

Considerations in Design of Interior Environment of Outpatient Department in Hospitals

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ABSTRACT

The healthcare environments are complex buildings with a lot of contending space planning and design requirements. Study on hospital spaces has a crucial value, as this is immediately related to human health. Architects and interior designers have a vital role in designing hospital spaces, and healthcare facilities. While designing and planning hospitals' environments besides the scale, volume, shape, size, and light necessary, the architects and interior designers should also consider the particular requirements of the healthcare facilities. This designing or planning procedure can lead to create spaces in which users and patients have pleasant experiences. Recent researches have investigated vastly the concept of healing environment to improve patient's satisfaction in hospitals. However, a few studies have been done on Outpatient Departments of the hospitals. This study focuses on the quality of interior environment in Outpatient departments of the hospitals and thus contributes to the knowledge on how to design these facilities, with a high spatial quality. The purpose of this study is to investigate the space design requirements in design of the aforementioned spaces and to prepare a checklist for the interior designers and architects to be used as a guideline in designing of these departments. This design checklist has been prepared based on researches found through literature review as well as relevant international standards and guidelines for designing healthcare facilities. Furthermore, the study implemented the checklist as a tool for evaluation of the Outpatient Departments in the hospitals. For this purpose, the waiting area space in the outpatient department (policlinic) in Famagusta State Hospital in North Cyprus has been chosen as the case study. After evaluation of the related spaces and defining the problems related to the physical environment, the research proposed some

recommendations for improving it. It is strongly believed that this design checklist can be used as an important help and as a guideline for interior designers specially and architects to design hospital outpatient department accordingly.

Keywords: Hospital, Healthcare Facility, Outpatient Department OPD, Physical Environment, Quality of Interior Space, Patient.

ÖZ

Sağlık hizmeti sunan ortamlar, genellikle özel mekan planlaması ve tasarım gereksinimleri olan karmaşık yapılardır. Hastane alanlarında yapılan araştırmalar, insan sağlığıyla doğrudan ilgili olduğu için çok önemli bir değere sahiptir. Mimarlar ve iç mimarlar hastane mekanları ve sağlık tesislerini tasarlamada hayati öneme sahiptirler. Bu nedenle, bu tür mekanların tasarımında, mimarlar ve iç mimarlar, ölçek, hacim, form ve ışık gibi mimarı konularda karar verirken sağlık hizmetlerinin özel gereksinimlerini de göz önünde bulundurmaları zorundadırlar. Bu tasarım veya planlama süreci, binada kullanıcıların ve hastaların iyi hissettikleri mekanların yaratılması ile sonuçlanabilir. Son araştırmalarda, hastanede hasta memnuniyetini arttırmak için iyileştirici ortam kavramı geniş bir şekilde araştırılmaktadır. Ancak ayakta tedavi (Poliklinik) bölümünün tasarımı konusunda çok az bir çalışma bulunmaktadır. Bu çalışma Poliklinikte iç mekan kalitesine odaklanmış ve dolayısıyla bu tür mekanlarının yüksek mekânsal kalite ile tasarlanması konusundaki bilgi dar ağacına katkıda bulunmaktadır. Bu çalışmanın amacı söz konusu mekanlarda tasarım gereksinimlerini araştırmak ve İç mimarlar ve mimarlara, hastane poliklinik departmanının tasarımında rehber olarak kullanılmak üzere bir kontrol listesi hazırlamaktır. Bu rehber liste, literatür taramasında bulunan araştırmalar, sağlık hizmeti tesislerinin tasarlanmasıyla ilgili uluslararası standartlar ve kılavuzlarla dayanılarak hazırlanmıştır. Ayrıca, çalışmada hazırlanan rehberi hastanelerde Ayakta Tedavi Departmanlarının değerlendirilmesi için bir araç olarak da kullanılmıştır. Bu amaçla Kuzey Kıbrıs'ta Gazimağusa Devlet Hastanesinin poliklinikte bekleme alanı örnek çalışma alanı olarak seçilmiştir. Alan çalışmasının değerlendirilmesinden sonra ve fiziksel çevre ile ilgili problemlerin tanımlandıktan sonra, araştırma, bu mekanların geliştirilmesi için

öneriler sunmaktadır. Bu rehber hastanelerin ayakta tedavi bölümlerin tasarımında iç mimarlara ve mimarlara önemli ölçüde yardımcı olabilecektir.

Anahtar Kelimeler: Hastane, Sağlık Tesisi, Poliklinik, Ayakta Tedavi Bölümü, Fiziksel Çevre, İç Mekanın Kalitesi, Hasta.

DEDICATION

To all My family, especially my beloved father and mother

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“In the Name of God, Most Gracious and Most Merciful”

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TABLE OF CONTENTS

ABSTRACT	iii
ÖZ	v
DEDICATION	vii
ACKNOWLEDGMENT	viii
LIST OF TABLES	xii
LIST OF FIGURES	xiii
LIST OF ABBREVIATIONS	xvi
1 INTRODUCTION	1
1.1 Problem Statement	4
1.2 Aim and Objectives of the Study	4
1.3 Research Methodology.....	5
1.4 Scopes and Limitation of the Study	7
2 UNDERSTANDING THE INTERIOR ENVIRONMENT OF HOSPITAL AND OUTPATIENT DEPARTMENT	9
2.1 The Hospital Environment	9
2.2 The Physical Environment in Hospital	11
2.3 Therapeutic Environment.....	12
2.3.1 Social Support in Hospitals.....	15
2.3.2 Positive Distraction	18
2.3.3 Perceiving Personal Control in Hospital	19
3 EXPLORING THE QUALITY OF SPACE IN HOSPITAL AND OUTPATIENT DEPARTMENT.....	23
3.1 The OPD and Waiting Area	23
3.2 Spatial Relationships.....	26

3.2.1	Accessibility and Circulation in Hospital	26
3.2.2	Wayfinding and the Role of Signs in Hospital.....	28
3.2.2.1	Wayfinding	28
3.2.2.2	Role of Signs	30
3.3	Spatial Quality.....	33
3.3.1	Quality of Lighting in Hospital	33
3.3.2	Color in Hospital	37
3.3.3	Sound in Hospital.....	40
3.3.4	Use of Artworks in Hospital	42
3.3.5	Natural Elements and Interior Landscape Plants in Hospital	45
3.4	Indoor Environment Quality in Hospital.....	51
3.4.1	Indoor Air Quality, Thermal Comfort and Ventilation.....	52
3.4.1.1	Natural Ventilation.....	55
3.4.1.2	Mechanical Ventilation	59
3.4.1.3	Hybrid or Mixed-Mode Ventilation	60
3.5	Functional Requirement.....	62
3.6	Furniture and Furnishing in Hospital	63
3.7	Material and Finishing Requirements in Hospital	69
4	CASE STUDY	75
4.1	Introduction	75
4.2	Healthcare Situation in North Cyprus	76
4.3	Famagusta State Hospital.....	77
4.4	Aim of the Case Study	78
4.5	Method of Data Collection.....	78
4.6	Data Analysis and Result	79

4.7 Discussion and Recommendations.....	85
5 CONCLUSION.....	90
REFERENCES.....	96
APPENDIX.....	130
Appendix A:.....	131

LIST OF TABLES

Table 1: The advantage and disadvantage of ventilation concepts in hospitals. (WHO, 2009)	59
Table 2: checklist for evaluation and observation the quality of physical environment in OPD in Famagusta State Hospital.....	89

LIST OF FIGURES

Figure 1: The interior of Outpatient Department (OPD) Famagusta State Hospital, North Cyprus, (photo by author, 2018).	2
Figure 2: Structure of the study in this research	7
Figure 3: Two different hospital first provide sustainable healing environment and second modern hospital with poor environment (Bensalem, 2015).....	14
Figure 4: The differences between two waiting area in hospitals (URL 1).	15
Figure 5: Healing gardens in Dana-Farber Cancer center, providing a proper furniture arrangement for improving a social support.	17
Figure 6: Outpatient department Famagusta State Hospital, Photo by (Author, 2017).	20
Figure 7: The outpatient department in children’s hospital trusts in the U.K (URL 2).	24
Figure 8: Entrance of OPD in Famagusta State Hospital, weak wayfinding system and no signs. photo by (Author, 2018).	29
Figure 9: The new Alder Hey Children's Hospital in Liverpool is one of the most advanced Healthcare facilities in the world (URL 3).....	31
Figure 10: Daylighting consultants (URL 4)	35
Figure 11: Using visual art to enhance the Clinic waiting area (Cusack, et al. 2010).	44
Figure 12: Northeast Georgia Medical Center (URL 5)	46
Figure 13: Garden plan of healing garden in Dana-Farber Cancer Institute, Yawkey Center for Cancer Care (URL 6).	50

Figure 14: The exterior view of the garden serves as a beacon and a symbol of healing. The garden 's third-floor location and lush plantings afford privacy for garden users (URL 7).....	50
Figure 15: Diagram shows different concepts of 'natural' and 'mixed mode' ventilation systems (WHO, 2007 P. 51).....	57
Figure 16: Hybrid or Mixed-mode Ventilation Concept (Heiselberg, 2000).....	60
Figure 17: General waiting area of Acibadem hospital Taksim, Istanbul, Turkey. By (Author, 2018).....	62
Figure 18: Existing, dayroom at 'Odense University Hospital', Denmark (Mogensen, 2018).	64
Figure 19: refurbished dayroom at 'Odense University Hospital', Denmark (Mogensen, 2018).	64
Figure 20: Comfortable seating furniture in 'Internal Medicine Department' waiting area, Acibadem hospital taksim, Istanbul, Turkey. Photo by (Author, 2018).....	66
Figure 21: Improving communication and socialization between the patients and families by arranging furniture in Acibadem hospital taksim, Istanbul, Turkey. Photo by (Author, 2018).....	68
Figure 22: Rush University Medical Center: LEED Gold–certified (URL 8).....	70
Figure 23: Using carpet in corridors: Acibadem hospital taksim, Istanbul, Turkey. Photo by (Author, 2018)	71
Figure 24: Dell Children's Medical Center of Central Texas interior (URL. 9).....	72
Figure 25: Massachusetts General Hospital interior (URL 10)	73
Figure 26: Summary of the physical factors to be considered in design of OPD	74
Figure 27: Island of Cyprus (URL 11).....	75
Figure 28: location of Famagusta city (URL 12).	76

Figure 29: Famagusta state hospital (gazimağusa devlet hastanesi) (by author 2018).	77
Figure 30: Interior of out-patient department in Famagusta state hospital (photo by author, 2018).	79
Figure 31: Elevator in X-ray department which is unclear visually & No cues or signs. (photo by author, 2018).....	80
Figure 32: This photo shows the users of the OPD handicap, children, Fracture Care patients and elder patient. (photo by author, 2018).....	81
Figure 33: Interior of OPD in natural skylight. Photo by (author, 2017).	81
Figure 34: Interior of OPD in Famagusta hospital. Photo by (author, 2017).	82
Figure 35: The main admission department show secondary entrance of polyclinic and hospital street which provide small group furniture arrangement and better sitting quality.....	83
Figure 36: Access to view natural and impacts to reduce the sense of separation. (photo by author, 2017).	84

LIST OF ABBREVIATIONS

AIA	American Institute of Architects
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
EBD	Evidence Based Design
FGI	Facility Guideline Institute
HBN	Health Building Notes
HCF	Healthcare facility
IAQ	Indoor Air Quality
IEQ	Indoor Environment Quality
LEED	Leadership in Energy and Environmental Design
NSW	New South Wales
OPD	Out-patient Department
TRNC	Turkish Republic of Northern Cyprus
U. K	United Kingdom
U. S	United States
VOC	Volatile Organic Compounds
WHO	World Health Organizations

Chapter 1

INTRODUCTION

Hospitals are considered one of the more complex buildings that people have different experiences in. Any study focusing on hospital spaces has a crucial value, as such spaces are immediately related to human health. Architects and interior designers have a vital role to play in designing hospital spaces and healthcare facilities. The World Health Organization (WHO) defines 'health' as "a state of physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1946). Therefore, the interior environment and space quality for the hospital should be designed such that they can ensure the health of the community. In a hospital, users mostly want to leave the hospital as soon as possible with minimal spending on treatment as nobody feels pleased to spend or wait on treatment beyond what is necessary (Mital, 2012); a well-designed hospital environment can help in making this experience less difficult.

Devlin and Arneill (2003) state that studies on the impact of the environment in healthcare have been done on the patients' outcomes in numerous fields, including: psychology, consulting healthcare, and architecture. The researchers and experts have begun to confirm that a sensitive design can promote recovery (Lemprecht, 1996) as the physical and psychological health of the patients have been known to be influenced by the designs of hospitals and healthcare buildings in general. Thus, the physical and psychological comfort of patient has been a vital goal of several therapeutic

researchers. Based on this approach, the heTaling procedure has become distinguishable from the treatment procedure that uses just medicine and surgery.



Figure 1: The interior of Outpatient Department (OPD) Famagusta State Hospital, North Cyprus, (photo by author, 2018).

In this respect, The General Design Guidance for Healthcare Buildings prepared by the UK's Department of health defines the quality the healthcare facilities should have as follows:

Healthcare facilities should provide a therapeutic environment in which the overall design of the building contributes to the process of healing and reduces the risk of healthcare-associated infections rather than simply being a place where treatment takes place. In turn, the healthcare planning and design process therefore needs to be correspondingly broad enough to include not only the issues surrounding the treatment of disease, but also the promotion of health and prevention of disease – essentially the creation of a safe and therapeutic care environment (The department of health U.K; Health Building Note 00-01, 2014 P. 27).

Rechel et.al. (2009) describe what is meant by a therapeutic environment as:

Environments are considered therapeutic (with healing qualities) when there is direct evidence that a design intervention contributes to improved patient outcomes. The characteristics that make up a therapeutic environment are considered to be the creation of non-threatening facilities through site planning, wayfinding, landscaping, human scale, thermal comfort, fresh air provision, natural daylight, control of the environment, privacy and dignity, reduced risk of infection, acoustic quality, art and color (Rechel, et al 2009, p.233).

People generally visit healthcare facilities in times of stress and doubt and that's why a therapeutic or healing environment can be very important in these situations. According to Lahood and Brink (2010), some of the key design elements that are related to the comfortability, aesthetic, and have important roles in the overall quality of spaces in hospitals are the finishing materials, furniture, color, lighting, furniture, circulation and wayfinding (Lahood and Brink 2010 cited in Lee, et al. 2014). Other similar studies have also found that components such as safety, privacy, general ambience, noise control and wayfinding in hospital can greatly influence patients' and users' wellbeing. (Frasca-Beaulieu, 1999). Highlighting all these issues in a proper way when designing hospitals is an important duty of healthcare facility designers. The research about the concept of therapeutic environments has generally focused on the inpatients needs rather than outpatients even though the demands of both inpatients and outpatients should be considered.

The outpatient department is often considered the most crowded place in the entire hospital by visitors. The facility cares for different types of patients who are not inpatient or 'hospitalized' and receive medical care on an appointment basis. A designated area is used for outpatient treatment, which includes the treatment room, doctor's office, waiting area, registration area, and pharmacy. The facility also has a direct relation to other units, such as the X-Ray and Laboratory departments. As such,

this study will focus on the quality of the interior physical environment in a hospital's outpatient department (OPD) and particularly in waiting area.

1.1 Problem Statement

Unfortunately, in the design of many healthcare facilities, the necessary spatial quality for a proper hospital environment is neglected. Previous studies show the impacts of the physical environment of hospitals on the patient's perception and experience with the quality of care. So, there is a demand for documents and strategies that allow designers to be able to design these facilities in a proper way. However, there is limited knowledge about how to design healthcare facilities in general and the out-patient department in particular. This study aims to be one of a few studies to explore how the quality of interior space should be for a healthcare Out-patient Department (OPD).

Although, most of the studies on therapeutic environments have been focused on the Inpatient Department rather than the Outpatient ones, the demands of inpatient and outpatient should be balanced when creating a therapeutic environment. There are many specific design elements that should be considered while planning or designing hospitals and creating healthy environments, such as safety, privacy, accessibility, light, color, sound, nature and positive distractions. Unfortunately, the application of this evidence is limited in practice, which means the hospital and facility designers or developers are missing a chance to enhance the quality of care.

1.2 Aim and Objectives of the Study

The aim of this research study is to determine what should be the considerations and criteria in designing interior spaces in the out-patient department of the hospital and investigating the quality of a proper physical environment in healthcare while focusing on elements such as accessibility and circulation, furnishing arrangement, lighting,

sound, materials, color, relation to outside, positive distraction and natural elements. In addition, this research attempts to prepare a checklist for healthcare facility designers to help architects and interior designers in the design and space planning of hospitals in general and the out-patient department in particular. As such, this thesis tries to achieve the following objectives:

- To understand how the quality of interior spaces in OPD's should be designed in hospitals.
- To explore the design considerations and criteria the outpatient department in a hospital should have so as to achieve good health care outcomes.
- To prepare a guideline for designers in designing hospital OPD.

1.3 Research Methodology

In order to achieve the main aim of this research, which is to provide designers with a checklist to be used as a guide in designing Out Patient Departments in healthcare facilities, the research is divided in to three steps. In the first step, theoretical framework has been developed by collecting data through literature review. These data have been gathered from the researches that have been done on hospitals as well as the relevant international standards, regulations and guidelines, such as the World Health Organization (WHO), Health Building Note (HBN) U.K, (FGI) Guidelines for Design and Construction of Hospital and Outpatient Facilities, The Australasian Health Facility Guidelines, The American Institute of Architects (AIA) standards for healthcare facility, the standards developed by Leadership in Energy and Environmental Design (LEED) and The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) for developing indoor environment quality. All of them have been reviewed to find the criteria that should be used in the design of hospitals' OPDs.

The second step of the study involves analyzing data to make a summary of and determine the key concepts for improving the quality of the physical environment in a hospital OPD. After surveying the literature, the research proposes a checklist to be used in designing and evaluating hospitals' OPDs.

The third step of this research is related to the implementation of the developed checklist as a tool for the evaluation of the Outpatient Departments in hospitals. For this purpose, the outpatient department (policlinic) in the Famagusta State Hospital in North Cyprus has been chosen as the case study. In order to collect the relevant data in this case, several techniques have been utilized.

