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## **INCREASING THE QUALITY OF THE INTERIOR DESIGN OF THE HOSPITALS FOR LUNG DISEASE CONSIDERING GREEN SPACES IN ARCHITECTURAL DESIGNING**

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**Abstract.** This study has presented some new methods to enhance the quality of the curing indoor environment for those lung patients who admitted to the hospitals. With the increase of air pollution in the developed countries, Smoke and also dust storms, occurring in countries such as Iran, Iraq and Saudi Arabia in recent years, pulmonary disease and respiratory allergies have been increased. In the case of Iran, in addition to the lack of specialized medical centers, the low quality of these centers is also crucial and so it is required to consider some methods in order to improve the quality of the medical centers, especially for those pulmonary patients who are admitted to the hospitals for a very long time and their conditions are more crucial than the other patients in pulmonary disease.

In the presented method, the suitable environmental conditions is discussed for pulmonary patients, including making healthy places using green designing inside and outside of the clinic, considering atrium according to special conditions of the pulmonary patients to reach the highest interior design quality and endorsing it by using opinion poll of the admitted patients and data analysis.

**Key words:** Pulmonary disease, Hospital, Healing environment, Atrium.

**Intoduction.** Review a global census shows that approximately 5.4 million people die annually due to the air pollution, and which 90 percent of those are among the developed countries. Air pollution can have both short-term and long-term damages on man's health. The effect of air pollution differs on different people. In Iran, besides the increasing air pollution, smoking and also occurring dust storms and many other pulmonary problems, however there is only one specialized clinic known as Dr. Masih Daneshvari in Darabad, Tehran. This medical center, according to some patients, makes the patients more exhausted, more confused and in some cases by over exhausted building, inefficiency of some sections and inconsistency of sections in the site of the clinic, consequently, it worsen the general condition of the pulmonary patients.

According to the special conditions of the pulmonary patients and the limits for using the environments around the building for the following reasons, it is very important to consider suitable methods to enhance the interior environment. The occurrence of excessive dust storms, which comes to Iran from neighboring countries during summers, is extremely harmful to pulmonary patients. This phenomena may continue for several days. Because of the special conditions of some of the pulmonary patients and in view to the pollinate of the plants in early spring, so there is a need for an environment free from any allergic signs, then, it is required to implant non-allergic plants outside the clinic. Moreover, in some days the weather is bad and the admitted patients are not able to use the outer space of the hospital. According to the cases mentioned above, patients have no chance of using the social healing environment and a good amount of natural light that leads to the problems in the spirit of patients and their recovery progress. Therefore, considering the conditions of an environment called Atrium, which are going to be discussed, seems to be a good solution.

**Materials and methods.** Atrium is a large space in hospitals that contains hundreds of patients, staff and visitors. Typically, they also reflect the characteristic design elements – the architectural intentions – of the entire hospital (Plappert, 2005). The 1993 Atrium-based addition to the 1951 Hospital for Sick Children (now known as Sick Kids) in Toronto is an iconic, widely emulated example. The lobby occupies nearly 25 percent of the 790,650 square foot ground floor, and which contains eight stories tall and topped by a curving glass roof (Adams, 2010). Some features of atrium include receiving more natural daylight, a place to relax, clean air (because of plants that are compatible with conditions of the atrium) and a place to venue the forum (IIH, 2009), which both patients along with their family and the staff can spend time together (Mofidi, 2007). It is also better to consider a buffet and a nursing

station in the atrium (IIH, 2009). By using the exterior elements inside the hospital, the interior spaces of the hospitals would be improvised (GGHC, 2007). Using green spaces allows the hospital to expedite the treatment process, reduce hospital costs and save energy (Ulrich, 2002). Green space plays an important role in reducing stress in patients [8]. Signs of natural images in the interior can also help patients to feel better (Mack, 2001). According to the survived subjects, the lack of a space, so called atrium, in the interior space of the hospital is obvious under certain circumstances. In this essay, initially, a brief explanation is represented about the appropriate conditions for the pulmonary patients in the hospitals and how the interior space of the hospitals can help to provide an environment in order to minimize the induced stress for the patients. Then the reasons for considering atrium is discussed in hospital designing and its positive features. Finally, the outcomes of the poll taken from the admitted pulmonary patients is analyzed about considering a space called atrium in the hospitals.

