Discussion on the model of community management of chronic diseases in cold areas

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Abstract

Because of the overbearing low temperature, cold areas increase the morbidity and mortality of chronic non-communicable diseases (chronic diseases) in exposed populations. With the growth of the aging population and the superposition of lifestyle risk factors, the number of people with chronic diseases in cold areas is climbing, and the family and social burdens are rising. These health-threatening circumstances in the cold areas render the general practitioners to face serious challenges and difficulties in the community management of chronic diseases. This paper summarizes the current situation of chronic disease management in cold areas and explores the relevant management models so as to provide a useful reference for regional health construction, graded diagnosis and treatment, and prevention and control of chronic diseases in China.

Keywords

cold area; chronic disease; community management; general practitioner

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Epidemiological investigation shows that cold climate, as one of the main risk factors of chronic diseases, increases the morbidity and mortality of chronic diseases such as circulatory system and respiratory system, and aggravates the health burden[1-3]. The risk and health burden of cold climate have increased over the past decades, and will continue to increase in the future[4]. China has a vast territory, and different regions have distinct geographical climate, temperature, and other factors as well. These regional variations confer the dynamic differences in society, economy, living environment, living customs, medical culture, etc. in China, thereby significant differences in community health service models, particularly between cold areas and the rest of areas. This paper discusses the management of chronic diseases in cold areas from the aspects of climate feature, disease characteristics, lifestyle, and management mode, as well as other pertinent issues.

1 The Influence of Climatic Characteristics on Diseases in Cold Areas

The cold areas of China mainly include Northeast, North and Northwest China, which have complex physical geography, dynamic climate, lengthy chilling wintertime with low and even

freezing temperatures, large temperature difference, many cold waves, much and deep snow, thick permafrost, and high wind speed and wind-cooling index[5]. Since the recent years, the adverse effects of extreme weather on human health have been well explored and expounded in numerous epidemiological studies, leading to a broad consensus that extreme cold can seriously impact human health[6-8]. However, there have been thus far few related medical research reports on the regional characteristics, disease spectrum characteristics, prevention, and treatment of chronic diseases in cold areas. Hypothermic stimulation in cold areas excites the sympathetic nerve system and increases catecholamine level in the body, leading to vasoconstriction, blood pressure elevation, heart rate acceleration, and even myocardial ischemia and hypoxia. Platelet activation promotes thrombosis and other pathophysiological changes, leading to the development and exacerbation of the underlying chronic diseases[9]. Professor Liu's team collected and analyzed the data records on the daytime temperature and stroke incidence in 16 cities in China and concluded that low-temperature climate is associated with an increase in stroke mortality, mainly in men and the elderly[10]. Professor Raatikka found that in cold regions such as Northern Europe and Finland, there are temperature-related joint and muscle

pain symptoms in one third of people[11]. It was reported that a drop in temperature increases the incidence of influenza and chronic obstructive pulmonary disease and causes muscle and joint pain[12]. Air pollution arisen from certain heating methods such as coal stove and hot kang (a traditional long platform made of bricks or other forms of fired clay primarily for sleeping used in the northern part of China) in wintertime can cause pathological changes in lung, accelerate atherosclerosis, and changes cardiac autonomic nervous function[13].

