

# Landscape Therapeutics and the Design of Salutogenic Hospitals: Recent research

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## Introduction

Due to their size and complexity, urban medical centers tend to be once removed from their immediate surroundings, functioning as ‘islands’ amid a surrounding dense sea of urbanity. This condition can preclude genuine connectivity with green spaces that could otherwise aid, in a therapeutic sense, in healing patients and improving the day-to-day experience of families and staff. The presence of green space holds the power to improve occupants’ morale, attitude, and overall disposition. Too often, hospital exteriors appear fortress-like, uninviting. This occurs both by design and by default. It can result from ineffective or insensitive campus master planning resulting from successive waves of expansion projects occurring over a period of decades. These capital improvement initiatives consume valuable former open green spaces, including gardens, lawns, open vistas, and interesting views. In the most unfortunate cases, successive expansions result in windows and views that overlook nearby walls, and parking decks filled with autos. Such conditions are both counterintuitive and countertherapeutic to the ideals of a physical, salutogenic healing environment that would otherwise aim to celebrate and promote the presence of nature and its therapeutic benefits. Such conditions are tantamount to unnecessary physical and cognitive barriers, and as such, can be a needless source of stress for the building occupant.

A paradigmatic shift is underway in the hospital campus planning and landscape architecture discourse. This shift seeks to reject excessive urban hospital densification, just as much as excessive suburban sprawl is to be eschewed, as both conditions deny the therapeutic affordances of nature and landscape. The re-embrace of landscape and nature as a contributor to place and to ‘healing places’ and as therefore being centrally important to the healing experience is underway. This, in certain respects, reprises attributes expressed in the ancient Greek Asklepiion. (Figure 1 and Figure 2). Much can be learned from the

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reappraisal of such precursors in terms of their salutogenic properties [17]. Hospitals are only now beginning to be, genuinely, consciously and carefully composed to be in internal and external harmony with environmental sustainability precepts and with the value of engagement with nature. However, research on this topic dates from the 1970s, including the work of Collins [1], Detweiler, et al. [2], Francis and Cooper-Marcus [3], Kaplan and Kaplan [4], Kaplan [5], Kaplan [6], Kuo et al. [7], Olds [8], Pati et al. [9], Pretty [10], Raanaas et al. [11], Stigsdotter [12], Grahn and Stigsdotter [13], Ulrich [14], Verderber [15], and Verderber and Reuman [16]. In the field of environmental psychology, work on attention-restoration theory developed by Kaplan and Kaplan has garnered especially widespread attention, and is relevant to this evolving discourse [4].

The term *theraserialization* has been created to describe a hybrid assemblage of the terms ‘therapeutic’ and ‘serialize’ [17]. This concept provides a promising ‘best practices’ alternative to the current status quo in hospital architecture and campus planning. It is defined as a continuum of indoor to outdoor space that is consciously designed in support of biophilic environmental design principles [18, 19]. It consists of creating spaces that are serialized in function and

