

Design Principle about Chinese Hospital with Combination of Medical Care and Pension in the Twenty-first Century

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Abstract—Pension problem and medical issues are important issue which arouse many discussions about Chinese society at this stage. The "integration of medical and nursing" pension model is the complementarity of medical institutions and pension institutions in the function of mutual integration of resources. Solving the traditional "medical and nursing separation" old-age care model has led to the contradiction between the supply and demand of medical care and long-term care for the elderly in the old-age care process, and a series of problems caused thereby, which has become a new type of old-age service model. Based on the background of aging, the demand of social pension is increasing day by day. In the face of the continuous development of aging, the plight of shortage of pension resources. Based on the analysis of pension buildings at home and abroad, this paper puts forward a new mode of "Medical Support Integration" architecture, and summarizes the design points of the pension medical care combined architecture. The purpose of this paper is to provide design basis for the construction of comprehensive and sustainable pension buildings, alleviate the plight of the elderly, and from the perspective of the elderly, fully consider the elderly physical and mental needs, improve the integration of medical and nursing care space, and create a paradise for the elderly.

Index Terms—architecture, space design, medical and nursing integration, elderly

I. BACKGROUND

Population aging is a problem that Chinese society cannot ignore in the next several decades. According to the internationally general definition, when the percentage of the aged population of a country or region above 60 years old accounts for 10% of the total population, or the aged population above 65 years old accounts for 7% of the total population, it means that the population of the country or region is in an aging society [1]. By 2015, China had 143.86 million people aged 65 or above, which occupied almost 10.5 percent of the whole population. In 2016, the World Health Organization (WHO) released by the national assessment report on China's aging population and health, said that "in the process of China's aging population than many

low-income and high-income countries, in the next 25 years is expected to more than double." [2]

The aging problem will urgently affect the medical and public resources in Chinese society. The acceleration of aging will have a great impact on the economic expenditure of families and social health care. The emergence of "medical and nursing" integrated hospital is of great significance for China to deal with the rapid aging process in the future.

II. INTRODUCTION OF MEDICAL& NURSING INTEGRATION

"Medical& nursing integration" It is a social service building integrating social resources. It is a service model integrating medical treatment, nursing, rehabilitation, and basic old-age care facilities, life care and barrier-free activities [3]. The mode of "medical and nursing integration" provides huge benefits to social public service resources which brings convenience to elder's health physically and mentally.

"Medical and nursing integration" has facilitated the daily life of the elderly. The traditional old-age care model only concentrates on providing basic living needs for the elderly to satisfying their basic material requirement. With the increase of age, the physical functions of the elderly are decline. The prevalence increase. At the same time, the recovery ability is weak, and the recovery time is longer than the younger generation. Therefore, the "medical and nursing integration" service model is a supplement for the traditional method. This new integration emphasized both medical and nursing aspects and put medical services as the first priority.

Medical and nursing integration fixes the problem of professional medical services lacking in traditional nursing homes. This integration is particularly important for some elderly patients who suffer from acute and chronic diseases. Currently, less than 60% of pension institutions are equipped with simple medical rooms. Less than 20 percent of institutions have rehabilitation rooms. 22.3 percent of pension institutions have neither a separate clinic nor a medical professional [3]. Therefore, elderly people who suffering from acute diseases need to seek professional medical help from nearby hospitals

when they come to the hospital, which will undoubtedly waste precious rescue time. For elderly people with chronic diseases, the medical care unit provides more daily care and hospice care services than the traditional hospital. With the deepening of the aging degree in China, the population of disabled old people keeps growing, and the demand for the medical service market is increasingly urgent. The service mode of "medical and nursing integration" includes health consultation, physical examination, disease diagnosis and treatment, daily nursing service, hospice care, etc. It combines medical service with the needs of the elderly, and can better meet the current social needs. Therefore, medical and nursing integration is the complementary and integration of social resources, which is a solution to the previous dilemma of "medical and nursing separation" in China.

