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Published: January 31, 2024

Citation: Lamb M, Kamran Z., et al., 2024. Building health: Understanding how hospital leaders make decisions around interior design and the impact of those decisions on patient well-being. Medical Research Archives, [online] 12(1).

<https://doi.org/10.18103/mra.v12i1.4851>

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DOI:

<https://doi.org/10.18103/mra.v12i1.4851>

ISSN: 2375-1924

RESEARCH ARTICLE

Building health: Understanding how hospital leaders make decisions around interior design and the impact of those decisions on patient well-being

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ABSTRACT

The design of a hospital's built environment is no longer treated simply as a place in which health care takes place. Design is a key component of patients' overall care as well as an influencer of organizational processes. The purpose of this study is to examine how hospital leadership makes decisions about interior design. That is, what do leaders take into consideration when making design decisions? What communicative, systemic, or cultural elements construct the environment wherein design decisions are made? Interviews were conducted with leaders from three different hospitals, from three different countries: United States, United Kingdom, and Saudi Arabia. Our goal in interviewing hospital leadership, from different countries, was to gain a rich and complex understanding about the various aspects that go into decisions leaders make concerning hospital design. Interview data was analyzed, and 5 themes emerged: 1) Organizational processes: Effects on staff, patients, doctors; 2) Structural challenges: Age and retrofitting old/new, budget, resources; 3) Design decisions that impact care: interactions between patients, doctors, staff; 4) Design strategies by function; 5) Strategies for improvement. The results of this study demonstrate the need for hospital leadership to examine their hospital's design, the importance of culture on design and therapeutic environments, and understand where design will have the greatest impact. Thus, our study addresses the complexities hospital leaders take into consideration to move design from an idea to an actor in the therapeutic environment with real influences on patient care, stress, and medical decision-making.

Introduction

The relationship between architectural design and patient health and well-being has been made clear.^{14,23,20,1} Research has established the connection between design and patient healing and stress.¹⁶ Current research has linked an association between the built, or physical, environment of the healthcare facility and health outcomes for patients.^{23,17} Here, we use Anaker et al's² definition of the physical environment (read interchangeably as built environment or architectural space) as "space that includes architectural features (layout and size), interior design features (colors and layout of furnishings) and ambient environment (lighting and noise levels)" (p. 1920). Moreover, this study focuses on leadership in hospital settings. Language around design often extends to include phrasing such as clinic or healthcare facility. While the connection between design, its effects on patients, and the therapeutic environment is established, little attention has been paid to hospital leadership's decision-making around design and how those decisions influence the patient throughout the pathway of care. Put plainly, understanding how hospital leaders make decisions around design is paramount to understanding the impact of those decisions on patient well-being.

The body of research on the physical environment has demonstrated the built environment to be an essential component to the quality of care in hospital settings.^{15,13,25,6,16} For example, research on evidence-based design establishes design choices regarding architecture and the built environment as fundamental to hospitals', and hospital leadership's, ability to develop high-quality healthcare facilities which promote patient

health, healing, and well-being.^{9,19,7} As much, design is important because it plays such a crucial role in shaping the healthcare environment and facilities in which patients seek care. Decisions about design can have cultural and social impacts. As Brambilla et al⁵ point out, "healthcare facilities are part of a much larger network of social infrastructures that occupy a central role in defining every city and region's health and welfare system" (p. 166). Thus, the construction and arrangement of space in a hospital's built environment is no longer treated, by researchers nor practitioners, simply as a place in which health care takes place. It is well-established as a key component of patients' overall care and treatment as well as an influencer of organizational processes.

While these studies are important for an overall understanding of design's impact, our study uses current literature as a point of departure to investigate how hospital leaders make design decisions. For the purposes of this study, we defined design to include the architectural structure of the building. This included, the overall look of the building to the layout of how users used the space, for example, the parking lot, paths and walkway, temperatures in various rooms, to any component with which any user of the space would engage in seeking or providing care. This also extends to include the layout and décor of waiting rooms, patient rooms, and even staff rooms such as break rooms commonly shared by staff. Staff, here, was used to include doctors, nurses, support staff, and administration. Our study adds to the body of literature by taking on an international perspective. Such a perspective is increasingly important in our current age of globalization and the globalization of healthcare. Therefore, our

study examines how hospital leaders make decisions about design and explores what leaders take into consideration when making design decisions.

Interviews were conducted with leaders from three different hospitals from three different countries: United States, United Kingdom, and Saudi Arabia. Our goal in interviewing hospital leadership, from different countries, was to gain a rich and complex understanding about the various aspects that go into decisions leaders make concerning hospital design, how hospital leadership thinks about design, and the cultural influences at play. For example, we start from the assumption that appropriate design in the United States will be different than in Saudi Arabia. Understanding these differences will provide valuable insight to hospital leadership, architects, interior designers, and more. The results of this study demonstrate the need for hospital leadership to examine their hospital's design, the importance of culture on design and therapeutic environments, and understand where design will have the greatest impact. Thus, our study addresses the complexities hospital leaders take into consideration to move design from an idea to an actor in the therapeutic environment with real influences on patient care, stress, and medical decision making.

