Hospital Architecture in China

---- Through Comparison between Chinese and Nordic Hospital Design
With a large population, China is under great demands of hospital construction. However, the hospital design in China is facing several problems, such as large scale, formalism and de-humanization. In this case, the thesis aims to solve these problems so as to improve the practice of hospital design in China.

In the thesis, Chinese healthcare background is introduced by comparing with Nordic countries. The main problem of hospital design in China is investigated. A series of solution on how to reduce size and height of a hospital, avoid formalism and be humanization is learned through literature and case study in Nordic countries.

Finally, a conceptual proposal of a Chinese hospital is made as an application of the study into Chinese condition, which not only improves the original proposal, but also solves the problems as is stated above effectively.

**KEY WORDS:** Hospital design; China; Nordic countries; size and height; improve treatment performance; adapt to future; humanization; healthcare background; literature and case study; conceptual proposal
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PART 1 Current Healthcare Background in China

Current Healthcare background in China

Limited Autonomy

Hospital design in China

Study from Nordic countries

Literature study

Case study
1.1 Population and Health Cost

China is very different from Sweden, it has a large population of approximately 1,344,920,000 people, hundred times bigger than Sweden, but the expenditure on healthcare is much less than Sweden. Despite such a disparity, they are facing a same problem of being an aging society.\[1\]

From healthcare statistics comparison between China and Sweden, we can have a clear picture about the current Chinese situation. (Fig.1)
1.2 Health Insurance System

The current health insurance system in China is facing several problems. Firstly, it is divided into different group of people who pay differently for the health cost, which leads to a disparity especially between urban employees and rural farmers. Besides, most resources are centralized in the designated hospital which is operated by the government because of the planned economy, which leads to the abandon of the township hospital. Thirdly, the lack of government investment on healthcare leads to a heavy burden of personal cost. [2]

The renovation of Chinese health insurance system may have the enlightenment about equality, market economy and government responsibility by looking into Swedish social insurance system. [3] (Fig. 2)

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**Fig 2** Health insurance system comparison between China and Sweden (Author: Jing Ju, based on reference 2.3.)
1.3 Demand of Hospital Construction

As China grows stronger, the number of hospital construction has increased rapidly in the last 50 years. According the government statistics, there are 23,170 hospitals (including 13,384 general hospitals) built in China in 2012.\(^4\)

Sweden, however, has gradually decreased the hospital construction year by year. Till now, the resource of hospital in China has come up with the number in Sweden. In 2010, there are 2.73 hospital bed per thousand population in Sweden, and 3.57 hospital bed per thousand population in China. (Fig 3)
PART 2  The Problem of Hospital Design in China
2.1 Large Size and Height

**Situation:**
Because of the large population, hospital design in China tends to make the hospital very big so as to receive more patients. Many projects in recent years designed hospital with over thousands beds, and even make hospital a medical city. (Fig 4)

**Disadvantage:**
Such a big hospital will result to a long walking distances for patient and staff. Meanwhile, the ‘medical city’ which makes itself isolated from city context highlights its identity of being a hospital with ‘abnormal life’.

![Hospital in Shanxi, 1300 beds](image1)

![Hospital in Shenzhen, 2000 beds](image2)

*Fig 4* Size of hospital design. (Source: Baidu Image)
2.1 Large Size and Height

**Situation:**
Because of the limited land use with growing population, hospital design in China tends to make it high-rises. Especially in the big city like Shanghai, many projects extend the hospital vertically to over 100 meters with a centralized layout. (Fig 5)

**Disadvantage:**
Such a skyscraper with a large transportation core make patients wait a long time for the elevators and delay the treatment. Besides, the high located ward damages patients’ feeling for away from nature.
2.2 Formalism

**Situation:**
Since the condition that most clients of the hospital project are from local government, they are willing to focus more on the eye-catching aspect so as to make their effort visible, the hospital project thus tends to be in a pursuit of formalism such as streamline, high-tech facade or a traditional Chinese roof. (Fig 6)

**Disadvantage:**
Such a face job leads to an over investment on facade while have no benefit for the treatment performances. Moreover, the particular form of the hospital make it impossible for the functional change in the future.
2.3 De-humanization

**Situation:**
Chinese hospital looks like an operated machine which only care about the symptom of decease, but lack of considering patients as individuals and care about their feelings. (Fig 7)

**Disadvantage:**
The hospital with little consideration of the healing environment not only damages patient’s feeling, but also affects the staff effectiveness.

