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RESEARCH PAPER

# Assessing Window Design for Healing Environment in Selected Hospitals

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**ABSTRACT**

This study examine the important characteristics of window design in selected hospital wards and how they impact patients' perception of health, with a particular emphasis on improving the healing environment. The architecture and environment of a hospital significantly impact patients' recovery. Hospital's layout and facilities can either expedite or impede the healing process, depending on their configuration. Windows have been identified as a crucial element of hospital architecture that can influence the patient recovery, along with other aspects of hospital design. This research employs a holistic methodology by integrating objective assessments of window characteristics with subjective evaluations of patient preferences. Five hospitals were deliberately chosen for examination, and the window qualities of one medical ward from each hospital were carefully examined via objective observation and subjective responses from the patients. The results of this study emphasizes the importance of holistic design strategies that harmoniously integrate physical attributes with psychological experiences.

**Keywords:** Healing Environment, Healthcare Architecture, Hospital Design, Patients' Perception, Views Of Nature, Windows

## Introduction

The architecture and environment of a hospital significantly impact patients' recovery. Hospital's layout and facilities can either expedite or impede the healing process, depending on their configuration (Ullah et al., 2023; Ullah and Park, 2016). Windows have been identified as a crucial element of hospital architecture that can influence the patient recovery (Ulrich, 1984), along with other aspects of hospital design (Ullah and Park, 2016).

Creating a healing-oriented atmosphere in healthcare facilities is not a new concept. Zborowsky & Kreitzer (2008) noted that traditional healthcare facility layouts were designed with the understanding that a patient's surroundings could either promote or hinder the body's natural healing processes. Florence Nightingale, the pioneer of modern nursing, emphasized the importance of providing patients with access to natural light and fresh air in their hospital rooms (Nightingale, 1863). She believed these factors played a vital role in patient recovery. Dijkstra, Pieterse, and Pruyn (2006) defined "healing environment" as a setting that meets the physiological, psychological, and spiritual needs of patients, as well as the needs of their families and healthcare providers.

Windows have been recognized as a crucial element in establishing a therapeutic environment as they provide natural light and a connection with the external world. Numerous studies have demonstrated that access to nature can improve patient outcomes, reduce hospital stays, and decrease the need for pain medication (Beauchemin & Hays, 1996). Additionally, research has shown that patients who have windows with an outside

view report feeling better overall and less worried (Ulrich, 1984). In comparison to patients who had views of a brick wall, Ulrich (1984) study found that patients with views of the outdoors from their windows required fewer painkillers and had shorter hospital stays following surgery.

The type and state of the windows may also affect how comfortable the hospital rooms are hot climatic regions. This is especially important in places like Khyber Phakhtunkhwa (KP), with a significant seasonal temperature variations.

**Literature Review**

This relatively new concept of healing through architecture and the ventilation of hospitals with the use of windows is becoming popular and attracting the interest of various specialists in the field of medicine and healthcare. Several studies have proved that natural light and access to a view, presumably focusing on nature, provide opportunities for patients to experience less pain, feel better, and recover faster. (Boubekri et al., 2014; Ulrich et al., 2008)

The use of windows for ventilation can promote indoor air quality and is crucial for patients. Various studies have repeatedly stressed the importance of natural elements such as plants or water sources in the healing environment in healthcare settings due to improved patient outcomes (Ulrich et al., 2008). Windows can enhance and supplement this element in holistic healing environments.

Edwards & Torcellini (2002) looked into the effects of natural light exposure on patients in a mental health hospital. The study found that patients' anxiety and depressive symptoms were lower in those whose rooms had more natural light than in those with less. This demonstrates how important natural light is for fostering wellbeing and mental health.

The 2021 study by Mihandoust and colleagues found that compared to patients with views of the nature, those with views of the built environment had higher levels of stress, anxiety, and discomfort (Mihandoust et al., 2021). The study found that people who had views of the outside world usually spent less time in hospitals and paid less for medical care.