2 Occurrences and Management of Chronic Diseases in Cold Areas

2.1 High Incidence of Chronic Diseases in Cold Areas

The social and natural environmental factors define the regional living environment of the population residing within the region. Residents living in cold areas are often tougher, more indomitable, and have the ability to resist the cold for tenacious survival[14]. Many factors contribute to fat accumulation and great changes in body shape of people in cold areas, such as short sunshine hours and large indoor-outdoor temperature difference, unhealthy living habits (intake of high-fat food, excessive and frequent drinking, high sodium intake, smoking, etc.), and lack of outdoor activities. These problems are deemed to increase the prevalence of chronic diseases and the associated disabilities. Cardiovascular and cerebrovascular diseases, respiratory diseases, metabolic diseases, and osteoarthritis are of high prevalence, disability, and mortality rate in cold areas. Taking Xinjiang as an example, the prevalence rate of chronic endocrine and metabolic diseases such as diabetes, hypertension and lipid metabolic disorders has been kept increasing year by year[15]. The prevalence rate of metabolic syndrome in Han and Uygur adults in Xinjiang is as high as 30.7%, and the standardized prevalence rate of age composition reaches 28.9%[16]. Therefore, people living in Northeast and North China, where the mean temperature is below 0°C during the cold season, are considered to have a greater risk of developing serious hypertension. Furthermore, rural villagers who engage in agricultural labor are habitually in salty diet with high sodium intake, including pickled vegetables, and such a lifestyle can very likely cause and promote hypertension[17]. For example, in Heilongjiang Province, the prevalence rate of hypertension in the middle-aged and elderly is 38.11%. High sodium intake in this area is crucial factor contributing to the high incidence of orthopedic diseases, diabetic complications, and lens opacity[18-19]. Patients with chronic lung diseases in Qinghai tend to have lower partial pressure of oxygen and are more likely to develop severe hypoxemia, respiratory failure, and chronic pulmonary heart disease[20-21]. Chronic diseases not only seriously threaten the life and health of residents, but also bring greater social and economic losses to the cold areas where the economy is underdeveloped[22-23].

2.2 Current Situation and Problems of Primary Medical and Health Resources in Cold Areas

China's cold areas are generally geographically remote and sparsely populated, where the economic development is backward with a large income gap behind the cities outside the region and uneven allocation of medical resources. There is insufficient attention paid to chronic diseases prevention in cold areas[24-25]. In the northwest region, due to a large regional span, dry climate, large temperature difference between day and night, and multi-ethnic gathering, the primary task of the state government is still focusing on the development and improvement of economy, infrastructure, medical care, and education. In the northeast region, the economy based on heavy industry has been trapped in serious recession, and modern industries are emerging slowly and scarcely. The low birth rate and net outflow of young and middle-aged people quickly turn the region into an aging society with a huge proportion of chronic diseases. Yang et al confirmed that, compared with the cities of more advanced economic development, those with lower levels of economic development are more vulnerable to extreme weather, which is manifested by the negative impact of low temperature climate[26]. The "siphon phenomenon" of tertiary general hospitals is particularly obvious in cold areas with a large number of non-urgent and critically ill patients pouring into the higher-level hospitals for medical treatment, resulting in a great waste of medical resources and the emergence of tertiary hospitals. Grass-roots medical service institutions come into a "deserted" scene[27]. The authorities are aware that it is crucial to screen for hypertension and other risk factors that are mostly asymptomatic before causing a serious disease, such as a stroke or heart attack[28]. However, regular and general health check-up mechanisms are still lacking, partially because the costs of medical services provided by public health facilities to individuals are set low by the government but the costs to the medical institutions as service providers are high. In addition, due to the low-level of economic development in cold areas, the job offer package for personnel working in community medical service departments is unattractive, the employment income and benefits are low, and the opportunity for and prospect of personal career development is uncertain. These realities drain general practice professionals away from community medical and healthcare service organizations on one hand and dissipate the trust in general practitioners from residents on the other hand. As such, the allocation of medical resources is imbalanced, and the goal of the diagnosis and treatment of "minor ailments in the community" is difficult to achieve.

3 General Practice Concept and Characteristics of Community Management

Healthcare for people with chronic disease is the major challenge

confronting our primary health system, and general practice can provide good quality care for patients with most high-prevalence long-term conditions. This has been demonstrated in the care for patients with type 2 diabetes[29-30], hypertension[31-32], and chronic musculoskeletal disorders[33]. The primary health care provided by general practice services can yield maximum health benefits to residents[34-35]. General practitioners strive to achieve full coverage of health management for patients with chronic diseases such as cardiovascular and cerebrovascular diseases, hypertension and chronic obstructive pulmonary disease in cold areas and to strengthen screening and early detection of chronic diseases[36]. Community-based chronic disease management takes general practitioners as the main body and community medical and health service departments as the platform and establish health records of the community residents based upon the information collected from the medical and health service resources. Community-based chronic disease management carries out health education, disease surveillance, primordial and primary prevention, and health care for patients with chronic diseases, formulates chronic disease treatment and intervention programs and implements hierarchical management and two-way referrals. The long-term, comprehensive and systematic disease management model, which takes people as the center, family as the unit, community as the scope, and the maintenance and promotion of overall health status as the direction, provides health care for the whole life cycle and a basic guarantee for other specialties to play a better role.

