional meter that must be walked by the healthcare worker to reach a sink decreased the likelihood of hand washing by approximately 10%.”

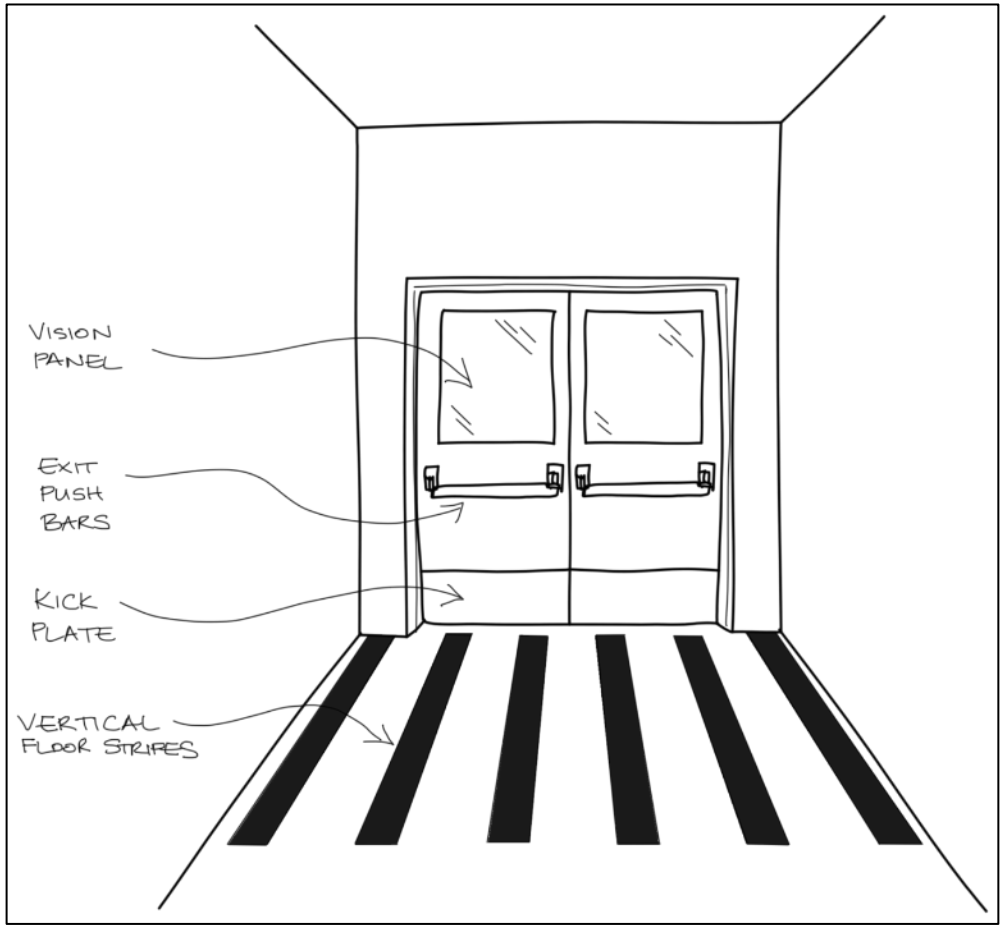
Source: Deyneko, A., Cordeiro, F., Berlin, L. et al. Impact of sink location on hand hygiene compliance after care of patients with Clostridium difficile infection: a cross-sectional study. BMC Infect Dis 16, 203 (2016). https://doi.org/10.1186/s12879-016-1535-x

Photo Credit: Diana C. Anderson

Floor Patterns to Control Egress



Exiting attempts decreased by applying horizontal tape applied to the floor in front of an exit door



Vertical striping was less effective than the horizontal pattern

Sources: Hewawasam, L. (1996). Floor patterns limit wandering of people with Alzheimer's. Nurs Times, 92(22), 41-44.

Hussian, R. A., & Brown, D. C. (1987). Use of two-dimensional grid patterns to limit hazardous ambulation in demented patients. J Gerontol, 42(5), 558-560.

Photo Credits: Diana C. Anderson

Project: De Hogeweyk, Dementia Village, Weesp, The Netherlands; Molenaar & Bol & VanDillen

Emerging Ethical Issues in LTC Design

Long-term care facility design is being increasingly used to modify behavior and create illusions that pacify residents, **without research or oversight**.

