Gresham Smith

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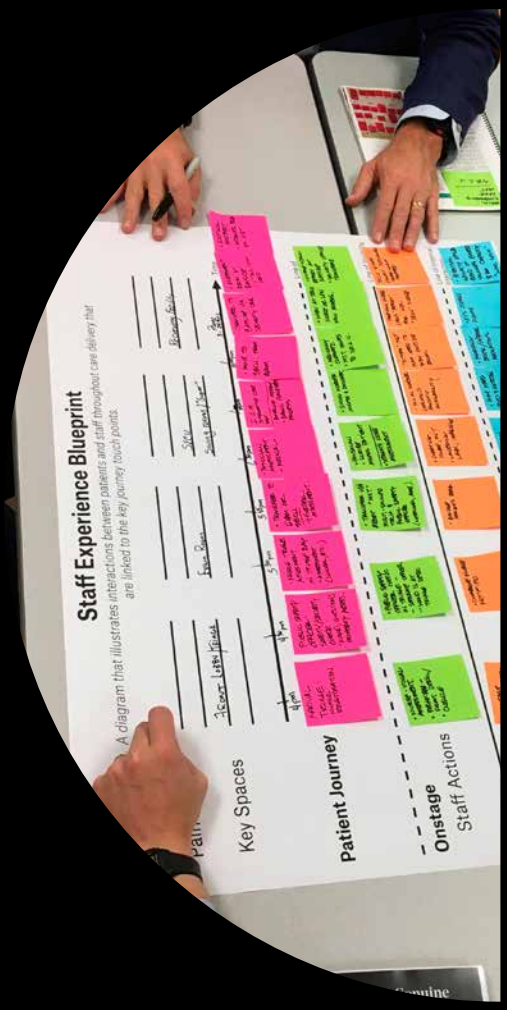


Research and Insights

Research Portfolio

The Evolving Healthcare Environment

Evidence-Based Design (EBD) is a multi-step process modeled after evidence-based medicine enabling empirical healthcare design solutions that achieve the best outcomes. Since Roger Ulrich's (1984) study indicated patients with views of nature healed faster than those who did not, EBD has evolved into a robust field of study that investigates the impact of the built environment on health and patient outcomes. Our Research and Insights team works collaboratively with our designers and engineers in the application and evaluation of EBD. This is a team effort that incorporates input from our healthcare staff, patients, and their families, using emerging technologies and methods.

UF Health North
Jacksonville, FL

What is Research & Insights at Gresham Smith?

The R&I team at Gresham Smith uses a human-centered approach applying both empirical and design thinking methodologies that are collaborative, empathetic and focused around the people at the center of a problem to be solved.

Research is a critical step in developing design solutions that will enhance the human experience and operational efficiencies. At Gresham Smith, we are passionate about contributing to health and wellness through the design of the built environment.

Research & Insights Core Team

Lesa Lorusso
Ph.D., Allied AIA, RID, NCIDQ
Director,
Research & Insights

Elisa Worden
RID, EDAC, LEED AP, NCIDQ
Senior Design Researcher

Dagmar Rittenbacher
MID, CKBD
Design Researcher

Tatiana Orozco,
Ph.D.
Research Analyst

Applying Research to the Built Environment

Three levels to explore and define what is important to our client.

Level 1

Least rigorous and most directly applicable to everyday projects.

- Case Studies
- Design Thinking
- Literature Review (Not Systematic)

Level 2

Utilize more rigorous methods and often involve Institutional Review Boards.

