New emergency building in Vrinnevi hospital in Norrköping

FANGFEI WU, 2014-05-13
My name is Fangfei WU. I was born in Beijing. I have done my Architecture bachelor degree in Beijing, and this is the last year of my master study in Chalmers University of Technology, Major in Architecture and Urban Design.

My Master thesis is the New emergency building in Norrköping and has been presented publicly on May 27 at Chalmers. I heard from the hospital staff that Sweco Healthcare Architecture team in Stockholm is in charge of the same project right now.

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Long periods of slow transition alternate with sudden changes, and sometimes these changes are real revolutions that drastically change the way hospitals operate and put new people in charge. Hospitals are buildings used for the care and cure of the ill and the injured.

The first example of hospitals emulate the model of the classical temple, which is hardly surprising, since the concept of healing was closely linked to religious rites and rituals. Besides, at that time the hospitals also connected to a church or a cathedral.

During 1400-1500, among the most famous is the Ospedale Maggiore, founded in Milan in 1456, and designed by Antonio Filarete. The first hospital to be designed according to the geometrical principles of the Renaissance, it is a symmetrical composition with a large central courtyard; on both sides of it, the wings of the building delineate four smaller courtyards.

By the middle of the nineteenth century, the pavilion type had conquered the world, it was either almshouses with integrated healthcare, or an indispensable part of the military. But the corridor type showed serious deficiencies, besides, the sewage system and clean air also had problems. It was time for a change.

After 1950, lots of specialist hospitals came out, with L type, H type, K type or T type plan. After the public health age and technological age, we are now in the third, the age of the chronically ill and elderly, is witnessing a renaissance in public health.
As architects and town planners, how can we be sure we have incorporated all the relevant aspects? Do we have enough information to analyze today’s hospitals? Have we really taken into account all the opportunities and obstacles that should be included in a realistic view of the future?

Today, a lot is expected from the hospital: it should be accessible to all, humane, less expensive, and more efficient from a point of view. Can these contradictory demands be satisfied? And what about hospital architecture: can it meet all these challenges? Is external life an option for these buildings, whether they are old or new? Or, should we see new hospital architecture as provisional, since hospitals have to accommodate permanently changing healthcare concepts and technologies?

The hospital is people live and die there, experiencing decisive moments in their lives—but how rare it is to see a hospital that is fit for living and really hospitable. It is much easier to talk about the functional efficiency of a plan, the technical features of the medical equipment, the way patients are monitored, strategies to facilitate maintenance, standardization of space, and so on. In themselves, these are important enough issues, but if they are the only ones determining how a hospital is conceived, architects will fail in their primary mission: to humanize the hospital, instead of institutionalizing it.

It is safe to state that the hospital’s layout has been determined by urban concepts, and the opportunities for change depend largely on design decisions made in the initial planning stages.

**BACKGROUND**
How can architecture contribute to healing?

This question touches on the essence of architecture. Even though design is its core business, it has far more fundamental issues to solve than the visual appearance of buildings. Finding ways to optimize the way a building functions requires the architect to be involved in formulating the program, the list of requirements that a project has to accommodate. Thinking about a building's functions, the architect may look to other building typologies for inspiration—in the case of hospitals, we have noticed a tendency to emulate either shopping malls or wellness centers.

Before an architect even thinks about what a project will eventually look like, he or she must address these functional considerations. In the context of healthcare architecture, there is one particular aspect of buildings that concerns the potential healing properties of hospital environments. These healing properties have inspired a whole new design approach that is generally referred to as Evidence Based Design. Architects who follow this approach to hospital design use knowledge on the health impacts of specific physical characteristics of designed space on patients, staff and visitors.

The architecture of hospitals should not focus on patient rooms and corridors, but rather on the construction of virtual, physical, and mental environments, thereby producing integral architecture at its best.

The likely future trajectory is quite straightforward when set within the following framework:

- Designing for lifecycle effectiveness. For the core (briefed) purpose, and from technical durability to a whole systems health economy.
- Designing for adaptability
  - Elasticity—changing demand
  - Function—changing role
  - Generality—intrinsic need
- Design as influencing culture as reflecting culture

This will require not only changes in investment criteria but recognition that we need to live in an age of ‘frictionless’ change. We need not only buildings (or portfolios of buildings) that are adaptable without major disruption, but also a workforce accepting of the need for continuous change as models of healthcare demand and response ebb and flows in the new landscape.

