CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

Architecture has been unique, and habitually separated from other creative fields or art forms for its role in satisfying the needs of the users who occupy the buildings. In architecture, the built environment is an envelope which organizes and structures space for the users; the interiors of the environment, the objects enclosing and inhabiting its rooms can facilitate or inhibit our activities by the way they are used.

Lawson (2005) states that space is the language of the built environment and is the vocabulary to express the users’ basic human need of for shelter and safety, and the spatial human needs are expressed and perceived as behavior or response to the environment in which the architectural buildings are set within. He perceives that space is a global human language in built environment and by sensing and moving in space, the meaning of the space is generated, which embodies and describes the character of the built environment. The built environment (Bell et al 1995) can create stress or boost users’ behavior and initiate a variety of reactions, both psychological and physiological. The perception of healthcare built environment as a contributory element in a patient’s recovery and wellbeing is a prerogative which is archaic in nature and evident from long history (Kirkbride 1854) and from the focus in research (Centre for Healthcare Design 2007). Given the importance of an individual’s surroundings, it is
clear that a clinical environment can affect clinical outcomes. Yet, in healthcare buildings, the complexity in function, utility pattern and building form manifest on the environment of care to create more harm than cure to the patient. This results in affecting the user’s thought and action leading to emotional distraction and physical barrier (Phil Leather et al 2000; Douglas et al 2002; Berg 2005).

A central theme in this research has been to seek for and identify those design aspects of a built environment that contribute towards the creation of a “Therapeutic Environment” (Canter and Canter 1979). “Therapeutic” means, causing someone to feel happier and more relaxed or to be more healthy and in the context of building design, an environment which is supportive of patient needs (Dilani 2005) and which portrays a “nurturing” and “non-threatening” image and helps to “put people at ease” (Carver 1990); it is essential for the built environment to create the emotional and physical variant for the betterment of the user’s thoughts and actions but not detrimental (Lawson 2005).

1.2 STATEMENT OF THE PROBLEM - NEED FOR THE STUDY

Many conventional hospital environments create a very different image, one which is strange and alien to many. Carver (1990) compares being admitted to a modern hospital to “entering an alien spacecraft”, where the atmosphere can be “intimidating and unfamiliar”. Leather (2000) feels that the unfamiliarity and strangeness characteristic of the hospital environment, has been found to generate strong negative emotions, including threat, vulnerability and fear, together with those associated with suffering and death. Ulrich (1991) states that such emotions derive directly from a design ethos that emphasizes the functional delivery of healthcare at the expense of patient
needs. The result, he concludes, are hospital designs which are “psychologically hard”, “unsupportive” and which “work against the well-being of patients”.

This view is significant in traditional Indian hospitals which show a built environment with the least understanding of the user’s physical and psychological needs on built form (indoor and outdoor) but prioritize rather on the integration of Medicare procedures, building service, operative system of hospital staff, their administrative demands and the (ever) changing technology within the built environment. However, with the present emphasis on the patients’ perceptive/needs and a change in the Medicare treatment concepts, the immediate need to recognize the hospital’s physical form and structure to imbibe the aesthetic ambience and therapeutic function, had emerged as vital in the Indian healthcare delivery system. (Rosen et al 2005). Also, the present Indian Medicare concept had advanced to the fact that healing or curing to one’s illness is not merely providing clinical care to one’s physical self but providing psychological care to his perceptual senses (WHO report 2000). Based on the statements issued by WHO (World Health Organization) in 2000 and the Indian National Health Policy 2002, it is observed that, current and future hospitals are to be prepared for the future change and focus essentially on matters specific to patients. The organization and the policy state that understanding the user need is mandatory, and that it should serve as the base for the hospital facilities to function purposefully and effectively.

