Places of healing

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> *The main purpose of the building is to function as a medical instrument.*
> Alvar Aalto, *Between Humanism and Materialism*

So said the famous Finnish architect Alvar Aalto, whose revolutionary views on hospital design culminated in the acclaimed Paimio Sanatorium in his homeland. Aalto was one of the first architects of the modern era to study the patient's environment and its contribution to healing. Over time, it has become increasingly clear that optimal design of medical architecture can have a profound impact on patient health and recovery.

The Paimio Sanatorium was designed with patient healing at the forefront. Through the conscious use of colour, space, lighting, and furniture, this hospital was, in a sense, a medical instrument.[1] For example, since sunbathing was a common remedy for tuberculosis at the time, patient wings and terraces were designed to receive maximum sunlight.[2] Hand-washing basins were designed such that water would run quietly, minimizing disruptions to the patient's rest. Artificial light sources in the room were placed so as not to be in the patient's field of vision. Colours were chosen strategically. Aalto explained:

> Physical and psychological reactions by patients provided good pointers for ordinary housing. If we proceed from technical functionalism, we shall discover that a great many things in our present architecture are dysfunctional.[3]

He further stressed the need to emphasize the patient perspective: "The ordinary room is a room for a vertical person: a patient's room is a room for a horizontal human being, and colours, lighting, heating, and so on must be designed with this in mind."[3]

Ancient inspiration

Twentieth century architects such as Aalto, Frank Lloyd Wright, and their contemporaries took inspiration from the ancient Greeks, who believed in the power of healing places. In ancient Greece, there were healing temples known as *asclepieions,* named after Asclepius, the Greek god of medicine.[4] Sick individuals traveled from afar to receive treatment at asclepieions. In ancient Greek medicine, therapeutic interventions that attempted to aid the natural healing properties of the human body were valued. The inherent healing properties of the temples were thought to aid the medical therapy, baths, dietary treatments, and rituals that took place there. These shrines were often constructed in wooded locations with nearby springs. The sacred land was separated from outside spaces by stones or a walled enclosure called a *temenos*.[4] Buildings usually faced east (toward the rising sun) and were slightly raised above the ground. Elaborate heated baths were constructed to function as saunas for therapeutic effect. Some temples had separate quarters for visitors to spend the night. Sleep at the temple was known as *incubation* (or *temple sleep*) and was believed to be especially vitalizing; it was said to result in dream visitations from Asclepius. The many successful treatments that were carried out at these Greek temples are still documented in the Asclepieion at Epidaurus.

Indeed, ancient cultures throughout the world believed in such places of healing. *Vastu shastra* is the ancient Indian science of architecture, consisting of design principles that are believed to lead to good health.[5] Writings detail topics such as the ideal direction for bodily alignment during sleep and the ideal direction for the main entrance of one's residence. These writings also include the first glimpses of organic architecture, providing guidelines on how towns and kingdoms should be harmoniously designed alongside bodies of water and gardens. Proximity to gardens was believed to have a beneficial effect on physical and mental health. The sun also played a key role in *vastu shastra*.[6] The first rays of the sun are received from the northeast, and then sunlight passes through the south and finally sets in the west. Communities were designed such that quarters requiring natural light throughout the day (kitchen, living room) were in the southeast, while those requiring little use at midday (bedroom, dining area) were in the west. Cities were designed to avoid tall structures in the northeast in order to provide adequate sunlight for city residents.[7] Furthermore, direct sunlight may inactivate certain types of bacteria,[8,9] and this could help provide safer sources of drinking water in appropriately designed communities, perhaps explaining why *vastu shastra* recommended locating water pools in a northeastern direction.

These ancient principles are incorporated in various monuments and temples of old, including the Angkor Wat complex in Cambodia, once a Hindu temple.

