

# EFFECT OF HOSPITAL INTERIOR ENVIRONMENT AND DECORATION ON HEALTHCARE PROVIDERS-PATIENT COMMUNICATION: A CASE STUDY OF SULTAN AHMAD SHAH MEDICAL CENTER AND KUANTAN MEDICAL CENTER

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## Abstract

Several attempts have been made to understand the relationship between space and society and how building design and layout affect people's communication patterns, work effectiveness, and agility. In contrast to many public hospitals in Malaysia, private hospitals, through their understanding of space and building layout, have willingly invested significant money in spatial configuration and interior design to improve their performance as healthcare providers. However, literature on space configuration and how space and layout design influence the communication between healthcare providers and patients are scarce to date. This paper aims to highlight how different interior settings of public hospitals affect the effective communication pattern between healthcare providers and patients. A questionnaire survey was conducted among staff and patients of the two selected hospitals. The study's outcome suggests the preferred interior environment and decoration that would influence the communication pattern, agility, and mood of staff and patients by comparing the two hospitals.

**Keywords:** Hospital interior, communication pattern, agility, SASMEC, KMC.

## 1 INTRODUCTION

Research has shown that a hospital's interior design can impact communication between patients and healthcare providers (Berens, 2023; Reiling et al., 2008b; Srivastava, 2017). Poor design, or psychosocially unsupportive surroundings, can lead to higher occurrences of delirium and elevated stress levels in patients (Lamb, 2021). This can make it more difficult for patients to communicate effectively with their healthcare providers.

Conversely, studies have found that single rooms with respect for patient privacy can lead to higher patient satisfaction (Reiling et al., 2008b). Additionally, research has suggested that some aspects of hospital design, such as layout and organization, can affect the perceived workflow efficiency of hospital staff (Srivastava, 2017). However, one study found little correlation between hospital design and care-related or overall patient satisfaction scores (Marberry, 2016), suggesting that other factors may be more important in determining effective communication between patients and healthcare providers.

While various studies have been made concerning space and spatial configuration with office social networks, interaction among office workers, and communication patterns, a limited number of studies attempted to consider the concept of space and spatial configuration in hospitals and how they affect communication between staff and patients. Pachilova and Sailer (2013) identified a significant gap in the

practice of evidence-based design (EBD) is the flaw in research on building configuration and its influence on patients and staff (Pachilova & Sailer, 2013). A rigorous and systematic way of studying the built environment, especially the hospitals and medical centers, is compelling to understand their interaction and communication pattern so that proper intervention or improvement can be made.

This research focuses on two broad aspects of the interior of a hospital, i.e., the interior environment settings and interior decoration, to study their impact on the communication pattern of the patient and healthcare providers.

## **2 LITERATURE REVIEW**

### **2.1 Significance of effective communication pattern between the healthcare providers and patient**

Effective communication between patients and healthcare providers in hospital settings is essential for providing quality care. Good communication enables healthcare providers to establish rapport with their patients, solicit crucial health information, and work effectively with all members of a care team and the public (Tulane University, 2021). It also helps to build trust between patients and providers, allowing providers to find better opportunities to improve patient care (CipherHealth, 2022). Strong communication among healthcare team members has been shown to influence the quality of working relationships and job satisfaction (Merlino, 2017) and promote continuity and clarity within the patient care team (Reiling et al., 2008a). Healthcare providers must understand the importance of communication in health care to protect their patients, save on costs, and ensure that they provide the best possible care (Regis College, 2021).

