

## AN ATTEMPT TO EXPLORE COMPONENTS OF EMPATHIC ARCHITECTURE IN HOSPITALS – A STUDY OF INDIAN HOSPITALS

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**Abstract.** Patients coming to the hospital are often fearful and confused and these feelings may impede recovery. Purpose of this study is to find out how the hospital stay can be made unthreatening, comfortable, and stress-free as possible by preserving, restoring and creating a preferred environment.

An exhaustive study has been conducted with a well designed questionnaire along with photography and behaviour mapping in three hospitals in Eastern India. A list of fourteen environmental attributes associated with creation of a healing environment within hospital set up was prepared. The perception of psychological comfort associated with these attributes was measured using a five – point scale. For further analysis, the researcher adopted Principal Component Analysis Technique and Varimax Factor Rotation Technique to extract major factors of hospital design with empathy. The findings of this research reassures the fact that no longer should the ethics of healthcare be viewed exclusively through the lens of physician-patient dyad but architects associated with hospital design bear equal responsibilities. The analyses have successfully highlighted issues like psycho – physical vulnerability of patients and family stress associated with hospitalization. The research concludes by suggesting some architectural design principles, which are helpful in generating a sense of trust, and faith on the hospital set up, familiarizing the patients and their relatives with hospital working system and process of treatment and creating a non – clinical overall appearance. It also highlights the need for comforting the patients through various rejuvenating elements and helping them in negating the fear of unknown through information dissipation and counselling.

**Keywords:** empathy, therapeutic environment, healing architecture, stressor, psychological comfort, hospital design.

### Introduction

Historically, it has been the role of architects, planners, and designers to interpret the needs, wishes, and capabilities of those who will use their buildings. Today, a need has been felt for advanced research to attain behavioral sophistication in facility design for proper determination of functional and ergonomic requirements and to translate them into the language of design and ultimately into bricks, mortar, and operating practices.

In India, a growing elderly population with increased affordability greatly emphasizes the need for better health care facilities in the country. Also the number of

relatively younger but affluent people suffering from various types of lifestyle diseases is increasing. As a result health care providers in the country can no longer limit themselves to providing curative and diagnostic services but they need to focus their attention towards overall wellbeing of people. It has been observed that due to lack of appropriate attention to components of environmental psychology, most of the high-tech super – specialty hospitals become harder for users to adapt to than the old buildings with poorer facilities. Often, these new hospitals are novel, but a bit confusing for the users, and this paper attempts to increase level of user satisfaction in such automated places.

### Experience in hospital

The mere thought of visiting any health care institution have been traditionally associated with negative feelings like tension, fear, nervousness, et – cetera. Through direct or vicarious experiences, most individuals learn to regard hospitals as unpleasant and frightening environments, associated with suffering and death (Brown 1961; Taylor 1979). Even in modern times, in – spite of progress made by health care professionals in providing more advanced and sophisticated medical facilities, many hospital visitors have negative feelings about the same, and their fears get compounded by a non therapeutic environment. The aim of this paper is to address this issue and identify environmental factors which can reduce users' stress.

Stress is any external demand, or threat, that seriously challenges the adaptive ability of an individual (Lazarus 1966; Lazarus, Launier 1978; Selye 1973). Selye (1973) noted that the exposure to a particular source of stress can deplete the physical and psychological resources of an individual. Also, stress can precipitate, relapse or create complications in people who are already ill (Andrews, Tennant 1978). Lazarus (1966) described six numbers of stressful stimuli he identified as 'noxious stimuli'. These noxious stimuli are (i) uncertainty about physical survival, (ii) maintenance of identity, (iii) loss of loved ones, (iv) inability to control immediate environment, (v) disruption of community life, (vi) avoidance of pain, or privation. Hospitalisation will cause all the above stressors to affect the patient. These may all occur at the same time, adding to irritation and stress (Schumaker, Reizenstein 1982). In addition to these, the structure of many departments also exposes the patients to unfamiliar noises, such as crying, moaning, groaning, shouting of other patients. Patients are often exposed to emergencies, unpleasant sights, and unpredictable behaviour from other users which aggravate the stressful situation.