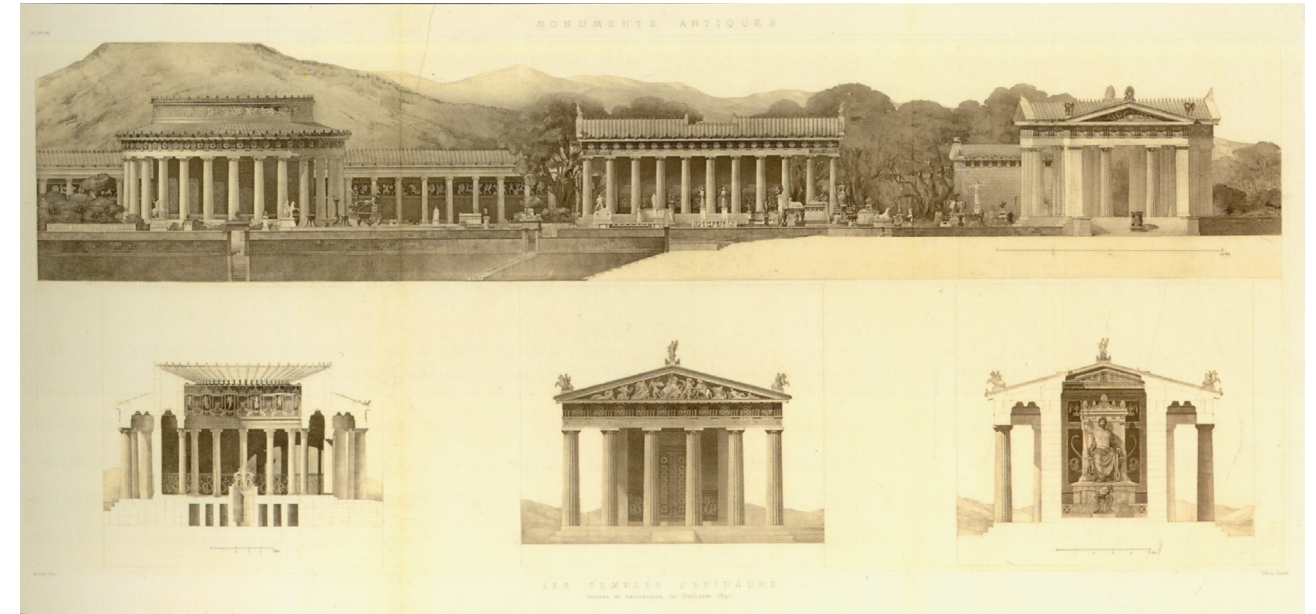


Figure 1. The Temple of Asclepius at Epidauros, 5th century BC,

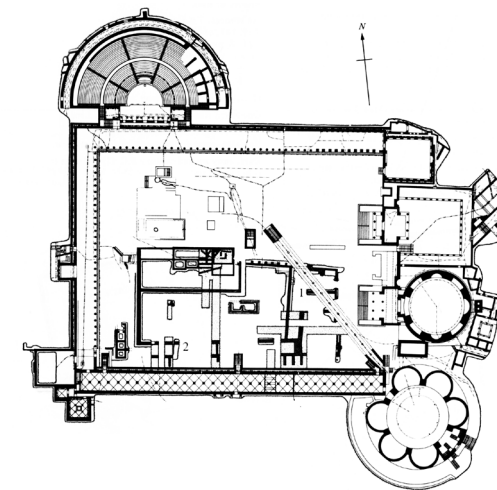


Fig 2. Pergamon, plan of Asclepiad and sanctuary complex at Epidauros, 5th century BC.

in their affordances — by means of layering, collage, superimposition and relative transparency.

*Theraserialization* denotes the existence of sequenced spaces from public areas such as parking and main entrance approaches, to the interior main arrival lobby, to corridors throughout the entire facility that open up and into corridors, gardens, and which afford views through to, and outward from, corridors, to semi-private spaces such as dayrooms and terraces, landscaped roof terraces, and ultimately to the inpatient room – facilitating the patient’s direct experience with the outdoors – views, daylight, sounds. *Theraserialization* emphasizes “anchor” functions equally with the spaces in-between, vis-à-vis illusion, immersion, light/dark contrasts, inter-

esting changes in path directionality, volume, and shifts from transparency to opacity. Ideally, it manifests as a continuum, graduated, as opposed to being abrupt, or disjointed. It can be expressed vertically, as in the soaring atrium lobby of the Lurie Children’s Hospital winter garden in Chicago (2012), or horizontally, as in terraces providing impressive views of a nearby mountain range such as at the Boulder Foothills Community Hospital, in Boulder, Colorado (2003) [17]. The meditation garden at the Banner Estrella Medical Center, in Phoenix (2005) comes quite close to the epitomizing this concept. The walls of an interior meditation space are moveable, at one moment closed and a few moments later able to peel away. This dematerialized open-air condition is at once biophilic, fluid, and connected to indigenous vernacular traditions, i.e. the use of natural stone, and incorporation of local fauna. The barrier between ‘inside’ and ‘outside’ dissolves. In this way, a building becomes quite literally capable of breathing – by achieving direct connectivity with the landscape [17].

Transparency, for its part, is closely related to *theraserialization* and edge-dematerialization of a hospital’s physical envelope. However, a ‘transparent condition’ alone does not necessarily equate with a hospital’s *theraserialized* physical envelope. In other words, full height windows that connect a clinic’s waiting room with the outdoors cannot succeed in this regard if waiting room occupants must directly look out onto the front bumpers of autos parked outside a mere few feet away. By contrast, if the windows in this same room overlook a garden, or pond, for example, the visual effect can be perceived as restorative, i.e. soothing, and therefore far more preferable.



Landscape Therapeutics: Design Considerations for a Salutogenic Hospital

Twelve design considerations are presented below. Each design consideration is grounded in the research design literature, and each is fundamentally inspired by Christopher Alexander's classic book, A Pattern Language: Towns, Buildings, Construction (see Note 1) [20]. For each design consideration, one or more recent evidence-based design case studies are cited [21]. Col-

lectively, these design considerations are applicable to urban, suburban, and rural hospital environments (Note 1). Particularly closely related evidence-based research precedents, in support of this set of considerations, are also reported. (Table 1). Here, key published, peer reviewed research studies are listed and assigned a weighted assessment of their relevance in relation to each individual design consideration one through twelve. This is followed by the design considerations themselves. (Figures 3a through 14b).