According to the special conditions of some of the pulmonary patients and also in view to the fact that it is required to provide an environment free from any allergic signs in the early spring, hence, it is necessary to take special arrangements related to implanting non-allergic plants inside and outside of the hospital. Also, the inappropriate weather conditions keeps the patients away from collective curative environment and the lack of enough amount of the natural daylight leads to problems in the spirit and the recovery process of patients.

Academic research conducted on a group of people (people who were investigated as a patient) showed that a simple look at an environment with flowers and plants, in contrast with an environment without any natural elements, has significantly improved the recovery process and lowered the stress level. High level of stress can cause pain and the experience of hospital wounds. However, there has been little attention to create a relaxing environment or managing the patient emotions (Mack, 2001). So, according to the following conditions, considering a space, so called 'atrium', seems to be the appropriate solution.

**Results.** The 'atrium' refers to the central space of a building with a transparent ceiling, which is surrounded by other sections of the building. Atrium, with thousand years of history, has been found in various forms in all continents. In sustainable architecture, interior space as an integrated and interconnected component has an independent identity, yet being coordinated with the shape of the building in an overall process, which merges one of the characteristics of the sustainable architecture. The modern architecture, by deepening the interior space and with the emphasis on the transparency of the external surfaces, led to an interior-exterior architectural pattern that willingly or not requires the sun shine to the middle space of the building (figure 1). Therefore, the atriums were able to provide residents with natural light and space protected from wind and rain, and with easy access and tropical green cover (IIH, 2009).



**Figure 1. Stanford Hospital Atrium: creating collective space with more access to natural light**  
Source: <http://beta.inhabitat.com>

In most of the new buildings using atrium in their designing, this space have been considered as a milestone for the opportunities to provide attractive visual elements, to create positive distraction for the patients (figure 2). Plants and the works of arts displayed in the atrium as well as the special artificial lightings at night are among the visual elements (Dalke, 2006).



[1] Figure 2. Heaven Hospital Atrium Yale New: considering plants in the interior design of the atrium, Source:<http://www.turnerconstruction.com>

Perhaps, the most significant reason to use atrium in hospital designing was the accessibility to more natural light, healing gardens and expanded collective environment which, as mentioned in the previous parts, have positive effects on the recovery process of the patients.

**Landscape designing in atrium with non-allergic plants.** Due to the special conditions of the pulmonary patients and the existing limitations in using green space around the hospital, considering a green landscape inside the hospital space, with non-allergic plants, is very important. Allergic reactions occurs by plants during the pollen time. Therefore, those plants that produce less pollen, are better options for the allergy-free environment. Different plants have different methods of pollination. Plants that are pollinated by insects, are less allergen, because pollen would not scatter in the environment. Among the types of pollination, wind pollination has lower degree of certainty, so in order to ensure successive reproduction, the plants must produce large amounts of pollen. Therefore, plants pollinated by the wind, are the most important source of allergens. These plants are characterized by large amount of small and non-decorative flowers.

Some of the plants pollinated by the wind, and which could cause severe allergic reactions in many people are as follows:

The most pollen producing trees are alder, aspic, birch, cypress, elm, maple, mulberry, oak, poplar, buttonwood, walnut, cedar and olive, acacia and almond.

Although alder, birch, elm, maple, poplar, ambergris and willow are allergen too, however, they generally have milder allergic reactions or fewer people develop an allergy to it. Grasses (Bermuda, bluegrass, weeds that grow on tree lands, grass, rye, sour grass, sweet grass, cat-tail grass) and weeds (dry plants that are used to burn the old spring, Russian thistle, rolling thorn) are dispersed in air.

