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Mission of the *Academy Journal*

As the official journal of the AIA Academy of Architecture for Health (AAH), this publication explores subjects of interest to AAH members and others involved in the fields of health care architecture, planning, design, and construction. The goal is to promote awareness, educational exchange, and advancement of the overall project delivery process, building products, and medical progress that affect all involved in those fields.

About AAH

AAH is one of 21 knowledge communities of The American Institute of Architects (AIA). AAH is unique in the depth of its collaboration with professionals from all sectors of the health care community, including physicians, nurses, hospital administrators, facility planners, engineers, managers, health care educators, industry and government representatives, product manufacturers, health care contractors, specialty subcontractors, allied design professionals, and health care consultants.

AAH currently consists of approximately 7,000 members. Its mission is to provide knowledge which supports the design of healthy environments by creating education and networking opportunities for members of – and those touched by – the healthcare architectural profession.

Please visit our website at aia.org/aah for more about our activities. Please direct any inquiries to aah@aia.org.

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Building is Only Half of the Battle: Multi-level interventions to impact change

Erin Peavey, AIA, NCARB, EDAC, LEED AP BD+C,
Architect & Design Researcher at HKS Inc.

ABSTRACT

Design interventions influence how one feels, behaves, interacts with others, and perceives their organization's culture and values. However, social ecological models demonstrate something we all intuitively know as true: The success of any design project depends on organizational and culture change occurring in concert with physical changes to the environment. Models of this system help us understand the multiple factors impacting design strategies' success. These models can also help design teams develop the partnerships and integrated approaches needed to impact systemic change. This article provides examples of how to apply interventions at each of these levels of the system. By understanding the existing attributes of the social ecology surrounding a built environment design project, one can better anticipate the success of certain interventions over others and potentially foster conversations with the client about moving the needle on all fronts to maximize their capital investment.

Sam recalled years ago he had stated that he'd never return to the hospital. As he approached the doors, he looked up at the plastic sign marked "Entry" and was struck by how much things have changed now that Grace needed him. Last week, she'd been complaining about chest pain. This week, he was on his fourth visit. As he navigated through the sterile halls, he felt the familiar mix of panic, hope, and claustrophobia settling in.

In Grace's room, her nurse Dan was checking vitals when he was paged by one of his other patients. He rushed out of the room, calling into the hall, "Can I get a little help? Patient lift in room 22." Dan was greeted with silence and quickly realized he'd be doing this alone. Sam and Grace shared a look of concern, feeling powerless and wondering what would happen if the next emergency was theirs.

Unfortunately, these experiences are not unique. They're created by a commonly used but broken system; however, they are avoidable. The factors that determine the success of health care improvement efforts depend in part on the quality of any physical design intervention (e.g., the design of patient rooms, staff workstations, departmental adjacencies). They are also largely influenced by the individuals, organizational norms, culture, and political climate. Fostering systemic change requires understanding the whole system. Whether through training, environmental changes, or organization-wide protocols, identifying and addressing all the changes happening within the system can feel like a maze with no roadmap. Models can help us see a complex system in more understandable parts.

Modeling the social ecology

Social ecological models (SEMs) show how the social, physical, and often abstract parts of one's environment are interconnected. These models have been used since the 1970s by Cornell professor Urie Bronfenbrenner to explain the person-environment interaction and make changes to the environment that support the individual.

Although researchers have historically used these models to focus on human health and development, applying them to health care environments can offer insights into understanding the system-wide changes needed to accomplish health care goals. The Simons-Morton, McLeroy, & Wendel (2012) model (see Figure 1) offers a widely encompassing SEM, organized into seven interconnected types of environments, or levels. These levels start at the individual and radiate out to include intrapersonal (i.e., within one's self), interpersonal (i.e., with others), organizational, community, public policy, physical environment, and culture. By examining and understanding each level, one can design interventions to improve the system and thereby the conditions for the individuals.

