

Architecture as Medicine: Salutogenic Design in Healthcare

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Abstract

Architecture plays a pivotal yet often overlooked role in healthcare environments, impacting patient outcomes, staff well-being, and overall healing processes. This paper explores the concept of salutogenic design, an approach to architecture that focuses on promoting health and well-being rather than merely treating illness. Drawing upon principles from salutogenesis, environmental psychology, and evidence-based design, this study investigates how architectural elements can contribute to the creation of healing environments.

Key components of salutogenic design include the integration of natural light, access to outdoor spaces, intuitive wayfinding systems, and the incorporation of biophilic elements. These features are not only aesthetically pleasing but also contribute to reducing stress, enhancing cognitive function, and fostering a sense of comfort and security among patients, visitors, and healthcare providers.

Furthermore, this paper examines case studies of healthcare facilities that have successfully implemented salutogenic design principles, highlighting the positive impact on patient satisfaction, recovery rates, and staff productivity. By prioritizing human-centred design and creating environments that support physical, emotional, and social well-being, architects and healthcare professionals can collaborate to revolutionize the way healthcare spaces are conceived and experienced.

In conclusion, embracing salutogenic design principles offers a holistic approach to healthcare architecture, where the built environment becomes an integral part of the healing process. By emphasizing health promotion, rather than solely focusing on disease management, architects have the opportunity to contribute significantly to the improvement of patient outcomes and the overall quality of healthcare delivery.

Keywords: Salutogenic design, Healthcare architecture, Healing environments, Evidence-based design, Biophilic elements, Human-centred design

Introduction

Salutogenesis is a concept that emphasizes health promotion and focuses on factors that support human.

Salutogenic design, rooted in the theory of salutogenesis proposed by Aaron Antonovsky, emphasizes the creation of environments that support and enhance human health and well-being. Unlike pathogenic approaches that target specific diseases or symptoms, salutogenic design seeks to cultivate holistic wellness by addressing the physical, psychological, and social needs of individuals within the built environment. By leveraging insights from environmental psychology, evidence-based design, and biophilic principles, architects have the opportunity to create healing environments that foster resilience, promote healing, and improve the overall experience of patients, caregivers, and visitors.

Healing architecture plays a crucial role in enhancing patient outcomes, improving the quality of care, and fostering a positive healthcare experience in several ways:

Physical Healing

Architectural interventions can directly impact physical healing by creating environments that support medical treatments and procedures. For example, well-designed healthcare spaces can optimize patient flow, reduce the risk of infections through proper ventilation and layout, and provide easy access to medical equipment and facilities. Additionally, features such as natural light, views of nature, and comfortable furnishings can contribute to patient comfort and relaxation, which are important factors in the healing process.

Emotional Support

Healthcare environments can be inherently stressful and anxiety-inducing for patients. However, healing architecture can help alleviate these negative emotions by incorporating calming elements such as soothing colors, artwork, and soundproofing to create a tranquil atmosphere. Private and comfortable spaces for consultations and discussions with healthcare providers also promote emotional well-being by fostering open communication and trust between patients and caregivers.

Psychological Well-being

Architecture can address psychological needs by promoting a sense of control, autonomy, and dignity for patients. This includes features like private patient rooms with adjustable lighting and temperature controls, as well as opportunities for personalization through artwork or family photos. Creating spaces that respect cultural and spiritual beliefs further contributes to psychological well-being by recognizing and honoring the diverse backgrounds and identities of patients.

Holistic Healing

Healing architecture takes a holistic approach to care by considering not only the physical

ailments of patients but also their emotional, social, and spiritual needs. For example, incorporating spaces for relaxation, meditation, and spiritual reflection acknowledges the importance of mental and spiritual well-being in the healing process. Similarly, providing areas for social interaction and support, such as family lounges or communal gathering spaces, fosters connections and a sense of community among patients and their loved ones, which can positively impact recovery and overall well-being.

