

Evidence Based Design: Architecture as medicine?

Proceedings of an international symposium held at the University Medical Center Groningen, The Netherlands, November 22, 2003.

Edited and with an introduction by Cor Wagenaar



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The new building of the University Medical Center Groningen radiates a pleasant semi-urban atmosphere that is highly appreciated by patients, visitors and staff.

Background

Cor Wagenaar & Agnes van den Berg

In 1997 the University Hospital Groningen officially opened its new building. More than a decade of reconstruction work preceded the festivities, some of the best hospital architects had worked on this project for almost thirty years. One of The Netherlands' largest hospitals, the new building radiates a pleasant, semi-urban atmosphere, a major achievement in a building this size. Two covered streets give access to the outward patient departments, each of which has been individually designed. Numerous shops, a supermarket, and a travel agency line the street that combine the two major lanes and the large hall with the building's main entrance. Designing these (semi-) public spaces has been the work of Wytze Patijn, the actual hospital was created according to the plans by Kruisheer and Team 4 (Kleinjan).



The new building of what is now known as the University Medical Center Groningen (UMCG) demonstrates that the Board of Directors believe that architecture really matters. This belief also triggered the project 'The Architecture of Hospitals'. The aim of this project is to bring the architecture of hospitals back in the center of the architectural debate. It wants to convince architects of the great artistic and cultural tradition of the hospital as a work of architecture, and healthcare decision makers of the immense importance of architecture as a factor contributing to the hospital's core business: promoting people's physical and mental well-being. The project has been organized by the 'Foundation 200 years University Hospital Groningen'.

The project The Architecture of Hospitals consists of a series of conferences, publications, and other initiatives related to hospital architecture and Evidence Based Design (See the Annex for more information). The main activity is a major international conference on The Architecture of Hospitals, to be held April 13-15, 2005 in Groningen, which is supported by several symposia, preliminary conferences, and workshops. The current publication contains the proceedings of one of these supporting activities, a one-day international symposium held at the University Medical Center Groningen, November 22, 2003, The Netherlands.

the symposium

the symposium aimed to explore the relationships between Evidence Based Design and architecture. The main issue was how social scientists and architects can cooperate in a mutually respectful and fruitful manner. The symposium was chaired by Bert van Meggelen, director of Maatwerk urban projects and cultural planning, The Netherlands. After he opened the symposium, five speakers from different countries addressed the theme of the conference from different perspectives.

Roger Ulrich from Texas A&M University, USA, presented a number of success stories of Evidence Based Design of hospitals. Terry Hartig from Uppsala University, Sweden, discussed the scientific evidence for the health benefits of healing gardens. Agnes van den Berg from Wageningen University and Research Center, The Netherlands, spoke about The Art of Making Places, an integrated approach to town planning developed in the UK which also has relevance to the architecture of hospitals. Wytze Patijn from Kuiper Compagnons, The Netherlands, sketched the dilemma's of integrating the various types of knowledge so that they can be used for a better design of hospitals. Finally, Bas Molenaar from EGM architects, The Netherlands, commented on the presentations and compared the American to the Dutch situation. The symposium was closed a panel discussion on the promises of Evidence Based Design for the future of the architecture of hospitals.

The Proceedings

This volume includes the written presentations by Roger Ulrich, Terry Hartig, Agnes van den Berg, and Wytze Patijn. It is introduced with a discussion of the origins and scope of Evidence Based Design by Cor Wagenaar, architectural historian and lecturer at Delft University, Wageningen. In his introduction, Cor Wagenaar claims that Evidence Based Design can be dated back to the late eighteenth century and operates on the basis of philosophical concepts that originate in the enlightenment and have far-reaching implications for the architecture of hospitals.

Roger Ulrich is the author of the first contribution, a fascinating story on the successes of Evidence Based Design in hospitals. His view is especially noteworthy since Evidence Based Design is seen as originating in his work. The examples he provides are totally convincing - though the question remains how they relate to architecture.

Terry Hartig, author of the second contribution, focuses on restorative benefits of gardens near healthcare settings. His approach is akin to that of Evidence Based Design, and his view on the healing powers of gardens, and, especially, the scientific approach of collecting data in this respect, appears to be critical and positive at the same time.

The next contribution is by Agnes van den Berg, one of The Netherlands' leading experts in environmental psychology. She outlines the concept of The Art of Making Places: a pragmatic approach initiated by architects and planners in the UK who try to define a 'people oriented' approach to town planning. The Art of Making Places respects both the world of science and that of architecture, and urges the designers of public spaces to listen to the people.

Fear that Evidence Based Design might result in 'das tote Leben', Thomas Mann's 'dead life', is expressed by Wytze Patijn. One of the architects of the Groningen University Hospital and responsible for the sequence of public spaces that are the building's most striking feature, Patijn represents a view diametrically opposed to the world of Evidence Based Design. His work exemplifies an attempt to conquer the hospital from outside, using architecture as a tool to introduce 'normality' inside the medical fortress. Evidence Based Design, on the other hand, represents an attempt to 'medicalize' architecture - eventually not only affecting the architecture of hospital, but transforming all architecture into something else, which may indeed resemble Huxley's brave new world. The two approaches are worlds apart, is Patijn's conclusion.



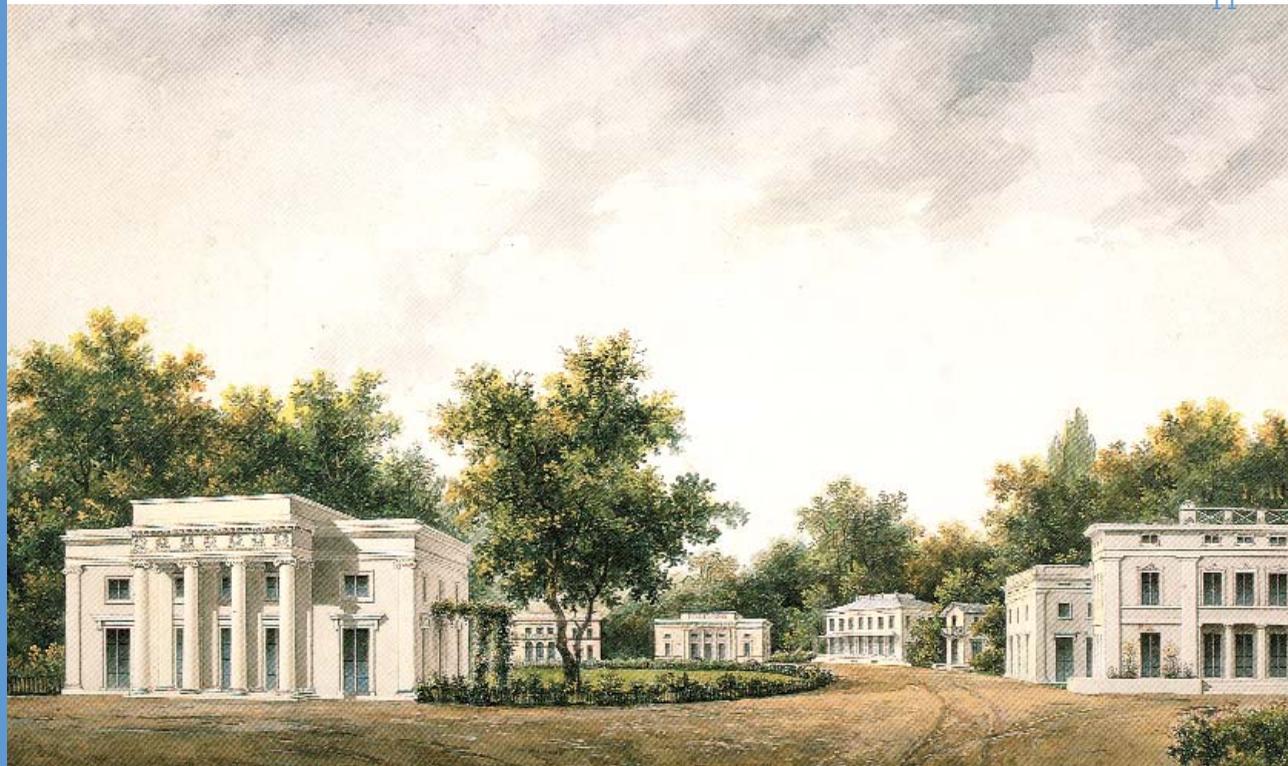
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Evidence Based Design: Architecture as Medicine?

