Analysis of the Status Quo of the Elderly's Demands of medical and elderly care Combination in the Underdeveloped Regions of Western China and Its Influencing Factors: A Case Study of Lanzhou

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Abstract

Background: This study aims to analyze the current demand of senior citizen in Lanzhou, China for the combination of medical and elderly care services and identify the factors influencing their needs.

Methods: 7500 participants aged 60 or above living in Lanzhou, China were recruited, a unified questionnaire concerning the elderly's demand of the service combining medical and elderly care has been adopted to conduct a survey on these subjects. The status quo of the demand of the service combining medical and elderly care and its influencing factors were analyzed with the single-factor Chi-square test and multi-factor binomial logistic regression method.

Results: 3,772 of 7,320 seniors have the demand of the service combining medical and elderly care, accounting for 53.15%. Different genders, marital status, degree of education, occupation before retirement, number of children, monthly income, health self-assessment status, endowment insurance type, medical insurance type, current way of elderly nursing, old-age demands, self-care ability, and the knowledge of combining medical and elderly care, the willingness to pay for the combination of medical and elderly care have statistical significance (P 0.05) with the elderly's needs of combination of medical and elderly care in Lanzhou, whereas different ages, living styles, and the prevalence rate of chronic diseases, have no statistical significance (P 0.05) with the elderly's needs of combination of medical and elderly care in Lanzhou. The number of children, types of medical insurance, and willingness to pay for the combination of medical treatment and nursing are major influencing factors among complex factors influencing the elderly's demand of the service combining medical and elderly care in Lanzhou.

Conclusions: The low knowledge rate and demand rate, the number of children, the type of medical insurance, and the willingness to pay the medical-nursing combination service for the elderly in Lanzhou have a great impact on the elderly's demand rate of combining medical and elderly care. Meanwhile, relevant government departments should focus more on the promotion of the endowment model of combining medical and elderly care and provide integrated medical care services by integrating multiple resources, and improving social security.

Background

In recent years, the aging trend has become prominent in China. There was 249 million elderly people more than 60 years old and 167 million elderly people more than 65 years old in 2018, accounting for 17.90% and 11.90% of the total population of the country, respectively, according to the latest statistics of the elderly population released by the National Bureau of Statistics. The proportion of the population aged over 65 years old has been increased year by year, and the old-age dependency ratio has been also increased year by year [1]. The number of people aged more than 60 years old is expected to increase to about 255 million by 2020, accounting for 17.8% of the total population; and the old-age dependency ratio is expected to increase to around 28%; the elderly with venerable age is expected to reach up to 29 million, while the elderly living alone and the empty-nested elderly are expected to reach up to 118 million

[2], according to China's "Thirteenth Five-Year Plan" for the Planning of Developing the Aging Industry and Constructing the Endowment System. As the aging trend is accelerating, the numbers of the elderly with venerable age, the disabled elderly, the semi-disabled elderly witness sustain growth in China. There were more than 40 million disabled and semi-disabled elderly people in China by the end of 2016. And 7% of the families should conduct long-term care for the elderly. Those who need direct care also desperately need the involvement of medical service [3-4]. Compared with developed countries in Europe and the United States, China shows a unique aging characteristic of such as getting aging far before becoming wealthy, larger scale, faster speed, and heavier dependency burden, etc. What's more, China's pension security system should be improved. And the Chinese society is encountered with tremendous pressure under the challenge of an ever-increasing aging trend.

With the basic national family planning policy and economic and social transformation, the family supporting function has been weakening, while the elderly's demands for professional nursing institutions and community services have been steadily on the increase. In particular, the elderly aged over 80 years old with a high morbidity rate of chronic disease desperately needs systematic, comprehensive, convenient, and low-cost medical services. Moreover, both medical and elderly care, as a matter of fact, are indispensable for the disabled and semi-disabled elderly [5]. The elderly's medical needs cannot be satisfied neither in most of the old-age nursing institutions that provide low-level medical services with few qualified nursing staff and limited beds, nor in medical institutions which cannot provide long-term hospitalization services for the elderly due to their limited resources. Besides, care resources in the community level cannot fully cover the medical and nursing demands of the disabled elderly and the elderly suffering from diseases.

The aging of population has exacerbated the shortage of resources for medical services and elderly nursing, which has put forward a request for improving the allocation and utilization of social resources. The traditional elderly nursing model cannot satisfy the elderly's all-round care needs. It is imperative to implement health care for the elderly. Nevertheless, medical treatment and elderly-care resources are inadequately supplied and mutually independent, which cannot meet the needs among the elderly nowadays. Therefore, it is of great necessity to provide the elderly with a "medical-nursing combination" service that organically combines medical and elderly care.

Since there is no standard definition of "medical-nursing combination" in China, it's defined differently by a wide range of scholars. Guo et al. believes that "medical-nursing combination", is to gradually form a cooperative service mode integrating medical treatment, recovery, and nursing from service providers (incl. hospitals, elderly nursing institutions, and communities) providing a medical and nursing service conforming to elderly nursing to the elderly in demand as per different needs of health at different stages of suffering from diseases [6]. Liu et al. defined the combination of medical care and nursing as satisfying the needs of health problems at different levels for the elderly at different stages in the care process through integrating medical resources and pension resources to optimize the allocation of medical and nursing resources [7]. Liu et al. considers that the elderly can achieve the purpose of obtaining medical treatment while suffering from diseases, and enjoying care while not suffering from

diseases under the new elderly nursing mode combining medical and elderly care[8]. As for Huang et al., medical-nursing combination possesses the same concept as "long-nursing" overseas, which focuses on satisfying the basic living needs of the elderly, as well as physical and psychological care; moreover, medical treatment should be highlighted, while the enhancement of daily living skills, the adaptation of social environment, and the realization of self-worth are also important [9].

In order to solve the medical problem of the aging population, the concept of medical-nursing combination was first proposed in "Several Opinions on Accelerating the Development of the Elderly nursing Service Industry" issued by the State Council in Sep. 2013. It pointed out to satisfy the needs of multi-level elderly nursing services, actively respond to the aging population, and accelerate the development of the elderly nursing service industry through actively driving the combination of medical and elderly care service. "Guiding Opinions on Promoting the Combination of Medical Treatment and Elderly nursing Services" issued by the State Council in Nov. 2015 indicated two tasks for promoting the combination of medical and elderly care , firstly, encouraging elderly nursing institutions to conduct various forms of agreement and cooperation with surrounding medical and health institutions and establish a sound cooperation mechanism; secondly, promoting the extension of medical and health services to communities and families. In the "Thirteenth Five-Year Plan" for the Planning of Developing the Aging Industry and Constructing the Endowment System issued by the State Council in Mar. 2017, it focused on assigning 9 tasks including active promotion of medical-nursing combination service, and improving the allocation and utilization of social resources. As of 2017, China has set up 90 national-level pilot cities for combining medical and elderly care [11].

