Hospital Design for Emotional and Cultural Needs

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We are all aware of the first dimensions in healthcare buildings: the layout and design of these structures so that they can function efficiently and economically as needed by care givers. Yet little is said and done to satisfy the second and the third dimension of healthcare, even though they are of vital importance.

The second dimension which I spoke of is the realization that the practice of medicine is constantly developing new and better ways to heal and concurrently abandoning old ones. These changes happen in approximately ten-year cycles and are now hastened even faster by the advent of globalization. The result of this is that major changes in particular areas of hospitals can become necessary after approximately ten years of usage. Often the changes involve the expansion of one high tech area and the relocation of services for this high tech expansion. Such changes themselves can be more expensive than the cost of the initial construction of the area. Since buildings should have a life span of fifty years or longer, it seems to be a terrible waste of the initial investment if change is necessary in ten years. Ways should be found to reduce this cost of change. This has a profound influence on the design of a healthcare building.

We have gone through various ways to find solutions to this problem.

Our initial solution was the interstitial hospital combined with a flexible mechanical and electrical system. The concept was to place between the various medical floors a structural floor in which the mechanical and electrical services could be placed and change could be made at any time as required without destroying the basic building. Ideally these services were designed for the heaviest mechanical conditions, but built only for the present need. If it was necessary to change the uses of an area, the needed mechanical and electrical services had only to be added without wasting what had been done before.

These buildings have a long and economical life span. However, they were more expensive in the initial stage. In the thirty years that we have been able to follow the performance of such buildings, the combined capital and operating

costs have been substantially less than in a standard building. Unfortunately, so often capital and operating costs are not considered together, but regarded independently as they usually are paid from different sources and at different times so the immense savings fall by the wayside.

We have attempted to reduce the construction cost of the interstitial hospital and succeeded in a series of hospitals that we designed for the New Brunswick government of Canada. In an independent report prepared for the government, these buildings were investigated and found to be only approximately 3% more than a standard hospital, but had almost all the advantages of a full interstitial hospital. We thought this was a brilliant solution, but it didn't change the market.

The present way in which we are exploring this problem is the "de-bundled" hospital. The concept is here that a healthcare building consists of various uses and not all hospital areas need the heavy mechanical services that some parts of them do (such as operating rooms, etc.). The concept is to separate the uses into normal and heavy services and have interstitial spaces only installed in the latter areas, but still at the same time have the heavy service areas located in such a way that the unknown future expansion would be possible. This does not allow total flexibility in the long term, but allows flexibility within a foreseeable range. This plan of course is only viable for projects that are all new.

Most of the construction of healthcare buildings, however, is adding to existing buildings where it is impossible to introduce interstitial spaces. It is possible, however, to arrange the services in such a way that changes can be made without losing the initial investment in its entirety.

For example, the Hospital for Sick Children developed into a referral hospital. A number of beds were changed into outpatient clinics. The initial hospital of 700 beds was rebuilt into 400 bedrooms, which was further reduced to 250. These changes were easily achieved by relocating the dividing partitions -- at minimum cost -- into an arrangement that suited the new outpatient purpose. It is unfortunate that this second dimension has not been properly regarded in general hospital construction and unnecessary sums are being wasted this way.

There is a third dimension which I spoke of in healthcare buildings - how it responds to the emotional needs of its patients and also its staff as well as its visitors who are involved in the healing process. This is the dimension of emotional response.

Let's look at the needs of the patients. There is a famous scientific research project done by Roger Ulrich[1], who investigated the reaction of patients in a surgical ward. The investigation was not by interviews, but was based on medical records during a ten year period. There were six rooms in a surgical ward that looked into an open area with trees and the other six rooms that looked at a brick wall. Ulrich investigated the severity of the operations, the nursing staff, the medical staff, as well as the patient profile and concluded that there was no difference in the treatment in the two types of rooms. But when he checked how much analgesic drugs the patients had taken and how quickly they were released, he found that the patients in the room with a pleasing view had taken 30% less analgesic drugs and were released 30% earlier than the patients with the view onto the brick wall. We had similar research evidence in a hospital we designed in Edmonton, Alberta, Canada: emotions are involved in the healing process.