Objective

In recent years, there has been a growing recognition of the profound influence that architectural elements can exert on the health and well-being of individuals within healthcare environments. Salutogenic design principles emphasize the importance of integrating elements such as natural light, access to outdoor spaces, wayfinding systems, and biophilic elements to create environments that promote healing and resilience.

Natural light, for instance, has been shown to positively affect mood, circadian rhythms, and sleep patterns, thereby enhancing patient comfort and recovery. Similarly, providing access to green spaces and incorporating biophilic elements, such as living walls or indoor gardens, can reduce stress levels, improve cognitive function, and foster a sense of connection with nature among patients, staff, and visitors.

Additionally, intuitive wayfinding systems contribute to reducing anxiety and confusion, facilitating navigation within complex healthcare facilities. By examining the impact of these architectural elements on health and well-being, designers and healthcare professionals can gain valuable insights into how to optimize the built environment to support holistic wellness and enhance the overall quality of care delivery.

Healing techniques implemented through architectural design in healthcare settings, with a focus on salutogenic principles:

1. Biophilic Design: Incorporating elements of nature into healthcare environments, such as natural light, indoor plants, and views of green spaces, has been shown to reduce stress, promote healing, and improve overall well-being among patients, staff, and visitors.

2. Evidence-Based Design (EBD): This approach involves using research evidence to inform design decisions aimed at enhancing patient outcomes, safety, and satisfaction. EBD principles may include optimizing room layouts, reducing noise levels, and improving wayfinding to create more supportive and healing environments.

3. Therapeutic Gardens: Designing outdoor spaces that are accessible to patients, staff, and visitors can provide opportunities for relaxation, social interaction, and physical activity, which are all beneficial for health and recovery. These gardens may include features such as walking paths, seating areas, water features, and sensory gardens.

4. Patient-Centered Design: Focusing on the needs and preferences of patients when designing healthcare facilities can enhance their sense of control, comfort, and dignity during their stay. This may involve providing private rooms, adjustable lighting and temperature controls, and spaces for family members to stay overnight.

5. Art and Music Therapy: Integrating art and music into the built environment can have therapeutic effects on patients, reducing anxiety, pain, and depression, and promoting relaxation and positive emotions. This may include displaying artworks, installing interactive musical installations, and organizing live performances.

6. Mindfulness Spaces: Creating designated areas within healthcare facilities where patients,

staff, and visitors can engage in mindfulness practices such as meditation, yoga, or deep breathing exercises can help reduce stress, improve focus, and enhance overall well-being.

7. Universal Design: Implementing design principles that ensure accessibility and inclusivity for people of all ages, abilities, and backgrounds can enhance the usability and effectiveness of healthcare environments. This may involve incorporating features such as ramps, handrails, visual cues, and adjustable furniture.

8. Environmental Sustainability: Designing healthcare facilities with a focus on environmental sustainability can promote health and well-being by reducing exposure to harmful pollutants, conserving natural resources, and creating healthier indoor environments.

Scope

This paper delves into the scope of salutogenic design within healthcare architecture, emphasizing its principles, impact, and future directions.

It examines how architectural elements such as natural light, outdoor spaces, and intuitive wayfinding systems contribute to creating healing environments. Through case studies and empirical evidence, it evaluates the effectiveness of salutogenic design in enhancing patient outcomes and staff well-being.

Furthermore, it considers future opportunities for innovation and collaboration to advance the field and create more supportive and holistic healthcare environments.

Design Considerations for a Salutogenic Hospital

Below are twelve design considerations grounded in the research design literature, each inspired by Christopher Alexander's seminal work, *A Pattern Language: Towns, Buildings, Construction* (see Note 1) [20]. These considerations are applicable to hospital environments in urban, suburban, and rural

settings (Note 1). Additionally, closely related evidence-based research precedents supporting these considerations are reported (Table 1). Key published, peer-reviewed research studies are listed and assessed for their relevance to each of the twelve design considerations (Figures 3a to 14a).