If a person is frail, sick, tired or otherwise debilitated, there is less energy to expend on coping (Folkman *et al.* 1979). They show symptoms like disturbance of emotional balance, disruption of motor systems, physiological changes and disturbance of cognition.

### Therapeutic environment

Stress factors in a general environment can have a negative effect on the immune system (Watson 1988). The concept of therapeutic environment is related to the branch of environmental psychology which deals with the psychosocial effects of environment, psychoimmunology, i.e. how environment affects the human

immune system and neuroscience, i.e. how human brain perceives built environment. In many cases, the elaborate and complicated layout of a general hospital confuses people who are often fearful due to uncertainty of their health situation or their probable isolation from their friends and family. Stress can negatively affect a person's immune system and can suppress a person's emotional and spiritual power. This would have a retarding effect on the process of recovery and healing.

Lang (1971) concluded that in designing a building, there are three main functions to adhere to. The designer needs to ensure that:

- They maintain the physiological states necessary for people to attain their goals.
- They allow, or perhaps configure, specific patterns of behaviour required by people to attain their goals.
- They support, to some extent, the psychological states necessary for people to attain their goals, by fulfilling certain symbolic needs. If the environment produced is unresponsive to human needs and behaviour, the potential user will choose not to use it. If they have no choice but to use it, a stressful situation, either physiological or psychological, will result.

Environmental Psychology in general deals with study of mutual relations between the socio-physical environment at all scale and human behavior at all levels of analysis. Understanding the nature of this transaction requires extensive research to explore the degree of interdependence of physical environment systems and human systems (Moore 1987). With the help of knowledge in Environmental Psychology, one can design, manage, protect and/or restore environments that enhance reasonable behavior, predict what the likely outcome will be when these conditions are not met, and diagnose problem situations.

The built environment affects the attitude and behavior of people (Mazumdar 2000), through the processes of sensation, perception, and cognition. Along with the common environmental stressors (e.g., noise, climatic extremes) some define stress as the failure of preference. Cognitive stressors like prolonged uncertainty, lack of predictability and stimulus overload (De Young 1999) are included in the definition. Judith Heerwagen (2006) states that a person's sense of well-being influences productivity, creativity, and engagement. Researchers have focused on presence or absence of the following stimuli which help to create positive and productive places.

Table 1. A summary of findings from earlier research in this field

Stimuli	Researcher	Derivation / finding
Crowding / unwanted intrusion and lack of privacy <i>These are types of socio-psychological stress due to an increased density of population unwanted exposure to people's view</i>	Csermely (2000)	Crowding causes complex changes at the behavioral and physiological level
	Schumaker, Reizenstein (1982); Proshansky <i>et al.</i> (1970)	Lack of privacy will affect the patients' expression of their 'response to illness' Pain may be accompanied by nausea and weakness, may provoke responses such as altered facial expressions, body movements, posture, vocalization or vomiting, which sufferer would not wish to perform in public
Misaffordance	Heft (1997)	Users are unable to readily discern functional properties of a space or incorrectly gauge building
Disorientation	Evans, McCoy (1998)	Human reactions are likely to encompass frustration, annoyance, and, on occasion, even hostility or helplessness
Control	Cohen <i>et al.</i> 1986	Prolonged experiences with uncontrollable environment lead to learned helplessness
	Kaplan, R. and Kaplan, S. (1989)	Involuntary attention or fascination facilitates recovery from mental fatigue
Restorative environment <i>Elements like retreat, fascination, exposure to nature provide resources that can attenuate stress</i>	Coss (1973)	Fascination can be created by design elements such as window views and various displays like aquarium, moving water
	Hartig, Evans (1993); Kaplan, R. & Kaplan, S. (1989); Ulrich (1992)	Natural elements and views of nature provide restoration
	Whitehouse <i>et al.</i> (2001)	Creation of therapeutic gardens or similar natural environment is related to healing process
Aesthetics	Ulrich (1991); Hildebrand (1992); Kuller, Lindsten (1992)	Aesthetic and non – aesthetic surroundings create an impression and affect a person consciously or unconsciously
	Ulrich (2001); Ulrich (1991); Kuller, Mikellides (1993)	Aesthetically pleasing surroundings improve a person's affective condition and contribute to a feeling of well-being
	Mallay (2002); Eisen (2006)	Art therapy
Wayfinding	Stewart (2009); Bonadies (2009); Braun <i>et al.</i> (2009); Briggs, Pehrsson (2008)	Music therapy Aroma therapy Pet therapy Bibliotherapy
	Evans, McCoy (1998); Arthur, Passini (1992)	'Way finding' in hospitals is the first stressor the patient can directly relate to the built environment. In addition, the orientation of an interior space and the shape of the setting directly influence the stimulation level.
	Abu-Obeid (1998)	Pictorial elements like shapes, surface qualities, special qualities and entrances have a profound influence on wayfinding