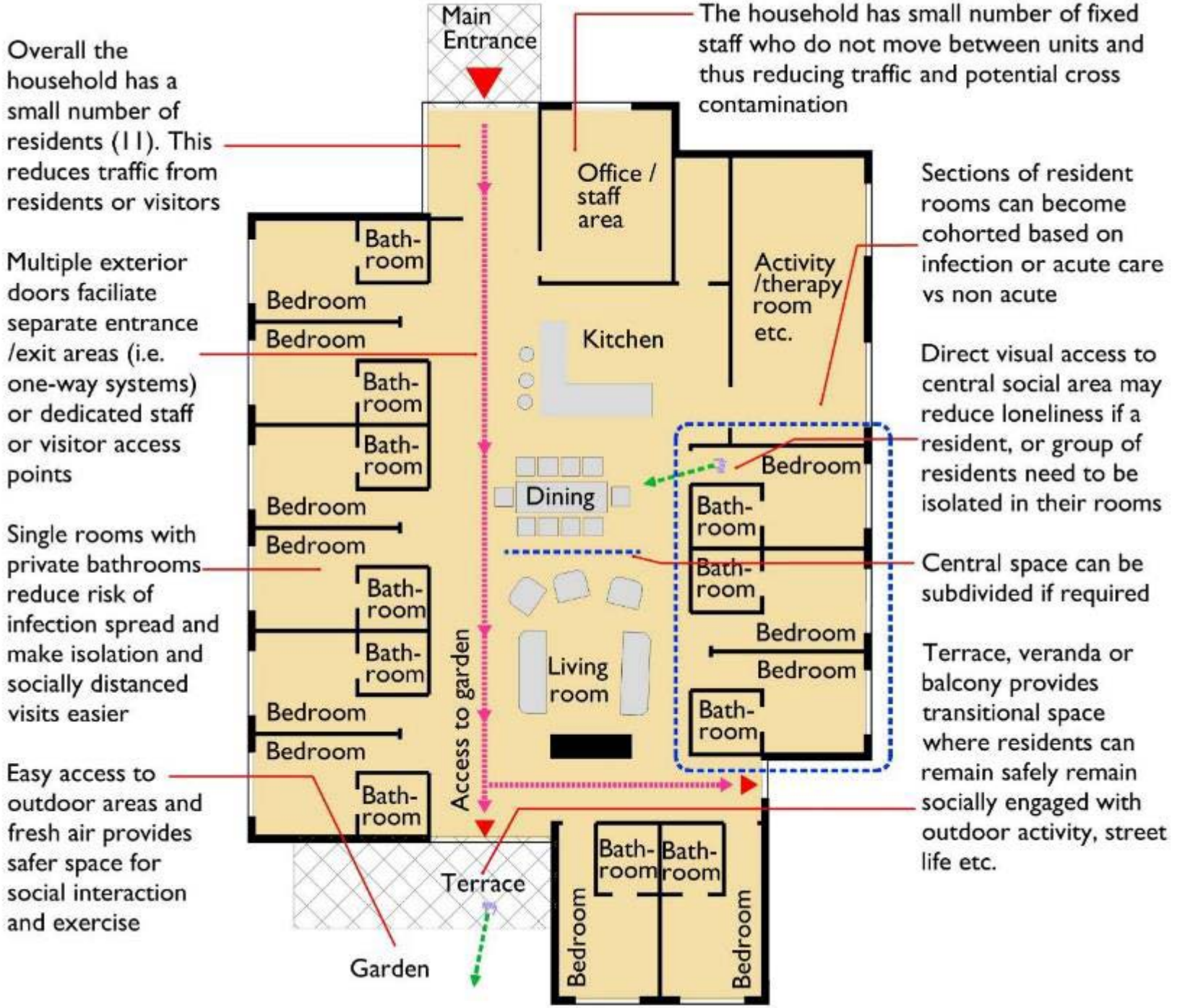
Design interventions may include:

- The illusion that a patient is free to leave, when they are not.
- The illusion of carrying out plans/reaching goals when they are not.
- Immersive environments that convince the residents they are either somewhere else, or in a different time period.
- Controlling resident behavior with designs that induce immobility or evoke fear.

These efforts are no different in kind than interventions undertaken in medical research or pharmaceutical development, either real or placebo.

