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Demand for Medical Services in the Changing Structure of the Aging Population: The Construction of a Personnel Training System for the Integration of Health Care and Nursing Care

Abstract: - The problem of population aging in China is becoming more and more prominent, and the impact of aging on the demand for medical services has become a focus of social concern. Against this background, this study aims to explore the relationship between population aging on the demand for healthcare services and how to build a healthcare-integrated talent cultivation system that adapts to an aging society. Through an in-depth analysis of China's demographic data, this study reveals the real challenges of population aging on the demand for medical services. The current high and diversified demand for medical services from China's aging population has put tremendous pressure on the existing medical service system. In view of this, this study proposes a multidimensional talent cultivation model that integrates medical knowledge and aging skills, aiming to cultivate composite talents with comprehensive medical knowledge and aging skills to meet the demand for healthcare services in the aging society, and provides an innovative solution to meet the healthcare challenges of China's aging population. By strengthening interdisciplinary education, policy support and practice innovation, it is expected to enhance the quality and efficiency of healthcare services in China's aging society and bring a better quality of life to the elderly.

Keywords: aging population; healthcare services; healthcare integration; talent training; elderly care model

1. INTRODUCTION

According to authoritative reports and in-depth analyses, the global phenomenon of population ageing is a far-reaching world trend. According to the United Nations Department of Economic and Social Affairs (UN DESA), the number of people aged 65 and over is expected to nearly double from 761 million in 2021 to 1.6 billion in 2050. This change not only poses a wide range of social and economic challenges, but especially in the area of healthcare delivery, it is an unprecedented test of existing public health systems and healthcare service delivery models. According to surveys, there are currently 13.6 million vacancies for long-term care workers globally, a situation that was further exacerbated during the COVID-19 pandemic. Older populations often require more medical attention and long-term care services, and existing health systems are often unable to meet this increased demand, especially with regard to the allocation of human resources and the development of specialized personnel.

In response to the challenges posed by ageing, the health-care integration model has emerged, with the aim of integrating medical services and elderly care to provide a more comprehensive and coherent service system for the elderly. However, although the model has been widely recognized at the theoretical level, it still encounters many difficulties in the process of implementation and promotion, especially in terms of personnel training. Currently, there is a general shortage of professionals in the medical and nursing industries to meet the needs of healthcare integration, which directly affects the quality and efficiency of services. Therefore, building a talent training system that meets the needs of healthcare integration has become an urgent problem. Existing research shows that although the theory and practice of the medical-care integration model has been gradually promoted, the research on systematically constructing the talent training system is relatively lagging behind. This study focuses on the impact of the aging population structure change on the demand for healthcare services, and how to respond to this challenge by building a talent training system for healthcare integration. By analyzing the impact of the aging population structure change on the demand for healthcare services and constructing a healthcare talent training system, this study aims to provide new ideas and solutions to address the challenges of

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healthcare services brought about by the aging population, and to provide theoretical and empirical support for the related policy formulation and practice.

The paper is organized as follows: the introduction section discusses the background, significance and methodology of the study, focusing on the impact of population aging on the demand for healthcare services and the integration of healthcare. The second section reviews the existing literature and outlines the current status and challenges of integrated healthcare services as well as the training of professionals in this field. Part III details the overall demand for elderly care services in the context of China's rapidly aging society and the government's strategies to meet these demands. The fourth section proposes a framework for building a combined healthcare and nursing personnel training system under the development of healthcare and nursing based on the structural situation of China's aging population and the demand for senior care services, including the principles, components, and recommendations for improving the training and development of combined healthcare and nursing personnel. Finally, the main results of this paper are summarized in the Conclusion and Prospect section, and suggestions are made for policy formulation and future research in the context of population aging and the demand for medical and nursing integration.

2. DEVELOPMENT OF THE MEDICAL AND NURSING CARE MODEL OF INTEGRATED CARE

The health-care integration model integrates the functions of health care and elderly care, with the aim of providing comprehensive services for the elderly, covering specialized medical care, daily life care and end-of-life care. This integrated service model aims to address the comprehensive needs of the elderly who are old, sick or functionally impaired, and overcomes the limitations of the traditional separation of healthcare and elderly care by pooling resources to achieve "one-stop" fulfillment of the needs of the elderly in terms of both life and healthcare. On this basis, it is crucial to cultivate medical and nursing personnel, who not only need to possess professional competence in geriatric medicine, nursing care and rehabilitation, but also have knowledge of healthy ageing, care for the psychological state of the elderly and treat them with love, patience and responsibility, while at the same time complying with professional ethics and applying scientific social work skills.

The model of integrating health care and nursing care, as an innovative system of elderly care services, has been emphasized globally and has been widely promoted and applied, especially in developed Western countries. These countries have conducted in-depth exploration and development of elderly care services because they have entered the aging society earlier and are facing more urgent demands for services for the aging population. Through the integration of medical and elderly services, the healthcare-anchoring model can provide the elderly with all-round support from basic life care to specialized medical services and even end-of-life care. This model not only meets the different levels of convalescence needs of the elderly, but also improves the efficiency and quality of services, so that the elderly can obtain better health protection and quality of life in their later years. The successful experiences and practices of Western developed countries in this regard provide valuable references and lessons for other countries.

