Research on the Design Points of Elderly Living Space in Foreign Conservation-type elderly Facilities

Deqing Bu¹, Xinxin Liang²,*

¹North China University of Technology, Beijing, China.
²Northern Polytechnic University, Beijing, China.

How to cite this paper: Deqing Bu, Xinxin Liang. (2023) Research on the Design Points of Elderly Living Space in Foreign Conservation-type elderly Facilities. Engineering Advances, 3(3), 169-174. DOI: 10.26855/ea.2023.06.003

Received: May 30, 2023
Accepted: June 28, 2023
Published: July 26, 2023

*Corresponding author: Xinxin Liang, Northern Polytechnic University, Beijing, China.

Abstract

With the deepening of China's aging population, the number of assisted care facilities for the elderly have increased. However, the spatial model of pension facilities and the setting requirements of the intermediary and nursing unit are not perfect, leading to a series of problems such as the lack of design guidance of the intermediary and nursing unit in most pension facilities, the unreasonable proportion of supporting facilities space. This paper sorts out and summarize the relevant norms and actual cases of care-type elderly facilities in Japan, Germany and the United States, where the elderly system is well developed, and focuses on the spatial design of the elderly rooms in the three countries, exploring the common design points of the elderly rooms in terms of usable area and room size, and summarizing the spatial strategies and methods of care-type elderly facilities. By summarizing and learning foreign experience, we can further improve the standardization level of the construction of elderly care facilities and provide reference for the design and improvement of elderly care facilities in China.

Keywords

Conservation-type elderly facilities, elderly bedroom, elderly institutions, functional space

1. Background and methods of the study

China entered the aging society in 2000, and is expected to enter the deeply aging society in 2025. With the accelerated process of population aging, the proportion of senior citizens and the disabled and mentally handicapped elderly is gradually increasing, but at present there is less research on conservation-oriented elderly facilities in China, and the design quality cannot meet the actual use demand.

This paper focuses on the elderly bedroom, which is the main space used by the elderly in care and maintenance facilities. In this paper, we study the living space of care-type elderly facilities in developed countries, taking the care-type elderly facilities in Japan, Germany and the United States as the research objects, analyze the design requirements of the living space in the design codes and standards of the elderly service facilities in each country, select the typical elderly facilities, and study the living space of the elderly in the care units in different cases.

2. Foreign design standards for elderly facilities

Foreign developed countries have entered the aging society earlier and have established a more perfect social security system for the elderly. The laws and regulations of foreign senior care facilities stipulate the basic functional configuration, usable area, space structure and other design standards of conservation-type senior care facilities. Studying and
sorting out the relevant foreign regulations can provide a reference basis for the construction of conservation-type senior care facilities in China.

The foundation for the construction of elderly facilities in Japan is based on policies and regulations established by the state, such as the Welfare for the Elderly Act, and the Residence for the Elderly Act. 1963 saw the enactment of the Welfare for the Elderly Act, known as the charter for the elderly, 1982 saw the enactment of the Health Care for the Elderly Act, which established the family and each municipality as the basis for basic welfare protection for the elderly, and 2000 saw the introduction of the Care Insurance Law [1, 2], the Nursing Care Insurance Act was introduced to address the issue of nursing care for the elderly and to establish a combined medical and nursing care system.

The German elderly care service is supported by a comprehensive system of laws and standards. The German government and the federal state governments have continuously introduced and improved the relevant norms "Social long-term care insurance", “Housing and care contract law” and a series of other laws [3]. In addition, the Act on Elderly Care Facilities and the Regulation on Minimum Building Requirements for Facilities set out in detail the basic services and housing requirements for care facilities. Each federal state will also establish laws related to care and support for the elderly based on domestic laws and taking into account local realities.