The above aspects have been successfully applied for designing a therapeutic environment for patients by reducing stress amongst them (Ulrich 1991). In addition to the above, an extensive review of the literatures in (Ghazali, Abbas 2011) supported the role of the physical environment towards the creation of the healing environment. While above-mentioned literatures have portrayed that the physical environment as a major determinant of a healing environment, there are others which have considered different components as impor-

tant contributions. Apart from physical factors such as daylight, fresh air and quietness of the environment (Berg 2005) there are many non-physical factors that are of equal importance in contributing towards the creation of the healing environment Ghazali, Abbas (2011a). A more holistic approach was adopted in achieving such an environment more successfully in the proposed Optimal Healing Environment (OHE) framework (Ananth 2008). The OHE, described as "the social, psychological, physical, spiritual, and behavioral

components of healthcare support and stimulate the body's innate capacity to heal itself" involved both the inner and outer environment comprising of seven components. The inner environment comprised of three components –developing healing intention, experiencing personal wholeness and cultivating healing relationship, while the outer environment comprised of the other four components –practicing healthy lifestyles, applying collaborative medicine, creating healing organization, and building healing spaces (Ghazali, Abbas 2011b). It can be summarised from literature review that hospital design needs empathy and empathy goes beyond compassion. It identifies with and attempts to understand what it would be like to be that bereaved person in this specific hospital environment. Attitudes of empathy allow the designer to experience vicariously the plight of caring survivors and others who attend the dying scene.

The present study was initiated with an idea to make hospital stay as unthreatening, comfortable, and stress-free as possible by preserving, restoring and creating a preferred environment. The main aim of the researcher has been to ensure optimal care to individual patients and assurance of proper care and treatment to their families in a warm, friendly and affirming environment. The objective is to provide spaces that simultaneously address the varied needs of individual patients, their families and a diverse team of health care professionals and volunteers.

The paper seeks to identify the components of a therapeutic environment that would present a conducive setup for rendering optimum level of curative and palliative care within hospitals in Urban Indian context.

## Methods

The term empathy is primarily borrowed from sociology where it refers to an association with another person. In the field of architecture, empathy means a positive association of the users with the built environment i.e. congruence between environmental components and user's expectations.

The ethics of designing a healing environment focuses on the designer's responsibility to maintain connection between users and environment. It includes as its distinctive elements the following three: (a) attention to particular others in actual contexts, (b) focus on needs versus interests of those particular others, and (c) a commitment to dialogue as a primary means of moral deliberation.

The vision of the present study is compassionate design and the aim has been to develop a set of parameters for achieving a psycho – physically stimulating environment in Indian hospitals. Such formulation of parameters, preliminary require identification and rating of environmental components by the respondents based on expected benefit from them. An exhaustive list of fourteen environmental attributes associated with creation of a healing environment within hospital set up was prepared. While selecting these parameters, the author has relied upon theoretical findings from previous research works, and opinions from experts.

The present research has incorporated prolonged studies in three hospitals in eastern India in order to understand user's needs and priorities. These hospitals were selected based on certain criteria like scale, location, layout, availability of facilities and type of patients to avoid any bias arising out of these factors.