**Investigating the performance of atrium due to energy saving and maintenance of energy.** Atrium as a buffer space keeps the inside temperature between 15 to 18 degrees, but its temperature changes according to the temperature of the environment and changes with time delay (Etzion, 1997). Adjacent spaces to atrium are protected from severe environment changes and reduces the heat waste from their transparent surfaces. The amount of these savings depends on inside temperature of the atrium, atrium airtight and air condition, thermal conductivity components and insulation levels of the surfaces (Mofidi, 2007).

By pre-heating or pre-cooling fresh air, heating and cooling load of the building will be reduced. In conditions that atrium is consisted of heat storage levels and also is turned toward south, passively, it uses solar energy for heating and cooling summer nights and consequently, it reduces the energy consumption (Flores, 1996).

In one hand, energy savings in adjacent spaces to atrium reduces the need to heat, and on the other hand, some of atriums, because of their being medial, reduce the need to heat the building. But this ability also depends on the internal therm of the atrium. This therm is related to the following issues:

1. The ratio between the windows' outer surfaces of the atrium to the walls' surfaces
2. The amount of passing heat from discriminant wall atrium from the main construction, which is usually determined by the ratio of the window surfaces to the whole surface of walls.
3. Orientation, inclination and the amount of heat transfer out of outer side of the windows of the atrium.

When the glasses of the atrium are steep, in contrary to staple windows, the amount of energy waste is greater and when the surfaces of the walls are facing the sun, the need of heating to be reduced by 25 % and there shall be no changes to the internal state structure. In this case, the heat absorbance of the atrium will depend on the ventilation system of the building.

[2] Atriums face temperature increase during summers and it is possible to reduce it with appropriate methods. These methods can include windward, shading surfaces by trees or hanging plates and the awnings connected to the atrium, the use of ventilation, and thermal mass and radioactive cooling (Mofidi, 2007). The appropriate design of the atrium significantly reduces the amount of energy used by the building. Its poor design can create the inappropriate temperature during day and conditioning overloads (Holford, 2003).

**Atrium ventilation.** Temperature and humidity control and air conditioning in the atrium is very effective and useful for the treatment of patients. In general, the building is ventilated with two different functions which include:

1. Ventilation for health: in order to provide fresh air for the people breathing inside the atrium.
2. Ventilation for comfort: affected by the flow of air through the building body.

Controlling the air flow between different parts of the hospital is the most important factor and could prevent the spread of contamination. Although it is not easy to control the air flow in different parts, because of the open doors, temperature difference between spaces, installation ducts, elevators and stairways, however, a proper design and positive and negative pressures can be partially useful. The following solutions are suggested to control the air flow:

1. Use a gentle stream of air at 20 – 90 feet per minute within the spaces.
2. Create a negative relative pressure in areas such as hallways, services etc.
3. Create a positive pressure in sensitive areas.
4. Use airtight strips on the doors and windows where the passing of the air through them is not allowed.
5. Air transfer through the spaces of the ceiling as much as possible and drain from the valves close to floor

(Ghanavati, 2013).

Other essential measure for ventilation and mechanical installations of the atrium is to consider a separated air device, especially for the space of the atrium – because of the volume of the atrium and the difference of temperature in contrast to other space of the hospital.

One of the factors that should be considered in the design of the atrium is fire. In time of a fire, flames and smoke spread horizontally rather than vertically. So, windows on top of the atrium will prevent the smokes from spreading out or coming down (Qin, 2009).

It is better to have no connections between the atrium and other floors for two reasons:

1. Preventing from the spread of the smokes in time of fire in each part of the building.
2. Preventing noise inside the atrium from leaking into the floors where patients are admitted.

**Discussion.** In the applied polling in the Dr. Masih Daneshvari hospital in Tehran – the only skilled center for pulmonary patients in the country – from 25 admitted patients with the average age of 20 to 84 who were admitted between 3 to 32 days, the following results were reached. The questions of this poll were categorized into three groups, including important and determining questions, questions with lower degree of importance and supplementary questions. The important questions – with 3 coefficient in calculation – have a determining role for the designing of the atrium. Questions with lower degree of importance – with 2 coefficient – and the supplementary questions – with 1 coefficient – have a completing role in designing atrium.

