



The Effect of Supportive Care Environment on the Treatment Process in Hospitals: A Qualitative Study

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Abstract

Objectives: According to the available evidence, changes in the design of medical centers, which can create a more comfortable, pleasant, and natural environment, have reduced the patient tensions and increased their satisfaction with the quality of treatment in the given centers. The present study aimed to investigate the effect of the architecture and design of a supportive care environment on the treatment process in hospitals adopting a qualitative study design.

Materials and Methods: This qualitative study with a phenomenological approach was conducted to investigate the effect of an optimal supportive care environment in hospitals based on the experiences and opinions of experts, university professors of architecture, and doctors in hospitals. To this end, experts were interviewed qualitatively and, then, eight main themes as well as 22 sub-themes were classified by performing content analysis. Furthermore, the effect of the environment on the patients, treatment control length, blood pressure control, and subjective nature of the disease's impact, as well as the effect of social relations on the vital signs, comprehensiveness and acceptability, place of using the supportive care model and a completely mechanical attitude towards humans in the modern period were all evaluated.

Results: The effect of the optimal supportive care environment on the patients' treatment processes was confirmed by qualitatively reviewing the experts' viewpoints and collecting comprehensive information from other sources.

Conclusions: In sum, it was recommended that the heads of the hospitals should consider the concepts of optimal supportive care environment when designing and/or reconstructing hospitals.

Keywords: Architecture, Supportive care environment, Spatial quality, Hospital, Qualitative

Introduction

The concept of a healing environment goes back to ancient Greek medicine. Sick individuals went to the temples at the time, hoping that God would cure them. Florence Nightingale established ventilation and fresh air as the primary law of nursing and highlighted the importance of silence, proper lighting, warmth, and clean water in 1860 (1).

Undoubtedly, the quality of the care environment affects the treatment. The design of these spaces is very important in terms of functionality, and has always been studied based on spatial quality, psychological dimensions, and physical impact on the process of treatment and recovery (2). Medical centers are built and used to treat patients and improve the community's health. In most cases, only the treatment quality of these centers is discussed and investigated. The physical structure of the building is evaluated according to the health and non-pollution as well as the functional and physical features of the existing spaces. However, the users' satisfaction with the space, different aspects of its visual features, and its impact on patients' behavior are not usually explored. Lack of attention to physical and interior design in therapeutic spaces leads to dissatisfaction among the users (3).

The aesthetic quality of artwork can improve the patient's mood, vitality, self-esteem, and individual awareness. Studies have shown that physiological factors such as heart rate, blood pressure, and breathing are decreased when individuals are deeply involved in activities they enjoy. Today, the architecture of medical centers is changing from mere functionality to creating a healing environment. A healing environment in medical centers means creating an environment that positively affects disease treatment (4).

Hospitals, as places where patients are treated, play a decisive role in relieving patients' physical pains and comforting their companions. This is only possible when beauty, decoration, and color of the hospitals are capable of exerting positive effects on the feelings and emotions of patients. In Islamic color therapy, it is believed that color can cure many diseases. Interior architects also use bright colors for the interior and exterior designs of the hospitals and other medical centers in order to make them more pleasant and peaceful places for the hospitalized patients (5).

The World Health Organization defines health as "a complete physical, mental, and social well-being and the absence of disease or infirmity." In 1998, this organization

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Key Messages

- ▶ Hospital stay could be an unpleasant experience for many patients due to the busy, unfamiliar, and stressful nature of its environment. For a patient, the hospital experience can therefore be a frightening and distressing place.
- ▶ Hence, an efficient supportive treatment environment can minimize these problems and encourage the patients to engage in therapeutic procedure. It can also facilitate the patients' recovery and motivate them to return to a normal life.
- ▶ This study investigated the effectiveness of the hospital environment and its design in improving the satisfaction and life quality of the patients as well as in facilitating their improvement, recovery, and return to normal life.

confirmed spiritual health as its fourth dimension (6). On the other hand, according to Bill Hitler, one of the founders of the National Welfare Institute, the welfare model includes physical, social, intellectual, occupational, emotional, and spiritual dimensions. Comparing these two models shows that physical, social, and spiritual well-being are the same in both human health and well-being models. The criteria for mental health and intellectual well-being are measured based on the capabilities of the brain and its function, which generally falls in the category of cognitive psychology. Measuring the emotional well-being has much to do with the human feelings and emotions, and is considered a sub-branch of emotional psychology. Therefore, addressing this issue can lead to an increase in the job satisfaction of employees in the hospital environment (7).

In a research conducted by Architectural and Environmental Organization of England, patients were asked to express their unpleasant experiences and memories from the hospital. The given patients used the following words to describe their experiences: confusing, boring, no windows, long corridors, noisy, lack of natural light, poor light, lack of sleep, isolation, and sensitivity to light (i.e., direct sunlight coming in inside). To create a healing environment, these measures are usually implemented: noise control, air quality improvement, thermal comfort control, lighting control, communication establishment, as well as color, texture, and privacy control. The attention to patient's condition and the fulfilment of his/her mental and physical needs due to his/her greater vulnerability than a healthy individual require that the architects follow all the principles and components of architecture more carefully and scientifically. Visual elements such as visually effective forms, light, color, etc., should be scientifically evaluated for their use in different parts of the hospital; moreover, their selections should be made in accordance with scientific evidence and after the examination of their effects on the patient's psyche and body as well as the performance of the treatment centers' staff. Since medical science has increasingly become evidence-based medicine in which clinical options are

selected based on research, the design of health and treatment centers has also become evidence-based design based on scientific research on the relationship between the physical environment of the hospital and the patients (8).