The WHO has identified “patient centeredness” as one of the key dimensions of the hospital performance linking it to the different theoretical models of performance laid down by the society of organizations.
1.3 Scope and Content

The scope of the research is to identify and categorize therapeutic design aspects and interpret them to create the practice design guidelines specific to the Indian user group in the context of cancer care facilities. The user of the cancer care facilities dealt with the research encompasses the primary user – patient and the accompanying relatives, and the secondary user – the medical staff constituting doctors and nurses (who are in direct contact with the patient and his relatives). The investigator envisages that the use of these design guidelines will enable the designer and healthcare provider to integrate therapeutic design aspects while creating or modifying cancer care facilities; and to validate whether architectural spaces like courts, daycare area, waiting area etc. are consciously identified as therapeutic in character in the built environment to provide an appropriate environment suiting both the needs of the user and having architectural significance. These criteria would also serve as indicators for assessing and evaluating the quality of the user environments in the existing or new healthcare buildings and develop a tool to achieve excellence in design rather than ensuring compliance with legislation, regulation and guidance. The investigator envisages that the study will help to see that a cancer healthcare building like any other typology requires a homely ambience with response to the user’s social behavior and cultural values.

The content of the thesis is to study users’ needs for a salutary physical environment in cancer care healthcare facilities (serving either as a hospital, institute, centre or department) providing them a physical setting for cure and comfort. Cancer is one of the major diseases in India with 80% death caused annually. It also causes a high level of physical and emotional stress to the sick and their relatives when encountering the disease. In the specialty of cancer care, the patient with cancer faces a wide range of challenges
stretching from biological to emotional, interlaced with unwelcome confrontation with mortality and altered normalcy of life (Brennan 2005). And incidentally, patients with varied degrees and stages of illness visit the hospital and encounter the hostile environment devouring them of their self respect, esteem and pride etc Foss et al (1993) Firestone et al (1980) and even more so for the relatives and friends of the patients.

In order to investigate these issues, research was done extensively and precisely by directly approaching the primary source—the patient, his/her relatives and the medical staff attending on the patient, to enquire about their needs and perception of the cancer care environment. Throughout health care, patients and family members are increasingly recognized as “experts” on the subjective quality of their experience—what matters, what makes them feel better, and what they need to help them recover, heal, and adapt to significant changes in their lives. (Leather et al 2000 and Francis et al 2000). So, in order to create “therapeutic” environments in healthcare, it is crucial to understand how patients and their families experience those environments, and offer the cancer care building design aspect that matters to them.

1.4 AIMS AND OBJECTIVES

The aim of the study was to identify the links which could usefully be researched in more detail and used to inform design guidance. It would also show whether the survey findings reinforced generally accepted beliefs about what patients and visitors experience as beneficial or unsatisfactory while moving around hospitals. It would also identify if there were therapeutic design factors important to people which have not commonly been recognized, and perhaps suggest the relative importance of the various factors. These outcomes could be useful in informing design and briefing guidance, thereby improving patients’ experiences. The research was designed to assess and
determine the relationship between the physical characteristics of the building with the users’ experiences, perception and their need for a therapeutic ambience by means of qualitative and quantitative spatial study with specific reference to the case studies.

The objective of this research is to observe and trace the users’ interaction with their hospital environment, based on "informed suppositions" established in past research and by the patient enquiry methodology. The extent of this research is to know about what happens during environmental interactions, and also why humans respond the way they do and about what might be done by designers to influence experience. In this research process, details on the user’s (namely patient, relatives and staff) perception on the hospital environment are collected through feedback questionnaire, and a scientific analysis of built form and design.

Hence the research probes into the following research query at coding and interpreting the issue as stated:

- To outline the consequence of built environment on the patient’s and relative’s experiences and behavioral responses in oncology department /centre.
- To identify the therapeutic aspects in the hospital building as per the patient, relatives and treating staff response.
- To identify and classify the architectural design elements - therapeutic in nature in the healthcare building as per the patient, relatives and treating staff response.
- To evolve and classify the quality of space associated with the therapeutic design elements for the Cancer built environment.
• To evolve and classify the architectural design facilities required by the patient’s and relatives physical, physiological and social interacts.

1.5 RESEARCH DESIGN

Research approach: The research is developed in stages as stated below:

1. Stage 1: General Survey: The research literature appraises the hospital built environments, patients’ opinion and the behavioral response of the user pertinent to the context. Based on the aspect of patients’ perception in built environment, the literature review also appraised various case studies and reports to understand the research process, empirical model and the research analysis method followed to derive the findings. With due importance given to the user’s surroundings, the review clearly affirms that the physical environment can affect the physical and physiological outcomes and can drastically alter the behavioral pattern and the sensitivity of the user. The user -predominantly the patient requires a therapeutic environment to support the process of healing in the hospital.