(Note: Figures 3a to 14a correspond to visual representations accompanying the design considerations.)

Design Considerations		Cooper-Marcus, C. & Sachs, N. A. (2013) ²¹	Dijkstra, K. et al. (2006) ²²	Edwards, L. and Torcellini, P. A. (2002) ²³	Kaplan, R. et al. (1998) ²⁴	Pasha, S. (2010) ²⁵	Pati, et al. (2008) ⁹	Smith, J. (2007) ²⁶	Ulrich, R. S. (1984) ¹⁴	Ulrich, R. S. et al. (1991) ²⁷	Ulrich, R.S. (1999) ¹⁹	Ulrich, R. Zimring, C. et al. (2004) ²⁸	Velarde, M. D. et al. (2007) ²⁹	Verderber, S. (1986) ¹⁵	Verderber, S. (2010) ¹⁷	Zadeh, R. S. et al. (2013) ³⁰
1.	Hierarchy of Landscape Realms	●	○	○		○	●	●			○	○	○		●	●
2.	Courtyards that breathe	●	○		●	○	●	●	●	○	●	●	●	○	●	●
3.	Vertical Gardens and Cutouts	○		○	●		○	○				○		●		
4.	Positive Outdoor Spaces	●	○		●	●		●	○	●	●	●	●	●	●	●
5.	Micro-Landscapes Narrow Wings	●	●	●			○	○			○		○	○	●	○
6.	Cascading Roof Terraces	●			●		○	○	○			○	○		●	○
7.	Transparent Arteries	○		○		●		○	○		○	○	●		○	
8.	Landscaped Arrival Zones	●			○	●	○			○		○			●	
9.	Dematerialized Edges	○		○	●	●	○		○			○	○		●	●
10.	Atrium Gardens and Lightwells	●	●		●	○		○		○	○	○			●	○
11.	Sequestered Gardens	○	○				○							●		●
12.	Therapeutic Viewing Places	●	●		●		○	●	●	●		●	●	●	●	●

Table 1. Relationship between Landscape therapeutics research and design considerations

Relationship: ● Primary ○ Secondary ○ Tertiary

Hierarchy of Landscape Realms

The effectiveness of landscape and nature content is maximized when it's structured as a hierarchy of green spaces spanning public, semi-public, and semi-private areas. This approach can greatly benefit the three main user groups of a hospital – staff, patients, and patients' families.

Courtyards that Breathe

Large hospital buildings, which may appear monolithic, can be visually softened by incorporating vertical and horizontal cutouts and voids. These architectural elements allow the building envelope to open up, enabling natural daylight to penetrate interiors from the lowest levels to the uppermost floors. This technique not only enhances aesthetics but also serves as a wayfinding aid for building occupants, particularly when intersected by circulation pathways. By strategically positioning hierarchical cutouts, voids, and slices at precise intervals – some even internalized within the envelope, including subterranean levels – a dynamic and visually engaging architectural expression can be achieved.

Vertical Gardens and Cutouts

In contrast to the previous pattern, which focused on reduction by carving out volumes to open up the building envelope, this approach emphasizes vertical cutouts, slices, and perforations. These operations involve articulated exterior elevations and building sections. Particularly in the case of mid- and high-rise healthcare facilities with narrow footprints on dense sites, this process can result in a variety of openings and indentations in composition and massing. This yields more visually engaging views and enhances the connectivity between interior and exterior spaces. By incorporating oblique and unconventional vistas, this method maximizes the potential for unique and captivating views. For example, a vertical garden installed on the side of a cutout or perforation of this type might evoke the appearance of Swiss cheese.

Positive Outdoor Spaces

In contrast to residual, disconnected outdoor spaces within hospitals, which are often underutilized, hospitals that offer a series of welcoming,

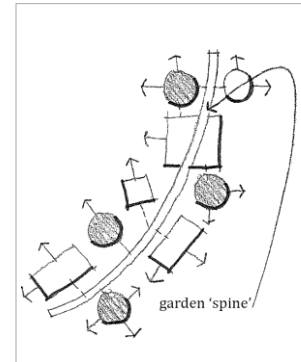


Fig. 3a: Hierarchy of Realms.

