

# Analysis of Frontier Evolution and Trends in the Field of Medication Use for Chronic Diseases of Older Adults in China

Shiyu Gao<sup>1, a</sup>, Fang Xia<sup>2, b</sup>, Chen Ding<sup>3, c\*</sup>

School of Health Management, Changchun University of Chinese Medicine, Changchun, 130117, China

**Abstract**—Objective: This paper analysis the historical overview and dynamic evolution of medication use for chronic diseases of older adults in China. Methods: CNKI database was used to screen related papers with the theme “Medication for chronic diseases of older adults”. Research hotpots, hotspot clustering and evolutionary trends in the field were analyzed using COOC and VOSviewer visualization software. Results: A total of 842 articles were included, with an overall upward trend in the number of articles published, the issuing institution covers a wide range of areas, and the research hotspots include “older adult, chronic disease, influence factor, community, multiple drugs, medication safety” etc. Conclusion: China has developed a number of research hotspots around the medication use for chronic diseases of older adults. The pattern of chronic comorbidity should be further studied, strengthening cooperation with the community and in-depth research in areas such as enhancing community care.

## 1 INTRODUCTION

As the primary factor threatening the health of the population, chronic diseases have become an increasingly serious public health problem. Older people who are vulnerable to chronic diseases are often at greater risk. The prevalence of chronic diseases among the elderly is 4.2 times that of the population as a whole [1], and with the elderly population continues to grow, the number of elderly patients is also increasing [2], which shows that chronic disease management has become an urgent issue for healthy care of older adults in China.

Visual analytics allows scholars to explore the rules and patterns behind such complex data from multiple angles. However, there are few studies on the visualization and visual analytics of chronic diseases. Previous studies mainly focused on the current situation and the analysis of relevant influencing factors, which rarely used scientometric methods, research characteristics, key research themes and frontier trends of medication use for chronic diseases of older adults in China have yet to be systematically mapped. It is of great significance for social stability to strengthen the management of medication for chronic diseases in elderly patients. This paper traces the clue by COOC and VOSviewer visualization software, the number of publications, high-frequency keywords and research hotspots are analyzed in order to clarify its rigorous path and propose future research directions for systematic and in-depth research.

## 2 MATERIALS AND METHODS

### 2.1. Research Methods

In order to explore the development status of medication use for chronic diseases of older adults in China, this paper was analyzed using bibliometric methods. COOC software was used for co-occurrence analysis of keywords, while VOSviewer software was used to verify the results of the text analysis as well as visualisation analysis.

### 2.2. Date Source

Data were collected from the Database of China National Knowledge Infrastructure (CNKI). In order to ensure the comprehensiveness, systematicness and accuracy of literature analysis, this paper uses advanced search to retrieve the paper whose title included "Medication use for chronic diseases of older adults". The initial 1014 search records were obtained, and after manual reading and screening, a total of 177 articles such as those that did not match the topic were eliminated, resulting in a final sample of 842 documents from 1984 to 2021 for the study.

<sup>a</sup>e-mail: 1471178416@qq.com

<sup>b</sup>e-mail: Xiafang425@126.com

<sup>c</sup>e-mail: 413044984@qq.com

### 3 RESULTS

#### 3.1. Statistical analysis of annual distribution of papers

It can be seen in Figure 1 that the number of publications increased from 1984 to 2021. As early as 1984, Chinese scholars published papers on medication for chronic diseases of older adults, but only a few of results were

published. A new phase of development began in 2000, with a gradual increase in the number of articles issued, even exceeding 10 in 2005, after 2015, relevant literature started a new round of significant growth, indicating that the research of medication use for chronic diseases of older adults is paid more attention to by scholars. Chronic diseases have become the number one health threat for the elderly in China, the health problem of older adults has become the hot spot of the whole society.