Research Precursors		Cooper-Marcus, C. & Sachs, N. A. (2013) <sup>21</sup>	Dijkstra, K. et al. (2006) <sup>22</sup>	Edwards, L. and Torcellini, P. A. (2002) <sup>23</sup>	Kaplan, R. et al. (1998) <sup>24</sup>	Pasha, S. (2010) <sup>25</sup>	Pati, et al. (2008) <sup>9</sup>	Smith, J. (2007) <sup>26</sup>	Ulrich, R. S. (1984) <sup>14</sup>	Ulrich, R. S. et al. (1991) <sup>27</sup>	Ulrich, R.S. (1999) <sup>19</sup>	Ulrich, R. Zimring, C. et al. (2004) <sup>28</sup>	Velarde, M. D. et al. (2007) <sup>29</sup>	Verdeber, S. (1986) <sup>15</sup>	Verdeber, S. (2010) <sup>17</sup>	Zadeh, R. S. et al. (2013) <sup>30</sup>
Design Considerations																
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 1–12

Relationship: ● Primary    ● Secondary    ○ Tertiary

Hierarchy of Landscape Realms

Landscape and nature content can be most effective when experienced as a hierarchy of green spaces traversing public, semi-public, and semi-private spaces. The three primary user constituencies of a hospital – staff, patients, and patients’ families – can benefit from this strategy. At the Miami Valley Hospital in Dayton, Ohio, adjacent to the recently opened Heart and Orthopedic Center, the campus master plan created by NBBJ (Columbus Office) increases the amount of exterior landscaped space by 54%, resulting in a hierarchical series of interwoven spaces. (Figures 3a and 3b). Campus buildings are arranged around a central landscaped core, and a ‘garden spine’ functions as a link to a network of exterior landscaped spaces of varying sizes, shapes, heights, and use-affordances [32].

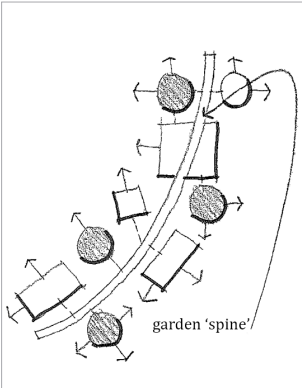


Fig. 3a: Hierarchy of Realms.



Fig 3b: Miami Valley Hospital, Dayton, OH, USA/by NBBJ.

Courtyards that Breathe

Large, otherwise monolithic hospital envelopes can be softened through the creation of vertical and horizontal cutouts and voids, devices that allow the building envelope to be opened up, and daylight to penetrate interiors from the lowest level to the uppermost levels. ‘Breathing’ also functions as a key wayfinding aid to building occupants – especially when bisected by circulation. Create hierarchical cutouts, voids, and slices, positioned at precise intervals – some completely internalized within the envelope, even from subterranean levels. At Rehab Basel, in Switzerland, by Herzog and de Meuron, the rehabilitation hospital’s building envelope features nine ‘breathing courtyards’ within a large box, resulting in a significant percentage of exterior/outdoor adjoining wall surface area throughout the hospital [17]. Dome-like skylights above every patient bed are a source of additional daylight. (Figures 4a and 4b).

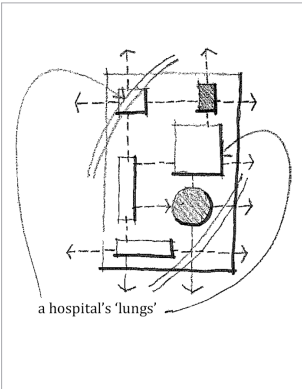


Fig. 4a: Courtyard Network.



Fig. 4b: Center for Spinal Cord and Brain Injuries, Basel, Switzerland/ by Herzog and de Meuron.

Vertical Gardens and Cutouts

In the previous pattern the focus was reductive – carving out volumes to open up the building envelope. Here the emphasis is on vertical cutouts, slices, and perforations, operations involving articulated exterior elevations and building sections. In the case of mid- and high-rise healthcare facilities with narrow footprints on dense sites, this process can yield a variety of openings and indentations in composition and massing, yielding more interesting views, and heightened interior-to-exterior connectivity. Oblique and unusual vistas and views can be maximized in this manner. A vertical garden on the side of a cutout of perforation of this type is a bit reminiscent of a piece of Swiss cheese. In 2012, the firm 3LHD won an international design competition for a medical center in Firule, in Split, Croatia. This polytechnic medical institute is situated near to the sea, with fresh air and dramatic views while complimenting an existing adjacent hospital campus. Semi-public terraces and hanging gardens are interspersed throughout, mirroring the aforementioned vertical band components. (Figures 5a and 5b).

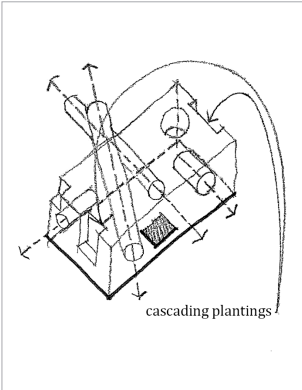


Fig. 5a: Gardens and Cutouts.



Fig. 5b: Polyclinic, in Split, Croatia/ by 3LHD Architects.