Poor interior design in hospitals can significantly impact patient safety and hospital functionality. Research has linked poor design to negative consequences for patients, such as anxiety, delirium, elevated blood pressure, and increased medication intake (Ulrich, 1991). Poor interior design can also lead to a lack of beds for patients in need and a lack of doctors needed as they spend more time dealing with the effects of poor design (Business Bliss Consultants FZE, 2018). In addition, research has shown that good interior design practices can positively impact the housekeeping staff and improve how hospital staff functions (Williams, 2012). Good interior design can also help reduce the spread of diseases by improving cleanability (The Korte Company, 2023). Finally, research has demonstrated that the design of a hospital can significantly improve patient safety by decreasing healthcare errors. (Ulrich, 2008)

### **2.2 Impact of the interior environment on the users**

Interior design significantly impacts users' psychological well-being (Harrouk, 2020; Re-thinking the Future, 2021). Studies have shown that interior design elements can evoke positive and negative emotional responses in people. For example, warm colors and textures can create a sense of comfort and relaxation, while bright colors and bold patterns can create a feeling of happiness and pride. The room's layout, the use of materials, lighting, plants, flowers, art, and color all play an essential role in creating an environment conducive to mental health. Space psychology also plays a vital role in large-scale projects, leading to better productivity when considered during the design process (Re-thinking the Future, 2021).

Similarly, interior design in hospitals can have a noticeable impact on user mood. Design elements such as room layouts, wall color, flooring choices, lighting, configuration, natural and non-natural materials, and colors can all affect the mood of patients and staff. Studies have shown that even small changes in these design elements can improve patient and staff moods. Color is essential in hospital interior design as personal preferences for color hue and values can influence user mood. Additionally, research has found that the quality of design in the working areas of nurses significantly affects their performance. Interior design also plays an essential role in mental health. A room's interior design can significantly affect mood, with people often heading home after a stressful day to find comfort in their surroundings. Interior designers must consider how their designs affect user mood when creating healthcare interiors.

Two hospitals are selected for this research to examine their interior environment settings and interior decorations. The selected hospitals are Sultan Ahmad Shah Medical Centre and Kuantan Medical Centre in Kuantan, Malaysia.

### **2.3 Sultan Ahmad Shah Medical Centre and Kuantan Medical Centre at Kuantan, Malaysia**

The Sultan Ahmad Shah Medical Centre, IIUM, is a teaching hospital in Kuantan, Malaysia. It was built based on the Private Funding Initiative (PFI) with a 25-year concession agreement and is equipped with 350 beds. The medical center has a Shariah-based Quality Management System (QMS) certification. It is the

main referral hospital for the state of Pahang and provides a wide range of medical services, including emergency care, inpatient care, and outpatient care. The hospital has several specialized departments, such as cardiology, neurology, and oncology.



Fig. 1 Interior of Kuantan Medical Centre (Source: <https://sasmec.iium.edu.my>)

The Kuantan Medical Centre Sdn Bhd is located in Kuantan, Malaysia, and provides 24/7 customer support. It offers various services such as medical check-ups, health screenings, and vaccinations. The center also has a strategic plan for 2021-2022, including objectives such as providing quality healthcare services to the community and improving patient safety (Awang, 2019). It is a secondary referral hospital that provides general and specialized medical services to the people of Pahang. The hospital has various departments, including surgery, paediatrics, obstetrics, and gynaecology.



Fig. 2 Emergency entrance of Sultan Ahmad Shah Medical Centre (Source: <https://kmihealthcare.com/>)

### 3 METHODOLOGY

A questionnaire survey was conducted to compare the answers of healthcare providers and patients in two hospitals. The survey included measures that have been tested for psychometric properties and are appropriate for hospital care. The first step was to design the questionnaire, which included questions relevant to the research objectives and appropriate for the target population. The questionnaire was validated for clarity and comprehension before finalizing. Select the sample: Next, 30 healthcare providers and 100 patients and attendants were selected from the two hospitals. The samples were representative of the target population and selected using a random sampling method. The questionnaire was administered to the participants in person and online. The healthcare providers were asked to complete the questionnaire during their work hours, while the patients and attendants were asked to complete it during their stay in the hospital or after being discharged. Once the data was collected, it was analysed using Microsoft Excel by comparing the results from the 5-Point Likert Scale between the two selected hospitals. The results were interpreted in light of the research objectives and any relevant literature, and a conclusion was drawn about the findings. Considering the complexity of a hospital's internal layout and function, this research only focused on the emergency departments of the two selected hospitals.