Medical treatment and recuperation are the main functions of the integrated medical and nursing mode. However, due to the difference in emphasis, there will be different choices in terms of overall layout and building site selection

II.1. Medical treatment as first priority

Building a new nursing home next to a hospital with specialized medical resources. So that we can directly with the existing professional medical resources to reduce new building raising medical input in the construction of traditional Chinese medicine, this choice and at the same time can provide the original hospital with more old-age care needs of social resources, optimize the procession of the original hospital medical resources occupied in maintenance, and then realize the complementary social medical resources and efficient use. But there are drawbacks to this approach. Because the hospital does not belong to the nursing home system, it will produce the routine function inconvenience, easy to produce the work docking problem [4].

II.2. Dominated medical treatment with auxiliary nursing

In addition to community hospitals and medical centers with professional medical staff to provide health examination and nursing services. This is also a common way of medical care in China at present. This way is very convenient for the elderly, and some of them can enjoy nursing and professional medical services at home. However, community hospitals are limited by large and expensive medical devices, and elderly patients with certain diseases still need to be treated in large hospitals.

II.3. The mode emphasizes on both medical treatment and nursing

Under this strategy, architectural design often contains complete functions which can create a large building complex or community to integrate the functions of medical care and elderly care, and provide medical and maintenance resources for elderly. The building will integrate all the functions, and the elderly patients can enjoy the complete facilities and services. For example, the Lanting nursing apartment in Hangzhou provides

medical treatment, rehabilitation care, catering and living services for the elderly.

In addition, many nursing homes in China prefer to choose places adjacent to kindergartens. The noisy atmosphere of the kindergarten did not affect the daily life of the elderly, but more elderly like to watch the children's play. This kind of communication is very beneficial to the physical and mental well-being of the elderly [5].

III. PRINCIPLES OF HOSPITAL SPACE DESIGN

Creating a comfortable space with medical services with long-term care system for the elderly are main design strategy for "medical and nursing integration". The design principles of the "integration of medical and nursing" buildings are basically the same as hospital space design. Color, light and sound play a significant role on people's space experience. Physically, when eyes are different color after stimulation, muscle function, and blood that is contracting inward or outward expansion will happen to the corresponding change, thus produce different emotional reactions and experiences, lead to different psychological feelings [6]. Besides, due to the multiple functions and the complex space, many hospital utilize color as a reminder of the function division to avoid the monochromatic space bringing boring experience. Hospital building form should not make public, intense, weird, so as not to cause the psychological feeling of restlessness [7].

Different spatial form has a different character. Architects use the spatial element to create an atmosphere, consciously, which can create a positive psychological and spiritual feelings for the patients.

These spatial elements include the interaction of personal space with other spaces in the room, closure and openness, spatial sequence and organization, physical factors such as area shape and height, and light exposure. Many hospital entrances and exits have transitional spaces, which can create independent architectural spaces separated from the exterior environment. Many hospitals have atriums inside the buildings to allow more sunlight into the interior spaces to create a warm atmosphere.

Free space is an indispensable part of the future "medical and nursing integration" design. In the plan layout, the rapidly developing medical technology department and emergency department can be arranged at the end for expansion [8].

Besides, movable walls allow the building to have a better respond to future demands. The scale of the interior should be in line with the usage habits of the elderly, the barrier-free design should be adopted in the toilets and the parking lot, and the slope and width of the ramp should accommodate the scale of the wheelchair.

IV. SPACE LAYOUT

There are two models of medical and nursing buildings in China. One is to add medical facilities in nursing homes, the other option is the addition of nursing homes and geriatric wards in hospitals. In the first model,

medical space accounts for an average of about 5 percent of the total area of elderly care facility in the second model, medical facilities account for about 10 to 20 percent [1]. The living rooms of the elderly are often

equipped with nurse stations and consultation rooms. Other medical functions in hospital can also provide services for elderly.

