

A Study on the Architectural Characteristics and Development Trend of Nursing Unit of General Hospitals in Qingdao

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Abstract

Development of a hospital ward is deeply influenced by society, economy, science and technology and culture, and is closely interrelated to the medical demand, medical technology, hospital management and medical care delivery model. Also, the medical building mode in turn constrains the implement and development of medical care.

This paper takes general hospitals' nursing unit in Qingdao, China as the research object. Theoretical studies, some site visits, interview and analysis of various characteristics of inpatient building are made to find out future development direction of nursing unit design and construction. Improvement of nursing support area, expansion of the use space of multi-bed rooms, provision of private washroom in patient rooms, establishment of multi-level patient rooms, provision of social support space and adoption of decentralized nurses' station can be included in the development directions of nursing unit.

Keywords : General Hospital, Inpatient Building, Nursing Unit, Development Direction, Qingdao

1. INTRODUCTION

The development of hospital ward is deeply influenced by society, economy, science and technology, and local culture and is closely interrelated to the medical demand, medical technology and hospital management. Every kind of medical care delivery model requires a corresponding medical building mode to accommodate it, which greatly promotes the development of medical buildings. Also, the medical building mode in turn constrains the implement and development of medical care.¹⁾

Due to the rapid development of economy and society, along with the highly improvement of science & technology and medical levels in China, the nursing concept has changed greatly from disease-centered care which deals with treating the disease alone to patient-centered care that cares for the patient with the disease, in which various factors like

social upbringing, physiological conditions of the patient, mental well being, general health and even religious beliefs are taken into account to assess the best form of treatment. Also, the care delivery model is changing from functional care delivery to primary care delivery. Therefore, the way to prevent the functional aging of medical building, to enhance the capability of development and adaptation, and to create the conditions for sustainable development in the future have become one of the most important issues in hospital design and construction.

This paper aimed to analyze the present situation and further development of medical health and facilities in China, and the architectural characteristics of inpatient buildings of general hospitals in Qingdao to find out the development direction of nursing unit of general hospitals in Qingdao and suggest some references for future hospital design and construction.

In this research, six upper first-class general hospitals in Qingdao which stand for the local highest medical level were chosen as the research objectives. Summary information of these hospitals are listed in Table 1.

As the research method, the current situations of medical health care and nursing in China and Qingdao general hospitals were analyzed, theoretical materials were collected

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1) Luo, Yunhu, Design of Modern Hospital Architecture, 1st ed., China Architecture and Building Press, Beijing, 2003, p.1.

together with related drawings, documents & literatures, and questionnaire & interview were executed through the site-visit.

Table 1. Information of Sample Hospital

Name of Hospital	No. of Beds	Site Area(m ²)	Floor Area (m ²)	Form of Ward Building
Hosp-1	1,995	130,000	200,000	Vertical
Hosp-2	650 (1160)	67,932	72,000 (134,000)	Vertical
Hosp-3	420	22,600	20,000	Horizontal
Hosp-4	600	58,000	76,000	Vertical
Hosp-5	880	93,000	100,000	Vertical
Hosp-6	2,000	292,000	223,000	Vertical

Hosp-1: The Affiliated Hospital of Medical College Qingdao University(Teaching Hospital)
 Hosp-2: New Qingdao Women and Children Hospital
 Hosp-3: Qingdao Combined Western and Traditional Chinese Medicine Hospital(General Hospital)
 Hosp-4: Qingdao Eighth People's Hospital(General Hospital)
 Hosp-5: New Qingdao Central Hospital(General Hospital)
 Hosp-6: Qingdao Municipal Hospital(General Hospital)
 () means new hospital in construction

Date of site-visit: 2013.7.7-2013.7.25

2. PRESENT SITUATION AND DEVELOPMENT OF MEDICAL HEALTH CARE AND FACILITIES IN CHINA

Since the founding of the People's Republic of China in 1949, and the beginning of the reform and opening-up in particular, health care sector has made remarkable achievements in China. However, there is still a rather prominent contradiction between the current development level of health care sector and the people's health demands and the requirements of balanced socio-economic development²⁾.

