

AIN SHAMS UNIVERSITY FACULTY OF ENGINEERING

DEPARTMENT OF ARCHITECTURE

A Thesis Submitted For the Partial Fulfillment Of The Degree of Master of Science In

Interior Design Concepts and Features in General Hospitals

By

Arch .Dalia Abd Elhamid Zakaria Fahmy
B.sc in Architecture 1996 – Department of Architecture – Ain Shams University

Supervised by

Prof .Dr. Prof .Dr. Prof .Dr Mohamed Kamel Mahmoud Khaled Ragheb Dewidar Amr Farouk El Gohary

Cairo - Egypt

2012

بسم الله الرحمن الرحيم

Contents

CO	NTEN	ΓS	I
AC	KNOW	/LEDGEMENT	I
LIS	ST OF I	FIGURES	III
LIS	ST OF	TABLES	XXI
IN.	ΓRODU	JCTION	XXII
1.	СНА	PTER ONE	1
]	HISTORY	Y OF HOSPITAL DESIGN AND CURRENT HOSPITAL TRENDS	1
	1.1	Introduction	1
	1.2	Definition of a hospital	1
	1.3	Types of hospitals	
	1.4	Hospital sizes	
	1.5	Hospital design from world war two till now	
	1.6	Current Trends in Hospital Design	
	1.6.1	· · · · · ·	
	1.6.2	•	
	1.6.3		
	1.7	What is healing?	
	1.8	What is a healing environment?	
	1.9	What are the tools to creating a healing environment?	
	1.10	How do we create a healing physical environment?	
	1.11	Changes to healthcare design due to the new trends	24
	1.12	The advantages expected from the new trend of supportive her	
		design	
	1.13	Spa hospitals a new emerging trend	25
	1.14	Conclusion	
2.	СНА	PTER TWO	
	COLOR		29
	2.1	Introduction	
	2.2	What is color?	
	2.3	Additive color	
	2.4	Subtractive color	
	2.5	The color wheel	
	2.6	Color terminology	
	2.7	Color schemes	
	2.8	Body chakras	
	2.8.1	Body chakras in detail	
	2.9	Qualities & psychology of colors related to the body chakras	
	2.10	Color therapy	
	2.11	Scientific explanation of how color affects us	
	2.12	Importance of color in hospitals	
	2.13	Case studies	
	2.14	Guidelines for Color Use in Hospitals	
	2.15	Conclusion	

3.	CHA	PTER THREE	88
	LIGHT		88
	3.1	Introduction	
	3.2	What are the kinds of light in hospitals?	
	3.3	How light impacts human health and performance	
	3.4	The ambient experience, a new trend in hospital lighting.	
	3.5	Lighting in different areas of the hospital	
	3.6	Conclusion	.116
4.	СНА	PTER FOUR	.117
	NATURE		. 117
	4.1	Introduction	
	4.2	Importance of nature for hospital users	
	4.3	Theories why nature is healing	
	4.4	How do we introduce nature into hospital environments?	
	4.5	Importance of views of nature and gardens for patients	
	4.6	Importance of views of nature and gardens for hospital staff	
	4.7	Types of gardens inside hospitals	.134
	4.8	Healing / therapeutic gardens	.140
	4.9	Case studies for hospital gardens	
	4.10	Conclusion	.166
5.	СНА	PTER FIVE	.169
	VISUAL	Arts and Furniture	.169
	5.1	Introduction	
	5.2	Visual Arts	
	5.2.2	Types of visual art suitable for hospitals	.181
	5.3	Furniture	.186
	5.3.1	New trends in hospital furniture	.186
	5.3.2	Recommendations for choosing hospital furniture	.190
	5.3.3	Examples of new healthcare - hospital furniture designs	.196
	5.4	Conclusion	.212
6.	СНА	PTER SIX	.214
	INTERNA	AL FINISHES	.214
	6.1	Introduction	
	6.2	Guidelines for selecting interior environment surface finishes according	
		international guide lines	
	6.2	Guidelines for selecting interior environment surface finishes for some of	
		the different areas of the hospital.	
	6.3	Conclusion.	.237
7.	CHA	PTER SEVEN	.238
	GUIDELI	NES FOR INTERIOR DESIGN OF HOSPITALS	.238
	7.1	Introduction	.238
	7.2	Color	.238
	7.3	Light	.246