### 4 RESPONDENTS' DEMOGRAPHY

In this study, 30 healthcare providers work at two hospitals—19 (63.33 %) from KMC and 11 (36.67 %) from SASMEC. The age range of the providers is diverse, with 19 providers in the 20-30 age range, 10 providers in the 31-40 age range and 1 provider in the 41-50 age range. Regarding ethnicity, 29 (96.67 %) providers are Malay, and 1 (3.33 %) are others. In terms of service type, 3 (10 %) providers are in administration, 8 (26.67 %) are doctors, 13 (43.33 %) are nurses and the rest are a mix of other service providers. According to the service duration, 13 (43.33 %) respondents are within 1-3 years of service, 6 (20 %) are within 5-0 years of service and 6 (20 %) are fairly new with less than 1 year in service. Among the most visited places for healthcare providers are reception and registration (18.61 %), waiting area (15.09 %), treatment room (12.02 %) and radiology (10.23 %). Among the least visited areas, there is a Counselling/ grieving room (1.02 %), plaster room (2.30 %) and the café within the emergency department (2.81 %).

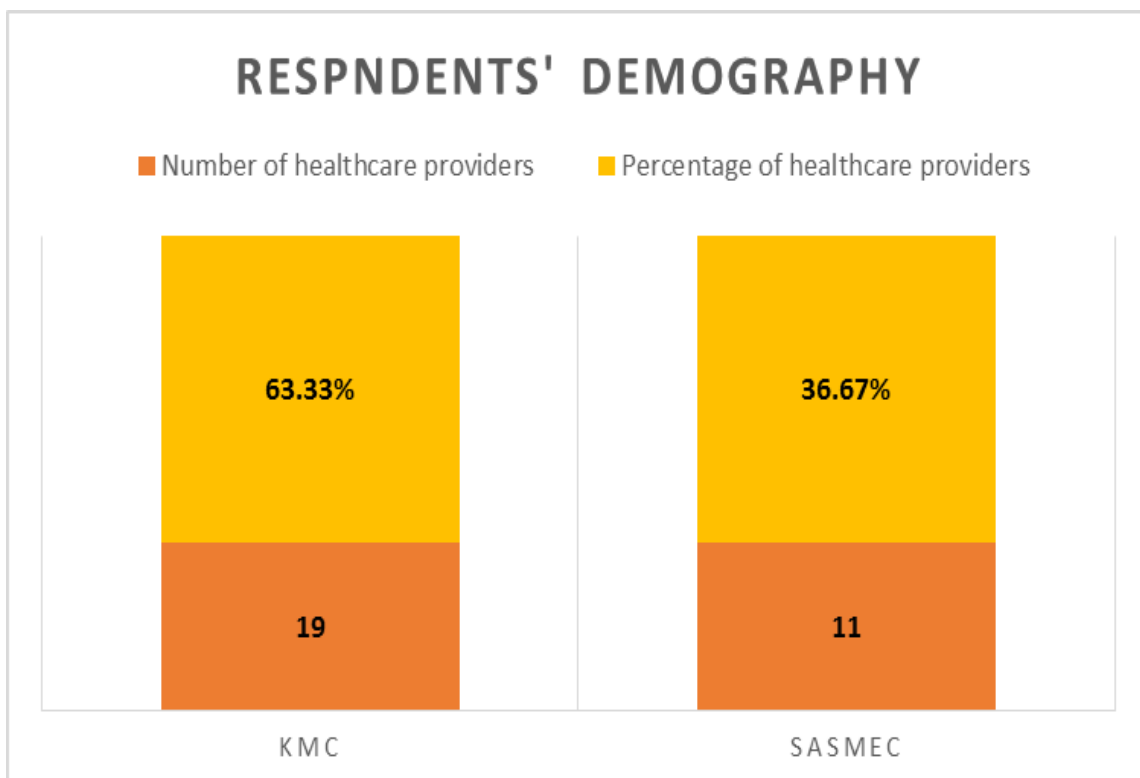


Fig. 3 Respondents' demography by hospitals

In addition to the healthcare providers, there are 100 patients and attendants from the two hospitals, 49 (49 %) from KMC and 51 (51 %) from SASMEC. The patients are split almost evenly by type, with 47 and 