Environment and patient well-being: Service quality, satisfaction

The built environment impacts patient perceptions of service quality and satisfaction of care. Harris et al¹⁴ conducted a survey of 380 discharged patients to measure levels of satisfaction with hospital setting and overall quality of care. Patients' feelings of satisfaction (of space and care) were found to be linked to

specific locations. Factors found to influence feelings of satisfaction included wayfinding, physical comfort, privacy and control of social contact, as well as the symbolic meanings embedded in the environment; what the authors referred to as, image atmosphere.¹⁴ Similarly, Anaker et al² investigated the built environment's role in patient activity and care during stroke rehabilitation. Their study found the layout of the rehabilitation space (ease of navigation or wayfinding, social interactions, and variations in the physical environment) greatly influenced patient rehabilitation, perceptions of care quality, and recovery times. Further, the built environment has been shown to be crucial for patients with regard to enhancing pain control.¹⁷ Environmental factors that are easily manipulated were shown to decrease side effects from medications, decrease medication costs, and enhance quality of care and outcomes.¹⁷

Patient-centered care

The built environment's impact on patient well-being, satisfaction, quality of care and outcomes has given rise to attention on patient-centered care through evidence-based design or EBD. Evidence-based design started with Ulrich et al, who compared the effects of natural scenery on patients' recovery times. Patients who had a view of nature in their hospital rooms had faster recovery times and shorter hospital stays than their counterparts whose rooms only had a view of a brick wall.²¹ Since then, Ulrich et al have published widely on the topic (see for example: Ulrich et al 2008; Ulrich et al 2010). Since Ulrich et al's first studies, the Donabedian model was developed as a framework for EBD. Research in this field generally privileges three main domains of

inquiry, namely, Structure or Dimension, Processes, and Outcomes.⁵ These domains are informed by the Donabedian model which first identified these domains as a guide for evidence-based design.

Built environment, staff errors, efficiency, and satisfaction

The built environment's impact extends beyond patients. Research has shown the physical environment plays a role in treatment errors and reduced efficiency in care settings.⁸ Similarly, Ulrich²² identified the physical environment's impact on staff outcomes. For example, "reduced noise, improved lighting, better ventilation, better ergonomic designs, supportive workplaces and improved layout that can help reduce errors, reduce stress, improve sleep, reduce pain and drugs, and improve other outcomes" (p. 3). Chaudhury et al⁸, refer to negative environmental impacts as "error producing conditions" for example, inadequate lighting or noise around nurses' stations (p. 758). This is further supported by Zamani²⁴ who found a significant connection between staff performance, efficiency, and satisfaction. Thus, the physical environment must be taken seriously as a key ingredient to overall patient care but also in its impact on staff decisions regarding treatment and errors which may have devastating effects.

Architecture's influence on the healthcare system is but one part of the overall process. In fact, we might think of the arrangement of space as the end result of a whole host of communication processes. Waiting rooms do not design themselves. Therefore, how decisions are made concerning healthcare architecture is critical. Architecture affects individual interactions (such as patient-doctor, doctor

family, patient-family, etc) as well as organizational processes.^{3,4} These processes range from facility management, to even diagnosis and treatment plans. Therefore, patient outcomes and safe, person-centered care, are "dependent on the physical environment of the healthcare architecture in which the health care is provided".¹¹ Because of this, a better understanding of how hospital leadership makes design decisions is an important addition to the existing literature for both future research as well as practitioner application in healthcare settings.

Methods

Design

To gain insight into hospital leaderships decision-making regarding the design of their healthcare facilities, the study employed a qualitative research design. The authors utilized semi-structured interviews. A qualitative content analysis was conducted using open coding to develop themes. Axial coding was also used in an inductive approach. The purpose was to allow new insights to emerge from the data collected.¹² To ensure anonymity, each of the hospital leaders interviewed for this study were given a codename; HL1, HL2, and HL3.

Participants

Three hospital leaders were interviewed. HL1 is currently employed as a medical doctor and consultant at a major hospital in London. HL1 has experience working in hospitals and myriad medical clinics as well as experience consulting on design in new hospital projects. HL2 is an anesthesiologist in Saudi Arabia. HL2 has experience consulting on new design projects as well as performing administration

leadership roles in Saudi Arabian hospitals. HL3 is the CEO of a hospital in Pennsylvania. HL3 oversees the daily operations of the hospital, its past remodeling projects, and its current project(s) to redesign efforts.

As stated, the purpose of the study was to capture the decision-making criteria hospital leaders' take into consideration when making decisions about the design of their hospitals. The purpose also included capturing an international perspective. Thus, the study recruited hospital leaders from the United States, the U.K., and Saudi Arabia. Therefore, participants were recruited using snowball sampling.¹⁰ That is, the authors recruited the first participant, and the interviewee suggested a second participant. Each participant recommended the third participant to complete the semi-structured interviews necessary to collect the data. Participants were recruited in this manner due to participants' expressed concerns over legal issues surrounding propriety information about hospital business.