Cor Wagenaar

What does architecture do to people? What does it mean? How does it function? According to advocates of Evidence Based Design it is now possible to answer these questions in a scientifically valid manner. The central thesis of this relatively new trend in healthcare design is that architecture has profound effects on health, well-being, and the costs of medical care which can be empirically demonstrated (Ulrich et al., 2004). In this article, it is argued that Evidence Based Design dates back to the late eighteenth century, and operates on the basis of philosophical concepts that originate in the Enlightenment. These concepts have far-reaching implications that are far more dramatic than the empirical evidence seems to warrant. Even though there is no doubt that Evidence Based Design can be a valuable tool to improve healthcare settings, its implications for the architecture of hospitals should also be taken into account.



The origins of Evidence Based Design

The late eighteenth century is the origin of many things that were later recognized as characteristic for the modern world we still inhabit today. It also saw the evolution of the hospital as a specific type of building, actually the very first building that was determined by its scientifically underpinned function. Not surprisingly, the function of the hospital was that it should contribute to healing the patients that were treated there. But how to treat patients in a world, basically, without medicine? Despite the fact that medicine was already an established discipline, with its own networks of medical provisions in countries like France, the medical profession was not seen as a dominant factor in curing people in the eighteenth century. Improving the environment where people lived was believed to be far more effective. Health was related to the environment, more specifically: the designed environment. It was generally believed that there was ample evidence for this conviction, but when we evaluate this 'evidence' from a modern scientific perspective we find that it was inspired mainly by philosophical considerations. Even so, it is safe to state that Evidence Based Design originated in the late eighteenth century and that, already at that time, it was closely related to the design of hospitals. Remarkably, many of the controversies associated with Evidence Based Design also stem from this period: the way evidence relates to design, the way design is conceived, and the role of nature.

Picturesque & Convenient: an Enlightenment idyll

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One of the most outstanding ideals of the Enlightenment is the identification of Nature as the ruler of the universe, and the conviction that, in principle, there is no distinction between nature and society. If nature reflects natural laws, society should do so to. What could be more fitting than to make society more natural, and nature more social? Inspired by examples from China, the picturesque movement evolved which tried to articulate and reinforce the laws of nature in the design of gardens. In a similar vein, it was believed that society - epitomized by the city - should also testify to universal natural laws. This implied, among other things, that cities should be convenient, well-ordered and beautiful places to live in, and all social layers should feel at home - which explains the introduction of public housing programs. It was feared that if nature or society - cities - would fail to adapt themselves to the laws of nature, they would become unsound places. Obviously, cities ran a much larger risk to become unhealthy than nature itself, which was seen as intrinsically healthy - a belief firmly rooted in antiquity and one of the basic premises of Evidence Based Design today.

Revolutionary hospital designs

The ideals of the Enlightenment had an outspokenly critical, even revolutionary ring to them- it is hardly surprising that, eventually, they inspired the French Revolution. Since eighteenth century

European society evidently did not coincide with natural laws, its transformation was seen as inevitable, even if this implied the forceful overthrow of existing political power structures. But even without these revolutionary aspects, the ideals of the Enlightenment imply the need for modifying society. Society, and most of all the city, should be redesigned. Naturally, what was most ill needed treatment most urgently. The fire in the Paris Hôtel-Dieu in 1772, which raged for eleven days and caused twelve patients to die, highlighted hospitals as the sickest parts of the city, literally. It triggered an avalanche of revolutionary proposals, the common feature of which was the intention to create hospitals that were in full compliance with natural laws. All of these revolutionary designs were based on thorough research by scientists and technicians. They were the first 'revolutionized' social and at the same time natural environments, which led the way to a destination that was seen as the ultimate goal of all historical and social developments. Hospitals were avant-garde, and so was hospital design. Part of the reasons for this exclusive position of hospitals, so unlikely from our twenty-first century perspective, was their Evidence Based Design - though, back then, nobody used these words.

The evolution of species: the end of Arcadia

In 1859, Charles Robert Darwin published *On the Origin of Species by Means of Natural Selection or the Preservation of Favored Races in the Struggle for Life*. Controversial in many ways, his evolution theory also marked the end of the harmonious universe of the Enlightenment. No longer were all phenomena, whether natural or social, seen as part of a great master plan that assigned everything its proper place. Introducing the now familiar mechanisms of the survival of the fittest and the struggle for life, Darwin's views can be regarded as the counterpart of the Enlightenment ideals of the picturesque and the convenient. The universe was an arena where tremendous wars between the species were waged; man was one of the species engaged in these fights. Instead of blending in his natural environment, he could now be seen as its opposite. Even more than his biological characteristics, civilization, his most specific feature, set him apart. Civilization and nature were now seen as different worlds. Man was part of both: he was a biological entity, determined by the evolutionary phase his species had reached, but at the same time he was a creative, civilized being, determined by the history of his culture. Whereas man's properties as a natural being are untouched by his will, his properties as a product of cultural history are largely determined by his own decisions, knowledge and expertise, and in this respect there is no doubt that the distinction between the two worlds is real (Wagenaar, 2004). This distinction is reflected in the scientific world, which can very roughly be divided in sciences that focus on the processes of decision making, and sciences that try to formulate universal laws. Linked to the unprecedented

¹ Well known is Karl Popper's and C.G. Hempel's so-called 'covering law model', that tries to explain historical events by reference to historical laws that work in pretty much the same way as the natural laws in physics (Ankersmit, 1984) .

progress in physics and technology, the latter are often seen as far superior, which explains the attempts to expand their domain to include cultural and historical phenomena¹.

What are the implications of Darwin's ideas for Evidence Based Design? Darwin's work fostered the notion that civilization is a negative phenomenon that prevents man from living in harmony with nature, and therefore should be abolished - an extreme position that can be traced back to, among others, J.J. Rousseau. The belief that civilization hurts people quickly found its way into the precursors of psychiatry and psychology: George Beard, for instance, claimed that since history unrolled at an ever increasing pace, the gap between nature and society also increased rapidly. Those who suffered most were those who were most civilized. Since they usually belonged to the wealthier social layers, Beard paved the way for the rise of the 'sanatorium' as luxurious, hotel-like place where rich people could voluntarily be treated against the consequences of neurasthenia. As we shall explain, the belief that civilization prevents health, both physical and mental, is very much alive today, and integrated in some brands of Evidence Based Design.

Precursors of Evidence Based Design healthcare architecture

After the revolutionary ferment of the eighteenth century had calmed down, the urge to realize the ground breaking hospital designs that had been inspired by it disappeared. The ideas, however, never lost their appeal. In the mid-nineteenth century the first hospitals that were guided by the principles of the Enlightenment were built. Famous for its pioneering qualities in this respect was M.P Gauthier's Lariboisière. Designed and built between 1839 and 1854, it became the model for an avalanche of pavilion hospitals. This can be considered the first wave of Evidence Based Design buildings, albeit that the 'evidence' was still of a philosophical rather than an empirical basis. The environmental qualities were seen as essential: these buildings were designed to let nature do its work. This was the main principle not only of hospitals, but of mental clinics as well. Continuing the tradition of the *picturesque* and the *convenient*, many of these buildings manifested a modest, neo-classical style, neo-classicism being seen as representative for the same universal qualities that were believed to be inherent in the laws of nature. One of the outstanding examples is La Charenton, opened in 1838 and designed by G.E. Gilbert; on the outskirts of Paris, overlooking the Marne, La Charenton is still in use today, as impressive as it ever was.