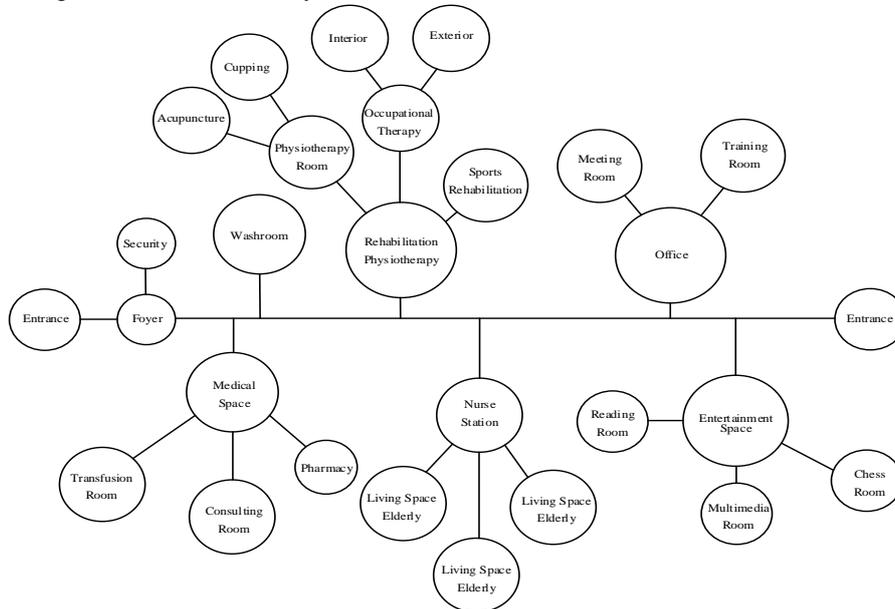


Figure 1. The space layout

V. PLAN LAYOUT STRATEGY

Comparing with the nursing homes, the medical and nursing buildings have different spatial layout strategy and traffic arrangement

VI. FUNCTIONAL LAYOUT



Figure 2. The functional layout

The design strategy is to combine rooms with similar functional types into one large quarter and the entire plan is composed of a different quarter. This design method has a clear partition and it is convenient for daily operation and management. All kinds of functional groups can operate independently with the close spatial relationship of each functional interval. Shinjuku Keyaki-en is a medicare and nursing home designed by a functional layout strategy. The traffic space is arranged in the middle of the two functional groups. The nursing area has a large public space, which has connected to the other while the facility also provides services such as fitness, bathing and entertainment for the elderly living

nearby. But the spatial orientation plan is weak, and caregivers often need to move between the two quarter

VII. ENCLOSED LAYOUT

The enclosed layout usually arranged medical rehabilitation space in an enclosed manner. In this strategy, public auxiliary space or the medical room and consulting room placed in the middle area, which is surrounded by elderly living and nursing quarters. The enclosed plan is a benefit to the elderly to have exchange activities and nursing services, save the transportation area, and the compact space layout enhances the connection between the central area and the surrounding functional areas, but it is easy to form some east-west rooms and form line of sight interference. Among them, the central area is the core of the whole layout and has the function of service.