Requirements for participation in the study consisted of several criteria. First, each participant was required to be currently employed at a hospital or healthcare facility. Second, they were required to hold a position of leadership in their respective hospitals. Finally, participants were required to have had experience playing a significant role in the design, redesign, or new construction of a hospital. For example, one participant is the CEO of their hospital and plays a central role in that hospital's design, maintenance, and renovation campaigns. Another participant was a central figure on the design committee of their respective hospital. Meaning, each participant brought to the study valuable, first-hand leadership experience concerning hospital design choices, their

impact on patients and organizational efficacy, and how design decisions are made.

Data collection

For each of the three hospital leaders interviewed for the study, data collection and interviews were conducted over a period of 6 months. The interviews were conducted by the authors and took place over video conference. When allowed, the authors visited the hospitals where participants were employed at the time of the study. Interviews were conducted using a semi-structured guide developed by the research team. Interviews were conducted based on each participant's schedule and sessions took place over the course of several days in total. Interviews spanned times of 30 minutes up to one hour. Generally, each session lasted approximately 30 minutes. All interviews were audio-recorded and transcribed verbatim. The video portions of the interviews were not recorded as to ensure anonymity. Participants were asked pre-scheduled questions yet were encouraged to answer each question freely. Meaning, each participant could add to each question or provide answers they thought were more pertinent to the discussion. Each question was structured as open-ended to allow for a free-flow exchange.

Interview questions

Interview questions were purposefully open ended (see Appendix A). Each participant's answers were followed-up with subsequent questions to clarify an answer or expound on a point being made by the participant. While each participant was asked a similar series of open-ended questions, each were encouraged to answer from their own experience either as

a decision-maker or in playing a significant role on a committee making design decisions. See Appendix A for a list of interview questions.

Data analysis

Each interview was transcribed to create a text version of participants' answers. After transcription was completed, the interviews were analyzed by each author of the study. Each author coded the interviews and developed categories and subcategories. Finally, these were compared amongst the authoring team and themes developed were finalized. Those themes were broken down into the finalized version below.

Results

The findings revealed the challenges hospital leaders face when making decisions about design and its impact on organizational process and patient care. From the analysis, five main categories emerged. The five main categories also resulted in subcategories pertinent to the overall main category. The categories are represented in bold print above the interview transcribed text. Text from each hospital leader is identified by their corresponding codename (HL1, HL2, or HL3)

Themes developed from interviews:

- 1) **Organizational processes:** Effects on staff, patients, doctors.
- 2) **Structural challenges:** Age and retrofitting old/new, budget, resources.
- 3) **Design decisions that impact care:** Interactions between patients, doctors, staff.
- 4) **Design strategies by function**
- 5) **Strategies for improvement**

Organizational processes: Impact on staff, patients, doctors.

Each of the leaders interviewed expressed connections between the design of the hospital and organizational processes. The theme of organizational processes emerged from interviewees describing connections between design and its effects on how well staff can perform their duties. This included how the space's layout might impact patients prior to staff interactions.

HL3 discussed the connection between design and the hospital's core mission:

HL3: I do think the structure, no matter what type of healthcare you're in, the structure and the way the building is kept is very critical for its overall purpose. Meaning, does it meet the core values, the core mission of what that?

HL1 discussed how the layout of the children's ward effected their day-to-day work with children up to and including the assessment of the child:

HL1: I personally have this problem because I work with children so sound proofing is an issue. You can hear if one child is distressed in room A and it can be heard in room B – it definitely effects my patient. I have seen this and my patient will wonder what's going on. It can affect my assessment because of the young persons state of mind. They can feel a little trapped or wonder what is going on. Another example, is the extra hot or extra cold, it definitely effects us all. We can all feel uncomfortable in those temperatures and it greatly effects interactions with patients and vice versa. For example, if a

meeting is going on and everyone is always having to adjust to what's going on then it just does not work that well. A colleague had with a tendon issue in her hand - the heavy doors of the hospital made the tendon issue worse and she had to get the tendon repaired again.

HL2 expressed concerns about design which logistically impacted patient care and convenience:

HL2: One of our major OR complexes, the ICU from there is about half a kilometer away and it's about ten stories up. You go through the corridors, which two of them are uphill. You're pushing the patient and then you go to the lifts. Lifts are very slow and that has impacts on things. They had all the good intentions of designing a very good building. They didn't think of it, that you're doing a complex surgery. You did a 12-hour anesthetic surgery and then you have to push the patient half a kilometer away and wait and then you'd have to go ten stories up and then handover the patient.

You know, the old build in our hospital that needs a lot of improvement. Because I think it dates back to where people didn't even think about these things. If the patient is at ease psychologically feeling well, he will give a good history. They will interact with the doctor properly and even the doctor will be feeling better. So all this is what is different between healthcare and other jobs. If the doctor had a fight with his wife when he tripped on a wire, or banged his head on the door in the consultation room, he will behave differently. The outline outcome might be different. He could misdiagnose.