On that basis, "medical and elderly care combination" is a new elderly nursing mode that provides the elderly with services such as uninterrupted daily care, mental consolation, disease diagnosis and treatment, health guidance, recovery from serious illnesses, and hospice care through effectively integrating medical and elderly care resources, so as to satisfy varied health care needs of the elderly at varied levels.

Currently, four medical and elderly care modes can be found in China [12]. The first mode is "nursing in hospital", that is, a geriatric department is set in some large hospital with conditions to provide medical treatment, nursing, care for the elderly, rehabilitation, health education, hospice care and the like services; or some low-level primary hospitals with idle resources are transformed into nursing institutions for medical rehabilitation, convalescence, and elderly nursing to achieve the goal of integrating medical and elderly care. The second mode is "constructing hospital in nursing institutions“, and providing professional medical and nursing teams according to the standards of national hospitals in large-scale elderly nursing institutions or welfare homes. Meanwhile, basic medical departments such as comprehensive medical-surgical department, rehabilitation department, and pharmacy are set up to form a new elderly nursing institution integrating elderly nursing with healthcare functions. The third mode is the union of medical and elderly care, namely, a cooperation mechanism is established between medical institutions and elderly nursing institutions. In this way, medical institutions provide medical care training to nursing staff in elderly nursing institutions, and regularly conduct basic diagnosis and treatment

services such as inspection of common diseases, chronic diseases, and geriatric diseases as well as health education. Meanwhile, the hospital also offers a green channel to provide timely medical referral service for the elderly in need, and conduct consequent recovery treatment in the elder care institutions after his/ her condition is controlled. By doing so, a two-way continuous care model is generated. The fourth mode is "home nursing", which is a family doctor model in essence. A service team provides out-patient services and life nursing services for the elderly. It is a model that is primarily designed for the elderly with good health, allowing the elderly to enjoy their old ages in peace with familiar surroundings.

As western developed countries entering the aging society is earlier than China, they have developed a new elderly nursing mode called "long-term nursing" that is consistent with the medical-nursing mode in concept, connotation, service purpose, content, and object. The United Kingdom, the United States and Japan are most typical countries that have developed their unique representative research results concerning elderly nursing.

The elderly nursing model in the United Kingdom is dominated by community and home care. Main service providers are composed of managers, professional staff and caregivers, who provide four major services including life care, material support, psychological support and overall care. Specifically, life care is mainly to provide home-care services and short-term care services for the self-care or semi-self-care elderly; material support includes the government upgrading the infrastructure of the elderly's living place and providing tax subsidies or preferences to taxpayers more than 65 years old; psychological support is that service staff visit the elderly for health inspection, publicizing health care knowledge, making rehabilitation and treatment suggestions and providing psychological counseling; overall care is that community activity centers funded by the government or the society are constructed to inject fun into the elderly in their later years, and some low-intensity jobs are provided to increase the elderly's income and maintain their mental health [13].

The elderly nursing model combining medical and elderly care in the U.S. is dominated by a program of all inclusive care for the elderly (PACE) that is set up for the disabled, the semi-disabled, and over-55-year-old low-income groups requiring long-term medical care. Covering medical services, rehabilitation services, social support services, the purpose of PACE is to facilitate the elderly, and the debilitated to live as long as possible in the community or family, improving the living quality of the elderly with weak self-care ability, and maximally protecting the dignity of the elderly [14]. The elderly nursing combining medical and elderly care model in Japan is dominated by the following models. First, day care center; this model mainly provides rehabilitation and life care services for the elderly more than 65 years old who are unattended at home in the daytime and need rehabilitation training. Second, nursing center; It's supported by a service consisting of nurses, caregivers, and welfare workers to provide daily services for the disabled elderly living in the center. Third, elderly welfare center targeted at the elderly in the community, service staff, mainly health care therapists provide services health examination, health education, health care services and family guidance. Fourth is the apartment for the elderly, which is mainly designed for the healthy elderly who can take care of themselves. It provides basic medical services and daily care

services. An all-round legal system is a major reason why the elderly nursing combining medical and elderly care has been well developed in Japan [15].

Researches on "combination of medical and elderly care" have been proven abroad with proven systems forming from policies to services, which can provide a reference and basis for researching and implementing the combination of medical and elderly care in China. Researching the "combination of medical and elderly care" service model is still in its initial stage of development in China. Related researches in the domestic literature focus on introducing and analyzing foreign elder care cases based on the "combination of medical and elderly care ", which propose the status quo of the development of the "combination of medical and elderly care" mode before making suggestions, or conducting case study in the pilot region of combining medical and elderly care in China. Nevertheless, few studies cover the service requirement and influencing. Instead, most of the researches discuss the elderly's basic situation, health status, social support, and income status, etc. Generally speaking, the better the health condition of the elderly, the higher the self-care level, the lower the income, and the lower the social support, the smaller the demand of the service combining medical and elderly care [12, 16]. Li et al. finds out that the number of children, health status, children support, and willingness to pay have significant impacts on the demand of services combining medical and elderly care after investigating more than 420 elderly people aged more than 60 years in four major urban areas of Chongqing [16]. Hu et al. discovers that degree of education, ideal elderly nursing way and willingness to pay are significant factors affecting the elderly's demand of the service combining medical and elderly care in urban areas after surveying the elderly in Yinchuang [17]. According to Zhao et al's research, age, degree of education, number of children and occupation type before retirement are main factors affecting the elderly's demand of the service combing medical and elderly care[18]. Through investigation, Wang et al's believes that the elderly in Changchun has a high willingness to participate in the combination of medical and elderly care. Gender, age, education, and occupation type are major factors affecting their choices [19].

The basis of medical insurance in China is comprised of basic medical insurance system for urban workers, basic medical insurance system for urban residents and new rural cooperative medical insurance [20, 21]. A unified basic medical insurance system for urban and rural residents should be gradually established nationwide according to the Opinions on Integrating the Basic Medical Insurance System for Urban and Rural Residents issued by the State Council in 2016. The number of people insured in basic medical insurance in China has exceeded 1.35 billion with a participation rate maintaining at over 95% by the end of 2017, basically realizing a full coverage from "insurance for few" to "insurance for all" [22].

The basic medical insurance system for urban employees is raised jointly by social medical unified planning and individual account, forming social medical unified planning fund and individual medical account fund. Individual account is not set in the basic medical insurance system for urban and rural residents. In other words, only social medical unified planning fund is established to raise funds through quota. The premiums consist of individual residents' contributions and financial subsidies.