Positive Outdoor Spaces

Residual, disconnected outdoor spaces within hospitals are often little preferred by their inhabitants, and are seldom used on a regular basis. By contrast, a hospital that provides a series of inviting, semi-enclosed ‘outdoor rooms’ for their users can add to one’s sense of protection, safety, and the ability to directly experience the outdoors while simultaneously feeling connected to adjoining interior spaces. Include in these spaces landscaping closely calibrated with the width and proportion of wings and the projecting ribbons of adjacent structures. Enhance these spaces by means of trees, hedges, fences, trellised arcades, columned walkways, and porticoes that protect one from unwanted exposure to the natural elements when one elects not to be exposed. As such, this will yield spaces that convey a positive, inviting quality, with spatial definition and therapeutic amenity – particularly when natural daylight and fresh air is in abundance. Dark, claustrophobic conditions represent the antithesis. Positive outdoor gardens and landscaping affordances can become high activity areas, i.e. an exterior terrace adjacent to a main dining room. (Figures 6a and 6b).

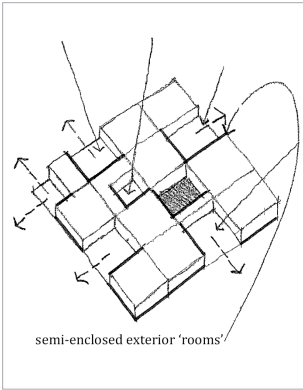


Fig.6a: Outdoor Rooms.



Fig. 6b: Palo Alto Medical Foundation, San Carlos Center, San Carlos, CA, USA/ by NBBJ.

Micro-Landscapes Along Narrow Wings

Twenty-first century buildings for healthcare warrant rethinking from the perspective of natural daylight. It has become desirable for natural ventilation and daylight to penetrate the building envelope, as feasible; regardless of site restrictions such whether the hospital’s site is narrow, amid a dense urban setting, or otherwise. Approach the provision of natural daylight as a positive therapeutic force with the expressive goal to enliven and activate otherwise drab, windowless spaces within the building envelope. Create multiple narrow wings, in footprint, of varying floor (or constant) heights, such as is the case at the Rikshospitalet in Oslo, Norway (2008) [32]. There, a series of A/B A/B wings project outward from a central building spine. This yields multiple ribbon-like volumes of green landscaped spaces between the projecting wings. At the center of the parti’, four courtyards transmit daylight and fresh air into otherwise entirely windowless spaces. (Figures 7a and 7b).

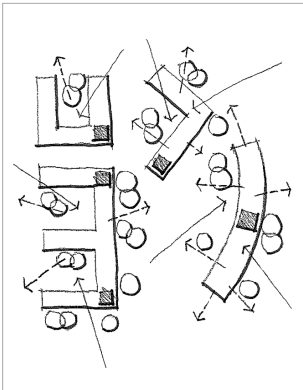


Fig. 7a: Micro-Landscapes.



Fig. 7b: Rikshospitalet, Oslo, Norway/ by Medplan Arkitekter.

Cascading Roof Terraces.

Many memorable and beloved buildings throughout history have featured cascading roofs, with projecting building elements, unfolding into a progression of smaller massings and roof elements, yielding terraces while simultaneously affording respite and the experience of a view of a skyline, a nearby mountain range, and so on. In the case of hospitals that feature well-known roof terraces, the Paimio TB Sanitarium, by Alvar Alto in Finland (1929) is exemplary. It features vertical plantings that hang from the sides with roof terraces on multiple levels, culminating at the uppermost terrace. The International Style megahospital, negated this, as building envelopes ballooned in volume both vertically and horizontally [33]. Cascading roof terraces can be achieved by stepping, yielding shaded places to sit outdoors such as in the winning proposal for Helsingborg hospital’s expansion, in Sweden, by Schmidt Hammer Lassen Architects. (Figures 8a and 8b).

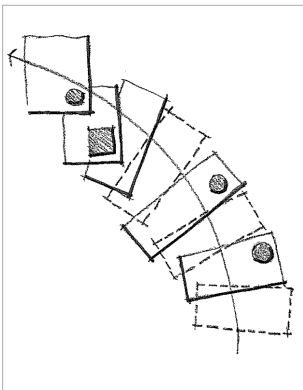


Fig. 8a: Terracing



Fig. 8b: Helsingborg Hospital Winning Proposal, Sweden/by Schmidt Hammer Lassen Architects.

Transparent Arteries

Circulation arteries should be inviting and transparent, affording views onto attractive, landscaped spaces throughout the diverse interior realms within a medical center campus. The term “mover spaces” was used in conjunction with a study of patient and staff perceptions of various public spaces within a hospital [32]. These circulation spaces feature a 24/7 constant hum of people and supplies and function as conduits in support of the ebb and ow of the daily patterns of use within a hospital and its medical center context. Corridors, connecting bridges and walkways, and vertical elements such as glass sheathed elevators and escalators, are essential in the creation of this type of person-landscape interconnectivity. In one recent study it was found that a garden located amid a low-trafficked zone within a hospital had a far lower probability of being discovered. By contrast, gardens located along a highly trafficked zone – public corridors as well as staff circulation – were much more actively used [28]. Incorporate transparency – with landscape and nature as magnets. (Figures 9a and 9b).

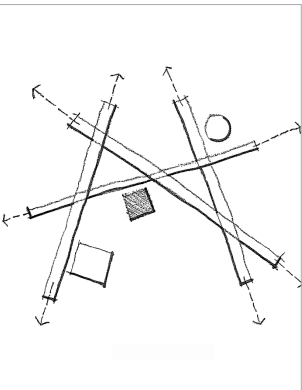


Fig. 9a: Transparency.