Table 2. Environmental attributes associated with psychological comfort

No	Attributes
1	Adequacy of natural light and ventilation
2	Scope to view support nurses / staff giving an assurance of help being available should the need rise
3	Neat & organized appearance indicating clinical perfection and mechanical efficiency
4	Use of colour / furniture and interior décor which are not typical of a hospital
5	Clear architectural layout ensuring visual connectivity between different places – presence of landmark, zones of interest
6	Belongingness and association to environment
7	Clear instruction regarding step wise actions
8	Clear signage and / other wayfinding measures
9	Distinct system of announcement and availability of patient help desk
10	Use of cleaning chemicals / room fresheners which are generally for domestic use
11	Proximity to family members
12	Adequacy of information being displayed about various ailments and treatment procedure
13	Scope of counselling by well trained psychologist and medical personnel for patient and patient parties
14	Ensuring patients are not vulnerable to accidents or pain while being taken from one place to another or during any treatment / diagnosis / stay

To ensure normality of the sample population and avoid any skewness in the data, fair representation of hospitals differing in the above aspects is allowed. In the survey conducted, the respondents were asked to rate each attribute based on the expected reduction of physical and psychological stress.

According to Henry *et al.* (1984), the minimum number of samples ( $n$ ) for factor analysis with ( $y$ ) number of variables should be more than  $30 + (y + 3)/2$ . For this study about 200 patients were interviewed. The sampling adequacy has been measured by the Kaiser – Mayer – Olkin (KMO) test which has been found satisfactory with value of 0.73 (i.e. greater than 0.5). The perception of psychological comfort associated with these attributes was measured using a five – point scale, (1) measures the lowest perception and (5) implies highest. While conducting these interviews, the author has largely relied on the phenomenological experience of empathy which is the natural ability of the respondents to understand the emotions and feelings of others, whether one actually witnessed his

or her situation, perceived it from a photograph, read about it in fiction book, or merely imagined it (Jean, Jackson 2004). It was observed that although all these fourteen attributes are responsible for creating a healing environment, there is scope for further categorising them under some broader heads for generic purpose based on certain commonalities. Factor Analysis is used to find latent variables or factors by reformulating a set of observed variables. Data cleaning and missing data analysis is the first step for initiating any analysis process and the same was done using SPSS software before performing Factor analysis. The data set was also analyzed for skewness.

### Results and discussions

SPSS software has been used to prepare the correlation matrix and extract the relevant factors F1, F2, F3, F4 (refer Table 4). Principal Component Analysis Technique and Varimax Factor Rotation Technique have been adopted here for improved interpretability. The following table shows loadings of fourteen varia-

Table 3. Correlation Coefficient for the average values of effectiveness of the environmental attributes in ensuring psychological comfort

Attribute	Light & ventilation	View / call nurses	Clinical perfection	Interior décor	Clear layout	Belongingness	Clear instruction	Clear signage	Clear PA/ help desk	Domestic materials	Family proximity	Medial information	Counselling scope	Not vulnerable
Light and ventilation	1.0	0.06	-.12	.33*	-.12	.08	-.02	.04	.01	.21	-.03	.28	.35*	.04
View / call nurses		1.0	0.0	.16	.35*	.23	.12	.12	.08	.05	.31	-.09	.23	.20
Clinical perfection			1.0	-.34*	.51**	.11	.13**	.47**	.39*	-.39*	.11	.27	-.05	.28
Interior décor				1.0	-.07	.11	-.03	.18	.25	.72**	.12	0.0	.11	-.02
Clear layout					1.0	.17	.24	.55**	.37*	-.18	.10	-.08	-.13	-.18
Belongingness						1.0	.42**	.19	.31	.25	.15	-.08	-.13	.18
Clear instruction							1.0	.5**	.42**	-.05	.49**	.29	-.13	.29
Clear signage								1.0	.65**	-.01	.31	.35*	.22	.30
Clear PA/ help desk									1.0	.08	.18	.04	-.01	.11
Domestic materials										1.0	-.01	0.0	.19	-.17
Family proximity											1.0	.11	-.21	.39
Medial info												1.0	.52	.17
Counselling													1.0	-.09
Not vulnerable														1.0