53 attendants. The age range of the patients is also diverse, with 44 respondents between the ages of 20-30 years, 27 patients between the ages of 31-40, 21 patients between the ages of 41-50, and 8 patients over

the age of 51. The patients' ethnicity is diverse, with 79 patients being Malay, 11 patients being Chinese, 8 patients being Indian, and 2 patients being among other ethnicities. The frequency of visits among the respondents also varies with 71 respondents visiting the hospital more than once while 29 respondents visited the hospital just once. Among the most visited places for the patients and the attendants are reception and registration (19 %), lobby and lounge (15.86 %) and Treatment room (12.63 %). Among the least visited areas there is Counselling/ grieving room (1.08 %), plaster room (2.42 %) and Café within the emergency department (2.96 %).

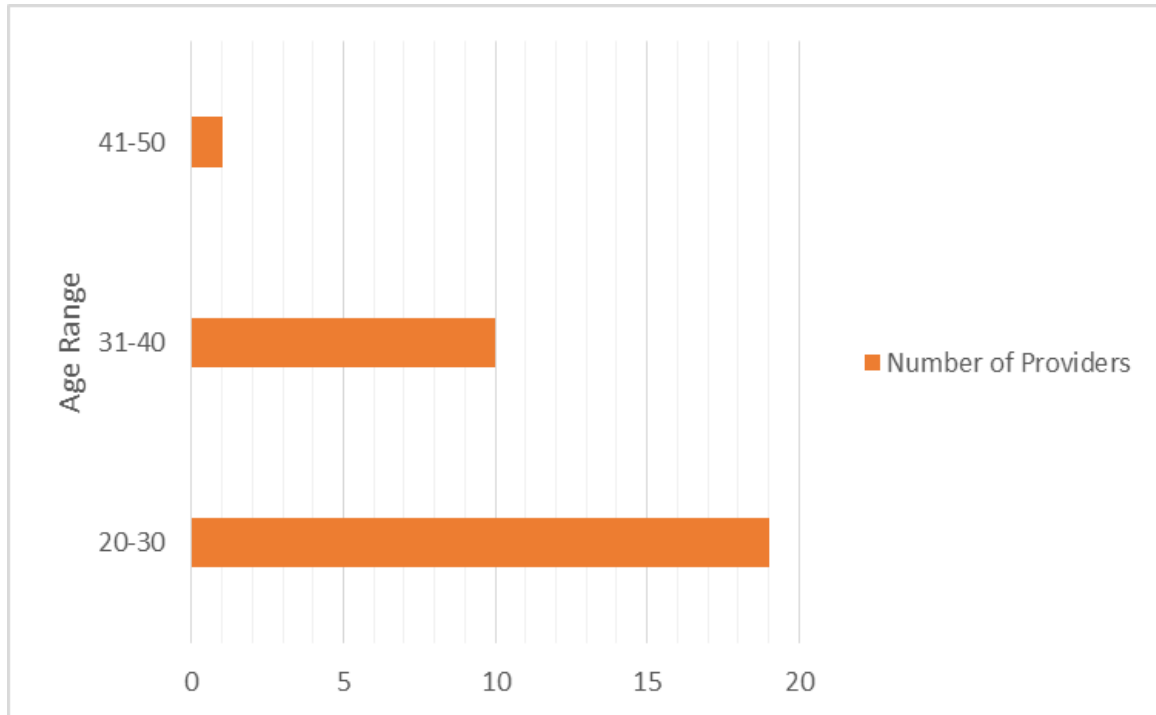


Fig. 3 Respondents' demography by age range

## 5 FINDINGS

This section will highlight the findings based on the two major aspects described earlier, i.e., interior environment settings and interior decoration. For each parameter, the findings will be presented individually for the two selected hospitals and then the overall combining both. The next section in discussion and recommendations presents an insight into the results comparing both cases.