Most scholars in our country believe that the demand of the service of combining medical and elderly care is affected by the design and implementation of medical insurance systems and the elderly's paying capacity under the current medical insurance system. In terms of system design, there is a lack of long-term care insurance specifically for elderly nursing, and the elderly nursing service combining medical and elderly care is not involved in the designated medical insurance units. Medical insurances in China focus on economic compensation for the loss caused by the disease, lacking compensations for preventive health care, rehabilitation, long-term care, and the like services needed by the elderly, whereas basic pensions are mainly used for daily care of the elderly [23]. In the aspect of system implementation, the reimbursement practice of medical insurance in China is characterized by" designated medical care with three medical directories". Since setting up medical institutions in nursing institutions is not included in the designated medical organization, additional medical services in the nursing institution cannot be paid through medical insurance. In the case, the elderly living in the nursing institution have to visit hospitals for treatment, lowering the access of medical service [24]. Besides, a plurality of issues such as the admission of nursing institutions, the verification of medical qualifications, medical insurance designated hospitals, and review and distribution of charges can be found in the nursing institution involving in the combination of medical and elderly care [25]. Regarding the elderly's paying capacity, the medical insurance only covers medical expenses and examination costs during the medical process. And with the lack of the long-term care insurance system, rehabilitation medical programs, life care programs, and auxiliary equipment programs are fully paid by the elderly. However, the elderly patients who are economically disadvantaged, especially the disabled and the semi-disabled, the elderly suffering from diseases, and more than 80 years old have a limited capacity to pay for the long-term care cost [26].

The elderly is a main service object of the "medical-nursing combination" model, whose demand willingness plays a decisive role in the development of the "combination of medical and elderly care ". Hence, it is absolutely essential to proceed from the elderly's demand and willingness before conducting an in-depth exploration of the elderly nursing mode combining medical and elderly care.

As of the end of 2018, the elderly aged 65 years old or above in Lanzhou has reached up to 498,800 people, accounting for 16.50% of the total population [27]. Moreover, the proportion of the population aged 65 years old or above has been apparently higher than the average level of the whole country and Gansu during the same period (See Fig. 1. Data source, national data from 2010 to 2018 were from the China Statistical Yearbook [27], and data of Gansu from 2010 to 2018 were from the Gansu Statistical Yearbook [28], data of Lanzhou from 2010 to 2018 were obtained from the Lanzhou Yearbook [29]). In addition, as can be seen from Fig. 1, the degree of the aged phenomenon has becoming more serious in Lanzhou from 2010 to 2018, of which, the aging rate was 8.20% in 2010 and jumped to 16.50% in 2018, indicating that the growth of aging population has been accelerated by 8.3%. By comparison, the national aging rate was 11.9% in 2018, which clearly shows that the aging rate in Lanzhou was accelerated. What's worse, the aging problem in Lanzhou would be crucial, as the degree of aging population could become serious over times. The accelerating population aging speed in Lanzhou has brought tremendous pressure on elderly nursing. Furthermore, elderly nursing involves a variety of requirements such as medical rehabilitation and spiritual happiness with the social progress, rather than merely basic

daily care. It can be seen that a tremendous requirement has been proposed to multi-integrated nursing services combining nursing and medical treatment based on the huge elderly group and the serious aging status quo in Lanzhou.

Incomplete statistics show that there are 27 nursing institutions in Lanzhou as of now, including 7 institutions run publicly and 16 run privately, and 4 institutions combining medical and elderly care, proving a total of 6,107 beds. Specifically, 18 hospitals have set up geriatrics and geriatric beds, providing a total of 500 beds, accounting for 69% of the total number of hospitals; 26 hospitals above the county level have set up green medical treatment channels for the elderly; and 19 nursing institutions can provide medical services, accounting for 70.4% of the total nursing institutions; the contracted service rate of the home-based elderly aged more than 65 years old in Lanzhou reached up to 73% [30-31]. As a national pilot city for combination of medical and elderly care, Lanzhou has made some achievements in the process of developing service combining medical and elderly care. However, the follow-up work remains cumbersome since the policy obstacles of combination of medical and elderly care should be overcome. What's more, concrete service contents and links should be improved, such as constrained nursing conditions in medical institutions, missing service function of nursing institutions, high cost, constrained reimbursement of medical expenses, pessimistic cognitive status of the concept of combination of medical and elderly care , and the institution management system requiring enhancement [31].

Scholars tend to be more willing to concentrate on the process and obstacles of combining medical and elderly care at the macro level for such a new type of elderly nursing. However, few studies analyzing the elderly’s needs of combination of medical and elderly care can be found.

The social and economic foundation of the undeveloped region of western China is relatively weak with a low level of social security and welfare. In particular, the elderly long-term care system in remote rural areas is in its infancy. Lack of a well-defined medical nursing mechanism seriously affects well-being and happiness of residents in the area. As the driving strategy of combining medical and elderly care has been vigorously promoted at the national level, theoretical introduction and countermeasure are essential to regional strategic layout. A questionnaire survey concerning the needs of elderly nursing service combining medical and elderly care was conducted on residents in Lanzhou. On this basis, specific needs of residents for elderly nursing services combining medical and elderly care were analyzed. By sorting out factors affecting the demand of elderly nursing service combining medical and elderly care, policy proposals were proposed accordingly. And the case study of Lanzhou was taken as an example to provide a referring significance of developing combination of medical and elderly care in the undeveloped region of western China, so as to lift health care levels of residents in the undeveloped region of western China, satisfy their medical and nursing requirements, and improve their nursing services.

Methods

2.1 Participants

A questionnaire survey was conducted in 4 districts of Lanzhou (inc. Chengguan District, Qilihe District, Anning District, and Xigu District, the location map of the study area is shown in Fig. 2) through stratified random sampling. The elderly aged 60 years old or above were selected as survey objects. A total of 7,500 elderly people were surveyed with the distribution of the questionnaire concerning the elder care service combining medical and elderly care.

Selection criteria: ①age≥60; ②length of residence≥6 months; ③the elderly without known significant cognitive impairment, severe illness and terminal illness, the elderly without visual and hearing impairment caused by various reasons; ④informed consent. 7,500 questionnaires in total were administrated this time, and 7,320 valid ones were collected.

2.2 Design and procedure

Questionnaire concerning the elderly needs of combining medical and elderly care: Questionnaires involving personal characteristics, health status, economic status and the cognitive degree of medical-nursing combination of the elderly, have been frequently adopted by scholars at home and abroad for investigating the needs of elderly nursing service combining medical and elderly care. In order to better compare with the results of related literature [12-19, 32-43], and perform an in-depth analysis of factors affecting the needs of combining medical and elderly care, a questionnaire related to the elder care needs of combining medical and elderly care has been designed by epidemiological and statistical experts and jointly compiled by the research team and elderly nursing management experts on the basis of a full reference to relevant literature [12-19, 32-43] and national health policies. The in-house designed "Survey on the elderly's Needs of Combination of Medical and elderly care in Lanzhou" was used as a survey instrument. The questionnaire was designed in accordance with the literature [12-19, 32-43], China Health and Pension Tracking Survey, the Fifth National Health Service Survey-Family Health Questionnaire, as shown in Table1.