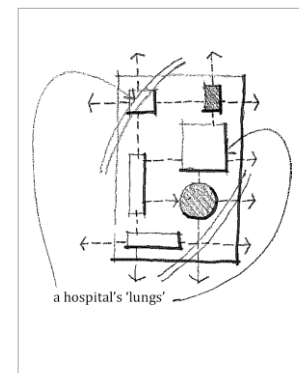


Fig. 4a: Courtyard Network

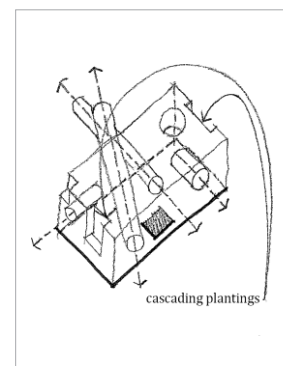


Fig. 5a: Gardens and Cutouts

semi-enclosed 'outdoor rooms' for their users can enhance feelings of protection, safety, and the ability to directly engage with the outdoors while maintaining a connection to adjacent interior spaces. These outdoor rooms should feature landscaping carefully tailored to the width and proportion of building wings and adjacent structures. Enhancements such as trees, hedges, fences, trellised arcades, columned walkways, and porticoes can provide protection from the elements for those who prefer not to be fully exposed. This approach creates spaces that exude a positive, inviting ambiance, with defined spatial boundaries and therapeutic qualities, particularly when abundant natural daylight and fresh air are present. Conversely, dark, claustrophobic conditions should be avoided. Positive outdoor gardens and landscaping can also become highly active areas, such as an exterior terrace adjacent to a main dining room (see Figures 6a).

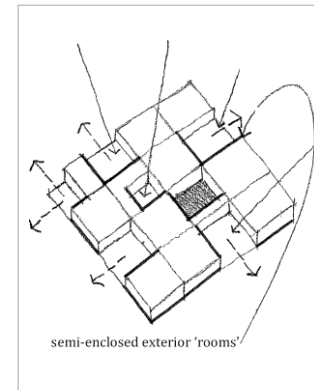


Fig.6a: Outdoor Rooms.

Micro-Landscapes Along Narrow Wings

In the context of twenty-first century healthcare buildings, it is imperative to reconsider the importance of natural daylight. Incorporating natural ventilation and daylight into the building envelope has become essential, irrespective of site constraints, such as a narrow site or a dense urban setting. Embrace the provision of natural daylight as a therapeutic element with the aim to invigorate and energize otherwise dull, windowless spaces within the building envelope (see Figures 7a).

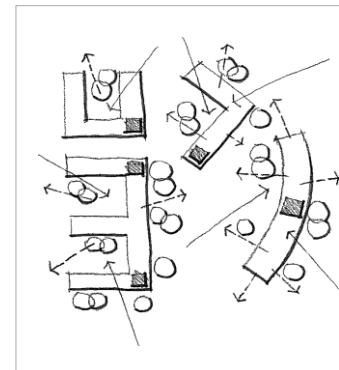


Fig. 7a: Micro-Landscape

Cascading Roof Terraces.

Throughout history, numerous iconic and cherished buildings have incorporated cascading roofs, characterized by projecting building elements that unfold into a series of smaller massing and roof elements. This architectural approach creates terraces that provide both refuge and panoramic views of skylines, nearby mountain ranges, and other scenic vistas (see Figures 8a).