The important elements in the design of therapeutic spaces are: creating integration between indoor and outdoor spaces, creating interaction between the patient and landscape design elements, the possibility of reducing noise pollution in the space, creating a suitable or green landscape, creating quality in indoor spaces, creating a sense of belonging to the space, the understanding of the space through paying attention to the needs of the patient, the existence of spaces for interaction between patients, the possibility of making changes in the furniture and arrangement, the possibility of adjusting the temperature and humidity conditions of the space, the appropriateness of the dimensions of the spaces, the use of designs and colors related to the mood of the patients. The presence of appropriate and controllable light results in reducing anxiety and stress in the patient and creating relaxation and improving environmental behaviors, reducing the duration of hospitalization, increasing the pain tolerance threshold, increasing the patient's enjoyment of the space, and the possibility of communicating with the space (9,10).

In this regard, American researchers conducted a semi-structured interview and found that natural elements had positive effects on sick children in a hospital (11). In 2005, Hutton also conducted qualitative research on seven sick teenagers and asked them to do drawing of their favorite room meeting their needs (12). In research on playing in the hospital, moreover, Jun Tai explored the role of playing in the recovery of sick children as well as examined the design of environments suitable for playing in the hospital and its effect on reducing the child's stress. Another study was conducted using the recording of stories told by children, in which the participants were assigned to two groups: one group included the children staying in the hospital, and another group included children having no hospital stay experience. The most common feeling expressed by children through their stories were the feelings of loneliness and fear during hospitalization. In addition, several other Canadian researchers adopted qualitative research design using interviews, observation, and photography techniques to investigate the role of the atrium in the design of the hospital, creation of a more favorable environment for children, and the positive effects of this space inside the hospital (13).

Recently, the architecturing of medical centers has shifted away from functionality to creation of a healing environment. The healing environment in medical centers is realized only when the environment has positive effects on the treatment of the disease (14). According to the available evidence, the changes in the design of medical centers creating a more comfortable, beautiful, and pleasant

environment have been discovered to reduce tensions in patients as well as increase the patients' satisfaction with the quality of treatment in medical centers. For example, the renovation of a waiting room in a neuropsychiatric clinic by making small changes in the general layout of the hall, color scheme, furniture, floor covering, and curtains, as well as the method of presenting information on the screen have been determined to increase the positive evaluation of the patients on the environment, improve their mood and physiological states, and increase their satisfaction with the waiting room (15).

Creating a healing environment in the hospital in a patient-centered approach, as opposed to a treatment-centered approach, was considered an extremely expensive and luxurious adventure in the past and, therefore, was eliminated from the functional requirements of the hospital. Today, however, the designers are looking for solutions to increase the quality of the care environment and address the problems caused by being in the hospital, which can result in reducing stress, increasing patient satisfaction, and improving treatment results (16).

As mentioned above, therapeutic spaces affect individuals' mental and emotional states, and poor designs of these environments can aggravate behavioral disorders and create or increase fear and anxiety in patients. The term "healing architecture" refers to an ongoing process initiated to create a physical environment capable of healing the patients' physical and mental illnesses. Therefore, this qualitative study aimed to investigate the relationship between healing architecture and the quality of treatment of patients in the hospital through by adopting qualitative interviews with experts in this field.

Materials and Methods

In this qualitative study, a phenomenological approach was adopted to investigate the effect of healing architecture on hospitals based on the experiences and opinions of experts, university professors of architecture, doctors, and healthcare service providers in hospitals. Considering the nature of the study subject, which required collecting information from the hospital based on the type of architecture, the environment for conducting this study was different. Among these environments, we can mention the organizations and bodies related to hospitals and other influential organizations in the field of hospital design, such as the engineering system organization and universities of architecture and design. These individuals were chosen because they had a lot of experience and knowledge about architectural engineering and hospitals – public hospitals, in particular. The selection criteria were as follows:

- Physicians with experience in managing hospitals and treatment professors in the Iranian universities of medical sciences with over five years of experience;
- Architectural professors having expertise in the field of environmental psychology and hospital

architecture with over five years of experience;

- Willingness and ability to participate in the study.

A purpose-based sampling method was used to select the participants. The participants were selected from among those individuals who had the richest information and were able to provide our research team with accurate information (17-19). This work continued until the information saturation stage was reached, that is, until the researchers felt that no new information could be obtained with the arrival of newer people. In the present study, the information saturation was reached after interviewing 12 individuals based on the results of the analysis of the conducted interviews; however, 16 individuals were interviewed to ensure the full saturation of the findings. After the initiation of the study and during the interviews, theoretical sampling was also used to identify individuals able to provide the research team with rich and useful information. Furthermore, it was ensured that the participants had the necessary variety in age, employment status, work experience, educational qualification, and job status to generate diverse data. The characteristics of the participants in this study are shown in Table 1.

Persian language was used to conduct semi-structured interviews and collect the data. The interviews were conducted in a place convenient for the participants. During the interviews, guiding questions were used, which had been designed by reviewing the texts and opinions of the experts in this field. The duration of each interview varied between 45 and 90 minutes (except for one case where the interview lasted 20 minutes due to his busy schedule). After obtaining the participants' consent, the interviews were recorded using a digital audio recorder, and notes were taken by the researchers during the interviews. The text of the interviews was listened to several times by the researchers immediately after the end of each interview and was implemented verbatim in the Word 2010 software. In Figure 1, the theoretical framework of the research is presented in the form of table.