The German elderly care system demonstrates a comprehensive response to the diverse needs of the elderly, with ageing in place becoming the preferred approach, focusing on care and support in the home environment. In order to support this system, Germany has implemented a comprehensive education and training mechanism for gerontological care, which is designed to produce caregivers with highly specialized skills. This includes educational pathways at different levels, such as the training of "geriatric nurse assistants" and "geriatric nurses", covering basic and specialized areas such as psychosocial, medical and nursing knowledge, working methods and management skills [1]. At all levels of education, from secondary vocational education to continuing education to undergraduate education, emphasis is placed on the ability to work independently and the comprehensive application of specialized knowledge and skills. Particularly in the training of professional nursing staff, Germany focuses on practical competence and professional depth, and ensures that nursing staff are able to meet the complex health needs of older people through the development of specialist courses such as intensive care and mental health nursing. In addition, all nursing staff must attend regular refresher courses in geriatric care to update their knowledge and skills and ensure service quality [2]. This systematic education and continuous training mechanism ensures the high quality and professionalism of Germany's geriatric services and provides a high standard of care for the elderly.

Since the end of the last century, the United States has been exploring a healthcare-integrated senior living

model in response to the growing challenges of aging and the pressure on government finances from specialized medical and nursing institutions. Against this background, and in conjunction with the trend of older adults' preference for community living, the United States has developed a community-based multifaceted model of aging services [3].In 1997, the passage of the Balanced Budget Act marked the formal introduction of the PACE program (Program for All-Inclusive Care of the Elderly), which aims to provide older adults with a full range of services that cover medical care, nursing care, counseling, rehabilitation, nutritional counseling, recreation and hospice care. PACE operates through adult day health centers, referrals, and in-home services, with a key focus on an interdisciplinary team responsible for providing integrated medical and social services. This team includes a variety of professionals such as physicians, pharmacists, and nurses who share management and care responsibilities to ensure that older adults receive continuous and comprehensive care in the community [4].The implementation of the PACE program not only reflects the emphasis on the quality of life of older adults, but also demonstrates the efforts of the United States to innovate the model of senior care services in an aging society [5].

In the face of the challenges of an aging population, Canada has developed a system of integrated care for older persons that is adapted to its national context, known as SIPA (System of Integrated Care for Older Adults). The system is designed to provide comprehensive support and services to frail older persons through a community-based integrated care model.The core of the SIPA system lies in its ability to cover both the community and the institutional domains, and to promote the autonomy of older persons and optimize the use of community care resources through the effective integration of medical and social services by means of assessment and intervention by an interdisciplinary team. This interdisciplinary team includes a wide range of professionals, including physicians, nurses, and social workers, working together to ensure that a customized plan of care is provided based on the individual needs of the older person [6-7].The SIPA system places particular emphasis on evidence-based interventions aimed at selecting and implementing the most appropriate care package for the older person through a science-based approach to achieve the most efficient use of resources and services. Through the SIPA system, Canada has achieved significant results in maintaining the health and well-being of older adults, especially in improving the utilization of community care services and promoting the ability of older adults to live independently.

China started late in the development of the combined medical and nursing care model of elderly care, which began to receive attention mainly after 2010 and was gradually promoted in theoretical research and practical operation [8]. So far, China has explored and developed four main models of combined medical and nursing care to adapt to different social needs and the elderly's preferences for elderly care. Currently, China has explored four models of combining medical and nursing care: first, through the development of elderly care services within medical and health institutions, taking advantage of the facilities and professional talents of medical institutions to provide specialized medical care and immediate rescue services for the elderly [9-11]. For example, the Binhu Hospital in Hefei City, Anhui Province, is a representative of this model; the second is the addition of medical services within the nursing institutions, i.e., the "medical care in nursing" model, which aims to provide comprehensive services for the elderly. The implementation of Qingdao's long-term medical care insurance system is a typical example of this model; third, the agreement between medical and health institutions and nursing institutions, through the complementary resources of both sides, give full play to their respective advantages, and jointly meet the medical and nursing service needs of the elderly [12]. The rehabilitation center jointly operated by Longwan People's Hospital and Hongjingtian Elderly Residence in Wenzhou, Zhejiang Province, is an excellent example of this model; fourth, the extension of medical and nursing care services to the community and the family, which is a model that fits the traditional concept of elderly care for the elderly in China and enables the elderly to receive services in a familiar family or community environment, which not only reduces the burden of mobility for the elderly, but also alleviates the pressure on family members' caregiving [13].

3. Overall Demand for Services for the Aging Population under the Development of Medical Care Integration in China

In a country like China, which is rapidly moving into an aging society, coping with population aging has become a major livelihood challenge in the process of national modernization. According to the November 2021 Opinions of the Central Committee of the Communist Party of China and the State Council on Strengthening the

Work on Aging in the New Era, the Chinese government has positioned the development of aging as a national strategy, emphasizing the concept of people-centered development, and integrating the development of aging into the country's overall layout. This strategy aims to be fully integrated into all aspects of economic and social development through the promotion of a positive view of aging and the concept of healthy aging. As a core component of the healthy aging strategy, the combined medical and nursing care business has seen rapid development in China. This includes the accelerated integration of elderly care service resources and medical resources, the expansion of service supply, and the continuous improvement of service quality. In order to cope with the problems of small scale, single level and uneven quality in the training of elderly care talents, the Chinese government and relevant departments have issued a series of guiding policies and measures following the principles of "active development, multiple forms, comprehensive strengthening and focus", aiming at strengthening the planning for the construction of the talent team, expanding the scale and upgrading the level of the training of elderly care talents. The aim is to strengthen the planning for the construction of a talent team, expand the scale of training for elderly care personnel, and upgrade the level of training. In the face of the rapid development of China's aging population, the deepening of the problems of aging and empty nesting among the elderly population, and the rapid expansion of the scale of the disabled and semi-disabled elderly population, there is a growing demand for elderly care professionals. Therefore, strengthening the development of strategic human resources, especially the training of geriatric care professionals, has become an urgent issue. Despite the remarkable achievements in the past decade, China still faces great challenges and needs in building a geriatric care workforce in the face of the increasingly severe aging situation. This study is a key step in understanding and addressing the challenges of aging by projecting future trends in the size of China's elderly population aged 65 and older based on data from the nation's seventh population census and demographic models. In this way, the size of the elderly population in 2025, 2035, and 2050 can be estimated to provide data support for planning and policy making in an aging society. Next, the size of the elderly population in need of care can be further estimated by analyzing the proportion of disabled and semi-disabled elderly population in different age groups. The disabled and semi-disabled elderly are the most pressing group in the demand for elderly care, and their need for professional nursing and daily care is much higher than that of the general elderly. Finally, the scale of demand for elderly care workers can be predicted based on the industry standard for elderly care workers, the Norms for Job Setting and Staffing in Elderly Institutions (MZ/T 187-2021). This industry standard sets out the basic requirements for setting up and staffing different positions in elderly care organizations, so that the corresponding demand for elderly care workers can be calculated based on the projected size of the elderly population in need of care.