Structural challenges: Building's age, retrofitting, budget, resources

Structural challenges emerged as another category. Participants' raised concerns about how the age of certain sections of their hospitals impacted approaches to design. Even when the participant worked in a newly designed building, not every part of the building was new or received the same renovation. Each participant worked in built environments which had a mix of new design and old or outdated design. Outdated, here, simply means design identified by the participant to be in need of renovation to better serve patients and the overall functioning of the hospital.

HL1 described portions of their hospital where the structural challenges make accessibility difficult.

HL1: I would start with access. For example, wheelchair ramps. These need to be redesigned or refurbished. Also, some doors are automatic, others are not. This can be confusing to patients. Doors are also very tall and very heavy so accessibility can be challenging for people. Some rooms are not soundproof. This could be changed for comfort and/or privacy. Also, some of the rooms are crowded and can feel cramped with patients, families, and doctors all in the room at the same time.

HL1 continued by discussing structural challenges being connected to, and dictated by, resources and budgets:

It depends on the budget to be honest because we know we're making a hospital. They know they need to think about all these things; the comfort, the easiness,

the purpose of the building, if we're talking about in-patient buildings or out-patient buildings, waiting rooms, they need to keep these things in mind and the population we are building the building for.

HL3 is the CEO of their current hospital. HL3 describes the structural challenges from a unique vantage point. HL3's comments detail how the structural challenges are tethered to budget and resources.

HL3: We've modernized to the degree we can on our units as we renovate and you know we look at the door frames as as simple as that we're. Traditionally, the the original door frames are only about 30 inches wide, right? Because people back in 1800s weren't real big. As time goes by wheelchairs, we have a lot of people with wheelchairs and so forth that doesn't suffice. So 36 is the standard for ADA accommodations. Well, we went to 40 just to make it even easier and that took a lot of work because I told you before that the walls are 16 inches. On the interior. A brick so. We've done that. We've done air handlers for the air conditioning and so forth. But since COVID and we saw how affected negative air machines were for COVID, we've have installed 100% makeup air in the units by convert by adding into the air handlers with an external vent. To suck in more fresh air and so, so therefore we can circulate 100% makeup air which basically acts as a negative air machine, right? And so we look at that another thing we looked at was. Humidity in in our units. So upper respiratory infections increase if you have dry. Air during the. If it's dry air, you don't have enough humidity.

We have more upper respiratory infections. So therefore to solve that problem we installed humidifiers. In the units.

HL3: Our building was. Built in 1869. That's when the cornerstone was laid. And so you figure that's over 150 years ago. And it is challenging to modernize a building from a 150 years ago that has its own uniqueness. The Nice thing for our hospital. It's the Kirkbride design. Doctor Kirkbride's philosophy, which is in tune to how I believe we should do things now, is individual rooms for patients, which was not common back in the 1800s. So every patient has their individual room. They have light because he believed openness. Now he also believed open windows for fresh air and stuff. Now there's reasons we don't have that in this day and age. It also had long hallways and open spaces.

HL3 also discussed structural challenges which extend to hospital grounds:

I think it goes to the time when you first step onto the grounds, not in the building, but actually on the grounds. If you notice, our grounds are pretty. They're very clean, they're very well. The building from exterior standpoint looks intact. That has a mindset on someone. If my family member was at a hospital, that everything is dirty. Things don't look like they're kept up. They're falling apart. I'm not going to feel good about it, you know, it's leaving my loved one there, along with the fact that the individual. They're statistics that show that if people are surrounded by beauty or surrounded by clean environment surrounded by good things.

Design strategies by function

A third category emerged from the interview data which centered on how leaders approach design by the intended function of each space. This third category was separated from organizational processes because participants' comments differentiated the function of the space with the day-to-operation of the hospital. In doing so, design strategies by function emerged as a category addressing how space should be designed with use as its first foundation so that organizational processes are layered within purpose and function.

HL3 discussed the importance of designing each space around an intended purpose which centers on the type of care performed in a space. For example, therapeutic spaces require more attention to individual feelings and keeping people at ease. Further, thinking about spaces by function also brings with it a certain practicality, for example, keeping spaces clean over spaces being beautiful.

HL3: We have an art therapist who is looking into how we can incorporate artwork to be discussion points for therapy and we look at design in that way, not just the physical design, but also how the beauty falls in line with what care we provide to our individuals. If you're talking clinical space, I think it is always good to look at how it's designed for the clinical purpose. Sometimes we're limited on what we can do based on the physical structure, but we should take that into account. If you're talking about a non-clinical space, such as food service and nutrition, that's a function where you need to be practical in your function. But, that's a design issue too. At the same time, it's

because the utility of that area is where we need to provide the best food we can to the consumers. So, we need to be as efficient as possible so the food remains hot and so forth. That has utility to it, but it's not the same as a clinical aspect.

