



**HEALTH AND NATURE:
THE INFLUENCE OF NATURE ON DESIGN
OF THE ENVIRONMENT OF CARE**

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The Center for Health Design is a nonprofit research and advocacy organization whose mission is to transform healthcare settings into healing environments that improve outcomes through the creative use of evidence based design. We envision a future where healing environments are recognized as a vital part of therapeutic treatment and where the design of healthcare settings contributes to health and does not add to the burden of stress.

The Environmental Standards Council (ESC) is a volunteer task force of The Center for Health Design. The ESC is made up of facility executives, design professionals, regulatory agents, product manufacturers, educators, and others who meet three times year to facilitate and encourage the development of performance guidelines and building codes that support life-enhancing healthcare environments.

Health and Nature: The Influence of Nature on Design of the Environment of Care

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Much of the recent research in the fields of therapeutic and environmental design has to do with patient stress and health outcomes, which refer to an indicator or measure of a patient's condition or progress. Now, healthcare designers are using this research to approach healthcare facility design with a different focus than the traditional methods.

This approach, called, evidence-based design, is based on information available from both research and project evaluations. Such design approaches are engaged to create environments that are therapeutic, supportive of family involvement, efficient for staff performance, and restorative for workers under stress. If implemented accordingly, these projects should result in demonstrated improvements in the organization's clinical outcomes, economic performance, productivity, customer satisfaction, and cultural measures (Hamilton 2003).

One major component of this process is the role nature plays in the environment of care. According to Ulrich, health outcomes research can potentially "indicate the degree to which gardens in healthcare facilities are medically beneficial and cost-effective relative to such alternatives as not having gardens" (Ulrich 1999).

In fact, research has documented that the appropriate use of nature reduces stress (Tyson, Lambert & Beattie, 2002); improves health outcomes (Parsons and Hartig, 2001; Ulrich, 1999); supports pain management (Ulrich, 1984); and

promotes a sense of overall well-being among patients, visitors, and staff (Mack, 2001).

According to these researchers, probable outcomes are benefits that will more than likely be experienced in the reduction of anxiety/stress or a buffering of subsequent stressful episodes by the patients, staff, and visitors alike (Ulrich 1984). Notably with patients, the reduction of depression has been observed, especially where access to nature fosters physical exercise (Lewy, 1998).

Patients who are in direct or sensual contact with nature have demonstrated higher thresholds of pain (Ulrich 1992). And interaction with nature in chronic and terminal patients yields higher levels of quality of life. When wayfinding and landmarks are associated with nature and are clearly identified, visitor stress is reduced (Carpman 1984).

Research also indicates that attention to the environment of care yields financial benefits as well. “Places of respite is a quality-of-life issue that has proven economic benefits to its users, including shorter patient stays, reduced staff turnover, and improved staff longevity” (Waxman et. al., 1984).

Clare Cooper Marcus and Marni Barnes have provided valuable research on the physical, psychological, emotional, and behavioral responses to being in contact with nature. Their numerous case studies of healthcare facilities and user groups are ongoing and are being further documented with post occupancy evaluations (POEs) as a way to check and document their findings. POEs examine the effectiveness of designed environments after an environment is designed, completed, and occupied (Cooper Marcus, Barnes, 1999).

Benefits of Nature

Within the environment of care, where life-challenging and life-threatening events are amplified, the pronounced focus on individual situations at hand necessitates diversions or distractions to allow those within to manage stress. Providing access to nature within healthcare facilities supports these evidence-based design concepts and offers opportunities for positive distractions.

In this sense, positive distractions may be understood as “environmental design elements that effectively promote restoration from stress in patients, visitors, and healthcare staff” (Ulrich 1992). However, some natural systems can be perceived by some as negative, such as the presence of certain animals from past negative personal experiences, for example, and would not be a probable component in this environment.

“Seeing the sky or feeling the sun on your skin can literally make you feel better...our surroundings affect our well-being” (Mack, 2001).