Conventional content-analysis, which is a very useful method to perform qualitative data analysis as well as to identify, analyze, and report the patterns (themes) in the text, was used for analyzing the data manually. This type

Table 1. Profiles of the Interviewed Experts in the Field of Healing Architecture in Hospitals (16 Individuals)

Degree of Education	Number
Ph.D. in architectural engineering	6
Gynecologist	2
Specialist in General Surgery	2
Internist specialist and gastroenterology subspecialist	2
Anesthesiology subspecialist and special care specialist	2
General practitioner	1
Ph.D. in Nursing	1

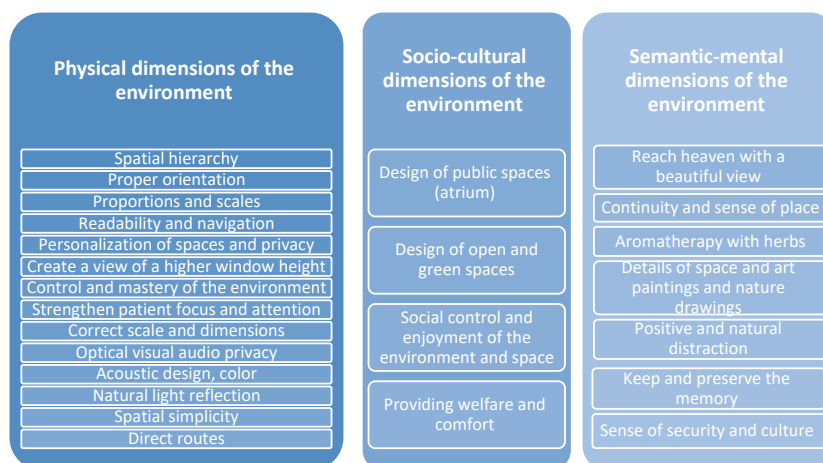


Figure 1. Summarizing the Effect of Treatment Spaces on Users' Satisfaction Based on Theoretical Studies.

of analysis is performed when the existing theories in the research topic field are limited (20-22). The stages of data analysis and coding were as follows: familiarization with the text including the data (i.e., reading the implemented texts several times, data immersion), identification and extraction of primary codes (i.e., identification and extraction of data that were more related to the primary codes), identifying themes (i.e., placing the extracted primary codes in related classes and themes), reviewing and completing the identified themes, naming and defining themes, recoding and renaming some classes and themes, and ensuring the reliability of the codes.

To increase the consistency and accuracy of the study results, four criteria suggested by Guba and Lincoln (23) were adopted as follows:

Acceptability and verifiability: in which long-term involvement, review by colleagues, and the experts' opinions were used. The respondent validity was also used. To this end, after finishing the meetings and summarization of the individuals' opinions, they were given a summary of their statements based on the notes made during the meetings in order to correct and eliminate the wrong and ambiguous cases.

Dependability: in which two individuals were picked for coding.

Transferability: in which the opinions of experts and purpose-based sampling were used. In addition to the above-mentioned cases in this study, moreover, the methods of integration in the research and transparency were employed. All effective treatment factors were obtained based on the theoretical studies and qualitative interviews.

Results

During the interviews, 14 questions (i.e., six open-ended and eight closed-ended questions) were asked. Table 2 shows the findings obtained from the participants' interviews in the form of open-ended questions.

As Table 2 displays, all participants interviewed about

the relationship between the environment and the place of treatment believed that there was a significant relationship between the care environment and effective and useful treatment for patients. During the interview, the participant No. 3 argued that "patients pay attention to both the space they are in and its inside furniture and equipment, which can have a positive or negative effect on the patients."

In response to the question about environmental problems affecting the patient, the participants identified various problems including the following: the lack of cleanliness of the environment, lack of easy access to comfort facilities, lack of independence in using spaces, unsuitable size of space, lack of public spaces for socializing with companions and others, lack of privacy (audio and visual), especially regarding the doctor-patient interaction, impatience and inattention of the staff, boring atmosphere, lack of a clean and pleasant quiet space, lack of comfort facilities for patients in the room (e.g., absence of greenhouse and green glass boxes, no use of decorative items, tables and chairs for writing and reading), complete darkness or annoying direct light, windows without opening, fixed curtains impossibility to change, very tall or very short ceilings white in color, inattention to the entrance and the traffic route, ignoring the subjective semantic and cultural issues, corridors with no designs, ceiling with no designs for inpatients, and sizes of the space unmatched with the number of the space users.

The participants in the interview believed in the existence of a mutual relationship between the environment of the treatment spaces and the spiritual and semantic components and the treatment of the patients. Regarding the criteria achievable by changing the architectural spaces and improving the quality of the environment, they also believed that the patients' recovery may have been accelerated by: creating special services for each room, providing sufficient light, adjusting the size of the windows with the size of the space and being flexible, selecting appropriate color and size for the furniture,

Table 2. The Results of Open-ended Questions Posed in the Interview With the Participants to Achieve an Acceptable Qualitative Model for Evaluation the Effect of Treatment