Based on the findings in the literature review section and the checklist, which was created accordingly, the physical environment in the three main areas of this hospital: waiting area, corridors and polyclinic entrance hall have been observed and evaluated. Personal on-site observation and photographic documentation have been used as data gathering techniques. The spaces mentioned have been evaluated in relation to various issues related to the quality of physical space such as: accessibility and circulation of patient, wayfinding system, lighting, color, sound, IAQ (Indoor air quality), ventilation, thermal comfort, as well as furniture features and arrangements, and connection to the other units and access.

Further explanation about the methodology of the case study will be provided in the relevant chapter. This evaluation section will be followed by a discussion part which includes some suggestions to enhance the quality of spaces in the hospital's outpatient department. The following diagram shows the methodology of the study.

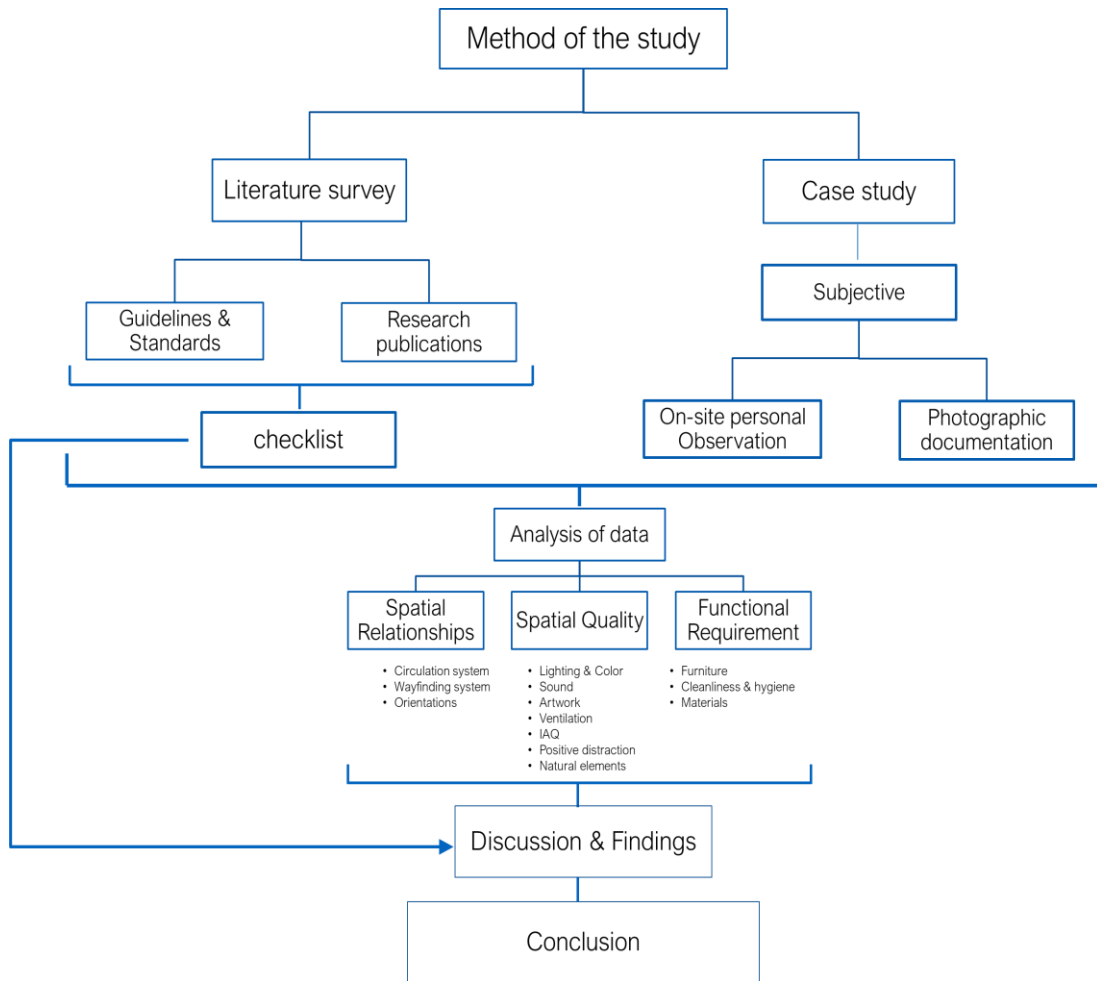


Figure 2: Structure of the study in this research

1.4 Scopes and Limitation of the Study

Hospitals are considering a very complex building with various departments and units. This research focuses only on the Outpatient Department (OPD) in hospitals. There are many aspects, such as psychological and cultural dimensions that have an impact on patient and users care. This study focuses only on the quality of the physical environment in the hospital interior. Considering that there are many possible healthcare facilities for the implementation of this study in North Cyprus, the researcher selected the OPD in the Famagusta State Hospital because it is the largest and newest public hospital in North Cyprus, which was designed under European Union standards. The study focusses on the waiting area, corridors and the main hall

in the hospital polyclinic. This research is limited by not having a broad-enough theoretical framework to guide Hospital OPD research. The research on the case hospital in particular posed certain challenges to the researcher, such as: not having access to hospitals and gaining basic documents about Healthcare facilities in North Cyprus, and the FSH administration did not give access to the drawings and plans of the hospital.

Chapter 2

UNDERSTANDING THE INTERIOR ENVIRONMENT OF HOSPITAL AND OUTPATIENT DEPARTMENT

2.1 The Hospital Environment

Understanding the impacts and influences of the environment in hospital for users is a significant issue. A concern is growing amongst Architects, healthcare providers, consultants and environmental psychologists about the role of environment in the process of healing (Martin, Hunt, & Conrad, 1990; Devlin, 1992, 1995). On the other hand, it has been found that changes made to physical and social environments can affect patient outcome positively (Verderber & Reuman, 1987; Davidson, 1994; Ulrich, 1984;). In the same way, the professionals in healthcare have found “a sensitive design can shorten hospital stays and enhance recovery” (Lemprecht, 1996, p. 123). In addition, an investigation conducted by Harris et al. (1999) to measure the satisfaction of patient through their experience in hospital, for instance, comprised no substances linked to the physical environments, at that point the patients have indicated the significance of environment to certain features of their cleanliness, privacy and comfort, (Bruster et al., 1994).

The built healthcare environment includes vital concepts used to understand the relationship between users and the hospital environment. It is of great significance that

healthcare environmental design takes into consideration the points of view of patients and other users. Most times, healthcare facilities are viewed as unusual, grim, and dreadful places that lead to feelings of crisis and defenselessness (Leventhal, & Nerenz, 1982; Carpman, Grant, & Simmons, 1984; Brown, 1961). Olsen (1978) argues that healthcare center outlines constantly pass the message that patients are unfit, sick and thus ought to remain as inactive as possible. Visitors and patients are given environmental standards (e.g., bedside security, medicinal hardware, and area of nursing stations) that affect their self-perception, affect their conduct, and provide a sense of the healthcare center's sympathy and capacity as an institution. The use of features that can be considered weird or unusual in the hospital environment will only produce powerful negative emotions that are connected to illness and even death (Brown, 1961). A study conducted by Fowler et al. (1999) on patients and their families discovered that the nature of the healthcare environment is closely related to the mood of its patients, as well as their comfort and sense of control. This is in line with much of the literature on the topic, which suggests that the impact of healthcare environments on the health of patients is significant.

Leventhal, et al (1982) point out that going to the hospital for restorative treatment usually results in a loss of control over several areas of everyday life in patients, including control over the physical condition, although the impact of the stress and nervousness caused by the hospital visit extends beyond purely physical effects (Lazarus and Cohen, 1979). Regardless, a hospital environment may at any point satisfy the concerns of its patients by using strategies that implement the requirements necessary to ensure their comfort (Reizenstein, and Shumaker, 1982; Zimring, et al, 1987). Lastly, the belief that a healthcare facility should be viewed as a therapeutic

curing machine to advance the well-being of people, instead of being viewed just as an environment, is becoming more common (Devlin and Arneill, 2003).

Finally, it is notable to state that the evidence-based design (EBD) has been developed during the last quarter of the century to apply scientific knowledge and methods to guide healthcare facility design (Berry, et al. 2004 & McCullough, 2010) which reduces the stress of facility patients and other users, improves safety and productivity, reduces resource waste, and enhances sustainability (Berry, et al., 2004).

A conceptual framework for the domain of EBD provides a structure that integrates multiple disciplines, serves as a communications platform for designers and researchers, and visually portrays the complexities, relationships, and pervasive implications of the healthcare-built environment (Ulrich, et al. 2010 p.96).

Moreover, McCullough, (2010) states that the Evidence-based design (EBD) is a process used by healthcare professionals in the planning, design, and construction of healthcare facilities. An evidence-based designer, along with an informed client, makes decisions based on the best information available from research and from project evaluations. A supportive healthcare physical environment contributes to patients' well-being and perceiving control (Andrade & Devlin, 2015).

2.2 The Physical Environment in Hospital

The physical environment is understood to include the inside of buildings, the functional interior space, materials, and the relation of outdoor and indoor that establishes the spatial relations between buildings (Netherland Board for Healthcare Institution, 2008 cited in Samah, et al. 2013). Schweiter et al. (2004) state that the physical environment of a hospital impacts the actions and interactions of users in hospital such as patients, families, and staff members who provide care.

In clinics and hospitals where individuals experience a moderately high level of vulnerability, worry and displeasure, the impact of interior physical environment on the patient's wellbeing tend to be particularly significant and have been pleasantly received (Ulrich, 1995; Devlin and Arneill, 2003). Conditions in the environment that indicate such positive effects are considered to be restorative in nature. This suggests that the physical aspects of medicinal services could have many effects on how quickly the patients feel healthier and alleviate their condition (Stichler, 2001). This notion of mending conditions, where the physical healthcare environment influences the wellbeing and health of patients, has also been supported by a number of studies (Dijkstra, et al. 2006 & Ulrich, et al. 2004), making it almost impossible to ignore environmental influences on the outcomes of users (see Ulrich et al., 2008).

2.3 Therapeutic Environment

Healing or therapeutic environments have been the focus of many new healthcare facility (HCFs) designs and modernization efforts to encourage patients, staff, and visitors' comfort. HCFs should be well-designed, attractive, functionally planned and aesthetically appealing in order to create a therapeutic environment. Creating a healing environment requires paying specific attention to utilizing the space quality, therapeutic sound, relaxing colors, natural light, pleasant views, and positive distractions, especially in an OPD waiting area, which has become a subject of discussion among healthcare designers and planners. In addition to the fact that a healing environment enhances the quality of patient outcomes, it appears to also enhance nursing care, which could reduce the frequency of errors.

Altimier (2004) states that the idea of the therapeutic environment is not recent; two hundred years ago, a study by Nightingale proposed that caring for a patient in an

environment with natural light, ventilation, cleanliness and basic sanitation would help the patient recover from the disease sooner (Nightingale, 1992). This idea suggests that the hospital environment can change the recovery rate of the patient. Studies have shown that patients experience positive outcomes in environments that include natural elements, calm colors, natural light, vision, peaceful sounds, and pleasant aesthetics (Rubin, HR, Owens, AJ, & Golden, G. 1998). Patients in such environments report that they have less stress, less analgesic use, and fewer negative comments documented in their nursing records than those placed in traditional hospital settings.

The experiences and activities of patients, as well as their surrounding environment, are all significant to the process of therapeutic. Furthermore, mindfulness activities are beneficial for taking the patients' attention then inviting them to receive their condition through approaching their emotions and thoughts without judgement (Williams, 2007). An emotional state of individual meaningfully impacts how they experience and practice both places and things. Additionally, to know it as emotional congruence theory, Niedenthal et al. (1994) claimed that the individual emotional state impacts what and how she/he realizes. Moreover, Williams, A. M. (2007) obviously defines it, as happy people can see the world over rose-colored glasses then they are predominantly appreciating and attentive to eye-catching scenes and elements, in addition, they are less possible to note unattractive thing. On the other hand, individuals who are also unhappy or worried might view an undistinguishable scene in a different way as they are extra attentive to a smaller amount attractive thing as well as it could be those that are threatening. Furthermore, there is evidence that is confirmed that dread endorses processing of dreadful, happiness the happy and sadness the sad" (Ulrich, 1999).

On the other hand, a recent study by Bensalem (2015) titled “Sustainable Healthcare Architecture Designing a Healing Environment” compared two different kinds of hospital. The study found that of the first sustainably designed and the second conventional modern hospital, the first one contained a well-designed healing environment with views of the outdoors, access to natural lighting, spacious room, wood interiors, direct access to the outdoors through the patio, and one bed per room. The second one on the other hand, contained artificial lighting, no windows, shared rooms, grey floors and white walls (see Figure 3), making it simple to know which hospital interior presented a truly therapeutic environment.



Figure 3: Two different hospital first provide sustainable healing environment and second modern hospital with poor environment (Bensalem, 2015).

For the Outpatient Department in hospital has the same situation see (Figure 4) first one providing well-designed healing environment with views of the outdoors, access to natural lighting, spacious room, direct access to the outdoors views and clear glass. But the second one is poor artificial lighting, no windows, poor furniture arrangements, no designing walls and ceiling and no positive distraction.

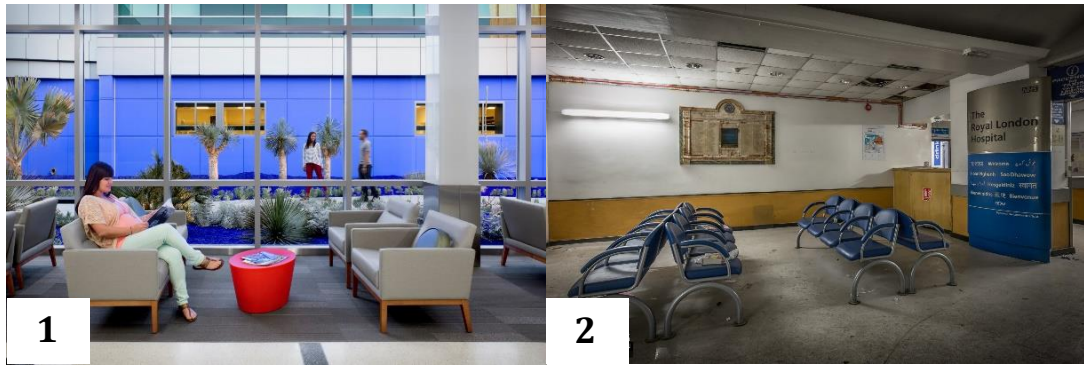


Figure 4: The differences between two waiting area in hospitals (URL 1).

Thus, therapeutic environments have been focused on the inpatient rather than outpatient, the demands of inpatients and outpatients should be balanced in the therapeutic environment unless it simply does not exist. there are many specific design elements that should be taken into account during designing hospitals and creating healing environments such as safety, privacy, color, sound, light, nature and positive distraction. In addition, the patients' well-being and creating healing environment related to social support, positive distractions and perceiving personal control (Andrade & Devlin, 2015).

2.3.1 Social Support in Hospitals

“Social support refers to emotional support and tangible assistance that a person receives from others” (Ulrich 2001 p.54) Patients derive important benefits from frequent or prolonged contact with family and friends who are helpful, caring, or otherwise supportive (Ulrich, 1991). The study by Sommer and Ross, (1958); Holahan, (1972) investigated how furniture arrangements and floor layouts affect levels of social interaction among patients. For example, studies of waiting area, day rooms or lounges have found that social interaction is reduced considerably when chairs are arranged side-by-side, especially along the walls of the room. Also, heavy, unmovable furniture usually inhibits social interaction. These studies indicate that the interior designer can considerably Increase social interaction among patients by specifying comfortable,

movable furniture that can be arranged in small, flexible groupings (Ulrich, 1991). Although a few studies have linked increased social interaction with such positive indicators of patient well-being as alertness (Knight et al., 1978). It can manifest in many ways, including expressing to someone that he or she is cared about; encouraging a person to express feelings or beliefs; giving someone a sense of belonging to a social group or network; and providing tangible assistance. Research findings have revealed that higher levels of social support, and lower levels of perceived loneliness and isolation, improve recovery (Ulrich, 1991 cited in Marcus & Sachs, 2013).

On the other hand, gardens and parks outside of the healthcare setting have been documented as places that facilitate social interaction. Research on public parks has shown that design, such as location and configuration of seating, can influence whether and how spaces are used (Marcus and Francis, 1997). Gardens within healthcare facilities can provide the same benefits. A variety of spaces allows for a variety of interaction. Seats that face each other, or that can be moved to face each other, allow two or three people to talk (Marcus and Sachs, 2013). Bigger spaces are also important for accommodating larger groups of visitors and staff for unplanned and programmed activities and gatherings. In some cultures, a patient is visited by his or her large immediate or extended family. Some of the design considerations listed under “Sense of control” also apply to “Social support,” including providing areas for privacy and locating gardens near gathering areas such as waiting rooms and cafeterias (Marcus and Sachs, 2013).



Figure 5: Healing gardens in Dana-Farber Cancer center, providing a proper furniture arrangement for improving a social support.

According to McCullough, (2010) describes the principles for increasing social support in a Checklist for EBD Healing Environment such as:

- Create a family zone in patient rooms Provide family respite locations, such as lounges, meditation rooms, and healing gardens
- Provide waiting rooms and lounges with comfortable and moveable furniture arranged in small, flexible groupings
- Provide a variety of seating to accommodate the widest range of persons
- Strive for a residential, not institutional look

Ulrich, (1991, 2000, 2001) also states that, examples of the many possible design approaches for increasing social support for patients include providing the following features to encourage and support the presence of family and friends: comfortable waiting areas with movable seating; convenient access to food, telephones, and rest

rooms; attractive gardens with sitting areas that facilitate socializing with patients; and convenient overnight accommodations.

2.3.2 Positive Distraction

Ulrich, as a pioneer in this field, says that: “Positive distractions refer to a small set of environmental features or conditions that have been found by research to effectively reduce stress” (Ulrich et al. 2004 p. 21). A study by Becker & Douglass, (2008) measured the attractiveness of waiting area in six clinical outpatients from the Weill Cornell Medical Center/ New York City. The analysis of this study exposed a vital correlation between the level of attractiveness of the physical environment in the waiting area and patients’ perception of the quality of medical care they received. They found that patients actually evaluated quality of care based on their perception of the physical environment, which was determined primarily by how attractive said environment is. The degree of attractiveness also functions as a positive distraction. Here, a distraction is understood as “the direction of attention to a non-noxious event or stimulus in the immediate environment” (Fernandez, 1986; Vessey, et al. 1994 as cited in Pati & Nanda, 2011 p. 125).