FIGURE 1
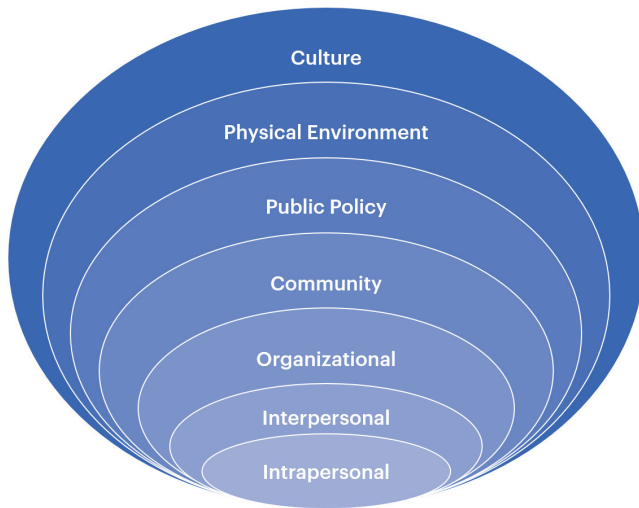
This figure is based on Simons-Morton et al. (2012). By understanding the interconnected layers of one's environment, more targeted and thoughtful interventions can be created to systemically impact patient safety. Each of these layers is interdependent with the other layers.

Ecology of change: Levels of influence

The Intrapersonal level defines the attributes that come from the individual person. This can include the individual's genes, biological or psychological factors, demographics, family situation, cultural background, education or knowledge, and more (Simons-Morton et al., 2012). For example, a nurse's level of stress, training, years of experience, and sufficiency of sleep can impact their ability to provide safe care.

The Interpersonal level addresses how the individual is influenced by others, including close ties such as friends and family, as well as larger social networks. Interpersonal influences can be either purposeful or unintentional. For example, nurse Dan may have learned poor handwashing behaviors by watching others—an unintended consequence; or he may have been instructed by his peers to wash his hands—a purposeful social influence.

The Organizational level of the model is a setting where the individual attends work, educational, social, or religious activities. Organizations often require membership, participation, or belonging, and are typically related to a place, such as a workplace or school building. Organizations tend to have defined social and procedural norms (e.g., safe patient handling practices or team

huddles) that can be influenced by the resources provided (e.g., continuing education offerings).

The Community level represents a setting or a place where healthy behaviors take place or are learned, such as a neighborhood. It can also be a social network or system—digital or physical. In many instances, such as a hospital setting, community and organizational levels overlap, where communities can be defined by organizational boundaries. The level of leadership, citizen participation, community values, resources, skills, power, and strength of social networks can facilitate change at the community level.

The Public Policy level includes policies, laws, and incentives made throughout the spectrum of local, state, and federal. These policies can range from funding for sidewalks to the 2010 Patient Protection and Accountable Care Act, which changed how our medical care, preventative services, and national health insurance is incentivized. Public policy often drives the incentives for health care practice through mandating national standards, public reporting, and reimbursement (Shin & Singh, 2016).

The Physical Environment level is a location for interaction, patient care, community, physical activity, and exchange. There are multiple methods in which the physical environment can impact health, including a medium for disease transmission, a cause of stress (e.g., noise, density), a source of danger (e.g., lead paint, slippery floors), enabler of health behavior (e.g., patient lifts, hand-rails, walking trails), and a health resource (e.g., gym proximity, patient record access) (Simons-Morton et al., 2012). The next section, Designing for Success, expands on the physical environment's interaction with each of these levels.

The Culture level is defined as a "shared system of learned norms, beliefs, values, and behaviors that differ across populations defined by region, nationality, ethnicity, or religions" (Simons Morton et all, 2012, p.60; Hruschka & Hadley, 2008). Most health care organizations define their explicit culture in their vision and mission statements; however, national and international practice standards influence local culture. Understanding the culture in which one is working can allow them to create more targeted and effective interventions. By transforming the environment at other levels, one often aims to influence the cultural values and norms.

Designing for success: Integration of social ecological thinking

Design interventions influence how one feels, behaves, interacts with others, and perceives their organization's culture and values. However, social ecological models demonstrate something we all intuitively know as true: The success of any design project depends on organizational and culture change occurring in concert with physical changes to the environment. SEMs help us understand the multiple factors impacting the success of design strategies and can help design teams develop the partnerships and integrated approaches needed to impact systemic change. Examples of how to apply interventions at each of these levels is shown in Table 1. By understanding the existing attributes of the social ecology surrounding a built environment design project, one can better anticipate the success of certain interventions over others and potentially foster conversations with the client about moving the needle on all fronts to maximize their capital investment.