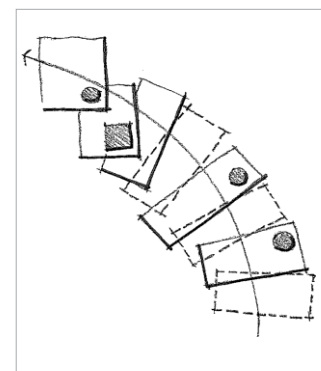


Fig. 8a: Terracing

Transparent Arteries

Circulation arteries within a medical center campus should be welcoming and transparent, offering views onto attractively landscaped spaces throughout the diverse interior realms. The term "mover spaces" was coined in a study focusing on patient and staff perceptions of various public areas within hospitals [32]. These circulation spaces are characterized by a constant flow of people and supplies, functioning as conduits that support the daily patterns of use within a hospital and its medical center context. Corridors, connecting bridges and walkways, and vertical elements such as glass-encased elevators and escalators play a crucial role in facilitating this person-landscape interconnectivity (see Figures 9a).

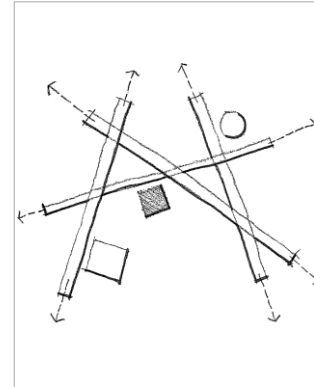


Fig. 9a: Transparency.

Landscaped Arrival Zones

Main arrival zones, and increasingly, emergency department entrances, are frequently characterized by a lack of inviting aesthetic elements, resulting in abrupt transitions into the somewhat sheltered and enclosed environment of the hospital. While it is essential for the hospital to provide safety and protection, it should not resemble a fortress. To address this, prioritize the use of nature and landscaping to create gradual and seamless transitions from the external environment to the internal world of the medical center, avoiding disorienting or jarring shifts. This approach should be reflected throughout the campus, beginning with welcoming entry portals and establishing visual axes through landscaping elements.

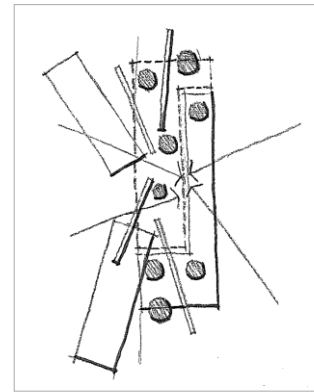


Fig 10a: Landscaped Arrival Zones

Dematerialized Edges

In the past, the exteriors and edge conditions of minimalist International Style hospitals often conveyed a harsh, institutional aesthetic. Nowadays, exterior facades and edges are characterized by high porosity, grid patterns, tactile surfaces, transparency, layering, and texturing. This increased transparency and dematerialization enable greater openness, varied massing compositions, stepped floor levels, user-friendly roofscapes, and decentralized services. As a result, services that were once housed outdoors can now seamlessly transition from patient rooms onto roof terraces, balconies, or ground-level spaces (see Figures 11a).

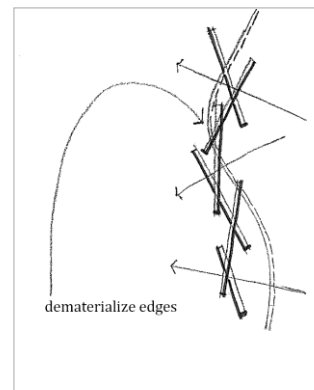


Fig 11a: Dematerialization.

Atrium Gardens and Lightwells

An atrium serves as a powerful means of bringing essential daylight, natural ventilation, and spatial variation deep into the building envelope. In extreme climates where sitting or strolling outdoors may not be feasible due to extreme heat, humidity, or cold temperatures, an atrium garden or lightwell provides a year-round solution. These spaces, which may be vegetated, are typically illuminated by skylights or equipped with operable roofs. In regions with harsh winters, winter gardens can feature a canopy of trees, ground-level plantings, seating areas, and water features, including water walls and ponds, providing an inviting and dynamic indoor environment (see Figures 11a).