Fig. 9b: Meyer Children’s Hospital, Florence, Italy/by Anshen + Allen with C.S.P.E.

Landscaped Arrival Zones

Main arrival zones, and increasingly, emergency department entrances, are often abrupt, lacking inviting aesthetic attributes to soften the transition into the somewhat cloistered, protective realm of the hospital. Albeit, it remains critical that the hospital be a safe and protective place, yet without it looking like a fortress. In this regard, strive to use nature and landscaping to avoid disorienting, sudden, or jarring transitions from the outer world to the inner world of the medical center. Single-family dwellings traditionally have front porches, where one can be seen and see others coming and going. This ambiance is reinterpretable throughout the campus, originating perhaps with bright entry portals and by establishing axuality with the use of landscaping. This is achieved at the Fleury Medicina E Saude, in Sao Paulo, Brazil, by Perkins + Will (2011). The entrance sequence features natural daylight, trees, and ground plantings. (Figures 10a and 10b).

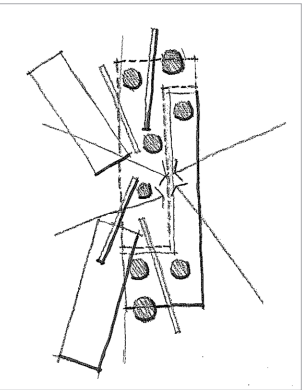


Fig 10a: Landscaped Arrival Zones.



Fig 10b: Fleury Medicina E Saude, Healthcare Ibirapuera Unit, Sao Paolo, Brazil/by Perkins + Will.

Dematerialized Edges

The exteriors and edge conditions of the minimalist International Style hospital were often harsh, inviting, and excessively institutional. Now, exterior facades and edges can be highly porous, gridded, tactile, transparent, layered and textured versus mid to late 20th century brutalist hospital exteriors and their edge conditions. This new transparency and dematerialization allows for far more openness, varied compositional massing, stepped floor levels, user-friendly roofscapes, and deconstructed services that need no longer to be housed within the hospital’s ‘main chassis.’ One should be able to walk, for instance, outdoors from the patient room onto a roof terrace, balcony, or a ground level space [17]. A continuum was created at the Peter and Paula Fasseas Canter Clinic, at University Medical Center, in Tucson. Its dematerialization yielded a tapestry of light and dark, mix of screened and semi-screened spaces accentuated by indigenous ground plantings. (Figures 11a and 11b).

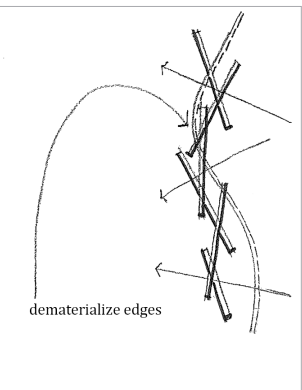


Fig 11a: Dematerialization..

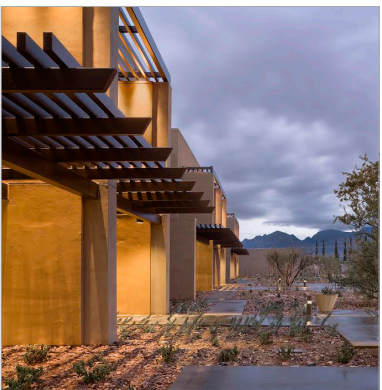


Fig 11b: Peter & Paula Fasseas Cancer Clinic University Medical Center, Tuscon, AZ, USA/ by CO Architects..



Atrium Gardens and Lightwells

An atrium is capable of drawing much-needed daylight, natural ventilation, and spatial diversity deep within the building envelope. In extreme climates, sitting or strolling outdoors may not be possible—due to excessive heat and humidity or excessively cold temperatures—whereas an atrium garden or lightwell that is vegetated functions year-round via a skylight or one equipped with an operable roof. Winter gardens in extreme climates, and vertical lightwells, can feature a canopy of trees, ground plantings, seating, and water features, even possibly water walls and ponds [19]. A canvas canopy shields the courtyard at the Sun Health Hospice, in Phoenix, Arizona, by Taliesin Architects (1997) in the hot arid climate of the American Southwest [38]. Another example is the John Muir Medical Center Walnut Creek Campus, by Ratcliff Architects. The Meyer Children’s Hospital, in Florence, Italy, features three conically shaped cutouts and colorful sculptures at ground level, double functioning as wayfinding aids [17]. Occupants are invited to look upward towards the sky(lights).

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 multifaceted. 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. Cutouts, setbacks and linear slices are in evidence at the Khoo Teck Puat Hospital in Singapore, designed by RMJM (2012). There, a half-hidden garden is adjacent to the main circulation artery. The parti’ is governed by the site’s natural amenities—resulting in a ‘hospital in a garden’. The gardens and water features at the main entrance reoccur throughout the interior, culminating in a series of stepped garden terraces on the patient housing floors.