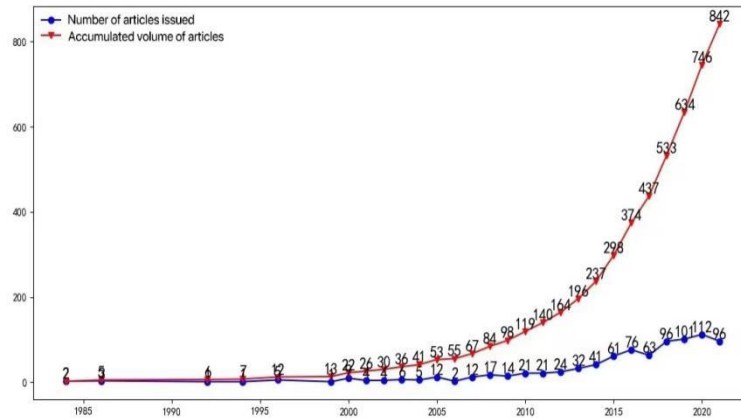


Figure 1. Annual issue volume (1984 to 2021)

#### 3.2. Analysis of issuing institutions

Statistics were made on the institutions with 6 or more papers in the field of medication use for chronic diseases of older adults. As shown in Figure 2, there are a total of 13 institutions, mainly in colleges and universities. Shandong University, which ranked first, has been doing in-depth research on chronic diseases for many years. In October 2021, the School of Public Health of Shandong University and Qingdao Center for Disease Control and Prevention jointly established the "Teaching and Research Office of Chronic Disease Prevention and Control", it gives full play to the advantages of scientific research in universities and the on-site advantages of CDC, fully integrates health education resources, with a

high level of cooperation methods, effectively expands and strengthens the joint teaching and research section of chronic disease prevention and control, and promote the integration of medicine and education between the two sides into a new stage of development, This indicates that China is developing a multifaceted approach to chronic diseases and that the focus on health issues arising from chronic diseases is gradually expanding to other areas. However, there is less cooperation among published institutions, and the knowledge map of institutional cooperation cannot be generated, this indicates that there are many scholars in this field, but most of them are independent, with little communication and cooperation between them, and the research in this field is extensive and not deep.

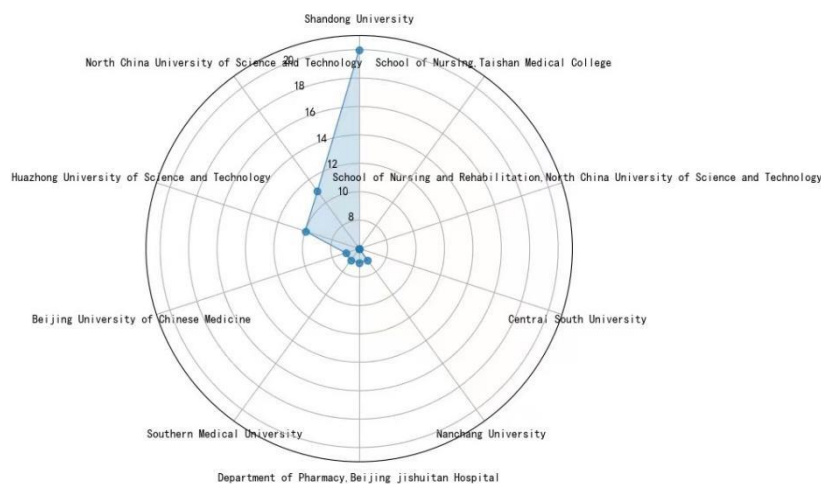


Figure 2. Volume of Institutional issued

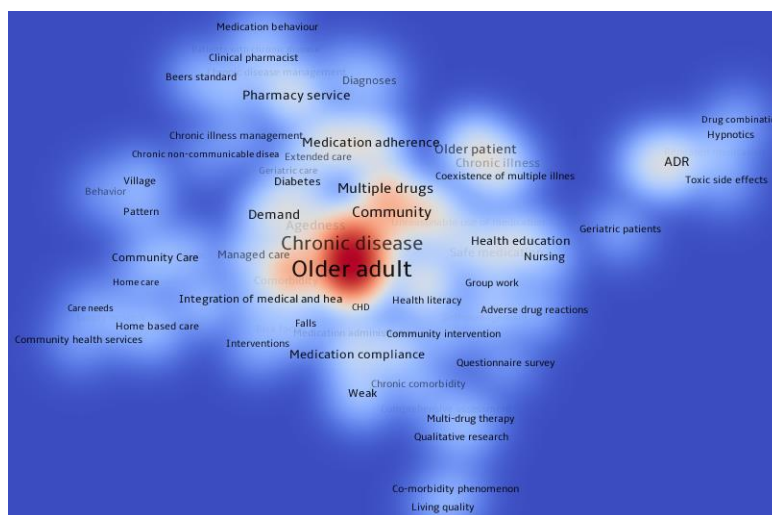
### 3.3. Analysis of keyword co-occurrence

