

# (M. Maria Sudarwani) The application of healing architecture and green architecture in hospital for children

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## The application of healing architecture and green architecture in hospital for children

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**Abstract.** Healing Architecture Approach which is generally interpreted as healing which is done through architectural elements. In its application, Healing Architecture is generally associated with giving aspects of colour and nature into buildings, considering these two aspects are proven to be able to help the patient's recovery rate. But by definition, the application of Healing Architecture does not always have to be realized in the form of the two aspects above. The purpose of the research is providing medical health facilities for children and special services for children's character with a healing architecture approach and based on the green building concept. The study process used in designing the Children's Hospital with the Healing Architecture Approach and the Application of the Green Building Concept is carried out by a research method that is quantitative-correlative analysis, which is to find and determine the correlation between the research variables. In a design object, a new approach is applied in the Healing Architecture principle. This approach is applied in the design of objects by presenting a healing feel of the architecture of the building itself in hospital activities. The Healing Architecture approach is supported by the green concept, which includes the entire building.

### 1. Introduction

A key objective of moving towards universal coverage is to improve population health through the reduction of financial barriers to needed services [1]. As stated in the Human Development Index (Human Development Index), there are 3 indicators that are used as a reference for assessing the development of a country, namely Economy, Education and Health. According to the United Nation Development Program (UNDP) report, Indonesia has indeed experienced an increase from 121 in 2012 to 108 in 2014, which then made us a Medium Human Development country. This means that Indonesia is in a stage of development that has not been optimal. Nowadays in Indonesia, the medical activity unit and its services are considered inadequate, where the ratio between the number of hospital beds and the total population of Indonesia is still very low. For 10 thousand residents, only 6 hospital beds are available. Therefore, it is necessary to have an adequate health unit and to solve the problem of the availability of health facilities in the community. The general hospital service unit is different from a special hospital such as a special hospital for children, where the paediatric hospital provides medical services and care as well as different nuances that are able to make paediatric patients feel calm and comfortable. This children's hospital aims to provide a cheerful and fearless feeling for its patients, especially young children. So that this feeling of fear will help in the patient's healing process. Sometimes hospitals also pay less attention to safety and comfort factors, especially for children who have special characters compared to adults in general equated with the character of adults in general.



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Healing architecture is an approach that can help medical services in healing patients by utilizing such a scope in a hospital that can relax and treat patients as well as this concept combines with an environmentally friendly concept. The research clearly indicates that if we can design our healthcare architecture on healing architecture principles the outcomes for patients, their quality of experience and the satisfaction and effectiveness of staff are all likely to improve significantly [2]. As is well known, an environmentally friendly system has become a standard for the era of globalization, environmentally friendly by implementing the "Green Hospital" system, which is a system of utilizing renewable and environmentally friendly energy in hospitals to turn the hospital into a sustainable building or sustainable building. Today, many hospitals feature gardens of various types, and their impact on care has been studied more rigorously. One study reports that 95% of people who walk through hospital gardens report a therapeutic benefit from simply being in them [3].

The purpose of this study is providing medical health facilities for children and special services for children's character with a healing architecture approach and based on the green architecture concept.