Household Model in LTC

10-12 single rooms with private bathrooms, organized around a central communal area, access to protected outdoor space



Source: Anderson DC, Grey T, Kennelly S, O'Neill D. Nursing Home Design and COVID-19: Balancing Infection Control, Quality of Life, and Resilience. J Am Med Dir Assoc. 2020;21(11):1519-1524.

Small Houses & COVID Deaths

Brief Report

Nontraditional Small House Nursing Homes Have Fewer COVID-19 Cases and Deaths

Sheryl Zimmerman PhD [a,b,c,*], Carol Dumond-Stryker EdD [d], Meera Tandan PhD [a], John S. Preisser PhD [c], Christopher J. Wretman PhD [a,b], Abigail Howell [d], Susan Ryan MA [d]

[a] The Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
[b] School of Social Work, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
[c] Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
[d] The Green House Project, Linthicum, MD, USA

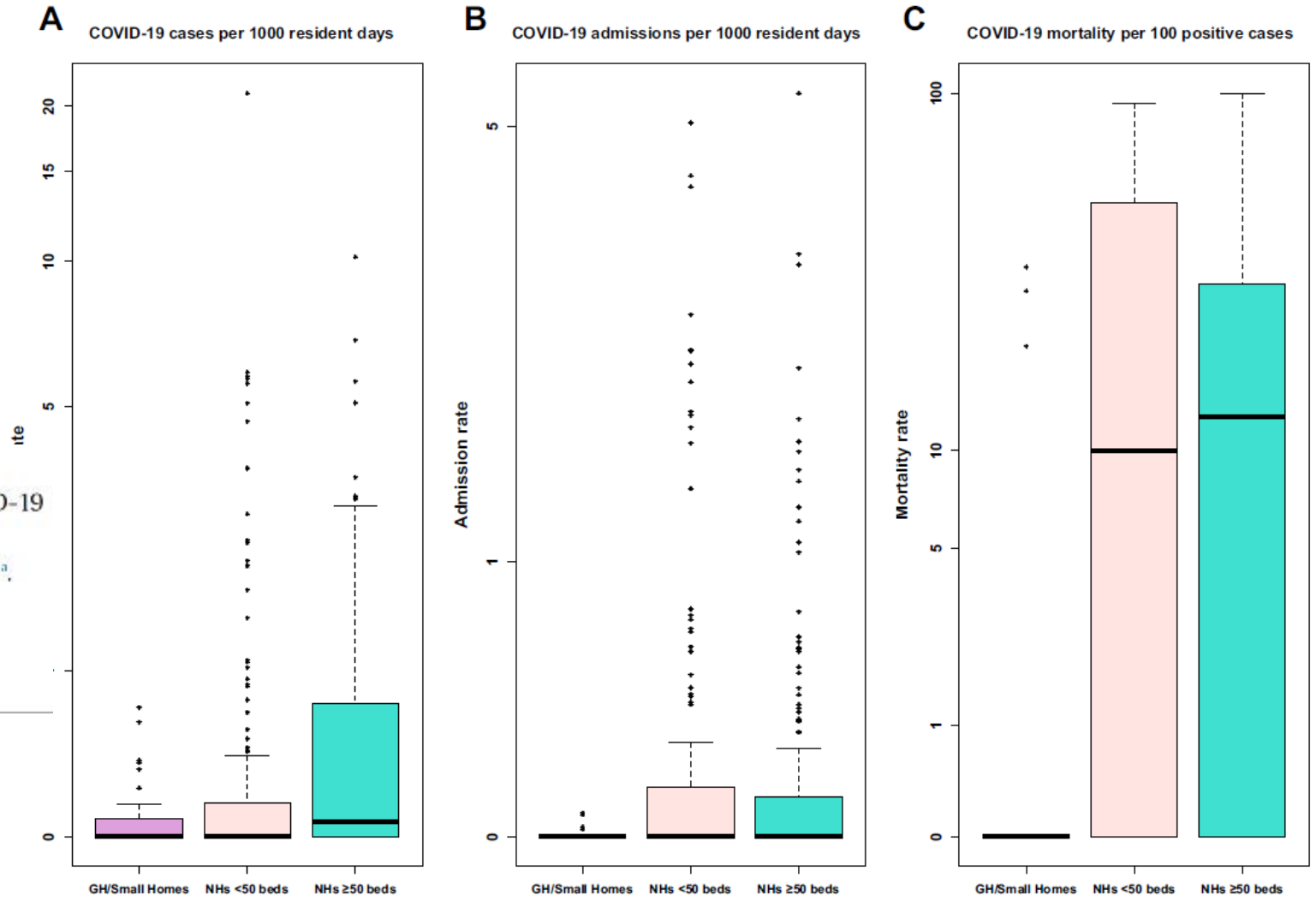


Fig. 1. Rates of COVID-19 cases, admissions, and mortality in Green House/small NHs (n = 43), traditional NHs with <50 beds (n = 177), and traditional NHs with ≥50 beds (n = 215). Each box represents rates between the 25th and 75th percentiles; the line within the box indicates the median. The line above the box indicates the majority of observations (up to the value representing the third quartile plus 1.5 times the interquartile range); asterisks indicate outliers. Data are presented on the log scale. One outlier among homes with ≥50 beds had an admissions rate of more than 50 per 1000 resident days and is not shown. GH, Green House.

Source: Zimmerman S, Dumond-Stryker C, Tandan M, et al. Nontraditional Small House Nursing Homes Have Fewer COVID-19 Cases and Deaths. J Am Med Dir Assoc. 2021;22(3):489-493. doi:10.1016/j.jamda.2021.01.069

Building Design & Health Outcomes

Small House Nursing Homes Have Fewer COVID-19 Cases and Deaths

Non-traditional "green house" homes (10-12 residents) - benefits

- Improved resident quality of life, fewer hospital readmissions, better quality indicators, reduced Medicare spending, possibly less staff turnover

Improved infection control

- COVID-19 incidence and mortality rates are less in green house/small nursing homes versus traditional nursing home models with <50 beds and ≥50 beds

Not necessarily higher costs

- Overall, fixed costs of small-home models may be higher but operational costs are similar; more direct-care and nursing time in small-homes with potential revenue enhancements

Sources: Zimmerman S, Bowers BJ, Cohen LW, et al. THRIVE Research Collaborative. New evidence on the Green House Model of nursing home care: synthesis of findings and implications for policy, practice, and research. Health Serv Res 2016; 51(Suppl 1):475e496.

Zimmerman S, Dumond-Stryker C, Tandan M, et al. Nontraditional Small House Nursing Homes Have Fewer COVID-19 Cases and Deaths [published online ahead of print, 2021 Jan 26]. J Am Med Dir Assoc. 2021;S1525-8610(21)00120-1. doi:10.1016/j.jamda.2021.01.069

