Architectural Variety of Hospitals in Relation to Feedback Effects of Health-Care Centers on Human Emotions

Sania Sami and Mohammad R. Daroudi

Abstract—As one of requirements of human life is health and hygiene, so, some places should be forecasted for these affairs to being true. Hygiene and health will be divided to physical and mental branches which researcher’s states that if mental health is provided, physical health can be easily available and finally, human can easily take his course during treatment which obtain healthy life. It finally causes creating great works and massive movements in human life. One characteristics of a good medicinal center is easy and rapid access, so that patients can have access to these centers with minimum time.

Doing studies and data collection and information evaluation is of the basics of designing and requires a full research design. The present study is to provide a comprehensive cognitive understanding of all those involved in architectural design for hospital building and patients. Besides, studying and collecting all available written and verbal references, principles and optimized guidelines of designing an efficient hospital were extracted in order to meet medicinal and psychological needs of patients.

Index Terms—Form; Health-care; Human Emotion; Patient; Space.

I. INTRODUCTION

Medicinal spaces are the most important urban spaces which have the important role in improving health of society. As patient, physicians and other staff of medical complexes have different hierarchy of needs, hospital space should be able to meet all needs including physical, mental and spiritual; but unfortunately in recent century with inattention to different dimensions of human beings, only physical dimension is considered in designing medicinal spaces and inattention to human spirit and issues like mental safety and belonging to place of users, result in creating full of stress, depression and worry. Modern hospitals with emphasis on diagnosis and treatment with little attention to destructive effects these environment cause on physical and mental health of patient, are often crowded, noisy, frightening, confusing and unacceptable. Many studies show that stress, anxiety, depression and losing control are extremely destructive for health and healing [1].

Hospital is one of the most important organizations offering health-healing services which play a basic role in recovering physical and mental health of patients in society. Unfortunately, there’s no long experience for making hospitals and what we see is an imitation from what has been made in advanced countries in the world. Considering buildings in context of life cycle and showing them as a part of ecosystem or ecological metabolism show that buildings have direct relation with health. Understanding this issue that building is determinant factor in health of human and world, shows that building which is healthy in its life cycle is a key toward a healthy planet [23].

It should be considered that in public’s view, hospitals are considered as environments with boring spaces and this issue for those which should be hospitalized for their treatment is a painful internal factor. So, physical environment of hospitals should be designed in a manner that while enjoying spatial and environmental quality, can provide relative mental and spiritual relaxation. Architecture as a field of study which define spatial and environmental quality for us is able to have an idea by correct approach to the issue and considering conditions of user and perform it in a suitable design [5].

Each hospital is a complicated and diverse complex of needs, conflicts, equipment and facilities. If we consider attention to beauty and psychological issues in architecture designing along with efficiency, stability and economy as essentials in process of creating architectural works, its position will be so important, particularly, in designing heath spaces. Regarding the importance of this issue in research, it’s attempted that by considering principles and form approaches in designing medicinal spaces as an effective factor in spirit and heath of people, there should be a step towards improving public heath of country and sustainable architecture [24].

II. RESEARCH FRAMEWORK

Statement of the problem: as treatment and medicinal places is an important and practical issue, designing and constructing these places should be considered. In hospital which is one of these places, simultaneously with idea and creativity in space designing, performances and relations between spaces and medicinal areas should be regarded, so that a space with relaxation will be created for patients’ movement. One of factors which will be clearly seen in these places is the necessity of continuity.

One of points which nowadays will be considered is the form of medicinal places. Today, People believe that medicinal places should be in right corner cube form, so that they have useful performance. Because it was based on the assumption that the cube-shaped rooms and corridors are directly from best practice in relation to hospitals, and consequently cause the skeleton of hospital will be built

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S. Sami is with Azad university of Qeshm Island, Qeshm island, Iran.

(e-mail: sania_sami@yahoo.co.uk)

M. R. Daroudi is with Azad university, Science and Research Branch-Tehran, Tehran, Iran
roughly and quite repetitive, while this hypothesis is debatable that form of medicinal places is effective on spirit of patients, it can be mentioned that all parts of a medicinal place isn’t of a functional model, and the other point is that the structural body of each building can be hidden beneath it and would be of more beneficial use by having a completely different form.

