

JEDDAH'S PAEDIATRIC HOSPITAL

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Received: 30.03.2020

Revised: 28.04.2020

Accepted: 01.06.2020

Abstract

A paediatric hospital is a hospital that serves children from the day they were born until the age of 18. A hospital that's not only treating them, but also making them feel comfortable going to doctors to get the care they need instead of feeling scared. Jeddah city has no specialized paediatric hospital; in fact there are lots of paediatric doctors. As a result a paediatric hospital is needed especially with this population growth. Several similar case studies are considered and the space program is proposed in this study. The primary zones considered are inpatient, diagnostics and treatments, admin, ancillary and support. The site selection is conducted based on the criteria of accessibility, land use, scenery, safety, noise, future development and urban objective. The building of the project is inspired by the LEGO, thus the building has its unique colour and shape to welcome the children in a joyful way.

Keywords-- Paediatric Hospital, Children, Inpatient, Diagnostics and Treatments

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DOI: <http://dx.doi.org/10.31838/jcr.07.08.42>

INTRODUCTION

Health care is different when it comes to children, they are not young adults, maybe the same illnesses in adults are seen in children but that can affect them differently [1, 2]. Children need a special care that focuses on their needs. Children health care starts from the first day the baby is born, it involves the parents from start to end.

A paediatric hospital is a hospital that exclusively serves children from birth up to the age of 18 years [3]. It gives a greater attention to the psychological support of children and their families. Mostly children get scared when they see doctors and equipment's, and some children needs a long term care, so they spend more time in hospital than being home. Paediatric specialists in general are trained to deal with children and how to make them feel comfortable. There many normal hospitals can also deal with children and serve them, but for a more special care parent choose a paediatric hospitals when it comes to their kids. Children need a hospital that specializes in their unique health care issues, paediatric intensive care, and their physiological issues. Paediatric hospitals are known for a greater attention to psychological support of patients and their families [4]. They are also responsible for lifesaving discoveries such as vaccines, gene therapies, and specialized surgical techniques that not only benefit children, but adults as well [5, 6].

As children grow and develop, their need for highly trained specialized health care increases as they transition to adulthood. The lack of paediatric hospital in Saudi Arabia has leads to propose of this project.

CASE STUDIES

This project considered three cases studies related to children hospital from USA. All the three children hospitals are carefully designed to provide the best environment, facilities and services to take care the patient. They are:

- Children's Hospital of Philadelphia, Philadelphia, PH, USA
- Nemours Children's Hospital, Orlando, Florida, USA
- Phoenix Children's Hospital, Arizona, USA.

Children's Hospital of Philadelphia, Philadelphia, PH, USA

Children's Hospital of Philadelphia is designed by Kohn Pedersen Fox Associates, located in Philadelphia, PH, USA (Figure 1).

The children's hospital of Philadelphia's existing building experienced a growth for services, necessitating a large facility expansion. A complete change of the accessibility to the building was made by adding more spaces to surround the buildings. The main entrance was totally transformed and the drop off was clarified, with the parking lots, and the emergency traffic was separated from the traffic flow. The front façade provided a lively image for the hospital, and creates a variation for the building from its surroundings. The use of coloured glass walls expresses the aesthetics from the internal atrium to the outer façade. From the patient rooms, the wall creates a view of coloured lights during the day. The project was done in three phases: Phase 1 (South Tower) includes 150 new inpatient beds, a new emergency department, and some site improvements. Phase 2 and Phase 3 were the new façade design, along the civic center Boulevard and diagnostic and treatment facilities to the west [7].

Nemours Children's Hospital, Orlando, Florida, USA

Nemours Children's Hospital is designed by Stanley Beaman and Sears, located in Orlando, Florida, USA (Figure 2). The architects stated the hospital has been set to a new design standards led by the architect, the hospital is testament to the term healing environment, which evoking a life affirming quality to reassure parents and delight children, the landscape reflects Nemours' understanding of the role nature plays in the children life. The design team was asking the families and children "What is the best interest of a child?" after that they stated their priorities as an organization [8].

