



## Evaluation of Quality Components in Architectural Design of Healthcare Buildings

**Aysun Ferrah Güner**

*Ph.D., Assistant Professor of Architecture*

*Istanbul Medipol University, Department of Architecture*

*Kavacık Yerleşkesi, Kavacık Mah. Ekinciler Cad. No.19, 34810 Kavacık Kavşağı, Beykoz/İstanbul, Turkey*

*GSM: 0 535 390 50 01 - Ofis: 0 216 681 51 00*

*afguner@medipol.edu.tr*

### **ABSTRACT**

The design and construction of healthcare buildings are much more important and require a special organization, due to the fact that human life is in question.

The architectural design and understanding of quality in healthcare buildings have changed over time, while in the beginning the architectural quality was being taken in the same sense as structural security and functional efficiency, afterwards aesthetic and cultural values, physical and psychological needs have been added to these values. Nowadays, when healthcare buildings are transformed into wellness centres, it has become compulsory to design these buildings to provide a healing environment.

The purpose of this study is to improve the quality of healthcare buildings by evaluating the quality concept and its components in healthcare buildings in terms of patient-centred design, evidence-based design, healing architecture and to make recommendations for establishing healing healthcare institutions and to contribute to the works to be done in this regard.

**Keywords:** Healthcare buildings, quality, patient-centred design, evidence-based design, healing architecture.

### **INTRODUCTION**

The health concept, defined by World Health Organization as; "physical, mental and social well-being", is a complex fact influenced by human-specific needs (WHO).

The design and construction of healthcare buildings such as healthcare centres (family healthcare centres), hospitals, rehabilitation centres, which provide the realization of the healthcare services and of which the purposes are to provide good service to patients, make quick diagnosis, heal in the shortest time, provide a peaceful and comfortable environment for the patient, patient relatives and healthcare personnel, reduce costs; are much more important and require a special organization, due to the fact that human life is in question (Ergonomics in healthcare buildings, 2015).

The architectural design and understanding of quality in healthcare buildings have changed over time, while in the beginning the architectural quality was being taken in the same sense as structure security and functional efficiency, afterwards aesthetic and cultural values, physical and psychological needs have been added to these values. Nowadays, when healthcare buildings are transformed into wellness centres, it has become compulsory to design these buildings to provide a healing environment.

In this article, quality concept and its components in healthcare buildings will be evaluated in terms of healing architecture.



### **Quality concept in healthcare buildings**

The quality of the healthcare building which is an architectural product is its capacity to meet the expectations of the user, which means the patient, patient relatives and healthcare personnel. When mentioning the quality of healthcare buildings, it is necessary to take all the features of the building into consideration as well as the safety of structure (Güner, 2016).

A quality healthcare building should include the followings;

- *Design quality*: It is the design which is functionally working in healthcare buildings, with its measuring, spatial forms, position and orientation, meeting the spatial, physiological, ergonomic, aesthetic, psychological and social requirements of the user, that means the patient, patient relatives and healthcare personnel.
- *Construction quality*: It is the appropriate technology, material, etc. application quality of the design.
- *Providing environmental quality*: It is that the healthcare buildings are designed and constructed in such a way that they have suitable spatial features in terms of indoor air quality, heating, ventilation, lighting, and that they are safe and facilitated for access by everyone.
- *Compliance with the regulations and standards*: It is the compliance with all current regulations and standards related to design, construction, providing environmental quality, operational and patient care quality.
- *Management quality*: The execution without disruption of the healthcare provided in healthcare buildings depends on the form of management, applied policies, processes, organizational structure and quality of healthcare personnel.
- *Patient care quality*: It is that the processes and the quality of the practice planned for the care of the patient, the occupational knowledge of the healthcare personnel, the technological facilities, meeting the needs of the patient and patient relatives. The physical features of healthcare buildings also affect the quality of management and patient care.

A quality healthcare building should be a qualification to be given to the buildings where the features set out for each process are provided and documented by various records (Akdoğan, Hacıhasanoğlu, 2006)

In order to obtain a quality healthcare building or to operate an existing healthcare building in a quality way, it is recommended to apply the total quality management approach, which is an integrated management concept for continuously improving the quality of products and services with participation of everyone involved in the organization.

As a result of the progress in science and technology in the field of health in the whole world, examination, diagnosis and treatment methods and medical applications and devices used in these methods are constantly developing (Design Standards Guide for Healthcare Buildings in Turkey, 2010).