Before the questionnaire was officially distributed, 100 retired residents were selected for pre-survey through convenience sampling. And a formal questionnaire was formed after the questionnaire was revised according to the pre-survey results. The questionnaire is composed of general demographics, health status, medical endowment insurance, and the knowledge and requirement of combining medical and elderly care. Detailed questionnaire is provided by us as Supplemental Materials. See the Supplemental Materials.

2.3 Quality control method

The survey was conducted face to face by trained investigators with the elderly. Investigators explained related concepts in the questionnaire during the survey considering that the elderly was not understanding the combination of medical and elderly care. Questionnaires were collected and checked by a specially-assigned person who was responsible for directly removing the invalid and the incomplete questionnaires. Qualified questionnaires upon the investigators' reviews were retrieved in time.

2.4 Statistical analyses

Software Epidata3.1 was used to log and proofread data in duplicate. Statistical software SPSS 18.0 was used statistical treatment. Enumeration data used χ^2 test, and the influencing factors were analyzed with binomial logistic regression. Statistical significance in the differences would be confirmed in case of P 0.05.

Results

3.1 Socio demographic Characteristic of senior citizens in Lanzhou

Table 2 presents the basic characteristics of the elders enrolled in current study. Retired elderly people aged more than 60 years old or above were surveyed. Among them, the number of males and females are 3,059, and 4,261, accounting for 41.79%, and 58.41%, respectively; and the elderly aged between 60 years old and 70 years old is 16.2%, aged between 71 years old and 80 years old is 39.6%, and aged more than 80 years old is 26.4%; also, there are 404 (5.52%) elderly people with elementary education or below, followed by 1437 (19.63%) with junior high school and 2560 (34.97%) with high school or technical secondary education, 2380 (32.51%) with college education, and 539 (7.35%) with undergraduate or above. Moreover, 50% of the surveyed elderly who worked in enterprises and public institutions before retirement enjoy stable retirement pay; 14.51% of the surveyed elderly have 1 child, 29.59% have two children, and 55.90% have 3 children. In the survey, there are 3388 elderly people considering they were in good health, accounting for 46.28%, while 44.64% of the elderly considered their health is not good enough, and only 664 elderly people (about 9.07%) considered they have weak health conditions. The prevalence of chronic diseases among the elderly involved in the survey is 50.46%; there are 5,231 elderly people who can take care of themselves, accounting for 71.46%; while 1890 and 199 elderly people need help from others and cannot take care of themselves, respectively, accounting for 25.82% and 2.72%, respectively. 3930 elderly people are participated in basic medical insurance for urban and rural residents, accounting for 53.69%; only 590 elderly people have commercial medical insurance, accounting for 8.06%; 983 elderly people are not participated in any medical insurance, accounting for 13.43%; up to 3791 elderly people are participated in endowment insurance for urban employees, accounting for 51.79%; there is the least portion of elderly people, only 111 are participated in commercial endowment insurance, accounting for 1.52%. There are 706 elderly people who are not participated in any endowment insurance, accounting for 9.64%. 2378 elderly people have a monthly income ranging from 2,000 to 4,000 yuan, accounting for 32.49%, followed by 2192 people with a monthly income ranged from 4,000 to 6,000 yuan, 1412 people with a monthly income larger than 6000 yuan. And there are 5,902 people choosing to live at home, accounting for 88.32%; people living alone account for 37.16%; and 5902 (accounting for 62.84%) people live in other ways. More details are presented in Table 2.

3.2 Cognition of and demand for the combination of medical and elderly care by senior citizens in Lanzhou

Table 2 also displays cognition of and demand for the combination of medical and elderly care for different social demographic characteristics of the elderly. Among the 7,320 elderly people surveyed, 62.43% of whom have never heard of the elderly nursing mode of combining medical and elderly care, 29.44% have heard of it but do not understand it; only 7.61% have a basic understanding of the mode, and only 38 people (accounting for 0.51%) have well understood this mode. Meanwhile, 3,772 out of the 7,320 elderly people surveyed have the demand of the service combining medical and elderly care, accounting for 51.53%. And 41.75% out of those who have the demand of the service combining medical and elderly care most want to obtain life care in the elderly nursing service combining medical and elderly care, and near half of the elderly most want medical care service integrating prevention, health care, medical treatment, with rehabilitation.

3.3 Single factor analysis of the influencing factors on the demand of senior citizens in Lanzhou for the combination of medical and elderly care

Through analysis, different genders, marital status, degree of education, occupation before retirement, number of children, monthly income, health self-assessment status, endowment insurance type, medical insurance type, current way of elderly nursing, old-age demands, self-care ability, and the knowledge of combining medical treatment and health care, the willingness to pay for the combination of medical and elderly care have statistical significance (P□0.05) with the elderly's needs of combination of medical and elderly care in Lanzhou, whereas different ages, living styles, and the prevalence rate of chronic diseases, have no statistical significance (P□0.05) with the elderly's needs of combination of medical treatment and health care in Lanzhou. More details are presented in Table 2.

3.4 Logistic regression analysis of the influencing factors on the demand of senior citizens in Lanzhou for the combination of medical and elderly care

Factors (incl. gender, marital status, degree of education, occupation before retirement, number of children, monthly income, health self-assessment status, endowment insurance type, medical insurance type, current way of elderly nursing, old-age demands, self-care ability, and the knowledge of combining medical treatment and health care, the willingness to pay for the combination of medical and elderly care) with statistical significance in the single-factor analysis were regarded as independent variables X_i; the patient's demand of the service combining medical and elderly care was taken as a dependent variable Y (Y= 1 indicates a demand of the service combining medical and elderly care, and Y = 0 indicates no demand of the service combining medical and elderly care) for conducting binomial logistic regression analysis. The relationship between the elderly's demand of the service combining medical and elderly care and various variables were obtained, as shown in Table 3.

Influencing factors were screened using the stepwise regression method. The inclusion criterion was α = 0.05 and the removal criterion was α = 0.1. The results of logistic regression on medical-nursing combined service need are shown in Table4. According to regression results, major influencing factors are comprised of the number of children, health self-rating, type of medical insurance, current mode of elderly

nursing, elderly nursing need, self-care ability of daily living, the knowledge of service combining medical and elderly care, and willingness to pay for the combination of medical and elderly care ($P < 0.05$, see Table 4).