2. Stage 2: Preliminary research Survey: In order to explore the research questions, three methods of enquiry were employed by the investigator to explore the users’ experience and therapeutic needs in the built environment of cancer care facilities. The methods utilized both qualitative and quantitative approaches and comprised of three types. The
first type is on categorization and listing of elemental design aspects necessary for therapeutic built environments derived from the workshop deliberations and the viewpoint of novice and expert that provides the perception and attitude of the public at large. The next approach type is on users’ (patient, relatives and staffs) feedback received from a self-completion questionnaire to provide an insight into the user’s preference and significance of the therapeutic design aspects (derived from the previous stage) within the cancer care built environment selected for the five case studies. And the final type is on users’ (patient, relatives and treating staff) response and assessment of the built environment for the therapeutic aspects and structured observation on the user’s behavioral pattern within the selected case studies received from self-completion questionnaire and using Depth map to trace the socio-physical phenomena.

During this stage, the investigator enquired and surveyed the requirement of the therapeutic aspects in cancer care built environment at Chennai, India. The identification and categorization of therapeutic aspects were prepared based on the experience and knowledge of the novice in the healthcare setting and environment. The experts’ opinion and suggestions based on their knowledge of the user’s therapeutic needs and preference were identified. The inferences drawn from the novice group were summarized to classify the architectural design aspects required for creating a therapeutic cancer care environment which if utilized would wholly and significantly aid in the recovery process of the patient. The novice group deliberated on this topic through group discussion and
provided views and proposed the provisions and design of hospitals with the therapeutic needs. Subjective assessments of the novices’ suggestions, by way of ranking the categorized sets of elemental factors were put forward by the novices.

The selection of five case studies in cancer healthcare facilities at Chennai was done to represent various cancer healthcare facilities based on the building functional classification (i.e. as an independent department to a specialized hospital) and the cancer care provider types (i.e. public to private types) in order to study and observe the significance of the therapeutic aspects on these case studies.

3. Stage 3: Analysis- User Preferences: Quantitative preference analyses on the user’s attitude and perception (patients’, his/her friends / relatives and medical staff) on the built environment were conducted through interviews using self-structured questionnaires and through visual observation to identify the intensity and value of the therapeutic aspects in the Indian context. The structure and the formulation of the questionnaire draft were based on the outcome of the previous stage of enquiry by novice - expert method and literature studies. Patients, both inpatients and out patients in the five case studies, relatives of the patients and the medical staff treating the patients were contacted to get their response. The feedback concludes that there is a need for therapeutic design aspects in the cancer specialty healthcare building and they must be integrated into the facilities offered.
4. Stage 4: Analysis User behavior in Case studies: The combined qualitative and quantitative spatial study of the impact of the building physical profile on the users’ perception and behavior with specific reference to the case studies was performed. This stage contains the qualitative spatial analysis and study of the building profile by using Space Syntax Depthmap software which is correlated and corroborated with the quantitative spatial analysis on the user perception and behavior through questionnaire survey and participant observation. The Depthmap software, developed by the Space Syntax from Space syntax methods use shape recognition to generate a topological or theoretic formal model of spatial configuration. Spatial configuration deals with space (indoor and outdoor) utilized and lived in by people and can be observed and trace people’s usage in plan. By decomposing the space in plan to its constituent units of analysis and giving these units numeric tags, the Depthmap 60818r software (version 5.1.0.0) in Syntax method helps to identify both patterns and their variations in order to decode spatial ordering and relate these codes to the underlying social and behavioral logic. A specific study and observation of the relation between the practical use of interior/exterior space and the respondents using empirical methods of structured field study, informal field observation and interviews; the checking and description of the layouts and building function; space occupancy; and the collection of background data concerning the physical ambience and atmosphere of the institutions are done (Cutini 2003; Dine 2003; Haq 2003; Rashid 2003; Doxa 2001). The result concludes with an optimistic verification of the need of therapeutic design aspects in cancer care building along with
specific subjective observation and inference on the evaluation of the building layout and design based on the visibility analysis using Depthmap software and user response.