2.1 Inadequate health funds by government

In recent 30 years, with the rapid growth of national economy, the GDP per capita has been increased quickly from 309 dollars in 1980 to 4,394 dollars in 2010. Meanwhile, the investment for medical health has been continually increased and the ratio of total health expenditure to GDP also has gradually risen from 3.15% in 1980 to 5.01% in 2010, but still below the average 8.1% across the developed countries and the average 6.2% across the developing countries³⁾, which indicated a increasing trend and a large space to improve in medical and health investment.

2) Opinions of the CPC Central Committee and the State Council on Deepening the Reform of the Medical and Health Care System, 2009.3.17 (http://shs.ndrc.gov.cn/ygjd/ygwj/t20090408_271138.htm)

3) Homepage of Tianto Information Consulting Co., Ltd. (<http://www.tiainfo.com/news/news3795.html>)

2.2 Unreasonable allocation of the medical and health care resources in urban & rural areas

It was reported that in China 80% of the medical resource were allocated in urban areas, of which 80% were allocated in large and best general hospitals⁴⁾.

Before 2009 most of the resources were invested in big general hospitals in urban areas, neglecting small hospitals⁵⁾, from 1998 to 2003, 80% of the government investment were poured into large and best general hospitals in urban areas. According to the Opinions of the CPC Central Committee and the State Council on Deepening the Reform of the Medical and Health Care System, since 2009 efforts has been made to enhance the utilization efficiency of medical and health resources and the newly added health resources must be in conformity with regional health planning, and priority will be given to weak areas such as rural and community health services⁶⁾.

In China, because of lack of medical equipment, poor medical condition, lack of general practitioner, and skilled medical staff, only 22.5% of the patients are willing to visit community medical centers⁷⁾.

2.3 Lack of long-term care hospital beds

Recently the number of acute hospital beds per 1,000 population has declined from 6.0 beds in 1980s to about 3.0 beds in 2000s due to the provision of long-term care hospital beds in community-based hospitals and specialty hospitals in most developed countries.

At the same time, the number of hospital beds per 1,000 population in China had gradually risen from 2.02 beds in 1980 to 3.56 beds in 2010, which had reached near to those of developed countries in 2000s.

However, because of poor medical condition and lack of long-term care beds in primary health care institutions, a lot of acute-care beds in general hospitals were occupied by patients who should be cared in primary health care

4) China's New Health Resource Will Shift to Rural and Community Area, Sina News, 2009.4.6 (<http://news.sina.com.cn/c/2009-04-06/185817556515.shtml>),

5) Community Hospital is the Key Point and Breach to Medical Reform, Xinhua News, 2009.3.11 (http://news.xinhuanet.com/comments/2009-03/11/content_10987768.htm)

6) China's New Health Resource Will Shift to Rural and Community Area, Sina News, 2009.4.6. (<http://news.sina.com.cn/c/2009-04-06/185817556515.shtml>)

7) Community Hospital is the Key Point and Breach to Medical Reform, Xinhua News, 2009.3.11. (http://news.xinhuanet.com/comments/2009-03/11/content_10987768.htm)

institutions⁸⁾(see Table 2). Considering the lack of long-term care hospital beds in China and severe aging problem, there will be a increasing need for long-term hospital care beds in future and more long-term care hospital beds should be provided for the patients.

Table 2. Number of Outpatients & Inpatients in Health Institutions in 2011

Institutions	Outpatients		Inpatients	
	Number (100 Million)	Proportion (%)	Number (10,000)	Proportion (%)
Hospital	22.59	36.0	10755	70.3
Primary Health Care Institutions	38.06	60.7	3775	24.7
Others	2.07	3.3	768	5.0
Total	62.71	100.0	15298	100.0

(Source: China Health Statistical Yearbook 2012)

With the reform of Medical and Health Care System, community healthcare center will be actively carried on a large scale along with the improvement of medical condition, and then the community health center will become the first choice of patients. In the near future, hospital construction may transfer from the expansion of hospital scale such as quantity of beds to the improvement of hospital quality like work efficiency and distribution of medical resource.