Along with the benefits of natural light and views, using windows for natural ventilation can enhance patient outcomes. Qian et al. (2010) investigated the impact of natural ventilation on patients in a respiratory unit. The study found that compared to patients in rooms with mechanical ventilation, individuals in rooms with natural ventilation had higher oxygen saturation levels and better respiratory function.

Additionally, the study raises the possibility of a connection between window design and patient outcomes. Hobstetter (2007) found that patients with windows facing a park or other natural views, needed less pain medication and stayed in the hospital for shorter periods of time.

The International WELL Building Institute (Well, 2014) has produced a standard for healthcare facilities that includes elements of Healing environment, such as access to outdoor, views of the nature, and the utilization of natural light.

Windows are crucial for creating healing environment in the design of healthcare facilities (Ullah et al., 2022). Well-designed windows can provide natural ventilation, which is necessary to control indoor air quality and reduce the spread of airborne illnesses. Windows also let in natural light and views of the outside world, both of which have been shown to enhance patient outcomes (Ullah et al., 2022).

The usefulness of windows in medical settings has been the subject of numerous research (Ullah et al., 2022). According to another study by Boubekri (2008), a Michigan hospital's usage of windows and other day lighting techniques reduced patient stays and improved patient satisfaction.

**Evolution of Hospital Design**

Historically, hospitals were considered as last resorts, reserved mostly for the poorest and sickest people. These pioneering hospitals prioritized the needs of the patients over their comfort and well-being with their straightforward architecture and functional design. Nonetheless, there was a trend toward the development of more patient-centered facilities as medical knowledge increased and the significance of the surroundings in inpatient facilities became evident.

The nineteenth-century pavilion-style hospital gained attention due to the efforts of Florence Nightingale. This design realized the importance of the environment in preventing disease and promoting recovery, for instance, air, sunlight, and cleanliness were given top priority (Nightingale, 1863). Large windows and lengthy wards with natural light and ventilation were characteristics of the layout.

Throughout the 20th century, other advancements including the introduction of specialized treatment and medical technology, Hospitals began to develop into complex, multifunctional structures capable of meeting a wide range of medical requirements. Better privacy and infection control were provided for the individual patient rooms. However, because they offered a window to the outside world, windows continued to be vital to patients' psychological well-being (Verderber & Fine, 2000).

Over the past few decades, the application of evidence-based design in healthcare has been increasingly significant. Research has shown that the physical environment can have a significant impact on staff productivity, patient outcomes, and the overall standard of healthcare. As a result, modern hospital designs typically include components that encourage recovery, reduce stress, and improve overall experience of the patient. As windows may produce views, control circadian cycles, and change the interior environment, they are crucial to this design approach (Ulrich et al., 2008).

**Role of Windows in Traditional Healthcare Settings**

Windows served a number of purposes in earlier medical buildings. They stood for more than just light and airflow; they also symbolized connection and hope. Patients could see outside their hospital walls through a window, which served as a reminder that life goes on (Asano, 2006).

Windows were seen by many cultures as portals linking the heavenly and the mundane. The spiritual side of healing was emphasized in many historical healing locations by the strategically placed windows that offered views of gardens, holy landscapes, or religious structures (Naderi & Shin, 2008).

Moreover, windows in conventional healthcare institutions often reflected the local way of life, including art, culture, and religion. The therapeutic atmosphere was aesthetically enhanced by the extensive use of intricate timber lattices, stained glass windows, and ornamental metal grills (Baldacchino, 2011).

Traditional hospitals, like KP, are designed with windows that would satisfy both functional and cultural needs in areas with diverse temperature conditions and a rich cultural legacy. The windows keep the healing chamber cold through passive ventilation,

kept it shielded from the direct sun light, and often anchored it in the local culture with regional motifs.

## Material and Methods

The study involved four main steps. The objective analysis of windows attributes, Patients' responses through questionnaires, synthesis and results.