Questions	Overall Result	Statements of the Participants
What do you think about the relationship between environment and therapy?	There is a significant relationship	<p>P 1: "Unsuitable work environment without amenities such as inappropriate height of space and furniture, as well as the lack of windows, even a refrigerator and tea maker can contribute to this effect".</p> <p>P 3 and 14: "Patients also pay attention to their surrounding space and to the furniture and equipment inside it; it can have a positive and pleasant or annoying effect on patients".</p> <p>P11: "... the environment can control the external factors affecting the patient and his/her mental states to some extent and reduce the complications related to it".</p> <p>P12: "...the created environment meets human biological needs such as shelter and his safety needs, such as physical and psychological security; belonging and respect through the symbolism of the environment and the aesthetic needs through formal beauty. "</p>
In your opinion, what are the environmental issues and problems affecting the patients?	<p>Lack of cleanliness of the environment, easy access to amenities, independence in using spaces, lack of definition for collective spaces suitable for interaction with companions and others, lack of private space and privacy (sound and visual) especially regarding the doctor and patient relationship, inattention and impatience of the staff and the depressing atmosphere, absence of a quiet, clean, and open space, lack of comfort facilities for the patient in the room (e.g., absence of greenhouse and green glass boxes, non-decorative equipment, table, and chair for writing and reading), lack of light or intense and annoying direct light, windows without opening, fixed curtains without the possibility of changing, extremely high or short ceiling with white color, inattention to the entrance and traffic route, ignoring semantic and cultural subjective issues, the corridors and roofs with no design for hospitalized patients, and th dimensions of space unmatched to the number of the users.</p>	<p>P 12: "The problems that most patients have and complain about are the cleanliness of the environment, easy access to amenities and light, and independence in using spaces and the right dimensions of the space, impossibility of interacting with others and companions, and lack of privacy and privacy. Lack of individual space (audio and visual), especially in communication with the doctor and expressing problems and explanations; the indifference and impatience of the staff and the depressing atmosphere that makes it difficult to tolerate the atmosphere and difficult to interact with the patient".</p> <p>P7: "Some patients consider themselves as prisoners who don't even have a cellmate".</p> <p>P 15 and 4: "The presence of the disease and the treatment environment is scary and stressful for the patient, which unconsciously increases the stress and anxiety and heart rate due to exposure to the space".</p> <p>P 2: "The environment in the treatment spaces is completely weak, and the patient avoids it".</p> <p>P 1: "(facing wall or ceiling) lack of design of the main partitions exposed to the patient's view."</p> <p>P 3: A patient is facing the challenge of his disease, the environment s/he is placed in should reduce his/her stress and worry caused by space and the furniture, and the patient's focus should be on his treatment".</p> <p>P 16 and 2: "A patient admitted to the ward is unaware of the presence of many issues and problems, but the presence of those issues and problems can affect his unconsciousness."</p>
In your opinion, what are the relationships among the environment of the treatment spaces, the spiritual and semantic components, and the patients' treatment?	<p>Having a comfortable environment with proper lighting, natural ventilation and appropriate color and decoration, easy access to services, water features design, inner green space, area for resting, and exchange of information; there is a deep connection between the environment and the patients' soul.</p>	<p>P 12: Environment has a significant effect on the treatment of the patient. A good, warm, and comfortable environment, with sufficient light and ventilation, reduces the patient's anxiety and stress and then the patient can focus on the treatment process; the improvement of the working environment causes concentration and comfort of staff and improves concentration and attention to the treatment process".</p> <p>P 5: "... delirium and depression can be reduced after treatment with the effect of the environment and the patient feels better"...</p> <p>P 7: "... the environment and its components affect the treatment process of patients and reduce their recovery time"...</p> <p>P 4: "The environment with meaningful components soothes the soul and mind; when the mind is calm, the patient is ready to receive treatment and the treatment can be persued until full recovery".</p> <p>P3: "There is a significant correlation between the comprehensive treatment of the patient and his quick return to the life cycle with the treatment environment architecture."</p>