Based on the data of the seventh national census and the analysis of the demographic model, the trend of China's elderly population aged 65 years and above shows significant growth in the outlook, and the projected size of the elderly population aged 65 years and above in different age groups from 2020 to 2050 is shown in Figure 1. As of November 2020, China's elderly population aged 65 and above has reached 191 million, accounting for 13.53% of the total population. Broken down by age group, the elderly population aged 65-69 accounted for 38.82% of the total population in this age group, or 74 million; the elderly population aged 70-74 amounted to 49.59 million, or 26.01%. Projections show that by 2025, the population of older persons aged 65 and over will increase to 223 million; by 2035, it will reach 339 million; and by 2050, it is expected to reach 459 million. This growth trend reflects the acceleration of population ageing and the increasing demand for elderly care services. In terms of age groups, the elderly population aged 65 to 69 will continue to be the group with the highest proportion until 2040. In terms of long-term trend, the size of the population is characterized by "decreasing-rising-decreasing", and will reach 74.1 million, 110.37 million and 90.79 million in 2025, 2035 and 2050, respectively. 70-74 year-olds The trend of changes in the elderly shows two "inverted U-shaped", in 2025, 2035 and 2050, the size of the elderly in this age group will be 65.4 million, 80.53 million and 85.19 million people, respectively [14]. Until 2050, the size of the elderly aged 75-79 years generally shows an upward trend, with the population sizes of 40.53 million, 62.5 million, and 100.11 million in 2025, 2035, and 2050, respectively.The trend of the elderly population aged 80-84 years is similar to that of the elderly aged 75-79 years, but the stage inflection point is pushed back five years compared with that of the previous age group, and the population sizes of the population are 23.9 million, 23.9 million, and 23.9 million in 2025, 2035, and population sizes in 2050 are 23.74 million, 49.44 million, and 85.19 million, respectively. the peak of the change curve for the 85- to 89-year-old population is pushed back another five to six years from the previous age group,

with 12.55 million, 23.33 million, and 51.62 million people in 2025, 2035, and 2050, respectively. For the elderly population aged 90 and above, the projections indicate that their sizes will be 4.47 million in 2025, 9.65 million in 2035 and 27.99 million in 2050, respectively; and the sizes of the elderly population aged 95 to 99 will be 1.98 million in 2025, 3.43 million in 2035 and 14.93 million in 2050, respectively. These data highlight the severity of the aging trend in China and the sharp increase in the demand for elderly care personnel, emphasizing the importance of strengthening the training of elderly care personnel and the construction of the elderly service system [15].

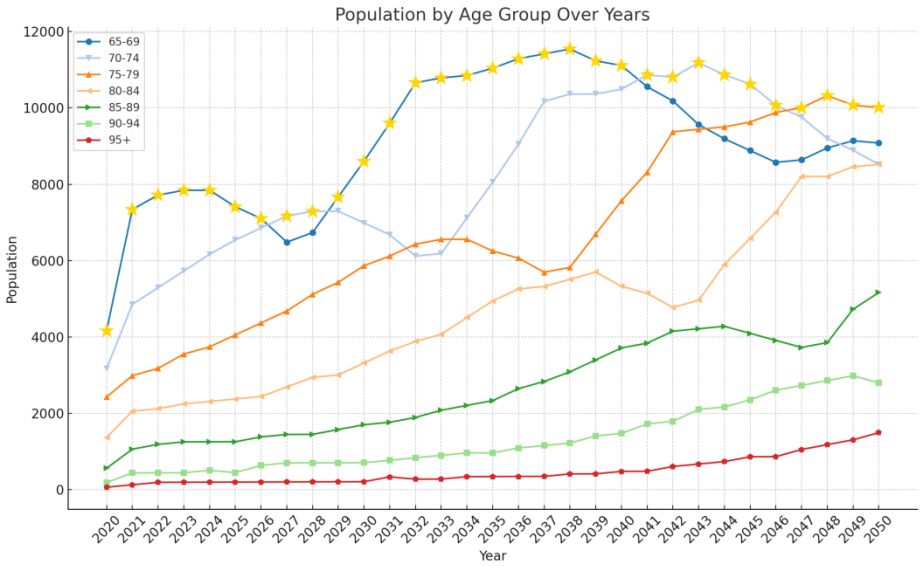

Figure 1 Estimated size of the elderly population aged 65 and above in different age groups, 2020-2050
Source: Measurements based on data from the Seventh National Population Census and demographic modeling.

