PAEDIATRIC CARE COMPLEX

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Abstract

Children need to focus on health care for their unique needs. Children need extra time, supervision, special medicines and specially trained medical service providers, who need to be compassionate and understand children of all ages. They also need institutions that support healthcare practices and policies to continuously improve paediatric care to make it affordable and accountable. Children's hospitals also should be uniquely qualified dedicated healing environments to meet the emotional needs of children who are treated there. Several case studies related to paediatric hospital were analysed. This study proposes a paediatric nursing complex that can provide the highest quality medical services and cost-effective results by providing intensive treatment services for specialist inpatients. The environment aims to support and encourage the treatment and care of children. The proposed paediatric care complex equipped with a research center that study and find solutions for children contemporary disease and spread the awareness and knowledge in the society. The selected site for this project is located in Al Khalidiya due to several advantages such as easy accessibility, less noise, good landscape, safety and good topography.

Keywords—Paediatric Care Complex, Healing Environments, Children's Hospitals

INTRODUCTION

Paediatrics is a field of medicine involving infants, children and adolescents from birth to 12 years of age [1]. Children's Hospital is a place that provides intensive care and medical care for children, and has long-term hospitalization facilities. These hospitals usually provide a high level of psychosocial care to meet the special needs of very young patients [2].

The main functions of children's hospitals are diagnosis, treatment and nursing, and the secondary functions are on-the-job training of doctors, nurses and other professionals, as well as education and training of parents in the treatment of children.

Creating an environmental design that allows a combination of these functions will improve the overall treatment of children. The outpatient center of the hospital should be the heart of the hospital, and should include not only the space for emergency arrival, but also the space for observing children for up to 16 hours.

Currently, the healthcare facilities moving forward in the Middle East as the appearing of children specialized hospital with a high technology. The first hospital that was specialized for children is 57357 Hospital in Cairo, Egypt [3]. 57357 Hospital is one of the world’s largest children’s cancer specialist hospitals. Another example of modern specialized hospital is Al Jalila Children’s Specialty Hospital, the country’s first hospital dedicated to paediatric care [4]. Thus this study proposes the development of paediatric care complex in Jeddah, Saudi Arabia.

CASE STUDIES

There are three paediatric hospitals from United States and China are considered as the main case studies namely Phoenix Children’s Hospital, Suzhou Children’s Hospital and Children’s Hospital & Medical Center. Another two paediatric hospitals from Australia and United States are considered as thematic case studies namely Royal Children’s Hospital and Nemours Children’s Hospital.

Phoenix Children’s Hospital

Arizona’s Phoenix Children’s Hospital located in Phoenix, Arizona, United States, designed and renovated by HKS Architects, Jeff Stouffer [5]. It is an 11-story tower facility and is one of the largest paediatric campuses in the United States.

The building is part of a larger campus and part of the Phoenix community, which is a factor that determines the aesthetics of the new building. It wins the Modern Healthcare award.

The beauty of the hospital appears in the tower because it reflects the blooming desert flower and is divided into three parts (Figure 1). The outer wall of the hospital was scattered by sails, which separated the inner part of the building and entered the three-story atrium below.

In fact, the sail is inspired by the facilities that welcome family members to the hospital, and is illuminated with bright colours to make the interior shine (Figure 2).

For the exterior, the facility glows at night and can be seen from the community. In fact, the main component of the facility is the visual access, which provides patients with external views from wards and public spaces (including elevators, game rooms, cafes, waiting areas, and corridors) [5].

In fact, the tower has been carefully designed to respond to the Phoenix Sun, maximizing its solar potential and reducing heat absorption.

The curvilinear form on the north side aims to produce a good response to the sun to the east and west of the surrounding area. In the summer, the outdoor courtyard is well shaded, and family members and staff can escape even for a short while.