Table 2. Continued

Questions	Overall Result	Statements of the Participants
In your opinion, how and by what criteria can the changes in architectural spaces and improvement of the environmental quality affect the recovery of patients and human psycho-physiological responses and return to the human life cycle and facilitate the treatment?	Special services for each room, providing sufficient light, the dimensions of the windows are suitable for and matched to the dimensions of the space, the dimensions and size of the furniture, the correct arrangement, communal spaces for each green section along with the presence of water, a space for patients to sit for more communication. Compliance with fire safety requirements, environmental hygiene, proper and natural ventilation, convenient and quick access to the nursing station, and installation of devices in the form of built-in walls, ceilings and floors to induce mental and psychological security and visual beauty, design of hotel spaces, panels with the themes of disease and treatment for patients, removing noise pollution and replacing it with pleasant and gentle sounds, a roof with beautiful views, an aquarium, audio and visual privacy, using vivid colors in spaces, walking even with a wheelchair or patient's bed, temporary hobbies and positive entertainment, creating happy moments by designing attractive and lively spaces, strengthening the patient's spirit and improving self-esteem.	<p>P 1: " spaces dedicated for different functions lead to better disease control and patients' behavior and accelerate the treatment process".</p> <p>P 14 and 2: "Paying attention to the quality of hoteling of the patient soothes his soul, improves the quality of attendance and reception, and improves recovery".</p> <p>P 8: "...the environments must be fully responsive to all needs of the patients; temporary users of the spaces must have the chance to spend their best moments during this period, by promoting a sense of satisfaction, mutual relationships, a sense of freshness and vitality, and self-confidence..."</p> <p>P 7: " a complete space for life (a sense of place, culture and identity).</p> <p>P 5: "We will bring the ideal environment to him to experience the least pain and stress and he should not worry about the treatment process or its results".</p> <p>P 3: "Strengthening the morale of patients, reducing their stress, and increasing their satisfaction will control the anxiety and relieve the patients."</p>
In order to increase the work efficiency of you and your colleagues, what do you expect from therapeutic environment as a doctor and user of it ?	Compliance with international standards in the design of spaces; Suitable dimensions, ideal ventilation, respect for hierarchy, designing of front spaces, creating a safe and individual environment with sound and visual privacy and belonging, internal buffet, rooms with balconies facing the tree-lined hospital grounds. Small glass greenhouses if water is possible, wide and all-round balconies for better interaction and renewal, using appropriate design for walls and furniture for individuals' relaxation, "Wide and short corridors, a sense of place in space using paintings, attractive colors, and furniture for encouraging the studying, thinking and relaxing; fountains installed in staff rest space, positive and happy atmosphere, using energizing colors in the spaces, creating a lively and interactive atmosphere to communicate with other colleagues away from stresses. A sense of peace and security in users.	<p>P 11: "Providing every individual with all items of an ideal environment similar to those found in a home, so that s/ he won't need to return home to perform activities such as taking a shower during work and providing relaxation. The possibility of meeting with family increases the quality of work."</p> <p>P 10: "In the environment that has the sense of home comfort as well as the security and comfort of a hotel for the user to take care of his work".</p> <p>P 7: "A rich space, a space where you can rest and have new energy to continue your activities."</p>
As a doctor, what environmental qualities and requirements do you think the inpatient spaces of your workplace should have in order to improve the treatment process?	The existence of a green space with beautiful features, furniture, and layout in a green, spacious, and cheerful space for patients and staff separately, inpatient spaces with high potential for all patients and not just VIP rooms, the rooms' sizes in proportion to the number of patients, special attention to the privacy of patients, strengthening the self-confidence, sense of independence, and security of the patients in the space and improving the treatment process; beautiful panels in the rooms, special buffet for each department, sound privacy; short, wide, and bright corridors, happy environments, applying principles of environmental psychology to all spaces, using color tones, wide and glass balconies as greenhouses and rest areas, using patterned antibacterial floors. The design of green atriums like heaven, rooms like dreams, the patterned designs for walls, panels and suitable furniture, the presence of separate public spaces in each section such as the dining room, the library, and the hall for watching TV and socializing.	<p>P 3: "According to my activity in Grade I Hospital, most environmental issues are observed to some extent, but not in an efficient and complete manner".</p> <p>P 2: "...patients in hospitals with well-designed and thought-out environments experience more well-being, vitality, and shorter treatment process. And they express a higher sense of satisfaction" ...</p> <p>P 13: "The mental and spiritual needs of individuals should be considered and the environments should be enriched. ... Sunlight is life-giving"...</p> <p>P 3: "Combined natural and artificial light to improve the function of rest and relaxation of the patient, design of all rooms (i.e., the walls, floors, and ceilings) to improve the sense of the vitality of the patients."</p>

P, Participant.

making careful arrangement, considering communal spaces for each green section with the presence of water as well as places for patient to sit and socialize, enforcing the compliance with fire safety and height requirements, adopting correct dimensions and size, providing environmental hygiene, proper and natural ventilation, providing easy and quick access to the nursing station, installing the required devices in the form of built-in walls, ceilings and floors to induce mental and psychological security and visual beauty, designing the hotel spaces and signs using the themes of disease and treatment, removing noise pollution and replacing it with soft pleasant sounds, installing the required devices inside the walls, ceilings and floors to induce mental and psychological security as well as visual beauty, designing hotel-like spaces and boards with the themes of illness and treatment, designing eye-catching ceilings, using aquariums, ensuring the sound and visual privacy, using vivid colors such as lilac, pistachio and purple instead of white alone for the spaces, encouraging the patient to walk around or use a wheelchair and patient's bed, pursuing temporary hobbies and positive entertainment, creating happy moments by designing attractive and lively spaces, strengthening the patient's spirit, and improving self-esteem. According to the participants, the given criteria may have further facilitated the treatment of the patients and their return of to the human life cycle.

The participants in the interview believed in the existence of a mutual relationship between the environment of the treatment spaces and the spiritual and semantic components and the treatment of the patients. Regarding the criteria achievable by changing the architectural spaces and improving the quality of the environment, moreover, they suggested the following: creating special services for each room, providing sufficient light and proper dimensions for the windows in accordance with the space dimensions and their flexibility, selecting appropriate color and size for the furniture, making proper arrangement, providing communal spaces for each green section with the presence of water, providing the patients with spaces to sit and communicate, enforcing compliance with fire safety and height requirements, using proper dimensions and size, providing environmental hygiene, proper and natural ventilation, as well as easy and quick access to the nursing station.

During the interviews with the treatment staff regarding their expectations as doctors and users of the treatment environment about its space to increase work efficiency in treatment centers, the participants suggested the following: enforcing the compliance with international standards when designing the spaces, using suitable sizes, suitable lighting, ideal ventilation, and appropriate furniture, respecting the hierarchy, using design for front spaces, creating a safe and individual environment with sound and visual privacy, internal buffet, rooms with balconies facing the tree-lined hospital grounds, small glass greenhouses

(if water is possible), and wide and all-round balconies for better interaction and renewal, considering appropriate height and dimensions for the station, designing a small greenhouse in the space for sitting, selecting appropriate wall design and furniture for individuals' relaxation, building wide and short corridors, creating a sense of place and space using panels and colors, and furniture suitable for the culture, creating a green and peaceful atmosphere for studying, thinking, and relaxing, selecting bright color for the environment and furniture, using appropriate and abundant flower pots, gardens, shrubs, and fountains in staff rest space, creating positive and happy atmosphere, using energizing colors in the spaces, creating a lively and interactive atmosphere away from the stress for the staff to socialize with other colleagues. The staff also argued that a sense of peace and security among users may have increased work efficiency.