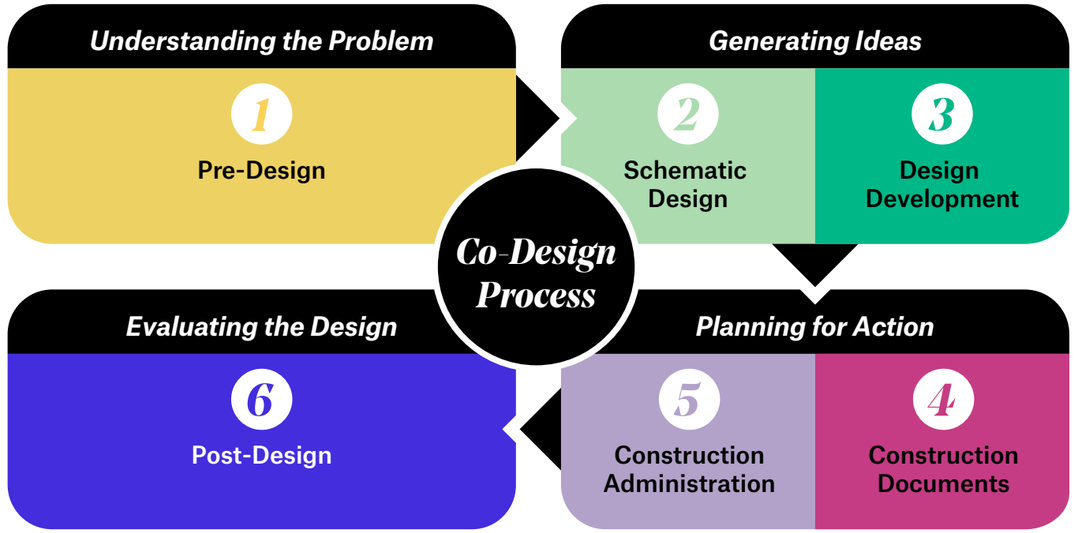
- Behavior Mapping
- Qualitative/ Quantitative Studies
- Systematic Literature Reviews

Level 3

Most rigorous and most publishable.

- Clinical Trials
- Randomized Controlled Trials
- University Partnerships

Creative Problem Solving + Architectural Design Process



Lorusso, L., Lee, J. H., & Worden, E. A. (2021). Design Thinking for Healthcare: Transliterating the Creative Problem-Solving Method Into Architectural Practice. HERD: Health Environments Research & Design Journal, 14(2), 16-29.

A CASE FOR
EVIDENCE-BASED DESIGN

What drives our healthcare design?

Healthcare Design is an evolving, holistic framework where we explore and define what is important to our clients. We focus on and measure our clients' *key performance indicators*:

Safety

While a healthcare delivery system's strategic goals and missions may change, all seek to eliminate medical errors, patient injury, falls, and healthcare-associated infections to protect patients from harm.

The reactive approach focuses on identifying errors/adverse events and reducing them to an acceptably low level, while the resilient approach proactively seeks out opportunities to increase the likelihood that everyday activities go according to plan as often as possible.

Quality + Efficiency

Positive outcomes are at the core of healthcare business and design impacts this in a number of ways. Healing environments employ evidence-based design regarding vistas, daylighting, family support, patient empowerment, positive distractions, and reduction of stressors, all of which contribute to a more supportive environment.

For operational performance and efficiencies, Lean and Six Sigma principles can reduce waste and build efficiencies. Process maps provide a graphic operational model of complex interactions, and computer simulation modeling is used to right-size components and improve throughput.

Integration of Technology

Emerging technologies in diagnostics, interventions and information are significant enablers of improved care. These technologies frequently have either specific environment requirements or enable new processes which dictate design considerations. Both scenarios require design to anticipate technology impacts.

Adaptability/Resiliency

Change is inevitable, so the goal of this focus area is to reduce future renovation costs by extending departmental life cycles through adaptable designs.

Resilience is defined as the ability of a system to adapt and sustain key operations in the face of expected and unexpected challenges or opportunities.

Ways of improving adaptability/ resiliency:

- Standardization
- Creating multifunction suites
- Removing barriers
- Sacrificial slabs
- Anticipating future projects
- Disaster preparedness
- Open-ended design

Healthy, Sustainable Buildings

Often sustainability is defined as having a triple dividend—social, environmental, and financial.

Committing to good stewardship and sustainable design yields solutions that are socially, environmentally, and financially sustainable, and are fine-tuned depending on a client's needs and goals.

Today's market demands reduced costs. The financial dividend of sustainability can improve an institution's bottom line.