Fig 7 De-humanization in hospital design. (Source: Baidu Image)
PART 3 Literature and Case Study of Nordic Countries
3.1 Healthcare Background

Healthcare renovation in Scandinavia

Scandinavia healthcare planning has been heavily influenced by political and economic changes that have created strong pressure to reduce the cost of healthcare while improving its quality. In 1991, a Stockholm Model is made as an economic control meanwhile increase the freedom of choice for the patient. [5] (Fig 8)

The outcome of the renovation turned out to be a driving factor for improving the hospital. On one hand, it makes hospital a patient-oriented hospital since patients are given power to express their desire with money follows them. On the other hand, it makes hospital more efficiently since they have to compete with each other in an open market to attract patients.

Fig 8 Healthcare renovation in Scandinavia (Author: Jing Ju, based on reference 5)
3.2 Reduce Size and Height

Network of small scale hospital

As communication network improved, portable technology will be more universally distributed. Such development will strengthen the trend towards homecare and ambulance-care. The effect will be a global reduction in large acute hospitals. [6] (Fig 9)

Fig 9 Network of small scale hospital. (Author: Jing Ju, based on reference 6)
3.2 Reduce Size and Height

**Limited height**

There is abundant evidence shows that high buildings actually will damage people’s mind and feelings. They wreck the open spaces near them, and they damage light and air and view. Therefore, most buildings shall have a four-storey limit. [7]

The four-storey height makes people on the ground as well as the one inside the building feel secure. The higher the building is, the more frightening people will feel. It is said that the hospital should not be taller than the highest tree. (Fig 10)

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*Fig 10 Limited height of the hospital (Author: Jing Ju, based on reference 7)*
3.2 Reduce Size and Height

**Take account of city context**

**St Olavs Hospital, Norway**

Architecture is an autonomous language that has a collective memory of form, which is embedded in the history of the city. We should avoid being nostalgic or based on form alone, but focus on improving treatment performance and adapt to new conditions.

In St Olavs Hospital, the hospital is divided into several blocks based on a city grid, which makes hospital well integrated with urban life, meanwhile gives easy access from every street. [Fig 11]

![Fig 11 City size of St Olavs Hospital, Norway (Author: Jing Ju, based on reference 5)](image)
3.3 Avoid Formalism

Improve treatment performance

Akershus University Hospital, Oslo

The main idea of the Akershus University Hospital is that treatment, offices, outpatient and bed wards are planned as a clinical unit which close to each other on the same floor. The hospital consists of several clinical unit which is organized according to different disease. As a result, the treatment performance become more efficiently. (Fig 12)
3.3 Avoid Formalism

Adapt to future conditions

McMaster Health Sciences Center

Due to the fact that the medical technology nowadays is changing rapidly, we have to thinking long term for the flexibility and adaptability of the hospital design.

The McMaster Type is designed with rectangular forms which try to standardize different functions. In each module, the vertical shafts are on the corner of the outside wall for services \[^5\] (Fig 13)
3.3 Avoid Formalism

Adapt to future conditions

New Karolinska Hospital, Sweden

The New Karolinska Hospital is called the ‘max-flexible’ hospital. Based on a general structure system, the hospital can be organized in many different ways, so that it will not be locked into any specific use and can be as up-to-date as possible when moving in occurs.

The building is designed with a general floor-to-floor height and a general load capacity so that the equipment such as X-rays and surgeries can be moved to any where in the building. The various type rooms are based on a modular network of 9*9m, which can meet the demand of possible functional change in the future. [8] (Fig 14)
3.3 Avoid Formalism

Adapt to future conditions

Automatic storage technology

In the future, the traditional storage room maybe replaced by automatic storage system, which have already been used in many countries in the field of healthcare. Such a system can maximum use of space on a minimal footprint, and also reduce the risk of infection in the hospital. Besides, the flexible storage with a modular system can be adapted to different needs. (Fig 15)
3.4 Humanization

Patient-focused Hospital

_St Olavs Hospital, Norway_

In the traditional nursing organization, the patients are moved to specialties and function units. Much time is spent in transportation between different units, such as operation, laboratory, wards etc.