In response to the question about the requirements of inpatient workplace spaces in terms of environmental quality to improve the treatment process, the interviewees discussed the following: building a green public space with beautiful features and furniture as well as a green, spacious, and cheerful space for patients and staff separately, building inpatient spaces with the best and most facilities for all patients (and not VIP rooms alone), determining sufficient sizes for the rooms proportional to the number of patients, paying special attention to the privacy of the patients (e.g., voice privacy), strengthening the self-confidence of the patients, strengthening the sense of independence and security in the space and improving the treatment process, building beautiful panels and special buffet for in the rooms and departments, building short, wide, and bright corridors, creating happy environments, applying the principles of environmental psychology to all spaces, using color tones, wide, and glass balconies as greenhouses and resting areas, using patterned antibacterial floors, designing green paradise-like atriums and like-dream rooms, building walls with patterns, building suitable panels and furniture, and creating separate public spaces in each ward (e.g., dining room, library, and the hall for watching TV and socialization).

Based on the responses to eight questions from interview package, 22 main themes were classified adopting the content analysis method, the results of which are shown in Table 3.

As can be seen from Table 3, in order of the questions about the impact of the environment on the patient (3 themes including indirect impact, completely imperceptible impact and impact on the inner and psychological sense of the person), the impact of the environment on controlling the length of treatment (3 themes including reducing stress the patient, positive distraction and increasing the patient's self-confidence), the effect of the environment on blood pressure control (2 themes including stress control and inducing relaxation to patients), the mental nature of the impact of diseases (3 themes including the effect of

Table 3. Responses to Closed-ended Questions From the Interview With Participants to Achieve an Acceptable Qualitative Model for Evaluating the Treatment Effects

Questions	Themes	Statements
The impact of the environment on the patients	1- Indirect impact	P9: "... so the type of environment, the users of the environment, and the type of encounters and interactions can affect our process positively or negatively..." P8: "... the treatment spaces in hospitals should have both short-term and long-term features for special users with the two dominant features of the patient and staff, but it requires more detail and difficulty..."
	2- Completely imperceptible effect	P7: "When the patients enters a comfortable and colorful place with a window, refrigerator, service, and air conditioner, s/he gets happy, his/her stress and fear reduce, and s/he finds the treatment easy".
	3- The effect on a individual's inner and psychological sense	P5: "... the environment and anything surrounding humans affect the his senses of fear, power, self-confidence, loneliness, comfort, security, insecurity, crowding, and solitude, and induce ambiguity, excitement, and... directly and/or indirectly.
The effusiveness of the environment in controlling treatment duration	1- Reducing patient stress and self-confidence	P4: "The environment can minimize the stress caused by the space and conditions and, therefore, the patient can completely focus on her/his illness".
	2- Create a positive distraction	P2: "...the treatment staff with a high workload should have time to rest for refreshment. They should rest in rich environments..."
	3- Increasing the patient's self-confidence	P1: "...I firmly confirm the 50% impact of the environment on the treatment process..."
The effect of the environment on blood pressure control	1- Stress control	P8: "It is not a medicine... but it can control the causes of blood pressure by controlling stress and creating security as if it eliminates one of the contributing factors. It cannot eliminate the physical factors of the patient, but it can eliminate the mental factors. You can destroy and even play a positive role".
	2- Inducing relaxation to patients	P4: "If the environment does not meet the user's needs, and the user become anxious and worried".
What do you think about the statement "most diseases are either mental or affected by the mind?"	1- The effect of the mind power on the functioning of different body systems	P7: "Or better to say, whatever comes to mind can affect our performance. Therefore, over time, stress, worries, sorrows and emotions affect the functioning of body organs and cause them damage." P 6: "Stress has a direct relationship with the development of disease and has an inverse relationship with the treatment of the patient".
	2- The effect of the mind on individuals' lifespan	P6: "This theory is more psychological, and I completely agree with it". P8: "most diseases are affected by the weak and sick spirit and mind, which have caused physical damage to individuals in the long term"...
	3- The two-way effect of the mind on the disease	P11: "If this part of the mind and psyche of the disease can be controlled with the help of the environment and interactions, the patient will accept his treatment with more confidence and will have more effective and accurate treatment".
Do you believe in the influence of the environment and social relations on vital signs such as blood pressure, heart rate and the dosage of drugs taken for controlling stress?	1- Reducing patients' stress	P2: "...the calm and comfortable environment causes the doctor to explain more to them and convince them of the treatment process, which in turn reduces the stress of the patients and, therefore, they feel more relaxed and have a proper sleep process. As the result, the patient's blood pressure is controlled and they'll have rapid recovery." P14: "...with the help of the environment and its optimal design, the causative factors can be reduced and controlled to some extent if not successfully treated...."
	2- Increasing trust in the treatment process	P3: "Spiritual and psychological security and meeting the patient's needs as well as a lively environment will keep him/her calm and help him/her sleep well; his/her trust in the treatment process will control his/her stress and reduce his/her heart rate".
	3- Feeling of peace and well-being	P2: "...by instilling security, self-confidence, strength, and trust in treatment, the patient will have a greater sense of peace and well-being..."
	4- Lowering the patient's blood pressure	P4: "...optimizing the environment based on semantic and social components such as creating environments with flowers and plants and water flow for social exchange and positive distraction can have a positive effect on controlling stress and reducing the patient's heart rate and blood pressure and finally on have the dosage of medicine..."

