

## Trend of Healthcare Architecture in China

黃錫璆\*

Huang Xi Qiu

중국의료시설의 최신 동향에 관한 연구

## 국문요약

본 연구는 경제성장과 함께 빠르게 발전하고 있는 중국의료시설의 최근 의료 환경과 의료시설의 변화 동향을 분석한 것으로 병원의 디자인, 병동 유니트 계획, 의료자원의 지역적 불균형과 건축기준 등 다각도의 변화 동향을 사진, 도면과 함께 제시하였으며, 중국 의료시설의 문제점과 과제를 정리하였다.

중국의 의료시설은 현재 급속한 성장기에 놓여 있으며, 그 과정에서 의료자원의 대도시 집중과 병원의 대형화 현상으로 지역적 의료자원의 불균형 문제가 나타나고 있고, 환자부족으로 중소병원의 경영문제가 심각한 반면, 대규모 병원은 환자집중으로 긴 대기 시간과 혼잡함 등의 문제가 나타나고 있다. 또한 대규모병원과 중소병원 간 의료자원의 과다한 중복으로 비효율성 문제가 지적되고 있어 합리적인 경제기반에 기초한 효율적인 의료시설과 건물시스템을 어떻게 개발할 것인가 하는 점이 중국 의료시설의 큰 과제 중의 하나가 되고 있다.

Key Words: Health Architecture in China, Hospital Architecture, Healthcare Trend

## 1. Introduction

Healthcare facilities are developing faster than ever before in China now. Except some new facilities, a big number of expansion/renovation of existing institutions could be seen in many places. In fact, economic development has stimulated the need of people health service. This includes the need of higher level of healthcare architecture.

## 2. Changing Health Environment

Number of hospital bed was increased from 80,000 bed in 1949 to 3140,000 bed in 1995. Health care institution was increased from 2,600 to 19,000 during the same period.

From the physical point of view, healthcare architecture is reflecting these trends. There are several factors, which bring the great impacts on healthcare service. The first one is the eager of better health service. This brings the need of better

health facilities as well as the upgrading of existing resources.

Several points could explain this change.

The first point is provide more amenity and more privacy for patients. In nursing ward design, for instances, one central washing room shared by several multi bed wards is a common way in previous design. Now it is replaced by single or double bed ward with annex washing room.

Another example is the adoption of central air conditioning system. In previous years, only hospitals that located in northern part of China could be installed with central heating system. Right now, central air conditioning system is very popular.

The second point is the impact that comes from of the advanced medical technique. Computerized Tomography Machine (CT), Nucleus Magnetic Resonance Machine (NMR), Digital Subtraction Angiography (DSA), Positron Emission Tomography (PET), Automatic Biochemical Analyzer, etc. could be seen in many hospitals. Those expensive machines are accepted and installed not only in large size hospitals in large city, but also in smaller size hospitals at

\* Ph.D., Institute of Project Planning & Research Engineering  
International committee member of Hospital Architectural Group, Beijing, China.

lower level institutions.

The great impact also come from computer technique. Tele-medicine, Tele-radiology are discussed and put into experiment practice in several institutions. Several healthcare institutions are equipped with PACS and BAS. Digital computer techniques would bring us the radical change both in healthcare service as well as healthcare facility itself in future.

### 3. Megatrend of Healthcare Architecture

#### 3.1 The changing of general layout pattern.

In previous decades, dispersed type layout was accepted in so many healthcare institutions, even in large size hospital. But this has been changing rapidly since the early of 1980s. Health authorities and hospital manager pay more concern about the efficiency and effectiveness of health institutions. Semi-compacted type or compacted type solution replaces dispersed type layout.

