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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 affects all involved in those fields.

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Applying Maslow's Hierarchy of Needs to Human-Centered Design Translating HCAHPS Results into Designs that Support Improved Care Delivery

J. Todd Robinson, AIA, Executive Vice President/Principal,
Earl Swensson Associates and Misty Chambers, Associate
AIA, M.S.N., R.N., Clinical Operations Design Specialist, Earl
Swensson Associates

ABSTRACT

In this paper, we apply Abraham Maslow's hierarchy of needs to the hospital setting to offer insights to health care organizations seeking to improve their Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey results. Positive survey results have a direct financial impact on hospitals; the Patient Protection and Affordable Care Act of 2010 ties their value-based incentive payments to their HCAHPS scores.

The HCAHPS survey contains two questions that relate directly to a hospital's physical environment. All remaining questions require patients to assess the quality of the care provided by caregivers—doctors, nurses, and hospital staff. The survey thus presents a difficult challenge to healthcare administrators and architects working on new construction or renovation projects: How to translate the information gleaned from these surveys into designs that facilitate improvements in healthcare delivery—and thus, better survey results.

As a conceptual response, we propose a “human-centered design hierarchy of needs,” based on Maslow's hierarchy of needs, as a way to conceptualize a hospital stay and illuminate ways in which healthcare facility design can support more responsive patient care delivery.

We conclude that facility design provides an essential foundation for the delivery of excellent patient care, which, in turn, supports the optimal patient experience. We also conclude that a lean design that promotes staff efficiency by locating support spaces and staff and physician work areas near patient rooms on inpatient care units supports improvements in both the efficiency and the efficacy of care.

Introduction

The challenge: Translating HCAHPS results into designs that supports improved care delivery

Starting in 1943, psychologist Abraham Maslow identified a hierarchy of needs common to all people in his seminal paper, “A Theory of Human Motivation” (Maslow, 1943). Maslow's theory of what motivates people is commonly presented as a pyramid, with basic physiological needs as the bottom layer, safety and security as the second layer, and positive social contact with others—belonging to a family and a broader social group—as the third layer. Each layer is necessary to support the layer above it. The bottom three layers provide the foundation for the top two tiers of Maslow's pyramid: Enabling people to lead meaningful, fulfilling lives.

In this paper, we apply Maslow's hierarchy of needs to the hospital setting as a way to support healthcare organizations as they seek to improve their Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey (Appendix 1) results. Hospitals and health systems are paying more attention to these scores as a result of the Patient Protection and Affordable Care Act of 2010, which—since 2012—has tied hospitals' value-based incentive payments to their HCAHPS scores on patient experience (See Appendix 2).

The HCAHPS Survey contains 21 areas where patients are asked to offer their perspectives on nine key elements:

1. communication with doctors
2. communication with nurse
3. responsiveness of hospital staff
4. pain management
5. communication about medications
6. discharge information
7. cleanliness
8. quietness
9. transition of care

Patients are asked the following:

- Did doctors and nurses treat them with courtesy and respect?
- Did these caregivers listen to them carefully?
- How quickly did nurses respond to call buttons?
- Did hospital staff do “everything they could” to help with pain?
- Did they explain for which purpose medications were administered and their potential side effects?
- Did patients understand their needs for follow-up care after their hospital stay before they left the hospital?

FIGURE 1



Image credit: J. Todd Robinson, AIA, ESA

At the survey's end, patients rate the hospital on a scale that goes from "worst hospital possible" to "best hospital possible."

Although the physical environment may have an impact on many areas of the survey, only two HCAHPS survey questions relate directly to the hospital environment:

- How often were your room and bathroom kept clean?
- How often was the area around your room quiet at night?

Both questions address issues where facility design can have a positive impact on a patient's experience. State-of-the-art healthcare designs now facilitate infection control and thorough, attentive housekeeping by avoiding the creation of spaces that are difficult to reach. Special consideration is given to selection of materials used on floors, walls, and other surfaces for durability, dirt- and bacteria-resistance, and ease of cleaning and maintenance. Proper soundproofing, which supports patient privacy, is also integral to modern healthcare design, dictated the use of materials that absorb rather than amplify noise wherever possible. Acoustic design that controls noise also improves communication among caregivers and between caregivers and patients, who are more likely to hear, understand, and respond to questions and directions if they aren't distracted by noise.