General practice in China began to enter the exploratory stage in the mid-1980s. Over the past 30 years, the government has made great efforts and supports to general practice and issued a series of general practice-related policies have been issued one after another. General practice has undergone drastic changes and stepped onto the stage of rapid development in our country. On the other hand, the community and people have gradually recognized, accepted and embraced general practice. However, there are significant regional differences in the development of general practice in China. The central and eastern regions of Beijing, Shanghai, Guangzhou, Zhejiang, and other central and eastern regions commenced their development of general practice earlier and thus have richer and better experience than the northern part of the west. Some community health service centers have explored and adopted the general practice development models most suitable for their respective local people. The Fang Zhuang Community Health Service Center, led by Professor Wu Hao, has significant advantages in the community-based home-based old-age medical service model incorporated with the intelligent family doctor optimization and cooperation (IFOC) model, and is well accepted and beloved by the elderly with chronic diseases[37]. Hangzhou Sijiqing Community Health Service Center has achieved remarkable results in implementing the accurate family doctor

service model[38]. The community health service department is equipped with a large number of general practitioners and excellent general practitioners with strong professional ability to provide timely, effective, safe, economical, convenient and fast medical and health services for community residents [39]. High-quality general practice service plays an irreplaceable role in maintaining and improving the management of chronic diseases.

4 Application and Advantages of Community Management Model in Cold Areas

When the general practice team provides long-term and continuous diagnosis and treatment services for community patients with chronic diseases, it not only provides patients with standardized and reasonable drug treatment, but also provides comprehensive and continuous medical care for patients with chronic diseases. General practitioners essentially focus on the needs of patients and cover personalized treatment plans for chronic diseases[40,41].

4.1 Health Education for Vulnerable Groups

As the four cornerstones of human health put forward by WHO, “reasonable diet, moderate exercise, quitting smoking and drinking, and psychological balance” are the basic principle of primary prevention[42]. In biomedical research, vulnerable people refer to the group of healthy people who have relatively weak adaptability to natural and social environments, poor ability to resist pathogenic factors and low ability to support themselves because of their genetic and physiological characteristics. Vulnerable individuals generally include women, children, the elderly, and the disabled. Personalized health education for vulnerable people in cold areas can improve their awareness of chronic diseases and self-efficacy and facilitate their effective role transformation from passive acceptance to active participation to improve treatment compliance. Taking full account of the health status, personality, economic conditions and social background of vulnerable people in cold areas, modern information means and care models with combined online and offline resources are used for community diagnosis and treatment services. Moreover, the traditional health management services such as health knowledge lectures, large-scale free clinics and health check-ups for the elderly are also regularly carried out for residents under the jurisdiction. Spring and autumn provide sufficient sunshine and comfortable ambient temperature and offer a good opportunity for guiding chronic patients for their physical exercise, and rehabilitation training. In autumn and winter seasons, people can experience sudden drops in temperature, and thus patients with cardiovascular and cerebrovascular diseases, respiratory diseases, are recommended to wear masks to protect the airway and minimize the stimulation of cold air to blood vessels. Because of the large daily temperature differences and slippery

roads covered by snow and ice in wintertime, cares need to be provided to vulnerable persons for guiding them how to keep warm and prevent falls. It is highly advocated to instruct residents to adopt humidification measures to maintain indoor air humidity between 50% and 55% against the dry air created by the heating system in cold areas. Utilizing humidifiers or planting green plants are recommended to increase the humidity of the living and working environments. General practitioners often cite real cases and real people around them to guide residents to better understand chronic diseases and abandon professional terms by adopting layman language for easy understanding, instead of using the "paternalistic" preaching of specialists. General practitioners are also required to formulate a personalized and comprehensive management plan for residents according to their personal characteristics, social background, living habits and other relevant aspects[43-44].