The main philosophy of the hospital is having a family-centred care, it led to supporting families from all aspects of life, such as: patient rooms have accommodation for two parents, laundry facilities, and a concierge desk in the lobby of each floor to help the parents in the healthcare system. The lounges and playrooms are overlooking and have access to the outdoors spaces that's designed for recreation; it includes rooftop terraces, water features, a discovery garden, and an event stage for live performances [8].

The project includes a landscaped entrance, 95 inpatient beds, 76 exam rooms, emergency facilities, central energy plant, and parking lots. Shell space that can accommodate 32 beds and 24 exam rooms more. The master plan is designed to have a future

expansion of inpatient, outpatient spaces, offices, and research and support facilities. The exterior materials include terracotta, metal panels, curtain wall systems, and glass panels with patterns. The interior consists of a high performance finishes and materials, and colourful furniture throughout the spaces. The patient rooms have coloured accent lights that can be selected by the child, creating a changing dynamic façade [8].

In this environment, intense sun is a major concern. Extensive solar studies allowed for maximizing the shaded outdoor spaces, and helped in the placement of exterior shading devices that block direct sun and allow natural sunlight to enter the spaces [8].

Phoenix Children's Hospital, Arizona, USA.

Phoenix Children's Hospital is designed by HKS Architects, located in Arizona, USA (Figure 3). The main idea was to create a welcoming oasis that provides healing while being visually connected to the surrounding landscape. It's an 11-story tower that is part of one of the largest paediatric hospitals, which has the ambulatory and the inpatients functions, to reduce patients and staff travel distances [9]. The main entrance is pointed by a large sail that's intersecting the patient care tower, at night the sail is transformed into a colourful item that show the idea of a night blooming cactus. A three-story atrium is located at the base of the sail, which welcomes patients and families with its shaded glass walls that show the colourful animated interiors. The tower is designed to reflect a night blooming desert flower, and it's divided into three sections to reduce the impact of a large building scale. The evening transformation of the south facade creates a purple glow like a lighthouse for the children of phoenix to show them hope [9].

The architects provide a comforting environment with landscaping, coloured and playful sculptures, and native plants. Daylight is reaching most of the areas, such as waiting areas as well as the corridors. Also the atrium itself is acting as a light wall that provides light to entrance, and the stage of the visitors. A family supportive escape from the hospital is provided on the rooftop, it has a play garden, dining, and a meditation gardens. The inpatients rooms are private with its own amenities to give the patients the control of the environment. The rooms have a sleeping sofa and a sitting area for the family members too [9].

Another point that the design team cared of was having special sustainable strategies to minimize the carbon footprint of the hospital. The tower is designed to respond to the sun in order to maximize daylight and minimize the heat gain, in order to decrease the load on the mechanical system. From the exterior, a shading device is provided in all the recreational areas, and the relaxation areas. The materials used are locally produced materials. The hospital also was designed to have a future expansion [9].



Figure 1. Children's Hospital of Philadelphia [7]



Figure 2. Nemours Children's Hospital [8]



Figure 3. Phoenix Children's Hospital [9]

SPACE PROGRAM

There are several things that need to consider while designed a hospital. The design of healthcare facilities with psychological and physical comforts is important, because the recovery also depends on the environment of the hospital, especially when it comes to children. Children respond to the environment differently than adults, the treatment and recovery of a child can be affected by the room interior and design. Table 1 tabulates the space program of the project.

Table 1. Space program

| Zone | Use percentage (%) | Area (m ²) |
|----------------------------|--------------------|------------------------|
| Inpatient | 41 | 11070 |
| Diagnostics and treatments | 42 | 11340 |
| Admin | 9 | 2430 |
| Ancillary | 2 | 540 |
| Support | 6 | 1620 |
| Total | 100 | 27000 |

The patient room is where the patient spends hours, days, or weeks. It's the most important place that will help the healing and treatment of each patient. In general, a patient room has three zones, the patient zone, the caregiver zone, and the family zone. A private room is the only way that will satisfy the patient. It reduces noise, allows for uninterrupted sleep, and privacy. Private rooms also are the most efficient to create the three main zones of the room.