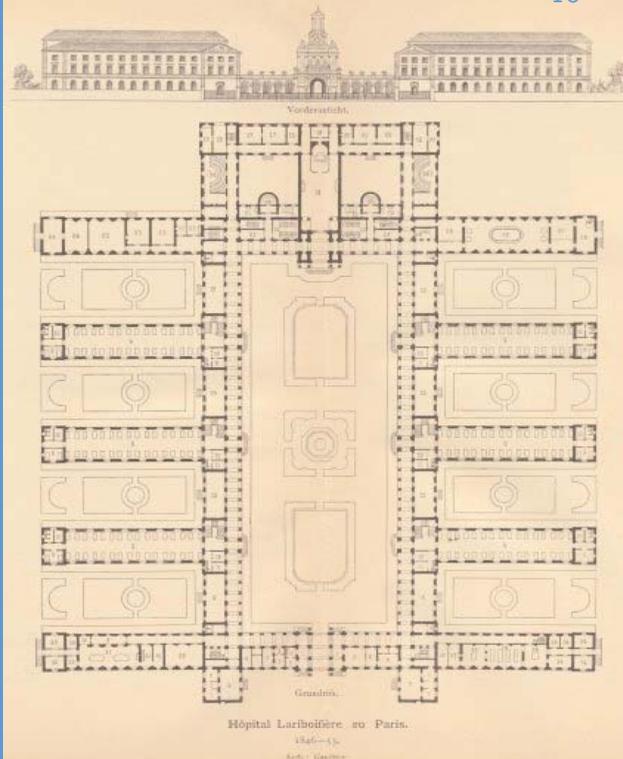
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Evidence Based Design

Until the beginning of the twentieth century, the architecture of hospitals was partly determined by the ideals that sprang up in the wake of the Enlightenment. A natural setting and the provision of clean air were seen as essential, and apart from that the hospital still figured as an important public building that should be designed by the best architects. Then this tradition broke off. A revolution in medicine and technology combined with the emergence of the International Style and transformed

the hospital into a functional, medical machine. Their environmental qualities were usually neglected. One of the achievements of Evidence Based Design is that it restored these qualities to their original preeminence.

Remarkably, Evidence Based Design did not develop as a specialization of architecture. In fact, it stems from a totally different context, one in which history, culture, and therefore architecture seem to be completely lacking. Evidence Based Design originates in environmental psychology and its evolution is intimately linked to the work of Roger Ulrich, an economist and geographer who is currently a professor of architecture at Texas A&M University. The term Evidence Based Design clearly refers to Evidence Based Medicine, and suggests the use of rigorous research methods that fulfill the criteria of medical research. What sets Evidence Based Design apart from its precursors is the ambition to measure the effects of the environment on the people who are exposed to it. Empiricism has replaced philosophy. Although in principle all types of buildings provide valuable research data, Evidence Based Design focuses on healthcare facilities, predominantly hospitals. Apparently, the environmental qualities of these buildings are considered to be particularly valuable since they might have an impact on the healing processes of the patients - a fascination that is reminiscent of the late eighteenth century. As a research category, hospital



patients are especially interesting since they are already subject to various types of examination that, naturally, provide additional data to the ones collected in human-environment studies: the types and quantities of medicine patients take, the time they have to spend in hospital. These are hard facts, easy to collect and not likely to be misinterpreted. These hard facts are complemented by personal, subjective data: does the patient suffer from stress, how does he evaluate the room he is in, what does he feel about the paintings on the wall, would he prefer to see a natural scenery from his bedroom window or is an urban view also acceptable. Obviously, this type of research did not exist in the eighteenth and nineteenth centuries, and only since the 1980s such data have been collected in a systematic, scientific way.

Scope

How does Evidence Based Design collect its data? Design can mean many things, but whatever its precise definition, the term always refers to environmental aspects. If the effects of environmental qualities can be measured, this is taken to mean that there is evidence that this effect is really there. Most tests are comparative. Groups of patients who are in multiple bedrooms are compared to patients with a similar medical record, but who spend their time in single bedrooms. In the same way, the effects of rooms with or without a view on nature are being compared. Even the effects of paintings on the bedroom walls has been evaluated: what are the effects of abstract painting relative to the impact of paintings depicting natural scenery? Remarkably, the impact of color is almost neglected, though precisely in this field a lot can be gained by referring to existing, groundbreaking research (Coryell, 2003; Nemcsics, 1993). Most of the research focuses on stress: do specific environmental qualities increase stress, or do they help to calm patients? (Ulrich, 1992)

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As Evidence Based Design developed and gained ground, all effects that could be attributed to environmental causes were accepted as evidence, and psychology became less important. Ultimately, everything that can be brought under the magic formula that relates specific environmental qualities to effects that are believed to stem from them are being integrated in Evidence Based Design. These effects can be manifold: apart from 'health outcomes' they include the prevention of injuries (by falling out of bed, for instance), reduction of infections, lower levels of medical errors, and better acoustics. The scope of environmental determinants has also expanded. Studies by Kirk Hamilton, a renowned architect who has recently joined the Center for Health Systems and Design at Texas A&M University, provide extremely useful strategies for mapping the aspirations and the functional needs of the hospital staff, enabling the architect to define a tailor made program (Hamilton, 1993, 1999, 2000). As Evidence Based Design covers wider fields, it develops into a discipline that sets out to provide the tools for improving the environmental

qualities of healthcare architecture, irrespective of the nature of the proposed interventions and the type of evidence that justify them. This field is already crowded: architects, town planners, specialists in healthcare programming, private or state-sponsored research institutes, the state agencies that define the (financial) framework of hospital design. What distinguishes Evidence Based Design is that it always relates environmental qualities to the people who are affected by them, most importantly the patients.

Man as nature

Evidence Based Design is not interested in people's opinions. Instead of mapping people's ideas and views, it concentrates on their 'primary reactions'. These 'primary' reactions are seen as hard, objective data. They deal with the primary facts of life, life and death, fear, stress, survival. When patients are critically ill and taken to hospital, they have to face the worst scenario. In a way, that reduces them to mere biological entities, representative only of their evolutionary state and bereft of everything that is determined by culture, education, social class. Some promoters of Evidence Based Design welcome this reduced state as exemplifying man in his pure, natural state, implying that culture denaturalizes him. As pointed out before, the denaturalizing qualities of civilization were already identified in the late eighteenth century, and the assumption that evolution determines people's 'natural' state is firmly rooted in the work of Darwin. So is the assessment that attempts to 'naturalize' society and 'socialize' nature can only be futile, since civilization and nature belong to different, incompatible worlds. This view inescapably leads to the conclusion that in order to live naturally, all culture should be discarded if not abolished, an extreme position that correlates with the presumption that whatever data can be collected on man's primary, natural responses should provide the guidelines for a complete reconstruction of society at large.

Architecture or design?

Concentrating on the physiological and psychological effects of specific design solutions for equally specific aspects of hospital buildings, Evidence Based Design pays no attention to the meaning invested in architecture, the symbolic nature it sometimes possesses, the intentions of the styles that were preferred, the social, political and cultural associations evoked by these styles, the patterns of movement that the built environment induces: in short: everything that designates architecture as a historical and cultural phenomenon. If anything is bound to provoke the most intense emotional reactions, however, the historical associations of cities and buildings do. Architecture and town planning demonstrate the evolution of society, the emergence and disappearance of political regimes, progress in science and technology, economic prosperity and

decline, appealing visions of tomorrow's society as a common destiny that promises happiness.²

Architecture and town planning often act as linguistic tools, captivating the minds of people - Evidence Based Design not only chooses to ignore this fundamental function, apparently, it would rather abolish it altogether. This is in no way unique. In a way, this purification was already part of the architectural program of early modernism, and one may even argue that in the United States, 'natural' architecture, rooted in the Enlightenment, has a tradition that goes back to Jefferson; to immigrants from Europe, architecture devoid of historical meaning may well have been a sign of liberation and hope. Even so, stripping architecture of this layer would imply the end of a discipline that dates back to the beginning of history; what would be left is design - and that probably explains why that is the term used to distinguish Evidence Based Design from architecture in the first place. Should one consider this as inherent in Evidence Based Design, or rather as typical for the early stages of its development? It is too soon to tell, but what is certain is that in recent years a number of outstanding architects have shown an increasing interest in Evidence Based Design without contemplating the destruction of their discipline. They may very well succeed in ushering Evidence Based Design in a next phase, where part of its philosophical clarity may be lost, but the gap with contemporary architectural culture would be healed.