Additionally, for an example, we have an area called the PAC. It's patient activity-based and stands for Patient Activity Center. So it's a general area. It's a big space. It has utility to serve a purpose right now. But it does not meet the design that I would like which is to enhance someone's recovery. There's certain functions we don't want to change. For example, the floor is a nice red tile floor. Is it the most prettiest? No. It isn't, but does it have a purpose? Yes. It's easy to clean up. It's easy to take care of. It's almost indestructible. So do we want to get rid of that floor? No. But what we can do is now change the design to make it more like a Plaza in Italy or a Plaza in Europe. So that way at least it has some creative design to it. That way it draws your eyes differently and the space looks better, and so therefore, I feel good, it helps you feel good, while you're doing recovery activity.

HL1 indicated that accessibility of of particular importance when considering function:

HL1: I believe the waiting rooms and even the car parking should be addressed because these are the first encounters. In England, parking is harder. Easy parking would help reduce stress. They have to find a parking spot, pay the attendant. And, if they're meeting runs over just a bit, they have to pay extras so that is another layer of stress. Car parking, accessing the

building, waiting area, reception, these should be designed in a more welcoming way and to not be overcrowded. Clinical spaces are next, and they should have soundproof rooms, reasonable temperature, and a reasonable way to conduct test and examinations that are required in a clinical room. For example, a reasonable space for families to consult with the clinician because these spaces need to be private. Too many pictures in the clinical rooms can be distracting. But, in the waiting rooms these can make things more comfortable. So clinical rooms should be more purpose-built for patient and clinician to talk.

HL2 described the importance of looking at function first as resources and budget also impact what is possible with design.

HL2: Basically, you have to strike a balance. You don't have unlimited resources. Here, in Saudi Arabia where their money is not a problem. Functionality has to be considered. Functionality, you have to keep it in mind. Resources are limited. When this hospital was designed, initially, it was designed for 250 to 300 patients. Now, the capacity of this hospital is about 2000 beds. The healthcare need is expanding more than the physical structures.

Strategies for improvement

A final category that emerged focused on participants' current strategies for improvement and how leaders measure design effectiveness, if at all. For example, leaders were asked how feedback, regarding design, may be embedded into their practices as a way to

make improvements based on patient or staff feedback. The category of strategies for improvement developed as a result.

HL1, for example, indicated this being an area of design where their hospital needed to improve. Feedback about the structure or the design, or even issues of wayfinding, odor, etc., can be identified by patients or staff. Yet, feedback about design, specifically, is not asked of hospital users.

HL1: We do not ask for feedback which is particularly focused on the building. They are always monitoring and evaluating the work being done, for example therapeutic modalities, but not specifically the building. One of the main questions we do ask is – 'is it easy to find us, the clinic and where to go?' I don't know if they are asked specifically about things like waiting rooms but they do ask about facilities. Patients can comment on things like room size but they don't evaluate the building specifically. If there are problems with the room or the facilities it does come back through that feedback [patient feedback about their experience] but we don't ask specifically about the building'.

HL2 discussed how feedback is asked of patients, however, questions concerning design are not specifically asked. Feedback about patients' overall experience is asked, quantified, and presented to staff. Yet, design questions, again, are not explicitly part of current feedback surveys.

HL2: We have a number of things which are done at the hospital level. One of them is which is regularly published every quarter is patient satisfaction survey okay.

It is part of the presentation in the grand rounds in every section. They give a questionnaire to the patients, which is quite detailed. They collate that and then they send it to all the departments as a feedback. That's one thing. There are number of things, for example, delayed discharge, delay in starting the case, number of patient-focused audits we do, which are fed back to the department to improve patient care and visual inspection. Because our IT system in Saudi Arabia is very good, you get a text on your registered mobile because everything in Saudi Arabia is connected to your mobile ID card, your driving license, your bank accounts. You get a text which asks you to do a survey. That is a quite simple one. How polite the doctor was, how long did you have to wait? I don't think it particularly asked about, you know, what kind of room you're sitting in. Were you comfortable But general questions about the overall experience.

HL3 described feedback about design as more of a mindset HL3 tries to instill in staff. Instead of feedback surveys about patient experience or design, HL3 incorporates a mindset.

HL3: No, I don't think there's necessarily a prescribed way that we do it. I think well, that this is a mindset too, because when I first started here and I've been here for almost 19 years, when I first started here we had a different perspective of well, this is what we have and this is what we deal with and this is all we're going to do. When I came in, we changed that perspective, we changed the perspective to: while we're here, we need to provide the best care, and that includes the physical space.

Does design matter?

One final category, which did not emerge from interview data, that was asked directly to participants was their opinion on whether design matters. The authors used this question as a way to gauge each leader's thoughts about design and its impact on health care and the design of facilities in which health care takes place. The purpose of this question was to capture each leader's explicit thoughts about design to help us better understand what they consider to be important when approaching design. Each full response is included below:

HL1: It does definitely. As a clinician, the environment, the design, the décor, everything I think it matters. It gives you, at first, the easiness, and then you start feeling comfortable. You feel like you are in the right place and that your needs can be handled well. It gives you a trust, I guess, into the clinic. Yes, definitely it matters and it is a very important topic.