## 2. Methods

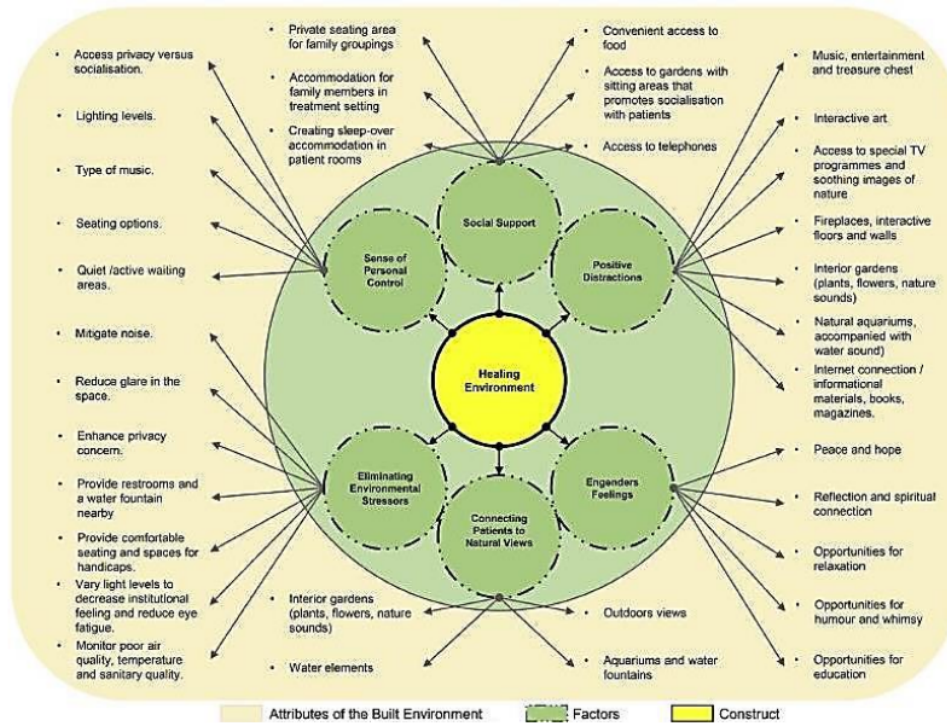
In designing the Hospital for Children in Jakarta, a conceptual foundation is needed which will underlie the physical design of the building. The concept will be described as follow: 1) The Hospital for Children is guided by healing architecture and green architecture concept, which is not only relying on medical treatment from doctors, care and family nurses but also environmental therapy, which is to form a physical environment in which several nursing units live in a comfortable, peaceful atmosphere and easily communicate with other patients. This is intended to reduce the patient's psychological burden, 2) The scope of services includes medical services, medical support, administration and services. Reference used to develop the basis of planning and program. The design of Hospital for Children in Jakarta City is the basis of the architectural planning and design approach. The basis for this approach is as follows: 1) Functional Aspects Approach, 2) Physiological Aspects Approach, 3) Psychological Aspects Approach, 4) Behaviour Approach and 5) Approach to Capacity and Amount of Space. From the design approach above, it is expected that a children's hospital design can be compiled.

## 3. Results and discussions

The hospital is one of the health facilities where health efforts are carried out by empowering various units of trained and educated personnel in dealing with and handling medical problems for recovery and maintenance of good health. Health effort is any activity to maintain and improve health aimed at realizing an optimal degree of health for the community and the place used to organize it is called a health facility. Health facilities have the function of carrying out basic health efforts, referral health, and or supporting health efforts. Health efforts are carried out by means of maintenance, health promotion, disease prevention (preventive), disease healing (curative), and health recovery (rehabilitative) approaches that are carried out comprehensively, integrate, and continuously [4]. Public hospitals in Indonesia are classified into 4 classes based on the workload and function of the hospital, namely Class A Hospital, Class B, Class C, and Class D [5]. Based on the type of service, the Children's Hospital is a type E Special Hospital which provides only one type of medical health services only, namely in the field of health services for children who provide services and care based on age groups, namely children aged 0-18 years (Permenkes RI No. 920/MENKES/PER/XII/2015). The definition of a child is someone who is not yet 18 (eighteen) years old, including children who are still in the womb (Undang-Undang No. 23/2002 About Children Protection). Children are individuals who are in a range of developmental changes starting from infants (0-1 years), toddlers (12.5 years), pre-school (2.5-5 years), school ages (5-11 years) to adolescence (11-18 years) [6]. The hospital must meet the technical requirements, advice and infrastructure to support complete health services which by standard involve the physical building and room.