Importance and necessity of research: clearly, there are many differences ideas about this issue, because a medicinal place is one of the most important man-made structures. Some believe that a medicinal place whether big or small should be recognized by its face because one of recognition’s codes of a good medicinal place, beside its performance, is its forms and elevations. But the most important point which is considered is mental issue of patients in these places. Nowadays, it’s proven in medical science that spirit of patients has considerable impact in improving them.

III. HISTORY OF RESEARCH

Many various researches are made in relation to effect of medicinal environments on physical and mental health of human. For example, Hassan pour and et al (2011) studied role of architecture in improving safety and work health of staffs. The findings of this research showed that attention to guidelines like quality of interior air, correct selection of materials and resources, using natural light in interior, access to nature and creating spatial qualities like silence, control over the environment, visual privacy and creating different aspects of physical, mental, social, cognitive and neurological comfort and reducing work damage by using efficient elevators for transporting patients and goods, decentralizing the medicinal provision such as bed warehouses, single-bed rooms use to reduce the displacement of patients and reduce noise and ergonomics in designing and furniture which is regularly used by staff and so on, are effective in improving safety and health of work environment for staff of these centers. Shamgholi and et al (2011) considered the necessity of attention to sustainable architecture while intruding green architecture as a modern approach in designing medicinal centers and found that observing principles of green architecture in hospitals beside its sustainability aspect, plays an important role in improving medicinal quality of patients. Boonda and Soosnavchik (2006) concluded that green hospitals spend less energy, show better performance in patients’ treatment and reduce hospitalization time. Also, the quality of interior environment of these centers has considerable impact in attracting patients [5].

Specific goals of research: in field of desired goals in process of this project, it’s necessary to explain about intellectual goals of research:

- Achieving to optimized forms in interior and exterior spaces of hospital in meeting functional needs of hospital
- Dealing with sociology of patients and also available social environment for achieving optimized and efficient form for meeting medicinal and psychological needs of patients.

Research method: present research is a combined qualitative-quantitative one from research nature’s viewpoint which uses field studies and content analysis in two parts of qualitative studies and measurement method in part of studies and qualitative analyses.

The variables studied in this project are shell and exterior structure with best interior performance which will be provided in different form and providing complete and tangible relation inside the building, so that desirable performance of medicinal places will be examined.

Research is based on field and library studies from approach of data collection. In this research regarding extent of issue, it’s necessary to use different methods of data collection which include related books, informed people, electronic sites, thesis in this field.

The analysis of qualitative data is based on inductive (from component to total) and deductive (from total to component) method. Statistical methods are used for qualitative analysis.

IV. ENVIRONMENTAL PSYCHOLOGY

What differentiates environmental psychology from other branches of psychology is study of relation of behaviours based on human’s spirit and environment. So, attention of designers to psychological study of designed spaces is a permanent connection between environmental psychology and designing, to the extent that architects found the necessity of creating a common language between psychologist and them and attempted to create a new knowledge for making environment which is familiar with people better than before [6].

Knowledge of Environmental psychology like other academic disciplines include two theoretical and practical parts and in fact is following to detect dimensions which have been forgotten in general psychology. Dimensions like environmental, architectural, cultural and social conditions and also environmental symbolic dimensions of practical fields of this knowledge can be effectively served by designers and architects and final findings can play an important role in process of architectural designing [7].

One of centers which have high sensitivity for design is designing medicinal centers due to special conditions of patients from their physical, mental and spiritual conditions. Researchers have shown that medicinal centers and hospitals’ staffs are exposed to diseases more than staff of other departments. So, architecture of medicinal centres can play important role in improving health of work environment for employees of these centres [8].

Now, if we consider disease and need of medicinal services as an integral part of life, it’s natural that need of standard centers according to disease and needs of human is an essential component of human’s life. So, need of planning, equipping and developing these centers are necessarily felt. It should be noted that a hospital, clinic or advanced medicinal centres include a complicated and diverse set of needs, conflicts, equipment and facilities. If we fairly see, we’ll find that goal of creation of architecture isn’t only meeting physical needs but a sublimed goal which is to establish relation with deepest human emotions [2].
V. FORM

If the idea of the form in architecture is the most important component, design has direct impact on architectural form of volume and finally whole of the form. So, idea and form are the most prominent and effective part of architects’ works. On the other hand, we should focus our attention on new spaces which will be created. Functional patterns which transformed in the form of ecological patterns during history and this change and transformation can create important impact on designing or changing approach in design [9].