The paper takes "keyword" as the node, set the minimum frequency of keyword occurrences to "8", draw the keyword density atlas (Figure 3). Further analysis of high-frequency keywords found (Table 1) that the word "older adult" appeared most frequently (388 times), followed by "chronic disease" (196 times). It is in the first echelon of hot keywords in this field, it shows that chronic diseases are more likely to occur in the elderly; the frequency of hot keywords in the second echelon is more than 50 times, including "influence factor" (97

times), "community" (58 times). Community is the front line of chronic disease prevention and control, being in the second echelon shows that China attaches great importance to community care work. Community care can have a significant impact on the management of chronic disease and improve the prognosis of patients [3]; the frequency of the third echelon was 35-55 times, such as "multiple drugs, medication safety, older patient, medication for the elderly, medication adherence", etc. These hot keywords are all related to medication use, indicating that medication issue has always been in the forefront of research in this field.

**Table1.** Keywords frequency table

Serial number	Keyword	Frequency
1	Older adult	388
2	Chronic disease	196
3	Influence factor	97
4	Community	58
5	Multiple drugs	49
6	Medication safety	41
7	Older patient	40
8	Medication for the elderly	388
9	Agedness	35
10	Medication adherence	35
11	Demand	32
12	Pharmacy service	31
13	ADR	30
14	Managed care	27



**Figure 3.** Keywords density knowledge mapping

In order to understand the origin and development status of the research on medication for chronic diseases of older adults in China, a visual atlas analysis of keywords was conducted (Figure 4). Keyword co-occurrence network reveals the degree of correlation between different keyword, which with higher frequency of occurrence are shown as larger nodes in the figure. Keywords are linked by lines, and more lines represent the high frequency of co-occurrence with other keywords, which further reflects its core position in this field. It can be seen that there are multiple connection lines between

chronic diseases of the elderly and nodes such as "multiple drugs", "medication safety", "rational drug use", while these keyword nodes are large and occur with high frequency. It indicates that chronic diseases of older adults are highly related to medication problems, and there are many scholars in this field. And a series of medication problems such as "multiple drugs", "medication safety" and "rational drug use" were analyzed in depth, which is also a current research hotspot and future development trend.