The purpose of this study is to investigate the use of windows in hospital design for healing purposes, specifically exploring the concept of healing environment.

Five Hospitals were selected for this study. DHQ Nowshera, Qazi Hussain Ahmad Hospital, Mardan Medical Complex**,** Ayub Medical Hospital Abbottabad**,** and KTH Peshawar. One medical ward from each hospital was studied and analyzed.

Analysis of windows attributes:

Ward was analyzed based on the following.

- No of Windows in the specific ward
- Size of Windows
- Glazing / non-Glazing Area
- Patients bed view
- View type Natural/Artificial
- Required Glazed area.
- Existing Glazed Area
- Max depth allowed.
- Existing depth provided.
- Windows facing

Descriptive data analysis was employed to summarize and interpret the window related attributes collected from each hospital. Patients' responses through Questionnaire were collected. A structured questionnaire was designed to capture patients' preferences, comfort level, emotional response, and observation related to the hospital windows. The questionnaire encompasses multiple type questions.

A convenience sampling method was employed to select patients from the medical ward under study. Participants were informed of the study purpose before completing the questionnaire.

Quantitative data from the questionnaire were subjected to descriptive statistical analysis involving graphs. This analysis provided a comprehensive overview of patient responses in relation to window related aspects.

## Synthesis

This section delve into a comprehensive comparative analysis of various critical aspects pertaining to the healthcare infrastructure of five distinct hospitals. These aspects encompass the number of windows, window types, sizes, views, glazed areas, required glazing, and even the correlation between these elements and the number of patients. This analysis aims to provide light on the distinctive qualities of each hospital under study and propose about how these environmental and architectural elements contribute to improving patient outcomes. The study begins by analyzing the window-related features of the hospitals and number of patients in each ward. Importance of window size, view type,

glazed areas, and the relationship between glazed areas and patient numbers were studied as shown in table below.

**Table 1**
Summary of Physical Observation.

| | Minimum | Maximum | Mean | Median | Standard Deviation |
|---|---|---|---|---|---|
| Total No. of Windows | 0 | 17 | 5.6 | 2 | 7.8 |
| Total Patients | 8 | 21 | 15 | 15 | 5.3 |
| Glazed Area (sq ft) | 58 | 408 | 190.8 | 189 | 149.9 |
| Required Glazing | 91 | 204 | 116.6 | 91 | 50.8 |
| Depth (sq ft) | - | 58 | 40.75 | 41 | 12.46 |

According to the analysis of the many types of windows in the hospitals, "Sliding Glazed windows" was the most popular style and was present in three out of five facilities. These hospitals usually housed 17 patients on average, and their average glazed area was 294.3 square feet.

In comparison, hospitals that use "Casement Windows" typically housed 8 patients, which was a significant decrease from the 58 square feet of existing glass area seen in hospitals with sliding windows. This implies that casement windows may let in less natural light and have smaller window spaces.

Surprisingly, KTH Peshawar is unique among hospitals in that it has no windows at all. This distinctive feature could significantly impact the hospital environment, potentially leading to a reliance on artificial lighting and ventilation.

Window sizes across the hospitals, identified the size "4’-0” X 7’-6”" is the most frequently used, appearing in two of the hospitals. On average, these hospitals accommodate 18 patients and have an average existing glazed area of 249.5 square feet. This indicates that this window size is associated with relatively spacious and well-lit environments, potentially contributing to patient comfort and well-being.

On the other hand, AYUB MEDICAL HOSPITAL stands out with the largest window size, measuring "11’-6” X 5’-0”." Larger windows like these can provide generous natural light and expanded views, which may enhance the overall patient’s experience and the ambiance within the hospital.