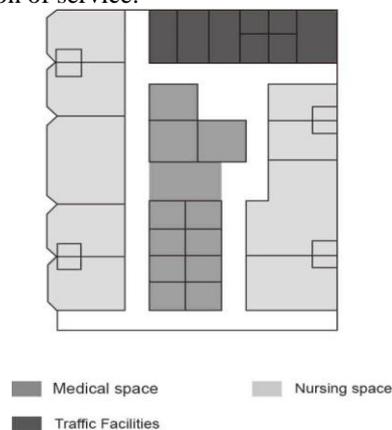


Figure 3. The enclosed layout

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VIII. FLAT LINEAR LAYOUT

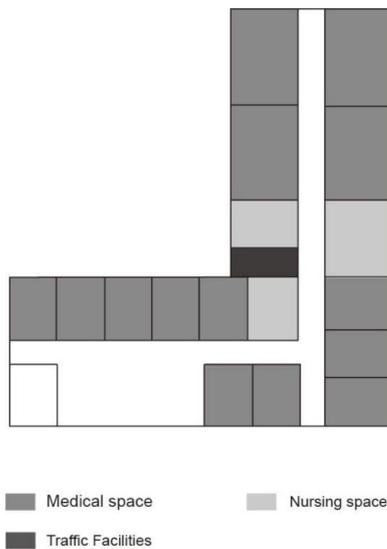


Figure 4. The flat linear layout

The flat linear layout is a common layout in the architectural plan layout, which is a concise spatial mode. The elderly bedroom ward is arranged along the corridor, and the medical rehabilitation space can be placed at the end of the corridor, or it can be connected to the traffic axis in a scattered way. In this design strategy, the room can be arranged on one side or both sides of the corridor according to the regional climate and other conditions. The arrangement of elderly living quarters could follow the corridor layout and medical rehabilitation space can be placed at the end of the corridor or take the form of scattered points connected in series on the axis of the traffic. The linear layout lacks enclosed space. Some medical facilities have arranged the interior green space, which not only improves the environment but also combines the traffic flow line with the courtyard, resulting in a landscape space combined with the functional space. The directivity of this strategy is clear and the overall building is a benefit to have a good orientation. However, because each group shares the traffic space, there will be congestion and poor accessibility. Therefore, flat linear layout is suitable for rehabilitation center setting with a small number of nursing wards.

IX. ELDER LIVING QUARTER

The main function of the living quarter is to maintain and nursing the daily life for the elderly. Compared with young people, the elderly experience a decline in physical function with age. The living quarter design should be based on the elderly daily requirement psychological and physiological. According to different ages, old people of different ages need different ways of nursing and medical care. As they get older, they will change from daily care to medical care [9].

The elderly usually suffer from senile diseases such as joint disease, insomnia, hypertension, and hypertension as they grow older. It can be divided into three different type according to different self-care abilities, which are Self-care elderly, Semi-disabled elderly and Disabled elderly.

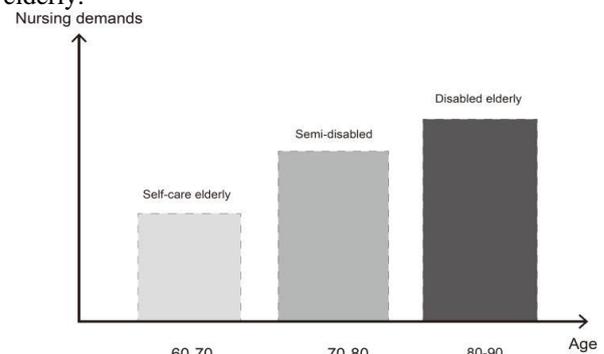


Figure 5. The elder living quarter

Self-care elderly people can achieve self-care, daily activities do not need to rely on help or tools.

Semi-disabled elderly, who need crutches, wheelchairs and other tools for daily living or rely on others for help.

Disabled elderly, this kind of life and living behavior of the elderly need to rely on the help of others to complete [10]. What old people need is not only a place to live, but also a place that can provide emotional communication and family reunion [11].

In the internal spatial organization in nursing nursing homes, there are two strategy: firstly, the W living unit is superimposed on the vertical space as a standard floor. The other is that the living, medical and public activity space is connected by horizontal transportation to form the ground floor and the high-density model [12].