### 5.1 Interior Environment Settings

Interior environment settings refer to the physical characteristics of a building or space that impact the well-being and comfort of its users. These characteristics include lighting, opening, furniture arrangement and utility placement. This aspect aims to identify how interior environment settings affect healthcare providers' and patients' communication patterns and agility.

### 5.2 Doors and Window Openings

For KMC the mean score for this parameter for the healthcare providers is 4.16 and for SASMEC is 3.64 for SASMEC, the preference for outdoor views and accessible green is relatively low (3.55) while preference for outdoor resting places is slightly higher (3.91). For the patients and attendants the mean value for KMC is 4.04 and SASMEC is 3.96 which is almost similar for both cases. Overall the mean value for both of the hospitals is 4.00, indicating a significant relationship between the openings of the emergency department towards positive views and the users' communication patterns.

### 5.3 Lighting and Ventilation

The mean value of 3.89 for KCM is higher than the mean value of 3.14 for SASMEC in terms of preference for natural lighting and ventilation. This suggests KMC with the mean value of 3.89 has a higher preference for natural lighting and ventilation in its emergency department compared to the one with the mean value of 3.14. Interestingly for SASMEC, the preference for natural lighting for positive impact on mood is fairly low

(3.00) while for KMC it is higher (3.84). For patients and attendants, the respective mean value for lighting and ventilation preference in KMC and SASMEC are 4.04 and 3.96, which are quite close to each other, indicating no significant contrast.

## **5.4 Furniture and Equipment**

Compared to the last two parameters, SASMEC has a higher mean value (4.02) in terms of furniture and equipment arrangement than KMC (3.93) from healthcare providers. However, the mean value for SASMEC (3.8) for the patients and attendants is lower than KMC (4.07). Especially for the question, the furniture arrangement helped the user interact with others easily; SASMEC scored fairly low (3.78).

## **5.5 Utility Placements**

Similar to the previous parameter, SAMEC scored higher (3.86) for utility placements than KMC (3.73) by the healthcare providers. However, for the patients and attendants, KMC scored higher (3.86) than SASMEC (3.65) in terms of utility placements. It shows that the placement of the utilities, such as the water sprout, vending machines, food and beverage spots, and hand sanitizer is more convenient for the patients and attendants in KMC rather than SASMEC and vice-versa for the healthcare provider.

## **5.6 Indoor Decoration**

The components of indoor decoration for a hospital emergency department typically include the following:

- Color scheme: The walls are usually painted in light colors, such as white or pale blue, to reflect natural light and create a sense of spaciousness.
- Surface color and flooring: The flooring is typically made of durable, easy-to-clean materials such as linoleum or tile.
- Display and way finding: Clear and easy-to-read signs are essential in any emergency department to ensure patients and staff can navigate the facility easily.
- Indoor green: Interior plants for visual comfort and creating a natural setting within the enclosed and controlled area of the emergency department.

## **5.7 Surface color and material**

For healthcare providers, patients, and attendants, the mean value for the positive impact of interior surface color and material is higher for KMC (3.85) than SASMEC (3.65). Although overall, the patients and attendants scored higher for both cases compared to the healthcare providers.

## **5.8 Display and way finding**

SASMEC scored significantly lower (3.56) than KMC (4.1) for the patients and attendants regarding way finding within the emergency department. However, the healthcare providers gave a better score for way finding for SASMEC (3.66) compared to KMC (3.42). The patients and attendants have specifically given low scores for the question "I do not lose my sense of place inside the emergency department as there are proper indications in each space."