The U.S. enacted the "Standards for the Aged in Institutions" to establish national codes for institutional senior living buildings, and the Older Americans Act to establish the U.S. the Care Reform Act was introduced to begin defining the content of different types of services in nursing homes. And state legislatures regularly inspected nursing homes for compliance with building codes, provision of personal care, and dietary compliance [4]. For example, the FGI Guidelines for Design and Construction of Residential Health, Care, and Support Facilities [5], standard include the functional configuration of buildings, space usage area, basic equipment requirements, etc., are highly practical and instructive.

The laws and regulations related to conservation-type senior care facilities promulgated abroad have taken into consideration the construction of senior care institutions, the content of senior care services, and the management of senior care institutions, with clear positioning at different levels and clear and comprehensive regulation requirements, which have good practical guidance and can create a good legal foundation and social environment for the elderly to enjoy their later life.

### Table 1. Regulations related to the design of conservation-oriented elderly facilities in various countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Pension-related regulations</th>
<th>Regulations related to the design of nursing care facilities</th>
</tr>
</thead>
</table>
| Japan   | ● Elderly Welfare Act  
          ● Elderly Health Care Act  
          ● Nursing Care Insurance Act  
          ● Senior Citizen Residence Act |
|         | ● Social Long-Term Care Insurance  
          ● Nursing Enhancement Act  
          ● Statutory Pension Insurance  
          ● The Housing and Care Contract Act and other laws |
| Germany | ● Supplementary regulations of the Federal Provinces and the regulations of the German Council for Elderly Assistance (KDA) |
| United States | ● Standards for the Elderly in Institutionalized Care  
                             ● The Social Security Act  
                             ● Older Americans Act  
                             ● The Social Welfare Act |
|         | ● Basic Standards for Facilities and Operations of Special Nursing Homes  
          ● Designated Staff, Equipment, and Operating Standards for Intermediate-Care Elderly Welfare Facilities |
|         | ● Law on Senior Care Facilities  
          ● Regulations on Minimum Building Requirements for Facilities |
|         | ● Building regulations of the federal states, e.g. the Berlin Residential Participation Act - Building Regulations for Residential Participation (WTG-BauV)  
                             ● the Brandenburg Hospital and NursingHome Building Regulations (BbgKPBauV), etc. |
|         | ● FGI Guidelines for Design and Construction of Residential Health, Care, and Support Facilities  
                             ● District of Columbia Code of Regulations Nursing Home Design Standards (NHDSS) |

Source: It is compiled by the authors.

### 3. Design of elderly bedrooms in foreign conservation-type elderly facilities

With the continuous development of foreign nursing care facilities, nursing homes are paying more and more atten-
tion to the privacy of the elderly and the quality of the living environment. The trend of elderly bedroom construction has gradually formed from multiple rooms to single rooms, followed by double rooms, while triple rooms and quadruple rooms are gradually replaced or even disappeared.

The elderly bedroom is divided into sleeping space, storage space and transportation space according to the actual needs of the elderly, and these spaces can be flexibly spliced or integrated to form the daily living space of the elderly.

3.1 Basic space for living space

The living space of the elderly bedroom can be divided into sleeping space, storage space and transportation space. The size of the space and the way it is composed affects the usable area of the elderly bedroom.

3.1.1 Sleeping activity space

Sleeping space is the main activity space in the elderly bedroom and contains the most frequent sleeping activities and daily activities of the elderly caregivers. In Japanese care and nursing facilities, the nursing beds are placed parallel to the depth of the room to prevent the elderly from falling accidentally and to reduce the size of the openings, making the room more economical and efficient. The basic furnishings in the room include nursing beds, bedside tables, tables and chairs for reading, and sofas to provide more space for the elderly to relax. The TV is hung in a way to save the room width. The desk faces the window for good sight lines and daylight. The basic furniture configuration in Germany room is the same as in the U.S., but the TV can also be placed directly on the wall or placed at an angle to reduce the space occupied. The placement of nursing beds is more flexible, mostly arranged against the wall in the direction of vertical room width, but also vertically in the direction of depth.