The patient zone has a view to the outside with a direct sunlight, a television, radio, Internet, light and temperature control, near to the bathroom, and at an angle that provide privacy from the door and the corridor. The care giver zone must have small sink, supplies, and a small area to write something. The family zone must have sitting and sleeping spaces, Internet, and a separate television. A private paediatric room is mostly 340-400 sq. ft.

The hospital room can designed to feels like a bedroom. Children always have favourite toys that are most of the time with them, and they need them in hospitals too, so a room with shelves that can hold photos and toys is important. Also a television will help the child to feel at home. A private bathroom in each room must be provided with a scale that is comfortable to be used by children.

Playing rooms for children are so important. Children can get together and play or use the computer. Playing room needs to be sunny and safe at the same time to help the patient while moving and playing.

The waiting rooms should be designed in way that attracts children, for examples: toys and games on a side of the sitting area, a television near a sitting area only for kids. Variety of colours, textures, and items that attract children eyes are also important. Sometimes adding themes can be helpful and attracting like sports, animations, and sea.

Some of the patient rooms should be design with movable walls to allow an expansion of needed for the family to stay, or rooms with two beds if a child whose parents aren't staying and they wants another child with them.

Floors of the corridors have to be covered with carpet or a sound absorptive material to minimize the noise of the visitors and stuff. Also acoustic walls are a must to keep the patient away of any noise and sound from adjacent rooms.

Enough bathrooms on each floor of the hospital are very important, a floor with 24 to 30 beds must have at least two bathrooms for visitors one near the waiting area, and the other near the playing area. Also a bathroom for stuff is required.

Outdoors areas are important to paediatric patients. For examples terraces on each floor could serve the patient to have a nice walk. Also all of the patient rooms should have an adequate direct sunlight that's considered a factor of healing, and maintain a better indoor environment for the patient.

In order to make the patient comfortable in the cafeteria it should be bright, well designed, accessible, and make it look like any restaurant. For the patients they mostly eat at their rooms, so the corridors must be designed in dimensions that accommodate the carts and trays. Also a service elevator for food carts and laundry should be available but accessible only to stuff.

All the machines and equipment's should be located together to avoid forcing the patient to walk long distances, which will increase the efficiency and reduce the stress of the patients.

Moreover, a sustainable design is required for most of the buildings nowadays. In a paediatric hospital is an important issue to maintain a healthy environment for the patients.

SITE SELECTION AND ANALYSIS

There are three sites were proposed for the project. Figure 4 shows site 1 is located in south Jeddah between king Abdullah Street and Prince Majid Street. Figure 5 shows site 2 is located along the Cornaiche road. Figure 3 shows site 3 is located between King Abdulazizi Road and Albarjee Street.



Figure 4. Site 1 [10]



Figure 5. Site 2 [11]



Figure 6. Site 3 [12]

Site selection of a project has an impact on the design and everything related to the project. This project considered seven site evaluation criteria. The first criterion is site accessibility; the hospital should be within 20-30 min distance. It should be near a main road and accessible from a many roads to avoid traffic jam especially in the emergency department area, it also should have a service zone with a 25km radius. A visual accessibility to the hospital is required too. Second criterion is land use; the hospital should be located in mixed-use area, although faraway from factories and polluted areas. Third criterion is scenery and ports; a sea view or any other pleasant view should be available in the hospital.

Also it should be near airports and seaports. Fourth criterion is safety; clear circulation network for patients, staff, emergency, and services. The site should be in an area that is free of any kind of pollution, such as air, water, and land pollution. Another concern is being away from flooding area; therefore a hospital should not be located in the lowest point of a district. Fifth criterion is noise; the hospital should be located in a quiet area to provide relaxation for the patient to faster the healing process.