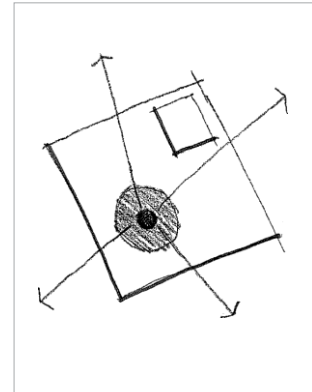


Fig. 12a: Atriums and Lightwells.

Sequestered Gardens

Courtyard gardens, in otherwise unadorned spaces and corridors in a hospital, are a source of intrigue. They are sought out while not being visible from the street and are often only accessible through relatively narrow passageways. The relationship between a garden and its adjacent spaces is complex and spatially multi-faceted. Its placement at midpoint—somewhere between the street and the most inner confines of the hospital—is preferred, fostering building inhabitants' sense of discovery, while providing restorative amenity. These spaces can lie half-hidden, waiting to be discovered.

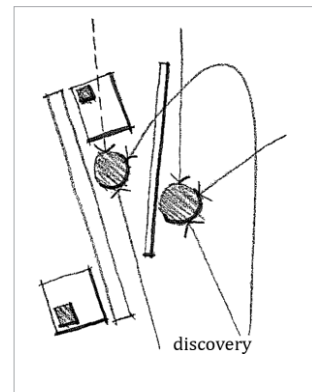


Fig. 13a: Hidden Gardens.

Therapeutic Viewing Places

As hospitals undergo expansion, green spaces, trees, and gardens are frequently sacrificed. These amenities are often deemed expendable in favor of accommodating expansion projects, primarily because they lack vocal constituencies advocating for their preservation.

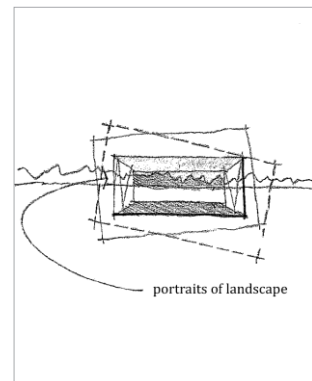


Fig.14a: Framed Views of Nature.

Promoting Healing Relationships

Architectural interventions can facilitate healing relationships between patients, caregivers, and their support networks. By creating spaces that encourage collaboration, communication, and empathy, healing architecture strengthens the therapeutic alliance between patients and healthcare providers, leading to more effective treatment outcomes and improved patient satisfaction.

In summary, healing architecture plays a critical role in enhancing patient outcomes, improving the quality of care, and fostering a positive healthcare experience by addressing physical, emotional, and psychological needs. By creating supportive and nurturing environments that promote holistic healing and well-being, architectural interventions contribute to a more comprehensive and patient-centered approach to healthcare delivery.

Practical implications of healing architecture have significant relevance for architects, designers, healthcare providers, and policymakers involved in healthcare facility planning and design. Integrating elements such as biophilic design, evidence-based design, patient-centered design, and therapeutic environments can yield several benefits:

Biophilic Design:

Incorporating biophilic elements like natural light, greenery, and views of nature has been shown to reduce stress, enhance mood, and accelerate healing. Architects and designers can apply biophilic principles by strategically placing windows to maximize natural light, integrating indoor gardens or living walls, and using natural materials such as wood and stone. For healthcare providers, these features can create a more soothing environment for patients and improve staff well-being. Policymakers can encourage the inclusion of biophilic design in building codes and healthcare regulations to promote healthier environments.

Evidence-Based Design:

Research-backed design principles have been proven to positively impact patient outcomes, staff satisfaction, and operational efficiency. Architects and designers can use evidence-based guidelines to optimize layout, circulation, and spatial configurations in healthcare facilities. Implementing features such as decentralized nursing stations, single-patient rooms, and accessible amenities can enhance patient privacy, reduce infection rates, and improve staff workflow. Healthcare providers can leverage evidence-based design to inform decisions about facility planning, resource allocation, and quality improvement initiatives. Policymakers can support the adoption of evidence-based design practices through funding incentives, accreditation standards, and professional training programs.