The disability status of the elderly is categorized as severe disability (completely unable to take care of themselves), moderate disability (partially able to take care of themselves) and mild disability (able to take care of themselves). The degree of incapacity is closely related to the age of the elderly, with the older the age, the higher the percentage of incapacity or semi-incapacity. In order to accurately assess the future demand for elderly care services, an important step is to estimate the proportion and magnitude of mild, moderate, and severe incapacitation among the elderly of different ages [16]. Using the demographic model and survey data on the proportion of elderly people with degrees of incapacity, it is possible to predict the proportion and size of the mildly, moderately, and severely incapacitated population among elderly people of different ages in China from 2025 to 2050 (see Figure 2). Accordingly, it is predicted that by 2025, the size of China's incapacitated elderly population will reach 32.43 million, accounting for 14.46% of the elderly population aged 65 and above. By 2030, the size of the disabled elderly population will increase to 40.54 million, accounting for 15% of the population. By 2035, the size of this population will expand to 48.65 million people, accounting for 14.52%. It is expected that by 2040 and 2050, the population of disabled elderly will increase to 54.05 million and 62.16 million, accounting for 13.61% and 14.47%, respectively. Specifically on the degree of incapacity, by 2025, the size of the elderly population with mild, moderate and severe incapacity is expected to be 27.88 million, 2.3 million and 0.9 million respectively. By 2035, the size of the elderly population with these three levels of incapacity will reach 41.98 million, 3.63 million and 1.44 million respectively. By 2050, the size of the elderly population with mild, moderate and severe levels of incapacity is expected to be 56.93 million, 5.99 million and 2.51 million, respectively (see Figure 3). These figures highlight the aging challenges facing China and the rapidly growing demand for elderly services. In particular, the increase in the population of severely and moderately incapacitated older people places higher demands on the elderly care service system, emphasizing the urgency of strengthening the cultivation of elderly care personnel and the enhancement of service supply capacity [17-18].

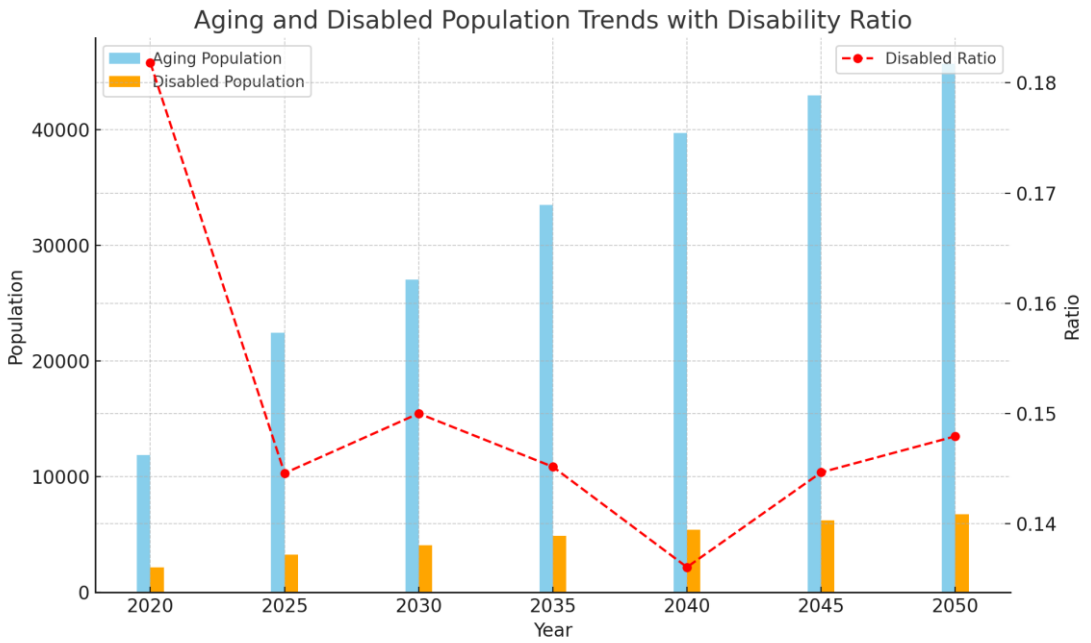

Fig. 2 Forecast of the size and percentage of disabled elderly in China, 2020-2050