Discussion

4.1 Comparison between the cognition and demand of senior citizens for the combination of medical and elderly care services

Surveyed data of this study show that only 7.12% of the 7,320 elderly people aged more than 60 years old in Lanzhou knew and understood the service combining medical and elderly care. 25.0% of senior residents in Datong basically knew the mode of combining medical and elderly care, while merely 6.0% well understood the mode of combining medical and elderly care [12]. As can be observed from the study conducted by Hu et al. in Yinchuan, merely 7.6% of the residents basically knew the elderly nursing mode of combing medical and elderly care, and 0.5% well understood the combination mode [17]. Studies conducted by Zhou el al. in Urumchi show that 13.67% of the residents heard of or basically knew the service combing medical and elderly care [18]. According to the research conducted by Wang et al in Chuangchun, 2.54% and 6.21% of the elderly in the community well understood and basically knew the elderly nursing mode combing medical and elderly care [19]. The study conducted by Liu et al. in Karamay found that only 11.30% of the local residents knew and understood the elderly nursing mode of combing medical and elderly care [38]; and the study conducted by Wang et al. in Beijing show that 12% of the senior residents understood the community elder care service of combing medical and elderly care, while only 4.0% of those understood and used the combination mode [39]. The results shown in this study are basically consistent with the above findings, indicating a low knowledge rate of elderly nursing service combining medical and elderly care.

The combination of medical and elderly care is still under the exploratory stage in China. And few investigations could be found in the demand rate of combination of medical and elderly care, since most of the related researches are dominated by theories, problems, and countermeasures. This survey shows that the demand rate of the service combing medical and elderly care of the elderly in Lanzhou is 51. 43%. And the elderly's demands for the service combing medical and elderly care were also reported in some domestic studies, for example, the demand of the elderly nursing service combing medical and elderly care for the elderly in cities and towns in Datong makes up for 50.5% [12]; the demand of the elderly nursing service combing medical and elderly care for the elderly in Chongqing is 53.00% [16]; the demand of the elderly nursing service combing medical and elderly care for the elderly in Yinchuan accounts for 50.08% [17]; 56.21% of the elderly in Changchun has the demand of the elderly nursing service combing medical and elderly care [19]; the demand of the elderly nursing service combing medical and elderly care for the elderly in downtown Zhanjiang is 54.60% [32]; 61.10% of the empty-nested elderly in Quanzhou communities need the service combing medical and elderly care[33]; the demand of the elderly nursing service combing medical and elderly care for the elderly in Karamay is 53.01% [39]; the demand of the elderly nursing service combing medical and elderly care for retired residents in Tianjin is

61.9% [40]; a strong demand of the elderly nursing service combing medical and elderly care for elderly patients can be witnessed in Weifang, accounting for 97. 40% [41], and 43.40% of the elderly in Qiqihar have a demand of the elderly nursing service combing medical and elderly care [42]. Compared with the above studies, a low demand of the elderly nursing service combing medical and elderly care can be observed in Lanzhou.

It is generally recognized that the knowledge rate and the service demand of combing medical and elderly care is directly proportional, namely, the higher the knowledge rate, the higher the demand of the service combing medical and elderly care [32, 43]. For example, the research conducted by Wu et al. in Zhanjiang proves that the elderly's knowledge rate of the service combing medical and elderly care in downtown Zhanjiang is 59.40%, and the demand rate of the service combing medical and elderly care is 54.60% [32]. Nevertheless, some studies also show that the knowledge rate of the service combing medical and elderly care is not a factor influencing the demand of the service combing medical and elderly care. For example, the studies conducted by Hu et al. in Yinchuan and by Liu et al. in Karamay show that the knowledge rates of the service combing medical and elderly care are 7.60% and 16.11%, respectively, and their corresponding demand rates of the service combing medical and elderly care are 50.80% and 53.01%, respectively [17,39]. They are inconsistent with the knowledge rate (8.12%) and the demand rate (51.43%) of the service combing medical and elderly care for the elderly in Lanzhou. The possible cause of the high demand rate is that Yinchuan, Karamay, and Lanzhou are located in the undeveloped region of western China with a low level of economic and social development, a high degree of aging population. The low knowledge rate of the service combing medical and elderly care is affected by a plurality of factors, which is primarily due to the lack of publicity from the perspective of policy. The elderly aged 60 years old or above has information receiving channels differing from that the youth. Effective ways that are accessible to the elderly, including television, newspapers, communities, and nursing institutions should be selected for publicizing the combination service, instead of new media such as the Internet, Sina blog, Weibo, and WeChat, etc. Also, the publicity should also cover the elderly's children and family members. Government departments are responsible for strengthening the publicity in this regard. Favorable policies should be released timely and rigorously publicized, so that the elderly can obtain the favorable information timely and effectively utilize various preferential policy provided by the country.

4.2 Influencing factors on the demand for the combination of medical and elderly care by senior citizens in Lanzhou

4.2.1 The willingness to pay for the combination of medical and elderly care

The demand rate of the elderly who is willing to pay 2,000 to 3,000 yuan per month for purchasing the service combing medical and elderly care is 49. 64%; the demand rate of and seniors who are willing to pay more than 3,000 yuan per month for purchasing the service combing medical and elderly care is 64.50%; and 36. 54% of the elderly are willing to pay no more than 1,000 yuan per month for the service combing medical and elderly care. According to the investigation conducted by Fan et al. on the elderly in cities and towns of Datong, more than 50% of the elderly are willing to pay 1,000 to 2,000 yuan per

month; 35% of the elderly are willing to pay 2,000 to 3,000 yuan per month; 13% of the elderly are willing to pay is less than 1,000 yuan per month, and only a few elderly people are willing to pay more than 3,000 yuan for the service combining medical and elderly care [12]. After surveying the demands of the service combing medical and elderly care for the elderly in downtown Chongqing, Li et al. shows that the demand rate of the service combing medical and elderly care for the elderly who is willing to pay 500 to 999 yuan per month is 38.7%; the demand rate of the service combing medical and elderly care for the elderly who is willing to pay 2,500 to 2,999 yuan per month is 8/9, and 31.0% (124/400) of the elderly are willing to pay no more than 500 yuan per month for the service combing medical and elderly care [16]. The result obtained by Hu et al. surveying the elderly in Yinchuan presents that 39.59% of the respondents are willing to pay 500 to 999 yuan per month for the service combing medical and elderly care; 32.99% of the respondents are willing to pay less than 500 yuan per month for the service combing medical and elderly care; and only 27.41% of the respondents are willing to pay 1,000 yuan or above per month for service combing medical and elderly care. It is different form the result obtained in this study, which might be caused by different income levels in different regions. The average monthly income of residents in Lanzhou in 2018 was about 6,800 yuan [29], which was higher than that in Datong (5900 yuan), Chongqing (6400 yuan), and Yinchuan (6000 yuan) [27]. In that case, the elderly is more willingness to pay for the service combing medical and elderly care in Lanzhou than in other three cities mentioned above.