Patient-Centered Design:

Designing healthcare environments with patients' needs and preferences in mind can improve their overall experience and satisfaction. Architects and designers can involve patients and caregivers in the design process through participatory design workshops, surveys, and focus groups. Creating comfortable waiting areas, wayfinding signage, and adaptable spaces can empower patients and reduce anxiety during their healthcare journey. Healthcare providers can prioritize patient-centered design by offering amenities such as family lounges, private consultation rooms, and accessible facilities for patients with disabilities. Policymakers can advocate for patient-centered design principles in healthcare facility guidelines and reimbursement policies to prioritize patient well-being and improve health outcomes.

Therapeutic Environments:

Designing therapeutic environments that support healing, rehabilitation, and well-being is essential for healthcare facilities. Architects and designers can create calming spaces with elements such as soothing color palettes, nature-

inspired artwork, and sound-absorbing materials. Integrating amenities like meditation rooms, sensory gardens, and relaxation zones can provide opportunities for patients to destress and recharge. Healthcare providers can incorporate therapeutic environments into treatment plans and wellness programs to complement medical interventions and support

holistic healing. Policymakers can promote the development of therapeutic environments in healthcare facilities through grants, incentives, and performance metrics that prioritize patient comfort and recovery.

CASE STUDIES:

BCM Kokilaben Dhirubhai Ambani Hospital, Indore

The super specialty hospital is a 300 bed hospital envisioned as one of central India's ambitious healthcare projects by the BCM-Reliance hospital group.

Concept and Organization

The multi-specialty hospital is tailored to accommodate the expanding workforce of Indore. Positioned in close proximity to the educational and IT hubs of the city, a sizable outpatient department, equipped with executive health check services, serves as the primary entry point to the facility. The lower floor lobbies are strategically designed to emphasize healing elements within the spaces, aiming to alleviate hospital-induced anxieties. These spaces feature positive distraction programs including salons, retail outlets, prayer rooms, restaurants, among others, meticulously crafted to foster conducive environments for both patients and their families. A deliberate distinction is established between the outpatient department and the in-patient areas to optimize operational efficiencies. Stakeholder workshops played a pivotal role in facilitating a negotiation process to determine the organizational layout based on requisite adjacencies and proximities

Program and Planning

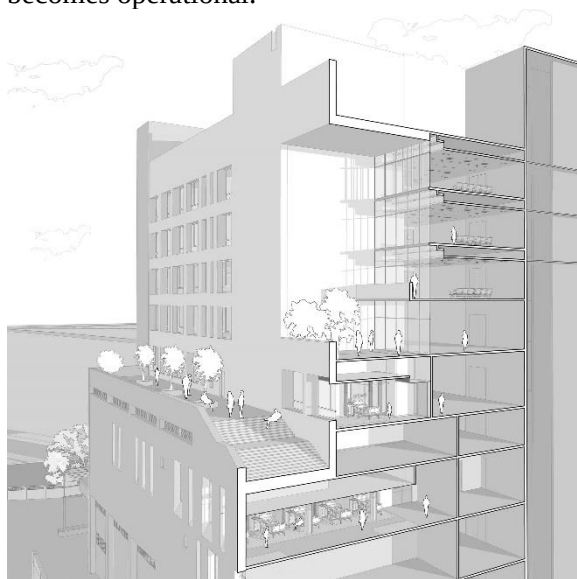
Our ongoing effort is to strategically minimize duplication of clinical facilities by consolidating common programs, thereby reducing staffing requirements across the hospital and subsequently lowering overhead costs. To address the challenge of accommodating large volumes of visitors throughout the hospital, special attention was given to ensuring all waiting areas are well-lit and offer visual and physical connections to the outdoors through features like terraces and decks. This design approach aims to provide a sense of positive distraction for the families of patients, helping to alleviate hospital-related anxiety.