The principle of a patient-focused hospital is that the resources are allocated to the patients. In this way, the total transportation of the patients can be reduced. Another advantage is that the individual patient will be in contact with a minimal number of staff which reduce mistakes in medication. [5] (Fig 16)

Fig 16 Different organization of medical activities. (Source: from reference 5)
3.4 Humanization

Patient-focused Hospital

St Olavs Hospital, Norway

St Olavs Hospital has a decentralized organization with six clinical centers. These centers are based on a specialty and the associated patient groups, i.e., Women/child center or heart/lung center. Each clinical center is given a high degree of self-sufficiency that traffic of patients and staff between the centers can be minimized. (Fig 17)
3.4 Humanization

Patient-focused Hospital

St Olavs Hospital, Norway

All the clinics have wards, polyclinics for investigation and treatment, day surgery with an operating department, special laboratories and premises for teaching and research, offices, and dining room, so that the decentralized center will be self sufficient for different associated patients. The neuro center is taken as an example to describe as follows:

Plan 1 contains general functions such as main entrance, reception, polyclinics, day surgery and canteen. Plan 2 contains teaching, research, examination, conference rooms and offices. Plan 3 and 4 contain ward spaces for treatment and operations. The underground level contains technical space, storage and culvert. (Fig 18)
3.4 Humanization

**Sociality**

**Dayroom/dining room**

Day room/dining room is very pleasant for patient to have social life and communicate with hospital staff, because it is a place where five senses can be stimulated in the same time, like the taste and smell of food, nice eye view and appealing music. The day room/dining room is better to have a close connection with the main entrance, courtyard and staff area, so that it can be frequently used. (Fig 19)

Fig 19 Dining room in St Olavs hospital, Norway. (Source: arkitektur n. 05. 2007)
3.4 Humanization

Safety

Nursing Organization

In traditional round nursing system, the nursing work is divided into functions according to the ‘conveyor belt’ principle, which result to too many staff dealing with one patient. It is difficult for the patients to know whom they should turn for help. However, in the pair nursing system, one nurse and an assistant nurse work together, and there is a marked division of responsibility for a group of patients.

Nursing Layout

The overview of the whole ward from the nurse station will increase the patients’ feeling of security. For this reason, there should not be more than one entrance. A good sense of control is particularly important at night and on weekends when the staffing is low. It is easier to achieve a good sense of control with planning solutions that have a single or an L-shaped corridors. (Fig 20)

Fig 20 Nursing organization and nursing layout in Narrokoping hospital, Sweden. (Author: Jing Ju, based on reference 5)
3.4 Humanization

Privacy

Three-patient room

The traditional planning of 3-patient room put all three beds in a row on one side, which makes the patient in the middle far too exposed.

The bed in the middle is not allowed to use curtains during the day since this cuts out the daylight to the bed by the corridor.

The beds are placed at right angles to each other. This enable each patient to have a corner of his own. It is easy for staff and relatives to talk to patients.

The bay windows introduce more light and offer a pleasant place to sit and chat. (Fig 21)

Fig 21 Different three-patient room arrangement in Halmstad Hospital and Kalmar Hospital, Sweden. (Source: from reference 5)
3.4 Humanization

Human Contact

The traditional nurse station with glazed window is not good for contact with patients and visitors.

An open nurse station designed with varying levels is good for patients in wheelchairs to have eye contact with nurse and staff. (Fig 22)

Nurse station in Vanda hospital, Finland

Nurse station in St Olavs Hospital, Norway

Fig 22 Different nurse station in Vanda Hospital, Finland and St Olavs Hospital, Norway. (Author: Jing Ju, based on reference 5)
3.4 Humanization

**Feel of Nature**

**Vision**
Vision is the sense that often gives us the first impression of the surrounding. Exposure to daylight is effective in reducing depression and improving mood. Proper daylight conditions also increase day time alertness, and fostering better sleep quality.

The art painting in the room plays an important role for patients to sense nature. The representational nature paintings containing human figures and harmless animals such as bird are preferred over counterparts that are somewhat abstract. [9]

**Hearing**
Mimic pleasant nature sounds, such as birds and water, can be used as a therapeutic tool in order to enhance well-being and distracting patients from stressful symptoms. [9]

**Taste**
The taste is closely connected to the sense of smell. The smell of flower evokes its sweet taste. By drinking cool water, it can stimulates its aroma of mint.