The remaining HCAHPS questions require patients to assess the quality of the care provided by caregivers—doctors, nurses and hospital staff. They are specific to respectful and responsive care delivery and address details such as timely response to call buttons, timely assistance in toileting, clear and courteous communication about medications, and appropriate pain management.

The HCAHPS questionnaire presents a challenge to healthcare administrators and architects working together on new construction or renovation projects: How do you translate the information gleaned from these surveys into designs that facilitate improvements in healthcare delivery by doctors, nurses and other hospital staff—and thus, better survey results?

We propose to use Maslow's hierarchy of needs as a means of conceptualizing a hospital stay to illuminate ways in which healthcare facility design can support more responsive delivery of patient care.

This paper is directed at an audience familiar with the healthcare environment. Using Maslow's hierarchy of needs, we will approach that environment from the perspective of adult patients experiencing their first hospital stay.

For our patient, Adam, the hospital is completely unfamiliar. Though he has probably seen hospital dramas on television, those may have given him an inaccurate impression that doctors and nurse spend hours in patients' rooms.

At home, he controlled his schedule. In the hospital, his schedule is controlled by others and is based on his treatment plan. He may have lost his freedom to choose what to eat and when. Whether he is allowed to choose his meals and meal times, his meal deliveries may be timed to accommodate scheduled tests or procedures.

Adam may or may not have chosen his doctor(s), and he certainly hasn't selected his nurses. And though they may be helping him with intimate tasks such as bathing and toileting, he is very likely meeting them for the first time—and in a hospital robe or pajamas—not attire anyone would choose for meeting strangers. He is aware that recovery, and perhaps his life, depends on their care.

Finally, the patient is in a strange place where he no longer controls many aspects of his life, but is there because he is sick or injured or, perhaps, dealing with a recently-diagnosed chronic health issue.

As Adam enters the hospital for his stay, his immediate environment makes an indelible first impression that will very likely influence his answers to the HCAHPS Survey he will complete after his discharge. This environment includes the following:

- the entry drive and approach to the hospital campus
- exterior signage
- the grounds and landscaping
- the hospital entrance and public areas
- the appearance of the inpatient unit to which patient is admitted
- the patient room

In this paper, we also propose a corresponding hierarchy of needs similar to Maslow's—one that supports human-centered design—and design principles to show various ways in which layout, materials, and infrastructure can facilitate patient-preferred practices. This requires the transformation of inwardly focused organizational cultures (which may have been provider-focused in the past) to cultures where each patient's experience becomes and remains a top priority.

We want to stress that patient-centered design and care delivery need not come at the expense of efficiencies such as building layouts that place doctors and nurses near patients and reduce time spent walking hospital corridors. Rather, we contend that patient-centered design, that supports the goal of maximizing the time clinical teams can spend attending to patients' needs, also promotes efficient use of caregivers' time.

A lean design that promotes staff efficiency by locating support spaces, staff, and physician work areas near patient rooms on inpatient care units increases the time the clinical team can spend at a patient's bedside and on other patient care tasks. For hospitals, lean design aims to create an environment supportive of both the efficiency and the efficacy of care (Miller et al., 2012).

Tier 1. The bottom of the pyramid: Physiological needs/facility design, layout & infrastructure

At the bottom of Maslow's hierarchy of needs are the basic requirements for human physical survival: air, water, clothing, shelter, nourishing food, and adequate rest. These requirements are essential to sustain life and underscore the importance of the physical plant and infrastructure at all types of health care facilities, where the aim also is to sustain life.