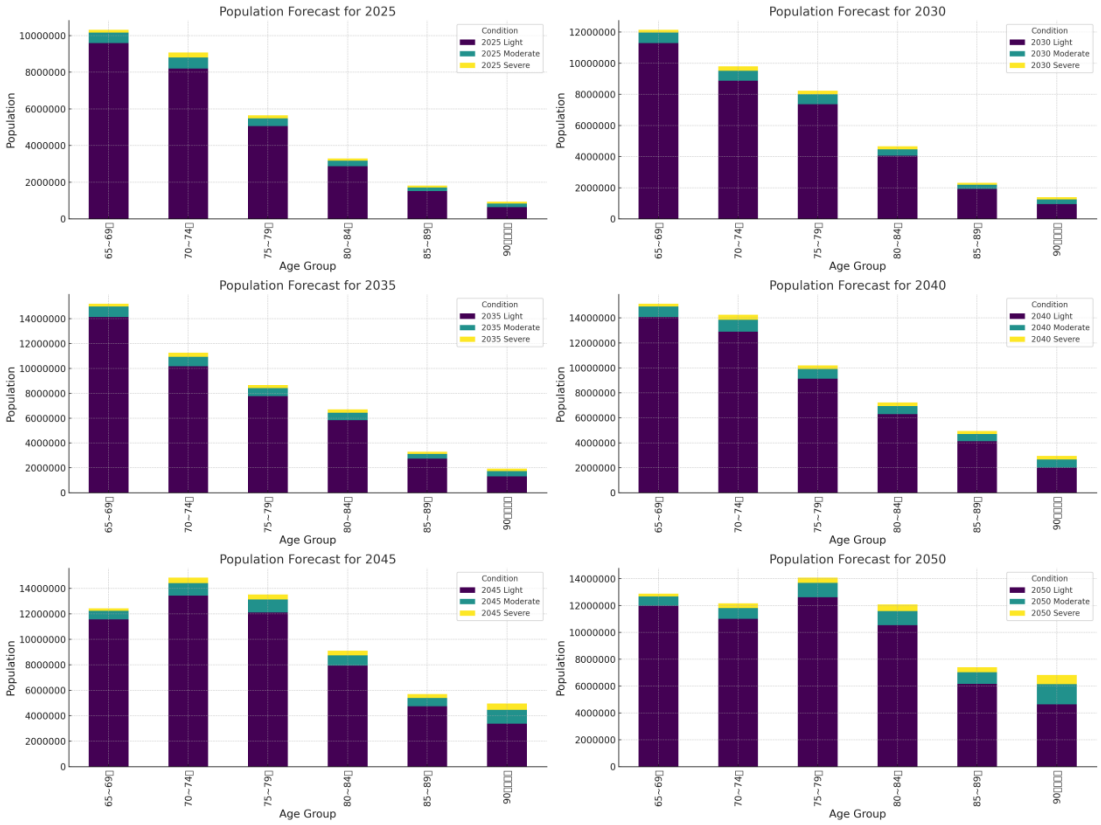

Figure 3 Population size (persons) by age group with degree of incapacity, China, 2025-2050

Based on the "Norms for Job Setting and Staffing of Elderly Institutions" issued by the Ministry of Civil Affairs in 2021, which specifies the ratio of elderly caregivers for elderly people with different self-care abilities: the ratio of elderly caregivers for the self-care elderly is 1:15 to 1:20, the ratio of elderly caregivers for the partially self-care elderly is 1:8 to 1:12, and the ratio of elderly caregivers for those who can't take care of themselves at all is 1:3 to 1:5 [19]. Based on these criteria, a predictive analysis of the demand for elderly care workers in China can be conducted. The predictive analysis shows that by 2025, the demand for elderly caregivers in China will be between 1.77 million and 2.45 million people, based on the minimum and maximum standards for

elderly caregiver staffing. By 2030, this demand will increase to between 2.2 and 3.05 million people. Further by 2035, the demand for elderly care workers will be between 2.69 million and 3.73 million. By 2040, the range of demand will expand to between 3.15 and 4.38 million people. And by 2045, the demand for senior care workers will further increase to between 3.53 million and 4.91 million people. By 2050, the demand for senior care workers is projected to range from 3.85 million to 5.38 million (see Table 1). This forecast highlights the fact that China's demand for elderly care workers will continue to grow as the population ages. This not only reflects the human resource challenges facing the senior care industry, but also emphasizes the urgency of strengthening the training of senior care personnel and improving the quality of senior care services. In order to meet the future demand for elderly care services, relevant departments and organizations need to take effective measures to expand the scale of training of elderly care personnel and to continuously improve the professionalism and service capacity of elderly care services [20].

Table 1 Forecast of demand for elderly caregivers in China, 2020-2050 (persons)

configure	age groups	2020	2025	2030	2035	2040	2045	2050
Minimum staffing ratio (3:37)	65-69 years	384372	557961	657484	822541	819106	672363	696664
	70-74 years	322469	513393	555025	637065	807058	840185	687994
	75-79 years	233946	320388	467179	491508	578989	767085	798967
	80~84 years old	136351	194797	274666	395314	426194	536835	712351
	85-89 years	59933	111355	142663	202586	305161	350266	455987
	90 and over	24775	67609	100673	140088	214315	359103	494674
	add up the total	1161846	1765503	2197689	2689102	3150822	3525837	3846636
Ideally equipped (3:26)	65-69 years	525082	762222	898177	1123657	1118965	918503	951700
	70-74 years	446305	710550	768170	881715	1116989	1162838	952202
	75-79 years	324016	443739	647044	680743	801903	1062418	1106574
	80~84 years old	190857	272666	384464	553339	596563	751433	997110
	85-89 years	84817	157586	201893	286695	431858	495689	645302
	90 and over	36374	99262	147802	205670	314646	527218	726256
	add up the total	1607450	2446025	3047550	3731819	4380923	4918099	5379144

4. SUGGESTIONS FOR THE CONSTRUCTION OF PERSONNEL TRAINING SYSTEM FOR MEDICAL CARE INTEGRATION IN CHINA

4.1 Basic principles

(1) Systemic

The system of training talents for integrated healthcare and nursing services is built on a multilevel composite system, which requires efficient integration of medical knowledge, nursing service skills and comprehensive thinking in the training process in order to achieve the goal of comprehensive education. This process emphasizes the importance of transforming professional knowledge into service ability and further internalizing it into personal literacy. The systematic design of the curriculum system is the core link in implementing the concept of integrated medical and nursing service education and realizing its educational goals. The system forms a coherent and complete curriculum structure by comprehensively integrating the personality traits,

modes of thinking, professional knowledge frameworks, and key skills required by learners, effectively matching the organic combination of teaching content, forms, and methods [21]. At the same time, the contemporary and social characteristics of integrated healthcare service education require it to be a social system project with multi-factor participation, relying on the joint efforts and participation of cross-industry, cross-sector, and even society as a whole.

(2) Combining theory with practice

Cultivating medical and nursing service talents requires not only the knowledge structure of medicine and elderly service, but also the basic intellectual and practical ability, i.e. medical and nursing service ability. Theoretical learning helps students construct a scientific knowledge system and accumulate a foundation for continuous development. Practical learning facilitates students to understand and apply the knowledge and skills they have learned. In the education of integrated healthcare service, the teaching principle of combining theory and practice is always adhered to, so that students can participate in relevant practical activities to comprehensively improve their abilities and skills.