Furthermore, the demand rate of the service combing medical and elderly care for the elderly in Lanzhou is on the rise with the rising price that is willing to pay, which is similar with related literature [12,16]. It is due to conditions such as social status, economic income and degree of education of the elderly with a high willingness to pay are better than those with a low willingness to pay [12,16].

4.2.2 Type of medical insurance

In this study, the type of medical insurance is a factor influencing the demand rate of the service combing medical and elderly care for the elderly. The elderly with urban medical insurance have an increasing demand of the service combing medical and elderly care. In general, the elderly nursing cost in nursing institutions is higher than home-based nursing. And the reimbursing proportion of urban medical insurance is high. Although many nursing charges are not included in the reimbursement category, costs incurred by the service combing medical and elderly care can be covered by the urban medical insurance, which can alleviate part of the costs for the service combing medical and elderly care. In consequence, the elderly with urban medical insurance is more willing to select an institution with the service the elderly nursing service for nursing. Some studies indicate that medical insurance is a factor influencing medical rehabilitation and health care services for the elderly [44]. Another study demonstrates that the elderly participating in the new rural cooperative medical system is more willing to have the service combing medical and elderly care, in comparison to those with the medical insurance for urban residents [45]. It is probably because of different reimbursement proportions of various medical insurance systems.

4.2.3 Number of children

This study shows that the number of children is a factor influencing the demand rate of the service combing medical and elderly care for the elderly. The elderly with less children has an increasing demand of the service combing medical and elderly care. This may be caused by the family miniaturization and the increase in empty-nest families. In this way, the children cannot well take care of the elderly's life. Generally speaking, the elderly with more children has richer family supporting resources, more secure family supporting care and lower demands of the service combing medical and elderly care. When a core family is formed, the number of the elderly requiring care is increased, while the number of family members who can take care of the elderly is decreased. In that case, the elderly cannot be cared in an all-round way. What's worse, family members could be helpless in handling the special requirements of treatment, nursing, rehabilitation and hospice for the disabled elderly, the elderly with chronic diseases, and being susceptible to disease as well as those suffering from terminal diseases. Therefore, the uncared elderly who has difficulty in medical treatment due to few children or children not around have a higher demand of the service combing medical and elderly care.

4.2.4 Level of awareness of the combination of medical and elderly care

The knowledge rate of the service combing medical and elderly care in this study is one of the factors influencing the demand of the service combing medical and elderly care for the elderly. As can be seen from the studies conducted in Zhanjiang and Urumqi, the elderly who knew and understood the service combing medical and elderly care have a higher demand rate of the service combing medical and elderly care, in comparison to those never hearing of the service [32, 37]. However, the knowledge rate (8.12%) of the service combing medical and elderly care for the elderly in Lanzhou is greatly inconsistent with the demand rate (51.43%) of the service combing medical and elderly care. It is primarily because the service mode combing medical and elderly care in Lanzhou is still under development with incomplete organization, lack of publicity, causing that the elderly barely has knowledge of it. Most of the elderly have never hear of or merely heard of it from television, and newspapers and other media without understanding or merely knowing the service combing medical and elderly care. Moreover, parts of the elderly cannot understand the service mode, service purpose, and service concept of the service combing medical and elderly care accurately and doubt about the service mode combing medical and elderly care. Some even consider that the service combing medical and elderly care is equivalent to the nursing service in traditional nursing centers and welfare homes [12]. As for the elderly, the elderly nursing mode combing medical and elderly care is a new elderly nursing model. The elderly with an in-depth understanding of the new mode and its advantages is more willing to select the institution combing medical and elderly care for nursing. It shows that the development of the elderly nursing mode combing medical and elderly care is greatly correlated to the understanding of residents. Therefore, relevant government departments should well publicize the elderly nursing mode combing medical and elderly care to enhance the knowledge and recognition of the new mode among the people.

4.2.5 Self-assessment of health

The elderly's health self-rating status in this study is a factor measuring the health status of the elderly. The elderly's conscious need for elderly nursing or medical treatment can be reflected in the health self-rating status. According to the single factor analysis results, a statistically significant difference can be in the health self-rating status in the demands of the service combing medical and elderly care (χ^2 = 31.027, P = 0.000). The elderly with poor health self-rating status have a higher demand of the service combing medical and elderly care than those with better health self-rating status. The demand rate of the service combing medical and elderly care for the elderly with poor health self-rating status is 52.78%; the demand rate for the elderly with not good enough health self-rating status is 52.27%; and the demand rate for the elderly with a good health self-rating status is 41.57%. After surveying the elderly in cities and towns of Datong, Fan el al. find out that the elderly a poor health self-rating status has a higher demand of the service combing medical and elderly care; the demand rate of the service combing medical and elderly care for the elderly with poor health status reaches up to 66%, while the demand rate for those with good health status is only 37%. Another study conducted in Urumqi shows that the aging population with poor health self-rating status have a higher demand of the serve combing medical and elderly care than those with good health self-rating status. And the demand rate of the service combing medical and elderly care for the elderly with poor health self-rating status reaches up to 68.74%; the demand rate for the elderly with not good enough health self-rating status is 46.19%; and the demand rate for the elderly with a good health self-rating status is 53.45%. The findings in this study are basically consistent with that concluded in above studies [12, 37]. The elderly's physical function will be gradually deteriorated with increased incidence rate of various diseases and worsened health conditions with increasing age. What's worse, some of the elderly might can not take care of themselves. Along with these situations, there will be an increasing demand of the service of medical and elderly care. That's the reason why the elderly with poor health status have a strong demand of the service combing medical and elderly care.

4.2.6 Current elderly care model

This study indicates that the current mode of elderly nursing is a factor influencing the demand of the service combing medical and elderly care for the elderly. Most of the elderly consider home-based care is the most ideal way of elderly nursing due to the influences of their physical conditions, children's time and energy, local cultural habits, economic factors, and psychological needs. Nevertheless, 42.13% of the elderly consider that there is a gap between the existing elderly nursing mode and the ideal one due to financial difficulties, unattended living, poor health and suffering from illness, no entertainment and loneliness, and other reasons [17]. And the mode combing medical and elderly care prioritizes the elderly's health and medical services, which is differed from the tradition way of providing high-quality elderly nursing services for satisfying the elderly's basic living need. It is appealing to the elderly to some extent.

4.3 Comparison between primary influencing factors on the demand for the combination of medical and elderly care in different study

We also compared primary factors influencing the elderly's needs of combining medical treatment and nursing in different study. In order to ensure the comparability of the data, we collected data from

literature reports using the same questionnaire as in this study[16, 32-34]. In the above literature, the influencing factors on the demand for the combination of medical and elderly care were analyzed by binary logistic regression analysis. Therefore, we used the forest map to compare the differences among the factors affecting different studies. As can be observed from Fig. 3, the primary influencing factors of the elderly's demand of the service combing medical and elderly care are varied. The primary influencing factor of the elderly's demand of the service combing medical and elderly care is willingness to pay in Lanzhou, children's support in Chongqing[16], the type of medical insurance in Zhanjiang[32], health management in Quanzhou[33], as well as income and age in Shihezi[34]. The above result show that related departments should formulate developing planning and policies for the service combing medical and elderly care in accordance with the actual situation.