Human Experience

Patient and family experience shapes satisfaction and influences provider selection. Positive work environments also influence staff culture, recruitment and retention. These results are not accidents but part of an intentional design analysis which evaluates all steps within a patient encounter. Elements which influence experiences include:

- Efficiency
- Access to information
- First impressions
- A building's message
- A sense of place
- Spatial sequences
- Connections to nature
- Aesthetics

TALLAHASSEE MEMORIAL HOSPITAL

Investigating the Impact of ICU Design on Sensory Stress for Patients, Families and Staff

An ICU/Surgery Tower Addition consisting of:

- 346,270 sf
- Six floors
- New hospital entrance for surgery and intensive care service
- 28 ORs
- Four interventional radiology rooms including support services
- 24 ICUs with a total of 72 rooms
- 13,000 sf expansion to the CEP
- Future floor expansion possibilities

Summary of Findings

- Sensory stress reported to decrease over time from the old to the new ICU space for all respondents
- High satisfaction with the new facility
- New decentralized nurses' stations enabled staff to block out unwanted sounds and focus more closely on their patients
- Turnover rates across all floors decreased slightly
- Overall acoustic levels were lower
- New patient rooms measured 3 to 5 decibels lower than old rooms
- New ICU floors had good visibility and walkability, lowering their sensory stress levels and enabling them to more easily care for their critically ill patients
- Medical staff communication improved
- Patients, families and staff reported reduced stress levels and increased satisfaction with the built environment
- Improved acoustics require phones to call other out of sight nurses since they can no longer shout across the space

Tallahassee Memorial Hospital
Tallahassee, FL

Research Question

How does the built environment positively impact outcomes to help reduce sensory stress for patients, families and staff?

Methods

Qualitative and quantitative investigation of outcomes related to sensory stress within the ICU.

Three separate data collection periods pre and post occupancy.

Research Goal

Partner with clinical staff at TMH on an evidence-based design investigation that supports the impact of the built environment on expected outcomes.

UF HEALTH NORTH

Caring for the Caregiver: The Role of Culture and the Built Environment on Nurse Respite

Attracting and retaining qualified nursing staff has been a critical concern for some time, and the increased demands on nursing due to COVID-19 has contributed to increased nursing shortages and high rates of turnover. To mitigate strain, healthcare systems are creating spaces specifically designed to help nursing staff relax and recharge. This study investigated the role of evidence based-design in break areas for nurses.

Research was conducted within a single medical tower on two architecturally identical medical-surgical inpatient units. The investigated break areas included meal-break and lounge break rooms. The lounge break rooms were on the same location on each floor, one was a work oriented setting, and the other was designed for independent reflection. Other break areas studied within the medical tower included the cafeteria, other open lounges, exterior courtyards, balconies, and a fitness area.

UF Health North
Jacksonville, FL

Research Question

Do nurses take breaks, where do they take them and what design features impact nurse engagement and satisfaction with breaks?

Methods

A 24-month longitudinal study at the UF Health North facility medical surgical units inpatient setting.

Research Goal

To investigate the impact of design on nurse utilization of restorative breaks.

Qualitative

Anonymous online questionnaire

De-identified results from an ongoing Press-Ganey survey

Focus groups using design thinking techniques

Quantitative

De-identified behavioral observations of nursing staff

De-identified nursing staff metrics including call-in and turnover rates and assigned patient loads/shifts

De-identified break room usage rates measured using passive infrared sensors and and badge access

Summary of Findings

- Nurses felt breaks provided much-needed relief from shift stress. ‘Restorative Breaks’ allowed staff to de-stress and re-charge away from the central nurse station, and ‘Bio-breaks’ were quick and focused on basic needs like food, water, and toileting.
- Nurses identified five major themes for a restorative break environment, including:
  - technology
  - nutrition
  - relaxing décor
  - access to nature
  - ergonomic furniture
- Surprisingly, both lounge break rooms were underutilized while the more traditional meal break rooms were preferred.
- Nurses showed a preference for the ‘work-oriented’ lounge, with a higher number of monthly visits, averaging 5 minutes. The longest duration was 30 minutes.
- Nursing culture outweighs environmental factors. This should be a major consideration when designing for nurse respite areas.

