Trend of Healthcare Architecture in China

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

2) Semi-compacted type:
   - Fo Shan hospital, 940 bed
     Fo shan City, Guangdong Province
   - No.1 Teaching Hospital, Beijing University
     1000 bed, Beijing City
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).
Some typical examples are as follows:
- Chang Zheng Hospital, 34 story, Shanghai City
- Wuhan Hospital, 34 story, Wuhan City, Hubei Province

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.

3.5 Higher building standard

Economic development has lead 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

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
   - JMGU (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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