The physical environment is the ecological layer that designers have the most influence over. On each of the interconnected levels, the physical environment plays a role in promoting or hampering health, wellbeing, and safety. From the way a single individual feels in it to how they connect with others or view their community – the place embodies more than can be contained in walls. The physical environment impacts an individual's mental and physical health in many ways. For example, impacts to air quality, exposure to natural light, nature, or noise can lead to physical and emotional stress. Interpersonal relationships can be impacted by providing spaces for people to gather and interact naturally with their colleagues. Similarly, programs within facilities impact the organizational and community structures, along with the interrelationships and shared space between departments. The public policy has a direct impact on the physical environment by determining types of buildings and setting guidelines for safety and zoning. Lastly, the culture of health is impacted by what behaviors and attitudes a building or community cultivates: Are there easy walking paths or other spaces for celebrating health and the patient journey? Or is the space windowless and difficult to navigate? These small changes can make a large difference in the way a space feels and the culture it embodies.

A brighter future

Imagine Sam's first visit to the hospital he had once written off. How would he respond if he pulled his car under a covered walk and was greeted by a valet who directed him to the main entry? Imagine Sam's reaction when he made his way through the tree-lined path into the hospital. Envision how he is welcomed into the sunlit lobby where the sound of a piano can be heard playing nearby, and a greeter smiles at him and offers help. Visualize too, that nurse Dan can easily see colleagues as he works, and with one quick call a fellow nurse nearby assists the patient in transferring to a ceiling lift.

Both realities are possible by making operational, physical, and cultural changes. We can help our clients create environments that foster health, mental, and physical well-being for patients, their families, and the staff that make their care possible.

TABLE 1

SEM LEVEL	ATTRIBUTE EXAMPLES	DESIGN INTERVENTION EXAMPLES	OPEARATIONAL INTERVENTION EXAMPLES
Intrapersonal	▪ Education, training, skills, & knowledge ▪ Age, weight, race, & strength ▪ Personality, mood, & mental workload ▪ Years of experience, experience with specific duties	▪ Natural light and views of nature improve mood and fatigue ▪ Noise levels impact staff distraction and patient sleep quality	▪ Skill-based training ▪ Inter-professional simulation training
Interpersonal	▪ Team size, members, and experience working together ▪ Social hierarchy ▪ Team support behaviors (e.g., social, task-based) ▪ Social learning and team norms ▪ Team size and experience working together	▪ Visibility and proximity between staff can increase communication, teamwork, and reduce feelings of isolation ▪ Dedicated team space enables interprofessional models of practice	▪ Inter-professional simulation training ▪ Caregiver buddy support system ▪ Team training ▪ Virtual communication technology ▪ Regular huddles and debriefs
Community & Organization	▪ Hospital culture & safety culture ▪ Leadership, management, staffing ▪ Incentive structure, financing ▪ Patient population and risk level	▪ Design of patient spaces influences family visiting ▪ Unit layouts and room numbers determine possible nursing ratios	▪ Increasing nurse to patient staffing ratios ▪ Organizational commitment to safety
Public Policy	▪ Regulatory and Allocative Tools ▪ Policies for zoning ▪ Mandatory overtime rules ▪ State adopted guidelines for design standards	▪ The Facility Guidelines Institute (FGI) and other building codes determine minimum room sizes and program ▪ Certificates of need determine the number of patient rooms that can be provided	▪ The PPACA legislation that implemented VBP and has changed incentives for hospital facilities by allocating funding to reward/penalize hospitals ▪ Regulations that mandate public reporting of patient outcomes
Physical Environment	▪ Size, spatial properties, physical resources ▪ Location, adjacency of spaces ▪ Aesthetics, sound, visibility, comfort ▪ Ease in cleanability ▪ Accessibility of supplies, resources	▪ Strong environmental design strategies can be created using an evidence-based design approach informed by client engagement	▪ Location of hand washing sinks or disinfectant dispensers to be in highly visible standardized locations that are easily accessible in path of travel ▪ Improving proximity and accessibility between care team members ▪ Provide shared workspace for team
Culture	▪ Beliefs, values, behaviors ▪ Influenced by religion, nation, geography, etc.	▪ Creating shared spaces for physicians, allied health and nursing can help create a culture of interprofessional collaboration	▪ The education of care staff about the rates of patient harm, and strategies that focus on improving quality

Table 1. Outline of attributes and interventions at each level. Attributes encompass what is innately a part of each level, some may be fixed (e.g., age), and others are adaptable (e.g., training). Interventions can be made at every level to impact attributes and benefit the system.

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