Greater diversity will be essential to the success of future research endeavors in architecture for health. Evidence Based Design (EBD) sought, first and foremost, to place the patient at the center of the equation, not the machine. It was therefore humanist in its origins and aims. It is time to fully recognize that humanist-based research in architecture for health has so much to offer societies around the globe.
The healing garden

Healing is dependent on reestablishing successful relationships and developing reciprocity between these factors. In fact, healing is not a process of curing or fixing, but rather a return to balance between all of these components. Health, therefore, is understood as the presence of this balance; illness is its lack.

According to today’s analysis about daily patient journey in a hospital, it shows that patients and their relatives waste nearly 50% of their time waiting. So the idea to design the waiting area around the healing gardens is very important.

Healing garden is a place to be together and to be apart. Gardens derive their healing potential from the interaction of humans with nature, the community, and the self. Gardens should therefore accommodate a variety of groups and activities. Because gardens are holograms of more intimate realities, paths, walks, and enclosures can also symbolize the journey of life and the discovery of the self, rebirth and regeneration.

Not only are there advantages for the patients, but also for staff, who work in stressful jobs, under difficult conditions. Improving the work environment, including providing outdoor space for breaks, can be an important investment.
It is important to recognize that 'healing' is not synonymous with 'cute.' A garden cannot mend a broken leg or cure cancer, but it can do the following:
• Facilitate stress reduction, which helps the body reach a more balanced state
• Help patients summon up their own inner healing resources
• Help patients come to terms with incurable medical conditions
• Provide a setting where staff can conduct physical therapy, horticultural therapy, etc. with patients
• Provide staff with a needed retreat from the stress of work
• Provide a relaxed setting for patient-visitor interaction away from the hospital interior

The garden is to be used and reach its full potential:
• visibility
• accessibility
• familiarity
• quiet
• comfort
• unambiguously positive art

Not only are there advantages for the patients, but also for staff, who work in stressful jobs, under difficult conditions. Improving the work environment, including providing outdoor space for breaks, can be an important investment.

A great deal of attention has also been devoted to the play of light and shadow which, naturally, has always been an important theme in architecture. It has direct consequences for the way a space is inhabited, as well as symbolic implications.

Light defines how a project manifests itself at different levels:
• The walkways and gardens, as well as the spaces between the buildings, derive their scale and proportions from the play of light and shadow
• The patios capture, reflect and distribute the light in the heart of the nursing units
• The patient room is defined by the window and the way it filters and spreads the light.

What is important is not the equal distribution of light, but rather the way it explains or, more modestly put, reveals, the essence of the spatial layout. What matters is how lighting helps to create relationships between the spaces in the hospital, while endowing them with their own characteristics. Sometimes the gallery is alternated with niches that invite people to sit down. Within the patient rooms, the windows are a frame and, at the same time, a separate space with a scale that relates to the scale of the room. The window marks a place of interaction with the world outsides; its proportions answer the twofold need to make the room a protected place that is also an open space - a place where there is shadow as well as light.
Designing hospitals for the future is a hazardous task: developments in medical science and technology require them to be flexible, budget constraints necessitate economic and efficient buildings, and patients expect them to be comfortable. Thinking about the future of our hospitals, we should see them as part of (urban) life.

Integrating the old parts with the new volumes involves a play of connections. This play is not limited to the site of the hospital itself, but has an urban dimension as well. The magistrale is an 'in between' element, linking the historical monument with the world outside it. And the most gratifying is undoubtedly the transformation of the hospital area into a landscape garden in the city. Another advantage is increased flexibility, both in the spatial solutions it allows and in the ways the working procedures are organized.

What will the future hospital like? Instead of programming spaces, we should program hospital functions, and we should see them not as determined by medical procedures, but by human needs, which is the first guiding principle. But there are others, too:

- Hospitals should be part of urban life, not isolated from it.
- Hospitals should be able to absorb future changes without losing their characteristic features.
- Instead of minimizing construction costs, we should focus on running costs.
- Instead of isolating medical functions in large-scale centralized facilities, we should integrate them into society by the use of small-scale satellites.
- Finally, hospitals need to make full use of architecture.