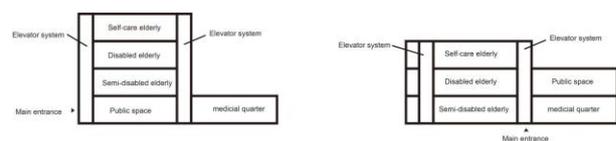


Figure 6. The spatial distribution

The living should include activity space, living space (living room) and medical space. The design of the living room should take the acute or chronic diseases as a design requirements for designs, instead of creating a unified standardized room. The nursing needs of the elderly vary depending on their ability to take care of themselves, and these levels of care require different care

facilities and living spaces. Special conditions such as alzheimer's and epilepsy require more care. What old people need is not only a place to live, but also a place that can provide emotional communication and family reunion. [13]

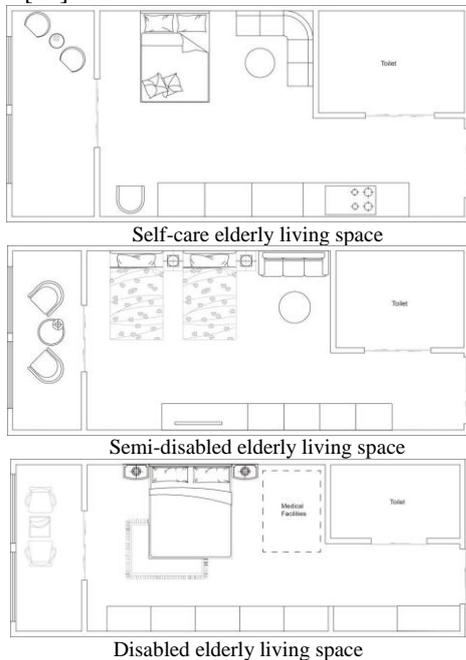


Figure 7. The classification of elderly living space

Besides, mental health is a significant issue cannot be ignored. The changes in social roles and status brought by retirement have cause different degrees of psychological changes to the elderly. Due to the change of social roles and environment, many elderly people need more communication and sense of belonging, which also leads to their yearning for companionship and nostalgia.

According to the different health of the old person and body condition, living room should have different configuration.

The nursing mode of self-care elder living space could mainly for medical care. Besides meeting basic functions such as the sitting room, the indoor space can also add some interior activity space. The bedroom space that takes care of oneself type old person does not need to be equipped with special medical treatment service facility commonly inside the bedroom space, the bedroom is commonly double room or single room.

Semi-disabled elderly needs assistance from nursing staff. In order to facilitate the care and improve service efficiency, the semi-disabled elderly living space usually have double and quadruple rooms. Companion beds can be set up in the room. The interior functions satisfy the basic daily requirement, while also leaving enough space for wheelchairs to pass through

The life of Disabled elderly is mainly based on nursing. Emergency call system is set up in the room so that the elderly can get opportune assistance in case of emergency. Partition should be set inside the room, appropriate uses intelligent automatic nursing bed and emergency rescue device

The bathroom is the place that accident happened easily because this is in when designing a toilet, should regard safety and convenience as a design gist. The toilet should separate into dry space and damp space. Protection and ventilated is the first priority of the whole strategy. The wet area includes a bathroom and its auxiliary area and the interior decoration and transformation should follow elderly demand. On the other hand, the bathroom also needs extra space for staff to assist the elderly. At the same time before the bathroom also should have enough preparation space in order to facilitate the elderly clothing replacement, the size of the space of the locker room should meet the needs of storage and changing clothes. The preparation space should be equipped with a seat for clothes changing and install handrails. At the same time, the floor of the bathroom also should have prevented slippery processing, there is armrest on metope, the bottom of lavabo also should have space for a wheelchair to use.

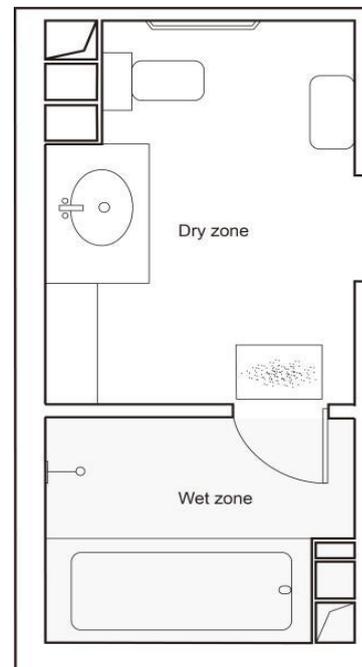


Figure 8. Wet and dry zone

X. MEDICAL SPACE

The nursing station is the core of the nursing quarter, which is also interconnected with the space of elderly people's living room. Its mission is to support the daily care of the elderly in the living quarter. The nursing station plays an important role in the medical and nursing architecture. It is a bridge connecting maintenance and medical care. The role of the nursing station is to deal with the acute emergencies of the elderly and to provide daily care needs.