The concept of a positive distraction implies the apart from stimulation levels per se, certain types of environmental elements are especially important is reducing patient stress and promoting wellness. A positive distraction is an environmental feature or element that elicits positive feelings, holds attention and interest without taxing or stressing the individual, and therefore may block or reduce worrisome thoughts (Ulrich, 1991 p. 102).

A study by Pati & Nanda (2011) examining how children’s behavior and activities are affected by the use of positive distraction in the waiting areas of two clinics found that such distractions captivated the attention of the children and immensely contributed to making their hospital waiting experience more bearable by enhancing the attractiveness of the environment. The researchers stated that: “It is also noteworthy that the TV monitors attracted more attention than fixed interior elements such as

doors, windows, floor, ceiling, furniture, and so forth, which are typically manipulated to enhance environmental attractiveness” (Pati, & Nanda, 2011 P. 139). So, it is unfortunately the case in many healthcare waiting areas that the influence of positive distraction has been neglected by designers. An alternative point of view is that positive distractions (such as T.V monitors, books, arts, music, natural elements, painting, toy for children and other positive distraction) have a significant role to play in the quality of clinic waiting areas and should also be considered by the interior designers of these facilities to reduce patient stress. Other positive distractions like artwork and natural elements will be described in detail in the following chapter.

2.3.3 Perceiving Personal Control in Hospital

In their research, Maslow and Mintz (1956) discovered that patient’s care experience is influenced by the features of the environment in a healthcare setting. For patients, the first impression they get is a particularly effective determinant of how they interact with other people, as well as with the environment. In addition, it impacts of how they comprehend the quality of care quality expect in order to obtain as well as how they assess the whole healthcare organization (Bitner, 1992; Arneil & Devlin, 2002; Fottler, et al., 2000; Leather, et al. 2003; Rice, et al. 2007; Becker & Sweeney, 2008). On the other hand, the following parts offers a characterization of the waiting room, which is especially significant for patient’s first impression and how they perceive the quality of a healthcare provider. Fottler et al. (2000) state that healthcare environment offers the first impressions of the healthcare experience and influences customer’s expectations before they have received service. The environment affects and determines the patient’s mood and impacts how they experience the provided service, in addition to also helping retain and customer (Fottler et al., 2000). In healthcare experiences, the greatest inevitable portion is waiting as well as the most patients spend

most of their time waiting places (Leddy et al., 2003). In the waiting room, patients are allowed to have a long look at their surrounding area and begin to guess the kind of organizational values that are provided in that healthcare environment (Becker & Douglass, 2008).



Figure 6: Outpatient department Famagusta State Hospital, Photo by (Author, 2017).

Specifically, a waiting room is where the introduction of the organization takes place because it is where people guess the characteristics of other people/things based on the way they observe them (Gosling et al., 2002). In addition, waiting areas can also determine what people expect the quality and type of their care experience to be, and the character and values of their healthcare provider. The objectives of the healthcare provider are equally strengthened by first impressions, as well as the components and elements of the surrounding environment (Fottler et al., 2000), which can have either negative or positive impressions. Ingham & Spencer (1997) state that the waiting room

is the place where the worry and anxiety about possible treatments and consultation will likely build. The waiting area and environment can be utilized to create an impression of comfort, tidiness, cleanliness and calm, with characteristics that help ease nervousness and motivate patients to have self-confidence in a capability of an exercise, letting them to be satisfied through the hospital that they could obtain (Rice et al., 2007). The waiting area that is designed weak, however, can pass unintentional messages to patients and negatively influence their interaction with staff and personal care providers in the future, consequently affecting their general care experiences and how they perceive its quality. On the other hand, Arneil and Devlin (2002) found that there are differences in what 18-24-year-olds and older adults require to be comfortable in waiting areas, although they did not examine what issues and factors are responsible for those differences. Arneil & Devlin, (2002) and Verhoeven et al. (2007) show that the waiting area influences the perceptions of patients about care quality in similar ways.

Arneil and Devlin (2002) examined whether or not the physical environment affected how patients evaluated the care quality before they interacted with persons in the hospital, as well as whether or not the environment was significant in transferring empathy, warmth, and friendliness. Generally, it has been explained that the attention in capitalizing via the time and care in designing waiting area on a part of the provider-controlled patient to be certain of that the same efforts could be engaged on the way to their care. That study shows that the dissimilar wants of dissimilar patients in the waiting area should be considered.

The design of hospitals is a complex effort to ensure that function follows both form and quality (Bensalem 2015). The facilities provided in a healthcare environment have

a wide range of uses ranging from medical applications (i.e. Outpatient department OPD, Intensive care unit ICU, emergency, rooms, treatment, diagnostic, etc.) to functional programs (i.e. office space, meeting areas, main hall, waiting rooms, housekeeping, food services, etc.).

To summarize this chapter, it is valuable to explain that there is a significant benefit in understanding healing or therapeutic environments, especially for the designers who design such facilities. The Healthcare designer is expected to study and consider each aspect of patients' and users' life so as to creating a healing environment in the hospital. Setola & Borgianni in a book titled "*Designing public spaces in hospitals*" state that:

Visual exposure to natural light, nature, water, art and digital dynamic elements has a restorative, relaxing as well as aesthetic effect that should not be underestimated, especially in the hospital context. These aspects strongly help to reduce stress and raise the patients' perception of the quality of care (Setola & Borgianni, 2016 p.123).

In conclusion, while therapeutic environments have been focused on the inpatient rather than outpatient the demands of inpatient and outpatient should be balanced. The therapeutic environment should be created, it does not simply exist. Healing or therapeutic environment could be achieved by improving the quality of physical environment in hospital such as providing natural light, flexible furniture, providing relax color, thermal comfort, safety, positive distraction, natural elements, accessibility and relation to outside and views of the outdoors. In following chapter all these design elements are described in detail.

Chapter 3

EXPLORING THE QUALITY OF SPACE IN HOSPITAL AND OUTPATIENT DEPARTMENT

3.1 The OPD and Waiting Area

Hing et al. (2008) argue that there are over one million annual outpatient visits in US hospitals. The Outpatient Department is considered the most crowded place in the entire hospital by visitors. The facility cares for different types of patients who are not hospitalized and receive medical care on an appointment basis. A designated area is used for outpatient treatment, which includes the treatment rooms, doctor's offices, waiting area, registration area, and pharmacy. The facility also has a direct relation to other units, such as the X-Ray and Laboratories department. In this facility, visitors and patients spend a considerable amount of time waiting to receive treatment, making the waiting area a major part of this department. As such, the quality of the interior space in the OPD has a significant impact on patient's psychology and physical wellbeing.



Figure 7: The outpatient department in children's hospital trusts in the U.K (URL 2).

According to Ulrich (1991), the design of healthcare interiors has been guided by an emphasis on functionality and the psychological needs of patients, staff and visitors alike tend to be ignored as a result. The facilities tend to be psychologically “hard” in that they are a source of stress for their users. Dijkstra et al. (2006) have argued that lighting, art, furniture, and color can be used to promote design conditions that better the wellbeing and health of users. Ghazali and Abbas (2011) have also suggested a similar but more comprehensive list of interior design considerations, including ambience and therapies, furnishings, outside view, lighting, artwork, color, ergonomics, and safety.

It is well known that people spend a significant amount of time in hospital waiting area. It has been argued that the quality of the waiting area has an effect on how visitors perceive the quality of caregivers and the care they provide. In fact, how patients perceive their waiting time has a greater effect on their satisfaction than the actual length of time and is influenced by the features of the waiting area (Pati and Nanda, 2011). Waiting areas are also important in healthcare settings as they can either further distress or reassure patients. Some studies like Ingham and Spencer (1997) have

argued that pre-treatment anxiety and worry among patients can be reduced by “softening” the waiting area. Zimring et al. (1987) have also argued that the furnishings and décor used in the hospital waiting area “speak” to users about the value placed on their comfort by the hospital. Less emphasis on the needs of the user in a waiting area can be interpreted negatively to mean that the patient is low on the list of the hospital’s priorities (Leather et al., 2003).

The U.K Health Building Notes (HBN, 2014) has guidelines for designing the Outpatient Department. They describe the quality of the OPD in a hospital and according to them, the internal environment of OPD should reflect the needs of patients, their escorts, and staff. Waiting spaces should be welcoming, well-illuminated and relaxing, and should have as much natural light and ventilation as possible. An excessively clinical appearance should be avoided. Colors, wallpapers, and furniture should be carefully chosen. Views to outside areas are essential (HBN 12 Out-patients department, 2014). As well as the American Institute of Architects (AIA) guideline for design and construction of hospital and healthcare facilities, (2001) argues that:

Environment of the unit should be characterized by a feeling of openness with emphasis on natural light and exterior views. Various functions should be accessible from common areas while not compromising desirable levels of patient privacy. Interior finishes, lighting, and furnishings should suggest a residential rather than an institutional setting. These should, however, conform with applicable fire safety codes. Security and safety devices should not be presented in a manner to attract or challenge tampering by patients (AIA, Guidelines for Design and Construction of Hospital and Health Care Facilities, 2001, p. 32).

In addition to the quality of the physical environment (such as lighting, color, sound, nature, interior finishing and furnishing, etc.), the space organization of the OPD with other departments, such as X-ray and Laboratories, should also be suitable for patient’s

accessibility and easy way finding. Because the outpatient department is used by various types of patients, among them disabled patients, children, and elderly people, the OPD should have the capacity to serve all of them. Therefore, the designer should consider all the principles of universal design and ergonomic design when designing suitable facilities for patients.

3.2 Spatial Relationships

3.2.1 Accessibility and Circulation in Hospital

Accessibility in complex building such as hospital is more important than other buildings, because hospitals serve various users and patients. So accessibility between the departments in hospital become a serious matter for patients and users to deal with the circulation system. Moreover, accessibility is directly related to the circulation system in the hospital. The accessibility and relationship of hospital units with areas outside the hospitals are challenging.

A significant portion of the total physical layout of a hospital is occupied by circulation zones. Circulation spaces provide access within the departments in a hospital, while communication spaces provide access between departments and can include main hospital streets (HBN 001, 2014). According to Carthey, (2008) the total function space for circulation spaces should not be more than 40%.

The hospital circulation area has been defining as a total serve function of the hospital the movement of goods, supplies as well as a movement of users for different departments in a hospital. Carthey, (2008) state that the circulation zones crucial for all types of delivery care system. As well as this system is the main parts for healthcare facilities and it could be independently accessed via members

of the public, as an entrance hall, reception, hospital main street, the front entrance, vertical circulations, elevator, staircase and even waiting area in the hospital (Steola & Borgianni, 2016). The designing of circulation space know as have an impact on the patient and visitors in hospital and Outpatient department. In addition, the accessibility and circulation zones are the first impression for the users to the functional design and space planning in hospital. as well as other zones such as the public area and corridors also perform a medicinal function because they may use for the rehabilitation of patients with particular ambulation capabilities (Callen, et al. 2004). therefore, those type of patients has been conducted to through the corridors and other space several time a day to walk through it. moreover, the circulation area in the hospital doubles as the backstage for communication between the patient, visitors, and hospital staffs. these areas are more active for socialization and activities because allow to various informal activity and learning (Carthey, 2008).

As described the circualtion zone in healthcare facilities has a significant role in the patients, staffs and other users total exprince through hospital environment. It has been founded that the total patients satisfaction are importantly related to the quality of circulation and public area in hospital (Bitner, 1992; Fottler, et al. 2000). In the study by Pangrazio (2013) state that public zones in hospital could help patient's experiences extra positive as well as unforgettable by providing orientation, clear direction, improving self-actualization, building self-confidence, and enhancing the general healing procedure. as well as particular it becomes significant for healthcare personnel, the one who spend most times in circulation zones as corridors are caring for patients. the study by Welton, et al. (2006) argue that the nurses with single shift travel five miles in 12 hours to care for four patients

and this number will increase when assigned patient increased to above five miles. There are numerous researches display how the circulation area influences the range of errors among nurses, fatigue, work satisfaction, communication patterns, and employees' physically and psychological stress levels (Ulrich et al., 2004, 2008; Hendrich, et al. 2008; Vischer, 2008; Pati, et al. 2008; Stichler, 2009). These circulation zone in hospital and especially in outpatient department has a vital factors to achieve the quality of care, well-being, satisfaction and work performance as well. In the outpatient department specifically, the circulation area should be designed as flexible. The Health Building Note 004 (HBN) "provides evidence-based best practice guidance on the design of circulation and communication spaces in healthcare buildings that are intended to be safe, accessible and fit for purpose" (The Health Building Note 004 'HBN' p.1). So, the interior designer should promote a safe environment, clear accessibility and fit to purpose as well as providing an easy, clear and comfortable, vertical and horizontal Circulation systems in outpatient departments.

3.2.2 Wayfinding and the Role of Signs in Hospital

When designing healthcare systems, easy wayfinding and navigating to specific areas in the healthcare environment should be an important consideration (MacKenzie and Krusberg, 1996). The wayfinding system in hospitals are critical for patient perceiving the quality of healthcare, however the hospital buildings mostly consist of many departments and unites the circulation in this complex building demands for a proper wayfinding system and signs or cues.

3.2.2.1 Wayfinding

The buildings housing healthcare facilities are usually complex and wayfinding in such indoor environments can prove to be a challenge. According to Ulrich et al.

(2004) problems with wayfinding in hospitals can be both stressful and costly. They also negatively affect visitors and outpatients, who are already unfamiliar with the hospital. Studies are increasingly showing that successful wayfinding and preference ratings are most effectively guaranteed by route cues (Daniel, et al. Denis, 2003; Denis, Pazzaglia, et al. 1999; Hund & Padgitt, 2010; Padgitt & Hund, 2012). See (Figure 8) shows that there is no consideration for wayfinding system and signages.



Figure 8: Entrance of OPD in Famagusta State Hospital, weak wayfinding system and no signs. photo by (Author, 2018).

Like waiting, problems with wayfinding are widespread among hospital visitors. One of the most disturbing aspects of being in a hospital is the disorientation one feels in the maze of corridors, waiting rooms, banks of elevators, and food-service areas. In terms of wayfinding, hospitals can be labyrinths in disguise. Due to the tendency of hospitals to grow in piecemeal fashion, the paths connecting the parts can become extremely complex, confusing, and unpredictable (Lincourt, J. 2002 p. 92).

Lincourt, J. (2002) described wayfinding as serving two related functions: 1) providing information on the surrounding environment and cues to reach the destination, and 2)

creating a perceptually rich and interesting route. Different design strategies can be used to aid wayfinding, such as landmarks serving as points of reference, a main artery, and proper signs (Lincourt, 2002). Furthermore, wayfinding systems are especially important in hospitals, which are notoriously difficult to navigate due to complex medical terminology and high stress levels among patients and visitors (Cooper, 2010). Such wayfinding systems would require spatial and environmental information to be properly encoded, processed and retrieved (Fortin et al., 2008). When done properly, they could have an immense positive effect on the behaviors and perception of patients, staff, and visitors, ultimately leading to the improvement of staff morale, the organization's bottom line, and patient satisfaction (Cooper, 2010). Instead of creating healthcare wayfinding systems independently of one another, groups of organizational psychologists, architects, engineers, and human-computing specialists need to cooperate with healthcare personnel (nurses and physicians) to combine knowledge from their various disciplines (Iamb et al., 2010). Such attempts at collaboration should also place emphasis on the interaction between technology, and effective workplace culture, patient care delivery processes, and the actual physical design (Clancy, 2008; Henriksen et al., 2007).

3.2.2.2 Role of Signs

Efficient wayfinding systems are critically important in new environments and signs are an important aspect of this. Gakopoulos (2009), Hablamos Juntos (2003), and Rousek and Hallbeck (2011); cited in Seunghae Lee, et al. (2014) have all pointed to the necessity of standardizing the public information signs used in healthcare settings. A sign is an easy to identify, eye-catching plaque that directs visitors to a desired location (Harkness, 2008). More than providing directions, signs also help visitors feel comfortable as they navigate the environment (Harkness, 2008). Research has found

that the significant effect of signage on the wayfinding experience needs to be included in the overall building configuration plan (Garling et al., 1986). Understood to be a spatial problem (Arthur and Passini, 1992), wayfinding requires a number of intellectual abilities, including information processing, making, and executing decisions and signs is useful as it facilitates each of them. the hospital considered all architectural aspect for providing good wayfinding system (Figure 9).



Figure 9: The new Alder Hey Children's Hospital in Liverpool is one of the most advanced Healthcare facilities in the world (URL 3)

Conversely, signs can sometimes be unhelpful and can even negatively affect people's experiences in buildings, especially healthcare facilities. Hospitals and healthcare facilities in general are not usually perceived as 'happy' places (Cowgill and Bolek, 2003). According to Kendler (2012); cited in Lee, et al. (2014) abstraction can be used

in signs design to make the message simpler and allow users comprehend the meaning more quickly by communicating only the significant aspects of the referent. As Olmstead (2003) has noted, however, a reader's ability to attach meaning to abstract symbols is determined by how familiar he is with cultural symbols. In fact, cultural differences have been known to cause receivers to misrepresent the sender's message. The idea of using signs or cues and wayfinding techniques in hospitals is expected to help users to easily navigate the area and maximize accessibility, especially in the OPD. These tourniquets should be considered by healthcare designers.

Architectural and spatial design of healthcare settings can provide intuitive cues to assist people orientate themselves and navigate through campuses and buildings. Design factors such as form, the layout of buildings, arrangement of roads and pathways, the alignment of corridors and location of clinical settings all contribute to a positive wayfinding experience for patients and visitors (Ministry of health NSW, 2014 p 50).

Moreover, the ministry of health, NSW, (2014) published a guideline titled "wayfinding for healthcare facilities" state that "The planning of healthcare spaces should be seen as hierarchical ranging from major circulation systems and spaces to secondary systems and spaces and finally to individual clusters of corridors and rooms" (Ministry of health NSW, 2014 p 50). Therefore, the signages should be considered by the healthcare designers to enhance the quality of wayfinding system in hospital and especially in OPD because this department has most visitors in different Medical Specialty, it leads to have direct access relation with other unites such as X-ray, laboratory, pharmacy and physio therapy departments. The interior designer and architect could offer intuitive cues or signs for assisting patient orientate themselves and navigate through hospital (Ministry of health NSW, 2014). In the same way, some features should be taken into account by designers such as using different colors to reinforce information in wayfinding system. Also, the position of signs should be

clearly visible and provide comfortable viewing angles especially for handicap patients and those in wheelchair.