Evaluating the Role of OR Acoustics on Medical Staff Performance

The OR research project has 4 parts:

1. **Systematic Literature Review**
2. **Baseline Investigation**
3. **Acoustical Modeling**
4. **OR Acoustics POE**

With parts 1 and 2 complete we are currently working with our acoustical consultant to prepare the Revit model for the acoustical simulations which are beginning shortly.

The acoustical model will simulate three scenarios using a small, medium and large OR design from a current client.

- Control Scenario — Existing Conditions
- Sound Diffusing Solution — Modifying Room Shape
- Sound Absorbing Solution — Modifying Architectural Materials

Did you know that noise levels in a hospital operating room can be as loud as a siren or rock concert?

Implications for Practice

Improving operating room acoustics will require either the elimination or the mitigation of noise producing offenders If sound levels and reverberant conditions are found the correlate with job dissatisfaction, stress, and performance, the results of this study could improve future OR designs to better mitigate acoustic problems and job satisfaction/performance and reduce staff turnover.

Internal factors

- Room size / layout
- Wall and ceiling configuration
- Surface materials

External factors

- Procedure room location
- Adjacency to equipment
- Ductwork

Confidential Client
Surgery Expansion/Renovation
Denver, CO

Research Question

What design changes in the OR will improve acoustics, reduce staff hearing loss, and improve staff performance?

Methods

Baseline acoustical readings collected and interventional scenarios simulated.

Measure staff stress using interviews and biometric data.

Findings will be implemented within an OR for validation.

Research Goal

Understand which design factors will improve acoustical performance, staff satisfaction, and performance.

CASE STUDY: CLINICAL TRIAL

Improving the Lives of Veterans with Dementia Using Multi-sensory Environments

The global population is aging rapidly. The U.S. Veteran's Administration (VA) estimates that 1.1 million Veterans will have dementia by 2029. Due to their progressive cognitive decline, people living with dementia have difficulty adapting to environmental stresses, which can often worsen their symptoms. Elderly people are often treated with drugs, which can be costly. However, the built environment may be a therapeutic alternative to pharmacological intervention.

Our team conducted a 20-week, research study with the VA to understand the effect of multi-sensory environments on Veterans with dementia. Researchers tied findings into healthcare design, demonstrating how person-centered spaces can improve behavior. The study also highlights the long-term goal of partnering with the VA to improve the design of dementia care facilities nationwide.

Summary of Findings

- Multisensory environments may be impactful as non-pharmacological dementia therapy
- At the VA, dedicated MSE rooms were preferred by staff respondents over mobile carts
- Training, staff engagement, a clear maintenance plan and access to the MSE were critical barriers to uptake
- Veterans seemed to favor the bubble tubes, aromatherapy and solar wall projector which staff also perceived as being the most effective in reducing problem behavior
- MSE within the bathing environment may reduce problem behaviors and increase positive behaviors

Implications for Practice

- Medical staff can use these findings to improve MSE uptake by implementing policies and organizational procedures that reduce barriers to uptake
- Healthcare design teams may help support better behavioral outcomes through incorporating sensory elements within the environments where problem behaviors are known to occur, like bathing rooms.
- Families may assist their loved ones with dementia at home to improve quality of life through the use of multisensory environments at home.
- MSE may be broadly applicable to other cognitive impaired populations

VA | U.S. Department of Veterans Affairs

Lesa N. Lorusso, Ph.D., Healthcare Director of Research and Insights, Gresham Smith
Ronald Shorr, MD, MS, Director of VA NF SG GRECC
Nam-Kyu Park, Ph.D., Associate Professor, University of Florida
Sheila Bosch, Ph.D., Assistant Professor, University of Florida
Sherry Ahtentzen, Ph.D., Professor, University of Florida
Maureen Conroy, Ph.D., Professor, University of Florida

Research Question

Are Multisensory environments effective as behavior interventions for people with dementia?