Conclusions

A low level of the elderly's cognition and demands of the service combing medical and elderly care can be witnessed in Lanzhou. Meanwhile, number of children, types of medical insurance, and willingness to pay for the combination of medical and elderly care are major influencing factors among complex factors influencing the elderly's demand of the service of combining medical and elderly care in Lanzhou. Relevant departments in Lanzhou should improve relevant laws and regulations and release systems and standards concerning the service combing medical and elderly care according to local conditions, while vigorously enhancing the publicity of the service combing medical and elderly care to raise the demand of the service combing medical and elderly care. What's more, the construction of institutions with the service combing medical and elderly care should be accelerated to safeguard the capacity of providing the service combing medical and elderly care.

Declarations

Ethics approval and consent to participate

The study has been approved by the Ethics Committee of the Gansu Provincial Hospital. This article does not report an individual participant's data. Trained interviewers at respondents' homes and local community health service centers conducted face-to-face interviews with older adults' written informed consent.

Consent to publish

N/A.

Availability of data and materials

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

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

GXB, TKG, and HC conceived and designed the study. YHW, JXZ, and BP performed the data collection. YHW and BP managed the data and performed the analysis. YHW and BP were responsible for data analysis and interpretation. JCW and YHW wrote the initial draft of the paper. HC critically reviewed, revised and supplemented the manuscript. All authors read and approved the final manuscript.