Table 3. Continued

Questions	Themes	Statements
In your opinion, to what extent the conceptual model of supportive treatment environments can be comprehensive and acceptable in rewriting hospital design protocols in Iran? To what extent can the culture of each region be effective?	1- Compliance with international laws and standards	P5: "The environment and its effects are currently the focus of clinical governance and hospital scoring. Culture has been dominantly interest in all regions of the Islamic country and attention to its items has been given an especial importance. Always the minimum of environment has been kept in mind. The sense of place and attention to the patients' moods have not come into focus. P17: "...there is an urgent need for updating design standards based on global standards..." P4: "... competitions are held annually to determine the best hospital in terms of environmental quality (healing space) in America,..."
	2- Emphasis on the privacy and Islamic nature of the spaces	P3: "The culture and atmosphere of each region is an integral part of the designs and individuals' needs, which should be considered in the designs". P2: "...in neighboring countries such as Baku and Turkey, the design of treatment spaces are extremely eye-catching and the treatment spaces are more like 5-star hotels, while in Iran they are very cold and dry. Therefore, they need a fundamental revision and in my opinion, it can be acceptable to start changes..."
In which wards of the hospital should the care treatment model be used? Why?	1- For both groups of conscious and non-conscious patients	P7: "In wards with conscious patients, this model significantly affects the patients and their stress caused by treatment, as well as on the patients' companions and the performance of the employees, keeping them calm and increasing work efficiency; however, ICU with unconscious patients, in addition to affecting the unconsciousness of the patient, affects the performance of employees and companions, causing better performance as a result of better and faster treatment efficiency".
	2- All inpatient, diagnostic, and treatment departments	P10: "It can be used in all inpatient, diagnostic and treatment departments. Because all these spaces have human users, and as a patient or user of the environment, humans need environmental peace (treatment or work)." P12: "...it is important that each hospital ward comply with the principles of environment design, so that the users do not feel imprisoned and trapped... and they accept the treatment process with less stress".
His opinion on "a completely mechanical attitude towards man in the modern period, which considers the treatment of disease to be the replacement and repair of diseased and damaged human parts"; According to the fact that man is a perceptive, motivational and behavioral phenomenon, please suggest?	1- The effect of physical illness on the human soul	P4: "... human is a beautiful and social being, and his needs are not limited to physical needs. Therefore, the damage caused by the treatment can be controlled based on his spiritual and social needs. By creating familiar environments and positive distraction, his positive attitude can improve the treatment process.
	2- Considering human beings with all their physical and mental characteristics	P3: "... human being is not a mechanical device whose pieces can be repaired or replaced; therefore, we must also consider the inevitable separation of the patient at every stage of his treatment, that is, his mind and soul should be provided with complete and comprehensive treatment without causing him mental injuries..." P18: "... human has physical as well as spiritual dimensions. His spiritual dimension greatly affects his physical dimension..."
	3- Help to elevate the human spirit and control stress	P11: "...so you can't consider a human being only as a body. This attitude is completely incorrect. The needs of an individual are beyond his/her physiological needs ..."

mind power on the functioning of different body systems, the effect of the mind on a person's life span, the two-way effect of the mind on the disease), the effect of the environment and social relations on vital signs (4 themes including reducing the stress of patients, increasing trust in the treatment process, feeling calm and well-being, and reducing the patient's blood pressure), comprehensiveness and acceptability (2 main themes including alignment with international laws and standards and emphasis on the privacy and Islamic nature of spaces), the place of using Yar treatment model (including 2 main themes of conscious and unconscious patients and all inpatient, diagnostic and treatment departments (and a completely mechanical attitude towards man in the modern period) including 3 main themes of the impact of physical illness on the human soul, considering man with all the characteristics of physics It was one and spiritual and psychological and helping to elevate the human spirit and control stress).

Discussion

This qualitative study investigated the impact of the architecture of supportive care environments in hospitals on treatment process based on experts' interviews. Most of the interviewees confirmed the architectural effect of a supportive care environment in hospitals and argued that taking corrective measures in the field of architecture associated with light, sound, ventilation, respecting the privacy of patients, effectively engineering hospital spaces, using space green and backyards and balconies in the hospital, improving the hotel status of hospitals and designing special collective spaces for resting and exchanging opinions were considered necessary in hospitals. Also, they emphasized promoting the culture of using a supportive care environment with an evidence-based engineering approach.

This study showed that the healing environment significantly affected the duration of the treatment process and time of return to the life cycle. The patients experienced less presence in the treatment environment with a greater sense of calmness and security. They also felt less stress and delirium after treatment. Therefore, this study approved "the existence of the relationship between architecture and treatment process" since the proposed model was able to meet the needs of treatment and mental health, improve patients' health, and reduce medical errors.

The results of the interviews have been classified in a conceptual model of supportive therapy environment with physical, semantic and mental components, behavioral and social environment. This conceptual model of supportive therapy is presented in Figure 2.

The results of this study were in line with those from the study by Mahlbani and Saleh Ahangar exploring the effects of color on the design of the inpatient hospital wards, which found that the correct use of colors in

different wards of the treatment center, including the inpatient ward of hospitals, was an extremely significant factor contributing to the process of patients' recovery (24). Furthermore, Mirzaei and Movahed in their study on the effect of the medical building color on the reduction of stress and length of patient treatment in Kausar hospital in Shiraz determined that color had a significant effect on the health of the human psyche. According to them, using appropriate colors and forms in different parts of the treatment center was a main factor contributing to the patient's recovery process. Our study results were consistent with the findings from the above-mentioned studies; taking into account the method of the article, however, they were inconsistent regarding the details (25).