Note: \* Correlation is significant at 0.05 level (two – tailed)

\*\* Correlation is significant at 0.01 level (two – tailed)

Table 4. Varimax rotation of principal factor solutions

Attributes	F I	F II	F III	F IV	Comm- munity
Adequacy of natural light and ventilation	-.084	.414	.085	.540	.447
Can view the support nurses / staff and an assurance of help being available should the need rise	-.078	.226	.694	-.203	.580
Neat & organized appearance indicating clinical perfection and mechanical efficiency	.637	-.515	.121	.108	.698
Use of colour / furniture and interior décor which are not typical of a hospital	.071	.845	.104	.127	.746
Clear architectural layout ensuring visual connectivity of different places – presence of landmark, zones of interest	.761	-.212	-.334	.049	.738
Belongingness and association to environment	.498	.404	.070	-.035	.539
Clear instruction regarding step wise actions	.637	-.048	.482	.014	.640
Clear signage	.792	.031	.223	.309	.774
Distinct system of announcement and availability of patient help desk	.766	.162	.107	-.032	.625
Use of cleaning chemicals / room fresheners which are domestic use	-.042	.859	-.059	.073	.748
Proximity to family members	.274	.048	.687	-.055	.553
Adequacy of information being displayed about various ailments and treatment procedure	.195	-.092	.126	.803	.708
Counseling scope by well trained psychologist and medical personnel for patient as well as patient parties	.039	.164	-.325	.789	.756
Not being vulnerable to accidents or pain while being taken from one place to another or during any treatment / diagnosis / stay	.056	-.280	.682	.2784	.627
Cumulative variance explained in %	23.98	40.62	54.74	65.78	

bles on four factors extracted. Adopting Kaiser's criterion rule, those factors with Eigen value of one or more is retained and the cumulative variance is calculated. The four factors which are extracted account for more than 65% of the total variance explained. A higher factor loading implies a domination of the corresponding variable.

On the basis of the various factor loading obtained, following interpretations are made.

1. Factor I, which accounts for 23.98% of the variance is associated with having a neat & organized appearance – presence of landmark, zones of interest (0.637), clear architectural layout ensuring visual connectivity of different places (0.761), clear instruction regarding step wise actions to be performed (0.637) clear signage (0.792) and distinct system of announcement and availability of patient help desk (0.766). All these attributes instill a sense of psycho – physical comfort and an urge to move in a clear and comprehensible environment. The factor has therefore been named as “Clarity on the procedural matters, sequ-

ence of activities and movement pattern within Hospital” Factor.

2. Factor II, which accounts for 40.62% of the variance is positively related to the use of colour / furniture and interior décor which are not typical of a hospital (0.845), use of cleaning chemicals / room fresheners which are domestic use (0.859), neat & organized appearance – institutional perfection and mechanical efficiency has got a negative loading (–0.515) since this creates an impression of mechanical and less humanized attitude in the sub – conscious minds of the patients. This factor is termed as “Preference for a Non – clinical appearance” factor.
3. Factor III, which accounts for 54.74% of the variance includes the need for viewing the support nurses / staff and an assurance of help being available should the need arise (.694), proximity to family members (0.687) and not being vulnerable to accidents or pain while being taken from one place to another or during any treatment / diagnosis / stay (0.682). These attributes reveal

preference of respondents to be within a comfort zone where there is a sense of safety and security. This is termed as “Sense of being looked after” factor.

4. Factor IV, which accounts for 65.78% of the variance contains aspects of adequacy of information being displayed about various ailments and treatment procedure (0.803) and scope for counseling by well trained psychologist and medical personnel for patient as well as patient parties (0.789). These together may be termed as “Negating fear of the unknown” factor.

The results of this Factor Analysis, if heuristically interpreted, four major factors namely: (1) ensuring clarity and comprehensibility (2) creating a non – clinical appearance (3) providing care and protection (4) negating the fear of unknown appear to be largely responsible for ensuring psychological comfort for different categories of patients in similar situations.