In addition, local materials have been used, including the main masonry materials and masonry with bright colors and low maintenance costs [5].
Suzhou Children’s Hospital
Suzhou Children’s Hospital is located in Suchou, China designed by HKS Architects (Figure 3). The concept for the design of Suzhou Children’s Hospital was inspired by the Kites [6]. The kite provides shelter and protection for children from the sun and rain, adding colour and joy to the children and their families. The building of the hospital emphasizes the relationship with the flexibility of the water in the garden and the canal and the mobility of the kite. These curves are visually appealing, like water waves or air currents. In addition, the use of colored strips scattered on the outer wall of the building adds a unique label to the hospital as a residence for children and their families. In addition, the facility can be used as a larger model of health sciences, and its research and education core has been fully integrated into the hospital. However, the project integrates itself into the regional environment by the famous local traditional Chinese gardens (Figure 4) [6].

Children’s Hospital & Medical Center
The Children’s Specialty Paediatric Center is located at 84th Street and West Dodge Road in Omaha, United State (Figure 5) [7]. The center symbolizes the expansion of the scale of children’s hospitals and medical centers and the expansion of services. The paediatric hospital is consists of five floor and it is specialized in cardiology, oncology, neurology, allergy, asthma and dental. In addition, the center also includes clinical facilities, gymnasiums and personal treatment rooms for children undergoing physical, occupational and speech therapy. Figure 6 shows the interior space of specialty paediatric center. Children’s Hospital and Medical Center was rated as the best children’s hospital in cardiology, cardiac surgery and orthopaedics by “News and World Report” [7].

Figure 1. Architecture image of Phoenix Children’s Hospital [5]
Figure 2. Interior view of Phoenix Children’s Hospital [5]
Figure 3. Architecture image of Suzhou Children's Hospital [6]
Figure 4. Garden area of the Suzhou Children’s Hospital [6]
Figure 5. The exterior façade of the hospital [7]
Figure 6. Interior space of specialty paediatric center [8]
Royal Children’s Hospital

Royal Children’s Hospital in Melbourne, Australia, designed by BillardLeece Partnership and Bates Smart architects (Figure 7). Royal Children’s Hospital is designed to be a world-class hospital, providing the latest quality care in a rehabilitation environment that can meet the needs of children, their families and staff. It includes an interactive playground, a two-story coral reef aquarium, a scientific work, displaying scientific wonders, a beanbag theater displaying the latest movies, and a room staring at the starlight. Children’s hospital is family-centered care. More than 85% of the rooms are single rooms, providing privacy for patients and their families. The hospital is surrounded by the parks of Royal Park, with views of trees and natural light [9].

For the interior spaces, it gives a wonderful experience as they used a locally inspired art enhancement to provide a positive interruption and to become the landmark feature. The hospital uses giant fish tanks to attract tourists to experience Australia’s coral reefs, and the Emergency Department is located below the level. However, the patient corridor has been turned out of the family rest area and has a panoramic view (Figure 8) [9].

The Royal Children’s Hospital is supported by a research center to research of childhood diseases. The Murdoch Children’s Institute connects clinicians and researchers directly through its location above the central clinical area, and connects it to the in-patient unit, clinical office, and teaching space both vertically and horizontally. The upper-level bridge is connected to the building of the research area retained during the reconstruction, and the building of the research area still accommodates part of the research institute. The Murdoch Children’s Institute’s Basic Research Program and the Australian Department of Paediatric Pharmacology’s Clinical Trials Department provide flexible use facilities for research and development of biotechnology programs.

Nemours Children’s Hospital

Nemours Children’s Hospital is located in Orlando, USA designed by Stanley Beaman & Sears architect (Figure 9) [10]. The new hospital is designed according to the term “healing environment”. Its philosophy is to enable children to “cross the entire continuum” from infancy to adulthood. Nemours Hospital specializes in serving children with chronic diseases as well as complex medical diagnoses and life-threatening diseases. The Children’s Hospital campus aims to encourage, inspire, participate and entertain, and invest in landscapes, which reflects Nemours understands of the role of nature in children’s lives. Nemours Children’s Hospital is considered to be one of only three children’s hospitals in the United States that have received LEED Gold certification. The main consideration to achieve sustainability is energy savings and good environmental quality. Architects put beautification in the first place, and they encourage planting in the early stages of construction. The internal space is designed to provide plenty of natural light, and the natural scenery is suitable for children and families as well as employees and support staff (Figure 10).