5. Stage 5: Finding and Inferences: The correlation of the general and specific inferences drawn from stages 3 and 4 to provide information on the level of preference and significance of the therapeutic design aspect at the Out-patient Area, the Diagnostic Area, and the In-patient area of the cancer hospitals were identified and prioritized. Table 1.1 describes graphically the methodology and sequence of work followed in the research. The supportive evidence was to be found, i.e. if a more pleasantly appraised environment is associated with improved health and well-being, then two conclusions are deduced. First, the evidence is to demonstrate the important role played by hospital design in the creation of a therapeutic environment, a claim often made but seldom empirically substantiated. Second, it is to demonstrate the fundamental importance of measuring users’ evaluations, rather than professionals’ judgments, of the value and meaning of any specific design configuration.

Figure 1.1 Methodology chart explains graphically the sequence of work of the research design as discussed above.
### Table 1.1 Methodology Chart showing the sequence of work

<table>
<thead>
<tr>
<th>Procedure of study</th>
<th>Description of the procedure</th>
<th>Outcome of the procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong>&lt;br&gt;General survey</td>
<td><strong>Introduction</strong>&lt;br&gt;- Introduction of the therapeutic aspect in built environment method of study&lt;br&gt;- Definition and scope of the problem</td>
<td>- Description of proposed interdisciplinary research methodology adopted for the study</td>
</tr>
<tr>
<td></td>
<td><strong>Literature survey</strong>&lt;br&gt;- Study on the existing Indian hospital environment&lt;br&gt;- The therapeutic aspects in hospital built environment&lt;br&gt;- The users’ physical and physiological needs&lt;br&gt;- The environment and behavior response by user group</td>
<td>List of therapeutic design aspects&lt;br&gt;List of human needs in the built environment</td>
</tr>
<tr>
<td><strong>Stage 2</strong>&lt;br&gt;Research survey</td>
<td><strong>Theoretical discussion and Preliminary research survey</strong>&lt;br&gt;on the requirement of therapeutic aspects in Chennai Cancer Hospitals&lt;br&gt;- from the expert and the novice groups&lt;br&gt;- from the architects and healthcare providers (public and private groups)</td>
<td>Theoretical review of the perception and the behavior of the respondents within the built environment. Identification and classification of therapeutic design aspects for cancer care hospitals: nine Aspects: AS1 to AS9 Five cancer hospital case studies in and near Chennai</td>
</tr>
</tbody>
</table>

Note: AS denotes the therapeutic design aspect. AS1=Image and Scale, AS2=Privacy and Dignity, AS3=View to the outdoors AS4=Physical comfort and control, AS5=Physical comfort and control, AS6=Legibility of place, AS7=Interior appearance AS8=Therapeutic design elements (indoor) AS9=Therapeutic design elements (outdoor)
Table 1.1  (Continued)

<table>
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<tr>
<th>Procedure of study</th>
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</tr>
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</table>
| **Stage 2**  
Analysis  
Identification of the respondent group | Selection of cancer hospital for survey and identification of the respondent group  
Identification and classification of the patient use zones in the hospital | The patient use zones: OP area, Diagnostic area and IP area |
| **Stage 3**  
User preference | Descriptive analysis of the respondents perception to cancer hospital environment with the aid of self completion questionnaire on the need for therapeutic design aspect in the three zones in the cancer hospital | Descriptive interpretation of the theory of action/decision given by the respondents  
Identification and categorization of the respondent’s choices and preference on the therapeutic design aspects. |
| **Stage 4**  
User behaviour in case studies | Descriptive Spatial analysis of the case studies on the 6 therapeutic aspects: AS1 to AS6  
1. Use of self completion questionnaire to receive the respondent’s evaluation of the three zones in the case studies.  
2. Use of Depth map software on the floor plan of the three zones in the case studies | Descriptive Spatial interpretation of the 6 aspects: AS1 to AS6 across the case studies.  
1. By the respondent’s evaluation of the significance of the therapeutic design aspects specific to the case studies.  
2. By using the Syntax-Depth map software outcome. |
| **Stage 5**  
Major findings and inference | Major findings and inference | List the similarities and difference from both the survey methods and prioritize the therapeutic design aspects based on the areas in the hospital.  
Propose design guidelines for OP Area, Diagnostic Area and IP Area in cancer hospitals |