Originating in ancient China, *feng shui* guides architecture and environmental design based on the concept of *qi* or life force. *Feng shui* states that cultivating *qi* in homes and buildings benefits health.[10] *Feng shui* often suggests "cures" such as the deliberate and specific placement of mirrors, plants, or sculptures in order to correct the flow of *qi*. Mirrors are said to double the energy of what they reflect, and thus emphasis is placed on reflections of natural light or pleasing spaces. A mirror should never face

one's bed at night owing to distracting reflections just before falling asleep.[10]

Contemporary views

A more recent example of the effect of design on healing comes from the work of Roger Ulrich, published in a 1984 issue of *Science*.[11] Ulrich's famous study showed the effect that the view from a window can have on patient healing. The research examined the recovery time of patients after cholecystectomy over nearly a decade at a Pennsylvania hospital.[11] The intervention group had windows with a view of nature. The control group, placed in similar rooms, had a view of a brick building (a "featureless brick wall").

Patients assigned to the nature view had shorter hospital stays and did not require as much pain medication. Additionally, the patients with the nature view had fewer minor postsurgical complications. There may also be a correlation to overall patient attitude, as these patients had fewer negative comments from nursing staff in their evaluations. Ulrich theorized that such natural views may reduce overall stress and agitation in patients.[11]

Further, a 2012 review in *Building and Environment* examined the impact of physical environment on both patients and health care staff.[12] The authors found that a building's environment can contribute to, or prevent, poor health care outcomes. Helpful design features included single-patient rooms, identical rooms, and appropriate lighting. The study also notes that from a financial perspective such healing environments are sound health care investments owing to improved efficiency and patient outcomes.[12] The authors speculated that giving the patient some level of control over their environment (eg, bed position and height, control over light sources, and so on) has beneficial outcomes owing to the principles of environmental psychology. Additional findings were that certain types of art (eg, natural landscapes) can reduce stress and usage of pain medication,[13] and that the incidence of hallucinations and delusions is doubled in windowless rooms compared with rooms with a window.[14]

Further studies have confirmed such effects. Specific changes were made to room design at the Penn Medicine Princeton Medical Center in Plainsboro, NJ, such as making the rooms single rather than double occupancy, providing a window with natural light and an outdoor view, offering more room for visitors, and having easily accessible sinks for hand washing.[15,16] Patient satisfaction increased from the 61st percentile to the 99th percentile. Patients asked for 30% less pain medication, and they rated the nursing care and food quality higher than patients in regular rooms did, even though both the care and the food were identical.[16]

Franklin noted that a mere handful of minutes looking at natural views such as trees, greenery, or natural water can bring about physiologic changes that reduce blood pressure and muscle tension, and contribute to reducing "anger, anxiety and pain."[17] Heart surgery patients in the intensive care unit were randomized to a view of a nature photograph, abstract paintings, or blank surfaces, and patients with the water and tree photograph had less anxiety and required less pain medication compared with those patients with the other views. The author theorizes that humans are, from an evolutionary perspective, responding to trees and water as they would an oasis in the harsh wilderness—a sign of a safe retreat. Additional studies have also shown positive effects of nature and outdoor views on the recovery of patients in intensive care.[18]

A 2013 study reviewed the financial implications behind such design.[19] It looked at the cost benefit of addition and maintenance of various outdoor spaces and features in assisted living facilities. It concluded that benefits were clear: such improvements led to increased well-being and satisfaction. Cost benefits were accomplished via increased word-of-mouth referrals, admittedly in an American health care system.[19] A study by Berry et al showed that buildings centred on these healing principles resulted in "substantial, measurable, and sustainable financial benefits."[20] In a 2019 review in the *Journal of General Internal Medicine,* physician-architect Dr Diana Anderson argued that "for some, in the absence of a medical cure or transformative treatments, design might supersede drugs."[21]

Closer to home

In my own practice, patient complaints about hospitals and care facilities are common. Most recently, an elderly man and his wife stand out in my memory. Their health had deteriorated unexpectedly, and they had had to move to a long-term care facility. Their voiced grievances were never about medications or procedures. Rather, they missed their home. They wished for privacy, a better view, a better sleeping environment, and more independence.

In our practices, we should be cognizant of patient privacy and independence, access to nature, light and noise levels that are conducive to the circadian rhythm, optimized ventilation, and access to a window with a view of nature. If modern medicine has forgotten this, it has done so at the cost of patient health and wellness. Clinics and hospitals can and should be places of healing.

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Competing interests
None declared

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