(3) Individuality combined with commonality

Integrated healthcare service activities are naturally characterized by the need to meet individualized health and aging needs. Therefore, it is crucial to encourage the free growth of students' individuality in the cultivation of talents for integrated healthcare services. Influenced by traditional Chinese culture and education management system, Chinese higher education tends to overemphasize commonalities in the talent training model, while ignoring students' individual differences. Considering the diversity of educational targets in terms of medical knowledge, interest in elderly care service, and professional background, a clear concept of personality development should be established in the process of cultivating talents for healthcare-integrated service, appropriately balancing the relationship between broad education and individualized education, paying attention to the students' realistic needs and future development, basing on the actual situation, and paying attention to stimulating the potential of the individual, and stimulating the students' healthcare-integrated service potentials through reforms and innovations in educational methods. The reform and innovation of education methods can stimulate the potential of students in integrating healthcare and nursing services [22].

4.2 Components

(1) Training Objectives

In constructing a system for training personnel for integrated health care services, clarifying training objectives is a critical first step. These objectives not only guide the formulation of teaching objectives and content, but also serve as benchmarks for evaluating the effectiveness of teaching. Therefore, when designing and constructing the training system of healthcare integrated service talents, universities should first establish targeted training objectives. The training objectives for health care combined service talents mainly cover the following aspects: 1) Professional awareness training. Professional awareness is a kind of professional tendency and personality trait necessary for medical and nursing service talents, which is reflected in the enthusiasm and devotion to the field of medical care and elderly service. This includes the cultivation of motivation, emotion, interest, needs, ideals and beliefs in the field of medical and nursing integration. By stimulating students' professional interests, they are guided to take the initiative to learn relevant knowledge and actively participate in the practical activities of healthcare and nursing integration.2) Professional quality shaping. The psychological and spiritual qualities demonstrated by healthcare-integrated service talents in their professional activities, such as a strong sense of social responsibility oriented to patients' needs, a positive and optimistic attitude, perseverance and strong will, independent thinking and innovative spirit. These qualities are crucial for improving service quality and efficiency.3) Professional ability training. The professional ability of healthcare service talents is a comprehensive ability, including good decision-making ability, organizational and collaborative ability, communication and management ability, etc. The cultivation of these abilities needs to be carried out throughout the practice activities of healthcare integration. Students' professional skills training and professional ethics education should be strengthened in order to form efficient service ability and multi-skill expertise.4) Professional knowledge learning. Adequate knowledge reserve and complete knowledge structure are the basis for healthcare integration service talents to work independently. The scope of knowledge that students should master includes professional theoretical knowledge, knowledge of humanities, knowledge of

policies and regulations, knowledge of medical and pension management, and basic theoretical knowledge and practical methods of medical and nursing integration. Through the formulation and implementation of these cultivation objectives, the scientific, integrity and practicality of the cultivation system of medical and nursing integration service talents can be ensured, and high-quality talents who have both specialized knowledge and the ability to exert innovation and service in the field of medical and nursing integration can be cultivated for the society.

(2) Teaching system

In the personnel training system of medical and nursing services, the construction of the teaching system is a key link to realize the training objectives, which mainly includes four aspects, namely, personnel training content, training mode, training process and quality evaluation.1) Talent training content. This part of the answer to the question of "what to teach", the core lies in the development of a reasonable curriculum system and teaching program. The curriculum should cover both theoretical and practical knowledge in the field of health care integration, including not only the core courses of basic medicine, nursing, elderly service management, but also the second classroom activities such as practical operation and internship training. The teaching plan should be formulated around the training objectives, combined with the principle of combining popularization and special training, and the teaching activities of each academic year should be arranged in a planned manner. 2) Training mode. Cultivation mode focuses on the issue of "how to teach", based on clear educational concepts and laws, and forms a set of practical and exemplary educational mode. In the cultivation of talents for integrated healthcare service, professional technical education and practical education should be integrated to build a comprehensive cultivation mode of "basic healthcare education + professional technical education + practical education", so as to realize the organic combination of theoretical knowledge and practical skills, and to cultivate students' professional competence and service consciousness. 3) Cultivation process. The training process focuses on the implementation strategy of "how to teach", emphasizing the selection and application of teaching methods. Modern teaching methods such as scenario simulation, case study teaching and project-based learning should be introduced to enhance students' practical ability and problem solving ability. At the same time, students' comprehensive vocational ability can be improved by combining theoretical learning with practical internships and interaction and cooperation between medical and nursing institutions.4) Quality evaluation. The evaluation of teaching effectiveness needs to be objective from the perspective of whether it meets the needs of the society and the industry. The quality evaluation system should include a comprehensive assessment of students' mastery of professional knowledge, practical skills and professionalism, etc. By evaluating students' comprehensive ability and professional skills, it ensures that the cultivated talents can meet the actual needs in the field of medical and nursing care integration services.

4.3 Cultivation recommendations

(1) Three-dimensional personnel training curriculum system

The training program for healthcare integration talents focuses on the improvement of comprehensive quality and professional skills, aiming to cultivate professionals who can adapt to the needs of geriatric medical and elderly services. The training program adopts an integrated education model, combining public basic and quality education, professional basic education, professional technical education, and practical education, in order to cultivate students' professional skills and application ability. In the early stage of the training process, i.e. the first academic year, the learning of basic professional knowledge is emphasized through large class teaching and theoretical courses, while public courses and basic courses involving the field of healthcare integration are offered with the aim of popularizing relevant theoretical knowledge and ensuring that students have a good professional quality. Entering the second academic year, the focus of education shifts to strengthening practical skills, utilizing practice bases and school-enterprise cooperation platforms, encouraging students to carry out service projects in combination with their own interests and the specific needs of the elderly population, and to enhance their professional skills through practical operation. At this stage, students will have the opportunity to receive personalized tutoring from experts and instructors in a small classroom setting, and deepen their professional knowledge and skills through a variety of means, such as special lectures, seminars and practical training. The third academic year continues to strengthen practical education, focusing on the close integration of theory and practice, and further enhancing students' practical skills and innovative thinking through participation in entrepreneurial competitions, project incubation and marketing, laying a solid foundation for

their future career development in the field of healthcare integration. The specific training program is shown in Figure 4.