According to calculations made from the results of the conducted survey, 98% of the total responses were close to the desired response. According to the categorization of the questions regarding their importance, the important questions were 100% near to the considered target. The design of these questions were based on the essential needs to elevate the spirit of the patients and, as it was presented, all of the 25 patients agreed to consider the mentioned equipment.

**Table 1: results and verification from the admitted patients**

row	Question	Version of question	Number of answers	Answers
1	Access to collective space in the hospital	Important	25	25 positive answers
2	Green spaces in the hospital	Important	25	25 positive answers
3	Participating in group works with other patient or with the families	Important	25	25 positive answers
4	Natural elements such as aquarium and fountain inside the hospital	Important	25	25 positive answers
5	Affection to watch natural scenes	Important	25	25 positive answers
6	The need of a place to communicate with others	Important	25	25 positive answers
7	The need of green designing inside the hospital to spend time with family	Lower importance	25	25 positive answers
8	Classes to increase the spirit of the patients inside the hospital	Lower importance	25	25 positive answers
9	Feeling of unawareness because of being admitted to the hospital	Lower importance	25	23 positive and 2 negative answers
10	Visual systems inside the atrium	Lower importance	25	24 positive and 1 negative answers
11	Play light music inside the atrium	Lower importance	25	24 positive and 1 negative answers
12	Drawing boards of natural scenes	Lower importance	25	25 positive answers
13	Considering reclusive places in the atrium	supplementary	25	25 positive answers
14	Using magazines and newspapers in the atrium	supplementary	25	25 positive answers

15	Considering places for recreations like chess in the atrium	supplementary	25	21 positive and 4 negative answers
16	Green internal design of the atrium in natural and familiar forms or using sophisticated forms	supplementary	25	15 answers to natural forms and 10 answers to sophisticated forms
17	Green traces in different floors of the atrium	supplementary	25	25 positive answers
18	The effect of a place with mentioned facilities to increase alleviation and hope of recovery and reduce patients' stress	supplementary	25	25 positive answers

In order to explain the elements of the first group, we can say that the public spaces in the buildings, which enhance communications and facial connections, has been provided by atrium. Atrium itself is a place for fun, game and conversation. The patients are able to do many of their daily activities under the glass ceiling and in inclement seasons.

In addition to easy movements and accessibility in the atrium, the presence of the people accompanied by the feeling of cooperation and solidarity. The advantages of using green spaces in the hospitals include healing, stress reduction, accelerate the recovery process, patient satisfaction, reduce in blood pressure and the amount of drug given to the patients, elevation of pain threshold, hospital cost reduction and energy saving (Ulrich, 1984). In care spaces, there must be numerous opportunities for different people to communicate and access the nature. These spaces could be interior or exterior, physical contact, watching or feeling. The quality of the interior environment can be enhanced by a good landscape or using outside elements into the atrium. It is better to combine the plants that can be maintain inside or images of the nature with the interior design (GGHC, 2007). Aquarium, glasshouse, fountain and waterfront are among the sources that could be inspired from the nature. The second category of the questions, lower importance questions, were 97% close to the target. The positive results of the nature-related therapy can be provided through simulating the themes and pictures of the nature. Watching the sky or feeling the sun on the skin can also help patients feel better (Mack, 2001). Stay in a hospital environment causes stress and some mental problems in patients. High stress is usually caused by disease, pain and wound care. One of the solutions to this problem is to hold classes in order to increase the spirit and energy of the admitted patients which can be placed in public space of the atrium. The next group are the supplementary questions that were 96% close to the desired response. Visual contact with areas such as corridors, upper floors and the well-prepared green traces can make interest and relief in the visitors.