Conceptualizing architectural spaces

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Even apart from architecture's cultural aspects, Evidence Based Design could gain a lot by using the architect's language in identifying spaces. Even the simplest room is necessarily complex: it is not possible to design an enclosed space without color, without a door that gives access to it, without lighting, whether natural or electric, and when a room has window, it will inevitably be a window with a view. Making a room implies the use of materials: natural ones like stone and wood, or synthetic ones like concrete or brick. There are no rooms without acoustic characteristics, and they are determined by many factors. Rooms without furniture won't do; the interior design can either be part of the architecture, or the work of specialist interior designers. Four walls, a ceiling, a floor and some chairs and tables, and already this very simple room is not so simple after all. Whereas architecture has developed a vocabulary to deal with these matters, Evidence Based Design has not. 'Certain environmental characteristics' are being compared, and usually only one aspect is singled out, neglecting all the others. That, of course, entails another problem: is it at all possible to make valid judgments if they are based on only one aspect of the multitude of factors that characterize even the least complicated architectural spaces? What if, for instance, not only the view from the window is different but also the window itself, the color of the walls?

² An anthology of 'happy' architectural and town planning imagery is compiled in C. Wagenaar (2004)



Alvar aalto, Tuberculosis Sanatorium and Paimia, 1929-1933

Evidence Based Design and the reform of healthcare architecture

There is widespread consensus on the failing qualities of most healthcare facilities. Can Evidence Based Design help to mitigate the negative feelings so often provoked by hospital buildings? There is no doubt that this innovative trend can do its part, but can it be the single most important factor in forging necessary changes? Addressing this question implies a clear view on what it is that endows hospitals with their negative aura. In part, this negative aura stems from the fact that hospitals are necessarily associated with diseases and injuries. It is hard to see how that can change - after all, dealing with these distressful phenomena is what the hospital has been created for³. What can be particularly distressing about hospital architecture is its institutional character. Illness and injuries are, obviously, private affairs, hospitals, on the other hand, are large-scale, collective buildings that are not designed to respect patients' privacy. Hospitals have become big operations not because of their function, but rather because they represent institutionalized healthcare. If one were to design a hospital on purely functional grounds, it would probably hardly resemble the buildings we now know. The most radical and effective way to improve hospital architecture, therefore, would be to liberate it from its institutional setting. That would not be a design issue, but primarily a task for the managers who control healthcare. Since they represent these institutions, however, they have become the least likely candidates to initiate such a revolutionary program.

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If a managerial revolution can be seen as the most efficient strategy to improve healthcare architecture, however unlikely it may be that it will ever happen, the second most efficient tool to revolutionize hospital architecture would be architecture, if only because it encompasses all aspects of design, from the highest level to the smallest detail. There is no doubt that architecture can profit from Evidence Based Design, but it is equally clear that Evidence Based Design alone cannot make the difference that is so desperately needed.

³One of the strategies to overcome at least part of these less pleasant associations would be to transform hospitals into veritable wellness centers reminiscent of the classical nineteenth-century spas. This strategy is already put into practice, for instance by some German hospitals. Since the facilities helping patients to revalidate already show similarities with wellness and fitness centers, the outlines of this transformation are already there.

Architecture as medicine?

Evidence Based Design constitutes one of the most fascinating trends in the design of hospitals. It gives access to a whole new field of research that is bound to inspire new solutions to problems that until recently were hard to grasp. It opens prospects of a pristine, crystal clear universe, untainted by the stains of history, resulting in an environment that fulfils basic human needs without blurring them by the ephemeral symbols determined by rapidly changing political and economic trends. Contrary to the eighteenth-century movements of the picturesque and the convenient, this environment is conceived of as purely natural, albeit man-made, answering only to man's natural needs and liberating cities and villages from the burden of modern culture. A world where not only hospitals are healing places, but eventually all that is being built contributes to man's well-being. What a glorious perspective, what a revolutionary view - but is it really valid? How hard is the evidence? Isn't this ideal inspired by philosophical positions as much as by empirical data? What does it mean to strip society of history? Where would it leave us? Would we see what Hans Castorp, the hero of Thomas Mann's *Magic Mountain*, saw in the final scenes of this great novel? 'Hans Castorp looked around. He saw something scary, evil, and he knew what it was: Life without time, life without worries nor hopes, life as stagnant, busy debauchery, dead life.'⁴ If Evidence Based Design wants to contribute to hospital as a vital part of society, it definitely needs architecture.

⁴Hans Castorp blickte ums sich... Er sah durchaus Unheimliches, Bösartiges, und er wußte, was er sah: Das Leben ohne Zeit, das sorg- und hoffnungslose Leben, das Leben als stagnierende betriebsame Liederlichkeit, das tote Leben.' Thomas Mann, *Der Zauberberg*, Frankfurt am Main 2001 (first published in 1924), p. 863.



Architecture Heals

Roger Ulrich

Evidence Based Design

Health care systems all over the world are facing the same challenges and the similarities across systems tend to be far more impressive than the differences. Evidence Based Design is one of these challenges. Does healthcare architecture really affect medical outcomes? Is there scientific evidence to make Evidence Based Design of health care buildings realistic? Is Evidence Based Medicine beginning to have its counterpart in architecture? The international medical journal The Lancet emphatically says YES. What are some of the key research findings in this area? And what are the implications for creating better hospitals? What medical and economic outcomes can be improved through evidenced based design? Can patients' safety be enhanced, can medical errors be reduced, can pain be lessened? These and other question imply my main objectives in this lecture, which is to review some of the major research findings on how the hospital's physical environment affects outcomes. At the end I will touch on economic implications of evidence based hospital architecture.

American health care architecture is without questioning experiencing an exciting new age, to a point where many hospitals are now regarded as outstanding design achievements by any standard. And, in fact, graduated students are being attracted to the field as an area of, yes, science, but also one of very high design. What an extraordinary change in ten or fifteen years. And this extends well beyond the facades of the American hospital. A more profound evidenced based revolution is occurring in the interior architecture of hospitals. And these internal developments matter most in terms of having strong effects on issues of great importance to physicians and healthcare administrators, politicians, civil servants and the healthcare consuming public. Issues such as medical safety and errors, patient satisfaction with care, the economic costs of care. My comments today will largely focus on these internal architectural developments, not on the exterior architectural face. I am going to talk about hospital architecture, but it is a series of comments intended less for those of you who are architects, than for those of you who are medical administrators, physicians or civil servants.

What are medical outcomes? These are a variety of indicators of the quality of care. There are many types; some are clinical indicators, which are observable, measurable symptoms of a patient's condition: the length of stay, the number of drugs taken for pain. Another important category of outcomes are medical errors, or patients safety. A very political and publicly charged set of outcomes. And finally the all important economic outcomes. Including the cost of patient

care, or for example costs associated with staff turnover. What is Evidence Based Design? I am often credited as the originator of this, but there is no universally shared definition at the present time, and there are a lot of definitions being offered in the literature currently. But they do agree that the goal of Evidence Based Design, or EBD, as I abbreviated it, is to create healthcare buildings that improve outcomes. Kirk Hamilton, a scholar as well as an architect, has written a lot recently about Evidence Based Design from the perspective of the architect practitioner. According to Hamilton, EBD refers both to the process of creating buildings using the best available research evidence in order to improve outcomes, and to the product of this process - in our case a hospital. According to Hamilton and other architects who are practitioners of EBD, the parallel between Evidence Based architecture and Evidence Based Medicine implies that the end of the process is not the product per se, but its assessments and evaluation. Just as when a drug is developed: it must be evaluated. So, according to Hamilton, measurements, assessments and dissemination of that knowledge should be a fundamental part of Evidence Based Design.