Healthcare buildings need to be designed and constructed in such a way to allow the use of these technological developments, to be where contemporary healthcare service is rendered, to entirely meet the needs of the user, that means patient, patient relatives and healthcare personnel, to be functionally working, to have suitable spatial features in terms of indoor air quality, heating, ventilation, lighting, with their measuring, spatial forms, position and orientation, to be safe and facilitated for access by everyone including handicapped and elderly users.

In this context, it is very important to adopt a patient-centred design approach, which means the design approach which prioritizes the patient and all their needs such as mental, physical, spiritual, etc. (Güner, 2016).



### **Patient-centred design**

According to the National Health Service (NHS) in the UK, healthcare buildings should be planned and designed to provide high quality services to patients and patient relatives. For example, patients and their relatives may be anxious, at this point the design of the space should help to calm and comfort the patient. In order to reduce the sterile and cold effects of healthcare buildings and to design, comfortable spaces instead, the concept of patient-centred design should be developed (Ergenoğlu, Aytuğ, 2007).

The features of the patient-centred design are determined as follows;

- Patient-centred design should be functional:

Healthcare building should be useful and efficient in terms of spatial organization and circulation. The design should reflect the appropriate space standards and include all the technical standards which need to be met such as material, accessories, visual, auditory, thermal and odour comfort conditions.

- Patient-centred design should be accessible:

Healthcare building and the environment should be accessible for everyone. The fact that pedestrian and handicapped transportation has been thought out and solved, solutions for parking areas for ambulance, public transport, service and fire vehicles have been produced, are the basic conditions for accessibility.

- Patient-centred design should help finding direction, path:

The fact that the plan scheme is legible, the markings are clearly visible and the marking system is hierarchical, the presence of an information advisory desk nearby entrance is major requirements for finding directions.

- Patient-centred design should provide social support:

Healthcare building should enable usage for social purposes. Areas such as religious spaces which will provide support to patients, and places that provide comfortable seating (including child care facilities) and meeting facilities for patients and their relatives should have been designed.

- Patient-centred design should authorize:

There should be design features in the healthcare building that will help the patient to make decisions. In order to make researches on diseases, there should be spaces such as libraries or spaces where patients and their relatives can communicate with healthcare personnel.

- Patient-centred design should provide privacy and autonomy:

The necessary privacy in patient rooms should be provided. Personalised spaces should be available, lighting and temperature can be controlled by the patient when required; options such as television and music which patients can use individually should be available. Furthermore options for child patients should also be presented.

- Patient-centred design should be aesthetic:

A design which creates a healing environment both indoors and outdoors aesthetically should be generated. To speed up the healing process; colour, texture, light, landscape and art objects, equipages, which bring out the spaciousness effect in spaces, should be located, and music should be used in appropriate places in the correct way. Natural landscape should be particularly preferred. In cases where this is not possible, the fact that nature is relocated to indoors in the forms of waterfalls, aquariums, plants, is an important feature of patient-centred design.

- Patient-centred design should be secure:

In the patient-centred design, a secure physical environment should be provided for the patient, patient relatives and healthcare personnel. The necessary precautions should be taken within the healthcare building, in consideration of possible infection, safety, theft, extortion incidents, fire, natural disasters, disasters and crisis scenarios.

### **Evaluation of case studies on the effects of healthcare buildings on patients and diseases**

Taking into account the effects of healthcare buildings on patient and disease, it is understood that the importance of these buildings in accelerating the healing process and



becoming the environments to support the patients both physically and spiritually is immensity.

Studies show that the design of space has effects on human health such as psychological anxiety, anger, depression, physiologically high blood pressure, weakness of the immune system and insomnia. For example, in intensive care units, exposure of patients to strong and uniform fluorescence light, monitor sounds, white or green walls, leads to sleep disorders, hallucinations, and in some cases, intensive care unit syndrome (ICU) caused by mild psychosis (Ergenoğlu, Aytuğ, 2007).

In a case study conducted with the aim of examining the architectural space quality of patient rooms in healthcare buildings, two private hospitals in Gaziantep, which are considered to have especially better physical conditions, that are preparing for accreditation, of which the surgical departments are working intensively and where use of single rooms are intensive, and user satisfaction has been evaluated.