Note :  
AS denotes the therapeutic design aspect. AS1=Image and Scale, AS2=Privacy and Dignity, AS3=View to the outdoors, AS4=Physical comfort and control, AS5=Physical comfort and control, AS6=Legibility of place, AS7=Interior appearance, AS8=Therapeutic design elements (indoor), AS9=Therapeutic design elements (outdoor)
1.6 CONTEXT DEFINITION: CANCER CARE FACILITIES IN INDIAN CONTEXT

Cancer prevalence in India is estimated to be around 2.5 million, with over 8,00,000 new cases and 5,50,000 deaths occurring each year due to this disease in the country (Nandakumar 1996); about two thirds of these patients die every year because of the advanced stage of the disease. And due to this, the disease is associated with a lot of fear and stigma in the country.

The Government of India developed the first statement on cancer control as early as 1971 followed by the National Cancer Control Programme for India in 1984 with three major goals focusing on prevention, detection and treatment facilities. This objective was met through cancer care facilities of 21 Regional Cancer Centers (RCCs) and a number of Medical Colleges in the country. Apart from the RCC and medical college, in 1980 the government under the stewardship of the Ministry of Health provided consent to the NGO’s to run cancer centers and hospital to serve and share the government’s objective (Sanyal 2005). The NGO (Non Governmental Organization) were either a Trust/registered body operated by a group or corporate hospital operated by selected individuals. Each cancer care provider with their respective background and resources provided healthcare facilities with varied concepts and interpretation.

1.7 CASE STUDY-CONTEXT DEFINITION

The following five case-studies are selected and set out to test the veracity of the claim that a more “pleasing” and “reassuring” physical environment can promote the patient’s well-being and recovery. Each of the five studies focused on specific zones within the cancer care department.
The selection of the case studies of the cancer care facilities was primarily based on two reasons:

1) In the cancer centers where higher occurrence of cancer disease with higher number of cancer patients visit the facilities, and socio-cultural classification of the patients and their relatives. Based on Population Based Cancer Registry (PBCR) and Madras Metropolitan Tumour Registry (MMTR), the data collected on the incidence of cancer cases among the residents of Chennai city with a total urban population of 4.2 millions in 2002, registering an average of 4,000 cases annually. MMTR records data on incident cancer patients within the metropolitan limits of Chennai irrespective of the hospitals attended by them and records Chennai as one of the first three cites with a high rate of occurrence of cancer and treatment for cancer. The average annual crude incidence rate (CIR) of cancer in the year 2002 was estimated to be 91.0 per 100,000 among males and 103.2 per 100,000 among females. The completeness of coverage of reportable cancers in MMTR was estimated as 96%.

2) Based on the character of the cancer care building:

- The cancer care provider type (public or private types), scale of the facilities (as a department to specialty hospital), the building physical typology (horizontal courtyard or vertical tower block) and the user group types.
Five hospitals of different building configurations were selected as case studies. These were chosen to include different geometric configurations of building as these determine the relationships of main entrances to departments, the ratio of vertical to horizontal circulation, the distances of frequent journey routes and the opportunities for visual way finding references such as views out through windows or across courtyards.

The public, private and clinical zones were identified in each of the hospital plans.

A number of locations were selected in each hospital at which to interview patients, relatives and visitors.

Chennai city has 10 cancer care facilities operating as both private, NGO and government run public healthcare facilities, of which the following are the cancer care facilities selected as case studies located in and near Chennai city:

1. Oncology Department – Madras Medical College and Government Hospital, Chennai
2. Aringar Anna Memorial Cancer Institute - Kanchipuram
3. Adyar Cancer Institute – Chennai
4. Oncology Department, Dr. Kamachi Memorial Hospital, Chennai
5. Oncology Department, Apollo Specialty Hospital, Chennai

A total of 695 respondent feedbacks were obtained with 68% from the patients, 22% from the relatives and 11% from the medical staff treating the patients representing 5% population of the subjects in the case studies.
The following three zones within the Cancer hospital are identified for their physical and psychological proximity to the primary user - patient and subsequently the other users. These three locations were:

- Cancer care - Out-patients area.
- Cancer care - Diagnostic area.
- Cancer care - Inpatient area.