What is the overall state of scientific knowledge? I am referring to hard science that has appeared in medical journals or international scientific journals. It is limited, but there is clearly some. And it is growing very rapidly at the present time. Roughly speaking, in my judgement there are about a 135 to 160 studies. Even initially sceptical medical researchers at Johns Hopkins concluded that about 75 percent of the most rigorous scientific studies in the area of Evidence Based Design have reported positive findings. That means that they have found a significant relationship between a change in the architectural features of a hospital, and one or more health outcomes. That is an impressively high success rate for medical research, considering that the usual success rate is only about 30 percent. So Johns Hopkins concluded: something is going on here! The environment really does matter and much more attention should be devoted to it. Those people were not architects, they were scientifically hard nosed researchers.

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Let me list some outcomes that have been shown by research to be influenced by Evidence Based Design. In some cases there are only three studies, in other cases more than ten. Studies analyzing patient satisfaction, for instance, make clear that this is indeed effected by architecture. There is simply no doubt about it. However we still have a great deal to learn, we have a very long way to go. There are other important outcomes that show the effect of what architects do. Patient transfers, moving them from one room to another cost a lot of money and you want to reduce them. Transfers are also dangerous, they are associated with alarmingly high rates of medical errors. How do you reduce transfers and thereby reduce medical errors? The quality of communication from the staff to the patient is centrally important in affecting patient satisfaction and also a variety of outcomes. It turns out that the architect is arguably more important than the

administrator, who is creating the organizational culture in terms of affecting the quality of communication from staff to the patient. Patient's confidentiality, the privacy of information, is also very strongly affected by architecture.



VIP-patient room at Huntsman Cancer hospital, salt Lake City, Opened july 2004

Single occupancy rooms

What should one do to use EBD in a successful way? First, begin by using the best available evidence to increase safety, reduce infection, injuries, falls and medical errors. Secondly: use the best available evidence to eliminate or reduce sources of environmental stress such as noise that will likely worsen patients outcomes. You can help to improve outcomes by reducing or getting rid of these stressors. Finally and more positively, use the best available knowledge, which is limited but growing, to introduce features that have restorative or stress-reducing effects on patients, family members and staff. Reducing stress will help patients to cope with the burden of stress that accompanies illness and hospitalization. Let's focus on the key example of hospital acquired infections. An international problem to the point where some would say it is a crisis. A number of factors affects hospital acquired infections rates, such as hand washing practices. These could be effected by architects by providing washing facilities. Air quality has long been known to play a major role. What I am going to concentrate on, however, is the growing evidence that single occupancy rooms often have significantly lower infection rates than multiply occupancy rooms. I recognize that this can elicit emotions, sometimes negative ones, in European countries, particularly the United Kingdom, where there is a long tradition of large multi bed wards. I am going to look at this matter as a researcher and analyze the record here as dispassionately as I can and just tell you my assessment of the best state of knowledge.

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What are the implications for choosing single rooms or multi-bedrooms? It has long been known, based on mainly European studies, that having one or more roommates is a very substantial risk factor for example for acquiring diarrhea in the hospital. More recently the greater risk associated with having one or more roommates has been demonstrated for critical care units, general medical surgical units, and neo-natal intensive care units. Single rooms appear to have lower infection rates, other things being equal. Now the great majority of studies on this issue has been done in Europe, where single occupancy rooms have been contrasted in infection rates with multi-bedrooms having four, six or even eight beds, as in the United Kingdom. Little research has compared the American situation where half of the patients stay in two bed rooms, whereas the other half has single occupancy rooms. A recent study by Richard van Enk, infection control officer based at Bronson Methodist Hospital in Kalamazoo in Michigan, demonstrates the positive effects of single occupancy rooms. Van Enk carried out his research as part of the Pebbles Project, which involves 20 different hospitals ranging from MD Andersen Cancer centre, Columbia University Medical Centre to small hospitals in the Mid-West or the North. They have joined together in a national project where they are evaluating the effects on outcomes in a three to six year period associated with new buildings or substantial renovations, where they have taken baseline data from the old structure and then studied what happens in the new building. Van Enk's study is

comprehensive in terms of including nearly all major types of hospital acquired infections. He studied all units in the Hospital and contrasted two years of data in the old building with double rooms and two years of data following the opening of the new building, where the air quality and the staff was essentially the same but where there are only single occupancy rooms. Infection rates in the mother-baby unit dropped. This is even more dramatic for cardiac surgery. The Paediatric Intensive Care and Neonatal Intensive care maintained their multiple occupancy rooms and were the only two units in the new building where infection rates did not decline. Even when those large units are included in the overall data, there was still an overall decline of eleven percent in nosocomio infections. Cutting nosocomio or hospital acquired infections not only improves things in human terms. It reduces risks and saves lives, but it is quite a rational thing to do economically too. It pays for a lot of architecture.

Falls

Here is another problem that is critical, in fact so critical in the United States that in many American hospitals it is the second largest source of expenses. When elderly people, over the age of 75, fall, there is about a 30-40 percent change of mortality during the first year after the fall. Then we have litigation of course, which drives up the cost even more. In the last two or three years, our understanding of how design can substantially reduce falls has made great progress. Some older notions have been turned upside down. Architects and administrators traditionally tackled the problem by providing good grab-bars, better lighting and the right kind of surfaces. When researchers such as Ann Hendrik devised a geography of falls, she noted a wide spread pattern for falls to occur at the edge of the patients bed and to a lesser degree at the door to the toilet. She surmised that falls were occurring when patients got out of bed, often to go to the toilet and were not assisted. Why weren't they assisted? The nurses where to far away, or took to long to respond, there was no family member in the room. The design implications were pretty clear to Hendrik and her colleagues. A new kind of nursing unit was needed that would greatly increase the amount of assistance continually available to patients. What would be the design strategies? Well, don't provide centralized nursing stations, but decentralize them, placing them as close as possible to patients rooms. And above of all, provide single occupancy rooms and make them spacious enough to include a family area. That encourages the ongoing presence of the family. This way, patients would not get up unassisted. This resulted in the very famous 28 room corner Intensive Care Unit at Clarian Hospital in Indianapolis. The nursing stations have been decentralized: one nurse for two rooms, with direct access to both. What are these rooms like? They are very large and have a family area with refrigerator. The family can help to care for the patient, relieving burden from the staff. The size is 36 square meters and that costs a lot, but it saves the money back in less than a year. When these changes were introduced, they alone reduced falls by 65

percents and there is growing recognition that family centered single rooms and decentralized nursing stations have a variety of effects, one being to dramatically cut fall rates. Those of you in Health Care administration or in civil service may fear the cost implications, but they completely dwarf over a period of time.

Noise

Now let's look at design measures to eliminate environmental stressors, such as noise. I have been writing for years now that stress reduction provides a scientifically creditable starting point for understanding how Evidence Based Design can improve a variety of medical outcomes in hospitals (Ulrich, 1992, 1999, 2002). Because after all stress is a pervasive problem among patients and, for that matter, family members and staff. Stress has, when it is acute as it is for many patients, a wide variety of negative effects, emotionally, physically and in the behavior of patients, which directly and indirectly tend to worsen health outcomes. If we can reduce stress, we should observe improvements of a number of health outcomes. This has been the subject of a great deal of research, also in The Netherlands. Of course, architects cannot do much about illness and injury. Then there is the organizational culture that has also been identified as a problem and source of stress: impersonal treatment, lack of information, long waits, bureaucratic processing. And then there is poor architectural design, where the environment might be functionally effective and hygienic, but also surrounds patients with stressors that add to the burden of illness: noise, confusion in way finding, complete lack of control over the environment, loss of privacy, design solutions that prevent families from giving their relatives social support. This is an area that architecture and Evidence Based Design can do a great deal about.