## **5.9 Indoor green**

Both respondent groups agree that indoor green provides visual comfort. However, the healthcare providers in SASMEC gave a lower score (3.73) when answering if indoor green will increase their comfort level compared to KMC, which scored (4.21) for the same question. For the patients and attendants, there is no significant difference between the two hospitals.

## **5.10 Overall communication**

There is a noticeable difference between the response of healthcare providers in KMC and SASMEC regarding whether a good indoor environment positively impacts the communication pattern of the users. While for KMC the mean score for these questions is 4.26, indicating the healthcare providers strongly believes that a good indoor environment has a positive impact on communication pattern, for SASMEC the mean score is 3.77, which indicates they do not necessarily think there is a significant relation between good indoor environment and communication pattern of users. For the patients and attendants, there is no significant difference between the two hospitals.

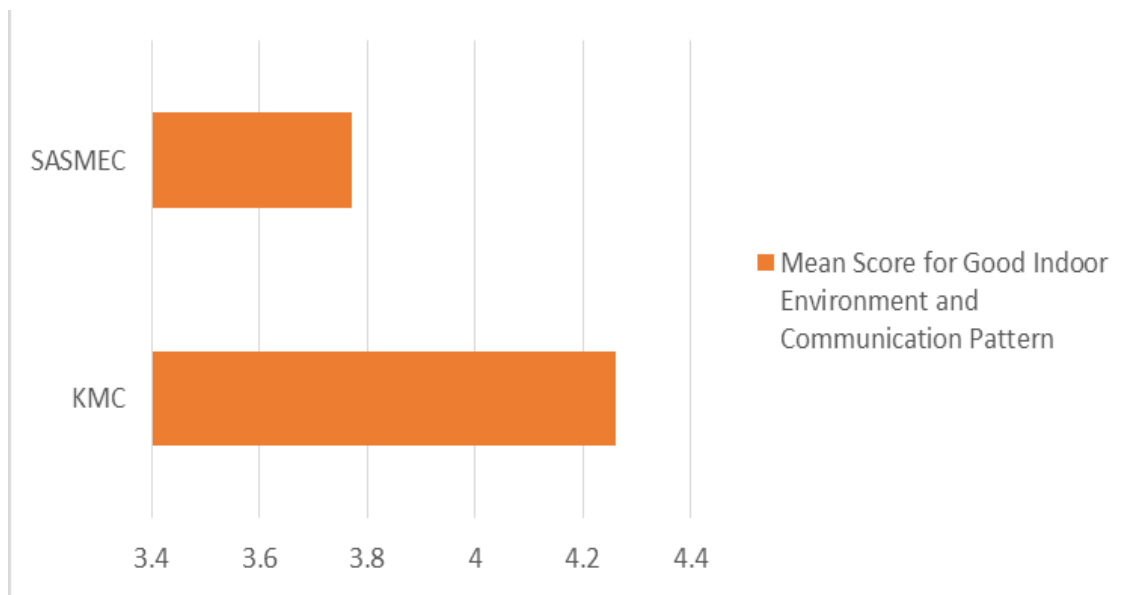


Fig. 4 Mean Score for Good Indoor Environment and Communication Pattern by hospitals

## 6 DISCUSSION AND RECOMMENDATIONS

### 6.1 Interior Environment Settings

There is a noticeable difference between the preference for door and window openings between the healthcare providers of KMC and SASMEC. Apparently, the respondents from SASMEC showed lower preference for having windows with external views and outdoor green spaces than KMC. From the layout, it is evident that KMC has less compact settings in its emergency department, allowing users to easily connect to the central lobby as well as the green space in front of the emergency entrance. Meanwhile, SASMEC's layout is compact and less connected with nearby large open spaces, which might impact the healthcare provider's preference for outdoor views and green areas.