Although the selected sample from the results of the case study conducted with a questionnaire showed a significant development with the service and physical space based on competition due to the fact that they were private hospitals, it was ascertained that there were problems in terms of architectural space quality. In terms of user satisfaction in patient rooms, the design criteria that should be taken into consideration in terms of architectural space quality are determined as function, aesthetics and security and the quality of care in patient rooms and factors affecting the healing have been presented.

In the context of these factors, physical and psycho-social needs in the patient's room are; the privacy, peace and quietness, the feeling of being watched in situations when help needed, cleanliness, security, being separated from other patients when necessary, friendship of other patients in situations when appropriate, factors that would encourage strolling outside the patient room, access to bathroom and shower, accurate and sufficient lighting, easy access to remote controls of bed and television, telephone, nurse call sign, an adequate and accessible space for personal belongings, the accommodation area for visitors, being able to see outside and aesthetic, pleasant environment (Ergenoğlu, Tanritanır, 2013).

All these needs can be met in different ways in rooms with various plan types and features in architectural design.

In another case study, the current situation of the comfort conditions for the interior space at healthcare centres has been tried to be presented in the direction of the user opinions. For this purpose, 10 healthcare centres with the most intensive use in Bursa were selected and 100 people consisting of patients all receiving healthcare service in each centre, a total of 1000 people were interviewed, user opinions related to the indoor temperature, thermal comfort, indoor air quality, natural ventilation, natural lighting have been evaluated.

As a result; when the evaluation was made in terms of thermal comfort and indoor temperature; it has been determined that 21% of the users felt discomfort from cold in winter, 20% from heat despite the winter season, and 34% from over-temperature in summer season.

The existing buildings where the questionnaire was carried out are heated by natural gas in the winter with the help of the central heating system. When the thermal comfort could not be provided, more than adequate fuel is consumed. For this reason, healthcare centres should be designed as original projects, as a healthcare building, and to be provided the necessary insulation. In general, there is an air conditioning in each doctor's room to avoid heat during summer. Energy consumption for purpose of thermal comfort



in healthcare buildings is a situation that should be considered separately for summer and winter times. Climatic data, orientation and energy efficient design parameters must absolutely be taken into account during planning.

When the indoor air quality is sufficient, it has positive effects on human health, while inadequate level it can lead to negative health problems in short and long term. It is possible to categorize the health problems caused by indoor air quality as biological and psychological effects. While the biological effects are sorted as; eye, nose, throat irritation, deep redness, itching, dryness, pain, inexplicable hypersensitivity, asthma and similar symptoms, changes in the senses of smell and taste; psychological effects can be sorted as; headache, dizziness, nausea, vomiting, mental fatigue, memory loss, and lack of concentration.

In the study, 44% of the users stated that indoor air quality was unfavourable and clean air was insufficient, 46% stated natural ventilation and 32% stated that natural lighting was insufficient. Small waiting areas and inspection rooms, which do not have neither natural nor mostly artificial ventilation, reduce the indoor user intensity and the amount and quality of breathing air. When the window sizes and layout plan are taken into consideration; it is very important to use technology products that will give the least harm to the environment when natural ventilation and lighting are not sufficient (Sezer, 2015).

### **Evidence-based design**

Nowadays, especially in the United States, the evidence-based design approach which is also certified by an organization called EDAC (Evidence Based Design) in a healthcare building that means the design approach which is based on the evidenced effects of the environment on the patient is on the agenda. For example, with the studies in the United States it has been evidenced that the patients are more quickly discharged and need less pain reliever when the patient rooms are designed in a way that all the patients are able to see the green landscape outside or that the use of artwork in healthcare buildings reduces blood pressure and pulse rate.

In this context, some design features which are seen as providing patient satisfaction in healthcare buildings and positively affecting healing of the patient are given below.

- **Patient rooms being single**

It has been determined that the use of single bed rooms, rather than a ward or two-person rooms, helps to protect the patient from hospital infections, provides patient privacy and allows the patient to sleep more comfortably, thereby contributes to the easier healing of the patient.

- **Sparing section for the family/companion in the patient rooms**

It has been observed that providing appropriate conditions for the patient companion and the visitors, allows the healthcare personnel to work more efficiently, reduces the fall rates of the patients, the design which puts the patient together with the family in more appropriate conditions, reduces the stress and depression seen on the patients.

- **Use of washbasins in the patient rooms**

It has been determined that the single rooms of which the usage is wide spreading and the fact that this situation allows healthcare personnel to wash their hands before touching the patient, helps to reduce infection.