Therapeutic Viewing Places

As hospitals successively expand, green spaces, trees, and gardens are too often the first to go. These amenities are prime targets for hospital expansion projects, largely because they have no vocal constituencies to advocate for their preservation. This is precisely that occurred at Michael Reese Hospital, infamously, in the late 1950s and early 60s, in Chicago [33]. In their place, harsh, uninviting new buildings, along parking decks and surface car parks, were constructed. Concomitantly, meaningful views onto these open spaces are lost, as are views outward to the world beyond: an urban skyline, natural shoreline, wooded area—all potentially offer therapeutic benefit as providers of brief respite from the rigors of one’ disease or illness. At the Owensboro Health Regional Hospital, in Owensboro, Kentucky (2012), visitors are able to experience framed views of the surrounding natural landscape [32].

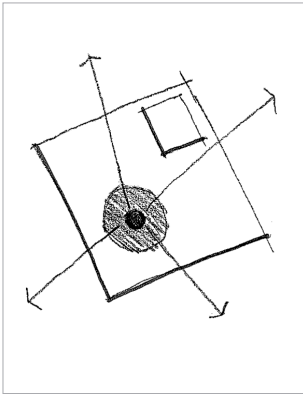


Fig. 12a: Atriums and Lightwells.



Fig. 12b: John Muir Health: John Muir Medical Center Walnut Creek Campus Expansion and Remodel, Walnut Creek, CA, USA/by Ratcliff Architects.

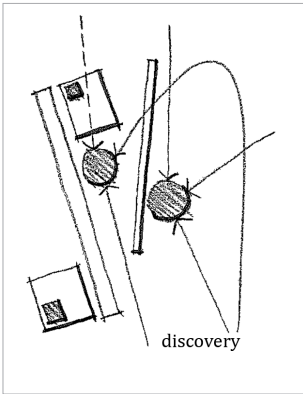


Fig. 13a: Hidden Gardens.



Fig. 13b: Khoo Teck Puat Hospital, Singapore/by RMJM.

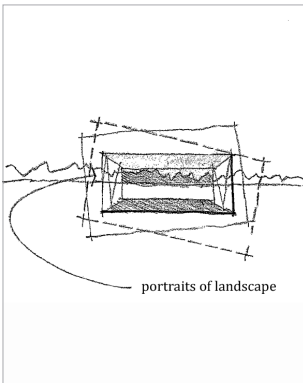


Fig.14a: Framed Views of Nature.



Fig. 14b: Owensboro Health Regional Hospital, Owensboro, KY, USA/by HGA.

Engagement with Nature in Waiting Room Settings: An Empirical Investigation

A recent empirical investigation (2015) explored human engagement with nature in hospital public waiting areas as a function of the impact of the degree of transparency that exists (or does not exist) between interior and exterior realms, vis-à-vis windows and the views they afford of the outdoors, as seen from these spaces. The realm of the hospital environment waiting room was selected because nearly every visitor and patient who seeks treatment at a hospital or allied medical treatment facility experiences this type of space, many returning on a repeated basis over the duration of a period of treatment that may last many months. The waiting area, as a discrete spatial entity, and its associated circulations spaces, i.e. hallways and vestibules, are therefore of fundamental significance to the day-to-day operations of a hospital and its broader medical center context. These spaces are equally fundamental as they often provide an indelible first impression of the overall facility to all newcomers to the hospital. As mentioned earlier, the role of nature had too often been tenuous, at best, in the ever expanding, densely developed International Style urban hospital campuses of the mid-to-late 20th century. In these care settings, the role and importance of person-environment transactions with nature and the outdoors was, too often, minimized to an insignificant stature.

The goal of this investigation was to ascertain whether the role and function of transparency is of importance to the occupants of this type of space, particularly in urban hospital settings. Second, to ascertain whether a greater degree of visual transparency and overall interconnectness between the indoors and outdoors contributes to a more salutogenic hospital environment. Two fundamental assumptions at the outset were: 1. The functional deconstruction of the modernist hospital/medical center has already been underway over the past twenty-five years [2, 17]. A significant level of visual transparency between the interior and exterior realms, as expressed through the aforementioned precept of theraserialization may have a positive therapeutic effect on occupants of waiting rooms, in terms of reducing their overall level of physiological and psychological stress. Functional deconstruction is defined here as the extent that functions of a highly centralized hospital/medical center are redistributed elsewhere, off site, in the community, thereby resulting in a reduced overall hospital/medical center ‘footprint’ [31, 33] .