3.3 Spatial Quality

3.3.1 Quality of Lighting in Hospital

The quality of lighting has been a topic of discussion since the 1990s and requires balancing human and economic needs, as well as environmental issues and architectural design (Veitch, 2006; Bellia, 2011). Bellia, L. et al. (2011) state that light is a basic need for humans and lighting is commonly identified as affecting physical, physiological and psychological behaviors. Moreover, many studies have argued that good lighting would provide the ideal conditions for visual performance, provide safety, determine spatial appearance, and contribute to the health and wellbeing of humans (Knez, & Enmarker, (1998); CIBSE, (1994); Rea, (2000); and Bellia, et al. (2011). The concept of lighting quality has developed considerably and become more complex since the initial discussions on its effect on human health (Brainard, et al., 2001); Thapan, et al. (2001); Veitch, (2006). As Bellia, et al. (2013) have argued, light also has non-visual effects in addition to its visual effects. These include its effect on attention span, mood, performance, the synchronization of the biological clock, intensity, timing, duration, and the circadian rhythm, which is directly affected by the distribution of spectral power in the light that reaches to the eye.

Experimental evidence has also shown that certain kinds of light patterns are preferred for specific applications since they are more likely to improve the quality of care (Boyce, 2014). While this performance-enhancing benefit is not realized in every application, determining which light patterns are best suitable for hospital environments, staff, and patient morale would be very beneficial. The extending reach

of the Disability Discrimination Act 1995 (DDA) all service providers mean that not only accessibility, but also the aesthetics and functionality of those buildings would need to be improved (Dalke et al., 2006).

Natural light: A randomized study conducted in 2004 tried to assess how the level of sunlight in the hospital affects the psychosocial health of the patient, the cost of pain medication and the amount of pain-relieving medication used (Walch, et al., 2004). The availability and use of views, and natural light should be a major consideration in the design of the hospital environment (The Facility Guidelines Institute: Guidelines for Design and Construction of Health Care Facilities, 2010 edition. p.14). According to recommendations in the 2010 edition of the Guidelines for Design and Construction of Health Care Facilities by the U.S. Facility Guidelines Institute: a) Each patient activity area, visitor space, or staff area should not be more than 15.24 meters from natural light and the source of natural light should be made as accessible to exterior views as possible. b) Unique natural views and other features should be given priority during the siting and organization of the building. c) Natural light should be made accessible even outside private space (FGI, 2010). “Using light as an intervention to reduce depression in clinically depressed as well as nondepressed patients is a relatively inexpensive intervention that has been shown to yield consistently positive results (Ulrich et al. 2004, p. 20).



Figure 10: Daylighting consultants (URL 4)

Daylight has been found to have a positive effect on patients (see Rubin et al., 1998), staff, and visitors. It improves patient's outcomes and reduces the occurrence of psychological problems, as well as reduces sickness levels and increases morale among staff (HBN 001 General design guidance for healthcare buildings, 2014). Furthermore, staff health and performance can be improved by increasing the accessibility of daylight, particularly in primary work areas as they perform their tasks as healthcare providers (Beauchemin & Hays, 1998). It works effectively as an antidepressant (Beauchemin, & Hays, 1996; Benedetti, et al. 2001) and minimizes pain (Walch, et al. 2005; Malenbaum, et al. 2008). Studies have also found that daylight is more preferable to artificial lighting (Joseph, 2006); it increases and decreases work satisfaction and stress, respectively (Kueller, 2006; Mroczek, et al., 2005; Alimoglu, et al., 2005; Scott, 2000; and Leather, et al, 1998).

Artificial light: The majority of recent lighting studies focus less on artificial lighting and more on natural lighting. The UK Department of Health, however, argues that artificial lighting should still be able to provide the required level of illumination at all

times. It also contributes to the interior aesthetic. As such, the design should provide the right lighting intensity for the task at hand in a glare-free low-contrast illumination background. Clinical areas specifically require that only approved color-rendering light sources are used. According to the U.K Department of Health HBN 12 outpatient department (2014): “A light and attractive interior is required, with an adequate level of illumination that can be varied to suit functional activities. Because natural lighting is variable in quality and quantity, the provision of a comprehensive artificial lighting installation in examination and treatment areas is essential” (U.K department of health HBN 12 out-patient department 2014, p. 9).

Role of light on reducing depression: One costly widespread problem commonly face in healthcare facilities is depression (Ulrich, et al. 2008). Research has found that the occurrences of depression can be treated using daylight and bright artificial light. Such lighting reduces length of stay and improves patients’ moods by regulating their circadian system (Lewy, et al., 1998). In addition to reducing depression and regulating the circadian rhythm, bright light (natural and artificial) also helps with sleep, agitation, and reduces the length of stay for patients suffering from seasonal affective disorders and dementia (Ulrich, 2004). A significant number of studies have found more specifically that depression is more responsive to morning light as opposed to evening light (Lovell, et al. 1995; Beauchemin & Hays, 1996; Van et al. 1997; Lewy et al. 1998; Benedetti, et al. 2001; Terman, et al. 2001; Wallace Guy et al. 2002). Additionally, light also improves the sleep patterns, behavior, and circadian rhythms of older patients with Alzheimers (Dowling, et al. 2005; Van et al. 2009).

A recent study by Behringer, (2011) concerning “The Daylight Imperative” confirms with other inpatient-related studies that bright daylight or artificial light in the morning

is more effective than in the evening. Beauchemin & Hays (1996) found in their study that patients with severe and refractory depression tend to have longer lengths of stay in rooms without sunlight than in sunny rooms. The average length of stay for patients in rooms without direct sunlight was 19.5 days, which was 2.6 days (15%) higher than patients in sunny rooms (16.9 days). Benedetti et al. (2001) similarly found bipolar depressive patients with west-facing windows to have an average 3.67-day longer hospital stay than those with east-facing windows (Benedetti et al. 2001). Lastly, Beauchemin, & Hays (1998) argue that it is important to remember that depression also affects patients with physical diseases and not just those in mental health facilities.

As a result, The American Institute of Architects (AIA) has stated that: “Artificial lighting should be provided sufficient for treatment and nontreatment needs” (*AIA Guidelines for Design and Construction of Hospital and Health Care Facilities*, 2001 p 163). Most of the researches demonstrate on the value of natural light which has important role in proper quality of healthcare OPD. As well WHO, (2009) state that the using natural skylight can be used for Outpatient department to have natural light which makes the space more livable. So, the designer should be aware in such crowded spaces by providing proper amount of natural light. And sufficient artificial lighting should be provided sufficient for treatment and nontreatment needs.

3.3.2 Color in Hospital

The colors used in the interior design of the hospital are both the most visible and easiest to change characteristic of the environment. Color influences human health, decision-making, behavior, and also adds character to a space whether or not we are consciously aware (Jalil et al., 2012). Put differently, even though color is a subtle stimulant, it still has significant physiological, psychological, and physical effects on humans every day and is increasingly being recognized for that. The same colors can

be interpreted differently by different people depending on their individual perception. Fehrman and Fehrman (2000, 2004) describe color as people's individual illusions in a seemingly colorless world.

Particular colors are known to have different effects on individuals: some raise feelings of calmness while others act as stimulants (Stone and English, 1998). More specifically, cool colors like blue and green hues have a calming effect while warm colors like red and yellow hues have an arousing physiological and psychological effects on individuals. Similar alternating effect have also been found in the extreme ranges of the same color (Jacob and Suess, 1975). As with colors, other studies have also found that environmental catalysts (such as daylight and smells) can also have a significant effect on nervousness and even sentiment (Walch, et al, 2005; Lehrner, et al. 2000). The color of a wall is also regarded as such an environmental stimulant; one that is easy to change and can also affect the 'climate' of an indoor environment, thus demonstrating the effects of environmental coloring on social behavior within a healthcare environment. Considerable research has been done to determine just how much of an effect color has on individual feelings, while studies into the nature of color as a component of the environment and its particular effects in a healthcare setting have been rather limited. Regardless, however, the relationship between color and individual feelings is widely accepted in the literature as proven by the shared acceptance that cool and warm colors have quieting and stimulating emotions, respectively (Kaya and Epps, 2004; Wexner, 1954; Valdez and Mehrabian, 1994). It is also widely accepted among designers of healthcare facilities that natural and cool colors are the most suitable for such environments. According to Tofle, et al. (2004) however, there has been no proven relationship between the efficiency of a healthcare

facility, the effectiveness of its staff, or even patient health and the use of a particular color scheme.

The Ministry of Health, New South Wales (NSW); “guideline wayfinding for healthcare facilities”, (2014) noticed that the using of red color should be used only to highlight emergence service and it is not recommended to use in any other purpose. As well as flooring color has a significant role in orientation of building and different flooring color could enhance a way finding system if it is planned for purpose and help visitors to find their way. On the other hand, for choosing a proper flooring color material in hospital, the study by Dalke state that:

All manufacturers of flooring have large ranges of colors so interior décor planning is easier than ever today. Paler flooring has been a major trend in flooring for a while in both soft and hard flooring. A pale color will reflect more light, brightening up any space, but may tend to show the dirt more. A darker color may mask dirt and not need to be cleaned so often, but it may show up lighter dust and debris normally hidden by lighter colors (Dalke, et al. 2004 p. 29).

Moreover, the study by Dijkstr et al. (2008) shows that orange color with a comparison to white has a significance influences on moods of arousal. But compared to green color has not the same reducing feelings of stress. This research used white color as a control condition. Because it is expected to be neutral color, which is commonly used in the most of hospitals. Additionally, white color has been assumed as a neutral and sometime it might even have an injurious effect (Kwallek et al. 1997 & Dijkstr et al. 2008). As well as in white interiors may make more mistakes than those in different coloured interiors (Kwallek, & Lewis, 1990). The Department of Health U.K 2014; Health Building Note 00-01 recommended that: 1) The further brighten color could be used for entrance and main hall and make it a refreshing place and natural. 2) Using much color will detract from significant signs. 3) Dark and dull should be avoided as

they will make an entrance seem inhospitable and austere. 4) The flooring color could be used for identifying routes. 5) Waiting area and reception destinations can be given extra identify through the use of a related color.

However, a few researches exist on hospital OPD to prefer a specific color for Outpatient waiting area space but, they demonstrate on that the color should be carefully selected for this zone, specially waiting area part which is known as a difficult and stressful time for patient in waiting for treatments, this zone should create a feeling of cleanliness and comfort. And using warm colors for flooring and understated greyed tones for walls as the background to stronger colors for seating furniture material. Also, some of them prefer soft yellow color that has positive impact on patient feelings. So those information's should be considered by the interior designers because color as an element design has a significant role in the quality of physical environments in hospital.

3.3.3 Sound in Hospital

Past research has attempted to study just how patients are affected by the built environment and how the resulting effects relate to the aspects listed above. Some such studies have found a link between physiological and psychological discomfort among patients, and a poorly designed environment (Ulrich, 1992). Different indicators can be used to assess the quality of various aspects of the hospital environment, including: social function, views and lighting, quietness, orientation, and spatial-physical comfort (Andrade, et al. 2012). It is vital, however, that these attributes are considered from the perspective of the users (Andrade et al., 2012; Fornara, et al. 2006). Studies dealing with acceptable sound level in a hospital environment tend to cite guidelines set by the World Health organization as a standard (Anand, et al. 2009; Tijunelis, et al. 2005; Hagerman et al., 2005; Akansel & Kaymakci, 2008). These standards have proven

useful given the well documented stress-inducing effects of noise on both staff and patients. Topf and Dillon (1988) argue that sound is an ‘ambient stressor’ that is capable of causing physiological or subjective stress and increasing burnout, fatigue, irritation, and work pressure among staff (Joseph & Ulrich, 2007; Topf, 2000).

A 2010 study found that the sound in the environment of a critical care unit was perceived as “awful”, “very noisy”, and made some participants wish they could “run out of the room” (Xie & Kang, 2010). Such findings show that sound has the capacity to distract staff, increase feelings of tiredness, and reduce concentration (Xie & Kang, 2010), thus proving the argument put forth by Topf (2000) that noise can be linked to burnout among staff. Individual perception is sometimes determined by uncertainty in regards to the senses. For example, auditory senses tend to become heightened to combat visual uncertainty (Heron, et al. 2004). This can cause problems in environments like hospital wards. Plagued with a variety of unusual environmental stimulus, noisy sound in such an environment can have the effect of bombarding patients (Akansel & Kaymakci, 2008). Even though it is now well known that the soundscape in a healthcare environment can affect individuals quite strongly and excessive sound can have negative health consequences (Ulrich, 1992), the full range of these effects has yet to be identified.

Schafer (1976) defines a soundscape as an audio version of a landscape. He also advocates considering the entirety of the sound environment, rather than specific sound sources like a monitor beeping. Understanding the concept of the soundscape is particularly important as research into hospital sounds evolves from just measurement to considering the positive aspects of sound (Dawson, 2005), especially since sound

quality is determined by factors other than loudness, such as the characteristics of the physical space (Mackrill, et al. 2013).

Hagerman, et al. (2005) argue that the psychosocial environment is also affected by acoustics. They found that interpersonal conflict and errors can both be reduced by improving the acoustics in healthcare environments. The two most important factors to be considered when determining noise and room acoustics are the reverberation time and the level of sound pressure. Both of these are integral to the creation of an environment capable of supporting hearing and mitigating any potential negative effects of noise and sound in general (Van Hoof et al. 2010). Moreover, some study prefers to design hospital courtyard system and providing a landscaped garden close to patient areas to include landscapes or plants that inspire or encourage the sounds of nature such as water feature and birdsong (Iyendo, 2017).

Finally, Suggestions for clinical practice and interior designers, to reducing the noise level by providing acoustic materials, especially flooring material shouldn't be hard to reduce the noise level. As well as it could be improved by implementing relaxing sounds and music. Also, the interior design may consider pleasant natural sounds such as birdsong, waterfall, ocean waves, and soothing music.

3.3.4 Use of Artworks in Hospital

For an architect, art is probably the easiest positive distraction to provide. Artwork can take many different forms, such as photography, sculptures, and paintings, amongst others. Regardless of the form, artwork in healthcare settings all serve the same purpose of inspiring and supporting the healing process. This purpose is not expected to be interpreted literally (e.g. by showing actual photographs of people healing), but

is rather meant in the metaphoric sense of displaying simple, positive, familiar, and inspiring works of art.

Pioneer researcher on the use of artwork in healthcare settings, Roger Ulrich, has argued that the ambiguity that is often found in abstract art makes it open to different interpretations and such interpretations could be negative and frightening among patients who already feel unwell (Friedrich, 1999). Furthermore, even unambiguous paintings could have negative effects and sensitivity should also be applied, even in the case of artwork containing human-shaped figures. For example, a painting of a woman with long flowing hair could be disheartening to a cancer patient who has recently lost her hair and cause feelings of negativity. Overall, more positive distractions could provide a much-needed link to humanity.

A link has also been found between patients' response to stress, anxiety, and trauma, and the images contained in pieces of artwork (Landro, 2014; Nanda et al. 2012; Ulrich, 1999). The positive distracting effects of artwork on rehabilitating hospital patients has widely been documented and these positive distractions are understood to include environmental factors that incite individual feelings of positivity without causing stress, thereby preventing them from worrying (Ulrich et al., 1991).

Art therapy is based on the idea that patients' experiences with creative activity gives them a large amount of energy that allows them to adequately and positively deal with their medical concerns. The documented effects of art therapy tend to follow the same pattern: they increase feelings of self-esteem and self-awareness among participants, cause them to be more realistic and accepting about their medical situation, allow them

to cope with bereavement, and help them develop their capacity for interpersonal relationships (Schweizer et al, 2014).

Dumfries Transplant Waiting Area



Figure 11: Using visual art to enhance the Clinic waiting area (Cusack, et al. 2010).

Combining both therapeutic and psychological methods, art therapy is an important tool for managing a variety of medical conditions. For example, it helps cancer patients better adjust to the realities and fear facing them as they struggle for survival. (Wood, et al. 2013). Women with cancer have been found to have a better quality of life, suffer from less stress, and report positive changes in their experiences as a result of their participation in art therapy (Monti et al, 2006). Similarly, Bar-Sela, et al. (2007) found a reduction in the occurrence of depression and fatigue among cancer patients undergoing chemotherapy amongst participant in art therapy, while Deane et al. (2000) found that such patients have greater chances of survival, a better understanding of their condition, and an enhanced will power. Ulrich, (1999) Study state that how patient reacts to the natural elements as well as abstract art, he found that patients have been negatively reactive to the abstract art, and in the same time positively reacted to the clear nature art.

Finally, all evidences demonstrate the importance of artwork to promote the healing environment. Artworks are known as elements that reduce symptoms of stress, pain, and anxiety, reduce feeling of isolation and enhance mood. However, it could not be found how the artworks should be used and with which styles or colors. But, the usage of artwork in hospital is suggested by many researches such as (Ulrich, 1990; Ulrich, 1991; Ulrich, 2004; Stuckey, & Nobel, 2010; Blomdahl, et al. 2013; Iyendo, & Alibaba, 2014). So, the interior designers should consider artwork and utilize in the design of hospitals and OPD spaces.

3.3.5 Natural Elements and Interior Landscape Plants in Hospital

Natural elements and interior landscape are described as positive distraction and environmental elements in healthcare facilities. They also play a considerable role in the quality of interior space and quality of care. In the literature, natural elements have been described as healing gardens or a healing landscape in both the interior and exterior of healthcare facilities. As Cooper et al. (1999) describe them, healing landscapes can be outside or inside of the facility. What makes them healing “gardens” is not their location but the presence of nature like water and/or plant features (Cooper, et al. 1999). In the 1980s “Laboratory studies reported that plants may reduce the level of air contaminants, including formaldehyde, benzene, trichloroethylene, carbon monoxide and nitrogen dioxide” (Wolverton et al., 1989 cited in Fjeld, 2000 p. 46). Other similar studies have found that individual wellbeing, physiological, and psychological stress levels are all affected by their surrounding environment with vegetation having a positive, calming effect (Ulrich, 1979; Ulrich et al., 1993; Ulrich and Parsons, 1992). According to many studies, the usage of nature in the hospital environment has great advantages, which include improving mood, reducing stress and increasing satisfaction in healthcare (Beauchemin et al. 1996; Cooper et al. 1999 &

Whitehouse et al. 2001), reducing pain (Ulrich, 2008), as well as providing an enhanced physical environment (Sandal et al. 2015). Rappe & Kivelä (2005) state that attending gardens enhanced emotional wellbeing and have a positive effect on patients' mood. He found that "four out of five participants felt that visiting the garden enhanced mood" (Rappe, E., & Kivelä, S. L. 2005 P. 302).