-	7.4	Nature	251
-	7.5	Visual arts	258
-	7.6	Furniture	258
	7.7	Finishes	259
-	7.8	Conclusion	265
8.	CHA	APTER EIGHT	266
CAS	SE S	TUDIES	266
8	8.1	Introduction	266
8	8.2	Children's Cancer Hospital 57357	266
8	8.3	Dr.Okasha Psychiatric Resort	
8	8.4	The International Medical Center	343
8	8.5	Comparative analysis table between all three case study hospitals	374
CONC	CLU	SIONS	376
RECO	M	MENDATIONS	381
BIBL	ЮG	RAPHY	384

Acknowledgement

First and foremost i would like to thank God who gave me the will and power to conclude this thesis.

I would like to express gratitude to all my family members who have supported me through the years of writing this thesis. I would like to specially thank my mum who *insisted* that I can conclude this thesis at times I had given up on finishing it. I would also like to thank my dad for his continuous support and encouragement.

I would like to thank Prof. Dr. Mohamed Kamel for his support, Prof. Dr.Khaled Dewidar for his support, and special thanks and gratitude to Prof. Dr. Amr El Gohary for his patience on my taking such a long time to complete this thesis, and for his continuous encouragement and technical support.

I would like to thank all my colleagues and friends who always encouraged me on finishing this thesis.

Abstract

This thesis is dedicated to studying two main points concerning the interior design of general hospitals. The first point is concerned with studying the new interior design concepts and trends that have evolved over the past few years and how design concepts have changed the features of the interior design of hospitals. The second point is concerned with studying the features or elements that compose the interior design environment of the hospital.

At the beginning of the thesis the history of how hospital architectural design has evolved since world war two was seen as being a good introduction to show how the designers thinking and designing methods have evolved through the decades, thus paving the way to understanding how the designers methodology of design and way of thinking has also evolved and introduced new trends to the hospital interior design. It was found that there are a few main concepts or theories that have evolved over the past few years; the salutogenentic perspective theory, supportive healthcare design, evidence based design or EBD. At the end all theories have one main aim, and it is how to create for all hospital users a healing environment, an environment that is stress free and helps patients not only to receive medical attention but also to heal them and cause them no additional stress, to create for them an environment that is friendly. The aim is also to create for visitors and staff a stress free environment and to help staff perform their task to best standards possible. The new trends are introduced and explained in terms of theory and how they are expected to affect all hospital users.

Six main features were found to compose the hospital interior design in order to create a healing environment. These features are Color, light, Nature, Visual Art, Furniture, and Internal finishes.

These features or elements are then studied in detail. Each feature is explained and defined in a chapter. Each feature is analyzed in terms of its importance to all users; it's psychological and physiological effect on the users. How each feature can be utilized in the hospital interior environment, in what form, and where it is best suited to be utilized in order to serve best. As a result of this analysis guidelines are drawn and defined. These guidelines are then gathered at the end of each chapter. Chapter seven of this thesis is dedicated to compiling these guidelines as a document to follow while designing any interior design of any hospital.