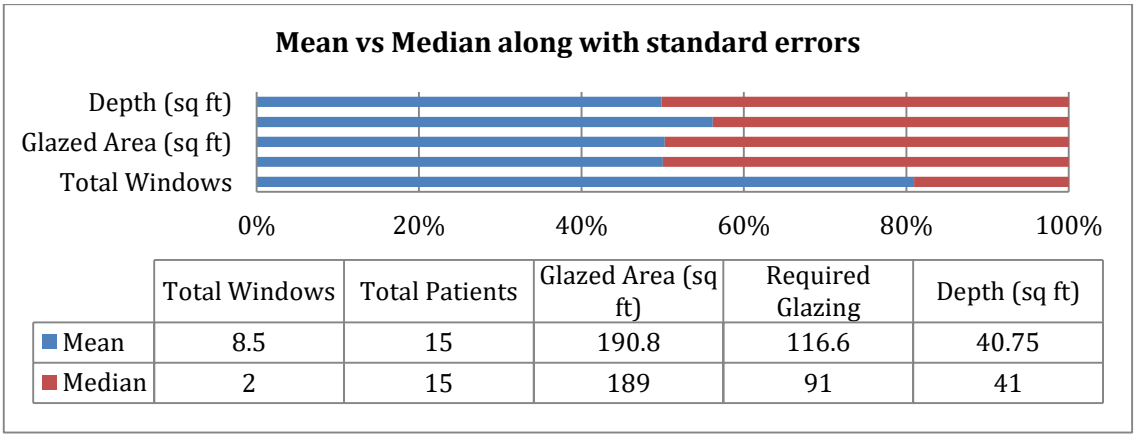


Figure 1 Mean and Median along with standard errors.

In the realm of view types, "Artificial" views dominate across four hospitals. Hospitals with "Natural" views, however, housed an average of 13.5 patients and exhibit an average existing glazed area of 190 square feet, whereas those with "Artificial" views have an average patient count of 16.75 and an average existing glazed area of 215.5 square feet.

DHQ NOWSHERA possesses the largest existing glazed area at 408 square feet, followed by QAZI HUSSAIN AHMED MEDICAL COMPLEX with 204 square feet. In contrast, AYUB MEDICAL HOSPITAL and Mardan Medical Complex have the smallest existing glazed areas, measuring 58 and 189 square feet, respectively.

**Conclusion**

The culmination of this research unveils a complex interrelationship between hospital ward window design and patient well-being.

According to this study and results, most of the patients strongly agreed with natural landscapes and courtyards compared with walls and paved areas. Window size as well as natural environments needs to be focused in the design of inpatient wards as it will enhance the healing environment of any hospital. Findings of this study underscore the pivotal role of windows as conduits for natural light, captivating views, and emotional engagement. These elements collectively contribute to the creation of a healing environment within hospital wards.

**Recommendations**

Hospitals with limited existing glazed areas needs to consider increasing glazing to augment natural light provision. Hospitals equipped with larger window sizes should explore optimizing window placement to enhance patient views.

**Enhancing Visual Connection with Nature:** Recognizing that some patients are positioned with windows opposite their beds, future hospital design should prioritize patients' orientation to facilitate visual connections with outdoor views.

**Prioritizing Patient Satisfaction:** Patients usually report feeling better about their treatment when their rooms contain windows. The correlation between natural light and patient satisfaction highlights the significance of window placement and planning. Hospitals needs to strategically place windows to create areas that promote comfort and relaxation.

**Optimal Window Size and Placement:** The size and positioning of windows should be carefully considered when building a hospital. Windows should be large enough to allow adequate natural light to enter without sacrificing the privacy of the patient. Well-placed windows with aesthetically pleasant views—like those of gardens or trees—can enhance the therapeutic environment even further.

**Incorporate Greenery:** Hospitals needs to create gardens or other plants that patients might view out of their windows. This upgrade enhances the vista and heightens the calming, healing atmosphere.

**Research Continuation:** As healthcare design is evolving, more research is needed to understand how window design impacts patient outcomes and well-being. The appropriate window features and their effects on various patient populations can be clarified by additional research.

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