3. ARCHITECTURAL CHARACTERISTICS OF INPATIENT BUILDING OF GENERAL HOSPITALS IN QINGDAO

3.1 Building Form of Inpatient Buildings

Table 3. Site Area and Site Area per Bed of Sample Hospital

Name of Hospital	No. of Beds	Site Area(m ²)	Site Area/Bed (m ²)	Form of Ward Building	Completion Time of Ward
Hosp-1	1,995	130,000	65.2	High-rise	2000s
Hosp-2	650 (1,160)	67,932	58.6	High-rise	2010s
Hosp-3	420	22,600	53.8	Low-rise	1980s
Hosp-4	600	58,000	96.7	High-rise	2000s
Hosp-5	880	93,000	105.7	High-rise	2010s
Hosp-6	2,000	292,000	146.0	High-rise	1980s(W) 2000s(E)

(W) : West Branch of Hosp-6

(E) : East Branch of Hosp-6

Before 1980s, most of the Chinese hospitals were low-rise buildings. Since the booming of reconstruction and expansion of hospitals, the site area per bed declined greatly(see Hosp-2 in Table 3). Because of the limited site area, vertical

building became more popular.

In the six general hospital, only one hospital(Hosp-6) meets the requirement of Construction Standard for General Hospital⁹⁾(See Table 4), and most of the hospital site area per bed are much lower than the required standard.

Table 4. Standards of Site Area/Bed for General hospital Construction

Scale(Bed)	200-300	400-500	600-700	800-900	1,000
Site Area/Bed (m ²)	117	115	113	111	109

(Source: Construction Standard for General Hospital)

In recent hospital buildings, although more elevators and materials such as steel, concrete and fire-fighting equipment are used, more energy is consumed and more floor area are occupied by pipeline wells and equipments, in order to save more space for outpatient department and medical support department and have more land for green coverage and future expansion, high-rise building may become a better choice due to the limited site.

On the other hand, some hospital authorities like to build ostentatious projects in order to make a good impression or show their achievements, so more attentions were paid to the image of buildings trying to make the hospital buildings to be a landmark, placing undue emphasis on the height of the buildings in the recent hospitals.

3.2 Configuration and Layouts of Nursing Unit

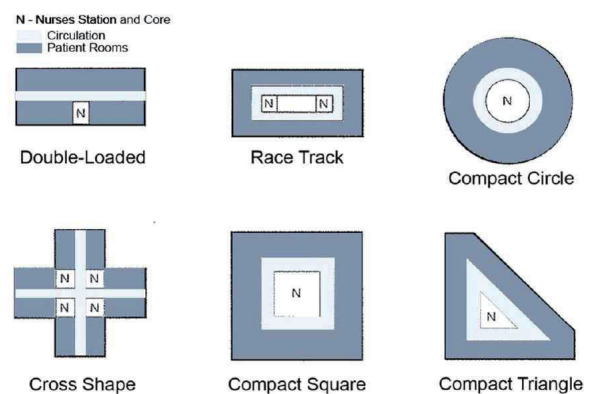


Fig.1 A variety of configurations of nursing unit

A typical nursing unit is composed of patients room, nurses' stations, a core of support spaces, training spaces and hallways. Some of the more common unit configurations include the triangle, square, circle, cross and racetrack layouts¹⁰⁾(See Fig. 1).

8) Going Deep into Medical Reform: How to Make the Community Hospital Popular, HXYJW News (<http://news.hxyjw.com/yigai/2582536/>), 2013.6.13

9) Ministry of Health of the People's Republic of China, Construction Standard for General Hospital, 2008.

In 1980s, because of good natural light and ventilation, south-faced orientation and simple structure, single-loaded is a common form of nursing unit¹¹⁾(see Fig. 2). In the design, the patient rooms are arranged in the south side of the unit and the support space and training spaces are arranged in the north side to allow all the patient rooms get enough natural light and ventilation.