Figure 12: Northeast Georgia Medical Center (URL 5)

Historical accounts show that this belief guided the exemplary hospitals of old, whose main objective was ensuring the comfort of their patients (Stein, 1990). Healing landscapes have been a vital aspect of people's life for a long time (Severtsen, B. 2015). The idea that plants and landscape are beneficial for patients in healthcare environments has been around for more than a thousand years and is more common in Asian and Western cultures (Ulrich and Parsons, 1992). For example, during the middle Ages in Europe, monasteries formed elegant and beautiful gardens to bring

charming, soothing abstraction to the sick (Gierlach-Spriggs et al., 1998). Furthermore, in the 1800s, landscape and plants were found to be important features in European and American hospitals (Nightingale, 1860). Even though gardens became less common in hospitals during the early decades of the 1900s, major progress in the medical sciences led hospital administrators and architects to focus on building healthcare structures that would not only reduce risk of infection but also serve as efficient settings for state-of-the-art medical technology. The strong emphasis on infection reduction, added to the attention given to practical efficiency, played a huge role in the design of hundreds of major hospitals internationally -- many are now viewed as barely institutional, insufficient, and unfitting to the emotional needs of patients, their families, and healthcare staff (Ulrich, 1991; Horsburgh, 1995). Little effort was made to create environments that catered to the emotional needs of patients as the intense stress caused by sickness, pain, and troubling hospital experiences usually took center stage (Ulrich, 2001). Regardless, interest in the healing effect of nature is rapidly increasing. The literature provided by Kaplan and Roger Ulrich exploring how a landscape can be restorative has also noted the specific effects of these natural landscapes, which include: a sense of fascination and to a huge extent, distancing users through distraction (Kaplan, 1998), decreased negative emotions, catching a person's attention, and hindering stressful thoughts (Ulrich, 1981). Ulrich also specifically pointed out that patients surrounded by the scenery of nature have significantly less post-operation hospital stays, fewer negative comments from caregivers, fewer use of medication and experienced less minor post-operation complications in comparison to patients with views of a wall (1984).

In addition, researchers have also confirmed that nursing home residents have significantly greater caloric intake and exercise more when they have physical or

visual access to nature (Cohen and Weisman, 1991). The subject of how urban and natural environments affect the process of healing mental stress has been explored by various different studies (Ulrich, 1991; Kaplan & Kaplan, 1989; Ulrich, 1997; Hancock, 1999; Francis, 199 and Riediker, 2004).

Other studies have tried to focus on the differences between outpatients and inpatients. In one inpatient study, Ulrich, (1984) discovered that patients with a view of natural settings usually has shorter hospital stays. Using patient medical histories, he found that patients with a view of a wall had longer recovery periods and needed more strong painkillers relative to patients who viewed trees. Additionally, staff tended to write more positively of patients with tree views in their reports (e.g. “patient is in good spirits”), while patients with wall views received more negative evaluations (e.g. “needs too much encouragement” and “patient is upset”). Although this study was conducted exclusively on inpatients, its findings are also applicable to outpatients even if in a limited sense.

In a case study by Marcus & Sachs (2013) on the Yawkey Center for Cancer Care, an outpatient treatment in Dana-Farber Cancer Institute (DFCI) in Boston, it was concluded that the healing garden in the building reflects Dana-Farber’s commitment to support the well-being, health, and safety of its patients, families, and staff. The indoor garden is 166 square meters with a big, clear glass wall and also provides a safe, suitable circulation area for wheelchairs and maintenance equipment. Both moveable and fixed wooden seating are used by individuals and smaller groups throughout the space and some of the seating areas are more private than other, more public ones (Figure 13), (Marcus, C. C., & Sachs, N. A. 2013). A beautiful arrangement of effective fluorescent lighting is used to decorate the main lobby,

combined with energy-efficient downlights in the passageways to support wayfinding. The glass envelope of the building allows for a view of the busy streets below and allows for daylight to reach the interior, effectively creating a pleasant patient waiting area. Creative architectural designs are lit with hidden and strategically placed soft lighting (Dana-Farber Cancer Institute Yawkey Center for Cancer Care - Fisher Marantz Stone, 2018). The center was primarily meant to serve as a modern clinical building to promote the safe, compassionate, respectful, multidisciplinary, and personalized care of cancer patients and their family in a conducive environment. Other intended goals of the center include: ensuring that advancements in medical related research are directly applied to actual patient care, optimizing space utility and flexibility, minimizing treatment and waiting times, streamlining the flow of patients and medical materials, increasing staff productivity and collaboration, and creating a modern presence. The design team for the project utilized the Green Guide for Health Care and the project itself has received LEED Gold certification (Dana-Farber Cancer Institute, Yawkey Center for Cancer Care – ZGF., 2018) (Figure 14).



Figure 13: Garden plan of healing garden in Dana-Farber Cancer Institute, Yawkey Center for Cancer Care (URL 6).



Figure 14: The exterior view of the garden serves as a beacon and a symbol of healing. The garden's third-floor location and lush plantings afford privacy for garden users (URL 7).

Taking the idea of environmental healing into consideration, the parts of the built healthcare environment that can minimize stress generally have a useful impact on

health-related variables and over the previous decade, an increasing number of observational studies have noted that encountering nature is a lot more beneficial to people's health (Health Council Netherlands, 2004). Furthermore, after a valuable search of the literature, it is clear that natural elements like attractive plants, flowers, rocks and water features have a valuable impact on patients. Specifically, they affect how patients perceive the quality of health care, especially in the OPD. Natural elements also have positive influences on patients, such as reducing pain, reducing stress and improving patient well-being. So, it is important to mention that the designers to have a vital role to play in patients wellbeing when they take into account providing better quality spaces and healing environments to achieve better quality of care.

3.4 Indoor Environment Quality in Hospital

While healthcare facilities are expected to always work towards the wellbeing of their patients, they can occasionally become unhealthy catalysts for the spread of infections (Capolongo et al. 2015). A good indoor environment quality (IEQ) is important because it has a direct impact on human health and wellbeing. Human beings have attempted to create indoor environments in which they can feel comfortable (Council, U. G. B. 2011). Especially since it has been discovered that people spend about 80–90% of their time indoors. Moreover, human health is the primary concern for any assessment of environmental comfort and “if for any reason the built environment is leading to sickness or negative impact on occupant health then it is a matter of concern and could point to some design or technical flaw in the building system” (Arif et al. 2016 p 2). The existing research has found that any problems with the IEQ (air, visual, acoustic, and thermal quality) of a building directly affects the productivity, comfort, and health of its occupants (De Giuli et al., 2012). It has also been concluded that the

relationship between individual wellbeing and IEQ is not a simple one and a variety of indoor variables could have an even larger variety of unexpected effects (Apte et al., 2000; Jantunen et al., 1998; WHO, 2002). These impact of these complex effects on individuals could have both short and long-term repercussions (Babisch, 2008; Fisk et al., 2006; Lewtas, 2007). The productivity of a building's occupants could be affected by any number of building-related pollutants and illnesses, or even sick building syndrome (SBS). IEQ has also been linked to a number of mental health issues and even some health issues not noticeable in the short-term, such as obesity, asthma, and cardiovascular diseases (Houtman et al., 2008; Jaakkola et al., 2013). The following sections describe certain strategies that can be used to improve the quality of an indoor environment, including regulating internal noise, the type of materials used, external view, ventilation, thermal comfort, and daylight.

3.4.1 Indoor Air Quality, Thermal Comfort and Ventilation

It is nearly impossible to avoid discussing the effects of air quality when discussing human health within the context of the built environment (Guenther, R., & Vittori, G. 2008). Indoor air quality (IAQ) is vital as it can have both long- and short-term effects on the health of a building's users (Wargocki et al., 2002b). Two strategies have been suggested to optimize the IAQ of a building during the design phase. The first involves increasing the rate of ventilation, which will minimize pollutants and increase the overall quality of the circulated air (Daisey et al., 2003). The second strategy tries to attack the source of the problem by removing any pollutants within and around the building to prevent them from being introduced into the air (Arif, et al. 2016). Consequently, it is important that adequate air conditioning systems are used in healthcare facilities if the needs of all occupants (patients, staff, and visitors) are to be met and their safety guaranteed. Natural ventilation systems can be used to handle

circulation and although most facilities prefer mechanical ventilation, natural systems still require proper design and operation by hospital architects and engineers (Li, Y. 2013).

The role of Indoor Air Quality IAQ is a significant function in healthcare facilities and helps provide a better environment for patients. IAQ has since been linked to the productivity, comfort, and health of building occupants (Samet 1993), which it affects based on thermal comfort parameters and the level of indoor contamination (Persily & Emmerich 2012). It is impossible, however, to define a building's IAQ performance solely on the basis of the degree of contamination due to the innumerable number of possible contaminants, a lack of related guidelines for most contaminants, and the simple fact that individuals respond different when exposed to similar contaminants.

In addition, for more understanding in thermal comfort WHO state that:

In temperate and warm climates and under good ambient air quality conditions, a higher ventilation rate is good for both thermal comfort and indoor air quality. However, this is not true for cold climates where outdoor air infiltration should be minimized for thermal comfort. When the ambient air temperature stays above 30 °C, the thermal conditions in a naturally ventilated ward may become intolerable. Therefore, in a naturally ventilated building, more effort needs to be spent on the architectural and envelope design to achieve acceptable indoor thermal comfort than for a building with mechanical ventilation (WHO, 2009 P. 36).

Alternatively, thermal comfort can be used to complement current efforts towards ensuring individual comfort in an environment (ASHRAE 2009). This is especially true as we are yet to fully understand the many complex ways through which different aspects of the indoor environment (sound, lighting, temperature, and contaminants) interact with one another (ASHRAE 2011). Building IAQ performance and other environmental indicators can also be evaluated using occupant questionnaires (Baird 2005). The downside to this strategy is that such questionnaires do not follow standard

format and fail to adequately address the health impacts of contaminants with effects that manifest long after exposure or those that are not easy to detect in low concentrations. The resulting failure to properly link the health and comfort of occupants to specific IAQ indicators means that performance requirements are best satisfied by guaranteeing good practice when designing, constructing, operating, and maintaining buildings. This was the strategy proposed in a recent IAQ Guide (ASHRAE 2010a). Maintaining a suitable IAQ also requires proper ventilation levels to ensure the flow of clean outdoor air, clean and dry buildings, ensuring proper building maintenance and operation, and limiting indoor contamination through source isolation and proper material election, among others. In 2009, the WHO state that:

With a higher air-change rate, the indoor air quality is more linked to the ambient air quality. The benefit is that the indoor air quality is less likely to be affected by the presence of common indoor pollutant sources, such as the off-gassing from common building materials. In regions with severe ambient air pollution problems, the location of an infectious disease hospital should be chosen carefully. A hybrid (mixed-mode) ventilation design may be the only option. Solely relying on ordinary window openings will expose the occupants to a high ambient pollutants level (WHO, 2009 P. 38).

The UK's Health Building Notes (HBN, 2014) outline the primary design features of healthcare facilities needed to ensure that their air quality is suitably fresh for patients, staff, and visitors. The factors that need to be taken into consideration include:

- The amount of space using air conditioning and/or natural/artificial ventilation;
- The accessibility of natural ventilation to building occupants; and
- The ability of occupants to conveniently control the level of ventilation and heating.

Most design standards applicable to healthcare facilities emphasize the importance of natural ventilation systems, in such buildings. The WHO best described the difference between air conditioning and ventilation when it stated that both air conditioning and

Ventilation are different ideas. The goals of ventilation are to preserve a proper IAQ, i.e. ensuring that indoor air is safe for breathing purposes. The goals of air conditioning are to preserve a 'thermally-comfortable' IEQ. As well as isolation rooms with satisfactory ventilation controls and controlled uni-directional flow of air could be available every time possible in healthcare facilities (WHO, 2007 P. 15). Moreover, the WHO has since gone further to suggest that there are three types of building ventilation:

3.4.1.1 Natural Ventilation

The Natural ventilation is considered one of the best ways to combat the spread of airborne infection in modern healthcare facilities (Qian et al. 2010 & WHO, 2009). While more research in the field of disease control is needed to prove the usefulness of natural ventilation to control the spread of infection, a number of recent publications (Escombe et al., 2007, Qian et al., 2010, WHO 2009) have convincingly argued in favor of the effectiveness of nature in reducing airborne pollution (including infectious pathogens). The WHO (2009) has recommended that to best combat the risks, specific needs, resource availability, and the price of the system should all be taken into account when deciding whether to use natural or mechanical ventilation for infection control (WHO 2009). It is noteworthy, however, that natural ventilation systems are more susceptible to changes in occupant behavior and climatic conditions making them better suited for warm climates as opposed to those that are humid (WHO 2009 and Salonen, et al. 2013). Ventilation systems draw air from outside into the desired room or building and also circulates the air within it. The central goal of ventilation is providing healthy breathable air by filtering airborne pollutants both from inside and outside the building (Etheridge & Sandberg, 1996; cited in WHO 2009).

It was in 2007 when the WHO published its first set of guidelines on the control of infections that considered natural ventilation to offer one potentially effective way on managing the spread of airborne pathogens from respiratory diseases in healthcare settings (WHO, 2007). By 2009, the organization released a set guideline concerning the operation, design, construction and maintenance of natural ventilation systems. (WHO, 2009). Low ventilation rates or lack of ventilation altogether generally correlate to the outbreak of diseases and increased infection rates in the cases of airborne and opportunistic airborne transmission. It follows, therefore, that infection rates can be kept down by increase ventilation rates. The WHO formally describes natural ventilation as:

Natural forces (e.g. winds and thermal buoyancy force due to indoor and outdoor air density differences) drive outdoor air through purpose-built, building envelope openings. Purpose-built openings include windows, doors, solar chimneys, wind towers and trickle ventilators. This natural ventilation of buildings depends on climate, building design and human behaviour (WHO, 2009 P.7).

Natural ventilation systems can be enhanced further by integrating other methods like wind towers, solar chimneys, and atria ventilation into the building design (see Figure 15).

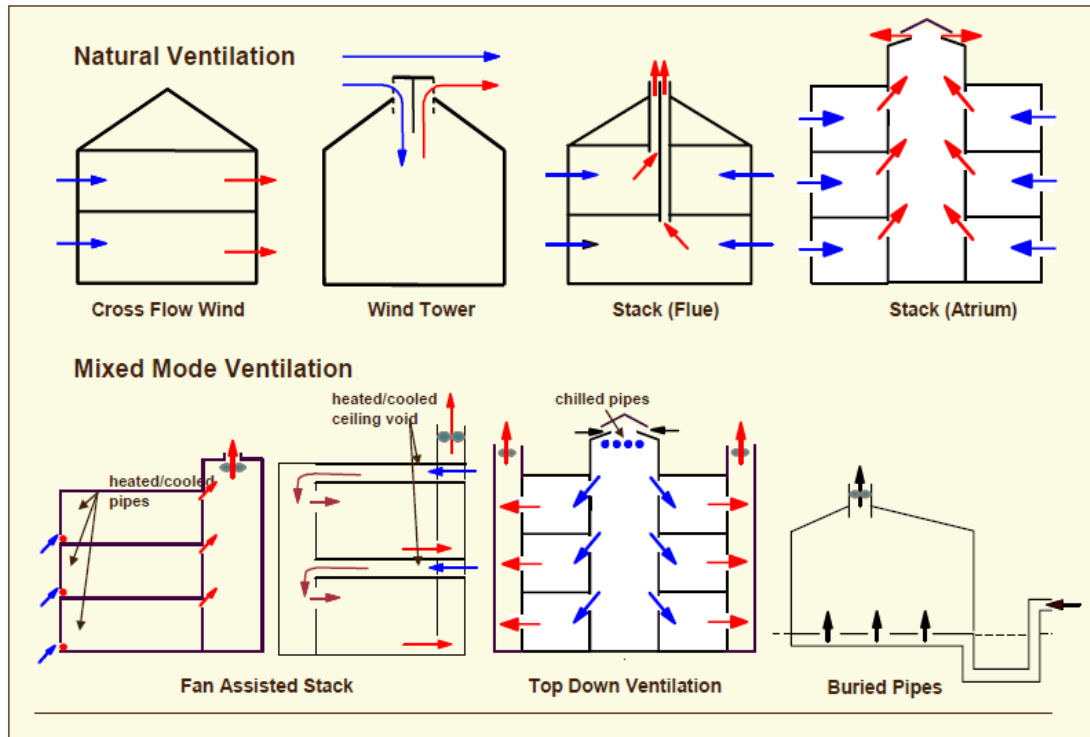


Figure 15: Diagram shows different concepts of ‘natural’ and ‘mixed mode’ ventilation systems (WHO, 2007 P. 51).

The risk of airborne cross infection in isolation rooms and hospitals can be effectively managed using high ventilation rates. Natural ventilation systems are more energy-efficient at providing higher ventilation rates than mechanical systems since they use the forces of nature (density difference and wind) to regulate the flow of air inside and around the building. While natural ventilation is arguably the most economic choice, it is nearly impossible to control and predict its precise temperature and airflow; although modern natural ventilation systems are increasingly becoming technology-dependent, similar to mechanical ventilation systems (Qian, et al. 2010). Contemporary natural ventilation systems use modern designs for their assisting fans, ventilation openings, and even modern computer control systems, in contrast to traditional natural ventilation. As a result, adequately designed natural ventilation systems can be just as effective as mechanical systems, particularly when they are combined using the principle of hybrid ventilation (Heiselberg, P. 2000). According

to Jiang et al. (2003) the use of large windows for ventilation also reduced the risk of infection in the two hospital buildings they studied.

The primary goal of a ventilation system is to ensure the thermal comfort of a building's users. In the case of hospitals, this objective is expanded to include reducing the spread of infection and this is why they mostly use 100% outside air and have an AER higher than in regular buildings. Occupants can become uncomfortable when the air supply is reduced as this means an insufficient amount of conditioned air is circulating in the rooms (Miller, et al. 2017). It is evident that further research is needed to understand the complexity of ventilation systems in hospitals. Table 2 below shows the advantages and disadvantages of the different kinds of ventilation systems for hospitals.