Therapeutic Environments

Within the healthcare campus, there should be numerous opportunities for the various user groups to encounter nature. Areas may be interior or exterior and encountered physically or by sensory perception. Any contact with nature, from looking at a picture to lying in the grass, has a wide range of positive psychological effects and subsequent benefits.

Interior environments are enhanced when views or elements of the outside world are brought into the interior design. Indoor plantings or pictures of nature should be incorporated into the context of the interior design. Aquariums and terrariums are also sources of life that bring nature within reach. Light wells and skylights

bring natural light into an interior space that may not be adjacent to an exterior wall. Also, fountains and water features provide natural movement and sound to an otherwise sterile institutional environment.

Wherever possible, views of nature from patient rooms and public spaces should be considered throughout the design process of healthcare facilities. The interior design should also incorporate nature into the environment through interior courtyards and atria. These spaces are often landmark design elements and wayfinding queues in the public spaces. They provide a year-round benefit to visitors by bringing natural daylight to the major gathering spaces of the facility.

Visual connections to such spaces along corridors or upper floors can provide interest and relief to the viewers. Upper-level floors can benefit from roof gardens and terraces that are normally occupied by mechanical equipment and expanses of void. Green roof technology—incorporating systems into the roof design to support organic environments - is being implemented for environmental reasons and supports therapeutic garden design concepts for healthcare facilities as well.

“Even when building sites have limited views of nature, designers are using interior spaces to create healing gardens and walls of windows to connect inside and outside” (Berry, et al., 2001)

Exterior environmental factors provide the setting for the healthcare campus and help to establish its character of healing. Providing landscape and green-screening along the arrival sequence from the property boundaries, to the gateway, to the parking space, to the front door will facilitate the therapeutic campus-design concepts.

Gardens, outdoor sitting and walking areas and green corridors through parking lots are all components to be considered. This access to nature should be designed to provide freedom from negative distractions from outside influences necessary to facilitate campus activities. Screening of service areas, vehicular traffic, mechanical noise, and pollution should all be considered and incorporated into the campus design.

Exterior courtyards and plazas that are adjacent to public areas, waiting rooms, and corridors allow the interpenetration of natural light and natural settings with public interaction. These areas can provide both public and semi-private spaces to meet a variety of users' needs. Smaller spaces may provide viewing and contemplation in pocket gardens or semi-private places of respite. Larger outdoor gathering spaces are essential to encourage outdoor activities without the fishbowl effect (the feeling of being constantly viewed). The type of garden or outdoor area design should be part of an overall design effort to provide a variety of spaces to meet the many needs of the healthcare community.

User Groups

The users or visitors encountering the environment of care are many faceted. First and foremost are the patients, who compose many categories depending on length of stay, physical and psychological needs, and type of disability or infirmity. Patient classifications may be as varied as ambulatory care or long-term care, pediatric or geriatric and the physically, mentally or emotionally impaired, to mention a few. The nature of the patient group and their individual needs contribute greatly to the choices made in the environment of care's design and how natural elements are incorporated.

Caregivers, who are perhaps equally benefited by an outdoor place of respite due to daily stressful conditions and long hours, vary from physicians and nurses,

therapists and technicians, to medical and administrative staff. Caregivers and staff are directly impacted by this environment and would be positively impacted by the presence of or access to nature.

Family members, visitors, and the community-at-large are in need of the benefits of positive distractions within the healthcare campus. The need of a place of solace, a source of wayfinding, an opportunity for relief from the institutional character of the facility is evident. All are areas that should be supported by a natural setting.

Types of Experiences

The types of experiences expressed within these gardens or natural settings also are varied and closely linked with the users' particular needs. Depending on the accessibility to nature and the mobility of the user, the experiences may be active, passive, or sensual. Different activities may be required for the various user groups and should be located adjacent to the facilitating areas or clinical departments.

Active experiences are often limited to walking, but any exercise opportunity is considered beneficial to the healing process. Walking paths, designated trails, or a meandering garden layout will encourage patients, visitors, and staff to exercise and relieve stress. Providing convenient access to those spaces close to adjacent treatment or waiting areas should offer a sense of connection and availability to patients or caregivers and a sense of security for those in an unfamiliar place.