The research is conducted in these three specific areas of the cancer care area - a place within the cancer care built environment, which the patients, relatives frequent often and are impacted physically and emotionally by the architectural profile of the space, and place where the level and degree of therapeutic integration can combine with the Medicare process without altering or affecting the latter.

1.8 ANALYTICAL TOOLS AND TECHNIQUE

1.8.1 Tools

The preference of the respondents and evaluation of the case studies were completed using the Likert scale of rating. The Likert scale is a widely used scoring format used for attitude based questions to measure the intensity which respondents feel about the issues. Microsoft Excel and SPSS (Statistical Package for the Social Sciences) software was used for compiling and undertaking the parametric analysis.

All the floor plans of the five case studies were developed using AutoCAD Software and were further analyzed for the research using the Syntax Depth Map software.
1.8.2 Technique

The feedback data were processed using the SPSS software and the inference data were examined taking the mean, standard deviation and level of significance between variables as the measuring and evaluating tool. In the Syntax Depth Map software, the effective utilization % was the measure and evaluating tool.

1.9 LIMITATION

The major limitation was the access to samples for survey – the medical condition of the patient and the willingness of the staff to give feedback resulted in reviewing patient needs who were medically fit to respond and the fixed number of staff to provide feedback respectively. The collection of case studies data namely drawing, interior photograph were restricted leading to representation of the case studies in terms of freehand drawing, graphic image and description of the case studies.

1.10 RESULT AND DISCUSSION

The outcome of the analytical work was discussed thoroughly to draw inferences about the respondents’ preference and need of a therapeutic aspect in the cancer hospital and to trace the consequence of the built environment on the users’ experiences and behavioral responses in a cancer care department/institute.

1.11 CHAPTERIZATION

The thesis consists of six chapters devoted to various aspects of the study. A brief description of the chapter area is stated below. The tabled
annexure provides the structure of the research design and the research methodology.

The **first chapter** introduces the context and gives an overview of the therapeutic need in cancer care health facilities. It deals with the importance, scope and objectives of the study and explains the methodology adopted in the research. This chapter provides the total overview of the task undertaken in this thesis by the researcher.

The **second chapter** deals with a review of the relevant literature. The review enquires into the user’s perception of the built environment, the physical requirements and psychological perspectives of the users (patient, relatives and staff). The review also explores the aspects on the notion of healing environments in cancer hospitals and the relationship between design, image and well-being.

**Chapter three** forms the initial investigation of the research by identifying and classifying the therapeutic design aspects derived from the novice techniques, interviews with the experts and the literature review. Validation and correlation of the identified therapeutic aspect was conducted to enable further application of the aspects in the next consecutive research stages. This chapter also elucidates the method of inquiry; tools applied and measures utilized in the research investigation.

The **fourth chapter** introduces and describes the case studies, in terms of selection, the area of study, the architectural character and the user respondents’ profile. The architectural character of the case studies includes graphical representations like drawing, sketches and physical profile, and ambience of the built environment in cancer care facilities. The respondents’
(patient, relatives and staffs) profiles provide an insight into user characteristics like age, gender etc.

The two phases of the detailed analysis of the research are dealt within the **fifth chapter** which had probed into the respondents’ preference and choice in cancer hospital at three zones i.e. Inpatient area, Outpatient area and Diagnostic area. The respondents’ experiences in the cancer care built environment are measured by the Space Syntax evaluation method. Studies on the five case studies’ floor plans (of Outpatient area, Inpatient area and Diagnostic area) using Syntax Depthmap Software were conducted to correlate its result with the respondents’ reply. The analysis and the findings are deduced to trace the impact of the building layout on the respondents’ response and behavior.

The **sixth chapter** concludes with the overall findings, recommendations and guidelines to identify the therapeutic aspects in the cancer hospitals in the three zones (Outpatient area, Inpatient area and Diagnostic area) in Chennai, Tamil Nadu. The chapter also discusses the future area of research.