Table 1: The advantage and disadvantage of ventilation concepts in hospitals. (WHO, 2009)

	Mechanical ventilation	Natural ventilation	Hybrid (mixed-mode) ventilation
Advantages	Suitable for all climates and weather with air-conditioning as climate dictates More controlled and comfortable environment Smaller range of control of environment by occupants	Suitable for warm and temperate climates — moderately useful with natural ventilation possible 50% of the time Lower capital, operational and maintenance costs for simple natural ventilation Capable of achieving high ventilation rate Large range of control of environment by occupants	Suitable for most climates and weather Energy-saving More flexible
Disadvantages	Expensive to install and maintain Reported failure rate in delivering the required outdoor ventilation rate Potential for noise from equipment	Easily affected by outdoor climate and/or occupant's behaviour More difficult to predict, analyse and design Reduces comfort level of occupants when hot, humid or cold Inability to establish negative pressure in isolation areas, but may be provided by proper design; depends on situation Potential for noise intrusion High-tech natural ventilation shares some of the limitations and disadvantages of mechanical ventilation	May be expensive May be more difficult to design

3.4.1.2 Mechanical Ventilation

“Mechanical fans drive mechanical ventilation. Fans can either be installed directly in windows or walls, or installed in air ducts for supplying air into, or exhausting air from, a room” (WHO, 2009 P.7). The specific type of mechanical ventilation used in a building is determined by the local climate. For example, the danger of interstitial condensation (which happens when cold surface comes in contact with warm moist air from inside a building through a roof, floor, or wall) in humid and warm climates

requires the use of infiltration. This often means the use of positive pressure mechanical ventilation in such cases. On the other hand, exfiltration is needed in colder climates to prevent interstitial condensation and is done using negative pressure ventilation systems (WHO, 2009).

3.4.1.3 Hybrid or Mixed-Mode Ventilation

In contrast to regular mechanical ventilation, hybrid ventilation systems provide the desired flow rate based on natural forces. Here, a low flow rate from natural ventilation is balanced using mechanical ventilation (Heiselberg & Bjørn, 2002). Exhaust fans are used to improve ventilation for patient rooms containing airborne infections when natural ventilation is not enough. It is important, however, to take great care planning the installation of the exhaust fans. The optimal placement should be on the roof or a wall where air from the room can be transferred directly outside. The desired ventilation rate can also be used to determine the number and size of exhaust fans necessary, all of which should be tested before installation (WHO, 2009). (Figure 16) below illustrates how the idea of combining natural and mechanical ventilation is used in a hybrid/mixed ventilation system.

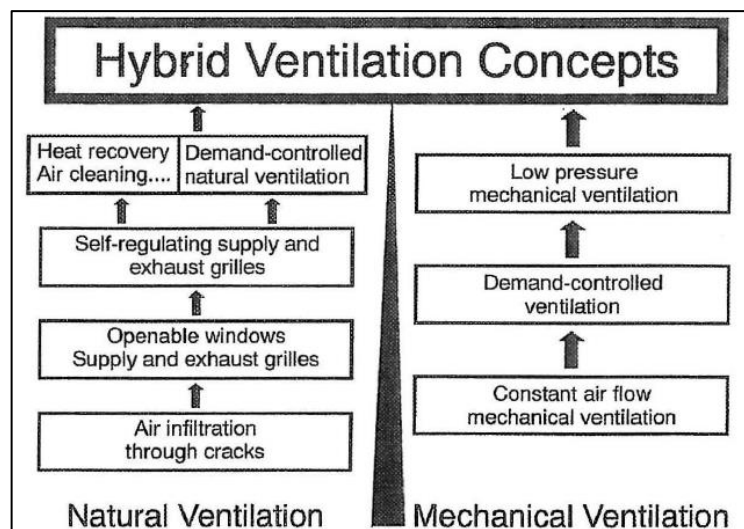


Figure 16: Hybrid or Mixed-mode Ventilation Concept (Heiselberg, 2000).

Hybrid ventilation systems can alternatively be described as systems that combine different features of natural and mechanical ventilation in different ways to provide an optimal internal environment during different times of the year (Heiselberg, 2000).

In the summary, it is valuable to mention that the IEQ has significant impacts on human health and human comfort. Consequently, hospital facilities face the challenge of designing buildings with better IAQ. Research shows the most recent guidelines, such as: WHO, LEED, ASHRAE, AIA, FGI and Green Guide for Health Care, report directly on the significance of indoor environments and ventilation systems for healthcare in countless detail. However, all of them describe these systems in general and not specific to a department even though the existing research was conducted on inpatient wards and typically evaluated just a single room. Very few studies describe the conditions of the outpatient department. In conclusion, after understanding the concepts of IEQ, IAQ and ventilation system and types, designers of these facilities have a vital role to play in achieving good levels of environment quality in the hospital interior, such that the patients feel comfortable and have a healthy indoor environment. For that reason, the designer should consider the following recommendations:

1. The designer should be careful in choosing materials with low VOCs for the interior.
2. The designer should study the site of the healthcare building.
3. The designer has to provide a good IAQ for patients and an overall healthy environment.
4. They should select a proper system of ventilation for the hospital, with respect to the climate.
5. The size and kinds of openings (passive stacks, solar chimneys, louvers, screens, windows) should be chosen based on the particular ventilation needs.

3.5 Functional Requirement

“Once the model of care has been agreed, the next key stage in producing the design brief is to develop operational principles and policies” (Health Building Note 00-01 2014. UK p. 21). Operational principles outline the functions of the individual services. They provide one way to test the effects of the overall care model on individual elements within the scheme. Operational principles also outline the relationships between the rooms and services used for a particular service to ensure that the department functions effectively as a whole (Health Building Note 00-01 2014. UK: Department of Health).

A properly planned waiting area can be very effective at helping patients relax, especially when combined with an outside view (Figure 17). Furniture choices can also contribute to making the waiting area comfortable and also improve the quality of the design of a healthcare facility (Kagioglou, & Tzortzopoulos, 2010).



Figure 17: General waiting area of Acibadem hospital Taksim, Istanbul, Turkey. By (Author, 2018)

3.6 Furniture and Furnishing in Hospital

Properly-chosen and well-placed furniture pieces can give the impression that they were created specifically for a particular interior space. They can also promote interaction, provide comfort and support, foster caregiver cooperation, and also reinforce the project's guiding principles. Performance and maintenance, therefore, should be the guiding criteria when choosing furniture, as is the case in material selection (McCullough, 2010).

There are various types of furniture finishes that can be used, including: composite materials, laminate, metal, and wood. To select the right finishing, the designer needs to take into consideration the area where the furniture is to be used. The layout of the design and the scale of the furniture (relative to the interior space) are also important factors to be considered (McCullough, 2010). An appropriate scale will not only physically fit in the space, but also affects the comfort of the users. Furthermore, hazards and risks can be reduced by choosing the tools, equipment, and suitable furniture (IFC Environmental 2003).

Mogensen, (2018) and Architects from the Health Innovation Centre of Southern Denmark suggested particular quality-enhancing changes to the design of the waiting area at Odense University Hospital, Denmark. Homely furniture with woolen upholstery were used to replace the existing furniture in the waiting area, which created an institutional atmosphere. The choice of furniture was intentionally meant to represent contemporary trends in residential interior design in Denmark, while the colors (blue and green) was intended to create a relaxed and calm environment (Salonen et al. 2013). Based on the idea that a homely atmosphere influenced the

activities in and general use of the waiting area, they attempted to create such an atmosphere by arranging soft cushions using the color scheme on recently-restored wooden lounge chairs. Interviews with some of the patients confirmed that they felt more accommodated and comfortable in the refurbished waiting area. The patients generally expressed that the furniture and color choices reminded them of home. The sort furniture was specifically noted to be a preferred alternative to the less comfortable traditional hospital chairs (Mogensen, 2018). As seen in (Figure 18 & 19).

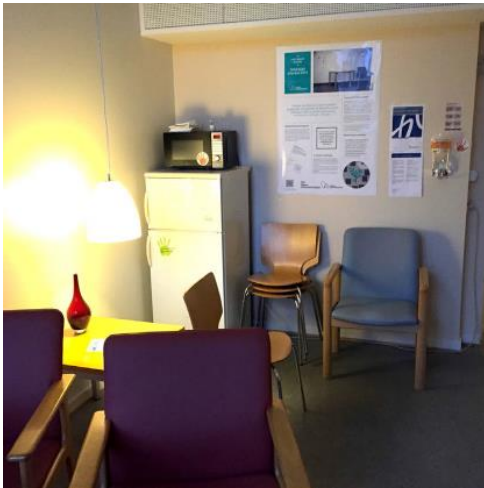


Figure 18: Existing, dayroom at 'Odense University Hospital', Denmark (Mogensen, 2018).

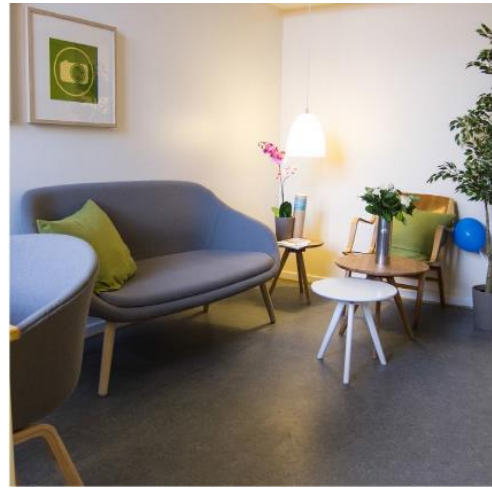


Figure 19: refurbished dayroom at 'Odense University Hospital', Denmark (Mogensen, 2018).

According to McCullough, (2010) waiting rooms are often designed to be able to hold as many people as possible. It is for this reason that they typically look like a collection of chairs. He suggests that waiting room designers should also consider adding space for computer work, knitting, reading, television viewing, and other activities. They should also consider the use of loveseats, long sofas, single lounge chairs, single-side chairs, and special seating (children's seats, hip chairs, etc.). In addition, the arrangement of furniture and materials should be comfortable to achieve a friendly environment for patient or homelike.

Another study by Huisman et al. (2012) found that comfortable furniture in waiting room is a personal need in hospitals and influences the satisfaction, comfort, privacy, and perception of users as they interact with their environment. They also stated that as with furniture height, other design features are also related to patient security and safety. These include: smooth edges, automated sinks, easy to clean surfaces, single-bed rooms, well-placed accessories and rails, suitable door openings, and non-slippery floors (Huisman, et al. 2012). "Good furniture planning can give life to large waiting spaces. Creating sanctuaries within the space has become widely accepted by the healthcare community to foster interaction or privacy when desired" (McCullough, 2010 p. 30).

Setola (2014) similarly found that waiting areas are a great place to foster interpersonal relationships between people. She argues that the following design considerations should be used by designers to ensure that such spaces are conducive to interaction: a) situating the waiting room parallel to the circulation flows that facilitate patient access; b) the visibility and morphology of the door to the examining room from the waiting room to allow staff better evaluate the treatment needs of each patient; and c) ensuring

that elements such as outside view, furniture arrangement, and light are used to encourage patient comfort and interaction, as well as “the furniture is designed according to the guarantee of psychological comfort and socialization” (Setola, 2014 p. 161).

The kind of furniture used can make patients’ experiences more pleasant and even bolster the quality of the design in a healthcare facility (Kagioglou, & Tzortzopoulos, 2010). (Figure 20).

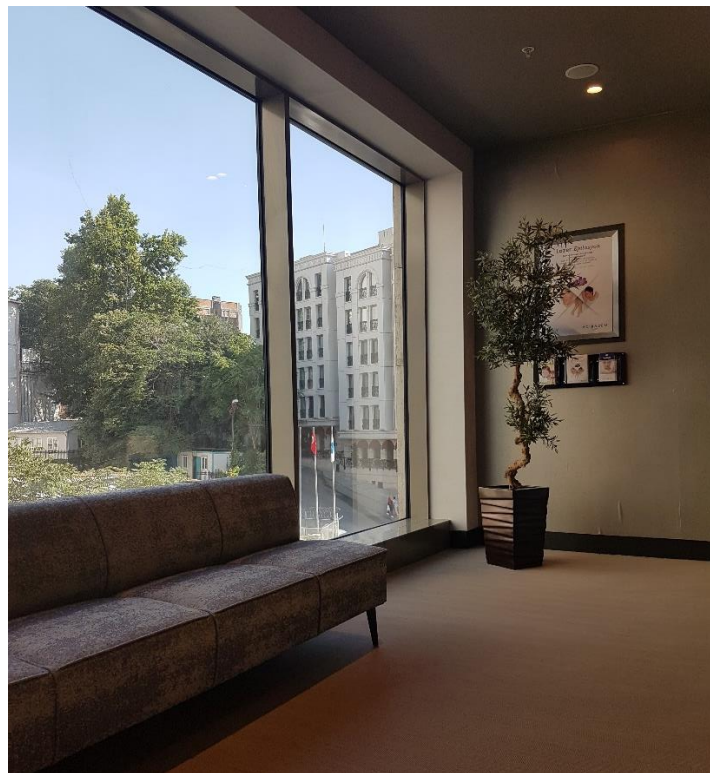


Figure 20: Comfortable seating furniture in ‘Internal Medicine Department’ waiting area, Acibadem hospital taksim, Istanbul, Turkey. Photo by (Author, 2018)

Another important issue to be discussed about furniture using in hospital is ergonomic features. The primary goal of ergonomics as a branch of applied science is to enhance productivity and performance while reducing occurrences of illness, discomfort, and injury (Springer 2007). The idea is to ensure that people remain safe and comfortable

while increasing productivity as they perform their respective activities. The ergonomic design of healthcare facilities can be maximized through the use of materials with suitable textures, colors, and sizes (Carayon et al., 2003), although it is relatively more challenging to apply ergonomics in such environments (Springer 2007). In hospital and healthcare facilities appropriate tools and furniture are demands to improve and support patients' care, and it should come up with comfortability and supporting whenever they feel stressed (Malone and Dellinger 2011 & Chaudhury et al. 2009). The tools such as wheelchair, beds, trolleys, tables, and chairs should be available, well-maintained and suitable (Chaudhury et al., 2009). Good ergonomics can also increase patients' ability to use information and perform tasks (Salonen, et al 2013a).

For improving the healthcare outcomes, the arrangement of furniture and its design in hospitals should: minimize using surface contaminated which produce infections for example using easily cleanable surface (Malone and Dellinger 2011). Prevent risk of patients fall by providing for example chairs with armrests and adjustable seat height (Malone and Dellinger 2011). Minimize errors for example by offering sufficient light and configurable furniture. Improve communication and socialization between the patients and families as well by arranging furniture to small flexible groups (Melin and Gotestam 1981; Somner and Ross 1958; Ulrich 1991; Ulrich 2000a; Ulrich 2000c; Ulrich 2000b; Karro, et al. 2005; Ulrich et al. 2008; Malone and Dellinger 2011) (Figure 21) and enhancing variations in scale, size and width (Gottesman et al. 2009; CDC 2008; Sigrest 2003; Malone and Dellinger 2011; FGI 2010). As well as minimize patients and users stress, by testing furniture for comfortable and safe use. Also improve staff communication, efficiency, and effectiveness, example, by providing

furniture that is easily adaptable to the ergonomic needs of individual workers and providing and using 'sound-absorbing' materials. (Salonen, et al 2013b).



Figure 21: Improving communication and socialization between the patients and families by arranging furniture in Acibadem hospital taksim, Istanbul, Turkey. Photo by (Author, 2018).

In summary, some of possible features of furniture that are used in HCFs' waiting areas can be listed as bellow:

- Easy-to clean furniture (Ulrich et al. 2008).
- Appropriate furniture arrangements, ergonomic, configurable furniture supporting acoustic and visual privacy (Salonen, et al. 2013a).
- Furniture and materials which create more home-like atmosphere. A research show that patients prefer soft textile chairs instead of plastic ones (Mogensen, 2018).
- Comfortable movable furniture arranged in small flexible groupings (Ulrich, 2004).

- Appropriate furniture design and covering, non-institutional, safe and comfortable for users, attractive, sound-absorbing materials that can be easily cleaned (Salonen, et al. 2013a).

3.7 Material and Finishing Requirements in Hospital

Materials and finishes should be chosen based on their compatibility with their intended function and need for little to no maintenance. It is important that designers avoid building elements that are either hard to clean/service or need to be refurbished regularly. Special consideration should also be given to entrances, counters, corners, partitions, and other elements expected to be used quite frequently (Health Building Note 00-01, 2014. UK: Department of Health). “A focus on improving public health or protecting ecological systems without addressing the production, use, and disposal of industrial materials will prove inadequate and ineffective” (Geiser, 2001 p. 390). The Materials should be healthy and easy to maintain, as well as attractive. “Well-selected, fit-for-purpose furnishings will complement a clear approach to design” (Kagioglou, & Tzortzopoulos, 2010 p. 65).

Cleanliness is important for good hygiene, which is important for preventing infections and is also affected by the kinds of materials used in a healthcare facility. The surfaces of many of these materials can be contaminated by infected patients and be transferred by personnel when they touch such infected surfaces even with their gloves (Boyce, et al. 1997 & Aygün, et al. 2002).



Figure 22: Rush University Medical Center: LEED Gold–certified (URL 8).

In addition to the fact that it is important for environmental safety that materials are free of any materials that could damage human health (Malone and Dellinger 2011), properly-selected materials can also help in controlling noise (McCullough, C. S. 2010). Soft surfaces (fabric wrapped panels, ceiling tiles, carpet etc.) absorb noise at a higher rate than hard surfaces. The strategic placement of materials can also affect the experiences of patients (who can rest easier), visitors (who perceive the environment as calm), and staff (who find it easier to concentrate and have less workplace mishaps) (Moeller, 2005).

Flooring material: One important step in building design is selecting the appropriate floor, and in healthcare setting, this choice should be made based on each material's ease of cleaning. Linoleum and rubber flooring are the most common choices as they require little maintenance, are sustainable, and highly durable (McCullough, 2010).