List of Figures

•	Figure 1.1 Tower on podium hospital design strategy	4
•	Figure 1.2. Mass plan of Northwick park hospital	5
•	Figure 1.3 Greenwich Hospital - section and plan	
•	Figure 1.4 The two concepts of the horizontal courtyard	strategy 6
•	Figure 1.5 Vertical: the zones are arranged one above the	
	that movement pattern is mainly vertical.	
•	Figure 1.6 Horizontal: The zones are linked together l	
	movement is mainly horizontal	
•	Figure 1.7 The art and science of creating environing	ments that
	prevent illness, speed healing and promote well-be	
	Tees Hospital Single Site Development, South Te	
	Hospitals NHS Trust).	
•	Figure 1.8 The positions of the seven main charkas of	
	with the names of the charkas and their relevant colors.,	
•	Figure 1.9 The atrium garden at Bronson Methodist	
	Kalamazoo Hospital, Michigan	
•	Figure 1.10. The atrium garden at the interior winter	
	the William Beaumont hospital, south tower addition,	
•	Figure 1.11 Internal healing garden at Bronson	Methodist
	hospital, Kalamazoo, Michigan	
•	Figure 1.12 Imagery for walls incorporated into treatm	
•	Figure 1.13 Use of painting art work at the entrance of	
	memorial hospital Presbyterian kitchen & cafeteria	
	Newport beach California.	
•	Figure 2.1 light defragged through a prism	
•	Figure 2.2 Primary Additive Colors	
•	Figure 2.3 CYM & RYB subtractive color systems	
•	Figure 2.4.Subtractive Primary Colors	
•	Figure 2.5 secondary colors	
•	Figure 2.6 Secondary color wheel	
•	Figure 2.7 . Tertiary - color wheel	
•	Figure 2.8 Color Hues	
•	Figure 2.9 Color Saturation	
•	Figure 2.10 Color Shades	
•	Figure 2.11 Example of monochromatic color scheme	
•	Figure 2.12 Example of Analogous color scheme	
_	1 15are 2.12 Drample of Analogous color seneme	

•	Figure 2.13 Example of complementary color scheme	37
•	Figure 2.14 Example of split complementary color scheme	37
•	Figure 2.15 Example of Triadic color scheme	37
•	Figure 2.16 Example of Tetradic color scheme	38
•	Figure 2.17 Seven main body chakras	
•	Figure 2.18 The location of the anterior hypothalamus in the	brain
		51
•	Figure 2.19 Room entrances in a long corridor highlighter	d by
	floor patterns at each door and contrast between the color of	
	wall and door to facilitate way finding. Corridor at the New	York
	University School of Medicine Laboratories, New York	55
•	Figure 2.20 Areas can be distinguished with the color of	their
	walls and floor patterns making them easily recognizable by	y all
	personnel. Entrance to Baptist Hospital of Miami Di	etary
	Expansion, Miami, Florida.	
•	Figure 2.21 Pastel shades of color are suitable for pa	tients
	sleeping areas. Patients room at Hoag Memorial Hospital,	Sue
	and Bill Gross Women's Pavilion, Newport California	66
•	Figure 2.22 A pastel shade of yellow used in patients ho	spital
	room	67
•	Figure 2.23 Using a large variety of bright attractive cold	rs in
	children's play rooms give them a feeling of a nursery	not a
	hospital. Playroom at Children\s Hospital at Montefiore, B	ronx,
	NY	67
•	Figure 2.24 Using bright attractive colors in waiting are	as of
	children's departments or hospitals relive the stress that chi	ldren
	feel in hospitals. Waiting room at Texas Children's Hospitals.	spital
	Clinical Care Center Huston Texas.	68
•	Figure 2.25 Children's treatment rooms brightly colored	
	decorated with highly saturated colors. Treatment room a	
	DiMaggio Children's Hospital Emergency Departs	ment,
	Hollywood Florida.	
•	Figure 2.26 Pastel colors should be used in children's slee	eping
	areas. Patient room at the university of Wisconsin Child	ren's
	Hospital, Madison WI	
•	Figure 2.27 Spa in the geriatric ward treated with warm colo	rs on
	the floors and walls. Resident spa at Cuthbertson Village, A	lders
	gate Charlotte north California	70