The findings of this research implies that no longer should the ethics of healthcare be viewed exclusively through the lens of physician-patient dyad but architects associated with hospital design bear equal responsibilities. It was established by earlier researchers that architecture, which heals, requires a milieu that allows harmony – with nature and components of healing architecture include adequate daylight, sound of water and aroma along with other elements of visual aesthetics like colour, nature, and artwork. However, the current findings highlight issues like psycho – physical vulnerability of patients and family stress associated with hospitalization. It focuses on the non-medical needs of family members and visitors as an important factor in deciding the merits of specific designs and policies for hospital architecture.

## Conclusions

The research concludes by highlighting importance of factors which are closely linked with generating a sense of trust and faith on the hospital set up, familiarizing the patients and their relatives with hospital working system and process of treatment. It also highlights the need for comforting them through various rejuvenating elements, helping in negating the fear of the unknown through information dissipation and counselling. The focus is towards creating a non – clinical overall appearance. It suggests that the following strategies be incorporated at the design and operation level.

- To include some special features or places in hospital where patients can be reassured, families consoled, and the power of medical diagnosis and prognosis be made less overwhelming and frightening. This can be through rejuvenating elements like view

of nature, daylight, open air café, book – shop, gift shop and similar elements which are traditionally known as effective mind - diverters.

- To include relevant posters / boards which would create awareness about various diseases and also speak positively about treatment procedures and raise hope of recovery.
- To include prayer rooms or meditation rooms which will provide a tranquil space for quieting patients and family members as they pray for comfort, strength, guidance or whatever they would need to accept the present state of affairs they are going through.
- To ensure that a patient’s first impression of a hospital is not that of a non-home-like environment which elicits feelings of dread, fear, and revulsion. This can be achieved by use of everyday elements like intimate seating areas in clusters instead of rows of seating in waiting areas, upholstery which creates a homely atmosphere, paintings, wall clocks, indoor plants, magazine rack et - cetera. The strong smell of antiseptic or analgesic lotions, cleaning chemicals should be avoided which has a traditional association with hospitals.
- To provide access to medical literature for patients to assess and understand their ailment and health status, treatment options and time for recovery.
- To comfort patient by creating a set up which, assures desired privacy and control over immediate space. Private rooms or double rooms are preferred to dormitories. In the third case, private bays should be provided, giving scope for interaction or seclusion at will.
- To ensure proper control of patients over immediate environment. Scope to control radio, television, reading light, night light and freedom to choose artwork and daily menu are quite effective. Providing personal storage area for patient belongings, giving access to mini library and computer terminals are some useful measures in creating a sense of territoriality and belongingness and at the same time avoiding the feeling of disassociation from the everyday world while staying in hospital.
- To provide family zone in patient room to accommodate one member at least.
- To provide places where patients can engage socially with family and other patients without any physical discomfort or compromise of the clinical norms. This can be in form of pantry where family members can prepare food for patients and can eat together.
- To allow access to mobile phones, Internet and Skype except for during the compulsory quiet hours as per hospital rules.



Patient's rooms with view of the window



Praying enclave



Ceiling murals at CT – scan / MRI areas



ICU



Wayfinding through signage and other methods



Waiting lobby with adequate sunlight, innovative furniture and bright colours

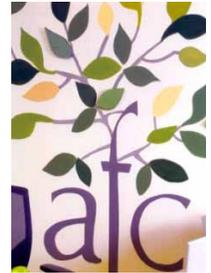


Inviting entry lobby and porch to hospital



Family niche

Homely seating arrangement



Rejuvenating elements like plants, gift shop, interesting mural

Above are some examples of existing hospital buildings that meet the above requirements.

Apart from these, the analyst however acknowledges existence of other relevant factors and architectural solutions, which may be identified through future research in this field. Future research may also focus upon inclusion into therapeutic environment those components which would prove to be beneficial for staff and caregivers in terms of satisfaction, less work related fatigue, effectiveness, and staff retention.

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