Furthermore, significant emphasis was placed on exploring innovative solutions to control and minimize hospital-acquired infections, including the implementation of pressurized buffers between transition spaces. The adoption of Evidence-based Design principles was prioritized to enhance patient care and promote faster recovery. Integrating rehabilitation spaces with the movement areas of the hospital has been

shown to expedite patient recovery and reduce hospital stays.

In addition to clinical considerations, our scope encompassed capturing and organizing clinical information from various user groups, including medical practitioners, nursing staff, administrators, and technical personnel with vendor-specific knowledge. This information was translated into schematic layouts and room data sheets, which formed the basis for the interior design stages. Furthermore, post-occupancy surveys are conducted to assess how the envisioned design is utilized once the hospital becomes operational.



Our design and planning standards were meticulously crafted to meet the requirements for accreditation with national and international hospital certification agencies such as JCI and NABH. The plans also accounted for future growth and development opportunities for the hospital, ensuring its long-term sustainability and adaptability to changing healthcare needs.

FORTIS MEMORIAL RESEARCH INSTITUTE

Fortis Memorial Research Institute stands as a multi-super-specialty, quaternary care hospital boasting an esteemed international faculty and renowned clinicians, including super-sub-specialists and specialty nurses, all supported by

state-of-the-art technology. Positioned as a premier referral hospital, it aspires to be the epitome of healthcare excellence not only for the Asia Pacific region but also beyond. Situated on a sprawling 11-acre campus with 1000 beds, this 'Next Generation Hospital' is built on a foundation of Trust' and is anchored by four key pillars: Talent, Technology, Service, and Infrastructure.



As a leading healthcare provider, Fortis is dedicated to enhancing the health and well-being of those it serves through comprehensive, innovative, and compassionate care.

The new Fortis Memorial Research Institute is designed to offer spaces that prioritize privacy, rejuvenation, choice, human-scale design, sensory experience, effective communication, and collaborative environments.

The hospital aims to integrate emerging trends such as wellness and technology, establishing itself as a cutting-edge medical center that sets new benchmarks in healthcare by focusing on healing and fostering robust health.

HEALING GARDEN

Situated at the southern corner, a tranquil and sunlit healing garden provides patients with a space for recuperation and serves as a respite area for staff and families.



NATURAL LIGHT

All major areas within the hospital are designed to maximize natural light, promoting a healthy and sustainable environment while enhancing the overall experience for patients and staff.

Standardized patient encounters and improved amenities aim to elevate the overall experience for both patients and staff.



Modular planning of clinical floors optimizes flexibility and facilitates wayfinding throughout the hospital.

A clear organizational layout and simple circulation system within medical areas simplify navigation for patients and staff.

Flexible floor plans accommodate shared practice spaces, systems, and amenities for various clinical modules and sub-specialties.

Efficient use of available site area within the existing compound is prioritized.



Efforts are made to ensure ample natural daylight reaches most common and waiting areas, contributing to a refreshing and congenial environment for patients through modern, upscale, and plush interiors.

Note 1

Christopher Alexander et al (1977) patterns that inspired patterns 1-12 above are include patterns 096, 098, 107, 108, 109, 111, 112, 114, 116, 118, 119, 122, 126, 128, 131, 134, 135, 150, 157, 160, 163, 166, 167, 175, 180, 192, 193. Also see Cooper-Marcus and Sachs' typology (2012): 01: Extensive Landscapes; 02: Borrowed Landscape; 04: Landscaped Setback; 05: Nature and Fitness Trails; 06: Entry Garden; 07: Backyard Garden; 09: Courtyards; 10: 'Hole-in-a-Donut Garden;' 12: Roof Gardens/Hanging Garden; 13: Roof Terrace; 14: Peripheral Garden; 15: Atrium Garden; 16: Viewing Garden

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