By 2050, for those fortunate enough to have one, the home, not the hospital, will be the enter of one’s healthcare ‘universe’ supplemented by anyplace where one has online access to health information. Health promotion, sickness prevention education, and self-empowerment is inhibited by a global discrepancy between high tech versus low tech societies and conflicting priorities between private and public agencies.

The hospital and its successor institution will, as a building type, retain its timeless, essential role in the care of the most acutely ill. This is already occurring: online medical databanks and telemedicine practices are being formed in anticipation of coming boom in home-based virtual healthcare.

The dwelling is being rethought in support of its new function as a virtual clinic. Holographic ‘consultation sessions’ with one’s caregiver will occur in one’s family room or kitchen. The possibility exists, in theory at least, that the patient, if one has access to such resources, will have access to health information anywhere, anytime.

Besides, many hospices are currently employing such humanist technologies as artificial landscapes, which have positive results. Today, hospital architects tend to think of the natural environment as itself therapeutic, yet still one step-removed from the formal language of architecture. Maybe the better way is to bring the nature into buildings as a means to protect the nature, to save the nature, ironically, from ‘destruction,’ and to preserve its inherent beauty for future generations to admire and take cognizance of.

Reference list:
Some problems about Today’s Hospital

In some hospitals, patients by ambulances and patients visiting on their own are mixed. In this case, some seriously injured patients can be seen by others including non-patients who accompany other patients.

Emergency patients are limited by their conditions and cannot get up the bed. They are not able to predict what is going to happen next.

Patients have no choice in bed locations and the patients they share the room with. Although patients are provided with a locker to store their belongings, patients still have to get off their bed to access it.

There is not enough space and furniture for simultaneous ongoing activities. The patient has constantly to re-arrange his belongings.

View protectors still donnot provide the necessary intimacy.

Incidents often occur in the evening and night. Patients call the nurses to get help whether they really need it or not. The other patients could get disturbed by such calls.
The university hospital area is a rapidly developing, hi-tech science center and is becoming increasingly bolstered by infrastructural projects like a city tunnel and public transportation, both of which converge at the site. The competition-winning proposal distinguished itself with a round, drum-like form that served to both exceed the logistical requirements of infectious disease healthcare as well as create an embracing, welcoming tectonic composition of colorful volumes and glass.

Terraced, plastered facades are cut by polychrome masses and protected by weather-deflecting glazed panes. Design becomes a form of infection control, in that patients enter an isolated ward via an airlocked hallway that surrounds the building. Interior and exterior elevators have expressly different purposes; patients of the units and hospital waste use the former, while staff, supplies and clean materials use the latter.

Following the principles of evidence-based design, single patient rooms for shorter stays are relegated to specific areas so as to avoid medical errors and each ward can be cordoned off into smaller units in the event of an epidemic.

Quality daylight and colorful finishes have been consciously employed to hasten the healing process and create a comfortable, therapeutic environment. The acute care department occupies the ground floor, upon which the glazed superstructure rests. Three levels are dedicated to the clinic while the top floor serves as the technology center and link to the existing surgery and ambulance buildings.
White’s task was to provide for the needs of the complex activities comprising modern healthcare, but also to create a good working environment and a friendly, hopeful environment for the patients. An important element of the project was to ensure that the building, which is located in the centre of Lund, would become a profile building.

Creating a light, bright environment is challenging for healthcare buildings that have a lot of enclosed rooms. The solution here has been, as far as possible, to design the rooms with glass walls onto the corridors, with clear glass at floor and ceiling levels, and opaque obscured glass in between. Atria bring more daylight into the building. The larger glass sections from floor to ceiling in conference rooms, staff rooms and waiting rooms open up the façade and provide a view out.

As regards the exteriors, the thick concrete façades have been clad in a mosaic, with various nuances of shimmering glass, creating a feeling of lightness. The new and old buildings are linked together by a glass hall for the main entrance.

A beautiful building for the healthcare of the future in the embrace of a green forecourt.
Norrköping boasts a geographical location for both people and companies accentuated by an efficient transport hub featuring the railway, a net of highways, the airport and the second largest port, measured by the value of the cargo handled. By train you can reach Stockholm in 75 minutes and the same journey by car takes 90 minutes. We are around 132 000 inhabitant.