Physical therapy and rehabilitation opportunities, if offered in an open-air setting, will provide patients the benefits of being in nature while undergoing therapy. This also allows therapists to simulate situations and obstacles that the patient

will encounter outside, thus instilling a sense of confidence and assurance of recovery. Also, horticultural therapy is a growing discipline of rehabilitation that encourages direct access to nature and its associated healing benefits.

Passive experiences of social interactions, such as sitting and talking, also provide therapeutic benefits within the healthcare campus. Opportunities to assimilate back into social situations are enhanced by familiar garden elements. Interpersonal interactions, such as meditation or simply watching natural systems move and change, are also meaningful and emotionally healing.

Biophilic or sensory experiences with nature involve enhancing or stimulating one or more of the five senses—seeing, hearing, smelling, tasting, and touching. The senses are the basic foundations for what individuals consider their sense of self and what they know as familiar (Wilson, E.O., 1984; Kellert & Wilson, 1993). Experiencing events of nature offers a common familiarity to all ages and backgrounds, regardless of their current situation, and it becomes a positive distraction. The way a visitor experiences nature can be both conscious and subconscious, but the overall effect of the experience is deemed to be beneficial.

Some examples of ways to incorporate design elements that address the senses are:

- *Sight*: gardens views or familiar sights of nature from pictures, such as a view of the outdoor space or a painting
- *Sound*: nature noises, such as a running stream or other soothing sounds
- *Smell*: aromatherapy, such as the scents of flowers and herbs
- *Taste*: herbal therapy, such as hot teas
- *Touch*: physical or horticulture therapy, such as familiar textures of nature

Therapeutic Garden Categories

Therapeutic gardens are designed garden areas that address the specific needs of the user groups within the environment of care. These gardens are defined as places to “achieve a degree of relief from physical symptoms or awareness of those symptoms” and places to “facilitate an improvement in the overall sense of well-being and hopefulness that an individual is experiencing and thereby assisting physical improvement” (Cooper Marcus 1999).

Ulrich’s theory of supportive gardens as a source of stress restoration and buffering is just one example of the type of research that defines nature as a vital component of the environment of care. “Patients who are in direct or sensual contact with nature have demonstrated a higher threshold of pain” (Ulrich, 1984).

Joanne Westphal, MD, who practices medicine and landscape design, briefly defines and categorizes therapeutic gardens in the following ways:

Healing gardens: Gardens that provide opportunities to passively and/or actively address restoration of body functions. The primary focus is to regain wellness in one or more of the three dimensions of existence: physical, psychological, spiritual. The effect to the user should be life-affirming.

Enabling gardens: Gardens that address the physiological needs of users to help them maintain and enhance their physical condition. They also enhance a particular life stage and may be programmed to (a) maintain and enhance the physical condition of targeted clientele through activities and (b) permit spiritual growth and development through meaningful reflective and cognitive activities.

Meditative gardens: Gardens specifically designed to allow individuals and/or small groups to quietly reflect and turn inward in thought process. The primary

focus tends to be spiritual and psychological with a secondary emphasis on physical well-being.

Rehabilitative gardens: Gardens are programmed to parallel the treatment protocols of a target patient population for the purpose of achieving the desired medical outcomes. The primary focus tends to be physical rehabilitation; the secondary benefits are psychological and emotional.

Restorative gardens: Gardens designed for the purpose of regaining homeostasis in a patient/user group. The focus is on the psychological/emotional side of the target audience. The main purpose is to passively allow the body to regain balance after stressful events.

(Westphal, 2000)

Design Goals, Objectives, and Considerations

Design goals, objectives, and considerations are integral parts of the design process. These goals are set by the design team to meet certain criteria that promote and support health outcomes. The specific space, predetermined user group, and associated activities help define the design goals and establish how the space is to be used or the desired health outcome of the visitor or viewer of that particular environment.

The design goals of a therapeutic environment, simply stated, should improve the health outcomes of its users and reduce their levels of stress. Establishing these design parameters early in the design process will help the integrated design team set up the framework for specific design objectives and considerations.