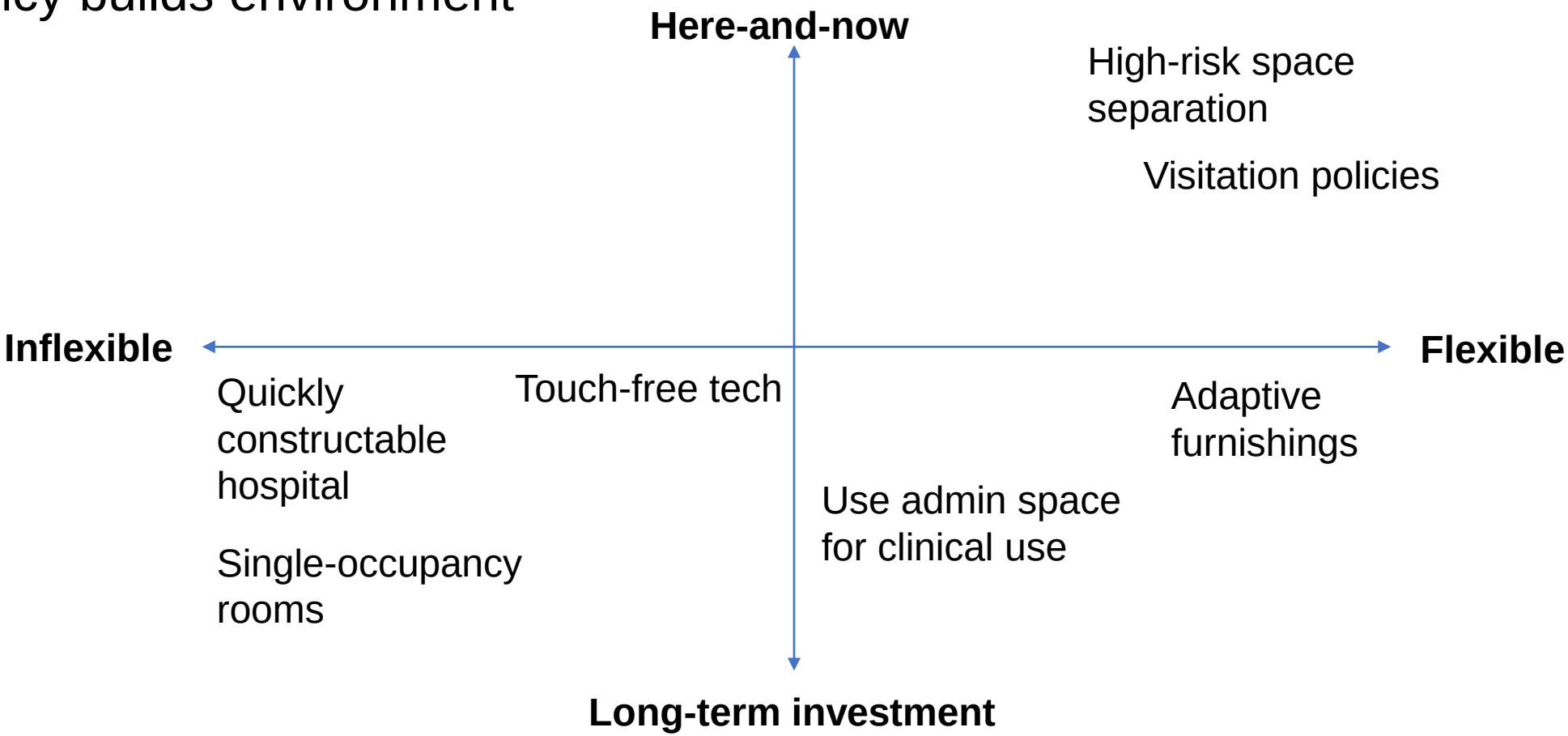
Jenkens R, Sult T, Lessell N, Hammer D, Ortigara A. Financial Implications of THE GREEN HOUSE® Model. Seniors Housing & Care Journal. 2011; 19(1): 3-22.


point of view
Policy
written contra
company, or