**Smell**
The various type of smell such as the fresh leaves and fragrant flowers in the air can recall good memories, and reduce pain from the patient.

**Touch**
Touch is a tactile sense. The sense of touch helps us to orientate ourselves and to feel the limits between our bodies and the environment. Through touch, we feel warm or cold, hard or soft. It also help transmitting information for blind when touching. [9] (Fig 23)
PART 4 Conceptual Proposal

Current Healthcare background in China

Learn from developed countries

Hospital design in China

Limited Design Autonomy

- Literature study
- Case study
4.1 Site Background

The site is the People’s Hospital in Shanxi, which is located in the center of Shanxi Province in China. It is the biggest general hospital in Shanxi province, serving a population of 4,277,700 inhabitants in Taiyuan City.

The hospital has undergone several changes since first constructed in 1953. Today, however, the hospital is in need of an upgrade to meet the new technology advancements and demands with healthcare.

Fig 24 Site background. (Source: Baidu Map)
4.1 Site Background

Problem of existing hospital

Arbitrary extension within the site

Disoriented main hall

Long corridor with no light and little waiting area

Hospital area:
- Acute care (Hot floor): the patient in emergency; 2 000 sqm
- Inpatient care: the patient in bed; 21 000 sqm
- Outpatient care: the patient visit and treatment; 15 000 sqm
- Medical service: laboratory and research etc. 12 000 sqm
- Technical service (-1F): supply, kitchen etc. 6 000 sqm

Staff area:
- Staff dormitory, administration and dining 67 000 sqm

The layout is a series of individual buildings, with its own function and has no connection with each other. People have to take much time on transportation.
4.1 Site Background

**Problem of original proposal**

The new high-rise casts a big shadow on the existing ward; Elliptical form unsuitable for functional change

People waiting for elevators in the centralized transportation core

The multi-bed ward has little concern about the healing environment.

**Hospital area:**
- Acute care (Hot floor): the patient in emergency; 73 600 sqm
- Inpatient care: the patient in bed; 8 000 sqm
- Outpatient care: the patient visit and treatment; 29 000 sqm
- Medical service: laboratory and research etc.; 12 600 sqm
- Technical service (-1F): supply, kitchen etc.; 13 000 sqm
- **Staff area:**
  - Staff dormitory, administration and dining 11 000 sqm
  - 63 000 sqm

The original proposal has a centralized layout with ward on the top, which result to large transportation and make the ward far away from the nature.

Fig 26 Problem of original proposal (Author: Jing Ju, based on reference 10)
4.2 Concept

- **SIZE**
- **HEIGHT**
- **FORMALISM**
- **HUMANIZATION**

- Small scale
- Connection to city
- Close to nature
- Horizontal expansion
- Improve treatment performance
- Adapt to future condition
- Healing environment
- Way finding

Fig 27 Concept (Author: Jing Ju)
4.3 Design Process

1. Original Plan
2. Keep and demolish old buildings
3. Add new buildings according to city grid
4. Inner corridors connect with all buildings
5. Create orientation center and public pathway for easy way finding
6. Frame courtyard along the pathway

Fig 28 Design process (Author: Jing Ju)
4.4 Rendering

Fig 29 Birdview (Author: Jing Ju)
4.4 Rendering

Fig 30 Interior of orientation center (Author: Jing Ju)
4.4 Rendering

Fig 31 Public corridor between out-patient department and in-patient department (Author: Jing Ju)
4.5 Reduce Size and Height

City context

Main entrance
The three main flow which come from old city, bus terminal and train station, take about 30min to the site by public transportation. They mainly use the street along the southern edge of the hospital area which is suitable for having a main entrance.

Patient hotel
The location of the patient hotel is better to be in the east of the site which has a close connection both with the hospital and the train station, so as to facilitate patients and relatives from afar.

Hospital network
Due to the influence of the medical university, many hospitals are distributed within the district, which makes the hospital network possible in the future, and result to a decrease the hospital scale on the basis of communication technology.
4.5 Reduce Size and Height

Surrounding

Fig 33 Surrounding (Author: Jing Ju)
4.6 Avoid Formalism

Improve treatment performance: Hospital Organization

The design is a decentralized organization with six clinical centers and an orientation center for easy way-finding. These centers are based on a specialty and the associated patient groups. Each clinical center provides main entrance, public functions, outpatient department, wards, office and sub-emergency, which is given a high degree of self-sufficiency.