Hospital street, grid pattern traffic system are adopted and selected in several hospitals. The comparison could be seen from following example:

#### 1) Dispersed type:

- Henan People hospital, 800 bed  
Zhengzhou City, Henan Province

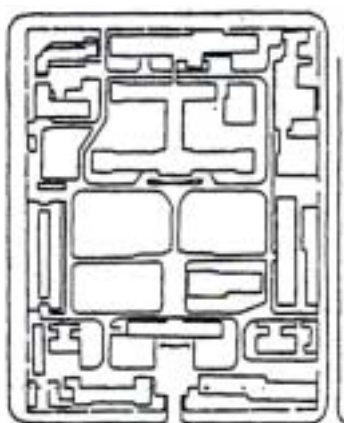


Fig. 1. Henan People hospital, 800 bed

- Xi Jing hospital, 1000 bed  
Xian City, Shanxi Province

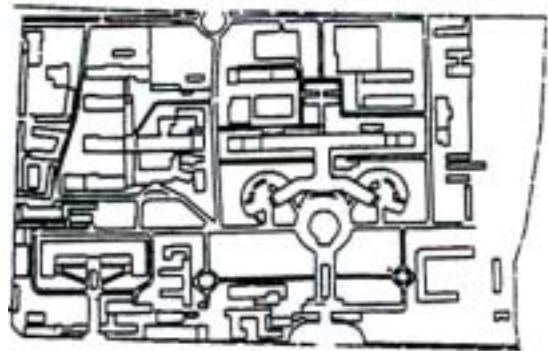


Fig. 2. Xi Jing hospital, 1000 bed

#### 2) Semi-compacted type:

- Fo Shan hospital, 940 bed  
Fo shan City, Guangdong Province

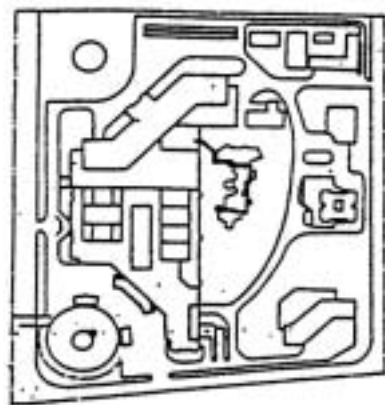


Fig. 3. Fo Shan hospital, 940 bed

- No.1 Teaching Hospital, Beijing University  
1000 bed, Beijing City

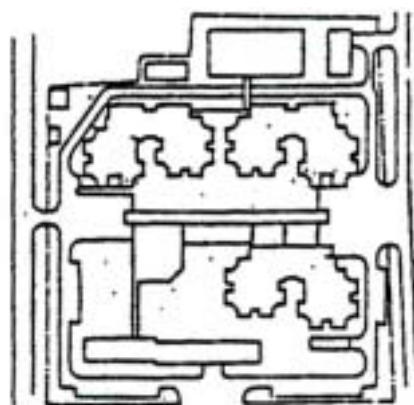


Fig. 4. No.1 Teaching Hospital, Beijing University  
1000 bed

### 3.2 Adoption of new hospital design concept

New design concept has been introduced and implemented in healthcare architecture.

This includes several aspects.

The adoption of hospital street and grid pattern traffic system in hospital layout is one of the examples. In order to improve and provide an efficient and convenient way of inter-functional department, hospital street as well as grid pattern traffic system was implemented in several new health projects. Those proposals were accepted and appreciated by both medical staff and patients.

Another example is operating department planning. The segregation of clean and polluted area in this section is strictly controlled. More new proposal including central bio-clean supply concept is adopted. The first design code for this specific department set by Ministry of Health was published in last Oct. in China.

### 3.3 Various types of nursing ward unit plan

Various solutions are chosen in many new hospitals(Fig. 5). Up to 1970's, rectangle flat block nursing ward unit is the monotype in the large part of China. However, this has been changed since the early of 1980's. Round shape, triangle shape, square shape or angular shape is adopted.

Improving of indoor environment, providing short service routes as well as creating more vivid facade have encouraged these changes.

Upgrading the interior quality of nursing ward is another trend.

Following examples show the different proposals(Fig. 6).

- 1) Shao Guan People Hospital, Shao Guan City, Guangdong Province
- 2) No.1 Teaching Hospital, Beijing City, Beijing University
- 3) No.4 Affiliated Hospital, Shi Jia Zhuang City, Hebei Medical University, Hebei Province

#### (1) High-rise solution

In several hospital constructions, multi story solution was gradually replaced by high-rise solution. 18-20 story or even higher hospitals were built during the last decades(Fig. 7, 8).