Institutional Policy and the Built Environment

Disease Control and Wellbeing

- Policy builds environment



Visitation Restrictions, Patient Experience, and Safety

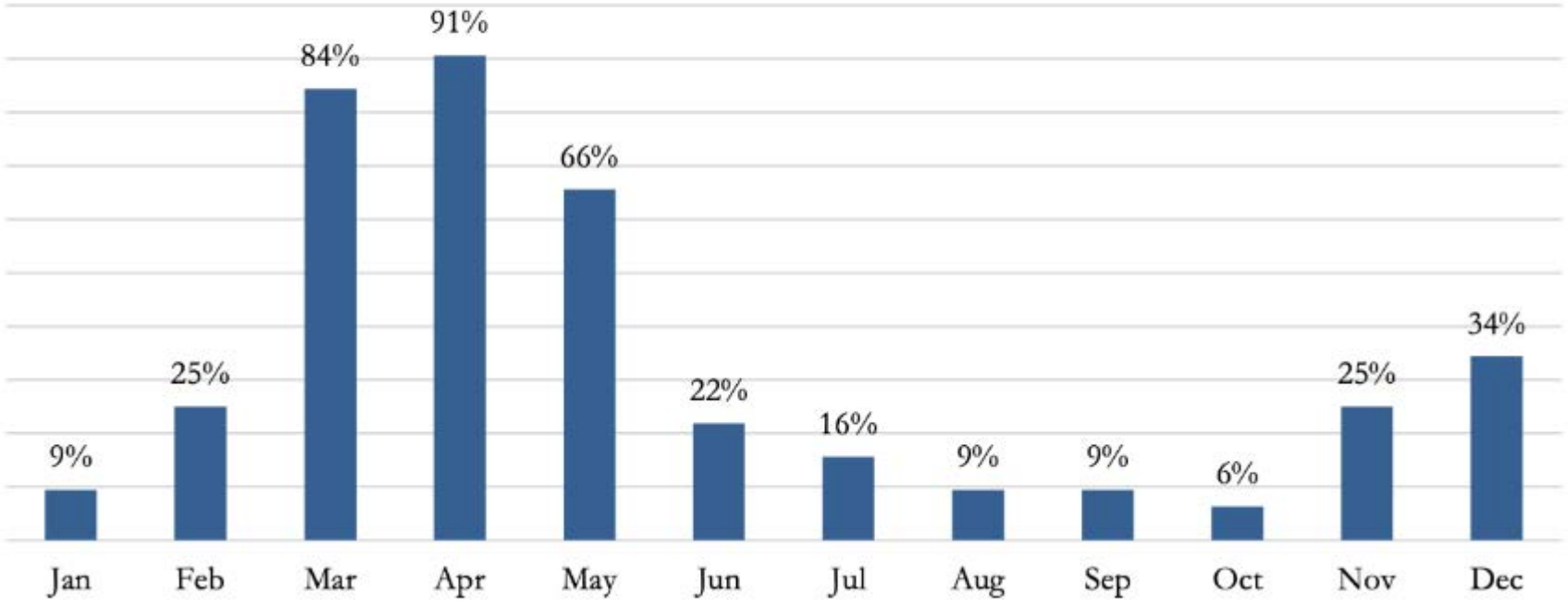
PXJ Patient Experience Journal
Volume 8, Issue 1 – 2021, pp. 30-39