The main task of nursing staff is to prepare daily nursing documents, register the health status of the elderly, receive the doctor's command information for the elderly configuration to take medicine. Besides many nursing staff also assume elderly food and laundry. Therefore, the nursing station should be equipped with

auxiliary facilities, such as a nursing table, working table and chair, data and medical records cabinet and software control, and should be closely associated with the dispensing room, observation room, treatment room, dispensing room, and other medical auxiliary rooms. The area of the nursing station is about 20m to 30m, and the service radius is controlled within the range of 30m to 40m. When the service is provided to the elderly with disability and dementia, the service radius should be controlled below 30m.

The elderly emergency treatment can be divided into three stages. Firstly, the rescue measures are carried out by staff in the emergency room. The patients will be transferred to the comprehensive hospital by the ambulance after the condition is under control. Secondly, the hospital needs to prepare for rescue and treatment in advance. Finally, after the remission, the elderly patients were taken back to the nursing home for rehabilitation treatment and nursing. The emergency room is mainly responsible for the emergency rescue and treatment of the acute disease. Emergency room of integrated medical and nursing building is different from that of the emergency room of the general hospital. In addition, the location should be close to the main entrance of the building, close to the layout of the clinic for the aged and equip with independent entrance.

The hospice room is the last station for the elderly and its role is to help the elderly to have a harmonious final time, the overall internal design layout should be soft and comfortable with warm color decoration. Besides, the hospice room needs a comfortable orientation, which could make the elderly have a better view of a good mood. Privacy is also significant element for hospice room. And the nursing equipment shielding in scope, and the old, the best atmosphere of weakening of the nursing institutions, set up family accompanied area, let the old man at the last time to enjoy the company of family

Apart from medical and living space, the medicare and nursing home also needs to provide the necessary space for the elderly's daily entertainment activities. These activity spaces need to ensure sufficient sunlight and sunshine time. The entertainment activities mainly include those that do not generate noise, such as reading calligraphy and painting, and indoor sports which might create noise, such as chess and table tennis. Therefore, in the design, different activities should be arranged according to the noise. These activity spaces are also significant places for the elderly to communicate with each other. Some nursing homes also have dance rooms, but the elderly people who choose medical and nursing mode generally have weaker mobility, and some are disable elderly. Therefore, the activity space area can be adjusted according to the percentage of disable elderly and their mobility. The reading space need a quieter atmosphere, and it can also be combined with the outdoor landscape or garden, which allow elderly have more opportunities to close to the nature

The elevator lobby should be given room for rest and seating, and there should be enough room for a wheelchair or stretcher. Turn traffic space should avoid

bulge obstacle and acute Angle, setting barrier-free corridor and stair armrest, such as a long corridor should be set to rest space, space puts sofa seats, recessed appropriately on the end of the corridor is best not to set up the be born glass, preventing the old man read collision accident due to decreased vision, set up the old elevator, can be appropriately to button alone before, stair set elevator in response to a particular situation.