4.2 Encourage Patients with Chronic Diseases to Manage Themselves.

People with chronic diseases often suffer from multiple conditions. General practitioners play an important role in preparing for cold weather and performing health monitoring on patients with chronic diseases. High-salt and high-fat diets are prevalent in cold areas, which is often accompanied by spirits and medicinal wines to warm the body and protect against the cold. Therefore, general practitioners should pay attention to primary prevention and carry out timely and effective intervention on the unhealthy lifestyle and eating habit. It is not easy for individuals to modify their lifestyle by reducing salt intake and refraining from tobacco smoking, because such health risk behaviors are widely adopted by residents ever since their childhood in the communities as a food culture. Community-wide approaches to lifestyle improvement are effective, as demonstrated by Chinese traditional exercise practiced by groups of elderly people in the community[45], and salt-reduction activities in rural Japan[46-47]. Patients with mild hypertension and early diabetes can be instructed to reduce their blood pressure and blood sugar to normal levels through exercise, low-salt and low-fat diet, and weight loss. Long-term home oxygen therapy and respiratory function exercise are important approaches for the treatment of chronic obstructive pulmonary disease. In cold areas, sunshine duration in wintertime is short, diurnal temperature variation is large, and the outdoor activity time for residents is reduced. Under such circumstances, general practitioners can make full use of the information means of "Internet + Medical Care" to carry out online appointment and consultation for chronic diseases, as well as offline medical drug distribution and cloud live health science popularization. Patients with chronic diseases can obtain diagnosis and treatment service suggestions from general practitioners via network video programs at home[48-49], thereby better instructions on home-based exercise or rehabilitation training.

Through systematic and scientific community health education and medical consultation, residents can better understand and aware that chronic diseases are generally lifelong conditions. Education and management are important measures of comprehensive healthcare management, and residents' health behavior and self-management ability are the keys.

4.3 Advocating Community Home Maintenance Service

Due to the lower levels of economic development and the limited attractiveness to young people in cold areas, the net population outflow continues to rise, resulting in increasing losses of young adults every year and leaving the aging population in place. The establishment of a long-term and effective community home care model not only can improve the quality of life of elderly patients with chronic diseases, but also has positive practical significance in promoting the development of the old-age security system in China, family harmony and social stability. General practitioners establish personal and family records and achieves of chronically ill patients on basic and general information, living habits, disease history, existing health problems, etc., and provide family doctor-signed services for patients[49]. Standardized management is provided to the revisiting patients with chronic diseases, with face-to-face follow-ups not less than 4 times a year. In fact, the form of service with the family doctor contract system belongs to the outpatient service. At present, such a service is mainly for those who are able to take care of themselves and go out to see a doctor. Community home care offers door-to-door service as the main form of services for patients with chronic diseases, who are disabled, unable to go out, or who are inconvenient to go out because of a cold climate. Chronic patients can make appointments with doctors by phone, WeChat, etc. Contracted general practitioners and nurses provide door-to-door medical services to guide the elderly and their families to familiarize themselves with common medication and basic knowledge of first aid and conduct health check-ups for the elderly, providing pain management, wound care, airway care, rehabilitation training, etc. Regular door-to-door service can not only help patients with chronic diseases make personalized medication plans and feedback, but also alleviate the anxiety and stress levels of the elderly who are living alone and are disabled. Such a service can make patients feel better about themselves and face life and disease positively and optimistically with peace of mind[50-51].

5 Prospects

The duties of general practice are to provide long-term and continuous diagnosis and treatment services for patients with chronic diseases in the community, with standardized and reasonable drug treatment, as well as comprehensive and continuous medical cares. Community management emphasizes

not only on patients' physical health status, but also their psychological state, aiming to achieve holistic medical services taking body and mind in a whole. Another equally important task of general practice is to keep records for patients and their families and background for aiding to uncover and identify the potential pathogenic factors from the family life cycle and facilitate the control and improvement of their health conditions. With the help of the "Internet +" technology, we can improve the follow-up mode, expand the outpatient follow-up channels, and extend the online consultation services. In this way, we can facilitate the development of the drug distribution model and the integrated follow-up platform with multidisciplinary cooperation and improve the efficiency, quality, and level of chronic disease management. Community management of chronic diseases is the core issue for China's ongoing medical system reform. Multiple and complex chronic diseases coexist with high incidence and large proportion

of residents in cold areas. Strengthening community management can not only meet the basic needs for chronic disease diagnosis and treatment of residents, but also make medical services fair, impartial and accessible. Additionally, it can also integrate the resources from all parties in the medical and health service system and promote the participation of all parties in medical services and other health-related activities. The construction of a primary health care system for chronic diseases in cold areas can offer better health management services to community patients.

Conflict of Interest

Yongchen Wang is an Editorial Board Member. The article was subject to the journal's standard procedures, with peer review handled independently of this Member and his research groups. The authors declare that they have no other competing interests.

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