### 3.1. Healing architecture

Healing architecture is a design concept in which architecture is involved in the healing process of the user. The use of the Healing Architecture Approach and the Concept of Therapeutic Spaces in the design of special health facilities for children is considered to be able to assist the healing process by means of architectural scope factors. There is good evidence, largely from existing studies, that specific design approaches in the hospital environment have the potential to reduce stress, pain, and anxiety. This includes good quality natural lighting, captivating healing colours, therapeutic sound (such as music, bird songs, water sounds etc.), privacy, and speech intelligibility. Besides it has also been postulated that physical factors contributing to healing in the healthcare environment include a view of natural landscape, mitigating the degree of noise levels, interactive arts, good air quality, adequate signage, maintaining and effecting environmental changes to enhance patient safety that may heighten medical error and increase infection rates. The physical setting has the potential to be therapeutic if it achieves attributes set out in Figure 1 [7].



**Figure 1.** A model for understanding a therapeutic environment.  
(Source: Iyendo, Uwajeh, & Ikenna [7])

Christopher Day [8], in the book *Place of The Soul* wrote about healing silence: the architecture of peace, “Where windows can be deep set into walls, light reflected off their reveals not only adds to room illumination, but intercedes between the brightness outside and the shade within, giving a calmness to the light. A frameless window, softened but firm and balanced in shape, with soft plaster texture can add to the mood of calm silence.”



### 3.2. Green Hospital

Green hospital is a hospital concept designed to empower natural potential as the main resource so that it is friendly to the environment and saves more energy expenditure. Seven elements that must be considered in an environmentally friendly hospital, namely energy efficiency, green building design, alternative energy generation, transportation, food, waste, and water. In Indonesia, green hospitals are still a concept that emphasizes the efficient use of water and electrical energy in an effective and efficient manner, as well as environmentally sound waste management. Green Hospital is a sustainable architectural concept where this concept pays close attention to environmentally friendly aspects which include renewable energy, energy saving and waste reused to reduce environmental pollution and also emphasize the preservation of the surrounding environment. The implementation of this green hospital includes a green environment, efficient use of water, electrical energy, use of materials, and reduction of waste. There are several steps to evaluate the environmental impact assessment, including characterization, damage assessment, normalization, weighting, and a single score. The method used is based on the Eco Indicator for several environmental impacts including carcinogens, respiratory organics, climate change, radiation, the ozone layer, ecotoxicity, acidification/ eutrophication, land use, minerals, and fossil fuel. Meanwhile, to assess the environmental impact on waste can be seen from the results of the life cycle assessment based on characterization, normalization weighting, and a single score.

### 3.3. The basic concept of children's hospital design

The basic concept of this design is based on references from the background, aims and objectives, then problems, analysis, and specific thematic that produce the basic concept of this building.

**3.3.1. Location and site concept:** Location and site concept are used to calculate site requirements and appropriate site location approaches for the Children Hospital in Jakarta City. The factors that determine the location approach are the conformity of the Jakarta City Government's Land Use Policy, the Level of Accessibility, Supporting Facilities and the City's Utility [9]. The site is located in the area of Jalan Arjuna Selatan, Kedoya Selatan Village, Kebon Jeruk Regency, West Jakarta, DKI Jakarta. Building Coverage 35% (see figure 2 and 3).

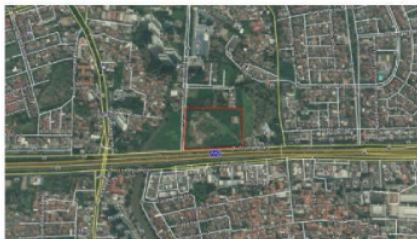


Figure 2. Map of site (Google Map)



Figure 3. Site plan.

**3.3.2. The building analysis:** The space requirements approach includes physical requirements, ventilation, lighting and sound acoustics in space. The spatial arrangement of the building and its use must be in accordance with the function and fulfill health requirements, namely by classifying the rooms according to the level of risk of disease transmission. Based on the Decree of the Minister of Health of the Republic of Indonesia No. 1204/MENKES/SK/X/2004 Regarding the Requirements for Environmental Health for the Hospital, the grouping is divided as follows: 1) Low Risk Zone, the low risk zone includes: administration room, computer room, meeting room, and reception room. The requirements are: the surface of the walls must be flat and lightly colored, the floor must be made of strong material, easy to clean, waterproof, light-colored, and the meeting between the floor and the wall must be in the shape of a conus, the ceiling must be made of a multiplex or strong material, light color, easy to clean, the frame must be strong, and a minimum height of 2.70 meters from the floor, the