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Let's focus on noise, for instance. Health care buildings are known internationally to be noisy places for two general reasons. First, noise sources are numerous and they are often unnecessarily loud. Floors and surfaces aggravate the problem because they tend to be hard and sound reflecting rather than sound absorbing. In Britain and the United States, the reverberation time, the time the pulse of noise lasts in the air and echoes, is usually nine tenth of a second up to one and one tenth of a second. That is a really good acoustic condition if you want to listen to live rock music, but if you want to be understood in conversation, it is terrible. This is a cause for concern, because there is growing evidence that noise worsens outcomes, resulting in loss of sleep and increasing blood pressure. For one of my projects, I approached the Swedish firm Eccophone, which makes high performance acoustic products, and asked them to install a slightly suspended ceiling (Hagerman et al., 2005). We changed nothing else except the ceiling tiles. During some weeks the ceiling tiles were low performance sound reflecting. During other weeks they were high performance sound absorbing tiles of visually identical appearance. We did nothing

else. Patients were 94 Swedes, most of them were having heart-attacks, some suffered acute unstable angina. We studied 36 nurses around the clock, 24 hours a day, for some months. In the low performance situation, with sound reflecting ceiling tiles, the reverberation time was somewhat better than in the original condition, but still bad. Eight tenth per second, that is how long a pulse of noise hang in the air. On other weeks, we installed sound absorbing ceiling tiles. This simple, very low cost change, cut reverberation time in half. A reduction of six decibels equates roughly to something like a thirty percent reduction in sound pressure. Here is what we found: during the times when the high performance tile was up, the staff experienced less work pressure, and there was substantially increased social support. This is very important, because social support from work mates is one of the three key factors in promoting and effecting workplace satisfaction for nurses. The nurses felt they were taking better care. They slept better at home. They were less stressed at work and there was better speech and intelligibility. For patients there was also a number of beneficial effects associated with the high performance acoustics. The quality of care was better. They also felt that the nurses communicated much better with them. Sympathetic nervous system activation, a sort of stress response, was lower. Patients reported fewer continuous awakenings at night. Remarkably, already after three months, statistics showed that the number of patients who had been treated under bad acoustic conditions and had to go back to the hospital, often via the emergency department, was significantly higher than the number of those treated under more favorable acoustic conditions. How much does it cost to re-hospitalise a patient by way of the emergency department? A lot. If you can substantially reduce these costs, it doesn't take many patients to pay for better ceiling tiles throughout the whole hospital.



Healing Gardens

Terry Hartig

I would like to share with you some thoughts on gardens in healthcare design. While scientific research on the value of natural settings for health is relatively new, the results are sometimes striking or remarkable in different ways, both positive and negative. Why I think this is so, I will explain at the end of this article. To begin with, let's first consider the term, 'healing garden.' What do we mean by 'garden'? I don't want to spend a lot of time on this point, but I do think we should be clear about what we mean when we speak about gardens. Ordinarily, we define 'garden' in terms of what is present. In the present context we can list the following features as foremost: flowering plants, trees, running water, and walkways, places to sit.

Preserving some conventional contemporary meaning of the word 'garden', it is this presence of natural features that I see as a first necessary characteristic of any place for which the description 'healing garden' might be claimed. The garden is a setting that appears natural, although the fact that people have shaped and maintained it is commonly obvious. Beyond that, it is safely and easily accessible. Perhaps other features could be added, but let's leave it at this. Its natural features and ease of accessibility promote healing.

We might also define 'garden' in terms of what is absent, of what permits healing by its absence. In the present context we could list the following features that somehow don't belong there: noise, and crowds. We have to stop and think, for how many of us does our sense of what a garden is include such features that would somehow detract from our ability to enjoy and reflect on what the elements of nature present to our senses? Here we might also include design features that some might think artistic, aesthetically pleasing, but which others dislike. Why should these be absent to permit healing?

This brings us to consider the next matter of terminology ...What do we mean by 'healing'? Consider these common dictionary definitions: 'To make healthy, whole or sound; restore to health; make free from ailment'. Nothing surprising here. 'To free from evil, cleanse, purify'. Here we get into matters verging on the spiritual. I want to refer to this to acknowledge the possibility that some healing may be confined to a psychological or spiritual plane, as with a person whose physical condition will only continue to decline but who can nonetheless benefit from the garden as a place for contemplation, for reflection, for organizing thoughts and coming to terms with a condition of impaired health or with impending death. How might gardens aid healing? Gardens may support a variety of processes that contribute to healing.

However, the process I want to focus on here is stress recovery, a form of restoration. For present purposes we can use the terms 'restoration' and 'stress recovery' interchangeably. As Roger Ulrich puts it, '... stress is a centrally important mechanism through which gardens potentially can have significant beneficial effects on health outcomes.' Stress commonly is in and of itself an aversive or unpleasant experience. Also, a large body of research has implicated stress, a process of physiological, emotional and behavioral responding to taxing or demanding situations, in a range of health outcomes. These associations between stress and health outcomes involve increasingly well-understood physiological and behavioral pathways, involving for example, neurohormonal and immune function, musculoskeletal activity, and behaviors such as smoking or disturbed sleep. So, as Roger Ulrich has put it in his chapter for the Cooper Marcus and Barnes book on healing gardens: 'There are sound scientific grounds for contending that gardens in healthcare facilities will improve health outcomes to the extent they are effective in fostering restoration and coping with respect to the stress that accompanies illness and hospitalization' (Ulrich, 1999). Here I would add that we can also have a legitimate concern with the stress that precedes entry into the healthcare system, and not only that which 'accompanies illness and hospitalization.'

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When I choose to focus here on restoration, I take up a process that I think contributes to healing, but I do not claim that all benefits of healing gardens have to do with restoration. In sum, in referring here to a 'healing garden,' I am referring to a natural place, a process of psychological restoration, and their intertwining. What evidence do we have that gardens can aid restoration? Consider the varieties of evidence that appear to have some relevance to the restorative values that people attribute to natural environments in general, not only gardens in healthcare facilities. First, consider some of the informal varieties of evidence. For example, the edenic and paradisiacal imagery that we maintain across cultures and within cultures represent peace, tranquility, freedom from worries, and happiness. This echoes also in literary accounts across the centuries. Consider also residential location preferences, that so very many people in urbanized societies try to locate their homes close to places of natural beauty, even when it involves inconveniences of long commutes to work or other services. People commonly show similar choices when traveling away from home, choosing hotel rooms that afford natural scenery. Consider also the efforts to create national and urban parks and community gardens, putting access to their scenic and other amenity values against expensive real estate and competing land use demands. In F.L. Olmsted's famous Central Park in New York, we see evidence of another sort, bearing on both residential location preferences and the desire for urban parks. Look at the height of the buildings, the desire for beautiful views that include both natural and urban features.

What scientific evidence do we have that gardens can aid restoration? Let's now consider the scientific evidence, structured empirical evidence, relevant to the question of whether gardens in healthcare facilities can aid restoration and so promote healing. Here too we can cast a wide net, encompassing research into the restorative or stress reducing effects of natural environments in general, from large wilderness areas to window views. Many studies of what people want from their outdoor recreation activities speak clearly to a desire to escape urban stressors and reduce tension. Many studies report a range of therapeutic benefits, some related to emotional or other psychological difficulties, not only to a physical recovery or healing process.

However, such studies typically have had a difficult time establishing that it is the natural setting per se, and not program activities, the social environment, or characteristics of a therapist that account for any beneficial change measured. Finally, we have an increasing number of laboratory and field experiments that have used a variety of measurement methods - self-reports about emotional states, performance on various cognitive tests, and psychophysiological measures - to compare some natural setting or settings to some other setting, most typically a locally commonplace urban setting.