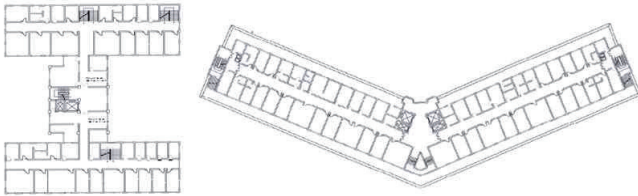


Fig. 2 Typical Floor Plan of Hosp-3 and Hosp-6 West Branch

In 1990s and 2000s, with the expansion of unit scale and increasing of walking distance from nurses' station to patient rooms, the race track were adopted(see Fig. 3) with the patient rooms arranged around a core of support space outside the unit, emphasizing the reduction of travel distance between nurses' station and patient rooms and the improvement of efficiency. While some of the patient room can not get sunlight and the support space in the core of the unit can not get natural light and ventilation and reduce the cross-ventilation.

In 2010s, a combination of single-loaded and race track came into use, which emphasizing allowing as much patient rooms as possible to get natural sunlight and ventilation and exclusive work area for medical staffs. In this design, main support spaces such as nurse station and treatment room are arranged in the center of the unit and other support spaces such as meeting room, doctor's office and lounge are arranged behind the nurse station with exclusive elevators and hallway(see Fig. 4).

3.3 Composition and Space Allocation of Functional Area in Nursing Unit

In nursing unit, functional area consists of bedroom area, day room and other public area for patients, nursing area, training area, service area and circulation area(see Table 5)¹²⁾.

10) Watkins, Nicholas et al. Accountable design for accountable care, Homepage of McGraw-Hill Research Foundation (<http://mcgraw-hillresearchfoundation.org/>), 2013.3.

11) Luo, Yunhu, 2003, p.151.

12) Kwon, Soonjung et al, A Study on the Proportion of Functional Area

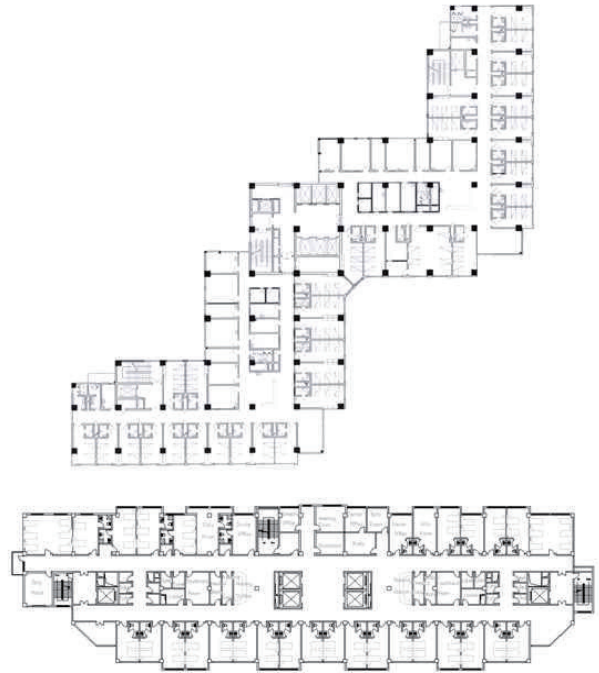


Fig. 3 Typical Floor Plan of Hosp-6 East Branch and Hosp-4



Fig. 4 Typical Floor Plan of Hosp-5 and Hosp-2

In Qingdao general hospitals, the total area of a nursing unit on average is 1019.3m². In terms of the proportion of different functional areas, the bedrooms takes the biggest proportion 45.9% followed by the circulation space 23.6% and nursing support space 13.3%, which is similar to Korean hospitals¹³⁾.

as in the Ward of General Hospital, Korea Institute of Healthcare Architecture, Vol.17, No.4, 2011.11, pp.49-55.

13) Kwon, Soonjung et al, 2011.11, pp.49-55.