minimum width of the door is 1.20 meters and a minimum height of 2.10 meters, and the lower window sill is at least 1.00 meters from the floor, ventilation must be able to ensure the flow of air in the room / space properly, if natural ventilation does not guarantee good air change, must be equipped with mechanical ventilation (exhauster), and all sockets and switches are installed at a minimum height of 1.40 meters from the floor; 2) Moderate Risk Zone, includes inpatient, outpatient, changing rooms and patient waiting rooms. The building requirements for the moderate risk zone are the same as the requirements for the low risk zone; and 3) High Risk Zone, includes laboratory, medical sensing room (medical imaging), and mortuary with the following conditions: wall surfaces should be flat and light colored, the walls of the laboratory room are made of porcelain or ceramic as high as 1.50 meters from the floor and the rest is painted in bright colors, the walls of the medical sensing room should be dark (provided that the walls are adjusted to the beam, beams generated from the equipment installed in the room, the dividing wall between the X-ray chambers with a dark room complete with transfer cassettes), the floor is made of strong material, easy to clean, waterproof, light colored, and the meeting between the floors with the walls must be a cone, the ceiling is made of multiplex or strong material, light color, easy to clean, the frame must be strong, and a minimum height of 2.70 m from the floor, the minimum width of the door is 1.20 meters and a minimum height of 2.10 meters from the floor; 4) Very High Risk Zone, covering the operating room and eye emergency room with the following conditions: the wall is made of porcelain or vinyl as high ceiling, or painted with no wall pain colorfast and safe, the ceiling is made of a strong and safe material, and minimum height of 2.70 meters from the floor, minimum door width of 1.20 meters and minimum height of 2.10 m, and all bedroom doors must always be in a state closed, the floor is made of strong material, waterproof, easy to clean and light colored, for operating rooms, surgical lamp girders with double INP 20 steel profiles must be provided prior to ceiling installation, there are shelves and cabinets for storing ready-made reagents, ventilation or supervision should be used air conditioning separate, equipped with a bacterial filter, for each chamber separate operations with other rooms. Installation air conditioning at least 2 meters from the floor and clean air flow the entry into the operating room came from the top down. Especially for orthopedic or transplant surgery rooms organs have to use, UCAS (Ultra Clean Air System) air regulation 8. No direct contact with air is allowed outside, an intermediate space must be made.

3.3.3. *The space organization:* The Space Program approach is based on provisions obtained from literature and regulatory studies. And sourced from the room standards set by the Ministry of Health, Data Architect, Standard Time Saver, Multiple Space Analysis, and Comparative Studies, it can be determined the amount of space in Hospital for Children.

#### 3.4. *Children's hospital design*

There are 4 determining factors in the construction of this Children's Hospital: 1) Architectural Plan, as a forum for regional and national activities, the architectural aspects of the building that will be displayed by the Hospital for Children reflect technological progress but still pay attention to contextual problems; 2) Building Mass Plan, the building mass type chosen is the block type while still providing a comfort, serenity so that it helps provide hope, motivation and enthusiasm for life from the patient; 3) Landscape, the landscaping of the hospital takes into account the atmosphere and comfort that can provide peace; and 4) Interior (See figure 4 and 5). The basic foundation that becomes the design concept is healing architecture and green architecture indeed.



**Figure 4.** The interior of children's hospital design.



**Figure 5.** The exterior of children's hospital design.

#### 4. Conclusion

From some of the descriptions above, it can be concluded that with the existence of the Children Hospital in Jakarta City, it is expected that: the children's hospital provide medical health facilities for children and special services for children's character, provide space for special children to play or socialize with children so that they are not bored in his treatment, creating a space with natural nuances without visualization so that the child can relax and feel comfortable, designing the building with the concept of architectural healing so that it can help children heal through natural therapy, and applying an environmentally friendly system to buildings to create a sustainable green hospital.

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