SPACE PROGRAM

This Project contains main four major zoning namely hospital, rehabilitation center, medical research and awareness center and outdoor park. Table 1 and Table 2 tabulate the project zone area and project site area respectively.

The basic form of a hospital is ideally divided according to functions into three main zones namely nursing zone, clinical zone and support zone. The nursing zone consists of administration, inpatient department, emergence department, amenities, and services. The clinical zone mainly for outpatient related function. The basic requirements of the outpatient department are the reception area and waiting area, consultation room, examination room, treatment room and personnel and
supply area. The support zone covered the department of radiology, Intensive Care Unit (ICU) and surgical department. The X-ray department should include three rooms, namely X-ray room, dark room, office and storage room. The intensive care unit must be a separate area and accessible only through lobbies. It has separate lobbies for staff and for patients. Also, the nurses’ workstation must be located in the central area of the ICU. Generally, the surgical unit is centrally located in the hospital. Surgical services must be close to emergency situations, intensive care services, walking units and sterilization services. The surgical room consists of an operating room, clean room and equipment room.

The Rehabilitation Center is a supported facility for the hospital. It consists of indoor and outdoor facilities. This center is specialized only in certain disabilities, which are physical disability, speech and hearing disability and mental disability. So, the main zones of the center are administration, physical therapy unit, speech-hearing unit and brain injury unit. The outdoor facility is a park with a pavilion. The hospital patients and the rehabilitation center patients can use this park.

The Medical Research Center is another supported facility for the hospital. It performs basic and applied biomedical research to meet the needs of the hospital. It will aim to encourage cutting-edge research in medicine, genetics, technology and other fields. These centers will enable researchers to better manage drugs for various health issues. The main functions of the research center are administration, laboratory, laboratory support spaces, meeting rooms, conference rooms, lecture room, and library. Also, this center provides a section for the awareness the community. The awareness facilities are seminar rooms, conference rooms, and digital library.

<table>
<thead>
<tr>
<th>No.</th>
<th>Zone</th>
<th>NET Area</th>
<th>GFA</th>
<th>Percentage (%)</th>
<th>No. of Floor</th>
<th>FPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hospital</td>
<td>1314</td>
<td>1795</td>
<td>66.17</td>
<td>4</td>
<td>4489</td>
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<tr>
<td>2</td>
<td>Diagnosis &amp; Treatment Center</td>
<td>4873</td>
<td>6630</td>
<td>16.84</td>
<td>2</td>
<td>2436</td>
</tr>
<tr>
<td>3</td>
<td>Rehabilitation Center</td>
<td>3355</td>
<td>4654</td>
<td>11.82</td>
<td>2</td>
<td>2327</td>
</tr>
<tr>
<td>4</td>
<td>Research Center</td>
<td>6482</td>
<td>1012</td>
<td>25.72</td>
<td>5</td>
<td>2026</td>
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<tr>
<td>Total</td>
<td></td>
<td>2785</td>
<td>3936</td>
<td>99.99</td>
<td></td>
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<table>
<thead>
<tr>
<th>No.</th>
<th>Zone</th>
<th>FPA</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Built Area</td>
<td>11,278</td>
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<tr>
<td>2</td>
<td>Outdoor Area</td>
<td>30,892</td>
<td>46.54</td>
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<tr>
<td>3</td>
<td>Park</td>
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<tr>
<td>4</td>
<td>Parking Area</td>
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<tr>
<td>Total</td>
<td></td>
<td>66,370</td>
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<tr>
<td></td>
<td>Expansion Percentage</td>
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<td>50</td>
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<tr>
<td>Final Site Area</td>
<td>66,370</td>
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Site Analysis
Selecting the site process is based upon the space program analysis and the requirements of the project. There are three proposed sites for the project and all the selected sites are located in the northern Jeddah. Figure 11 shows the size of site 1 is 33,000 m², located in Al- Ruwais. It can be access from two main roads, Hail and Al-Anduls roads. The site is near to many hospitals such as International Medical Center (IMC), United Doctors Hospital, Dr. Samir Abbas Medical Center, and Dr. Soliman Fakeeh Hospital. Figure 12 shows the size of site 2 is 66,370 m², located in Al Khalidiya. It can be access from KingAbdul Aziz and Al Rwadah roads. The site is located in the new developed area. Near to the site there are two hospitals namely Saudi Airlines Medical Service and Dr. Samir Abbas Hospital. Figure 13 shows the size of site 3 is 56,156 m², located in Al- Khalidiya. It can be access from three main roads, Al Andalus, Al Hamra and Hail roads. The site is located near to the recreation area and other green areas. Also, it is near from Dr. Soliman Fakeeh Hospital and Saudi America Clinic.