At the base of our patient-experience hierarchy of needs pyramid is the physical building and infrastructure, with the following essential elements to meet patients' physiological needs and create a healing environment:

- Natural light in public areas and in patient rooms
 - Natural light helps keep patients oriented to circadian rhythms. Research has demonstrated that natural light has a positive impact on improved sleep, pain control, patient stress, and depression (Boyce et al., 2006) (Joseph, 2003). It is also one of the most comforting and familiar things hospitals can provide their patients.
 - It also benefits staff. Nurses exposed to exterior nature views and natural light report improved alertness and reduced stress, and a recent study indicates physiological benefits. Natural light has a positive impact on staff satisfaction and decreases staff stress (Sadeh et al., 2014).

FIGURE 2

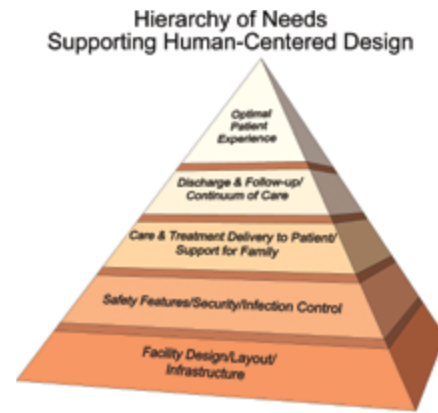


Image credit: J. Todd Robinson, AIA, ESA

- Private patient rooms to promote a healing environment
 - Private rooms support infection control, reduce instances of hospital acquired infections (HAIs) (Ulrich et al., 2008) reduce noise and stress (Reiling et al., 2008), and provide patients with their own space in an unfamiliar place.
 - Private patient rooms have been shown to reduce patient falls and medical errors (Gallant and Lanning, 2001).
 - Multiple studies demonstrate patients' needs for privacy and control over their environment.
 - Private rooms afford patients desired privacy and control, which translates to more favorable scores on the HCAHPS survey (Knutt, 2005).
 - Patients perceive a private room as being cleaner and less noisy (Cullinan and Wolf, 2010).
 - Private rooms are more conducive to the involvement of family, friends, and partners in the care experience and have a positive effect on patient satisfaction (Reiling et.al, 2008).
 - Private rooms provide a more homelike and welcoming setting.
- Ample, accessible public and family areas
 - Many patients will have family members who remain with them for the duration of their stay, which is now encouraged based on evidence showing the benefits of the presence of family members on communication, decision making, and patient care during hospitalization and outpatient procedures (AACN Practice Alert, 2016).
 - Meeting the physiological needs of family members who are supporting patients during their stay and will likely assist with follow-up care is as important as meeting the patient's own physiological needs.

- > Effective air-handling systems that control temperature appropriately, eliminate odors, and provide adequate air exchanges to support infection control
 - Rooms should be equipped with accessible controls that allow the patient and/or staff to maintain the room at a temperature that's comfortable for the patient.
- > Use of acoustic design and sound-absorbent materials to reduce or eliminate noises that disrupt rest and sleep
 - High sound levels in healthcare settings increase patient and staff stress.
 - A quiet hospital environment is one of nine areas included in the HCAHPS survey.
 - Acoustic ceiling tiles have been shown to be a cost-effective solution to noise abatement, whereas hard ceilings increase noise level (Frederick et al., 2012).
- > A state-of-the-art kitchen and meal delivery system that makes it easy for patients who can choose their own meals to do so and provides nourishment for family and caregivers
 - Availability of nourishment on the patient unit so patients aren't dependent solely on meal delivery.
- > Bathrooms that accommodate patients and family members of all shapes and sizes, which can be quickly and easily cleaned and disinfected
- > Ample warm (rather than cool) lighting in all areas
 - Hospital corridors and work areas must be well-lit.
 - Warm light in corridors, patient rooms, and treatment rooms creates a more home-like, less institutional atmosphere.

Adam, our adult patient, may enter the hospital for his treatment through the emergency room, through the front entrance via a pre-arranged appointment, or from a physician's office in an attached medical tower. He may be walking, in a wheelchair, or on a stretcher. If he is awake and cognizant, the first part of his patient care experience will involve his impression of public spaces, corridors, elevators, the room he will occupy during his stay, any noises he hears, and any odors he smells.