HL2: It's the Psychology. Psychologically, how the patient is feeling, how good he is feeling? This has an impact on their healing. Or, how they are going to progress in their healing. That is, how soon or how quickly they're going to get better. So, I think my answer will be that whatever makes the patient feel better is important to me because I am there to provide the best possible care to the patient. Right now, the patient will definitely feel better even if you give them a choice between two hospitals. One is very well-designed, is very pleasant. And even if the thing that the other hospital, which is not very well-designed, which doesn't smell nice, it smells of chemicals, its old structure. They will go to the hospital

which is well designed even if the clinical care they are going to get in the other hospital might be better. Even if I tell a patient, look, in this hospital you might get better care. But they would opt for the other hospital, which is very well-designed, which is very pleasant to go into. I think it matters because it matters to the patients. And I think if it matters to the patient, it definitely will impact on their health care.

HL3: One thing I am a great believer in is the space that you create does affect how someone can recover from their illness. It affects how staff can interact with people and how staff feel about where they work. Patients' recovery is quicker. They'll get better no matter if it's a physical health issue or a mental health issue. And, mental health even more so because they're preoccupied with different things. Yes, I think that has a tremendous value and not just for patients and family, but also for staff. If I'm going to go into a hospital that is falling apart and not looking well, even from the outside, I'll feel less about myself. It doesn't inspire confidence. So yes, it does and internally same principle; things need to be clean, kept up safe. We try to modernize as much as we can with still keeping the integrity of this building even as old as it is. I think all those things come into play for people's well-being.

Discussion

Our study investigated what hospital leaders take into consideration when making decisions about the design of their healthcare facilities. Thus, a consistent focus in the interview process centered on each leader's decision-making criteria concerning design.

1. Organizational processes: Impact on staff, patients, doctors.

The day-to-day functioning of the hospital was of paramount concern for each of the interviewed leaders. In fact, this category emerged rather quickly in the coding of the interview data as each leader was seemed focused on this connection to design from the start of the interviews. This is, perhaps, to be expected as each leader was in a position to make decisions about design which would potentially impact job efficacy of doctors and staff which in turn could influence the quality of care patients receive(d). This programmatic side of design presented challenges to each of the interviewed leaders as each discussed trying to find a balance between aesthetics and evidence based designed, and facilitating work flows and patient care.

Building aesthetics (environmental or structural) may be an initial point of judgement (by patients, family members and or staff), about the quality of care that will be provided. Consider the acute mental status of patients and their family members in the context of building design. Depending on the acuity of the patient, building design or layout might not be an initial concern. However, the patient's family might experience additional anxiety or concern if navigation is complicated and or if the state of the facility suggests a diminished capacity to provide high-quality patient care.

Leaders are challenged with building trust between clients and the organization. At the base level, hospitals provide a service to their clients. Importantly, leaders must consider the makeup of their clients and stakeholders. One might initially consider that the patients who are receiving care are the clients. In reality, the

clients are a combination of the patients, their family members, and every person who is employed by the organization. Thus, the meaning, function, and interpretation of design may vary based on the client's perspective.

Patient attitudes can shift while receiving care. People who are anxious, in pain, depressed, etc. may be critical of their environment, the quality of food being served, or sensitive to interactions with others. Leaders should consider the patient's perspective during the planning and design phase because hospital reimbursement is directly impacted by patient feedback. Consider the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scoring system. This is a quantitative measurement system designed to evaluate patient satisfaction. The HCAHPS survey allows patients to score provider-patient communication, staff responsiveness, hospital cleanliness, noise level, pain management, and information availability. The individual scores from each category on the survey (and others) are calculated into an overall satisfaction rating. Simply, higher HCAHPS scores result in increased reimbursement.

Leaders should also consider the employee perspective when discussing a change in design. However, the employee perspective may present a challenge. A common complaint among hospital staff is a lack of space. In some circumstances that complaint is founded. However, the underlying issue may be an inefficient use of the current allocated space. Leaders may benefit from making an environmental design change in lieu of a structural change in design. If a new unit is designed to provide more space, distances between patient rooms, the nurse's station to

patient room patient rooms, the supply closet and medication room to patient rooms, etc. will increase. The increase in space results in added time from point A to point B. The added time may seem insignificant but will compound going forward. Hospital staff will walk longer distances throughout their shift which may result in delayed response times. From the provider perspective, modifying the environmental design can improve the efficiency and effectiveness. An increase in efficiency and effectiveness may increase patient satisfaction.

2. Structural challenges: Building's age, retrofitting, budget, resources

Further, our study found that design is simply not a blank slate. Hospital leadership is constrained by structural challenges in seemingly every aspect of their attempts to incorporate design for improved health care experiences, for employees and patients alike. Like the challenges presented by organizational processes, this is perhaps no surprise. HL2 captured this sentiment most effectively while discussing resources in Saudi Arabia being less of an issue than when HL2 worked in the U.K. Put plainly, HL3 noted, here in "the Rabia, (where) their money is no problem." Budget and resources effected each leader's ability to incorporate design at every level.