**Conclusion.** This study explored the use of atrium in order to enhance the quality of the curing inner environment for those lung patients who admitted to the hospitals. According to the special conditions of the pulmonary patients and the limits of using green environment around the hospital and in view to some problems such as the air pollution, bad weather, the dusty weather in some months of the year and the pollinations of the plants, which worsen the allergens in the pulmonary patients, considering a space called atrium seems to be an accommodating method. Important advantages of the atrium in the hospitals were accessibility to more natural light, healing gardens with non-allergen plants and expanded collective environment. Atriums caused convergence, collaboration and connection between the patients in a spacious and cheerful place. In such places the temperature rised during summer, so it was possible to cover its surfaces with materials other than glass or bowers connected to the atrium. It was also possible to use conditioners, heating mass and radial frigorific to reduce the temperature. According to the verification and the categorizing questions into 3 classes with different level of importance, the first class including questions with high level of importance mentioning the main factors to design atrium. According to the opinions of the patients, these questions were 100% close to the desired answer. In conclusion, the answers of the patients regarding to create atrium, according to the mentioned conditions, were 98% close. This result showed that considering such space with mentioned conditions in hospitals had positive effects on the patients' recovery process.

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## ANALYTICAL REVIEW OF MOTIFS AND THEMES USED IN GURAKANI INDIAN TEXTILES

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**Abstract.** Studying in Islamic art in the Indian Gurakani era, particularly the woven fabrics of this age and the analysis of its motifs and content in the study of inter-religious relations between Iran and India, have been the subject of interest by many Islamic scholars. This research focused on analyzing the various types of designs, patterns and themes used in Indian Gurakani textiles and excavate the reasons for the influence of these motifs on the role of the Safavid dynasties in Iran. The results indicated that most of the designs and themes used in Indian Gurakani textiles include the various forms of artifacts like decorative artifacts, herbaceous and Arabesque, geometric and abstract, animal and human motifs, and lyrical, hunting, literary and a descriptive content, which has been influenced by Iranian textiles. In the structural aspect of design, these textiles could be classified as Altars, moharamat, lachak and Medallion, goldani, Arabesque and geometric grids. Also, there are identified similarities between these designs and Safavid Iran Textiles. This research utilized historical-descriptive and analytical method based on library and visual resources.

**Keywords:** Indian Gurkani, Textiles, Design, content and Safavid Iran.

**Introduction.** India is one of the countries that is located in the east of the Islamic world and has left many beautiful Islamic works. The Indian Gurakani era should be considered as a peak of Indian cloth in the Muslim period in that country. During this period, the immigration of Iranian artists and artisans to the Indian court had a great impact on its textiles and fine arts. In this article, Indian Islamic textiles in the Gurakanian period are studied as the most important centralized Islamic state in India; Also there is discussion about Safavid Iranian textiles' influence on the Indian Gurakani's ones. Investigating on the designs and patterns used in Indian Gurakani textiles shows that Indian Muslim weavers created exquisite artworks influenced by Iranian art such that their distinction in many cases is very difficult due to their similarity. This influence is clearly evident in design, content and texture of silk, shawl, brocade, velvet and calico textiles. In this essay, the identification of some Indian Gurakani textiles, the structure of motifs and its contents are studied.

**Problem statement and methodology.** The purpose of this research is studying on design and content used in Gurakani textiles in India. In addition, the authors have studied the influence of Gurakani textiles on Safavid textiles in Iran and its reasons. Many of researchers have focused on descriptive and historical issues in this area; However, this essay tried to examine motifs and content with analytical perspective more. Because of that, descriptive-analytical and historical methods helped to determine aesthetic concepts of studied images by describing their appearances in detail. On the other hand, the tendency of the Gurakani kings to combine cultures and beliefs has created an open space for influencing different styles of both sides; Of course, these effects did not appear in a general way. The main focus of this research is woven designs and robes in Gurakani textiles. Accordingly, features and methods of Gurakani weaving are firstly examined. Then, by categorizing woven designs and patterns, they are divided into three Group: Plant designs; Human and animal designs; and calligraphy drawings.

### **Research questions**

1. What are the most important topics, designs and content used in Indian Gurakani textiles?