Adam has a good experience: He doesn't have to wait to enter his room, and the care team greets him by name. Although he has heard that hospital staff repeatedly ask patients the same questions, his care team already has his personal health information, which he and his doctors provided electronically before his admission. Once checked

into his private room, he has a room of his own. Though caregivers will be monitoring him, he can close the door of his room if he wishes. He controls his privacy.

The hospital remains an unfamiliar space, but the room where Adam will spend his stay is clean, cheerful, well-lit, and quiet. His room includes a wardrobe, a writing desk, and storage for his personal belongings. His bed is angled toward the window for views to the outside and access to natural light.

There is a comfortable chair for his wife, and the admitting nurse mentions the availability of a sleeper if she wishes to stay overnight. The family space provided in his room ensures his children don't have to wait in the corridor and also benefits staff by helping keep halls clear of visitors, so staff can move freely through the corridors.

If Adam is able to eat, he is presented a menu and invited to order his own meals. The nurse mentions a nourishment area on the unit that is available to patients and family members and a cafe located near other family amenities. The bathroom is obviously designed to accommodate people with severe physical challenges, but it is sparkling clean and accessible. Adam's concerns about "that hospital smell" evaporate.

Adam's basic physiological needs are met with a design that also meets the needs of the doctors, nurses, and other staff who will provide his care. His inpatient unit and room are both laid out to align with the work patterns of the doctors, nurses, and other staff members who will be caring for him. Because his unit includes decentralized work stations, the nurse assigned to him is nearer his room where she can observe him more easily and reach his room in less time. A standardized room design helps staff avoid wasting valuable time searching for equipment, supplies, or electrical outlets. Patient rooms are equipped with standardized headwalls and laid out so as to save staff steps. Charting accommodations are planned at the bedside to support real-time documentation and avoid charting errors.

Adam can't see them, but the building's systems are well-maintained and efficient. A central energy plant and its systems support the delivery of heated or cooled air to the entire facility. Ample natural light, which benefits staff as well as patients, streams through energy-efficient glass. Acoustical tiles in the ceiling and soundproofing in the walls absorb the sound of Adam's flat-screen television and of his visitors so the patient sleeping in the next room is not disturbed. The soundproofing in his and other patient rooms also helps nurses preparing medication for patients to focus on their work without distraction.

In addition to meeting Adam's basic physiological needs, his room may have some pleasing modern features that his room at home lacks, such as LED lighting with control options for him and his family, and modular furniture with built-in features to accommodate his needs and those of his family.

The leadership team of the hospital where Adam will be treated has been very intentional about providing a healing environment, down to the last detail, while also supporting staffing and workflow efficiencies through lean design concepts.

Tier 2. Safety & security: Patient-care priorities

In May 2016, patient safety experts at Johns Hopkins University School of Medicine released the results of an eight-year study indicating that more than 250,000 deaths per year can be attributed to medical error, which the study defines as "an unintended act (either of omission or commission) or one that does not achieve its intended outcome; the failure of a planned action to be completed as intended (an error of execution); the use of a wrong plan to achieve an aim (an error in planning), or a deviation from the process of care that may or may not cause harm to the patient" (Makary and Daniel, 2016). The study notes that "Patient harm from medical error can occur at the individual or system level" (Ibid).

Adam, our hospital patient, saw a news report about this study on television and is understandably concerned about medical errors and hospital-acquired infections such as MRSA. Adam is less aware of many other patient safety issues, such as falls, and he may not realize the materials used on the ceilings, walls, and floors of his room, the corridors and various treatment areas promote his safety and the safety of his caregivers by aiding in the prevention and reduction of falls and supporting infection control.