Table 5 Space Allocation of Functional Area of the Nursing Unit

	Bedroom	Dayroom & Public WC	Nursing Support Space	Training Space	Service Space	Circulation Space	Total Area	Type of Nursing Unit
Hosp-1	493.7 (41.9)	107.7 (9.1)	139.8 (11.9)	97.7 (8.3)	43.1 (3.7)	295.5 (25.1)	1177.5 (100)	Race Track
Hosp-2	570.1 (37.9)	73.9 (4.9)	191.7 (12.8)	115.0 (7.7)	61.2 (4.1)	491.3 (32.7)	1503.2 (100)	Race Track Single Corridor
Hosp-3	280.7 (46.1)	19.8 (3.3)	60.4 (9.9)	60.8 (10.0)	11.8 (1.9)	175.4 (28.8)	608.9 (100)	Single Corridor
Hosp-4	426.1 (44.8)	33.4 (3.5)	160.6 (16.9)	78.1 (8.2)	32.6 (3.4)	221.1 (23.2)	951.9 (100)	Race Track
Hosp-5	586.9 (56.3)	26.2 (2.5)	115.0 (11.0)	82.4 (7.9)	36.0 (3.5)	196.8 (18.8)	1042.8 (100)	Race Track Single Corridor
Hosp-6	322.2 (46.2)	35.7 (5.1)	120.5 (17.3)	68.2 (9.8)	17.6 (2.5)	132.8 (19.1)	697.0 (100)	Single Corridor
	552.3 (47.9)	109.6 (9.5)	149.6 (13.0)	95.8 (8.3)	42.0 (3.6)	204.2 (17.7)	1153.5 (100)	Race Track Single Corridor
Average	461.7 (45.9)	58.0 (5.4)	133.9 (13.3)	85.4 (8.6)	61.3 (3.2)	245.3 (23.6)	1019.3 (100)	-

Nursing Support Space : nurses' station, treatment room, disposal room, dressing room, pantry and nurse duty room etc.

Training Space : demonstration room, doctor's office, doctor's duty room and meeting room etc.

Service Space : switching room and cleaning room etc.

In Hosp-2, there is a sharp increase in circulation area compared with the increase of bedroom area. Because there is only one nursing unit in each story without another nursing unit to share the circulation space, the proportion of circulation space is as high as 32.7%, much higher than the average 23.6%, making the proportion of bedroom space the lowest 37.9%, which means that only one nursing unit in each story is not economic. While in Hosp-5, a combination of double-loaded and race track layout was used to reduce the circulation space and to get more patient room area, making the proportion of bedroom as high as 56.3%.

4. DEVELOPMENT DIRECTION OF THE NURSING UNIT OF GENERAL HOSPITAL IN QINGDAO

Inpatient department is an important part of hospital that provides a place for inpatient to live and receive treatment. A reasonable design of nursing unit can provide support for work efficiency and quality of care.

With the reform of Medical and Health Care System, community healthcare center will gradually become the first choice for long-term care patients. In near future, hospital construction will transfer from the expansion of hospital scale such as quantity of beds to the improvement of hospital quality like work efficiency and better healing environment.

4.1 Site Selection and Architectural Form of Inpatient Buildings

Economic development has lead to a willingness of upgrading living quality and either urban or rural inhabitant requires a higher level of health services.

In near future, it may be appropriate to build a general hospital in urban fringe area with the connection of subway that provides convenient transportation. Besides sufficient lands for construction, the urban fringe with beautiful scenery, fresh air, plenty of sunlight, less interference factors is conducive to the rehabilitation of the patients and can also reduce the negative impact of hospitals in densely populated areas.

Considering the high initial cost, running cost and low work efficiency of high-rise hospital buildings, compact and low-rise design concept such as "best buy hospital" may be a better choice for future hospital design. In this concept, as the hospital function is based on the horizontal principle with departments of related functions horizontally banded on the same level, the movement from one department to another flows freely and more stably, extraneous vertical movement can be minimized and flexibility and economy are permitted in the use of space and facilities. Besides, low-rise hospital buildings can be easily harmonized with natural environment, reducing the visual impact of what is a substantial building and providing a humane and reassuring environment for patients and staff with natural landscape and light¹⁴).

14) Moon, Changho, Sustainable Design Concepts of Hospital Standardization in UK, Symposium on 2009 China (Shanghai) hospital architect

4.2 Adoption of New Nursing Unit Design Concept

New design concepts need to be introduced and implemented in inpatient buildings. Although the race track nursing unit can reduce travel distance, these units require more square meters, and some support space in the center of unit can not get natural light & ventilation and reduce the cross-ventilation in the unit, increasing the dependency on mechanical ventilation and artificial illumination.

Compared to rectangular units, nurses in circular units can walk less distance and spend more time executing patient care activities¹⁵⁾, but this unit is suitable for 12-18 bedrooms and in those with multi-beds rooms, the core is not adequate to support the supply requirements¹⁶⁾.