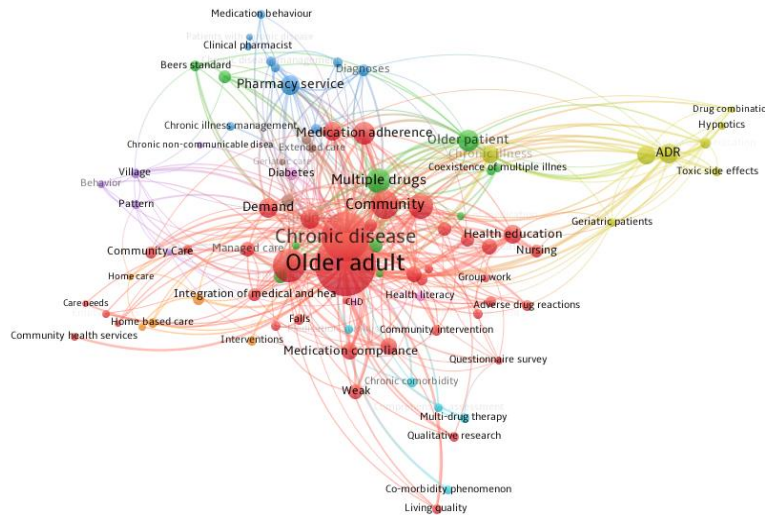


Figure 4. Keywords co-occurrence knowledge mapping

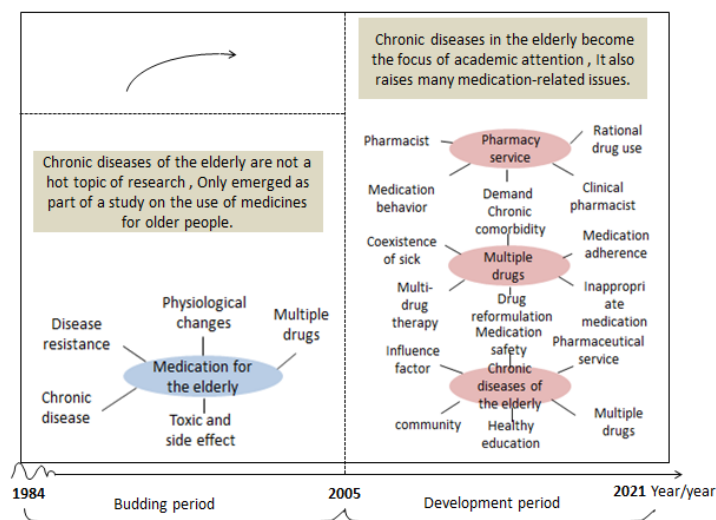


Figure 5. Hotspot evolution analysis mapping

The high-frequency keywords were further analyzed according to a timeline in order to categorise and dissect the hotspots of research at different periods (Figure 5). At the budding period, chronic diseases of older adults are not a hot topic of research, only emerged as part of a study on the use of medicines for older people; at the development period, medication use for chronic diseases of older adults has become a hot topic, and the number of articles is increasing year by year. In 2015, it began to further differentiate and focus on the three fields of "chronic diseases in elderly", "multiple drugs" and "pharmacy service", the three fields also have essential intersections, "multiple drugs" and "pharmacy service" focus on "chronic diseases of older adults", it shows that the study of medication use for chronic diseases of older adults in China is refined, and it is still based on the consistency of the underlying logic and retains the commonality of the upper and middle layers of research. However, the problem of medication use for chronic diseases of older adults has yet to be solved, China has not yet reached the mature period.

### 3.4. Analysis of key research themes

Keywords co-occurrence analysis can understand the research hotspots in the field of medication use for chronic diseases of the older adults in China, which is concerned by current scholars, the co-occurrence analysis of single keywords cannot show the logical relationship and their thematic structure distribution between keywords in this field. In order to further explore the main focus topics, a clustering analysis of keywords was carried out and the results are shown in Table 2.

Cluster I is the influencing factor. There are many influence factors about medication problem of older adults in China, the biggest problems of medication adherence in older people include increasing the dose to increase the curative effect, randomly stopping or reducing the dose when the curative effect is not good or the symptoms are improving and forgetting to take the medication when going out [4]; China's aging population has accounted for 20% of the world's total [5], in current clinical research, as people age, the incidence of various

diseases is increasing, and traditional monotherapeutic drugs are unable to meet the increasingly complex diseases, drug combinations are needed to improve

effectiveness, irrational use of drugs is easy to occur. It is necessary to analyze the situation of irrational drug use in the elderly and give specific suggestions.

**Table 2.** Keywords clustering table

Cluster	Keywords	Number
Cluster I	Influence factor, medication adherence, multiple drugs, medication safety	4
Cluster II	Health management, health education, weak, community, rational drug use, pharmacy service, agedness, medication for the elderly, older patient, hypertension, medication safety, pension agency, demand, chronic illness, ADR	15
Cluster III	Chronic comorbidity, survey, chronic disease in elderly, falls, medication use, influence factor, village, health condition, living quality, nursing, review, potentially inappropriate medication, geriatric syndrome, comorbidity	14
Cluster IV	Community health services, home care, chronic disease management, nursing intervention, ageing population, chronic disease, diabetes, community elderly, chronic patients, chronic disease in elderly, adherence, community care, countermeasures, Integration of medical and health care	14

Cluster II is chronic health management for the elderly. Focusing on "health management and health education", this paper discusses its role. Today's ageing population is growing and the incidence of chronic diseases in older people is increasing, requiring better prevention and treatment. Community and pension institutions are the main places for the elderly, and strengthening health education and management plays a very important role in preventing the occurrence of chronic diseases [6].