Vrinnevisjukhuset in Norrköping (ViN) is a county hospital for eastern Östergötland about 170 000 inhabitants. The hospital cooperates with other hospitals within the county, with the county body care centers and with institutions of Health Sciences.

The hospital has about 310 beds and approximately 2,200 employees. Vrinnevisjukhuset offers a modern diagnostics, safe care and treatment. Acute seriously ill and injured a speedy and qualified medical assistance round the clock.

An emergency hospital with focus on:
• High patient safety
• Smooth collaboration
• High quality education
The catchment area for Vrinnevisjukhuset is the eastern part of the county and consists of Norrköping, Finspång, Söderköping and Valdemarsvik municipalities.

The total catchment area of the county Östergötland consisted of 429,642 inhabitants in 2010. Of these were 172,581 residents in the eastern part of the county, i.e. (that is) 40% of Östergötland population. The forecast of 2020, the population will increase to 180,500 people in 2020. An increase of 4.6%. In 2020, persons 60 years or older will constitute 27 percent of the population in the eastern part of the county. Comparing with 2000 when they constituted 22.8%. This represents a 4.2% increase of the care-giving age group. Above all, the number of people 60-79 years old increase, while the number of people over 80 only increases marginally.

Vision 2020: Adapt our premises to meet the demands of healthcare in the future
- Modernize psychiatric facilities and create a sobering unit
- Patientsafe and effectively planned emergency unit
- Outpatient surgery unit (separation of inpatient surgery and outpatient surgery)
- Surgical units on the same floor as surgery and intensive care
- Medical units on the same floor
- Registration and payment will be made in the main entrance
- Patientsafe and flexible built wards > 50% single rooms
- Patient safe and modern premises for neonatology closely located to the labor ward and maternity department
- Conference, clinical research, education and training facility centre
New emergency building in Vrinnevi hospital in Norrköping

1. Main Entrance

2. Natural Views

Heath-promoting environments
Vrinnevi Hospital in Norrköping, Sweden, was planned between 1982-89 by Bo Castenfors architects. The project contained thoughts about humane environments that led up to Rikshospitalet. Castenfors himself was part of the team that won the competition for the Oslo hospital in 1991. Located in natural surroundings and possessing a gross area of 110,000m², Vrinnevi buildings have three above-ground stories, and are constructed on a slightly sloping site.

Main Conceptual Ideas:
- Daylight for most rooms
- A low, horizontal layout; access to nature
- A curved main street, with glimpses of nature
- The main entrance in the middle
- Human environment, with generous amounts of art in public spaces
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Sun analysis

Connections

Ambulance

1 Big Courtyard

2 Inner Courtyards

Gap with daylight

Round shape with courtyard

Gap with light

3 Entrances
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IDENTITY

Good equal daylight & views

VISIBLE FLOWS

Ambitions

• Space itself healing
• "urban courtyard" with nature
• "Open" (Daylight Fresh air View Communication)
• Medical neighborhood

FLEXIBILITY

Sustainability

Energy Efficiency

• Reuse the old existing building
• Keep the old red brick walls
• Try to use Architectual ways to give the "Touching corner" life
• Make it as a central communication place

REFLECTED FACADE

Common area with Healing Gardens

Warm color glazing
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New emergency building in Vrinnevi hospital in Norrköping

SITE PLAN 1:1000

EXISTING MAIN ENTRANCE
EXISTING INNER COURTYARD

NEW MAIN ENTRANCE
NEW INNER COURTYARD

AMBULANCE

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## Rooms of Level 1

<table>
<thead>
<tr>
<th>Level1_Ambulance</th>
<th>Rooms of Level 2</th>
<th>Rooms of Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level1_Adult akut dept 3M</td>
<td>Level2_Outpatient day surgery unit VIN</td>
<td>Level3_Neonatal Dept</td>
</tr>
<tr>
<td>Level1_AVA Akut wards adult 3M</td>
<td>Level2_Endoscopy dept VIN</td>
<td>Level3_Obstetrical Dept</td>
</tr>
<tr>
<td>Level1_Children akut dept</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Level1_Ambulance
- **Name**: Ambulance
- **Description**: Ambulance
- **Area**: m²
- **Close/Connect to**:

### Level1_Adult akut dept 3M
- **Name**: Adult akut dept 3M
- **Description**: Adult akut dept 3M
- **Area**: m²
- **Close/Connect to**:

### Level1_AVA Akut wards adult 3M
- **Name**: A VA Akut wards adult 3M
- **Description**: A VA Akut wards adult 3M
- **Area**: m²
- **Close/Connect to**:

### Level1_Children akut dept
- **Name**: Children akut dept
- **Description**: Children akut dept
- **Area**: m²
- **Close/Connect to**:

### Level2_Outpatient day surgery unit VIN
- **Name**: Outpatient day surgery unit VIN
- **Description**: Outpatient day surgery unit VIN
- **Area**: m²
- **Close/Connect to**:

### Level2_Endoscopy dept VIN
- **Name**: Endoscopy dept VIN
- **Description**: Endoscopy dept VIN
- **Area**: m²
- **Close/Connect to**:

### Level3_Neonatal Dept
- **Name**: Neonatal Dept
- **Description**: Neonatal Dept
- **Area**: m²
- **Close/Connect to**:

### Level3_Obstetrical Dept
- **Name**: Obstetrical Dept
- **Description**: Obstetrical Dept
- **Area**: m²
- **Close/Connect to**:

---

**INSERT**

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New emergency building in Vrinnevi hospital in Norrköping

Flows of Level 1

Flows of Level 2

Flows of Level 3

JIGSAW_FLOWS
New emergency building in Vrinnevi hospital in Norrköping

FLOWS & FUNCTIONS
The round shape new building with the low bearing structure can supports itself from the existing building, which provides lots of advantages, such as protecting the old brick existing buildings, reducing the construction costs and giving elasticity and flexibility for different functions or even for future use.
New emergency building in Vrinnevi hospital in Norrköping

PLAN CONCEPT_GROUND FLOOR
New emergency building in Vrinnevi hospital in Norrköping

GROUND FLOOR_1:400
New emergency building in Vrinnevi hospital in Norrköping

COMMON WAITING
GROUND FLOOR
New emergency building in Vrinnevi hospital in Norrköping

PLAN CONCEPT_FLOOR2
New emergency building in Vrinnevi hospital in Norrköping

FLOOR2_1:400
New emergency building in Vrinnevi hospital in Norrköping

COMMON WAITING_FLOOR 2
New emergency building in Vrinnevi hospital in Norrköping

PLAN CONCEPT_FLOOR3
New emergency building in Vrinnevi hospital in Norrköping

FLOOR3_1:400
New emergency building in Vrinnevi hospital in Norrköping

INTENSIVE IVA_FLOOR 3
Add **NEW BLOOD** to the old existings = **MODERN HOSPITAL + IDENTITY + MAKE DIALOGUE** with the old in a positive way 
( Minimalism, modularization, whole volume feeling, reflect the surroundings, get more light and views in, keep privacy to exam or operation rooms, not so boring, be suited to the long dark cold snowing days in Norrköping, Sweden )

**REFLECTION**

- Two materials: Glassing + Metal plate
  - strong + slight reflex
- Only glassing: color glassing + normal glassing
  - strong reflex

**COLOR**

- Calm colors (Hospital = blue / green !?)
- Warm colors (Becuse of the existing buildings)

**MODULE**

- Outer facade color glassing module: $1200 \times 4050(1350)$, Included angle: $2.5^\circ$
- Inner facade color glassing module: $872 \times 4050(1350)$, Included angle: $5^\circ$
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ELEVATIONS_1:400
New emergency building in Vrinnevi hospital in Norrköping

DESIGN CONCEPT_SECTION1

HEALING GARDENS
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**DESIGN CONCEPT_SECTION2**

**HEALING GARDENS**
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SECTION 2: 1:200
New emergency building in Vrinnevi hospital in Norrköping

HEALTHCARE ARCHITECTURE IN CHINA

People are living increasingly longer
Cooperation on health and medical care
Patient-oriented
Attach great importance to patients' safety and privacy
High-quality wards
Daylight for most rooms
Humanized design in the common areas

Large elderly populations
Extend the old hospitals (city center)
Build new complex (Suburb)

No daylight in OP rooms
Should pay attention

No one-patient rooms
Design more in Suburb

Rational but not very cozy
Bring nature inside
Healing garden around the common area