3.1.2 Storage space and transportation space

Storage space is a more flexible space that can be combined with transportation space or sleeping space. In Japan and Germany, storage space is usually located at the entrance of the apartment, together with the transportation space corridor. The storage space in the Japanese elderly bedroom can be set at the entrance corridor transportation space, or can be combined with the plumbing space. Because of the separation of wet and dry in the Japanese elderly bedroom, the transportation space, together with the storage space and the washroom space, constitutes the entrance space and efficiently concentrates various practical functions.

German storage space can be centrally located at the entrance as an all-in-one cabinet, integrating the functions of dressing, storage and shoe changing. Better quality nursing home double rooms will also provide a dedicated space for storage area. The centralized application of storage space helps to ensure normal passage of the elderly, timely contact between caregivers and elderly to improve the efficiency of daily care.

Source: https://www.archdaily.cn.

Figure 1. SRAP Sedlak Rissland + Dürschinger Architekten Sanatorium, Germany.

The storage space in the United States is not located in the entrance traffic space, but is co-located with the sleeping activity area, the entrance space leave space for the door to open to prevent the elderly from being disturbed by the open door when walking in the corridor. Two consecutive rooms can form a recessed entrance space, the entrance space can also effectively reduce the area of the elderly room and increase the area of public use space and the overall building utilization rate.
Table 2. Floor plans of elderly bedrooms in foreign conservation-type elderly facilities

<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
<th>Germany</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single Room</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic floor plan</td>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
<tr>
<td>Functional division</td>
<td><img src="image4" alt="Diagram" /></td>
<td><img src="image5" alt="Diagram" /></td>
<td><img src="image6" alt="Diagram" /></td>
</tr>
<tr>
<td>Net usable area</td>
<td>15.9</td>
<td>21.61</td>
<td>13.83</td>
</tr>
<tr>
<td>Axis size</td>
<td>3300X6300</td>
<td>4200X7100</td>
<td>3500X6200</td>
</tr>
<tr>
<td><strong>Double Room</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic floor plan</td>
<td><img src="image7" alt="Diagram" /></td>
<td><img src="image8" alt="Diagram" /></td>
<td><img src="image9" alt="Diagram" /></td>
</tr>
<tr>
<td>Functional division</td>
<td><img src="image10" alt="Diagram" /></td>
<td><img src="image11" alt="Diagram" /></td>
<td><img src="image12" alt="Diagram" /></td>
</tr>
<tr>
<td>Net usable area</td>
<td>29.40</td>
<td>28.87</td>
<td>19.64</td>
</tr>
<tr>
<td>Axis size</td>
<td>4200X6000</td>
<td>5900X6100</td>
<td>3500X7700</td>
</tr>
</tbody>
</table>

Source: It is compiled by the authors.

3.2 Size of living space

Japan "Basic Standards for Facilities and Operation of Special Nursing Homes" advocates the construction of single rooms, stipulate the basic functional configuration and area of nursing homes, including a net usable area of 10.65 m² or more for single-room living units and 21.3 m² for double-room living units [6]. In actual cases, the actual net usable area of single rooms in Japan is 16-20 m², and the better quality rooms can reach about 25 m², with dimensions of about 3.3mx6.3m. Double rooms are mostly used by couples or same sex, and the net usable area is 23-25 m², and the better quality rooms can reach 36 m².

The German government stipulates that the minimum net area of a single room in a conservation-type elderly facility is 12 m², the net area of a double room is at least 18 m². Each canton will also set local requirements according to its own actual situation, integrating the federal government's norms. The number of double rooms is smaller, and when they are designed together with single rooms, they are usually found at the end of the floor and the arrangement is more flexible. In actual cases of conservation-type senior care facilities, with a net usable area of 22 m²-25 m², while double...
rooms add beds horizontally or vertically to single rooms, a net usable area of 28 m²-30 m².