A patient-centered hospital integrates these safety features into its design:

- Avoiding small, inaccessible spaces that are difficult to clean and disinfect to support both infection control and efficient use of staff resources
- Use of non-porous, bacteria-resistant materials on walls, floors and counters to support infection control
- Ample storage for equipment and supplies to eliminate clutter in patient rooms and hallways, reducing instances of clutter-related accidents and supporting cleanliness and infection control
- Smooth floor transitions to help avoid trip hazards and prevent falls
- Ceiling-mounted lifts for patient and staff safety when transferring non-ambulatory patients
 - > Patient lifts are becoming a necessity to support staff and patient safety during transfers (Assoc. of Occupational Health Professionals, 2014).
 - > Numerous studies indicate that facilities that install patient lifts in rooms significantly reduce staff injuries and missed staff days due to injury (Alamgir et al., 2009).
 - > As of 2011, fewer than 20% of new projects included lifts (Washington Dept. of Labor and Industries SHARP Program, 2011).
- Adequate space on all sides of the bed for caregivers to gain access to and assist patients
- Sinks that remind staff to wash their hands
 - > Some healthcare organizations have embraced the use of hand-hygiene compliance monitoring (HHCM) systems to monitor and impact change in caregiver hand washing behavior (Lorenzi, 2014).
- Visual cues to guide patients to the sink and the bathroom
 - > These cues may involve stripes on the floor and/or low-level lighting.
- Well-lit work areas and work surfaces to reduce medication and documentation errors
- Wireless bedside technology for monitoring patient vitals
- Decentralized work stations make it easier for nurses to observe and check on patients
- Convenient access to medications in distraction-free areas to reduce the potential for medication errors
 - > Pain management is one of the nine key areas addressed in the HCAHPS survey.
- Separation of public flow from the flow of patients, supplies, and materials
 - > Providing separate travel paths for clean and dirty materials through an on stage/off stage design concept supports infection control principles and safe transport of people and materials
- Clear and consistent signage to support ease of wayfinding and avoid the waste of movement and time spent searching for one's destination
- Strategic use of art to serve as navigational landmarks for patients and visitors and support wayfinding, which has the added benefit of making the hospital environment more inviting and hospitable

All of these features support the hospital's rigorous infection, quality, and risk management programs. The hospital is taking careful steps to create a safe environment for Adam, its patients, staff, and visitors, while also reducing the number of steps that doctors and nurses must take to deliver attentive care.

Tier 3. Connecting with the patient and keeping him connected: Belonging

The "belonging" level of Maslow's hierarchy addresses the need all people have for social interaction, family connections, and belonging. Our corresponding tier addresses a patient's experience with all caregivers.

A well-designed facility with safety features that support a reduction in the number of medical errors and promotes patient safety only sets that stage. Patients' interactions with caregivers will determine their perception of their hospital stay. How patients perceive the quality of the care they received and whether they felt they were treated with respect and listened to is thus the major focus of the HCAHPS survey.

Our corresponding tier focuses on how design can have a positive impact on the interactions of caregivers with patients. A major goal is to maximize time available to caregivers to interact with patients by eliminating unnecessary steps, providing efficient workspaces located near patient care areas, and standardizing work and storage areas:

- Efficient department layouts to reduce the number of steps required to reach patients and attend to their needs
- Standardized space design to avoid wasted time when staff members must orient themselves to different room layouts, including supply rooms, support areas, treatment and patient rooms
 - › Standardized patient room designs also improve the experience of patients who must move from one room to another, as the new room is still familiar.
- Standardized headwalls to facilitate multiple forms of patient care
 - › Both space limitations and evidence-based design point to the benefits of designs that maximize adaptability of inpatient rooms as a long-term solution for responding to evolving technologies and treatments.
- Alignment of inpatient units with physician medical practices maximize the time physicians have to devote to patient care
- Wireless internet access in patient rooms and staff work areas

- › Most patients will bring laptops, tablets, and/or smartphones when they enter the hospitals.
- › Family members will also bring these devices; some may need to work from their family member's bedside.
- Accessible, adjacent parking for doctors and staff
 - › Parking that doesn't require doctors and hospital staff to walk a long distance sends the message that the hospital values doctors and employees' time and their role in a patient's recovery.
- Thoughtful use of the arts throughout the hospital to promote healing (Arts in Healthcare, 2009)
 - › The arts have been shown to have a positive impact on patient health outcomes, reduce stress and anxiety, and decrease perception of pain—a focus of the HCAHPS survey, which asks patients to evaluate whether their pain was controlled and if hospital staff did "everything they could" to help with pain.
 - › Art in patient rooms and public areas has a civilizing influence; it also increases patient compliance with recommended treatments and reduces use of pain medications.
 - › The arts also increase a sense of well-being and reduce stress for caregivers.
 - › Reduced stress and a higher sense of well-being enhance the patient experience.
 - › Reduced staff stress translates to fewer medical errors, higher job satisfaction, and enhanced patient safety.