•	Figure 2.28 Using shades of blue and green with white, colors
	that do not exhaust the eye and help concentration. Lab at Texas
	Children's Hospital, Feigin Research center, Huston, Texas70
•	Figure 2.29 Bright colors used in the hospital visitor's cafeteria
	Cafeteria at M.D. Anderson Cancer Center Ambulatory Clinical
	Building, Huston, Texas71
•	Figure 2.30 Reception areas treated with attractive colors relive
	the feeling of being in a hospital for patients and visitors
	Reception area at New York - Presbyterian Medical Center, New
	York71
•	Figure 2.31 Using direction signs with high contrast colors to
	facilitate direction.Corridor at UCSF children's hospita
	ambulatory care center, Pediatrics clinic, San Francisco
	California
•	Figure 2.32 Examples of colored direction signs used in hospitals
	to facilitate way finding.
•	Figure 2.33 Colored floor patterns are used to guide persons
	through the corridors, to high light entrances to rooms and the
	reception counter. Reception and waiting at New York university
	medical center, Radiology Department, New York
•	Figure 2.34 Patient registration desk a key destination blends
	bright colors together; it is highlighted with a magenta colored
	back wall, orange carpet, and yellow ceiling
•	Figure 2.35 Different colors used for each floor facilitate way
	finding74
•	Figure 2.36 Using the warm color yellow for walls and signage in
	the eye clinic.
•	Figure 2.37 Red can be used in children's departments. Entrance
	at the Rex child development center, Cary NC and the mobiles
	play room at Greenville hospital System, Greenville SC
•	Figure 2.38 Red used to facilitate way finding by using it in the
	ceiling and as a floor pattern to highlight important areas of the
	hospital. Emergency triage at Dell children's medical center of
	central Texas, Austin, Texas
	Figure 2.39 Orange can be used in visitor's areas. food court a
	the Texas Children's Hospital Clinical Care Center, Hustor
	•
•	Texas
•	Curci Cancer Center, California
	Cuici Canci Centel, Canionnia//

•	Figure 2.41 Nuclear medicine room part of the imaging
	department treated with yellow walls making it brighter and more
	spacious. Nuclear medicine room at Nebraska Heart Institute
	Medical Office Building, Lincoln, Nebraska
•	Figure 2.42 Green color is suitable for use in imaging exam
	rooms. Imaging exam room at ST. John's Medical Center, the
	Breast Center. 80
•	Figure 2.43 Public areas can also be treated in green, admitting
	area at Louise Obici Memorial Hospital, Suffolk, Virginia80
•	Figure 2.44 Green in floors, walls, ceiling of the surgical
	recovery area at the Westhoff Medical Center -Melbourne,
	Melbourne, Florida
•	Figure 2.45 Green used in heart patient rooms at the Nebraska
	Heart Hospital, Lincoln, Nebraska
•	Figure 2.46 Green is a color that is very suitable for use in
	operating rooms, it is calming that helps reduce stress, OR at the
	General Hospital Clinical Services Building Toronto, Ontario
	,Canada82
•	Figure 2.47 Blue is suitable for use in ICU rooms. ICU patient
	room at Mary Imogene Bassett hospital, inpatient tower,
	Cooperstown, New York83
•	Figure 2.48 Blue used in the floors, seating and different
	elements of interior design at the areas for administering
	chemotherapy at the Memorial Sloan - Kettering, Ambulatory
	Cancer Care Center, Commack, new York84
•	Figure 2.49 Blue is suitable for use in sleeping areas, picture
	above of the nurse station at the bed tower of the Memorial
	Hermann The Woodlands Hospital, Texas84
•	Figure 2.50 Blue used in the walls, floors, and furniture of the
	emergency department at the ICU at Louis A. Weiss Memorial
	Hospital South Addition, Chicago, Illinois85
•	Figure 2.51 Blue is a suitable color to use in cardiology
	department and heart patient rooms. Patient's room at Inova
	Fairfax hospital, Inova heart & vascular institute falls church,
	Virginia,85
•	Figure 3.1 Images of different ambient experience lighting
	themes
•	Figure 3.2 A picture of the Cath lab at Desert Medical Imaging,
	Palm Springs, CA, USA showing the skylight provided over the
	table. 96