The building's age and attempts to retrofit existing spaces also presented as major challenges to leaders and effective design. Each of the leaders' worked in buildings which were partially or fully refurbished. The need to retrofit already existing facilities presented common challenges for leaders in the U.S., the U.K., and Saudi Arabia. Thus, retrofitting

older construction to incorporate modernized, evidence-based, design, was a challenge in each of the countries. The authors each felt surprised that unique approaches to similar problems were not discussed by interviewed leaders.

While analyzing interview data, the authors were struck that organizational processes and structural challenges seemed consistent across each of the countries and socioeconomic environments in which interviewed leaders worked. Our expectation was that different countries and different environments would pose unique challenges. We still assert that these do present unique challenges, however, such differences were not discussed at length by participants. Our study found that organizational processes and structural challenges appeared to be similar experiences across each hospital.

These challenges may be common experiences due to supply and demand. Leaders must find a company who is willing and able to meet the building standards for healthcare facilities. It can be difficult to introduce new technology into dated buildings. A key element to consider is how the construction will affect ongoing patient care. The flow of oxygen, medical air, and vacuum lines may need to be rerouted or turned off during the construction phase. This can impact the availability of rooms to provide patient care. Additionally, hazards such as fire need to be considered. It is imperative to ensure the staff is educated and know the policy and procedures for hazardous circumstances. Moreover, the existing structure may not have been designed with the consideration of future potential growth.

Patients and staff will also be impacted by the noise, smell, and the construction environment.

3. Design strategies by function

Our study found that hospital leadership was concerned about design following function. According to leaders in each country, the function or purpose of each space must dictate design choices. Surgical procedures, for example, would necessitate different design than would a waiting area or consultation room. Each space would require design fit to its function. A surgical room should not have comfortable couches or large screen information displays. One reason being, the need to sanitize the space while another might be the need to accommodate the workflow, spatially, of the operating surgeons.

For example, HL3 mentioned keeping waiting rooms smaller in size to help reduce the cost of heating and air conditioning in those spaces. Thus, for leaders making design decisions, the material conditions and purpose of each space must inform design strategies. Again, design is known to affect patient care and organizational processes, yet design can be thought of as the end result of myriad decision processes leaders must consider.

This is one area of the data the authors expected to see more discussion, by leaders, on cultural components of design. For example, it is not enough to say that a waiting area should be designed comfortably to reduce stress or make patients more at ease. While participants discussed patient-centered design, we expected data to reveal how design efforts were also culturally centered. Culturally centered design seemed to be implied in the data but was only explicitly discussed by HL2 (participant working in Saudi Arabia).

HL2 discussed "In Saudi the society is very religious. [The hospital] actually did a study quite a while back. In the rooms they have on display always Hermain [which is Shareefian and refers to two sacred locations] and Nabwi [the Mosque of the Holy Prophet] and always recitation of Quran." Here, HL2 is discussing culturally specific and patient-centered approaches to design which help to put patients at ease. This is an important piece of the decision-making criteria which leaders consider. Yet, only one of the three leaders brought up explicit cultural connections to design.

Cultural norms may be best handled on a case-by-case basis. Healthcare facilities are equipped to provide care to patients from any cultural background. The patient, or their family members, have the ability to request a modification in the care plan to allow for cultural norms. Creating specific spaces for every cultural background would be difficult and cost prohibitive. Leaders have the opportunity to implement education focused on culture and diversity. This education creates awareness and provides a framework to navigate situations that differ from the norm. Additionally, leaders can address the importance of culture and diversity when creating or improving the organizational culture within the facility.

Function and design should be synergistic. Spaces should appear aesthetically pleasing and allow for an effective and efficient flow. Function and design can be limited due to uncontrollable variables. Leaders must consider potential barriers and plan for adaptation in design. Leaders would benefit from conducting a needs assessment in their current

organization(s). Insights from front-line health care providers could identify what works well and areas of improvement.

4. Strategies for improvement

Another result of particular interest, and high importance, was that interviewed leaders had few active strategies to measure design effectiveness. This result was revealing. Each leader expressed the importance of design. Each leader expressed knowledge about design's impact on organizational processes and patient care. Yet, none of the interviewed leaders discussed in-place strategies to collect feedback for evaluation and assessment of design's impact.

This could also be a structural challenge. However, each leader did discuss surveys used to evaluate patients' experiences while being treated. Both HL1 and HL2 described feedback surveys which ask patients about staff and interactions with doctors. Even when surveys focused on facilities, the questions (according to participants) focused on cleanliness and directions to help patients find the hospital. Neither disclosed that surveys asked about natural elements used in rooms, wayfinding, lighting, privacy, temperature, or other aspects of design considered to impact health care. HL3 even disclosed they do not gather data centered on design, but that they try to instill a mindset, or culture, with employees around design's importance.