Methods

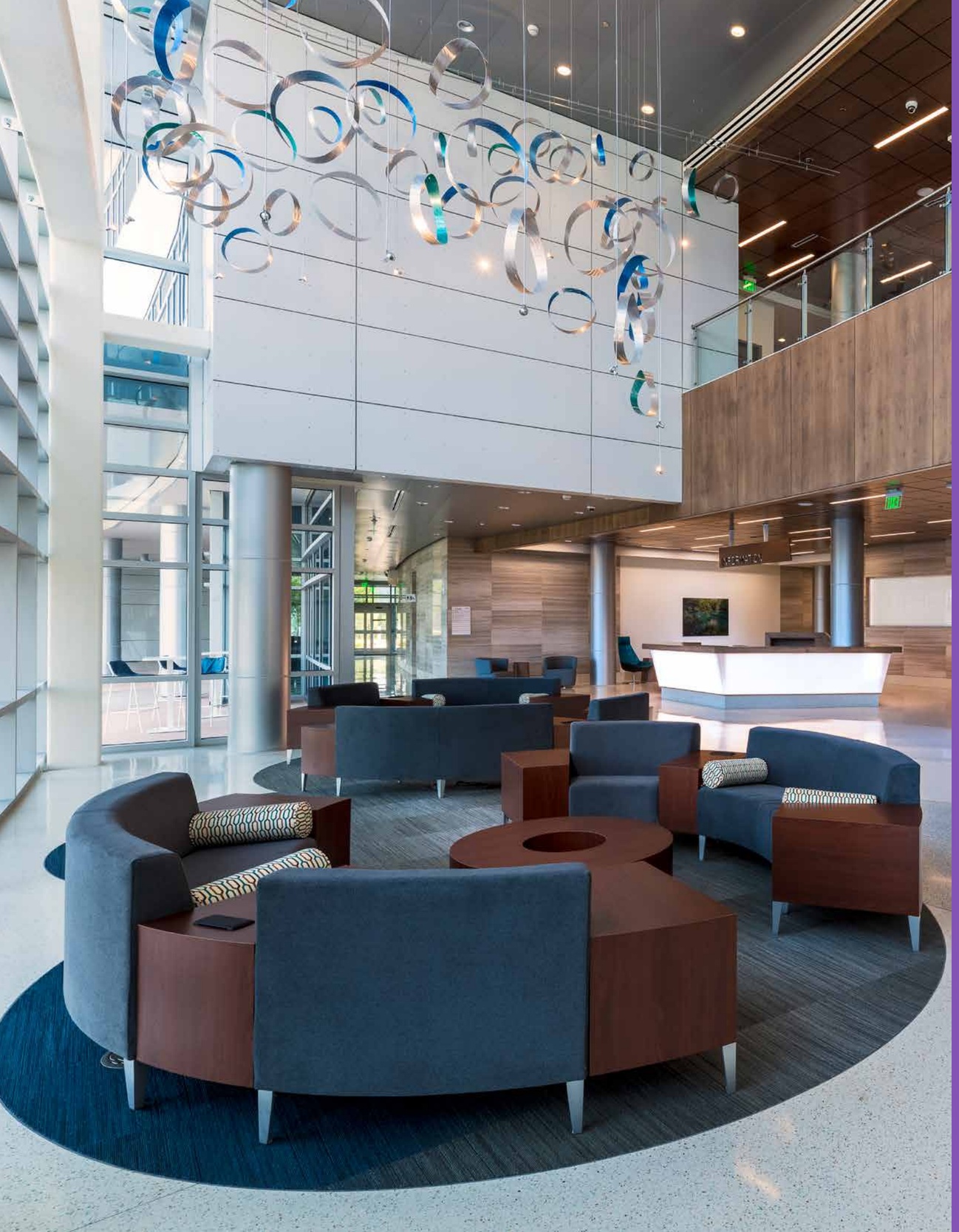
Systematic literature review.

VA-wide interviews of medical staff.

Observational clinical trial.

Research Goal

Partner with the VA to improve environments for Veterans living with dementia.



We specialize in planning and architectural design to deliver

research-driven, evidence-based, design solutions

for health systems, care providers and patients alike.

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GreshamSmith.com
615.770.8100

222 Second Avenue South
Suite 1400
Nashville, Tennessee 37201

For more information on
Research & Insights:

Lesa Lorusso, Ph.D., NCIDQ
lesa.lorusso@greshamsmith.com
407.598.9307

Gresham Smith

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