Forms have psychological effects and desired information that can be sent to patient by a specific form. Each form has its own mobility of that form. So, it should be selected to match the content of space. Rectangular forms suggest motion; instead, square form will inspire the focus. Also, irregular forms force patients to fantasy while simple and symmetrical forms suggest balance. On the other hand, concave form is inviting but convex one is repercussive. Finally, using familiar forms for patient helps them to build a second home for themselves from a new environment [10].

VI. DIFFERENT TYPES OF ORGANIZATIONS OF HOSPITAL BUILDING

1) Horizontal organization: this building type has advantages. There’s in no water pressure problem in this type of building which is seen in vertical buildings. Emergency exit, building development and movement of wheelchair are easily done among hospital’s yards. Time of building construction is low and also natural lighting will be provided. Also, it has minimum resistance to storms and harsh winds.

2) Vertical organization: construction and maintenance costs will be reduced in lieu of each square meter in each storey in comparison with horizontal method. The relation of employees with each other is easier and central core including elevator, stairways or ramps reduce the length of corridor so that circulation and movement of people is made without confusing and maintenance will be easily made and few personnel is needed for transferring patients, material and goods.

3) Round organization: construction cost is lower than other points, the rooms are closer to each other and also, to the center of building. But there are disadvantages in round-shaped buildings, for example, it’s not possible to create lighting and air conditioning in centre of building, less visual control will be made and there are problems in developing building and using construction materials [3].

VII. ANALYSIS OF SAMPLE OF HOSPITAL FORMS

Model 1, vertical volume on horizontal one: in this model, establishing proper communication between different parts in necessarily vertical form should be carefully considered. In this model, in order to maintain good communication between different sectors, devoting more stories should be avoided in hospital unless in special circumstances that the size of the hospital’s land is limited. For having suitable natural light in interior spaces, its vertical volume is designed in stretch form. This form for having considerable area for ground floor can meet humid climate conditions which there’s no possibility of making basement and support sectors can be considered in ground floor. For avoiding undesirable increase of length of corridors in this form, attention to separating interior spaces are of great importance [11].

Model 2, cube: this model can have more efficiency in limited and dense lands. But light of interior spaces will face serious problems due to compression of this form and more attention is needed in resolving internal communication. However, designing spaces without natural light is inevitable in this form. If central courtyard is predicted, problems of lighting and natural ventilation can be reduced. In case of combining this form with other geometrical forms, problem of lack of interior spaces can be resolved by predicting suitable dimensions for cube volume. However, designing cube volume is considered less by hospital designer due to lack of attraction of its form, impossibility of suitable design and performance for all parts [12].

Model 3, cylinder: this model isn’t much different from cube model in terms of performance; it can be used individually or in combination with other volumes. Providing parts related to ground floor causes lack of uniformity in its volume and its circular forms causes diverse views towards outside. One of problems facing this form is how to deal with functional needs of hospital which makes creating remote spaces inevitably. In case of large area of its stories, impossibility of suitable separation of each storey and determining location and designing vertical communication systems is one of those problems. If its dimension’s meet designing each part for each storey, circular designing is inevitable for all parts which result in impossibility suitable functional communication [25].
Model 4, H model: this model is common models in making hospital and many hospitals have been designed and built based on this form in 20th century. This model is considered in hospitals in which horizontal development is important and has many beds. Suitable separation of parts in each floor of the building, providing suitable internal communication, strength of its structure, possibility of natural ventilation and lighting of all interior spaces are distinctive features of this model. There’s possibility of future development of its parts for having more view. Main vertical communication is located in central wing of building so that there’s possibility of better communication of different parts. Regarding suitable position of vertical communication system in case of having bigger dimensions, there’s no need of predicting vertical communication system [13].

Model 5, U and L (U, L) design: These two models are also common hospital designs and many hospitals has been designed and built using this model in time. Adequate lighting and ability to internal design according to functionality and links of different units are some of the notable characteristics in this model. Other characteristics include the ability to divide emergency room from clinics while having links to diagnostic units, ground floor and physiotherapy department. In overall, these two models are similar in functionality and architecture. But vertical link system in U model is formed in joint wing, while in L model it is formed in joining part of 2 wings. In both designs, longest distance between link system and furthest point in each unit must be considered very carefully. These kinds of hospitals can be expanded according to the surrounding plains condition [14].