Fig 34 Hospital organization (Author: Jing Ju, based on reference 5)
4.6 Avoid Formalism

**Improve treatment performance: Hospital layout**

Car and pedestrian entrance

Car flow

Pedestrian flow

Public passage and greening

Fig 35 Hospital layout (Author: Jing Ju)
4.6 Avoid Formalism

Improve treatment performance: Program and flow

Fig 36 Program and flow (Author: Jing Ju)
4.6 Avoid Formalism

**Improve treatment performance: Program comparison**

The area analysis shows that the new proposal mainly expands its functions in the acute care and outpatient department, while decreasing the size of ward unit in comparing with the original proposal. Other functions such as medical service and technical service remains the same as the existing hospital.

The total hospital area is 69 000sqm, bigger than the existing hospital (56 000sqm) and a bit smaller than the original proposal (73 600sqm).

*Fig 37 Program analysis (Author: Jing Ju, based on reference 10)*
4.6 Avoid Formalism

**Improve treatment performance: Construction process**

1. Original hospital
2. Build new ward and new supply center
3. Build new outpatient department
4. Build new emergency and laboratory center
5. Move emergency to build the outpatient department; Build orientation center and public pathway

**Legend**
- Emergency center
- Ward
- Outpatient department
- Laboratory center
- Supply center
- Public pathway

Fig 38 Construction process (Author: Jing Ju)
4.6 Avoid Formalism

Adapt to future: Flexible room arrangement

Out patient department with double corridors

In patient department with 3-pat room and single-pat room

Out patient department with single corridor

Laboratory department

Fig 39 Flexible room arrangement (Author: Jing Ju)
4.7 Humanization

Way finding: Comparison of enclosed square

The enclosed square makes entrance space very important so as to guide people into the hospital. A large enclosed square with a narrow entrance won’t be easily noticed from the outside, meanwhile the emergency and laboratory building surround it makes the square less used by the public. If enlarge the entrance and locate an orientation center in the middle which has a good connection with all the buildings will benefit for easy way finding.

Fig 40 Comparison of enclosed square (Author: Jing Ju)
4.7 Humanization

Way finding: Comparison of main entrance

**Original main entrance**
The orientation center is hidden from the street, which makes patient difficult to find the entrance.

**Bottom overhead main entrance**
The bottom overhead structure of the original building makes the orientation center recognizable from the street perspective, however still a bit confusing.

**Tall entrance**
The tall ceiling makes the entrance distinctive and offers a public space in the front, however, the nice form has little benefit for the performance.

**Low entrance**
The low entrance is easy for patient to recognize from the street and follow the way to the orientation center, meanwhile gives importance to the old building.

Fig 41 Comparison of main entrance (Author: Jing Ju)
4.7 Humanization

Way finding: Path towards entrance

The tallest existing building
People will easily notice the tallest existing building from afar and guide their way to the hospital.

Horizontal space corridor
When people follow the way and arrive at the main entrance, they will see a horizontal space corridor which indicate them to pass through.

Two paths for patient
When people get to the central square, they can either go to the orientation center on the left to know which building to go if come for the first time, or go directly to the decentralized clinical center on the right.

Fig 42 Path towards entrance (Author: Jing Ju)
4.7 Humanization

Patient needs: Ward layout

Safety: Single corridor with nurse station near the entrance

Sociality: Dining room close to entrance, nurse station and courtyard

Safety: Decentralized team station with each responsible for 9 patients

Automatic storage system: Decentralized storage close to team station and patient room

Fig 43 Ward layout (Author: Jing Ju)
4.7 Humanization

Patient needs: Three-patient room

- Wardrobe next to patient with bed height
- Each patient has a family zone at its own corner
- All facilities hidden backward to the patient
- A triangle communication relationship among patients
- Look through from the entrance
- Access to nature from bay window and balcony

Fig 44 Three-patient room (Author: Jing Ju)
4.8 Site Plan 1:1000

Fig 45 Site plan (Author: Jing Ju)
4.9 Floor Plan 1:1000

Fig 46 Ground floor plan (Author: Jing Ju)
4.9 Floor Plan 1:1000

Fig 47 Third floor plan (Author: Jing Ju)
Fig 48 Floor plan of out-patient department (Author: Jing Ju)
4.9 Floor Plan 1:400