Several studies have explored the relationship between flooring materials (Anderson et al., 1982; Skoutelis et al., 1994) and furniture coverings (Lankford et al., 2006;

Noskin et al., 2000) on the one hand, and environmental contamination in hospitals on the other. In addition to the fact that carpets are notoriously harder to clean than hard flooring materials (Harris, 2000), they are also more open to being infested with bacteria and fungi (Anderson et al., 1982; Beyer & Belsito, 2000; Boyce et al., 1997; Skoutelis et al., 1994). Conversely, other studies have found that some very dangerous pathogens (e.g. vancomycin-resistant enterococci VRE) are better protected against using carpets as opposed to other types of flooring material, including vinyl, linoleum, and rubber tiles (Lankford et al., 2006). In addition to being less conducive to VRE, carpeting performed well in cleaning tests and also transferred less VRE than rubber and vinyl through direct contact (Lankford et al. 2006 cited in Ulrich et al. 2008).

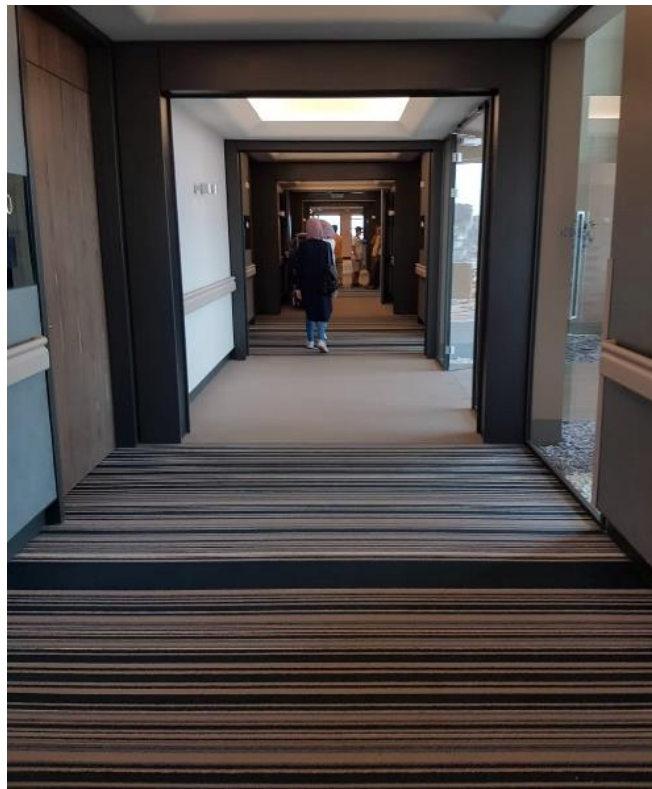


Figure 23: Using carpet in corridors: Acibadem hospital taksim, Istanbul, Turkey.
Photo by (Author, 2018)

Regardless, carpeting is typically more common in home, rather than hospital environments and while some studies are more welcoming, most studies are firmly

against the use of carpeting in healthcare facilities. In their study, Cheek, et al. (1971) found that hospital staff reacted quite negatively to carpeting, even though the hospital administration thought it was a successful alteration as it improved both the appearance and safety of the unit in hospital. The carpeting was also considered a success because it was installed before the unit became functional, meaning that appropriate arrangements had been made for cleaning services beforehand. The success of carpeting in a hospital environment appears to be a question of particular organizational and situational variables (Huisman, et al. 2012).

Figure 24, shows an example of using a sustainable flooring material. The Dell LEED Platinum-certified Children's Medical Center of Central Texas, used Low Embodied Energy, healthy building materials, low VOC material. Healthy materials include rubber and natural linoleum as the dominant flooring materials.



Figure 24: Dell Children's Medical Center of Central Texas interior (URL. 9)

Another example: In Massachusetts General Hospital they used: Low Embodied Energy/Healthy Materials, toxic chemical avoidance, and low emitting as well as absorbing material such as rubber flooring. Decentralized nursing stations reduce ambient noise levels through design solutions including rubber flooring. This project is also LEED Gold–certified (Figure 25).

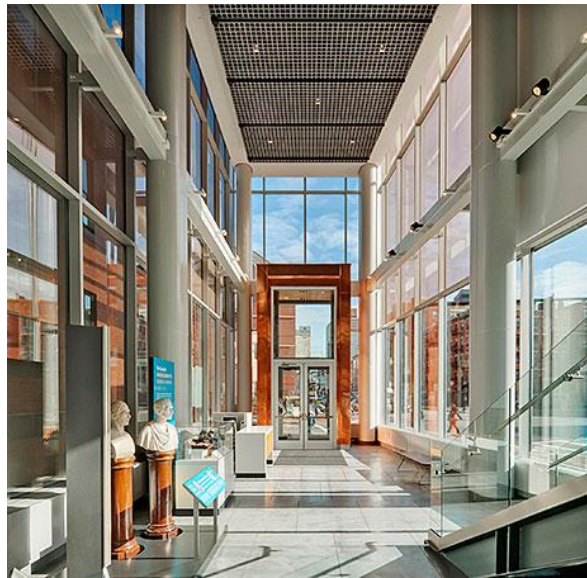


Figure 25: Massachusetts General Hospital interior (URL 10)

Eventually, the choice of proper flooring materials is necessary to ensure the comfort, safety and health of patients and staff. Sustainable flooring materials are available to meet these demands and reduce environmental impacts. When choosing flooring solutions for healthcare buildings important considerations are to be sustainable, durable, hygienic, easy to clean, safe, cost-effective, and aesthetically pleasing. Flooring is a key component of any healthcare environment, and hospitals in particular.

As a conclusion, to achieve a better quality in hospital spaces in general and in the Outpatient Department waiting areas specifically all the design factors mentioned above: quality of lighting, accessibility and relation of indoor to outdoor, circulation,

wayfinding, signage, color, sound, artwork, IEQ, IAQ, ventilation, positive distraction, natural elements, functional requirements, furniture, material and finishing should be taken into consideration as they all have a large impact on the users of the spaces and the way they feel and work in these spaces. The following diagram shows the summary of space quality components and space requirements in hospital OPD.

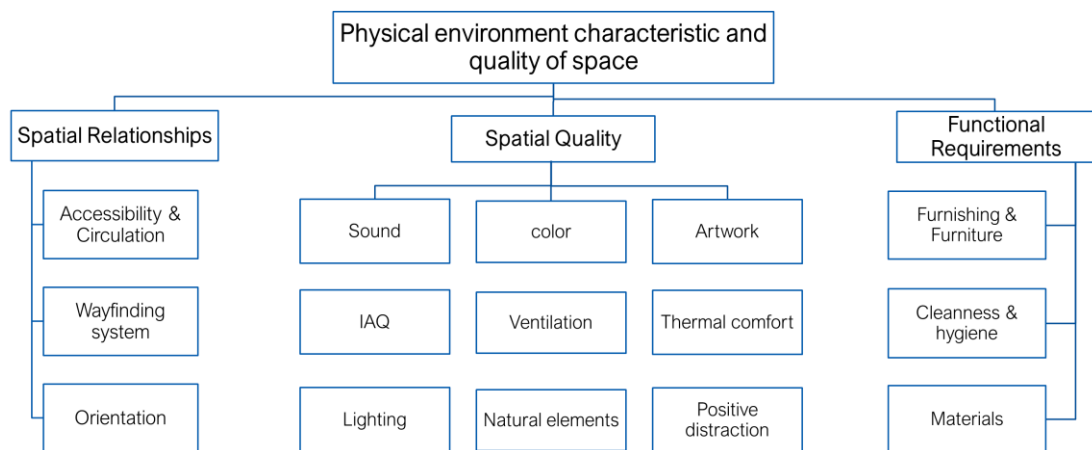


Figure 26: Summary of the physical factors to be considered in design of OPD

Note: A detailed checklist that designed based on literature survey have been shown in (Appendix A).

Chapter 4

CASE STUDY

4.1 Introduction

The case study research has been done in Famagusta city on the Island of Cyprus, which is located in the Eastern Mediterranean region. The island is considered the third largest Island in the Mediterranean Sea (Figure 27). The island consists of two-parts: North and south. The North part of Cyprus is known as the “Turkish Republic of North Cyprus” (T.R.N.C), and the south part is known as the “Republic of Cyprus”. (Figure 28). Famagusta is the second largest city in the TRNC. This study focused on the public hospital in this city, which serves Cypriot as well as international residents.



Figure 27: Island of Cyprus (URL 11).

4.2 Healthcare Situation in North Cyprus

There is very little research about the ‘healthcare’ situation in North Cyprus. In a study by Rahmioglu et al. (2012), it is stated that people who live in North Cyprus are able to access healthcare facilities via four possible care pathways:

1. The first is access through the public healthcare system. The public care system provides a great discount rate for people who have social security insurance, which is required for every person who works in the country, either employed by private sector, governmental employer or self-employed.
2. The second way is through the private sector, many people are seeking medical attention through this sector.
3. The third alternative is to use public services in Turkey. The Northern Cyprus government helps to send people free of charge to Turkey in case the specialist healthcare services required are not available in public health sector of the country.
4. The fourth pathway is crossing the border and accessing public health services in Republic of Cyprus.



Figure 28: location of Famagusta city (URL 12).

4.3 Famagusta State Hospital

The Famagusta State Hospital has been opened since November, 2007 (Figure 29) and has been serving Famagusta city, as well as other neighborhood districts, such as Iskele and Karpaz (URL 30).



Figure 29: Famagusta state hospital (gazimağusa devlet hastanesi) (by author 2018).

The Famagusta State Hospital is the largest hospital in the Turkish Republic of North Cyprus (URL 31). The hospital has a 120-bed capacity, 95 acres of land site and the built area is 18,500 square-meters. It consists of many departments. The TRNC Ministry of Health states that this hospital is operated using European Union standards with its operating room, x-ray, laboratories and policlinics. The hospital serves both outpatients and inpatients, has 122 nurses, 38 doctors, 77 civil servants and 49 workers working for 24 hours. The hospital management consists of the Chief Physician, Chief Physician's Assistant, Chief Nurse, Chief Nurse Assistant, and 3 Administrative Officers. The hospital also has a car park for 500 cars and an emergency car park for 34 cars (T.R.N.C, Ministry of Health, URL 32).

4.4 Aim of the Case Study

The main aim of this case study is to evaluate the OPD in Famagusta State Hospital through the checklist which was developed based on literature survey. The checklist consists of all components and parameters of space quality with details and recommendations that can be used as a base for designing and evaluating for healthcare facility providers. The checklist table is provided in Appendix A.

4.5 Method of Data Collection

In order to limit the research and form this case study, the research focused on the waiting area space in the out-patient department (policlinic) of the Famagusta state hospital. In order to collect the relevant data in this case, several techniques were used.

Based on the findings in the literature, this case has been observed by evaluating the physical environment of three main areas: waiting area, corridors, and policlinic entrance hall. The personal on-site observation procedures have been done several times in different periods in a year so as to attain comprehensive and preferable results from the observation research. Moreover, different techniques were used for the purpose of evaluating the interior physical environment, such as: accessibility and circulation of patients, way-finding system, orientation for vertical communication and the absence of visual barriers, and the safety of patients in terms of lighting, color, sound and thermal comfort. Also included are functional requirements, such as: furnishing and furniture arrangements, distinction between waiting area and transit and connection to other unites and access. In terms of privacy, the availability of different areas for socialization was checked and we also evaluated design elements that impact the psychological dimension and comfort of users, including lighting, color, materials and furniture.

As was previously mentioned, the site was visited several times so as to be more familiar with the whole hospital environment. In conclusion, the evaluation of case study has been done according to the checklist that has designed based on the literature review as shown in (Appendix A)

4.6 Data Analysis and Result

This department mainly consists of two floors with a doctor's room, main corridor, waiting area and pharmacy. The department is considering a crowded part of the hospital with all types of patients, different diseases and different ages. This department has 27 doctors' rooms from different medical specialties.



Figure 30: Interior of out-patient department in Famagusta state hospital (photo by author, 2018).

In regard to the organization and spatial relationship of functional areas in this department, the department space has a very simple long rectangular floor plan with a simple line sitting furniture arrangement in the middle; this type of arrangement results in less socialization between patients. At the same time, the sitting furniture are parallel to the seating area and are also visible to the examining room from the waiting room (Figure 30).

The accessibility and circulation to other departments, such as X-ray and laboratory, is visually unclear for patients to find their way and we noticed that some patients faced difficulties in finding their way. For example, if a patient needs the laboratory for a test, he/she should use the staircase as his first vertical communication or the elevator in the X-ray department, which is visually unclear (Figure 31). As such, providing an elevator for this department is necessary because the department also deals with the handicapped, children, fracture care patients, as well as elderly patients (Figure 32). Moreover, the way-finding system is another issue for patients, especially in case of needing the X-ray or laboratory departments. Finally, it is possible for the hospital to use universal cues and signs to enhance the quality of way-finding in the hospital.



Figure 31: Elevator in X-ray department which is unclear visually & No cues or signs. (photo by author, 2018).



Figure 32: This photo shows the users of the OPD handicap, children, Fracture Care patients and elder patient. (photo by author, 2018).

The lighting system enhanced the waiting area by providing strong natural sky lighting, which enriched the space quality as well as minimized the use of artificial light in waiting area. It was mentioned earlier that Natural lighting increases patients' comfort, wellbeing, and provides a more pleasant experience.



Figure 33: Interior of OPD in natural skylight. Photo by (author, 2017).

The color for the interior space was carefully chosen and uses a combination of harmonious colors. The interior walls were painted using cool colors, mostly near to pearl white, with white for the ceiling, and the flooring tiles are light gray. For the furniture, a metallic light gray was chosen.



Figure 34: Interior of OPD in Famagusta hospital. Photo by (author, 2017).

Tiles are used as the flooring material in the OPD. In choosing the flooring material, it is important to use safer, comfortable and acoustic materials. It is obvious that the flooring material is the first contact between the user and the physical environment. So, this material should be sustainable, durable, hygienic, easy to clean, safe, comfortable to walk and stand, acoustic, and aesthetically pleasing. These are the all-important considerations for designers and facilities' providers when choosing flooring solutions for healthcare buildings, which should be acceptable in both aesthetic and durable dimensions. Unfortunately, it was discovered that tile is not comfortable underfoot, acoustically poor, and is also not safe for patients, who tend to fall. Alternatively, it is possible to use Rubber or Luxury vinyl tile (LVT), which are preferred by the LEED for use in clinic waiting areas and corridors.

Sitting furniture is also an important element of the physical environment that patients use to sit and wait for treatment. The furniture material is simple metal without hand support, hard, and uncomfortable to sit on. On the other hand, this furniture is easy to clean even though it seems to be unsatisfactory for the patients. In terms of arrangement, as shown in Figure 33 & 34, the space is furnished in a long line, which leads to patients being less socialized with each other. The hospital did, however, provide some small group waiting areas at the main entrance of the hospital street, which is located next to the Polyclinic. We observed that some of the patients try to use this space for socializing and it seems to be more comfortable than the furniture in the main waiting area, as well as being a generally less noisy place. See (Figure 35).



Figure 35: The main admission department show secondary entrance of polyclinic and hospital street which provide small group furniture arrangement and better sitting quality.

For its ventilation system, the hospital utilizes a laminar flow ventilation system. This system controls the thermal comfort, heating, humidity and pressure (URL 32).

According to the literature, however, WHO and other guidelines for healthcare IEQ prefer a natural ventilation system in healthcare facilities. We noticed that the system is just mechanically ventilated. So, to increase the ventilation rate, it is possible to provide natural ventilation through an open skylight in the OPD. This method is recommended and approved by the WHO (2007).

We found a lack of positive distractions in the OPD. During observation, the researcher found that many people try to find something to distract them during their wait times and most of them opt to deal with their mobile phones. At the same time, the environment is also unfriendly to children. We recorded that many children start to cry when they enter the OPD. So, it is necessary to utilize the concept of a child-friendly environment by increasing positive distractions, such as T. V monitors, books, arts, music, natural elements, painting, toy for children and other positive distractions. All of these elements can be added to this facility. Finally, it should also be mentioned that we found some positive distractions in the main lobby of this hospital, such as a comfortable sitting area, access to natural view and indoor plants. Figure 36 shows the impact of the outside view to reduce the sense of separation or isolation in the Famagusta State Hospital.



Figure 36: Access to view natural and impacts to reduce the sense of separation. (photo by author, 2017).

The researcher prepared a checklist for assessing the case study combining the requirements of design features and evaluated each of them. The rating system assigns a variable scale, ranging from good to not good, and not existing. This means there are three levels; the maximum value is good, then not good and the minimum value is not existing in case where the requirement was absolutely not met. Table 2 below summarizes the evaluation of the quality of the physical environment of the OPD.

4.7 Discussion and Recommendations

The aim of this research study was to uncover what the considerations and criteria should be when designing the interior spaces in waiting areas of the out-patient department in a hospital and the quality of the physical environment in healthcare settings with a focus on design elements. This research was purposed to understand the ideal quality of the OPD interior in a hospital, as well as to investigate what the design considerations and criteria for designing out-patient department in a hospital are.

This research was trying to answer and achieve the objectives. In this research, based on the literature review and the results of the case study and observation, the factors that determine the quality of the OPD interior are summarized as following:

- Circulation systems should be designed to promote a safe environment, be accessible and fit for use in OPDs. Additionally, the vertical circulation should be visible and comfortable.
- Wayfinding system should be improved by using various colors for both floor and lighting. Also, visible signs or cues should be used to help the users find their way.
- Lighting: Proper lighting should be provided with respect to natural light. Efforts should also be made to enhance natural lighting, specifically by using a natural

skylight for the OPD, which should be controllable both manually and automatically. Moreover, the artificial lighting provided should be sufficient for both treatment and non-treatment needs. Natural light should be accessible for patients to improve the healing process as it is known to have positive effects (psychological, physiological, and physical) on patients.

- Sound: Reducing noise levels by providing acoustic materials. This could also improve by way of relaxing sounds and music. The interior designer may also consider incorporating pleasant natural sounds (such as bird song, waterfall, ocean waves, and soothing music).
- Indoor Air Quality (IAQ) should be healthy and comfortable by improving daylight, thermal comfort, infection control, low VOCs material, reducing internal noise levels and HVAC.
- Natural ventilation: The interior space should achieve a natural ventilation system that is comfortable and capable of controlling airborne infections. In addition, using a proper method for cooling and heating system according to the environmental issues.
- Positive distraction: Natural elements, including interior gardens and plants, and natural light above. Access to an outdoor view and viewing nature and animals through the windows. Attractive plants, flowers, rocks and water features have a valuable impact on patients and should be considered by HCF designers. Other positive distraction should also be considered by the designers, such as T. V, books, painting, internet access, toys for children, nature and attractive elements.
- Art work: It is known that such elements will reduce symptoms of stress, pain, and anxiety, reduce feelings of isolation and enhance mood. However, it could not be

concluded how the artworks should be used, and which kinds and colors. Regardless, the researchers recommend a cool color for interior spaces.