Model 6, #: This model can be counted as developed H Model and one of effective and innovative hospital designs. This design used when we need hospitals with vast number of beds in limited plain spaces. Using this design, in addition to extra foundation, central lighting problem is solved via central yard. Most significant benefit of this model is connection of lateral wings to central units that allows optimal planning of few units in the same floor. In some cases, it is possible to predict 4 units in each floor via 2 main and separated vertical link systems. This model is best suitable for massive hospital projects where distance and size of main wings is planned according to hospital design [15].

Model 7, +: this model is also one of the common hospital designs that its simple distinguished structure can make objectives of hospital to be possible functionally. Size and joining of wings, can be designed according to hospital plans and functional connections. Specifically, vertical link systems are placed in joint structure of wings or proximity of it so that there is adequate connection between different units. Central position and approximately equal distance between vertical link system and different units can meet big hospitals with huge number of beds needs. One of the significant characteristics of this model is having adequate natural lighting [16].

Model 8, line: in these cases, architecture will have difficulties in responding to internal needs and complicated solutions are needed, especially in units of ground floor. Extending hospitalizing units and therefore extending
personnel path in addition to inability of dividing units in the same floor are some of the problems that designer will have to face. This model can be curvy regarding its landscape and its beauty. This model definitely cannot meet big hospital needs [17].

Model 9, simple compound: hospital has different units with respective size and area according to their needs and functionality. Adequate space for area and size may not be accessible easily in all floors to meet hospital needs optimally. Therefore, hospital designers using this compound model of simple geometric masses will have lesser time reaching punctual functionality of units. But this model has potential to become an effective hospital design via form changing according to hospital’s function and creative design. Also because of high flexibility of the design, adequate lighting of internal design is possible. Vertical link system and providing optimal connection between all the hospital units is very important in this model. This model is best suited to open spaces and average hospital, especially educational centers. Also compound structure will allow further expansion [18].

Model 10, erratic compound: difference between erratic and simple compound model can be found in characteristics of plains and designer’s different view to hospital architecture. Careful considering of regional condition is suitable for all units of hospital and has led to this model. According to importance of regional condition, providing adequate natural lighting will not be a problem for designers. Although high flexibility of model will allow suitable design of all units, but the important point is providing optimal external connection and proper vertical link system that is very sensitive in this model. Ability to expand is one of the other features of this design [19].

Model 11, regular compound: In most cases, this model arises from considering function and geometry that providers face. This model is only suitable for big and educational hospitals with vast space and therefore, number of these hospitals is very limited. Some of the specific characteristics of this model include proper dividing of ground floor units and horizontal link of them, regular use of central yards according to overall combination of hospital, and adequate lighting in different places. Also symmetry design will add to visual beauty. Important point in this design is considering vertical link system that must be placed according to the ground and upper floor design and area of each floor. Consequently, this design can have more than one vertical link system. This model can be expanded further, but this must be considered in designing [26].

Model 12, Cluster Compound: This model is somehow the combination of several H models and historically used in big and educational hospital. In this model, one linear mass will link other masses that have approximate and orderly distance. This will lead to ease of access in branching units. Hospital functionality is considered in this model and adequate lighting in all internal spaces is possible. Although this model scales big hospitals, designing the building and choosing number of situations for several vertical link systems will not be a problem for designer. One of the features is ability of further expansion, especially in open spaces. But considering vertical and horizontal link is very important in expansion [22].
VIII. CONCLUSION

Nowadays, different kind of designs in space is derived from knowledge and awareness of architects more than their personal feelings and views. Designer’s awareness of knowledge that will directly or indirectly influence designing profession has allowed their structures to match needs and culture of consumers better and therefore designed spaces will provide necessary conditions to live peacefully and safely for humans.

One of the supplementing sciences of architecture is environmental psychology and awareness of architect in psychological necessities in designing especial spaces. Because there is no doubt human is under influence of his work or life environment. This will be more noticeable when human health is considered. In designing healthcare centers, in addition to providing physical spaces for different care units, an innovative design and spaces is needed so that patients can trust and accept care process that happens in appropriate hospital space. aesthetic and psychological prospects, are especially important in health-care centers that take care of refractory conditions, because this spaces must be designed in a way that promote the will to recover and prevent depression in these patients. It must be noted that combining these two parts is critical for any effective hospital. Combining principals and initiatives of functionality and patient’s psychology in designing a hospital will lead to better progress in recovery, increase of hospital efficiency, safety of patients and their satisfaction with hospital and its staff. Fortunately, there are efforts in proper designing and using appropriate models while opening new hospitals in recent years.

REFERENCES