Interestingly, we have to my knowledge no experimental evidence of restorative or otherwise healing effects of gardens. Though not from an experiment, we do have evidence from Roger Ulrich's well-known case-control type study - of what it might mean for hospital patients confined to their rooms to be able to look out on trees or other natural features instead of some undifferentiated, uniform or homogenous architectural features (Ulrich, 1984). The study concerned the surgical recovery experience of 23 pairs of patients, all of whom had a common form of gall bladder surgery (cholecystectomy), matched on variables such as sex, age, weight, smoking, year of surgery, and, to the extent possible, physician. It appears that the combination of tree views and weak painkillers - acetaminophen - served as well as the combination of wall view and moderate painkillers, like injections of Demerol. To me it is a wonder that this study has not to my knowledge been replicated

However, we have a variety of other studies that deal with the likely process through which window views might have promoted recovery from surgery, and we can also consider these for what they have to say about visual and possibly physical access to gardens in healthcare facilities. These are experiments that have to do with the way in which views of natural features evoke positive feelings, reduce psychophysical arousal, and enhance pain control. 36 Swedish students randomly assigned to a roughly 15-min simulated walk following a 3-hour lecture. A series of slides simulating a walk in a typical Swedish pine forest vs. an urban environment likely to be familiar to all. A seemingly weak intervention, yet the effects were substantial.

The next study also involved a natural vs. urban comparison, but we used field settings rather than simulations (Hartig et al., 2003). Carried out in the Orange County area south of Los Angeles, the environments were locally typical. The 112 university student subjects started at a central location, were equipped with an ambulatory blood pressure monitor, gave a set of reference blood pressure values, then drove to their respective field sites on matched routes. Blood pressure measures were obtained at 10 minute intervals during the drive and subsequently as well. The drive alone served as a stressor for half of the subjects. The other half of the subjects performed a set of cognitive tasks at the field site immediately after the drive. Again the results were striking.

Why are the results remarkable? Even at this late stage, we have few studies that have directly addressed the therapeutic effects of gardens per se. Yet, even without direct tests, the totality of results encourages continued inquiry. Discoveries in public health have indicated environmental interventions, without complete knowledge of the underlying mechanisms. Congruent with a sensitivity to nuances, we encourage a stance of enthusiasm with restraint. We are not promoting a view of the garden as a panacea. Gardens in healthcare facilities may not be therapeutic for all users in the same way, or even for particular individuals at all times. We would do well to keep an open mind about the therapeutic value of gardens relative to other environmental measures that could be used to meet user needs.

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Is there anything that helps decision makers manage the tradeoffs - a garden versus something else, like more personnel, more sound insulation? From a review of Cooper Marcus and Barnes book, by Charlotte Grant in JAPR, summer 2002: 'It is a rare administrator in any health care facility who is not interested in the bottom line. With often-limited budgets, administrators need hard evidence to convince them to put dollars into outdoor space over other areas of need in their facilities'

The Art of Making Places

Agnes van den Berg

What is The Art of Making Places⁵? It is an approach that developed in the area of urban planning and design, not in the medical or hospital world. The aim of this approach, which originates in the U.K., is similar to that of Evidence Based Design: The Art of Making Places is about making livable public spaces (Carmona et al., 2003). Livability is the core of this approach, but also important and typical for this approach is that it focuses on public spaces, spaces that are used by people. It's a people oriented design approach. It was triggered by the notion that many public spaces do not support user's needs (Gehl, 1987). As a consequence, people reject these places and even feel tempted to vandalize them. The Art of Making Places is about the development of strategies that counteract these negative tendencies. It is complementary to the Evidence Based Design approach. What makes this branch of research worthwhile for the architecture of hospitals? There are several reasons.

Unlike Evidence Based Design, which focuses mainly on the interior of hospitals, The Art of Making Places provides guidelines for designing the exterior of hospitals. Architects have the natural tendency to focus on the visual aspects of the façade, discarding the psychological impact on the people in the public spaces surrounding the building. The literature on The Art of Making Places gives evidence about the importance of designing buildings in harmony with their surroundings. In the perception of people, the way a building connects to other buildings is very important. Architects also tend to neglect the practical functions of the exterior of buildings. For example, alcoves in south-facing walls that retain warmth from sunlight can invite passers-by to sit down and relax. The Art of Making places recommends to incorporate such practical functions of buildings in the design process.

Apart from providing guidelines for designing the exterior of hospitals, The Art of Making Places is also relevant because part of the interior of a hospital can be seen as a series of public spaces. In The Art of Making Places, public spaces are defined in terms of user needs, experiences, and activities: standing and talking, standing and watching, sitting and waiting, sitting and listening, sitting and eating. By collecting information on user needs and activities, public spaces in the hospital can be designed in a more user-friendly way.

⁵For more information on The Art of Making Places, see the website www.making-places.info/places/index.html. This website was made for this symposium by Prof. Em. Anne Beer from the University of Sheffield, one of the leading British experts on The Art of Making Places.

The third reason why the Art of Making Places is relevant for the medical world is a more strategic one. It is a highly successful approach, especially in the United Kingdom. It is supported by scientists, designers and planners. What I like about it is that it actually was initiated by designers and planners. It is a practical approach with a broad scope. It focuses on the implementation of evidence on the importance of the physical environment to human health and well-being, including user needs and the experience of places.

Evidence is important to convince people of the effectiveness of creating livable cities and spaces. But once everybody is convinced, the next step is: how are we going to do that? Of course, the same question haunts the medical world. We have all this evidence, how can we get it to be applied. One could define The Art of Making Places as the application of Evidence Based Design in the urban area, but I think that a more appropriate term would be to label it People Oriented Design. In general, there are three forms of people-oriented design: Designing by observing, Evidence Based Design, and participatory design. The Art of Making Places combines elements from all these three types of People Oriented Design. To illustrate this, I will give an impression of the typical steps in an Art of Making Places design approach.

36 The first step is to develop a typology of public spaces, and link this typology to a preliminary assessment of the range of user needs likely to occur in each type of space. Of course, doing this as an architect, you use your own observations and knowledge about how people behave and how people experience places. The positive side of it is that it is quick, and that it costs little time and money. The drawback is that your observations, when they are not carried out scientifically, are bound to be biased. You can come to conclusions that are not valid, not reliable. To overcome this drawback, you could actually add to that some little experiments or observation studies. The Art of Making Places does not rely only on general evidence, but it takes the specific design topic as a starting point. You start with a place.

The second step is where the Evidence Based Design is most important. Once you have this typology of needs tied to places, scientific evidence on relationships between environmental features and human behavior and experiences can be used to design places that support user needs and provide desired experiences. The third step would be to discuss your design with the public, preferably using computer simulations. It has often been suggested to me to simply skip the first two steps all together, and ask the people straight away. That won't do, I think. Architecture and environmental psychology are disciplines and skills. You cannot shift the responsibility for design and research to the people themselves. They lack the skills. They are able to express their feelings, but they are not able to create an evidence based building.



The entrance hall of the University Medical Center Groningen can be seen as space that serves a variety of user needs.

This gives you an idea of The Art of Making Places as an approach to urban planning and design, which probably can also be translated to the context of the hospital and the medical world. One of the benefits of The Art of Making Places could be to bridge the gap between the architects and the scientists. Scientists tend to underestimate the complexities of translating evidence into design. Architecture has its own added value. One of the ideas that may be in the minds of scientists is that evidence is design - well, it is not. Of course, architects have biased ideas of their own. They tend to be afraid that Evidence Based Design will limit their creativity. If you broaden your perspective, however, the contrary may be true.

I hope I got the message across: The Art of Making Places does not imply the surrendering of design to the evidence, nor the neglect of the evidence in order to make the design all-important. Instead, it wants to integrate evidence and design.



Buildings Do Not Heal

Wytze Patijn

I will start with a statement: you can not heal people with buildings and environments. If you want to heal people, ask a doctor. Architects are probably not very happy with this statement, so let me add another one. When we don't make good buildings, people suffer. If hospitals make people suffer, it is because they are usually very ugly. Why does architecture seem to be absent in hospitals? Why does the bureaucratic and utilitarian image always dominate? Why does a regime of mediocrity prevail in buildings for healthcare? Why do they look purely rational, even though they are buildings for people?