Sixth criterion is future development; a sufficient area should be supported for future expansions. Last criterion is urban objective; the hospital should be in the center of the urban area, where a higher population can be gathered. The hospital also needs to be near other facilities such as, mosques, schools, and commercial centers. The site evaluation result of each site is demonstrated in Table 2.

Table 2. Site evaluation

| Criteria | Weight (%) | Site 1 | | Site 2 | | Site 3 | |
|--------------------|------------|-------------|-----------|-------------|-------------|-------------|-----------|
| | | Rate (1-10) | Score (%) | Rate (1-10) | Score (%) | Rate (1-10) | Score (%) |
| Accessibility | 25 | 10 | 25 | 9 | 22.5 | 10 | 25 |
| Land use | 5 | 6 | 3 | 8 | 4 | 8 | 4 |
| Scenery | 10 | 4 | 4 | 10 | 10 | 8 | 8 |
| Safety | 20 | 5 | 10 | 9 | 18 | 9 | 18 |
| Noise | 25 | 4 | 10 | 8 | 20 | 6 | 15 |
| Future development | 10 | 10 | 10 | 10 | 10 | 8 | 8 |
| Urban objective | 5 | 6 | 3 | 8 | 4 | 8 | 4 |
| Total | 100 | | 65 | | 88.5 | | 82 |

Based on the site evaluation result in Table 2, the evaluation shows site 2 is the best choice for a hospital. The selected site combines between being accessible physically and visually, having the sea view and site area of 40000 sqm. Besides that, the site is safe for being accessed from a secondary road that is coming from the main road. The site has an opportunity for a future expansion, and finally the location is in medium density area not a crowded one.

PROJECT DESIGN

Jeddah's paediatric hospital is a place for intensive care, medical, and surgical treatment of children. The hospital cares for children from birth until the age of 16. The design concept was inspired from the LEGO, because of the variety of colours forms, and shapes. It was designed to welcome the children in a joyful way.

Figure 7 shows the project utilise green roofing as to emphases the concept of green building. This also improves the surrounding air quality. The glass treatment of the building is using dark and double glazing as shown in Figure 8. This can create a soft light ambient and prevent the eyes from the sun's harmful UV rays. The main perspective of the project is shown in Figure 9.



Figure 8. Dark and double glazing windows

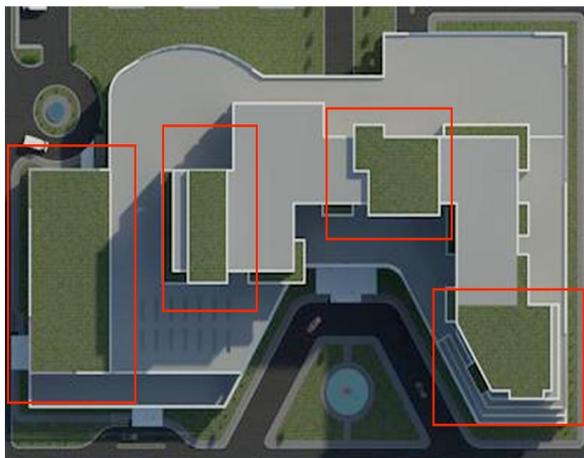


Figure 7. Green roofing



Figure 9. Main perspective of the project

CONCLUSION

The proposed project creates the first paediatric hospital in Saudi Arabia, which helping families to deal with their new-born babies. The hospital supports the healing environment concept, to help in the healing process. The space program of the project has divided into five main zones namely inpatient, diagnostics and treatments, admin, ancillary and support. Site 2 located along the Cornaiche Road is selected as the project site location

based on several criteria such as accessibility, land use, scenery, safety, noise, future development and urban objective. The project building design is inspired by LEGO which may capture the attention of children. Moreover, this project may increase the awareness of children diseases in Jeddah to avoid chronic diseases.

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