Devlin and Arneill showed that the perceived quality of care and the treatment services by the patient had a close relationship with the level of empathy, warmth, and friendliness of the environment in which the patient stayed. Our study results were different from the results of the above study in terms of the adopted method, but the general conclusions of the studies were similar (26).

Malkin examined the characteristics of the healing environment and reported that ambient air quality, thermal comfort, noise control, solitude, light, nature view, visual peace for very sick individuals, visual stimulus for those in a quiet recovery period, access to nature, positive entertainment, access to social support, the right to choose (control), removal of stressful factors in the environment such as noise and bright lights, as well as inadequate air quality were the characteristics of healing environments, which was consistent with our study result (27).

The results of studies in the architecture of hospital spaces in Singapore highlighted the importance of

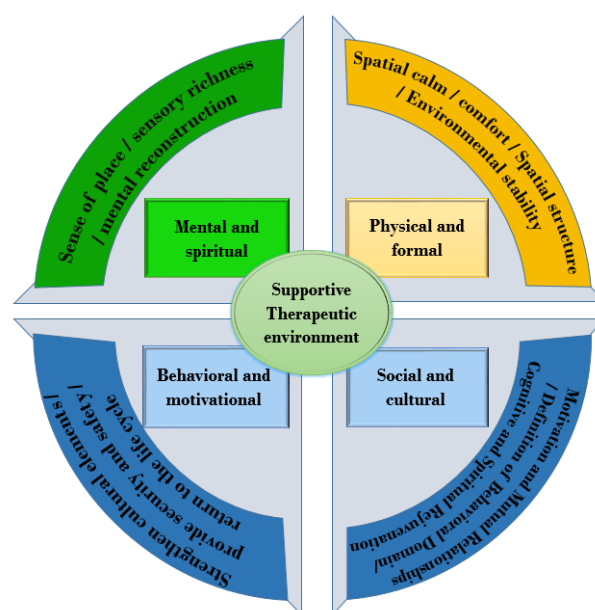


Figure 2. Summary of the Results From Interviews Based on Four Main Components of the Environment.

receiving natural light and staying in green spaces. For example, the rooms in Ji Teng Fong and Jurong Hospitals in Singapore, with the largest number of biophilic patterns, were found to be the high quality and healing rooms. Each person, while having a private space, has a window facing the green balcony of the room, which makes all patients receive the same view and natural light, and the patients are able to control the light and lighting in a personal way without disturbing others. The results of these studies were in agreement with our findings in terms of receiving natural light. In our study, however, the emphasis was mainly placed on maintaining confidentiality and preserving Islamic values in hospital rooms, which was contradictory to their study result (28-30).

Some studies conducted in Astra Sweden Hospital, Khu Tek Puat Singapore, Del Austin Children's Hospital in Texas, and Royal Melbourne in Australia showed that the biophilic design patterns in each hospital were created by adopting strategies that fitted the conditions and location of the project; the appropriateness of the project's spatial and temporal requirements was in line with our findings and the opinions of our study participants (31-34).

Zare et al concluded that interaction with nature affects many health indicators, reduces the duration of treatment, and has many benefits on health. Stress reduction and focus recovery theories are the most important theories justifying these results. These theories explain that in connection with nature, humans unconsciously experience a reduction in stress and anxiety, as well as an increase in concentration and cognitive performance. These results were consistent with the findings and emphasized by the participants in our study (35).

Saghaei et al highlighted the importance of creating the healing environments in the hemodialysis wards of Abu Ali Sina, Namazi and Shahid Faqihi hospitals in Shiraz. They reported that creating a healing environment may have reduced stress, anxiety, and depression in patients and increased the patient's enjoyment of the therapeutic space in which they inevitably had to stay. Their findings were in agreement with our study findings in this regard (36).

Motalebi and Vojdanzadeh demonstrated that the changes made in the environment significantly increased the perceptive or intuitive quality that was the result of the individual's experience and existence in the environment. The changes made in the environment provided a suitable and responsive environment for users and, more importantly, reduced the patients' stress. Their study results were inconsistent with our findings regarding the examination of the response rate which was not investigated in our study (37).

Conclusions

Taking into account the opinions of experts, doctors, and architects as well as the comprehensive data from the theoretical foundations of the research, it was confirmed

that the optimal supportive care environment accelerated the recovery and treatment of patients. In other words, the optimal supportive care environment, with the help of positive distraction, may have facilitated stress control, patient relaxation, and acceptance of the treatment process. It was found that it may have contributed to reducing the heart rate, controlling blood pressure, and reducing delirium and depression during and after treatment by affecting the physiological factors. Furthermore, Therefore, it is expected that according to the results of qualitative research in treatment departments, the quality of treatment can be improved, so hospital heads can use the concepts of supportive treatment environment in designing and renovating hospital spaces. Therefore, it was recommended that the hospital heads should adopt the optimal supportive treatment environment concepts when designing and renovating hospital spaces.

Limitations

This study faced some limitation. First, selection of architectural and medical experts active in this field was a difficult procedure which negatively affected our study. Second, the attempt to control the interview process and address some issues caused some other issues which were not addressed in our study.

Suggestions

Due to the qualitative nature of this research, therefore, it needs quantitative researches with the approaches of environmental impact in the process of treatment and recovery of the patient, so that they can complement the design of therapeutic spaces in Iran along with the qualitative results of the treatment environment. As a rule, future research with a quantitative method about therapeutic environments and the effective psychological effects of designed environments on users can solve the gap in this research.

Authors' Contribution

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Conflict of Interests

None.

Ethical Issues

Not applicable.

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