Fig 49 Floor plan of in-patient and laboratory department (Author: Jing Ju)
4.9 Floor Plan 1:100

Fig 50 Floor plan of patient room [Author: Jing Ju]
4.10 Model

Fig 51 Model photo (Photographer: Jing Ju)
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DISCUSSION

The starting point of this thesis is the healthcare studio which I participated for designing a general hospital in Sweden last semester. This is the first time for me to design a hospital. In order to get familiar with the hospital design, we made a study trip to St Olavs Hospital, where I was greatly impressed with its large differences in comparing with Chinese hospitals. So I started to make reflection during the hospital design, and learned a lot about the theory of hospital design which I thought can be introduced into China.

Through the thesis I made further understanding about the hospital design, especially in the aspect of humanization which I think can be further developed.

The thesis provides a perspective to look into the hospital design by comparing with different countries. It offers a big background which even refers to politics, while ends with a practical proposal in an architectural way.

The thesis is suitable for most of the situation in China, however, in some special cases, it may asks for different solutions on hospital design. For example, some big cities with strong urban context and land limit may not fit with a small scale hospital. A high rise which has solved the elevator problem can be a nice solution since its compact structure makes everything closely located in distance.

After all, the thesis offers a different view in Chinese hospital design by investigating the problem and solving it through learning experience from Nordic countries. I hope that the thesis can help people get inspired and give rise to further insight regarding this topic.
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1. **Current healthcare background in China**
   - First tutoring: project plan; simple schedule; define limit on research
   - Working schedule and preliminary framework
   - Data collection: OECD/WHO/Chinese statistics; literature study in healthcare background
   - Diagram making: health cost; insurance system; construction and distribution; funding

2. **Problem of hospital design in China**
   - Second tutoring: discuss processing; recommend reference literature on Nordic hospitals
   - Literature and case study on Chinese hospital: problem of existing hospital; history of hospital architecture; regulations; latest project, etc.
   - Investigate main problems of hospital design in China: size and height; formalism; de-humanization
   - Choosing site for conceptual proposal: study existing site and original proposal

3. **Literature and case study from Nordic countries**
   - Third tutoring; define goal and conclusion; choose reference project for case study of Nordic hospital
   - Literature study on Nordic hospital: healthcare background; history of hospital architecture; adapt to future; EBD in healing environment, etc.
   - Case study on Nordic hospital: St Olavs Hospital (including study trip), new Karolinska hospital, Akershus hospital, etc.
   - Thinking of application in China

4. **Conceptual proposal**
   - Fourth and fifth tutoring: develop the main idea of the proposal
   - City analysis: history; geography; transportation; type of street, function of surrounding
   - Drawing and Model making: master plan; program and flow; floor plan; computer model; facade and section, etc.
   - Booklet making and presentation preparation

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In China, most general hospitals are state hospital which are funding by the government. With the renovation of Chinese insurance system which gradually open to the market economy, more and more private enterprises are encouraged to invest for the hospital. [4]

However, because the fact that the insurance system is only applied for the designated state hospital, and that most resources are still allocated in the state hospital, most people are still willing to go to the state hospital rather than to the private hospital.

**Fig** Tendency of state and non-state hospital construction on general hospital from 2005-2011 (Author: Jing Ju, based on reference 4.)
Healthcare Background: History of hospital architecture

History of Chinese hospital

1229 Ancient hospital in Suzhou
Small building, long corridor, garden surroundings; concerned about people’s feeling.

400 BC The Asclepieion at Pergamo, Greece
Physical health importance: Exercise, sport facilities; Psychiatry therapy: Usage of art and music

1917 Peking Union Medical College, Peking
Pavilion style; Western layout with traditional roof

2003 Ruijin hospital, Shanghai
Mega hospital

1933 Hospital in Lille, France
Mega hospital

1933 Hospital in Lille, France
Mega hospital

1933 Hospital in Lille, France
Mega hospital

1933 Hospital in Lille, France
Mega hospital

1933 Hospital in Lille, France
Mega hospital

APPENDIX

Fig History of hospital architecture (Author: Jing Ju)
Improve treatment performance: Hospital flow

Overall flow

Emergency flow

Outpatient flow

Inpatient flow

Fig: Hospital flow (Author: Jing Ju)
Building a patient hotel can be a method to reduce the size and height of the ward. The patient hotel is designed for patients who do not need to be in a nursing ward. It also opens to relatives and regular visitors. It is a hotel with basic nursing facilities and nurses on hand 24 hours. Thus, patient hotel can be built as a commercial building while has a close connection with the hospital.