Research

The influence of COVID-19 visitation restrictions on patient experience and safety outcomes: A critical role for subjective advocates

Geoffrey A. Silvera, PhD, *Auburn University/Patient Experience Journal, geoff@pxjournal.org*
Jason A. Wolf, PhD, CPXP, *The Beryl Institute/Patient Experience Journal, jason@pxjournal.org*
Anthony Stanowski, DHA, FACHE, *Commission on Accreditation of Healthcare Management Education, astanowski@cahme.org*
Quint Studer, *Studer Community Institute, quint@quintstuder.com*

Figure 5. Percent of Facilities Reporting "No Visitation" Per Month in 2020



Source: Silvera G., Wolf J., Stanowski A., Studer Q. The Influence of COVID-19 Visitation Restrictions on Patient Experience and Safety Outcomes: A Critical Role for Subjective Advocates. Patient Experience Journal. 8, 1 – 2021, pages 30-39

Figure 6. Comparing HCAHPS Performance Relative to Visitation Policy

HCAHPS Domain Measures	HCAHPS 50th Percentile 2019	Open Visitation 2019	Open/ Limited Visitation 2020	No Visitation 2020	Net Difference (Open/Limited to No 2020)	% Difference (Open/Limited to No 2020)
Overall Rating of Hospital	73%	73.4%	73.6%	73.3%	-0.3	-0.4%
Responsiveness of Hospital Staff	69%	67.6%	66.3%	64.7%	**-1.7**	**-2.5%**
Transition to Post-Hospital Care	53%	57.3%	56.6%	56.0%	-0.5	-0.9%
Communication with Nurses	81%	82.0%	81.7%	81.2%	-0.4	-0.5%
Communication with Doctors	81%	82.5%	82.2%	81.9%	-0.3	-0.3%

Figure 7. Comparing Safety Results Relative to Visitation Policy

PSI Composite Measures	AHRQ Benchmark (July 2020)	Open Visitation 2019	Open/ Limited Visitation 2020	No Visitation 2020	Net Difference (Open/Limited to No 2020)	% Difference (Open/Limited to No 2020)
Pressure Ulcer Rate (PSI 3)	0.65	0.45	0.39	0.49	0.11	**28%**
In-Hospital Fall with Hip Fracture Rate (PSI 8)	0.07	0.03	0.07	0.14	**0.07**	**104%**
Postoperative Sepsis Rate (PSI 13)	3.97	2.93	2.65	5.39	2.74	**104%**

Harmful Policy: Strict-no visitation policy
PROS
More effective disease isolation (without increasing expenses)
CONS
Increased rates of pressure ulcers, falls w/fractures, and sepsis[1]
Increased staff communication burden,[2] less GOC changes[3]
Loss of patients' "lifeline to reality"[4]
Heightened disconnect between public life and realities of illness and death

Harm-mitigating Policy: Visitation allowed policy + additional PPE provided
PROS
Decreased rates of pressure ulcers, falls w/fracture, and sepsis[1]
Improved patient psychological measures, lower patient stress, increased nurse job satisfaction[1]
Decrease staff communication burden,[2] more GOC changes[3]
Reconnects clinical realities w/day-to-day lived experience
CONS
Increased expense (additional PPE, +/- staff)

Sources: Silvera GA, Wolf JA, Stanowski A, Studer Q. The influence of COVID-19 visitation restrictions on patient experience and safety outcomes: A critical role for subjective advocates. Patient Experience Journal. 2021; 8(1):30-39. doi: 10.35680/2372-0247.1596.