Due to space limitations, the present discussion does not allow for a detailed description of this investiga-

tion, therefore only a brief summary is provided. The basic research question was to ascertain whether one’s degree of exposure to nature in this type of setting significantly impacts respondents’ overall mood, perceptions, and environmental assessments of the physical settings being evaluated. Three levels of exposure were assessed: little, moderate, and maximum exposure to nature from within the waiting room setting. As mentioned, the theoretical premise was drawn from attention-restoration theory that postulates that an excessive amount of directed attention can become stressful and that an appropriate level of engagement with nature can be restorative and can help to lessen mental fatigue [24]. It was hypothesized that transparency and nature engagement is preferred versus windowless and minimally windowed hospital waiting areas. As for the research methodology, a laboratory experiment was designed whereby a total of ninety-five university students (N= 48 males; N= 47 females) at Clemson University, between the ages of 18–30, evaluated a series of 21 slides of hospital waiting areas (7 slides depicting no windows; 7 slides depicting limited views to the outdoors; and 7 slides of scenes depicting a high degree of transparency between indoors and outdoors). The set of images presented to respondents were sampled from the literature and were pre-rated by a team of five expert reviewer/judges (academicians and practitioner-specialists in healthcare facility research and design) along a series of rating scales as to their being expressive of a continuum of scenes ranging from windowless to highly windowed, and from no nature content to a high level of exterior nature content. The setting for the experiment was a research laboratory in the School of Nursing at Clemson University. Each respondent’s systolic blood pressure was recorded, as was one’s heart rate, measured continuously by means of a GE Dinamap device. Mood disturbance assessment was assessed by means of the POMS pre-validated mood assessment instrument, and each slide was also assessed on a five-point likert scale. The three conditions of slide content were referred to as Treatments 1, 2, and 3 (T1, T2, and T3).

Among the findings, it was learned that six slides (of the set of 21) were particularly preferred. (Figure 15). These slides contained views of nature that respondents’ found to be particularly engaging, i.e. sampled scenes identified as not being stressful or aesthetically unappealing. Additionally, the mood scores of female subjects were found to be significantly higher across T1, T2, and T3 compared to male subjects for those images depicting a highly transparent view condition of nature. Female subjects’ depression and anger scores were found to be significantly lower while viewing this type of scene, implying that transparency and a heightened degree



of visual engagement with nature content may have a rather pronounced effect on female patients. This finding, while rather unexpected, may have major ramifications for facilities geared towards women’s healthcare, and is therefore worthy of further investigation in future studies.

As mentioned, a second major finding was that the top six highest rated scenes depicted highly transparent conditions, with windowless scenes garnering the lowest preference and mood assessment scores. Specifically, these scenes featured floor to ceiling windows and maximized natural views, i.e. ground vegetation and trees, and views looking onto healing gardens, abundant natural daylight, rooms that depicted seating facing onto (versus away from) the window wall, and interiors that feature natural materials including stonework, task ambient lighting, comfortable furnishings, and scenes depicting a fireplace in the waiting room.

The twenty-one scenes evaluated by the respondents were subjected to statistical multivariate factor analysis. This analysis process yielded six ‘factors.’ Three of these (F2, F4 and F5) related especially strongly to and underscored the salience of five of the twelve design considerations. Each factor-analytic index, or ‘dimension’ of similarly rated items, contained between three and images similarly perceived by respondents. These five most closely-related design considerations (DCs) were Transparent Arteries (DC7), Dematerialized Edges (DC9), Atrium Gardens and Lightwells (DC10), Sequestered Gardens (DC11), and Therapeutic Viewing Places (DC12). These relationships were illustrated in Figure 13. These were therefore empirically supported, particularly Therapeutic Viewing Places (DC12). It was found that when all empirical data were collectively assessed, this DC had the strongest potential to reduce respondents’

negative mood, optimize their visual preference and thereby have a positive overall outcome effect in respondents’ stress reduction. Here, scenes of waiting areas that provide full views of nature and have seating that allows and encourages occupants to look directly outside were most preferred and were perceived as least stressful. Specifically, large windows and/or high-window-to-wall ratios were featured, where direct views to exterior landscapes and healing gardens were present (as opposed to brick walls and parking lots), water features were visible, and views overlooking and onto human activity in the everyday milieu. Additionally, sightlines allowed for direct contact/engagement with nature and with natural daylight. Seating in the most highly preferred scenes was clustered along the window wall without negating natural seating arrangement affinities, and comfortable seating was provided.

Directions for future research on this topic include perhaps applying a more pronounced, manipulated stressor-source, a larger respondent sample size, additional emphasis on qualitative methods in data collection, such as behavioral observation and interviews, and compare/contrast methodologies whereby real conditions and the same sampled conditions are assessed in tandem or sequentially in a phased manner with the sampled scenes assessed extemporaneously, followed by an encounter with and assessment of those same actual scenes. In other words, the utilization of a mixed-method, phased research design strategy either in lieu of, or in conjunction with, a laboratory component in future work on this subject can possibly generate more comprehensive insights into person-nature transactions in the hospital environment, not only in waiting areas but in other areas of the hospital environment [32].