Design objectives provide attainable metrics that the design team can establish in the early visioning sessions of the conceptual design phase. Some of the design objectives for therapeutic environments include:

- Enhance the work setting.
- Provide accessibility to nature.
- Include comfort and user-friendliness.
- Incorporate visibility and visual interest into/out of the garden.
- Provide a sense of security and safety.
- Promote a sense of control of surroundings.
- Address the five senses (diversity of biophilic input).
- Underscore the distinct difference from interior.
- Balance the functional and aesthetic design variety.

“Reducing staff stress and fatigue through a healing and supportive environment may be achieved through application of evidence-based concepts such as places of respite in health care design” (Tyson, Lambert & Beattie, 2002).

Design considerations for therapeutic environments are multi-faceted and should include:

- Visual relief and interest in vertical and horizontal dimensions
- Seasonal interest, incorporating nature to reflect the positive changes of life through each season
- Design elements that stimulate the senses and create an atmosphere of peace, such as labyrinths and reflecting pools, plant material that attracts birds and has seasonal interest, and found objects of art and elements of surprise and delight

In addition, these garden spaces should incorporate multiple-use opportunities and provide separate space for:

- Contemplation and reflection
- Walking and movement
- Shelter from sun and wind
- Social activity (encouraged by an open space)

Other design considerations should be addressed to support the functional design and layout of the healthcare campus. Zoning and building requirements, vehicular and pedestrian circulation, safety, and quality of care are all important design elements that need to be addressed.

Supportive Design Considerations

Supportive design considerations are intuitive and functional to the specific space and its user group. Considerations should also address the mission of the institution and connection to community and should include:

- Convenient wayfinding and circulation clarity
- Accessibility
- Access to privacy
- Seating that facilitates social interaction
- Exercise opportunities
- Contact with nature
- Support of the sense of community
- Enhancement of the institutional image
- Improvement of the overall quality of the space

“When way-finding and landmarks are associated with nature and are clearly identified, visitor stress is reduced” (Carpman, et al., 1984).

Design Recommendations and Considerations for Healthcare Facilities

Based on the research and evidence-based design process on the positive health outcomes that access to nature provides, recent design guidelines for hospitals and healthcare facilities have included language and metrics to encourage the incorporation of these concepts into future building initiatives.

The American Institute of Architects (AIA) Guidelines for Design and Construction of Health Care Facilities is updated every 4 years by the 128-member, multi-disciplinary Health Guidelines Revision Committee. In the most recent update, The Environmental Standards Council of The Center for Health Design drafted and submitted additions to The Environment of Care chapter, which outlines, among other things, the environmental factors that contribute to patient, staff and family satisfaction. The additions were unanimously accepted by the Committee and are now part of the 2006 Guidelines.

As a result of these new additions, access to nature is now recommended for hospitals and long term care facilities. Likewise, natural daylight and views to nature is now recommended to bring natural light into the facility for the positive health benefits that natural lighting brings to patients and staff work areas.

Because these new recommendations are based on evidence and research, their influence on health outcomes is universal. Areas of integrated design, access to nature and places of respite are now supported in new sustainable guidelines as well.

The U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program, the premier green building tool in the US, and the *Green Guide for Health Care*, a green building tool tailored to the healthcare sector, both provide incentives for integrating a connection to the natural world into project designs. "In design, evidence-based research into the impact of the

built environment on therapeutic outcomes and the sustainable design movement are coalescing into a powerful new vision for healthcare architecture.” (Guenther, 2003)

Incorporating the above supporting references, the following parameters should be considered as minimum recommendations for the design of healthcare facilities.

Views to Nature

The outdoor areas should be visible from interior public spaces for security, administrative, and medical purposes. Visual access to nature from within the facility should also be addressed from patient rooms and public spaces alike. Indoor places of respite should have direct line of sight to the outdoor environment for 90 percent of the total aggregate net program area *and* 50 percent of those qualifying areas with direct views of nature (GGHC, 2007).