Cluster III is chronic comorbidity. "Comorbidity" is a key word that appears frequently in recent years, it refers to the long-term coexistence of 2 or more chronic diseases in one individual. Chronic comorbidity is a major cause of physical decline, reduced quality of life, added health service utilization, increased disease burden and risk of disability and death in the elderly, and has become a universal problem in the world. Research on chronic disease co-morbidity in older people started late in China compared to other countries and the level of attention is gradually increasing.

Cluster IV is community chronic disease management of older adults. The group of elderly with chronic diseases is very large and each patient has a serious negative impact on individuals, families and society, elderly patients need community care in disease care, disease prevention, health promotion and other aspects. Therefore, the importance of community care should be reflected, and the development of community care can be promoted by actively absorbing the new concept of community care intervention, strengthening the training of community care talents and improving the endowment insurance system.

## 4 CONCLUSIONS

Based on the development and evolution trend of the literature on medication use for chronic diseases of older adults in China, the following conclusions are obtained:

Firstly, from the analysis of basic statistical characteristics, it can be seen that the number of issued in the field is generally on the rise, it can be divided into two stages, including the budding period from 1984 to 2005 and the development period from 2005 to 2021,

China has not yet entered the mature stage; on the whole, the research institutions are mainly universities. The strength of research institutions is very fragmented, with a low degree of institutional concentration, insufficient academic cooperation and a lack of information sharing and exchange between institutions. Secondly, from the analysis of relevant research hotspots, it can be seen that the key words in the field are "older adult, chronic disease, influencing factor, community, multiple drugs, medication safety", the focus should be on the linkage between medication use for chronic diseases of older adults and community, and on strengthening cooperation with community to improve the problem; in the research frontier, it is mainly reflected in "chronic diseases in elderly", "multiple drugs" and "pharmacy service"; the clustering results showed that there are four major categories, including "influence factor", "health education", "chronic disease comorbidity", and "community care".

In conjunction with the previous analysis, community care provides health management for patients with chronic diseases, purposeful improvement of patients' lifestyles and modification of the risk factors of chronic diseases [7], which can fundamentally improve the treatment effect of chronic diseases and thus reduce the multiple risks that medication may bring to the elderly. As the axis, community service centers provide health education for the elderly, do a good job of chronic disease prevention and treatment is conducive to the incidence reduction and control [8].

The situation of chronic disease comorbidity among the elderly in China is serious, the important challenge facing China's health system is how to effectively prevent and manage the problem, improve the physical function, health status and medication use of the elderly [9]. Although the keyword of "comorbidity" does not appear in the total frequency table, it appears more frequently in the development period than in the budding period, and may be a future research trend, and the situation of chronic comorbidity is more common in the elderly. Currently, there is a relatively lack of studies on chronic comorbidity and comorbidity pattern of older adults in China, and further studies are still needed in the future.

## REFERENCES

1. Wang H M .Pay attention to the health status of Chinese elderly population and promote the national strategy of healthy aging.Chinese journal of epidemiology, 2019,40(3):259-265.
2. Li Xu , YU Jun. Analysis of rational drug use in the elderly.Chinese Journal of Gerontology, 2019, 39 (7):1789-1791.
3. Hsu P Y. Effects of community nursing on health behavior and quality of life of elderly patients with chronic diseases. Forum on Primary Care Medicine , 2016.
4. Feng Qiang, HUANG Huihong, GU Xiaoqing, et al.Investigation and analysis of medication status of the elderly in Xidu community nursing institutions. Shanghai Med, 2018, 39 (8):11-13, 46.
5. Xu Juan. Research on The Characteristics and Countermeasures of Consumer Behavior in China's Elderly Tourism Market. Chinese Economist, 2016, (9): 169-170,173.
6. Nie Y M. Analysis of the role and countermeasures of health education in the management of chronic diseases of the elderly in community. Science Consulting, 2021, (10):51-52.
7. Jiang XIAOqin. Analysis on the importance of community nursing for elderly chronic diseases. Wisdom Health, 2020, 6(33): 178-179,182.
8. Wu Yangling. Discussion on chronic disease management in community health service centers. Science and Technology for The Masses, 2021, 23 (10): 110-112,93.
9. Li Yanna, WANG Yiqiao. Study on the status and model of chronic disease comorbidities in the elderly in China. Chinese Journal of General Practice, 2021, 24 (31):3955-3962, 3978.