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Policy Action

- We should pursue policies which mitigate the harmful effects of the clinical environment.
  - Investigate how and when our current physical environments harm patients and staff, and
  - which policies effectively reduce harm.
- The COVID-19 pandemic has provided the rare opportunity to examine the effects of various hospital designs and policies.

Project: Rancho Los Amigos National Rehabilitation Center; SmithGroup

Our Next Steps

It is time for the built environment to become a part of the same calculus as other physical and psychological factors affecting care.

- *Funding and scholarly research* is required to investigate the curative efficacies of specific architectural interventions.
- The ethical issues in healthcare architecture experimentation requires an *ethical rubric* to clarify the intent, risks, and expected outcomes.
- Bioethicists need to engage with healthcare architects around issues of *equal access and treatment, prevention of comorbidities, and use of space to influence people.*

The opportunities to create lasting improvements in equitable, efficient care delivery and preparedness for the next public health emergency should motivate us all to take up this challenge.

Faculty Biography & Contact Info

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Geriatric Neurology Research Fellow, VA Boston Healthcare System

Diana Anderson, MD, M.Arch, is a healthcare architect (ACHA), a board-certified internist (ABIM) and geriatrician. As a “dochitect”, Dr. Anderson combines educational and professional experience in both medicine and architecture. She has worked on hospital design projects globally, is a frequent speaker on health design and is widely published in both architectural and medical journals, books and the popular press. A Co-Founder of the Clinicians for Design group, this international network of leaders seeks to inspire and accelerate the design of environments and systems. A past Fellow of the Harvard Medical School Center for Bioethics, Diana explores the ethics of built space. As a Principal at Jacobs, Diana provides thought leadership at the intersection of design and health. She is also a research fellow in geriatric neurology at the VA Boston Healthcare System.

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Stowe Locke Teti is an ASBH-certified clinical ethicist, bioethics educator, and editor-in-chief of Pediatric Ethicscope: The Journal of Pediatric Bioethics. He recently completed a two-year appointment as member of the core faculty at the Harvard Medical School Center for Bioethics and lecturer in the department of Global Health and Social Medicine, where he was director of the Writing Support Program and executive editor of the Harvard Bioethics Journal. Stowe have a record of program initiatives, innovations, and achievements that have led to visible and lasting practice improvements benefitting patients, families, and staff. He is currently a clinical ethicist at Inova Fairfax Medical Campus.

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William J. Hercules, M.Arch., FAIA, FACHA, FACHE
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Bill Hercules inspires healthcare leadership teams by shaping their future places of care. Having planned and/or executed healthcare architecture totaling 26.3-MSF and $10.3B$_{PV}$, Bill's cross-disciplinary and bold ideation accelerates mission alignment by creating frameworks that attract the future through focused inquiry within organizations, and by innovative approaches outside of healthcare's historical channels.

Bill founded WJH Health, a global consultancy that resolves the place of care at the nexus of mission, performance, and experience. He is the only practicing global triple-Fellow in the American Institute of Architects (AIA), the American College of Healthcare Architects (ACHA), and the American College of Healthcare Executives (ACHE). And he is a global expert in healthcare design with more than 100 publications and speaking engagements.

He is a Past-President of the ACHA and currently serves on the AIA National Strategic Council. He served on the AIA COVID Rapid Response Taskforce – work which was subsequently translated and distributed globally by the U.S. State Department, and on the Hospital Surge Capacity taskforce of the international Facility Guidelines Institute. He is currently leading a research team pioneering the intersection of healthcare design and bioethics.

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David A. Deemer, MD, MA, is a bioethicist and an Internal Medicine Resident at the University of Wisconsin. A native of Lincoln, Nebraska, Dr. Deemer is an award-winning conference presenter and researcher, having presented on a wide variety of topics including survey bias, rhetorical analysis, and public procurement ethics. Dr. Deemer is also published in print and online on a variety of topics, from peer-reviewed research in medical education survey analysis to Op-Eds on topics like COVID-19 hospital no-visitation policies. Finally, Dr. Deemer has extensive leadership experience, having held positions in school, regional, and national leadership during his time in medical school.

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