The emotional hospital experience of patients is of course not concluded with a view out of the window. It starts when human beings arrive at the hospital, the way they move through the hospital, the presentation of the room, the view out of the room, the appearance of the various treatment areas and on and on. Each issue must

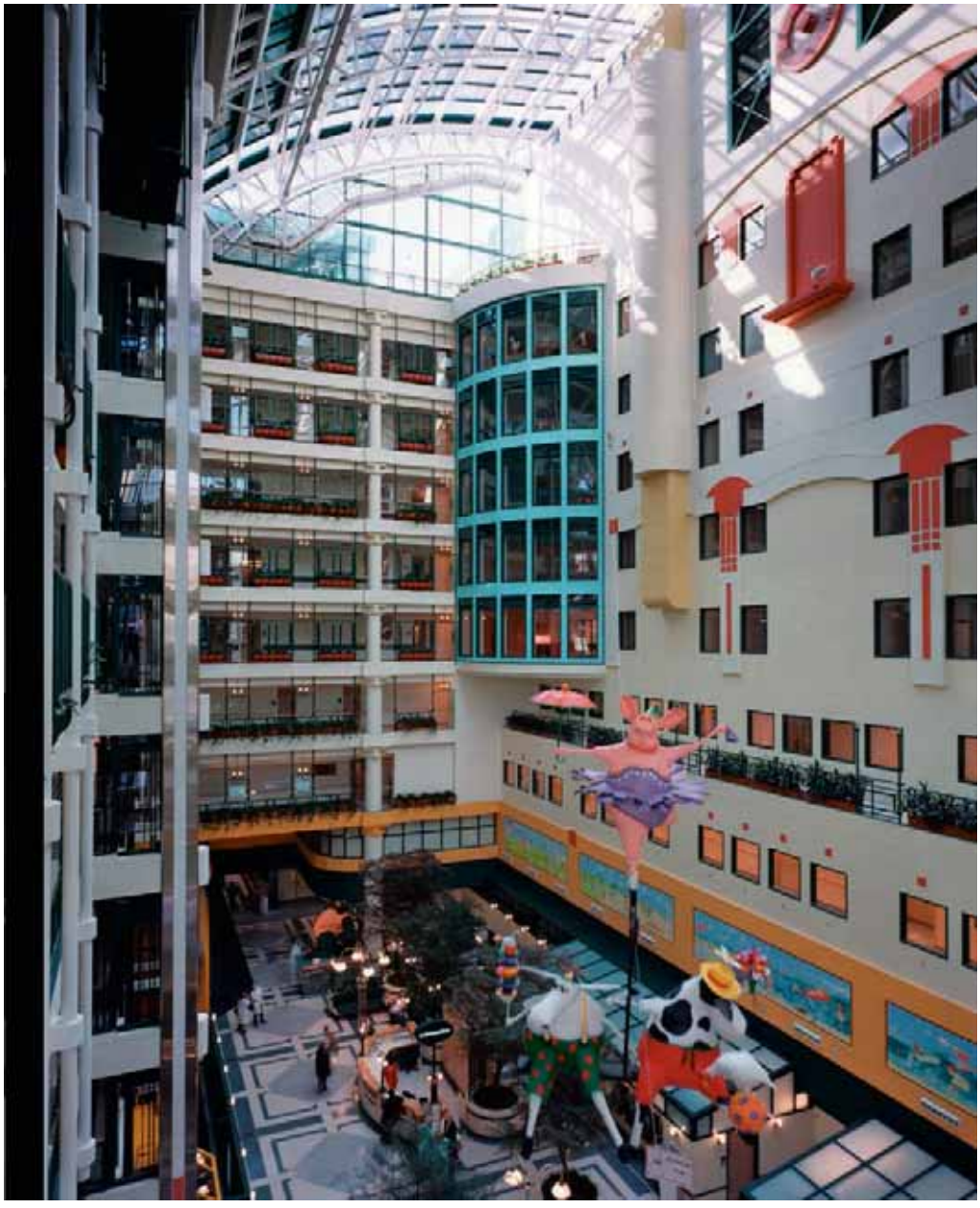

Figure 1 *The Hospital for Sick Children, Toronto, Ontario, Canada*

be carefully investigated to fulfill its emotional function. In addition to the emotions of the patients, we also have to consider how the general staff, the medical care givers and the visitors feel about the hospital and how that in turn influences the patient's recovery.

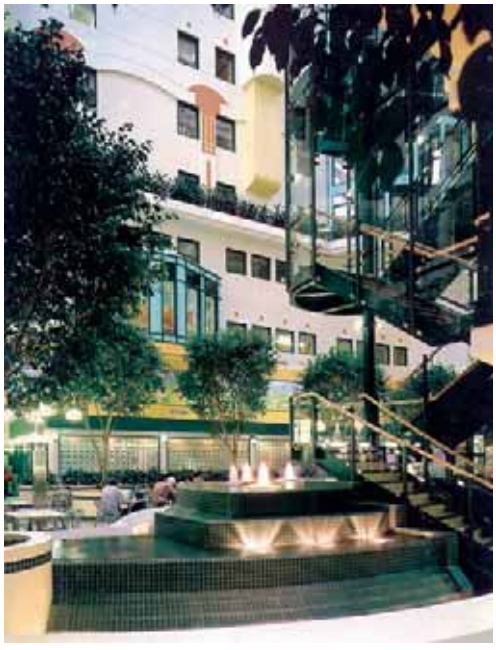

Figure 2 *The Hospital for Sick Children, Toronto, Ontario, Canada*

First, a hospital will have to fit into its neighbourhood, either if it is in a crowded urban setting, a suburban setting where it has to respond to the height of its neighbours, or if it stands alone in the countryside and has to respond to the feeling of a natural setting. When you finally arrive at the building the first glance that opens itself to you should give you a feeling of the community you are about to enter and show you clearly where you have to go but at the same time give you the feeling that you have entered a pleasing atmosphere that guides you to your destination in a relaxing way, that offers you places to sit down and wait, to create pleasant connections, and also gives you the opportunity to buy some essentials when you have time to spare which would give the hospital the opportunity to increase its resources. The cafeteria should not be a necessity only for the staff, hidden away, but should be in full view so you can't miss it as you pass by. It should be a wonderful way to wait and to create revenues for the hospital. All activities that are needed in a hospital and used by the public should be displayed in these public walkways.

It is important to organize the vertical transportation in such a way that it separates the public visitor elevators and hospital elevators, because it is most unpleasant and risky to have hospital beds in the same cab as visitors. The visitor elevators should be located so that they are easily visible from the main pathway through the hospital. For instance, in Edmonton they open from a public gallery, and in the Hospital for Sick Children, they are in the centre of the nursing units. In both hospitals, the hospital service elevators are separated and located in the service wing.

The nursing units themselves should be organized so that each unit can be entered separately by visitors and not by walking through another nursing unit. The first person that one should meet should be the nurse at the nursing station. It is therapeutic in a children's hospital to be able to have the playroom surveyed from the same nursing station. The bedrooms should be as close as possible to this nursing station. In children's hospitals we have experienced that single rooms with a bed for a parent create the most successful arrangement.

These issues, of course, affect all three dimensions. Let us look at some case studies – evidence of how we have brought the third dimension into the hospital without neglecting the other two. These buildings span a time of over 30 years and I believe it is important not to just look at new hospitals but see how ones built some time ago have lasted.