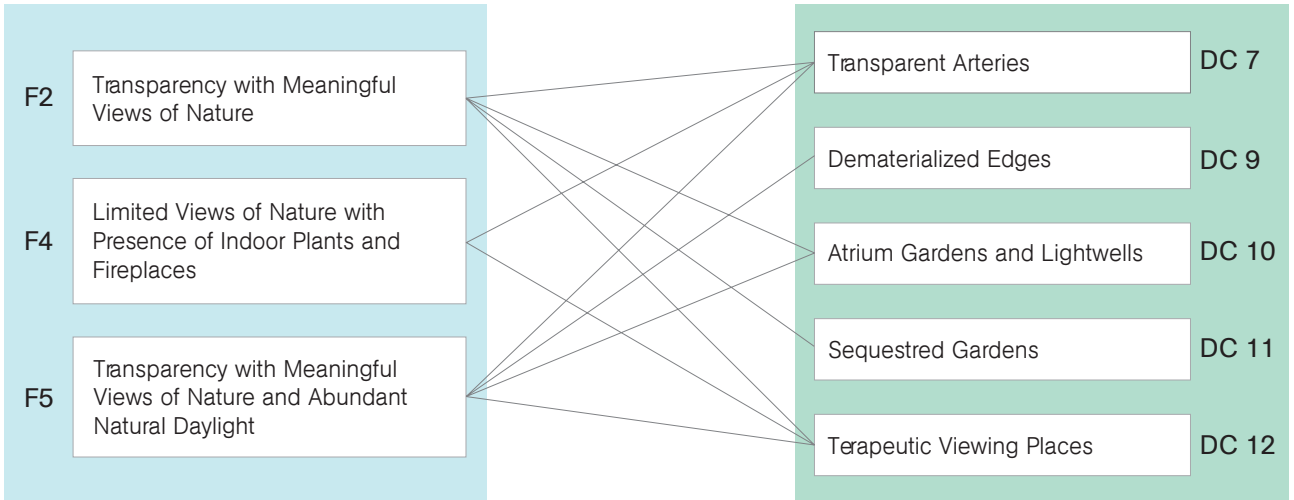


Fig. 13: Empirical Relationship Between Factor Analytic Dimensions and Design Considerations.

Summary and Future Directions

The immense urban megahospitals of the late 20th century were conceived and erected in a manner that too often divorced patients from the immediate and broader natural environment, isolating them from the therapeutic affordances of natural daylight, view, and ventilation, and from direct contact with exterior spaces such as gardens [33]. It has been argued that such conditions were (and are) stressful as they induce a type of sensory understimulation [28]. Moreover, even where a healing garden may be present, it may be closed off to use, thereby creating frustration and becoming counter-salutogenic from a patient-healing standpoint [25, 34]. For the building inhabitant, environmental stressors of this type are avoidable and can be mitigated through sensitive, compassionate planning and design strategies.

In the empirical investigation reported above, for the first time, a theory of relative, serialized transparency was operationalized. The findings provide further fuel to the argument for the articulation of a continuum of landscape-architectural connectivity within healthcare environments. Transparency, as conceptualized by architectural theorists, has been expressed as ‘continuous spatial sequencing’ [35]. This condition, ostensibly, can manifest in the blurring of needless artificial lines of demarcation between the interior and exterior in healing settings and in their associated public support spaces such as corridors and entry vestibules [37].

The research and built case studies literature review conducted a priori, plus the specific findings of the empirical investigation reported above, collectively point to the importance of avoiding the guillotine effect, whereby the exterior walls of the hospital slam down to the ground, taking little cognizance of the potentially powerful effect of nature and landscape as healing modalities. Instead, the surrounding natural ecosystem can be interwoven, inventively, throughout the healing environment of a hospital through thoughtful landscape design and site planning strategies. Strive to create a genuine sense of place while simultaneously achieving internal/external connectivity – as an unbroken continuum – between ‘landscape’ and ‘architecture’. Their mutual exclusivity must be eschewed in favor of a new type of symbiosis.

This innovative approach is achievable at all scales of a healthcare facility, from site planning to the design of an inpatient room and its nature-connectivity quotient. In general, excessive, or worse, wholly needless visual barriers and over-compartmentalization of rooms and room typologies, are among the most blatant enemies of theraserialization. Of course,

“Transparency, as conceptualized by architectural theorists, has been expressed as continuous spatial sequencing”.

the satisfaction of internal functional requirements will out of sheer operational and patient care necessity continue to be of highest priority in any hospital of any size in virtually any site context. Nonetheless, certain longstanding biases, which have been implacably skewed towards highly internalized, minimalist building envelopes, windowless rooms, and poorly windowed spaces, warrant a thorough reappraisal at this time. This is being borne out in recent innovative built hospital case studies (those cited above, as well as in other hospitals driven by these and similar precepts), in the recent research on this subject, and in the numerous ‘legacy’ research investigations carried out over the past three decades [38]. The modernist credo “form follows function” calls for a reinvention – literally turning it inside out – in favor of hospitals that possess ‘lungs’ that allow them to literally and figuratively breathe and boldly extend outward and upward to meaningfully re-connect with nature and with the stress-relieving, therapeutic affordances of landscape [39, 40]. When this transformation fully occurs, landscape architecture for health, as a scholarly discipline, and as a professional endeavor, will have attained unprecedented stature in 21st century hospital architecture. □

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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