Access to Nature

Exterior spaces, courtyards, or gardens should be handicap accessible (in compliance with the American with Disabilities Act) and located adjacent to public spaces, such as reception areas, corridors, waiting rooms, and dining areas. In addition, user-specific departments within the environment of care should also have adjacent exterior spaces that may address specific needs of the user groups of that particular area.

“Patients are less likely to exhibit signs of depression especially where access to natural light and opportunities for physical exercise are present” (Lewy, et al., 1998).

Based on professional “best practices” recommendations, the intent of the *Green Guide for Health Care’s* Sustainable Sites credit goal, *Connection to the Natural World: Exterior Access for Patients*, is to “provide direct access from their unit/department to a secure, supervised and sun-oriented exterior courtyard, terrace, or balcony with a minimum area of 5 s.f./patient served for 75 percent of all inpatients and 75 percent of qualifying outpatients with a clinical LOS [length of stay] greater than four hours” (GGHC, 2007).

Designated Exterior Spaces

The healthcare facility design should provide for designated exterior spaces for the purpose of nature-centered restoration, rehabilitation, and therapy for the various user groups within the environment of care. Such areas should be free of negative distractions, such as smoke and fumes, noise pollution, strong sunlight, distracting views and activities, insecurity, crowding, and ambiguous design features or art that may be interpreted in multiple ways.

“Places of Respite is a quality of life issue that has proven economic benefits to its users, including shorter patient stays, reduced staff turnover, and improved staff longevity.” (Waxman, et.al., 1994)

The defined area designated as Outdoor Places of Respite should be 5 percent of the net usable program area, specifically programmed and with direct connection to the natural environment *and* an additional 2 percent of the net usable program area as outdoor places of respite dedicated for staff (GGHC, 2007).

“By reducing stress, places of respite have been shown to improve health outcomes” (Whitehouse, 2001).

Conclusion: Health Outcomes

Potential advantages derived from interaction with natural environments in healthcare facilities are exhibited in patient, family and staff satisfaction and, in some patient categories, a shorter length of stay. Examples of reduced pain medication requirements, increased patient mobility and independence, and a notably higher patient satisfaction with the both the facility and the healthcare provider are evidence. These potential benefits are further amplified in increased job satisfaction among staff, which enhances the healthcare organization's ability to attract and retain desired physicians and staff.

Where nature exemplifies life-affirming occurrences and sequences of life events, evidence-based design research suggests that contact with nature often supports, enhances, and encourages the healing process within the environment of care.

“By fostering patients' ability to cope with stress and promoting restoration from stress, gardens potentially can improve various health outcomes” (Ulrich, 1999).

Bibliography

- Cooper Marcus, C. and Barnes, M. 1999. *Healing Gardens: Therapeutic benefits and design recommendations*. New York: Wiley
- Cooper Marcus, C. and Barnes, M. 1995. *Gardens in Healthcare Facilities: Uses, Therapeutic Benefits, and Design Recommendations*. Martinez, CA: The Center for Health Design.
- Gerlach-Spriggs, N., Kaufman, R., and Wagner, S. Jr. 1997. *Restorative Gardens: The healing landscape*. New Haven and London: Yale University Press.
- Guenther, R. 2003. The Green Guide for Health Care: A Tool for High-Performance Healing Environments. In *Green Healthcare Institutions – Health, Environment, and Economics, Workshop Summary, Institute of Medicine of the National Academies*. Washington D. C., The National Academies Press.
- Paine, R. and Francis, C. Hospital Outdoor Spaces. 1990. In Cooper Marcus, C. and Francis, C. (Eds) *People Places: Design Guidelines for Urban Open Space*, 263-288. New York: Van Nostrand Reinhold.
- Tyson, M. 1998. *The Healing Landscape: Therapeutic outdoor environments*. New York: McGraw-Hill.
- Ulrich, R. S. 1999. Effects of Gardens on Health Outcomes: Theory and research. In Cooper Marcus, C. and Barnes, M. (Eds) *Healing Gardens; Therapeutic Benefits and Design Recommendations*. New York: Wiley.
- Westphal, J.M. 2000. Hype, Hyperbole, and Health: Therapeutic site design: In Benson, J. F. and Rowe, M.H. (Eds) *Urban Lifestyles: Spaces, Places People*. Rotterdam: A.A. Balkema.