Figure 3 *The Hospital for Sick Children, Toronto, Ontario, Canada*

The McMaster Health Science Centre is now 35 years old. It was the first interstitial hospital that integrated a mechanical and electrical service system. At its time it was world news. We had over 30,000 experts from across the world visiting and investigating it. But as the building was completed its healing environment seemed to get just as much attention as the rational system. From the laboratory to the cafeteria and to the nursing station the building brought also the emotional element into the healing process.

The Edmonton Health Science Centre was to replace an existing hospital on the university campus and use the new building as a connection to the existing research facilities at the south and the existing teaching facilities to the north. Two glass roofed galleria achieved the desired connection and divided the new hospital into three sections. The upper floors contain two nursing wings on the exterior with a common service wing in the middle. Each nursing unit was T shaped to allow the closest relation between beds and nursing station as well as having a direct nursing station controlled entrance for each unit. In this hospital we experience the 30% drop in the use of analgesic drugs when we placed the first 400 patients into the new hospital while 600 remained in the existing building until the total new building was completed.

The two glass covered galleria proved to be less expensive than if we had left them open because the inside walls changed from the more expensive exterior cladding to interior cladding and the vertical duct connections from the interstitial spaces could be left exposed. The west gallery was the connecting walkway from the teaching facilities to the research facilities and the east galleria contained the cafeteria and a resting space.

The existing Hospital for Sick Children had to be renewed on its tight urban site. An outdated nursing home and an above-grade parking garage to the east were demolished. The parking was put below grade and the site could be used to build the nursing stations, the emergency ward, the surgical unit, the I.C. Unit, outpatient units, kitchen and cafeteria while the existing building was maintained for Radiology and Administration and its remaining area transferred to research.

Figure 4 *Walter C. Mackenzie Health Sciences Centre, Edmonton, Alberta, Canada*

The T-shaped nursing units were arranged around a central enclosed atrium as this proved to be more economic than leaving this area open. This created a feeling of community for the hospital as the nursing units could look into this space just as done in Edmonton. The roof was lifted and the exterior walls were transformed to less costly interior walls and substantial money was saved. We also came to the conclusion that one-bedrooms would be more efficient than multi bedrooms. In this referral hospital the average stay is 10 days. In the old hospital the patients had to be moved 3 to 5 times in order to find roommates of similar age and similar medical problems. We felt that in a single bedroom

Figure 5 *Walter C. Mackenzie Health Sciences Centre, Edmonton, Alberta, Canada*

the patient would never have to change rooms. A parent staying with the patient would lower the anxiety and assist in the care of the patient. We had problems in achieving the official approvals as it was felt that this would be more expensive. However, we accommodated this nursing unit in the same square foot area as a normal unit of 1, 2 and 4 bedrooms.

The inclusion of a parent into the room has been a great success as over 40% of the time a parent has stayed with the patient. This is considerable if you consider that this means each patient in average has his/her parent staying for the first 4 days there. Again the nursing station is close to the beds but also close to the entrance and the play area.

The Sunnybrook Health Science Centre needed a new surgical suite, ambulatory care and clinical services. The existing hospital has been arranged along a 1000' long linear corridor.

We located the new building parallel to the existing and created rectangular connections to reduce the walking distances. A new main entrance into the hospital for visitors and general hospital users was created. An ambulatory drive-in entrance was placed below. The new general entrance was enlivened by retail and pharmacy dispensers and visually connected with the lower ambulatory entrance. The main entrance connected the main hospital spine with a new elevator bank for public use; the hospital traffic with its elevators are separated. An atri-

Figure 6 *Sunnybrook and Women's Health Sciences Centre, Toronto, Ontario, Canada*

Figure 7 *Sunnybrook and Women's Health Sciences Centre, Toronto, Ontario, Canada*

um was achieved between the old and the new buildings and was used as a cafeteria as well as a general meeting space which became the community focus for the hospital.

The operating rooms have an outside glass corridor, which serves also as the patient waiting area. Furthermore, the operating rooms have window views through this area into the outside landscape.