- **Color:** The color should be pleasing and comfortable. It could be used to define different areas, show directions or floor levels, circulation paths and destination. It has an impact on patients that is both positive and negative. Most of the researchers recommend using cool colors rather than warm colors for the hospital interior and some of them prefer soft yellow color for interior walls.
- **Furniture features:** The furniture arrangement of the waiting area should be parallel to the circulation flows that facilitate patient access. The arrangement should consider the safety of patients, promote positive feelings and improve socialization. The visibility and morphology of the door to the examining room from the waiting room is also important. The furniture material could be a sustainable material, easy to clean, have a low contamination rate, be safe, comfortable and attractive. Additionally, universal design principles and ergonomic features have to be considered.
- **Cleanliness and hygiene** are achieved by controlling indoor infections, a good IAQ, using low VOCs material that are easy to clean while controlling airborne infections.
- **Materials:** Materials should be chosen based on their compatibility with their intended function and need for little to no maintenance. Sound absorbing materials should be used, which also have to be easy to clean and attractive.
- **Flooring material:** The choice of flooring material should be based on each material's ease of cleaning, comfort underfoot and aesthetic. Moreover, sustainable flooring materials have to be used, such as Luxury Vinyl Tile (LVT). Linoleum and

rubber flooring are the most common choices as they require little maintenance, are sustainable, and highly durable.

In conclusion, based on this understanding, how should the quality of the OPD interior in a hospital be ensured? The researcher attempted to determine what the relevant design considerations and criteria are for designers designing the out-patient department in a hospital. All the data gathered from the theoretical framework in the literature review, case study, and observation of the quality of the physical environment in the OPD of the hospital are combined in the table below. This table was prepared to help as a guideline for architects, interior designers and HCFs designer. The table shows the physical environment characteristics and quality of the space in terms of spatial quality and relations, and functional requirements. Each of them contains the design features and recommendations for each element. Finally, the last column of the table provides notes if needed (Table 2).

Table 2: checklist for evaluation and observation the quality of physical environment in OPD in Famagusta State Hospital.

Physical environment characteristic and quality of space		Design features for OPD		Recommendation and guidelines	evaluate	Note					
		Spatial Relationships									
Physical environment characteristic and quality of space		Circulation system		- Should be designed to promote a safe environment, accessible and fit for purpose. And it should have hierarchy	X						
		Wayfinding system		- Wayfinding should be improved by Using various colors in floor and lighting. Also, the visible Signs or cues to guide the users find their way.	-						
				- The vertical circulation should be visible and comfortable.	X						
		Orientations		- Distinction between waiting area and transit	-	√					
				- Connection to other unites and access between the departments	-	X					
				- Providing Natural sky light.	-	√	WHO recommended in OPD				
		Spatial Quality		Indoor Air quality IAQ		- IAQ should be healthy and comfortable by improving (thermal comfort, infection control, reducing internal noise levels and HVAC)	X	Could be designed according to WHO or ASHRAE standards			
				Ventilation		- Provide a natural ventilation technique to interior space through above and other techniques as wind tower, cross flow and atria	-		Hybrid or mixed-mode ventilation mostly recommended by WHO		
						- Using a proper method for cooling and heating system according to the environmental issues.	-	√			
				Lighting		- Providing a good light with respect to natural light.	-	√			
						- The Artificial lighting should be provided sufficient for treatment and nontreatment Needs. - It should be controlled both physically and automatically.	-	X			
				Natural sunlight		- Natural light should be having access to patient to improve the healing process It has positive impacts (psychology, physiology and physically). As well as, providing natural skylight in to hospital interior.	-	√			
				Sound		- Reducing noise level by providing acoustic materials.	-	X			
						- Should be provide implementing relaxing sounds and music. - The designer should consider pleasant natural sounds such as (bird song, waterfall, ocean waves, and soothing music).	-	-			
				Positive distraction		Natural elements		- Providing interior gardens and Plants	-		
						Art work		- Access to outdoor view and viewing natures and animals throw the windows.	-	X	
								- Attractive plants, flowers, rocks and water features have a valuable impact on patients. It should be considered by HCF designers.	-	-	
				Others		- The artwork should not be abstract art, it should be clear art to be used in hospital space.	-	-	According to Ulrich theory		
Color				- Others positive distraction should be considered by the designers such as (T.V, books, painting, internet access, toys for children, nature and attractive elements)	-	-					
				- The color should be pleasing and comfortable. And dark, and dull colors should be avoided - It could be used for define different areas, show directions or floor levels, circulation paths and destination way finding system. - It has impact on patient both positive and negative, researches recommend using cool color rather than warm color for hospital interior.	-	√	There is no certain color to specify to be used. But most of them prefer cool color in hospital				
Functional Requirement		Furniture features		Furniture arrangement	- The arrangement of waiting area should be parallel to the circulation flows that facilitate patient access. - The visibility and morphology of the door to the examining room from the waiting room	X					
				- the arrangement should consider the safety, cheerful and improving socialization.	-	√	It possible to provide in other space next to OPD.				
		Furniture material		- The sustainable material (easy to clean, low contamination, well-being and attractive).	-	X					
		Ergonomic design		- Universal design principles and ergonomic features should be considered e.g. chair with providing the adaptable chair with armrests and seat height and materials should be easy for cleaning	-	-					
		Cleanliness and hygiene		- By controlling infection, good IAQ, low VOCs material, airborne infection and martials easy to clean.	-	X					
		Materials & Flooring Material				- Should be chosen based on their compatibility with their intended function and need for little to no maintenance and easy to clean	-	X			
- Materials need to be healthy and easy to maintain and attractive. Sustainable and low VOCs material	-					X					
- Floor material should be based on each material's ease of cleaning and comfort underfoot and aesthetic.	-					X					
- Sustainable flooring material should be use such as (Luxury Vinyl Tile (LVT), Linoleum and rubber flooring are the most common choices as they require little maintenance, are sustainable, and highly durable).	-					-	Using sustainable materials especially for flooring				

Note: Good (√), not good (X) and not exist (-)

Chapter 5

CONCLUSION

“We shape our buildings and afterwards our buildings shape us” (Winston Churchill, 1941). Hospitals are medical facilities that take care of human health and are considered one of the complex buildings that people have different experiences in. Studies on hospital spaces have a crucial value as this is immediately related to human health. Architects and interior designers have a vital role to play in designing the hospital spaces and healthcare facilities that concern human health. Therefore, the interior environment and space quality for the hospital should be examined to design a good community healthcare facility.

For designing a successful healthcare facility, Kunders (2004) in his book ‘Hospitals: facilities planning and management’ states that “All successful hospitals, without exception, are built on a triad of good planning, good design and construction, and good administration. The absence of any one of these closely related components means building a mediocre hospital or one that is doomed to fail ... to be successful, a hospital requires a great deal of preliminary study and planning. It must be designed to meet the needs of the people, it is going to serve and be of a size that the promoters can afford to build in the first place and operate and sustain later” (Kunders, 2004 p.5).

The design of hospitals is a complex effort to ensure function follows both form and quality (Bensalem, 2015). The facilities used in healthcare have a wide range of function from medical application (i.e. Outpatient department OPD, Intensive care unit ICU, cardiac care unit CCU, emergency, rooms, treatment, diagnostic, etc.) to functional programs (i.e. office space, meeting areas, main hall, waiting rooms, housekeeping, food services, etc.). It is valuable to remember that there is a significant benefit in the understanding of healing or therapeutic environments, especially for the designers that design these facilities, who should be able to have all the information they require. Healthcare designers are expected to study and consider each aspect of patients' and users' life in order to design a healing environment in the hospital. A healing or therapeutic environment should be created by improving quality of the physical environment in the hospital, such as by providing and enhancing natural light, flexible furniture, providing relaxing color, thermal comfort, safety, positive distraction, natural elements, accessibility and relation to outside and views of the outdoors. All these aspects should be considered when designing a hospital space.

The findings of this research highlight the impact of the physical environment on patients. For this reason, the study investigates the quality of the space in an outpatient department in a hospital with a focus on the physical environment and its impact on the quality of care. The literature shows that design factors in a hospital, such as: quality of lighting in hospital, accessibility and relationship of indoor to outdoor in the hospital, circulation, wayfinding and role of signage, lighting and types, color, sound, artwork, IEQ, IAQ, thermal comfort, ventilation and types, positive distraction, natural elements, functional requirement, furniture, material and finishing requirements, should be considered by healthcare facility designers.

Moreover, the role of interior designers, architects and healthcare designers in regulating the effects of the environment on hospital users and patient's life is highlighted. As such, the researcher recommends that all interior designers, architects, and healthcare designers have an awareness of this fact when designing physical environments in hospitals in general, and the OPD in particular by considering most design features to provide the maximum quality of care. Based on the findings from the theoretical framework in the literature, a checklist has been prepared to evaluate the quality of the physical environment and the design requirements for the ultimate quality of OPDs in hospitals. The checklist attempts to be a guide for designers to use in OPD facility design.

The case study that was selected is the largest modern hospital in North Cyprus. This choice enhanced the study's findings by causing them to be more reliable and more robust. Based on the literature review, personal on-site observation and photographic documentation techniques were done. The OPD design features and the quality of physical environment have also been evaluated according to checklist mentioned earlier. After evaluation, the research proposed a series of recommendations for improving the quality of the physical environment in the OPD of Famagusta State Hospital.

Finally, the study prepared a checklist for the design of this facility based on the theoretical literature review. This checklist contains many recommendations that can be used as a guideline for interior designers and architects when designing the OPD in any hospital. This thesis focused on 12 design elements recommended for facility designers to use as guidelines for the design and space planning of the OPD, which include the following:

The OPD should promote a safe environment, be accessible and fit for its intended purpose. It should have a hierarchy as well as provide clear and comfortable vertical and horizontal circulation systems in OPD. The wayfinding system should be improved by the use of various colors in floor and lighting. Also, visible signs or cues can be used to help the users find their way. For lighting, the space should provide natural light through a skylight in the OPD. In addition, artificial lighting should also be sufficiently provided for treatment and nontreatment needs. In regards to sound, the interior space should reduce noise levels by providing acoustic materials and make it possible for users to experience relaxing natural sounds and music.

Another important issue is the Indoor Air Quality. The hospital's interior space should provide a good IAQ, be healthy, and comfortable. Additionally, it is possible to use natural ventilation techniques to improve the quality of health, control airborne infections and provide thermal comfort using cooling and heating systems. Moreover, designers should consider implementing natural elements, interior gardens and plants in the interior space, and/or provide access to outdoor views, nature, and animals through the windows. This can be achieved by utilizing the concept of a courtyard building system. Furthermore, attractive plants, flowers, rocks and water features have a valuable impact on patients. Others positive distractions should also be considered, such as T.V, books, painting, internet access, toys for children, nature and attractive elements. Art work is identified to reduce symptoms of stress, pain, and anxiety, feelings of isolation and enhance mood. However, no conclusion was reached on how the artworks should be used, and which kinds and colors. According to Ulrich's theory, however, the artwork should not be abstract art; only clear natural art should be used in the hospital space.

Furthermore, the choice of colors should be pleasing and comfortable. They could be used to define different areas, show directions or floor levels, circulation paths and destination. It is important to use cool colors rather than warm colors for the hospital interior. While there is no particular color specified for use in hospitals, most researchers prefer cool colors in hospital and some have even suggested using a soft yellow color for interior walls.

On the other hand, the furniture arrangement of waiting area should be parallel to the circulation flows that facilitate patient access. The arrangement should consider the safety of patients, their cheerfulness, improve socialization, and ensure the visibility and morphology of the door to the examining room from the waiting room. Furthermore, the furniture material should be a sustainable material, easy to clean, have a low contamination rate, be safe, comfortable and attractive. Universal design principles and ergonomic features also have to be considered. Cleanliness and hygiene can be achieved by controlling indoor infections, ensuring a good IAQ, using low VOCs materials that are easy to clean, as well as controlling airborne infection. Finally, materials should be chosen based on their compatibility with their intended function and need for little to no maintenance. Sound absorbing materials should be used. These should also be easy to clean and attractive. The choice of flooring material should be based on each material's ease of cleaning, comfort underfoot and aesthetic. Moreover, Sustainable flooring materials, such as (Luxury Vinyl Tile (LVT) have to be used. Linoleum and rubber flooring are the most common choices as they require little maintenance, are sustainable, and highly durable.

All of the information provided in this thesis can be beneficial for architects and interior designers who design healthcare facilities in general and the OPD in particular.

The recommendations and design checklist could be used as a tool for designers to design their facilities accordingly. Further research in the same field could also be done centering on the following:

- The guidelines for the design and space planning of the general hospital in North Cyprus.
- The role of universal design principles in the interior of hospital settings.
- Combining the concept of sustainable design and the healing environment in a hospital.
- The role of furniture arrangement on patient's socialization in a hospital waiting area.

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URL2: The outpatient department in children's hospital trusts in the U.K <https://www.sheffieldchildrens.nhs.uk/news/new-outpatients-department-now-open/>

URL3: The new Alder Hey Children's Hospital in Liverpool is one of the most advanced Healthcare facilities in the world <https://www.ascotsigns.com/projects/hospital-and-healthcare-signage/alder-hey-hospital>

URL4: Daylighting consultants online available <https://daylightingconsultants.com>

URL5: Northeast Georgia Medical Center source;
<https://www.totallandscapecare.com/green-industry-news/the-fockele-garden-company-earns-planet-award-for-wilheit-keys-peace-garden/>

URL6: Garden plan of healing garden in Dana-Farber Cancer Institute, Yawkey Center for Cancer Care (2018). Retrieved from <http://www.fmsp.com/projects/dana-farber-cancer-institute-yawkey-center-for-cancer-care/>

URL7: The exterior view of the garden serves as a beacon and a symbol of healing. The garden 's third-floor location and lush plantings afford privacy for garden users. Retrieved from <http://www.fmsp.com/projects/dana-farber-cancer-institute-yawkey-center-for-cancer-care/>

URL8: Rush University Medical Center: LEED Gold–certified. Received from: <https://perkinswill.com/work/rush-university-medical-center.html>

URL9: Dell Children's Medical Center of Central Texas interior
<https://www.pinterest.com/pin/387309636677950132/>

URL10: Massachusetts General Hospital interior. Received from <http://en.coppercanada.ca/applications/architecture/awards/2015/massachusetts-general-hospital/homepage.html>

URL11: Cyprus map

<https://www.bing.com/maps?toWww=1&redig=8EBB324DFD634CFFA4633CBF683BC020>

URL12: The location of Famagusta city. Received from: <http://www.north-cyprus-villa.com/north-cyprus-trnc.htm>

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APPENDIX

Appendix A:

Checklist design Recommendations and guides for healthcare facility designers.

Design features for OPD		Recommendation and guidelines		Evaluate	Notes		
Physical environment characteristic and quality of space	Spatial Relationships	Circulation system		- Should be designed to promote a safe environment, accessible and fit for purpose. And it should have hierarchy			
		Wayfinding system		- Wayfinding should be improved by Using various colors in floor and lighting. Also, the visible Signs or cues to guide the users find their way. - The vertical circulation should be visible and comfortable.			
		Orientations		- Distinction between waiting area and transit - Connection to other unites and access between the departments - Providing Natural sky light.			
	Spatial Quality	Indoor Air quality IAQ		- IAQ should be healthy and comfortable by improving (thermal comfort, infection control, reducing internal noise levels and HVAC)			
		Ventilation		- Provide a natural ventilation technique to interior space through above and other techniques as wind tower, cross flow and atria - Using a proper method for cooling and heating system according to the environmental issues.			
		Lighting		- Providing a good light with respect to natural light. - The Artificial lighting should be provided sufficient for treatment and nontreatment Needs. - It should be controlled both physically and automatically.			
		Natural sunlight		- Natural light should be having access to patient to improve the healing process It has positive impacts (psychology, physiology and physically). As well as, providing natural skylight in to hospital interior.			
		Sound		- Reducing noise level by providing acoustic materials. - Should be provide implementing relaxing sounds and music. - The designer should consider pleasant natural sounds such as (bird song, waterfall, ocean waves, and soothing music).			
		Positive distraction	Natural elements		- Providing interior gardens and Plants - Access to outdoor view and viewing natures and animals throw the windows. - Attractive plants, flowers, rocks and water features have a valuable impact on patients. It should be considered by HCF designers.		
			Art work		- The artwork should not be abstract art, it should be clear art to be used in hospital space.		
Others			- Others positive distraction should be considered by the designers such as (T.V, books, painting, internet access, toys for children, nature and attractive elements)				
Color		- The color should be pleasing and comfortable. And dark, and dull colors should be avoided - It could be used for define different areas, show directions or floor levels, circulation paths and destination way finding system. - It has impact on patient both positive and negative, researches recommend using cool color rather than warm color for hospital interior.					
Functional Requirement		Furniture features	Furniture arrangement		- The arrangement of waiting area should be parallel to the circulation flows that facilitate patient access. - The visibility and morphology of the door to the examining room from the waiting room - the arrangement should consider the safety, cheerful and improving socialization.		
	Furniture material		- The sustainable material (easy to clean, low contamination, well-being and attractive).				
	Ergonomic design		- Universal design principles and ergonomic features should be considered e.g. chair with providing the adaptable chair with armrests and seat height and materials should be easy for cleaning				
	Cleanliness and hygiene		- By controlling infection, good IAQ, low VOCs material, airborne infection and martials easy to clean.				
	Materials & Flooring Material		- Should be chosen based on their compatibility with their intended function and need for little to no maintenance and easy to clean - Materials need to be healthy and easy to maintain and attractive. Sustainable and low VOCs material - Floor material should be based on each material's ease of cleaning and comfort underfoot and aesthetic. - Sustainable flooring material should be use such as (Luxury Vinyl Tile (LVT), Linoleum and rubber flooring are the most common choices as they require little maintenance, are sustainable, and highly durable).				