•	Figure 3.3 Bright light should be used at the entrance to make it seem welcoming and to facilitate the vision of people entering to adjust to inner lights. External view of the entrance foyer at
	ST. Vincent Mercy Hospital Elwood Indiana showing internal light used in the entrance foyer.
•	Figure 3.4 Wall washing lights can help make the foyer look bright and cheerful. Entrance foyer at Alaska Psychiatric Hospital, Anchorage, Alaska
•	Figure 3.5 Entrance lobby (Reception area) at Parker Adventist Hospital, Parker, Colorado. It is a cheerful space with good indirect lighting and wall-mounted lighting fixtures as recommended
•	Figure 3.6 Target spotlight used to highlight the information desk at Anschutz Inpatient Pavilion, University of Colorado Hospital, Aurora, Colorado
•	Figure 3.7 Reception desk highlighted with ceiling mounted lighting fixtures. Reception desk at Edward Hospital, Emergency Department, Naperville Illinois
•	Figure 3.8 High mounted lights should be used in atriums. Atrium at Vassar Brothers Hospital, Comprehensive Cancer Center, Poughkeepsie, New York
•	Figure 3.9 Ceiling lights used along with surrounding wall lights for the lighting of the waiting area of Lucy Curci Cancer Center, Eisenhower Medical Center, Rancho, Mirage, California 103
•	Figure 3.10 Indirect light used to light the elevator lobby at the Center for Advanced Medicine, Washington University Medical Center, St.Louise Mission
•	Figure 3.11 Indirect light and wall mounted light used at a corridor at the Swedish Convent Hospital, Acuity – Adaptable Inpatient Unit, Chicago, Illinois
•	Figure 3.12 The approach of staircases should be clearly marked, this can be achieved with using light. Staircase at the Edward Heart Hospital, Naperville, Illinois
•	Figure 3.13 Highly lighting the ceiling the above the nursing station makes it clearly visible to all users and provides light for the work surface. Nurse station at Orlando Regional South Seminole Hospital Emergency Department Addition, Longwood, Florida
•	Figure 3.14 Semi private room at Greenwich Hospital, Greenwich

•	Figure 3.15 Levels and distribution of night light in hospita wards
•	Figure 3.16 Patient light for reading and activity
•	Figure 3.17 Patients beds can be provided by over the bed
	mounted fluorescent light that combine indirect uplight and down
	light for patient activity purposes and examination of patients
	Patients room at Holy Spirit Hospital, Ortenizo Heart Center
	Camp Hill, Pennsylvania
•	Figure 3.18 Patients bedroom with three sources of light provided
•	over the bed, ceiling fluorescent lights for examination and
	general lighting, wall mounted lighting and over the bed
	spotlights for reading and patients activity. Patients room a
	Memorial Hermann The Woodlands Hospital Bed Tower
	Addition, The Woodlands, Texas
•	Figure 3.19 Decorative lighting in the in the pediatric area should
•	resemble lighting fixtures used in their homes and play areas like
	nurseries
•	Figure 3.20 For general lighting in the operating rooms there
-	should be light for the perimeter walls and work surface
	Operating room at The Texas Hear Institute at St. Luke's
	Episcopal Hospital, the Denton A. Cooley Building, Houston
	Texas
•	Figure 3.21 Low level light FOR general illumination should be
	used in the dialysis unit. Dialysis unit at Dialysis Centre, Herne
	Germany
•	Figure 4.1 Outdoor garden at Swedish Medical Center. Cancer
	Institute Seattle, Washington
•	Figure 4.2 Fish aquarium in the waiting room at the Hope
	Children's Hospital Out Patient Pediatric Oncology Oak Lawn
	Illinois. 122
•	Figure 4.3 Fish aquarium at the waiting room at South Carolina
	Oncology Associates Columbia, South Carolina
•	Figure 4.4 Sky light at Abington memorial hospital, Lenfes
	pavilion, Abington, Pennsylvania
•	Figure 4.5 Sky light over the waiting area St. Vincent Carme
	Hospital Addition Carmel, Indiana
•	Figure 4.6 Water fountain in the main reception and waiting area
	at Heart Clinic Arkansas, Little Rock, Arkansas
•	Figure 4.7 River like water feature at The Health &Wellness
	Center by Doylestown Hospital, Warrington, Pennsylvania. 124