The Ontario Cancer Institute / Princess Margaret Hospital was relocated into the hospital district of University Avenue in Toronto. The site available was too small to develop a typical horizontal hospital. It also had an additional problem of having two historic buildings occupying half of the already tight site, one adjacent and one north of the Mount Sinai Hospital to the south. Due to the tight downtown site, the various departments of the Hospital had to be arranged horizontally with the Oncology Department in the basement, the ambulatory treatment area as the first section above ground, the research section on the next level and the bedrooms on top.

While University Avenue was the major visual presence of the hospital to the outside world, the existing historic buildings made it impossible to have a convenient drive-in entrance. This had to be provided by Murray Street, one street to the west. While the 1930's historic building to the north had to be maintained in its entirety, the 1910 building needed only to keep its facade, because what was behind had been destroyed by previous renovations. This allowed us to create a new connection to University Avenue.

In order to use this square site efficiently it was necessary to introduce an atrium. But we felt that to make it the full height of the building would create a dizzying experience. So the atria were separated. The lower atrium with five levels was for the ambulatory treatment section which opened to below and brought daylight into the waiting areas of the Oncology Department. The second atrium above was devoted to research connected by a glass skylight. Locating research between treatment and the bedroom section above emphasizes that cancer treatment is still in a research stage. These research atria became the meeting place for the researchers. Watson and Crick, for example, got a crucial piece of information for the discovery of the DNA double helix not in the laboratory but in a common area. Therefore, this space around the research atrium could be as important to science as lab benches.

Figure 8 *Sunnybrook and Women's Health Sciences Centre, Toronto, Ontario, Canada*

The bedrooms are on top of the buildings with views into the green university campus and landscaped interior courtyards. The cafeteria was located to have splendid views towards University Avenue. The elevators were organized to be separated for various functions and visible from the courtyards related to the atrium they had to serve.