For lighting and ventilation, due to the strict requirement of regulated lighting and ventilation within an emergency department, it is not possible to provide natural lighting and ventilation in all the spaces. However, it is possible to explore the options in common spaces like the waiting areas, café, and lobby as natural lighting and ventilation are proved to impact the users' agility positively. There is a slight increase in the preference of natural lighting and ventilation between the healthcare provider, patients, and attendants. It could be because the healthcare providers are more frequent to restricted spaces within emergency department which requires artificial lighting and ventilation, compared to the patients and attendants who visit mostly the non-restricted part of the emergency department with less strict lighting and ventilation requirement.

SASMEC scored lower than KMC from the patient and attendants' perspective and higher from the healthcare providers' perspective. It indicates that the furniture and equipment arrangements in SASMEC were designed considering the healthcare providers rather than the patients and attendants. While for KMC, there is a balance in arranging the furniture and equipment for the ease of the healthcare providers, patients, and attendants. In contrast to the furniture arrangement, the utility placement has also shown a preferable condition for the patients and attendants in KMC compared to SASMEC.

### 6.2 Indoor Decoration

For indoor decoration, KMC has an overall high score than SASMEC, indicating KMC users are more satisfied with its indoor decorations in terms of surface materials, colors, display and way finding and indoor green compared to the users of SASMEC. Moreover, the compact layout of SASMEC with complete detachment from natural settings shows that the healthcare providers in SASMEC consider the presence of natural elements within the indoor settings less important.

Apart from that, for the overall communication, healthcare providers in SASMEC scored higher in way finding, availability of services than KMC while KMC users preferred a good indoor environment for better communication patterns among users.

### 6.3 Recommendations

- a) Provide adequate openings with outdoor views, preferably towards green areas from the frequently visited spaces like the lobby, reception and waiting area. Wherever possible, provide accessible green spaces or link with other spacious areas like the central lobby and lounge, café etc. Providing views and accessible greens are expected to positively impact the communication pattern between the users of the emergency department.
- b) Explore the possibility of providing natural lighting and limited natural ventilation for the areas with more design flexibility, such as the lobby and lounge area, café etc. It will allow the users to create a sense of place and time within the strict settings of an emergency department.
- c) The arrangement of the furniture and equipment impacts the healthcare providers, patients, and attendants. It means that the communication between these two groups is affected if the arrangement is unsuitable for one or both. Therefore, it is important to consider both groups while arranging the furniture and equipment where both of these groups use the space. The same recommendation is applicable for the utility placements also.
- d) The indoor decoration for a hospital emergency department can vary depending on the hospital's design guidelines. However, in general, the decoration in a hospital emergency department should be functional, clean and easy to maintain.
- e) The walls are usually painted in light colors to reflect natural light and create a sense of spaciousness. The flooring is typically made of durable, easy-to-clean materials such as linoleum or tile. Lighting is often bright and evenly distributed to aid in visibility and safety.
- f) Artwork, plants, and other decorative elements may be limited to avoid cluttering. The waiting area may be decorated with comfortable seating and magazines to make patients and their families feel at ease.
- g) Overall, the main goal of the indoor decoration for a hospital emergency department is to create a calm, efficient, and welcoming environment for patients, staff and visitors, which in turn will have a positive impact on the mood, agility and communication pattern between the healthcare providers and the patients and attendants.

### 7 CONCLUSION

A good indoor environment in a hospital is crucial for effective user communication. Proper lighting, temperature, and air quality can help reduce stress and fatigue, negatively impacting communication. A well-designed layout and marked signage can also improve navigation and reduce confusion. Furthermore, using natural materials and plants can enhance the overall aesthetic, creating a more pleasant and calming atmosphere that can positively impact communication. In short, investing in a good indoor environment in a hospital can lead to improved communication, ultimately leading to better patient care and satisfaction. This research is among the first few that explore the impact and significance of the hospital interior environment on the communication pattern of its users. However, due to the limited scope and complexity of a hospital facility, the study only focused on the emergency department of two hospitals. Further research on this topic can go in-depth to study the overall facility and its inter-relationship for a holistic outcome.