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Tables

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Figures

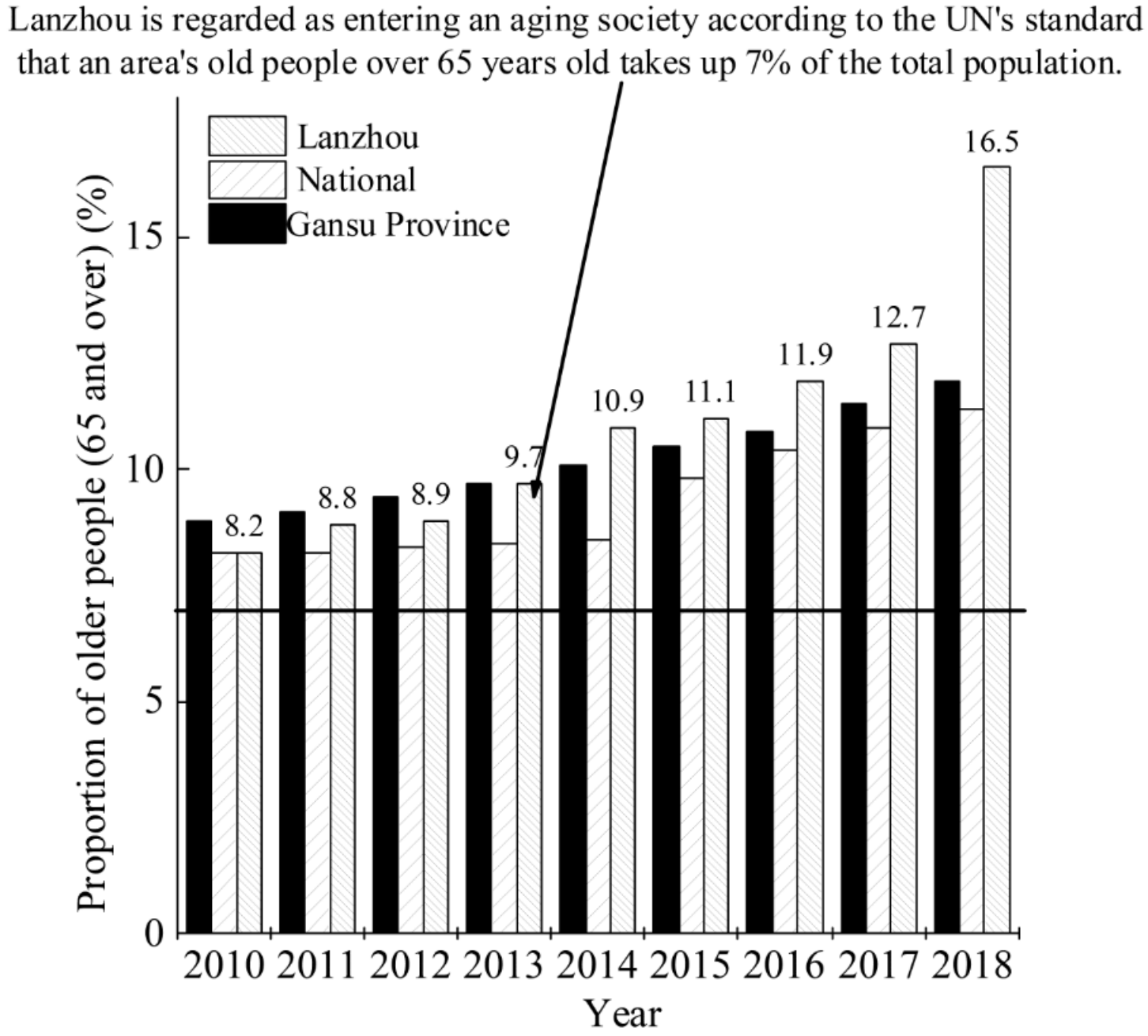

Figure 1

Population aging trend in Lanzhou city from 2010 to 2018

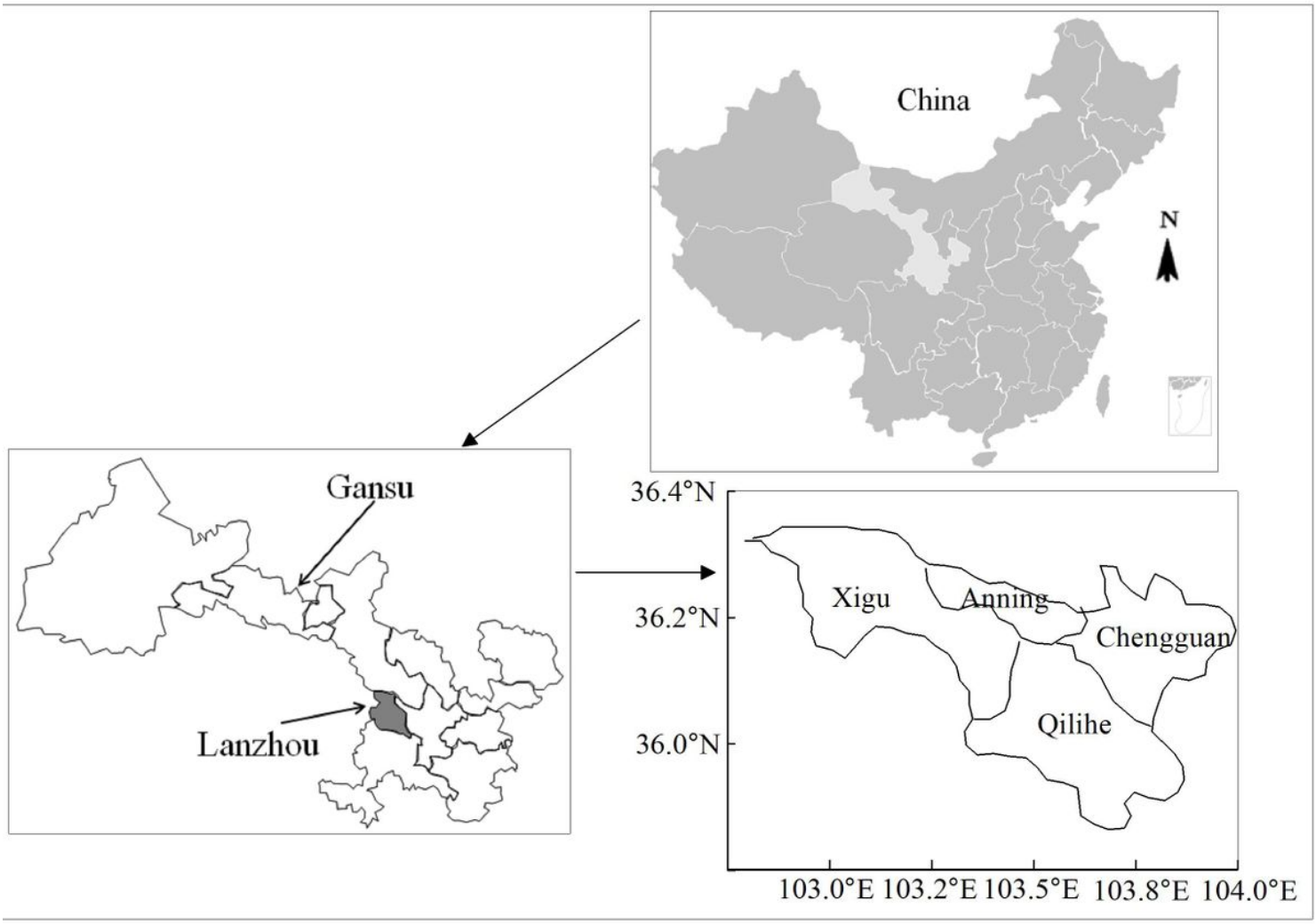

Figure 2

The geographical location of the study area in China Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

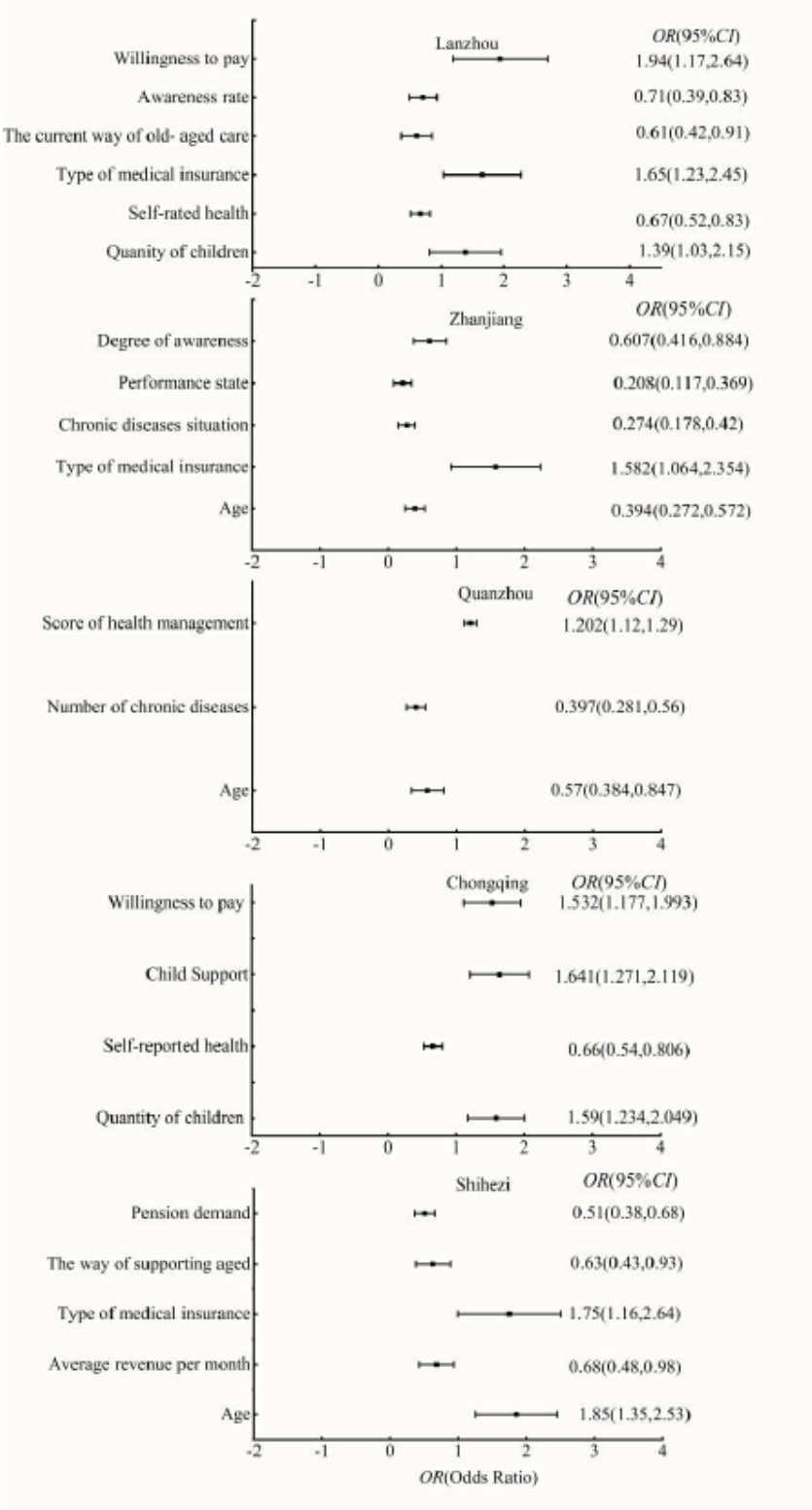

Figure 3

Comparison of primary factors influencing the elderly's needs of combining medical treatment and nursing in different study

Supplementary Files

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