Figure 9 *Princess Margaret Hospital, Toronto, Ontario, Canada*

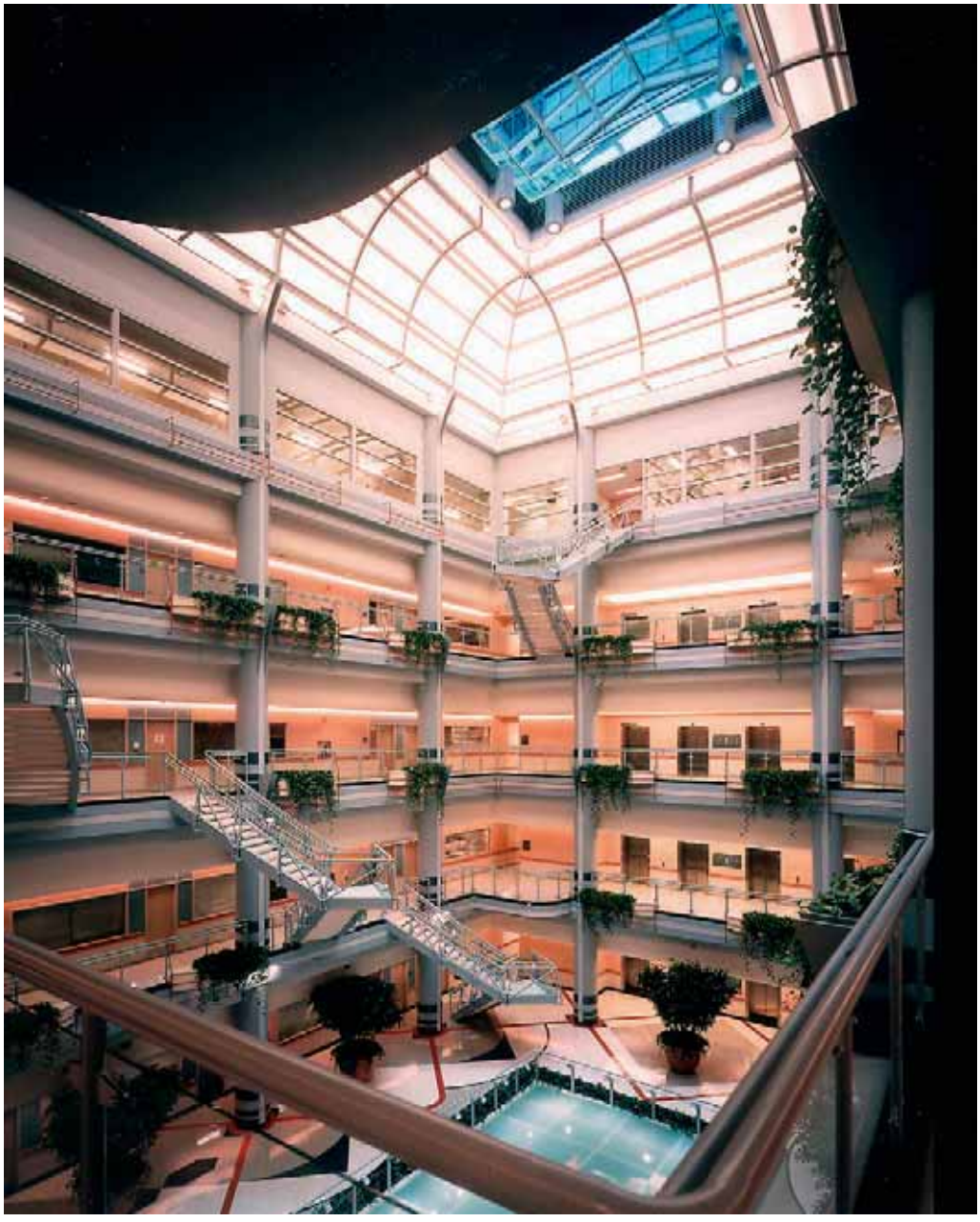

Figure 10 *Princess Margaret Hospital, Toronto, Ontario, Canada*

Figure 11 *Assuta Medical Center, Tel Aviv, Israel*

The Homer Gudelsky Building in Baltimore, U.S.A. had to be added at the southeast corner of the University of Maryland Medical System. This created a gallery that improved the existing heavy general and outpatient traffic of the hospital. By putting this traffic around the existing building it freed the overused interior corridors which could now be used solely for medical purposes. All the existing and new elevator banks could be reached from this new corridor which at the same time created a pleasant environment for visitors and outpatients by its restful waiting areas and an attractive cafeteria. The new Homer Gudelsky elevators are visible from the gallery and connect immediately to the nursing station control areas and open each department to its special treatment areas and nursing stations.

The Herzzentrum in Coswig, Germany is solely for heart operations. The hospital functions are organized into two wings, one containing the high-tech treatment and operating rooms and the other containing the bedrooms. Both are connected by the main entrance. A separate connection not visible from the entrance links the treatment wing with the nursing units. This glass entrance creates an attractive structure with waiting areas and a coffee shop that looks out onto a beautiful landscape.

The Assuta Medical Center, Israel was one of the most complex hospital designs we have ever been involved in. The institute had purchased a beautiful site that was part of an existing development where the footings had already been built. This dictated the outline of the hospital. It appeared to be an impossible task to create a functioning hospital with these restrictions, but after many alternates we achieved a well-functioning solution. The visual concept of the building to separate the base from the tower was an allusion of local traditions.

The site is between a pleasant urban street and a beautiful park. Naturally, we wanted to relate the park to the hospital. The main entrance from the street leads past retail stores into a cafeteria

facing the park. The ambulance entrance and ambulatory clinics are also entered from the street side and face the park. The outpatient clinics, administration, outpatient recovery and Diagnostic areas are above. The next floor is Surgery and I.C.U. with an interstitial floor for the necessary mechanical services. On top of this base is a patient tower with outpatient and inpatient facilities and beautiful, therapeutic views into the park.

The design of a hospital is not a one dimensional affair but needs the integration of these three dimensions to function truly as a healing environment.

[1] View Through a Window May Influence Recovery from Surgery, Roger S. Ulrich, Science, Vol. 224