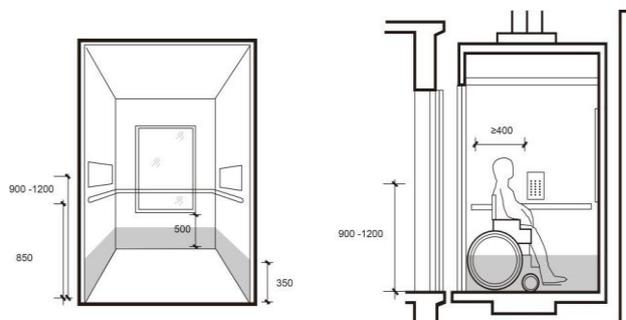


Figure 9. The medical space

XI. CONCLUSION

As China's aging problem becomes more and more prominent, medical care and elderly care are becoming increasingly inseparable. The integrated medical and nursing model is still in the exploratory stage in China, and there is still much room for development in the design of the integrated medical and nursing model. The principle of integrated medical and nursing design is still based on the physical and psychological needs of the elderly. The comfort, safety and scale are factors that must be considered in the design. In the context of global aging and the face of social pension dilemma, in order to improve the quality of retirement life of the elderly, "medical care combined with nursing building" model came into being. In order to better combine the medical and pension functions and build an efficient and livable integrated pension building of medical care, this paper starts from the needs of the elderly, fully considers the site selection, functional configuration, aging design and other aspects, combined with the advantages of foreign mature building examples, the suggestions and key points are shown as follows:

(1) Based on the sustainable development of nursing buildings, in the early stage, the location planning should fully consider the transportation network, supporting facilities, site location and environmental conditions. Generally speaking, the location should be located in the area with convenient transportation, nearby medical resources and pleasant environment, which is conducive to the follow-up development of pension buildings.

(2) In the building, it is necessary to clearly distinguish the functional areas of each part, ensure the convenience and independence of different traffic lines, and reasonably allocate pension resources and medical resources, which will effectively improve the efficiency of nursing work and protect the life and health of the elderly.

(3) The elderly care building is not only a place for the elderly to provide for the aged, but also should pay

attention to the psychological needs of the elderly, so that the elderly can fully feel the warmth of the elderly life, which is the goal of modern humanized nursing building.

REFERENCE

- [1] R. Jie, "Study on the layout design of the institutional pension space under the mode of medical support," Dalian University of Technology, 2017.
- [2] World Health Organization, *China Country Assessment Report on Ageing and Health*, 2015.
- [3] C. Ning, "Development experience of world "medical and nursing integration" service model and its enlightenment to China," *China Pharmacy*, vol. 28, no. 11, 2017.
- [4] L. H. Dai, Z. Qi, and Z. Wang. "Study on the elderly care system and spatial distribution guided by medical-nursing," 2014.09, No. 126
- [5] R. S. Wang and G. Min, "Preliminary study on design method of old-age care facilities based on medical care orientation," *Journal of Qingdao University of Technology*, vol. 38, no. 3, 2017
- [6] Z. Shengyang, "Practice and exploration on humanized design of public space in general hospitals," South China University of Technology, 2012
- [7] G. Lun and Z. Yong, "The design essentials of green hospital," *Modern Hospital*, vol. 11, no. 10, Oct 2011.
- [8] Y. Man, "Creating a highly adaptable building space discussion on modern hospital building design," *Journal of Chongqing Jianzhu University*, vol. 27, no. 1, February 2005.
- [9] Y. Yezhen, "A preliminary study on the design strategy of the old-age building under the mode of medical-nursing combined," Xian University of Architecture and Technology, 2018
- [10] W. Taixing, *Modern Gerontology*, Zhengzhou University Press, 2001
- [11] Z. Yanmin, "The old man, the old house renovation design highlights," Beijing: China Building Industry Press, 2012.
- [12] X. Yanyan, "Research on Nanjing ORPEA nursing home design with medical nursing combined model," Southeast University, 2015
- [13] Z. Yanmin, "Elderly residential renovation design highlights," Beijing: China building industry press, 2012

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Haotian Wu is a student who has just completed the master of Architecture of the University of Melbourne. In the past seven years, I have systematically learned the knowledge of architectural design and participated in some residential design work in my internship. The process of design is very interesting to me. At the same time, the process of design also needs to add more diverse thinking and viewpoints. Therefore, I also participated in many interesting design projects in the course, including the design and restoration of buildings in novels and the wine-making device. I will continue to participate in more architectural design in the future.