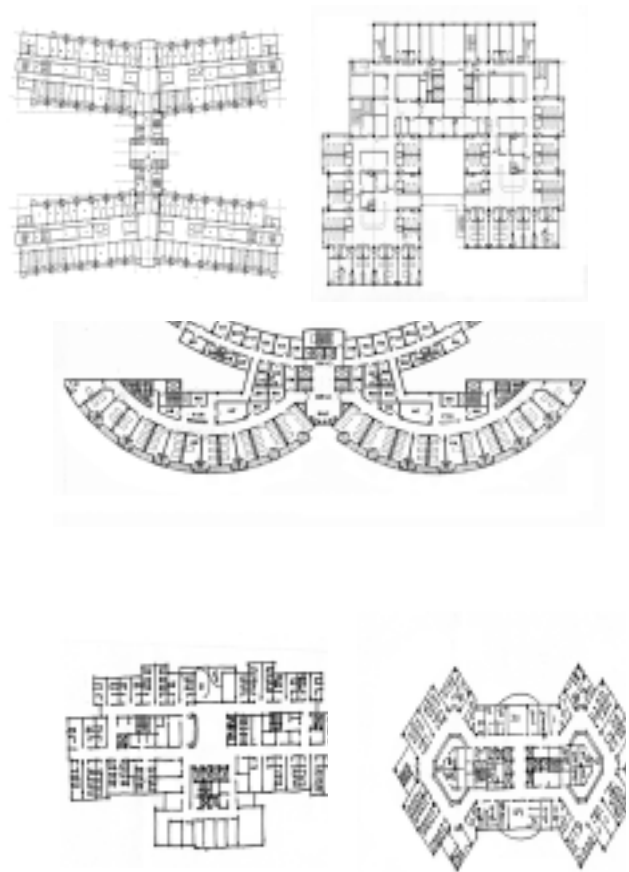
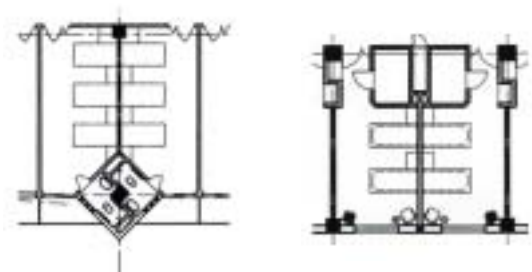
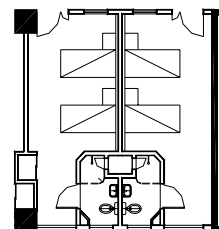


Fig. 5. Various Types of Nursing Ward Unit



- 1) Shao Guan People Hospital
- 2) No.1 teaching Hospital



- 3) No.4 Affiliated Hospital

Fig. 6. Various Types of Patient Room

Some typical examples are as follows:

- Chang Zheng Hospital, 34 story, Shanghai City
- Wuhan Hospital, 34 story, Wuhan City, Hubei Province



Fig. 7. You an Hospital, Beijing



Fig. 8. Geriatric hospital, Chang sha City, Hunan province

- Zhan Jiang Hospital, 24 story, Zhanjiang City, Guangdong Province

High-rise solution was adopted, despite of its high initial cost, running cost and the question of working efficiency. To build a huge health complex within an existing congested campus is another issue of this background

(2) Comprehensive and Specific professional hospital

Accept comprehensive general hospital, several professional hospitals were built during the past

year. They include maternity and children care center, children hospital, infectious diseases hospital, tumor hospital, tradition chinese medicine hospital, etc.

To meet the changing of diseases spectrum, some new specific health institutions are growing very fast, such as rehabilitation health center, geriatric hospital as well as hospice, nursing room for elderly care.

To improve the first-aid rescue system, emergency network was created in many cities. In some large cities, the application of helicopter as another tool for first aid was discussed.

### (3) Challenge of expansion/renovation project

Except new construction, quite a lot of expansion/renovation project within existing campus are required. Lack of proper developing plan based on careful study has already caused the difficulties of new development. Buildings that were built recently require to be demolished only because of new construction.