Our study found this area to be of great need to hospital leadership. Such questions could be difficult to incorporate into existing feedback surveys. For example, patients may be reluctant to answer additional questions. Questions themselves may be difficult to

formulate. Asking a patient about natural elements used in the décor may seem superfluous. Leaders may consider collecting this data during executive rounds. Collecting real-time data in the patient environment may provide a more significant response rate because some patients may not respond to paper or electronic surveys after discharge. However, leaders should take data on design into account when making design decisions. This is one area where leaders can positively add to datasets on evidence-based design.

5. Does design matter?

Our study found that design does matter to hospital leaders. In fact, study data reveal that design is central to leadership's thought processes regarding the built environment of the healthcare facility. Each leader expressed belief in the power of design to impact patient care and organizational processes of their respective hospitals. This confirms current research about the impact of design in each of these areas.

Perhaps most noteworthy, is that our study revealed a disconnect in the feedback loop leaders use to gauge the effectiveness of design. While each participant expressed belief in design's importance, none of the leaders discussed active strategies to measure the effectiveness of their design choices. Granted, none of the leaders interviewed made design decisions alone and decisions of this magnitude are extremely complex. However, survey design should be revisited as an area where data on design effectiveness could show areas of improvement. This will also help leaders make more informed, evidence-based decisions when attempting to navigate design implementation around

organizational, structural, and functional challenges.

Design is important because it is an initial point of judgement about the capability of a facility or organization. However, design changes can be difficult to implement due to uncontrollable variables (e.g. construction personnel, supply chain disruption, etc.). Leaders may not seek out design opinions from patients or staff due to the quantity of people that would need to be included in the survey. However, leaders may consider developing a combined community and staff focus group to identify potential areas of improvement.

Limitations and Future Research

Our study has several limitations that need acknowledged. First, one strength of the study was the international perspective as well as the opportunity to gain empirical insight into hospital leaderships' decision-making around design. Yet, the study was limited to three leaders from three different countries. Future research could build from this insight by interviewing more leaders from each respective country. This would provide a valuable foundation to compare and contrast differences even within the same country.

Another strength of the study was that interviews were conducted with leaders who directly make decisions about design and leaders who participate on committees which make decisions about design. Future research could be expanded to discuss other constituents involved in design. For example, architects, board members, and those responsible for financial support of new construction. This would provide a more complex understanding

of the processes required to make design decisions.

The study would also benefit from insights from patients seeking care in each hospital. Several of the leaders interviewed mentioned that feedback surveys pay little to no attention to patients' impressions of design. This could be a key source of insight for better understanding the impact of design and the decision processes which bring it into being.

Finally, a small sample size in qualitative research provides an opportunity to explore phenomenon. The research participants were specifically selected because their expertise and knowledge provided an in-depth understanding of the issue. The nature of inquiry is mainly inductive. Therefore, the collected data from a small sample population can be used to identify themes and to develop hypotheses. Future quantitative research depends on identified themes and hypotheses to develop a study with data that can be generalized. A small sample size affords the opportunity to understand the complexity of an issue and to learn more about phenomenon. The data from qualitative studies are not intended for generalization because of the small sample size. The results of this qualitative research are best transferred to similar contexts or situations.

Conclusion

Results of this study demonstrate the impact design has on the therapeutic environments. We sought to better understand what hospital leaders take into consideration when making design decisions. We wanted to gain an international perspective to not only add complexity to our inquiry but to also add a

much-needed international perspective to the body of literature. To investigate this focus, we conducted interviews with leaders from three different hospitals from three different countries: United States, United Kingdom, and Saudi Arabia.

Interviewing hospital leadership from different countries has expanded our understanding of the importance of design and furthered understanding about the various aspects that go into decisions leaders make concerning hospital design. Our study shed light on these differences and has provided valuable insight for hospital leadership, architects, interior designers, and more. Further, our study adds validity to hospital leaderships' (as well as scholars') thinking about ways design can also impact organizational process. Perhaps most importantly our study helps solidify and legitimize the connection between leaderships' decisions about design and its impact on patient care.

Finally, this study adds understanding hospital leaders can use to make informed decisions around design to have the greatest impact for many processes involved in hospital operations. While our study does have limitations, it adds further knowledge to the complexities hospital leaders take into consideration to move design from an idea to an actor in the therapeutic environment.

Conflict of Interest Statement:

None

Funding Statement:

None

Acknowledgement Statement:

None

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Appendix A

1. Can you please tell me about your role in the design of your current hospital? This question was used to establish participants' role in the decision-making components of their hospital's design.
2. Can you please tell me how you feel about the current design of your hospital? Subsequent or supplemental questions used ranged from, for example, the lighting, the sound, how you see it affecting patients and staff?
3. In your experience, do you think the hospital's design influenced how people interact in the health care space? For example, what have you seen that is working or creates challenges?
4. What do you take into consideration about each space when making design decisions? For example, are there spaces in which design matters more or spaces in which design might be subordinate to function?
5. Can you tell me about particular strategies your hospital has employed to orient design to be more patient-centered or focused? This question was supplemented by asking what decision criteria do you consider when making such decisions?
6. As someone in a leadership and decision-making role in your hospital, what would you change about your hospital's design if you could?
7. Finally, do you believe design matters?