- **Patient rooms having natural landscape**

It has been observed that the patients staying in rooms with natural landscape have less pain perception, less pain reliever is used, level of stress and depression reduces and the patients are discharged in shorter times.

- **Patient rooms receiving daylight**

The fact that the spaces receive daylight as much as possible is one of the major principles of both the "green" building as well as the people-oriented design. It has been determined that daylight reduces pain, stress and depression on patients, and that



patients staying in rooms receiving daylight could be discharged earlier. It has also been observed that the healthcare personnel working in spaces receiving daylight make less mistakes and this situation provides significant contributions in terms of both efficiency as well as motivation.

With the evidence-based design being wide spreading, these design principles, which we apply with habits in architectural design, can now be compared with the healing periods, pain and stress perception levels of the patients, and positive or negative effects can be evidenced (Towards People-Oriented Healthcare Buildings, 2017).

## CONCLUSION AND RECOMMENDATIONS

Standards for project; design, construction, maintenance and repair of the healthcare buildings which are to be constructed, renovated, reconditioned have been introduced in Design Standards Guide for Healthcare Buildings in Turkey, prepared by ministry of health, directorate of construction and repair and aiming to increase the quality of services by setting minimum design standards in healthcare buildings, by utilizing sources such as TSE (Turkish Standards Institute), AIA (American Institute of Architects), ADA (Americans with Disabilities Act), JCI (Joint Commission International), researches, publications and regulations and by carrying out workshops with architects, engineers, hospital operators, etc. working in the healthcare field (Design Standards Guide for Healthcare Buildings in Turkey, 2010).

In this guide prepared in 2010, some standards for example, for physical environmental conditions, ventilation, lighting, etc. have been specified. It will be possible to improve the quality of healthcare institutions and to create healing healthcare institutions with the implementation of patient-centred design, that means the design approach that prioritizes the patient and all their requirements such as mental, physical, spiritual, etc., and with the rearrangement of these standards by the consideration of the evidence-based design, that means the evidenced effects of the environment on the patient.

In terms of healing architecture or healing healthcare building, first of all, it is necessary to make the evidence-based researches in healthcare buildings with the support of the ministry of health and also universities and to use the findings in architectural design.

## REFERENCES

- Akdogan, R., Hacıhasanoglu, O. (2006). Kaliteli Bina Elde Edilmesine İlişkin Yönetmelik Yaklaşım Önerisi, *itudergisi/a architecture, planning, design*. Volume 5, Issue 1, pp:71
- Design Standards Guide for Healthcare Buildings in Turkey, (2010). Türkiye Sağlık Yapıları Asgari Tasarım Standartları 2010 Yılı Kılavuzu, T.C. Sağlık Bakanlığı İnşaat Ve Onarım Dairesi Başkanlığı., Sağlık Bakanlığı Issue 800, pp:1-5
- Ergenoglu, A. S., Aytug, A. (2007). Sağlık Kurumlarında Değişen Paradigmalar ve İyileştiren Hastane Kavramının Mimari Tasarım Açısından İrdelenmesi, *YTU Mim. Fak. E-journal*, Volume 2, Issue 1 pp:50-57
- Ergenoglu, A. S., Aytug, A. (2013). Genel Hastanelerde Kullanıcı Memnuniyeti açısından Hasta Odalarında Mimari Mekân Kalitesinin İrdelenmesi: Gaziantep İlinde Bir Alan Çalışması, *Megaron* 8(2), pp:61-63
- Ergonomics in healthcare buildings <http://www.slideshare.net/Intdes/salik-yapilarinda-ergonomi> (Access Date: 25.12.2015)
- Güner, A. F., (2016). Sağlık Yapılarında Kalite Kavramı, Sağlık Düşüncesi ve Tıp Kültürü Dergisi, Issue 39, pp:20-21
- Sezer, F., Ş. (2015). Sağlık Ocaklarında Konfor Koşullarının Değerlendirilmesi: Bursa/Nilüfer Örneği, *Çukurova Üniversitesi Mühendislik Mimarlık Fakültesi Dergisi* 28 (1), pp:205-206
- Towards People-Oriented Healthcare Buildings <http://www.ekoyapidergisi.org/973-insan-odakli-saglik-yapilarina-dogru.html> (Access Date: 20.9.2017)



WHO (World Health Organization) (1946). World Health Organization Official Records, International Health Conference, New York, No: 2, pp: 100