To avoid this mistake, more and more hospital authorities, architects put more attention on the developing plan based on scientific way. How to develop a good expansion proposal for an existing old hospital is one of the great challenge for us.

### 3.4 The gap between developed area and developing area

So far the economic development is uneven, the gap is evidently exist. In prosperous area, such as Chang Jiang River delta zone, Zhu Jiang River delta zone, health service system including health facilities is much better than those in remote or poverty area.

In Qinghai province, for instance, these are clinic with no electrical supply. Solar photocell is one of the solutions for providing electricity to clinic located at such a remote area. Instead of ambulance care, village doctor have to ride on horse to serve the patient. The poor condition of those facilities is evidently existing. How to improve health service, to design an appropriate and economic healthcare facility to those who live in that poverty area is another challenge to Chinese architect.

54 sqm/per bed in 1979 to 60¥70 sqm/per bed in 1992.

Larger entrance hall, atrium with glass roof, single or double ward with annex washing room, central air conditioning, better more expensive covering furnishing material are adopted in many projects. It means also the rising of initial cost. In 1960's, 1000 ¥/per sqm is acceptable, right now, 3000 ¥/per sqm is a moderate cost.



Fig. 9. Zhou jian central clinic, Shan xi province



Fig. 10. Fo shan hospital, Guang dong province

### 3.5 Higher building standard

Economic development has led to a willingness of upgrading living quality. Either urban or rural inhabitant requires higher level of health service.

The average building area in hospital building standard set by Ministry of Health is increased from



Fig. 11. Fo Shan hospital



Fig. 12. Chang sha central Hospital

### 3.6 Private sector in healthcare service

In previous times, all of the health institutions were owned and run by government. Health authorities governed every health institutions either at high level or at lowest basic level. However this

has been changed since the adoption of open policy. The market oriented economy system has stimulated the private sector to get into the healthcare field.

Private dental clinic, private eye clinic is popular now in many cities. 300 bed Tumor Hospital, 500 bed Cardiac thorax hospital equipped with high tech medical equipment is emerging.

### 3.7 Co-design work in healthcare project

In previous decades, foreign firm only designed a few projects. A typical example is China-Japan Friendship Hospital. It was designed in 1984.

Open policy provides more chances to foreign firm. Foreign architectural firm designed many projects including hospital in the past few years.

Those project lists are mention as below:

- 1) Eastern Hospital
  - JMGR(U.S)
  - Shanghai City
  - Zhejiang Architectural Design Institute
- 2) Shanghai Children Hospital
  - NBBJ(U.S)
  - Shanghai City
  - East China Architectural Design Institute
- 3) Beijing Friendship Hospital
  - B+B(Germany)
  - Beijing City
  - Beijing Architectural Design Institute

## 4. Conclusion and Discussion

Those trend which we discussed above showing the rough picture of hospital architecture in China.

If we go deeper, we could find following problem.

The first problem is co-exist phenomena of shortage and waste of available health resource. Quite a number of large size hospitals are built. More beds were added, higher luxury standards

were adopted, and high tech expensive medical equipment was installed in so many cities. Because of high reputation and quality of service, large size hospitals are overcrowded, patients have to wait for several weeks or several months for get into those hospitals. Meanwhile, so many small size health facilities are abandoned. Because of poor occupancy rate of hospital bed, drain away of professional staff, the poor condition is accelerated.

The balance of big ambition and available financial resource is another important point. The change of economic system has already changed the former financial system. In some extend that health institution authority has to find its own way for developing itself. To raise more support from society at large is one of the solutions.

To cope with the market oriented economy policy, higher standard healthcare building become a tool of promotion. The tendency of build an expensive, high standard and luxury health institution is evident.

How to develop an efficient and appropriate healthcare building and building system based on rational economic base is a great challenge to Chinese architect. In short, opportunity is co-exist with challenge to us.

In order to improve the quality of healthcare facility design, capacity and quantity of architectural planning and design are playing a very important role. How to strengthen this point is one of the key issues.

Indeed, more healthcare projects were co-designed by home and foreign firm, more training course on healthcare architecture design was included in several universities. These reflect the willingness of this aspect. However, for creating and building a good healthcare service system, it is still a long way to go for Chinese architects.

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