The types of U.S. conservation senior care facilities are divided into new construction and renovation. The Guidelines for the Design and Construction of Residential Medical, Care and Support Facilities stipulate that for new construction, the net usable area of a single room should meet the basic functional needs, excluding the vestibule and bathroom, is approximately 11.15 m². The minimum net floor area per resident bed in a double room with a depth of about 6.4m and a width of 3.5m is about 10.03 m². The net floor area of the elderly bedroom of the renovation class requires that the net floor area of the single room shall not be less than 9.29 m², and the net floor area of the multi-bed area shall not be less than 7.43 m².

Comparing the floor plans and dimensions of elderly bedrooms in various countries, it is found that each country has appropriately expanded the area of the room and provided leisure and comfort space for the elderly, helping the elderly create a familiar living environment and diminishing the uneasiness and strangeness of living in a senior living facility.

Table 3. Normative standards for the living area of the elderly in conservation-type elderly facilities by country (excluding washrooms and toilets)

<table>
<thead>
<tr>
<th>Function Space</th>
<th>Japan</th>
<th>Germany</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Room</td>
<td>Net usable area of single room: 10.65 m² or more</td>
<td>Minimum requirement: single room including a bedroom and bedroom with a living area of 12 m²</td>
<td>New construction: 120 square feet net floor area for single beds (11.15 m²), excluding bathroom, closet, storage, closet, niche room or vestibule (3.35m)</td>
</tr>
<tr>
<td></td>
<td>Berlin: Individual living space must be at least 14 m²</td>
<td>Alterations: Beds must have a net floor area of no less than 100 square feet (9.29 m²)</td>
<td></td>
</tr>
<tr>
<td>Double Room</td>
<td>Net usable area of double room: 21.3 m² or more</td>
<td>The living space for two people must be at least 18 square meters</td>
<td>New construction: The minimum net area per resident bed is 108 square feet (10.03 m²), i.e. the net total use area of a double room is 20.06 m²</td>
</tr>
<tr>
<td></td>
<td>Berlin: The living space in a double room must be at least 22 m²</td>
<td>Alteration: The minimum net area per resident bed in a double room is 80 square feet (7.43 m²/person), which means the total net area in a double room is 14.86 m²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hesse: The living space in a double room must be at least 24 m²</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: It is compiled by the authors.

4. Summary of elderly bedroom design in foreign conservation-type elderly facilities

Through the study and comparison of the floor plans of the elderly bedrooms in the developed countries, the elderly bedrooms in the elderly care facilities in foreign countries pay more and more attention to the quality of life and privacy of the elderly, and continue their original living habits. The elderly bedrooms in the elderly care facilities are mainly single rooms, followed by double rooms, and multiple rooms are almost no longer set.

The function of the elderly bedroom in the conservation type elderly facility is more concise and generally divided into sleeping activity area, storage space and bathroom. Sleeping activity area includes nursing beds, bedside tables, desks, TV basic furniture, storage space can be set in the channel or sleeping activity area, the design specifications of various countries require the net area standard of single room for the elderly to be 10-15 m², the area standard of double room is 18-24 m², while the area in the actual project will be appropriately increased, the net area standard of single room is 16-20 m², double room is 20-35 m², the overall living comfort is enhanced.

Japanese elderly homes are generally more economical in general, with smaller openings and areas, providing a warm and comfortable sense of space for the elderly to a certain extent. The economy of European and American countries is more developed, the quality of nursing homes is higher, and the construction method is different from the frame structure of China, so the area of the bedroom is more flexible, leaving space for the elderly to increase the furniture arrangement according to their own preferences, so the area of the elderly bedroom is larger, and the maximum area of a single room can reach 28 m².

Japanese elderly homes are generally more economical in general, with smaller openings and areas, providing a warm and comfortable sense of space for the elderly to a certain extent. The economy of European and American countries is more developed, the quality of nursing homes is higher, and the construction method is different from the frame structure of China, so the area of the bedroom is more flexible, leaving space for the elderly to increase the furniture arrangement according to their own preferences, so the area of the elderly bedroom is larger, and the maximum area of a single room can reach 28 m².
References