Visitors, patients and the staff use the hospital. Why does architecture play such a limited role? Why are the names of famous architects hardly ever associated with hospital design? In 1947, Joseph Hudnut, founder of the famous Harvard Graduate School of Design, already commented on the lack of architectural values in healthcare facilities. 'No art is more widely misunderstood', he stated, 'then the art of architecture and no building illustrates the misunderstanding more clearly than the hospital. The hospital has become so completely a product of the technologies of medicine and manufacture, so precisely adapted to the uses of science, as to become in effect a scientific instrument not essentially different from the X-ray machine or the operating table which it encloses. It is hard for people to imagine any relationship between such a building and that great tradition whose flowers are the Parthenon and the Cathedral or Chartres. It is hard to think of a hospital as a work of art'. Some hospitals in the Netherlands look like government ministries. They are bureaucratic administrative strongholds.

Hospitals belong to a very special group. They are among the largest and most complex buildings known to society. A hospital is often self-supporting, even in terms of the supply of energy and the provision of clear water. It is only rarely that hospitals are integrated in their environment. They are islands in the city. Are these the buildings that have been designed to cure us from our diseases? In the university hospital in Aachen, functionalism is present everywhere, representing the triumph of the medical sciences. The architects were inspired by the Pompidou Center in Paris by Renzo Piano. Technology provides the primary means of expression. It demonstrates the supremacy of high-tech. It is a system where you usher in sick people in one end, hoping that they will return in a pure, healthy, happy state at the other end.

In the construction of a hospital, architecture is mainly the result of an administrative, medical engineering puzzle where artistic expression is lacking. Often, the hospital's complexity is seen as the reason - but this claim doesn't hold. There are even more complex buildings, like airports, where architecture is present everywhere. By implication, if we want to explain the lack of architecture in healthcare facilities we have to look elsewhere. The authorities are to blame. With their patronizing attitude, their often restrictive rules, their continually changing opinions, their mediocrity, their continuous budget cuts, they make architecture almost an impossibility. They represent sets of standardized ideas and they are usually not interested in the architectural qualities of healthcare facilities. Even so, I do not think the rules and regulations themselves are to blame. That would be equally shortsighted as the idea that rules can solve all problems. Rules reflect the values of the dominant culture. I think we must blame our way of thinking about hospitals. A hospital is more than a skin for a function. A hospital should also be pleasant to work in, it must have an atmosphere where people feel cared for. A hospital can also be warm and friendly. I will give you some examples.

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A lot of waiting takes place in a hospital. The type and atmosphere of the spaces where people have to wait is very important. While waiting, people usually do not like to be confronted with other people. When I was first hired by this hospital, some thirteen years ago, a standard waiting area had been designed where people were seated in a circular set-up that forced them to watch each other. There was no privacy. We decided to change this. Waiting should be agreeable. Waiting areas should be designed in a number of ways, we wanted to introduce variety. People should have something to look at, something to take their minds off the reason they were there. The design should stimulate them to take a stroll. They should see different things everywhere, we abolished standardization as far as we could. The furniture, the floors, the art work, everywhere variety should prevail. Designing the chairs was an adventure in itself. We engaged more than ten architects, some of them specialist in interior design. They all came up with chairs without arm rests, and when we told them that we preferred chairs with arm rests, they designed couches... Their primary interest was aesthetic, but we wanted to accommodate the elderly, and people who didn't feel too well. It took some effort to persuade the designers, but we did. Another primary objective in changing the atmosphere of the building was the introduction of nature. We have been severely criticized for this, mainly by our fellow architects. They thought that the architectural spaces should be beautiful in themselves. For them, plants and trees were too romantic. Architects are pre-occupied with the building itself. Both the design of the furniture and the introduction of nature demonstrate the architects' aesthetic pre-occupation, which sometimes may harm functional and ethical considerations.

That brings us to a fundamental question: can Evidence Based Design make a difference? And can they make buildings more beautiful? In my opinion, research and scientific information are extremely important. But there are no facts without a vision. It is very difficult to look at facts as facts. Science may help us to get a clear picture of the problems, but if comes to giving the answers, science can be very dangerous. You might end up with Huxley's kind of brave new world. I am afraid we will get an Evidence Based Society. In my view that would be very dangerous. Where would it leave little practical jokes like the one where a deer was placed in a showcase in a parking garage? When we see this scene, it cheers us up. That is what art can do. Art can help you to restore perhaps, but also to give us a kind of comfort. In a hospital, a lot of people are sick. Our vision was a simple one: create a kind of atmosphere that diverts people. For the patients, a hospital is often a kind of prison. The medical regime is very strict and you are confronted with serious problems. The idea to introduce very big public spaces in the hospital was not only triggered by the wish to connect it to the city. We wanted to create opportunities for the patients to wander around and have something else to wonder about. We wanted to free the patients from the awareness of being sick all day. It's enough that they are confronted with their problems when they are in their bedrooms.

I want to conclude by showing this building in Barcelona, the hospital de la Santa Creu i Sant Pau, built between 1902 and 1912 by Lluís Domènech i Montaner. This is a hospital, but it is also a great building, a festival of architecture. It's a warm day, the patients wander around between the pavilions. For me that's the atmosphere of the hospital at his best. The patients are not patients but normal individuals, they are part of the city.

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Annex: The Project The Architecture of Hospitals

The project The Architecture of Hospitals is an initiative of the 'Foundation 200 years University Hospital Groningen'. It consists of a series of conferences, publications, and other initiatives related to hospital architecture and evidence-based design. The main activity is a major international conference on the architecture of hospitals, to be held April 13-15, 2005 in Groningen, which is supported by several symposia, preliminary conferences, and workshops. One of these supporting activities was a symposium on Evidence Based Design held in Groningen, November 22, which is described in the current publication. Other activities include a symposium entitled "Buildings as ideas: the hospital", which was held in August 2003 in Groningen and organized by the K.L. Poll Foundation for Education, Art and Science. This symposium resulted in two products: the reader "The Hospital" (K.L. Poll Foundation, 2003), and a video called "The town in the town". A preliminary conference held in Delft, April 2004, focused on recent trends in the evidence-based design of hospitals as healing environments. Finally, a one-week design workshop with participants from several Dutch academies focused on the ultimate future interior of hospitals. The results of this design workshop will be presented at the main conference in April, 2005, and will be exhibited in the city of Groningen for several weeks after the conference. The proceedings of the main conference will be published in the course of 2005.

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Further publications of the project include a book on the planning and building of the new University Hospital Groningen (Van den Noort, 1999), a book on Dutch hospital architecture after the Second World War (Mens & Tjihuis, 1999), a book on Dutch psychiatric clinics (Mens, 2003), and a review of health impacts of healing environments (Van den Berg, 2005). In addition, a book is currently being prepared that analyzes the evolution of housing and (semi-) medical facilities for the elderly.

A final product of the project The Architecture of Hospitals is a television documentary on the role of the architect as a therapist, directed by Joost van Krieken (date of broadcast on Dutch television: April 10, 2005) .

The project The Architecture of Hospitals is made possible by:

- HGIS - Netherlands Culture Fund
- Plants for People
- Stimuleringsfonds voor Architectuur - The Netherlands Architecture Fund
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- Brocacef
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- Netherlands Board for Hospital Facilities
- Deloitte
- Alterra Green World Research
- PGGM
- EMC Computer Systems
- Van Heugten Consultants
- Forbo Flooring
- Bossers & Cnossen
- Getronics ICT solutions and services
- Interoffice Office Supplies
- Medtronic - Cardiac Rhythm Management
- Nashuatec copiers and printers
- Sijbes Office Supplier

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The Architecture of Hospitals collaborates with:

- Amice An Amicable network of Academic Medical Centers in Europe
- University Medical Center Groningen
- BNA Royal Institute of Dutch Architects
- Health Council of the Netherlands
- NAI Netherlands Architecture Institute
- RuG University of Groningen
- STAGG Public Health Section / Royal Institute of Dutch Architects
- TU Delft - Delft University of Technology
- L'assistance publique - Hôpitaux de Paris
- Harvard University Graduate School of Design, Cambridge
- Karolinska Institute, Medical University, Stockholm
- Texas A&M University College of Architecture