Site selection
A set of criteria has been set to evaluate the selected sites. The main components that the criteria were set are accessibility, noise level, opportunity for good landscape, safety, topography, urban and future developments as well as visibility and views. The site that has highest score will beselected. Table 3 demonstrate the result of site evaluation.
Table 3. Site Evaluation

<table>
<thead>
<tr>
<th>No.</th>
<th>Site Criteria</th>
<th>Value of Criteria (%)</th>
<th>(Site 1)</th>
<th>(Site 2)</th>
<th>(Site 3)</th>
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<tr>
<td>1</td>
<td>Accessibility</td>
<td>25</td>
<td>17</td>
<td>20</td>
<td>25</td>
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<tr>
<td>2</td>
<td>Nose Level</td>
<td>22</td>
<td>13.2</td>
<td>17.6</td>
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<td>3</td>
<td>Opportunity for good landscape</td>
<td>8</td>
<td>5.6</td>
<td>6.4</td>
<td>6.4</td>
</tr>
<tr>
<td>4</td>
<td>Safety</td>
<td>8</td>
<td>6.4</td>
<td>6.4</td>
<td>5.6</td>
</tr>
<tr>
<td>5</td>
<td>Topography</td>
<td>6</td>
<td>1.8</td>
<td>4.2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100</td>
<td>59.5</td>
<td>77.8</td>
<td>75</td>
</tr>
</tbody>
</table>

Selected Site Analysis

According to the result of the site evaluation in Table 3, the site 2 which is located in Al Khalidiya, has the highest score. Site 2 is considered to be preferable site for the paediatric hospital as the site is located in the new developed area and it doesn’t has enough number of hospitals. Figure 14 demonstrates the project site analysis for climax. The accessibility to this location is convenient as it can be access from King Abdul Aziz and Al Rwahad roads. The site has small topography. The highest point at the site is 8m heights at the northwest corner of the site. The lowest point is 6m. The selected site is surrounded by Saudi City and residential areas from the northwest side. From the other sides it is surrounded by residential areas and some commercials. Also, it has a bank in the east side and green areas in the west side. Figure 15 demonstrates the project zones has been placed in a way that user can access all the facilities easily.

PROJECT DESIGN

The concept of this project is to create the best psychology environment to the patients by creating welcome space and providing a view to the green area in order to help them to recover from illness. This project also provides a social spaces and inner garden which will contribute positively to therapeutic process. This project also emphasize use of daylight and nature ventilation for inner spaces by applying sustainable design such as vertical, horizontal coloured sun shade panel, also maximum the site greenery coverage. Figure 16 and Figure 17 demonstrate the view of the concept design and front side of the project respectively. Figure 18 and Figure 19 display the inner garden in the hospital and the night view of the project respectively. Figure 20 shows the front, back elevation and section view of the project.
CONCLUSION

This study proposed a hospital that is dedicated for certain children diseases which offers a welcoming and family care environment where the children feel as they are at home and not hospital which help in fasting healing integrated with an innovation inside and outside landscape and playground. The hospital is supported by a center that provides services for children with special needs and a research center, which brings together the best knowledge in pediatric research, thereby setting new standards of pediatric care and finding new treatments for children's diseases method. The proposed project consists of four major zoning which are hospital, rehabilitation center, medical research and awareness center and outdoor park. The selected site for this project is located in Al Khalidiya, with several advantages such as easy accessibility and near few hospitals.

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