Based on a widespread healthcare information technology, the hospital can be more decentralized such as community hospital, home care, ambulance care and overseas treatment, which helps reduce the size of the hospital meanwhile enable people to have a more private care with a shared medical network.
Humanization: Room design

Ceiling design
- Pleasant form
- Sound absorbing (noise reduce)
- Light (daylight and artificial light)

Wall design
- Low and horizontal window (wider view for patient when laying down in the bed)
- Door opening (1300mm, opening direction)
- Visual art present nature and human activities (not abstract art)
- Sense of control (temperature, daylight)
- Textile for touch (soft or hard, warm or cold)

Floor design
- Even color (calm and peace)
- Material: Anti-slippery
- Easy cleaning (wall hang facilities, e.g. toilet seat)
- Connect with balcony/courtyard
Study trip

Every clinical center has its own identity

Open reception easy for communication

Staff in dayroom close to working place

Facilities hanging on top for easy cleaning

Automatic guided vehicles (AGV)

Wardrobe next to patient with bed height

St Olavs

Family zone in single patient room

All facilities hidden backward to the patient

Tube which transmits samples to laboratory

Nature light with forest image

Fig Study trip (Photographer: Jing Ju)
Site background: Problem of original proposal

The ward plan have several design problems as is stated in the research. Firstly, the high rise leads to big transportation core in the middle which not only cost money but also delay the treatment performance. Secondly, the curved wall makes hospital inflexible for future change. Besides, the floor plan has little concerned about healing environment, such as long corridor with little waiting area, centralized nurse station and multi-bed ward without family zone.

Fig Problem of original proposal (Author: Jing Ju, based on reference 10)
Site background: City context

History
Taiyuan City has a long history of over 2500 years. At first it is a small city, with a smaller town inside. The main traffic goes through the city from north to west. Later, it continues to expand to the south, and with its main transportation connects closely with the site.

Geometry
Since the city is sandwiched between two mountains, it always suffers a strong wind from north-west during the winter period.
Site background: City context

Street fabric (≦5m)
This old city have kept its special street fabric for over 2500 years, which is quite different from the modern one (like a cross shape). The street in every block is always discontinued and zigzag, which people can not easily see through towards the endpoint of the road. Such a pattern protects the city from suffering strong wind and forms the microclimate.

Four types of street
The ‘I-shaped’ street has a broad eye view over the main traffic road, without a main focus of eyesight. The ‘T-shaped’ street has a strong direction, with a focus of a building on the endpoint. The ‘L-shaped’ street has a enclosed eye view, with a focus of a wall on the endpoint. The ‘broken-line shaped’ street extends the space, with eye focus on every turning point of the street.

Fig City context (Author: Jing Ju, based on research on the ‘T-shaped’ crossing Pattern of traditional streets in Taiyuan. Lizhen Yi. 2011)
Conceptual proposal: Street in hospital

The ‘I-shaped’ street in hospital offers a broad view to the courtyard. The ‘broken-line shaped’ street extends the space, with an eye focus on the courtyard at the endpoint. These streets not only have good relationship with the nature, but also beneficial for easy way finding.
Conceptual proposal: Sketches

- 2015.04.05 Conception of Master plan A
- 2015.04.05 Conception of Master plan B
- 2015.04.20 Hospital organization
- 2015.04.20 Hospital structure and flow
- 2015.04.28 Logistics and car parking
- 2015.04.28 Add a central orientation
- 2015.05.04 Flexible room arrangement
- 2015.05.04 Flexible room arrangement

Site Plan

- 2015.04.28 Development of floor plan
- 2015.04.28 Clinical center
- 2015.04.28 Add a central orientation
- 2015.04.28 Logistics and car parking
- 2015.04.04 Flexible room arrangement
- 2015.04.04 Flexible room arrangement