Adam's hospital stay is an anomaly for him—a sharp break from the familiar daily routines of his life. Contact with his wife and children, friends, and other visitors reinforces his sense of belonging and thus his sense of well-being. Isolation accomplishes the opposite. Rooms that—in addition to providing a comfortable, safe and secure environment for the patients—also provide comfortable accommodations for family and visitors (including comfortable chairs and sleeping accommodations for overnight stays) send a powerful message about the importance hospital management places on enabling the patient to maintain his connections with family, friends, and the outside world.

Attractive, comfortable public areas where families and friends can gather also support the patient's sense of belonging. Several visitors have commented on the interesting visual art throughout the healthcare campus, opportunities to hear music and live performances, access to a valet for convenient access to the main entrance, retail options provided on the main level, and the comfortable

and pleasing aesthetics of the hospital environment.

These design elements (along with accessible, secure, well-lit parking that doesn't require visitors to walk a long distance each time they visit the patient) sends a powerful message that the hospital values their time, their presence, and their role in a patient's recovery.

Adam's wife spends two nights in the hospital with him on comfortable sleeping accommodations. His room is large enough, so his family doesn't feel crowded and uncomfortable when his children visit. The hospital's well-maintained wireless network allows Adam and his wife to use their laptops to work, read the newspaper online, and talk to family and friends via Skype. Neither feels isolated or as if they've lost touch with their work colleagues, family, and friends.

Tiers 4 & 5. The top-tier goals: Fewer readmissions, better outcomes

The top two tiers of Maslow's hierarchy of needs address personal accomplishment and the achievement of one's potential. Our corresponding tiers are patient discharge—the patient has recovered sufficiently that he no longer needs acute care—and follow-up. The four lower tiers of our hospital hierarchy of needs include a well-designed environment; safety features, security and infection control; patient care delivery that integrates and accommodates family members; and discharge and follow-up. All tiers combine to support the optimal patient care experience.

In addition to addressing the patient's experience during his treatment, the HCAHPS survey addresses follow-up instructions:

- Did the patient receive them?
- Were the instructions clear?
- Did doctors and nurses explain any help the patient would need after leaving the hospital?
- Did they ask whether that help was available?
- Did they offer written information about symptoms or health problems to look for after leaving the hospitals?

When Adam is discharged, the nurse reviews the follow-up care he will need, including appointments with his doctor and physical therapist, medications, and the duration of his recovery at home before he returns to work. He learns that his follow-up visit with the physician can be done via the health system's telehealth portal, which allows Adam to communicate directly with his doctor without having to travel to the medical center, and thus missing another day of work. As he leaves the hospital, he is surprised: An experience he had feared would be isolating, alienating, inconvenient and uncomfortable—a three-day hospitalization—has been much more positive than he expected.

Conclusion

The design of a healthcare campus and the spaces within its facilities makes a crucial first impression on patients and sets the tone for the patient care experience. The hospital's safety, risk management, and infection control programs are also vital to protecting the patient from acquiring HAIs or being injured during his stay.

An attractive and efficient layout of patient care spaces aligned with caregiver workspaces supports and facilitates attentive care from doctors, nurses, and other members of the healthcare team. By fully addressing the first tier and supporting the priorities of the second and third tiers, facility design provides an essential foundation for the delivery of excellent care, which in turn supports the optimal patient experience.

Appendices

Appendix 1: HCAHPS Survey PDF

Appendix 2: HCAHPS Faculty Sheet PDF

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