Compared with other types of nursing unit, the triangular units(see Fig. 5¹⁷⁾) are optimal for a variety of reasons such as minimal walking distance due to compactness, utilization of available space and maximum daylight exposure¹⁸⁾.



Fig. 5 Triangle Nursing Unit of Some Korean Hospitals

4.3 Development in Functional Space

1) Improvement of nursing support area

In the past, nursing practice focused only on nursing patients. In the design and construction of inpatient building, the physical and psychological need of nursing staff were neglected, and usually the nurse' duty room and lounge were located in a bad location with a small area even without natural light and ventilation, so proper measurement is needed.

In the interview with nurses, they complained that long hours of work in space without sunlight made them depressed, so a sunroom needs to be provided for nursing staff.

In some ward, nursing support space such as treatment room and nurses' station(see Fig. 6) is small, and some equipment have to be placed in the corridor(see Fig. 7). In order to support the practice, more space is necessary to make the treatment room large enough for two treatment carts at least.



Fig. 6 Nurses' Station of Hosp-6



Fig. 7 Corridor of Hosp-3

2) Expanding the usable space of multi-beds room

In some hospitals, area of multi-bed room is not enough for nurses' practice. In most multi-bed room, net distance between adjacent beds is only 0.8m(see Fig. 8), just meet the basic requirement on care practice. In this case, the division of adjacent beds has to use I or L shape curtain(see Fig. 9). According to research, net distance between two beds should not less than 1.2m¹⁹⁾, considering the division of adjacent beds, 1.5m is a better distance to support nursing staff's practice and patients' daily life.



Fig. 8 Multi-bed Room of Hosp-3



Fig. 9 Division Curtain of Hosp-6

3) Provision of private washroom in patient rooms

With the improvement of living standard, people's demands for complete amenities are getting higher and higher. However, in most wards built in 1980s, there is no private washroom in patient room, even in some wards built in 2000s, there is no washroom in multi-bed room, walking a long distance to the public washroom brings some trouble to patients and private washroom become an indispensable part of patient room.

4) Establishment of a multi-level patient rooms

In general hospitals of Qingdao, number of beds per

ture design and equipment international conference and exhibition, 2009.4, pp.274-285

15) Watkins, Nicholas, et al. 2013.3.

16) Hamilton D K., Design for patient units, Healing by Design: Building for Health Care in the 21st Century, 2000.

17) Moon, Chang-Ho, A study on the Architectural Characteristics in Recent Hospital Design, Journal of The Architectural Institute of Korea, 2008.11, p.19

18) Watkins, Nicholas, et al. 2013.3.

19) Luo, Yunhu, 2003, p.168.

nursing unit(NU) ranges from 32 to 44 and average number is 38.0, which is still much higher than the general hospitals of developed countries(less than 30beds/NU²⁰). Especially in recent inpatient buildings, number of beds per NU expanded to about 40 beds due to the increase of inpatients.

In terms of patient room types, two-bed room and three-bed room are in majority, usually accounted for more than 60% and single bed room, four-bed room and six-bed room take only a very small proportion of the total patient rooms(see Table 5). And according to the interview with patients, two-bed room and three-bed room are most favored for less noise and more privacy and space, while six-bed room are not welcomed because of more noise and less privacy and four-bed room is an acceptable choice for patients due to less financial burden.

In all types of patient rooms, only the basic living goods such as storage cabinets, chairs and a bedside cupboard are provided.

Since the general hospitals serve various income social stratum, multi-level patient rooms with corresponding furnishings need to be constructed to provide a variety of choices for different income social groups. So more single-bed rooms with complete facilities need to be provided for the high income group to improve their living standard while four-bed rooms with basic living goods need to be provided for low income group to relieve their financial burdens.

5) Provision of social support space

A sunroom or day room is a good place for patients and their families to bathe in the sun to have a rest and talk. However, only a few hospitals provided sunroom or day room for patients and their families. In the interview, it is found that a sunroom was requested by both patients and nursing staff.