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### REFERENCE LIST

- Awang, M. S. (2019). *Interior Design for Healthcare Environments*.
- Berens, M. J. (2023). *Interior Design Impact on Healthcare Outcomes*. NursesUSA. [https://nursesusa.org/article\\_interior\\_design\\_impact\\_on\\_healthcare\\_outcomes.asp](https://nursesusa.org/article_interior_design_impact_on_healthcare_outcomes.asp)
- Business Bliss Consultants FZE. (2018). *Psychological Impact of Interior Design on Hospital Patients*. <https://ukdiss.com/proposal/the-psychological-impact-interior-design.php?vref=1>



- CipherHealth. (2022). *Importance of Communication in Healthcare*. CLINICAL OUTCOMES. <https://cipherhealth.com/blog/importance-of-communication-in-healthcare/>
- Harrouk, C. (2020). *Psychology of Space: How Interiors Impact our Behavior*. <https://www.archdaily.com/936027/psychology-of-space-how-interiors-impact-our-behavior>
- Lamb, M. D. (2021). Health Inequity by Design: Waiting Rooms and Patient Stress. *Frontiers in communication*, 6. <https://doi.org/10.3389/fcomm.2021.667381>
- Marberry, S. (2016, September). *Hospital Design Doesn't Matter*. Sara Marberry LLC. <https://www.saramarberry.com/encore-hospital-design-doesnt-matter/>
- Merlino, J. (2017). *Communication: A Critical Healthcare Competency*. Patient Safety and Quality Healthcare. <https://www.psqh.com/analysis/communication-critical-healthcare-competency/>
- Pachilova, R., & Sailer, K. (2013). Evidence-Based Design: The Effect of Hospital Layouts on the Caregiver-Patient Interfaces. *Design for Health*. <https://www.healthdesign.org/knowledge-repository/effect-hospital-layout-caregiver-patient-communication-patterns>
- Re-thinking the Future. (2021). *Relevance of Psychology in Interior Design*. <https://www.re-thinkingthefuture.com/interior-design/a2939-relevance-of-psychology-in-interior-design>
- Regis College. (2021). *The Importance of Communication in Healthcare*. <https://online.regiscollege.edu/blog/importance-communication-health-care/>
- Reiling, J., Hughes, R. G., & Murphy, M. R. (2008a). Patient safety and quality. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*, 167–192. <https://www.ncbi.nlm.nih.gov/books/NBK2633/>
- Reiling, J., Hughes, R. G., & Murphy, M. R. (2008b). The Impact of Facility Design on Patient Safety. In R. G. Hughes (Ed.), *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. <https://pubmed.ncbi.nlm.nih.gov/21328735/>
- Srivastava, C. (2017). Effect of Clinic Design on Patient Care: Perceptions of Medical Staff and Patients. *Intersect: The Stanford Journal of Science, Technology, and Society*, 10(2), 2–12. <https://ojs.stanford.edu/ojs/index.php/intersect/article/view/955>
- The Korte Company. (2023). *Building Smarter Healthcare Through Better Healthcare Interior Design*. <https://www.korteco.com/construction-industry-articles/building-smarter-healthcare-through-better-healthcare-interior-design/>
- Tulane University. (2021). *Strategies for Effective Communication in Health Care*. School of Public Health & Tropical Medicine Blog. <https://publichealth.tulane.edu/blog/communication-in-healthcare/#:~:text=Skillful communication enables healthcare providers,care team and the public.>
- Ulrich, R. S. (1991). Effects of healthcare environmental design on medical outcomes. *The Journal of the Royal Society for the Promotion of Health*, 111(3), 89–93.
- Ulrich, R. S. (2008). The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity. In R. G. Hughes, P. Safety, & Q. A. E.-B. H. for Nurses (Eds.), *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. Agency for Healthcare Research and Quality. <https://www.ncbi.nlm.nih.gov/books/NBK2633/>
- Williams, J. G. (2012). *The Impact of Interior Design on Hospital Cleaning: Can Good Design Decisions Help Cleaning Staff Achieve Better Outcomes?*