References

- 2006 AIA Guidelines for Hospitals and Health Care Facilities, The American Institute of Architects.
- Berry, L. L., Parker, D., Coile, R. C., Hamilton, K. D., O'Neill, D. D., and Sadler, B. L., 2001. The Business Case for Better Buildings. *Frontiers of Health Services Management*, 21 (1).

Carpman, J. R., Grant, M., and Simmons, D. A. 1984. No More Mazes: Research about design for wayfinding in hospitals. Ann Arbor, MI: The University of Michigan Hospitals.

Green Guide for Health Care (GGHC), Version 2.2, 2007.

Hamilton, D. Kirk. 2003. The Four Levels of Evidence-Based Practice. *Healthcare Design*, November.

Kellert, S.R. and Wilson, E.O., Eds. 1993. The Biophilia Hypothesis. Washington D.C.: Island Press.

Lewy, A. J., Bauer, V. K., Cutler, N. L., Sack, R. L., Ahmed, S., Thomas, K. H., et al. (1998). Morning vs Evening Light treatment of Patients with Winter Depression. *Archives of General Psychiatry*, 55 (10): 890-896.

Mack, L. 2001. New Woodbury Hospital Uses Natural Ambiance to Assist the Healing Process: Woodwinds Is an Example of Push to Make Facilities Patient Friendly. *Minneapolis Star-Tribune*, July 30, C1-2.

MacRae, S. 1997. Consumer Perceptions of the Healthcare Environment: An Investigation to Determine What Matters. Martinez, CA and Cambridge, MA: The Center for Health Design and The Picker Institute.

Parsons, R., & Hartig, T. 2000. Environmental Psychophysiology. In Cacioppo, J. T. and Tassinary, L. G. (Eds.) *Handbook of Psychophysiology* (2nd ed.). New York: Cambridge University Press, pp. 815-846.

Tyson, G. A., Lambert, G., & Beattie, L. 2002. The Impact of Ward Design on The Behavior, Occupational Satisfaction and Well-Being of Psychiatric Nurses. *International Journal of Mental Health Nursing*, 11(2), 94-102.

Ulrich, R. S. (1984). View Through a Window May Influence Recovery from Surgery. *Science*, 224 (4647), 420-421.

Ulrich, R. S. (1993). Biophilia, Biophobia, and Natural Landscapes. In Kellert, S.R. and Wilson, E.O. (Eds.) *The Biophilia Hypothesis*. Washington, DC: Island Press.

Ulrich, R. S. 1999. Effects of Gardens on Health Outcomes: Theory and Research. In Cooper Marcus, C. and Barnes, M. (Eds). *Healing Gardens' Therapeutic Benefits and Design Recommendations*. New York: Wiley.

Ulrich, R. S. 1992. How Design Impacts Wellness. *Healthcare Forum Journal*, 20, 20-25.

Ulrich, R., Quan, X., Zimring, C., Joseph, A., Choudhary, R. 2004. The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity. Concord, CA: The Center for Health Design.

Waxman, H. M., E. A. Carner, and G. Berkenstock. 1984. Job Turnover and Job Satisfaction Among Nursing Home Aides. *The Gerontologist*, 24, 503-509.

Whitehouse, s., Varni, J. W., Seid, M., Cooper Marcus, C., Ensberg, M.J., Jacobs, J. R., et al. 2001. Evaluating a Children's Hospital Garden Environment: Utilization and consumer satisfaction. *Journal of Environmental Psychology*, 21(3), 301-314.

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With 20 years of professional experience and holding degrees in Botany, Architecture and Landscape Architecture, Jerry is also a contributing essayist to Sustainable Healthcare Architecture is on the faculty of the School of the Chicago Botanic Garden, a lecturer at the Knowlton School of Architecture at The Ohio State University and presented nationally on sustainable healthcare environments.