6) Adoption of decentralized nurses' stations

Maximum travel distance refers to the distance from the exit of the nurse station to the door of the farthest bedroom. It is an important evaluating indicator to increase the time of care and reduce the nursing staff's fatigue to improve the quality of care²¹). According to the nursing staffs, the maximum travel distance is too long(see Table 6) to reduce

the time of care and cause a physical fatigue, and in the nursing staff's opinion, about 20m is a reasonable maximum travel distance, which can considerably reduce the travel distance and relieve fatigue.

Table 5 Composition and Proportion of Patient Rooms

	No. of Beds/Unit	1-Bed Room	2-Bed Room	3-Bed Room	4-Bed Room	5-Bed Room	6-Bed Room
Hosp-1	36		10 (71.4)		4 (28.6)		
Hosp-2	40		6 (46.2)		7 (53.8)		
Hosp-3	39	2 (18.2)	1 (9.1)	3 (27.3)	2 (18.2)		3 (27.3)
	34	2 (16.7)	5 (41.7)	2 (16.7)	1 (8.3)		2 (16.7)
Hosp-4	35		10 (71.4)	3 (21.4)			1 (7.2)
	32		13 (92.9)				1 (7.1)
Hosp-5	40	2 (13.3)	4 (26.7)	8 (53.3)			1 (6.7)
	40	2 (14.3)	1 (7.1)	10 (71.4)			1 (7.1)
Hosp-6	40	3 (21.4)	2 (14.3)	7 (50)			2 (14.3)
	44		10 (55.6)	8 (44.4)			

Table 6 Maximum Travel Distance(m) of Nursing Unit

	Hosp-1	Hosp-2	Hosp-3	Hosp-4	Hosp-5	Hosp-6	Average
Maximum Travel Distance	28.1	35.3	31.6	40.6	36.7	$\frac{23.0}{37.9}$	33.3

Considering the nursing model change from functional nursing care delivery model to primary nursing care delivery model, decentralized nurse station may be a good choice for the future nursing unit design.

A decentralized layout can improve work efficiency through bringing staff and supplies physically and visually closer to the patient causing a reduction in time spent walking by nurses and a corresponding increase in the time spent in direct patient care activities²²).

5. CONCLUSION

This paper aimed to analyze the present situation and further development of medical health and facilities in China, the architectural characteristics of inpatient buildings of general hospitals in Qingdao, and find out the development direction of nursing unit of general hospitals in Qingdao.

22) Dutta R., Influence of Nursing Unit Layout on Staff Communication and Interaction Patterns, A Master Thesis Presented to the Faculty of the Graduate School of Cornell University, 2008.

20) Moon, Chang-Ho, 2008.11, p.19

21) Luo, Yunhu, 2003, p.150.

For a long term, there is still a rather prominent contradiction between the current development level of China's health care sector and the people's health demands and the requirements of balanced socio-economic development.

However, with the reform of the Medical and Health Care System, the situation of uneven development of health care undertakings between urban area and rural area, unreasonable allocation of resource and weak work on rural and community health care will be greatly improved.

Under this situation, in near future, hospital construction may transfer from the expansion of hospital scale such as quantity of beds to the improvement of hospital quality like work efficiency and medical environment.

In urban area, conditioned by limited site area and people's preference for high-rise building, vertical inpatient building will continue to be in a dominate position in future hospital construction.

In urban fringe area, it is appropriate to introduce low-rise design concept for future hospital design to improve efficiency, flexibility & economy of space and quality of healing environment.

In 1980s, single-loaded nursing unit was a common form of nursing unit. In 1990s and 2000s, a racetrack type become popular in nursing unit design and construction due to the expansion of nursing unit scale. In 2010s, a race track type with patient rooms in the south side and a dedicated space for nursing staffs is welcomed.

New design concept of nursing unit such triangle unit might be introduced with advantages of minimal walking distance, flexibility, utilization of available space and maximum daylight exposure.

Development directions of nursing unit include improvement of nursing support space, expansion of the usable space of multi-bed rooms, provision of private washroom in patient rooms, establishment of multi-level patient rooms, provision of social support space and adoption of decentralized nurses' station.

A good nursing unit is the result of comprehensive consideration of various factors. Further research on the architectural plan layout of nursing unit need to be continued.

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