•	Figure 4.8 Interior atrium at Huntsman Cancer Institute Research
	Hospital, University of Utah Medical Center, Salt Lake City,
	Utah
•	Figure 4.9 Exterior courtyard at The Villages Regional Hospital, The Villages, Florida
•	Figure 4.10 Windows providing external views of nature (trees
	and water) at the infusion hall in the Good Samaritan Hospital,
	Good Samaritan Cancer Center, Puyallup, Washington126
•	Figure 4.11 Waiting room at the Detroit Medical Center
	Lawrence & Idell Weisberg Cancer Center, Farmington Hills,
	Michigan. A view of outdoor nature is provided through a full
	height glass wall over an outdoor view of planting126
•	Figure 4.12 Main lobby at The Villages Regional Hospital, The
	Villages, Florida . Plants are incorporated into the interior of the
	main lobby creating a welcoming less stressful experience127
•	Figure 4.13 Waiting area at the Sacred Heart Hospital on Emerald
	Coast West Destin, Florida. Waiting area is provided with indoor
	planting, making it more welcoming and less stressing127
•	Figure 4.14. Using natural materials is a way of introducing
	nature into our healing environments, waiting area at the Center:
	Orthopaedic Neurosurgical Care Research Bend, Oregon. Wood
	in the ceilings, natural stone in the walls and clay brick are all
	incorporated into the finishes of the area
•	Figure 4.15 Entrance at the High Point Cancer Regional Center,
	elements of nature are used in the ceiling, and floor to give
	seashore effect. Picture on the right is of floor motive mimicking
	seashells
•	Figure 4.16Exterior court garden at Central DuPage Hospital,
	Ambulatory Services Pavilion, Winfield, Illinois
•	Figure 4.17 Terrace at the South Alabama Medical Center,
	Women's Center, Dothan, Alabama
•	Figure 4.18 Pictures from the roof garden at Schwab
	Rehabilitation Hospital - Chicago, IL
•	Figure 4.19 Healing garden at the Good Samaritan Hospital,
	Good Samaritan Cancer Center, Puyallup, Washington138
•	Figure 4.20 View from inside the main lobby onto the garden at
	Conta Costa Regional Medical Center, Ambulatory Care Clinic, Martinez, California. Patients may receive their chemotherapy
	,
	inside the garden; it is also viewed from the center's corridors.139

•	Figure 4.21 Atrium garden at the Bronson Methodist Hospital
	Kalamazoo, Michigan
•	Los Angeles, CA, is clearly visible from the inside of the hospital
•	Figure 4.23 Interior courtyard at Lucile Packard Children's Hospital Palo Alto CA
•	Figure 4.24 Shelter and seating provided in the garden at the Vanderbilt Children's Hospital, Nashville, TN
•	Figure 4.25 Leveled stone used for paving the walkways at the Healing garden at Children's Hospital Los Angeles, Los Angeles CA
•	Figure 4.26 Al awn and different types of planting used at the children's garden at Lucile Packard Children's Hospital, Pale Alto, CA.
•	Figure 4.27 Courtyard tree at Banner Children's Hospital, Mesa AZ
•	Figure 4.28 Garden stream at Arkansas Children's Hospital Little Rock AR
•	Figure 4.29 Play equipment at the garden at the Children's Mercy Hospital, Kansas City MO
•	Figure 4.30. Picture of the atrium garden at the center of the south tower of the William Beaumont Hospital
•	Figure 4.31 View from a patients room onto the healing atrium garden, hedges provide a buffer zone between patients room and the garden
•	Figure 4.32 An internal view of the seating inside the atrium garden
•	Figure 4.33 Picture of the Debra Saber –Salisbury memoria garden showing the Seating alcoves shaded by large trees, and the glass link to the sixth floor.
•	Figure 4.34 One of the gardens forming the pediatric garden, with colorful forms, LCD monitors showing
•	Figure 4.35 a view of the pediatric garden showing the skyligh and forms specially designed to fit young patient's needs158
•	Figure 4.36. View of the river through patients room at the Shiranui Hospital
•	Figure 4.37 View of the central court at Ystradgynlais Community Hospital as seen from inside the hospital160