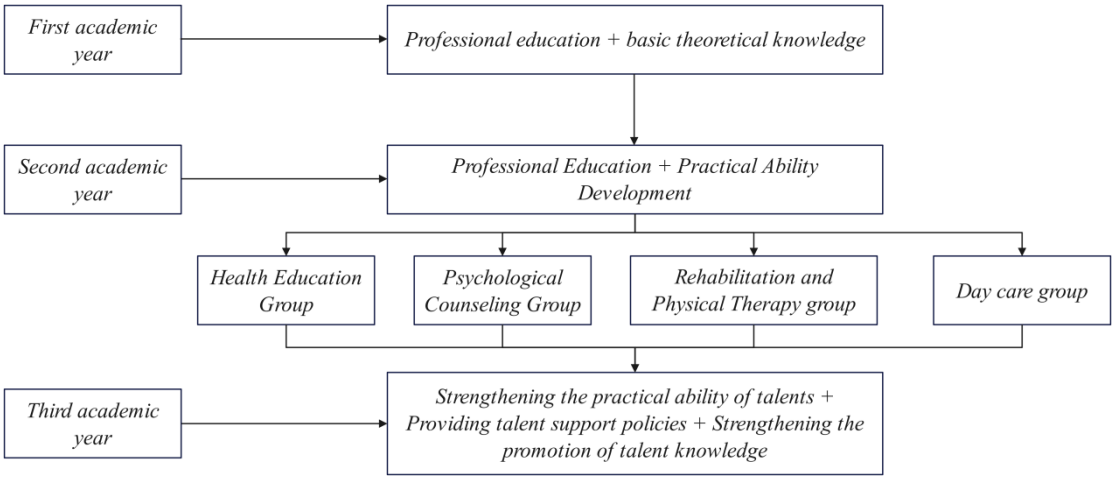

Figure 4 Talent Training Program for Healthcare Integration Professionals

In the process of implementing the "dual-creation" education and the "Healthy China" strategy, the nursing program of higher vocational colleges and universities should focus on creating an innovative education model, aiming to closely integrate the cultivation of health care talents with innovation and entrepreneurship education. This educational model focuses on the clear definition of cultivation objectives and talent specifications, as well as the establishment of a systematic curriculum system to synchronize the cultivation of professional skills in health care and the enhancement of innovation and entrepreneurship. At the same time, the organic integration of professional skills and innovation and entrepreneurial ability is realized through the establishment of courses such as "Health Care E-Commerce" to ensure that students can realize innovation and entrepreneurship in the field of health care integration. In addition, specially designed courses such as Chinese Medicine Nursing (Innovation and Entrepreneurship Edition), Mortar and Pestle Acupuncture and Tuina (Innovation and Entrepreneurship Edition), Rehabilitation Nursing (Innovation and Entrepreneurship Edition), and Elderly Daily Nursing Care and Health Education (Innovation and Entrepreneurship Edition) not only cover the professional knowledge of the integration of health care, but also incorporate the elements of innovation and entrepreneurship, which are aimed at strengthening the innovative and entrepreneurial thinking and ability of students through practice and exercise. In the practical teaching session, students are provided with abundant practice opportunities by combining internships in medical institutions and senior care service organizations, as well as diversified platforms such as innovation and entrepreneurship parks, clubs, project incubators and science and technology parks. Such practice sessions not only enhance students' professional and technical abilities, but more importantly, through the participation in innovation and entrepreneurship-related activities, they stimulate students' innovative potential and entrepreneurial enthusiasm, and enhance their self-awareness and practical abilities.

In order to fully implement the spirit of "dual-creation" education, and at the same time to explore and meet the special needs of the healthcare integration field, higher vocational education institutions have adopted a series of innovative teaching methods and practical sessions aimed at training healthcare integration professionals. Teaching methods emphasize diversity and interactivity, including small class teaching, group discussion, case study, brainstorming, sand table simulation, mind mapping, practical exercises, trial lectures and critiques, and seminars on innovation and entrepreneurship plans, etc., which are designed to stimulate students' innovative thinking and enhance their ability to solve practical problems. Practical sessions occupy an important part of the teaching program, including pre-school education for new students, military training, social practice, clinical apprenticeship and graduation internship, etc., totaling 44 weeks, which are uniformly arranged by the university. Experiments, practical training, apprenticeships and other practical activities are carried out throughout the public basic and quality education courses, professional basic courses and professional technology courses to ensure that students can deepen their theoretical knowledge and improve their professional skills in practice. The curriculum is designed to provide students with space for personalized development, and to build a comprehensive and flexible learning system by combining compulsory and elective courses, classroom learning

and independent learning, and process and outcome assessment. The total credits of the program are set at a minimum of 136 credits, including 115 credits of compulsory courses, 15 credits of restricted courses, and 6 credits of optional courses, aiming to ensure that students can fully master the necessary professional knowledge and skills. The evaluation system adopts a combination of process evaluation and result evaluation, with a view to more comprehensively assessing students' performance in terms of innovation and entrepreneurship knowledge, ability and quality. Through diversified evaluation means, it can not only effectively test the effectiveness of innovation and entrepreneurship education, but also promote the education reform and the continuous improvement of quality, laying a solid foundation for the cultivation of high-quality innovation and entrepreneurship talents in the field of medical and health care integration.

(2) Guaranteed Service System

In order to effectively enhance the cultivation and development of elderly service personnel, government agencies must deepen their role and, through careful planning and continuous optimization of the policy framework and overall layout, begin to formulate clear policy guidelines for the cultivation of elderly service personnel. This involves nurturing both quantitatively and qualitatively adequate professionals, and protecting the legitimate rights and interests of elderly service workers through the formulation and implementation of relevant laws and regulations. This not only corrects public misconceptions and prejudices about the profession, but also guides public opinion and enhances the social recognition of elderly care work and the professional pride of those who work in it, thereby attracting more talented people to join the profession. At the same time, the market plays a key role in the allocation of resources, the state and the government in the macro-control at the same time, should be based on market demand, the implementation of overall planning and step-by-step implementation of the strategy, to avoid the fragmentation of the policy and management level of the gap. In particular, regulatory agencies at all levels need to strictly fulfill their regulatory responsibilities and supervisory powers to ensure that relevant policies on talent training, employment guidance, vocational qualification assessment, job title promotion and remuneration and benefits are actually implemented and realized. In addition, local government departments should establish and optimize a standardized education and training mechanism, and build a multi-level, high-quality training system for senior care talents that includes secondary vocational education, higher vocational education, undergraduate, master's and doctoral education. This includes standardizing the teaching standard system for the training of diversified human resources such as medical, nursing, rehabilitation, medical information and health management, and focusing on the cultivation of elderly service professionals who can meet the current social development and market demand. At the same time, the State should incorporate the credit of elderly service personnel into a strict credit supervision system to reduce the impact of uncertainty on the stability and mobility of personnel.

In order to improve the efficiency and quality of the training of elderly service personnel, educational institutions need to play a central role in fostering specialized and multi-skilled elderly service personnel by increasing resource input and reforming teaching methods. First of all, educational institutions should update the content of their curricula and introduce new specialties related to elderly care services, such as home management, health management and social work, as well as promote the development of teaching materials and the reform of teaching methods in order to meet the needs of the industry. In addition, they should strengthen school-enterprise cooperation and industry-teaching integration strategies, develop practical training bases and practice platforms to ensure that students can combine theoretical knowledge with practical operation, and cultivate nursing care talents with practical operation ability. Secondly, it is crucial to build a professional team of elderly service teachers. This includes encouraging teachers to participate in the practical work of elderly services to accumulate experience, introducing teachers with rich clinical experience to participate in teaching, strengthening continuing education and academic upgrading of teachers, as well as supporting young teachers to go to study and exchange at home and abroad, and introducing new educational concepts and teaching methods. At the same time, professionally qualified psychological counselors and dietitians are hired to join the teaching team, thus improving the comprehensive quality and teaching ability of the teaching team. In addition, innovative enrollment and publicity strategies are also key to attracting more students to join the elderly service program. Publicizing the characteristics of the educational institution, professional prospects and employment opportunities through multiple platforms, as well as actively publicizing preferential policies such as tuition fee waivers and scholarships, can effectively attract the attention of students and the society. Finally, it is emphasized that the cultivation of humanistic qualities is equally important for improving the quality of

elderly care services. Offering courses such as humanistic medicine and medical ethics can not only enhance students' professional skills, but also cultivate their professional ethics and sense of humanistic care, thus comprehensively improving the quality of elderly service personnel. Through these comprehensive measures, the quality of the training of elderly service personnel can be effectively improved to meet the social demand for high-quality elderly service.

Healthcare and elderly care organizations play a key role in nurturing elderly care professionals, and need to build and improve the talent training system by establishing a clear distribution of responsibilities and strengthening cooperation mechanisms. First, based on, for example, the National Occupational Skills Standard for Elderly Caregivers (2019 edition) issued by the Ministry of Human Resources and Social Security and the Ministry of Civil Affairs, institutions should implement occupational skills level appraisals and develop comprehensive training programs, including pre-service, on-the-job as well as lifelong education, to adapt to the different needs of professionals. At the same time, modern information technology and diversified teaching methods are utilized to stimulate learners' innovative thinking and initiative, ensuring the effectiveness of training and the improvement of service quality. Further, medical professionals, such as general practitioners, geriatricians and Chinese medicine rehabilitation specialists, are encouraged to participate in the medical services of elderly organizations and provide services such as disease prevention, health care and nutritional health care through multi-disciplinary practice. This not only optimizes the knowledge and skills of the professionals, but also ensures the quality and implementation of services through the performance appraisal mechanism. In response to the challenge of high talent turnover in the field of elderly care services, it is recommended that a system of talent exchange and further training be established between medical and elderly care organizations to promote the planned mobility of talent. At the same time, the induction training of new employees should be strengthened and labor contracts should be signed in accordance with the law to clarify rights and obligations and effectively reduce talent loss. This series of measures aims to establish a standardized and efficient system for training and retaining talents in elderly services to meet the long-term development needs of the industry.

5. Conclusions and outlook

5.1 Conclusion

This study comprehensively addresses the challenges and needs of aging demographics on the demand for healthcare services, and proposes a specific construction of an integrated healthcare training system. Through an in-depth analysis of demographic data and current service needs, it identifies key gaps in the existing training framework. The proposed multidimensional talent training model not only bridges these gaps, but also meets the dynamic needs of an aging society by advocating a balanced integration of medical knowledge and geriatric care skills. This study presents an innovative contribution by proposing a structured approach to the development of a workforce proficient in medical and geriatric care services, thus ensuring a sustainable response to the changing healthcare environment affected by an aging population.

5.2 Outlook

The contribution of this study is to address the complexities of elderly care in a changing demographic with a prospective perspective that lays the foundation for future research and policy development in the field. While it provides a robust framework for talent training, it also recognizes the need to continually adapt and innovate educational strategies to keep pace with technological advances and changing societal needs. Future research efforts may include exploring the impact of digital technology on aging services, evaluating the effectiveness of interdisciplinary training programs, and developing policies that further support the integration of healthcare and aging services. This study paves the way for holistic healthcare services for an aging population, emphasizing the importance of preparation, policy support, and continued development of talent training systems.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, author-ship, and/or publication of this article.

DATA SHARING AGREEMENT

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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