

Social Care Study of Alzheimer's Disease Based on Intelligent Diagnosis and Biomarkers

Yuehan Yang^{1,*}

¹*Xi'an Tie Yi High School, Xi'an, China*

**Corresponding author: yangyuehan2025@163.com*

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Abstract: The number of Alzheimer's patients in China is the highest in the world, with more than 10 million, and it is the fastest rising disease. Paying attention to the group of Alzheimer's patients is an urgent topic that we must face in the aging society. Elderly people should also enjoy the convenience of digitalization and intelligence and support the social goal of humanistic care for aging with scientific and technological innovation, thinking about the social care for Alzheimer's disease from the technological level of the digital and intellectual era has a huge research space and practical necessity. This paper uses literature research method, comparative analysis method, field observation method, and in-depth interview method to improve the cognition of Alzheimer's disease, and to emphasize the humanistic flavor of naming in order to reduce the sense of stigma; in the prevention of Alzheimer's disease, to strengthen the early intervention and popularization of the digital intelligence technology; in the help and service of Alzheimer's disease, to enhance the service of the community institutions and the assistance of the network platform; and in the social care of Alzheimer's disease, to In terms of social care for Alzheimer's disease, it is necessary to convey humanistic care with emotional warmth and safeguard the dignity of life.

1. Introduction

Wang Haidong, director of the Department of Elderly Health of China's National Health and Health Commission, expects China's elderly population aged 60 and above to exceed 300 million by 2025 and 400 million by 2035, as China enters a heavily aging society. According to statistics, there are about 50 million Alzheimer disease patients worldwide, and by 2050, the number will rise to 130 million. And China has the highest number of patients in the world, and now has more than 10 million people. The prevalence rate of elderly people over 65 years old is about 5%, and 20%-50% of elderly people over 85 years old suffer from Alzheimer's.

Medical statistics show that the fastest rising disease is Alzheimer's. Every 67 seconds, one person in the United States is diagnosed with the disease, and the number of Alzheimer's patients will triple by 2050. Projections show that the incidence of Alzheimer's disease in China will continue to rise from 2020-2049. The incidence rate for the whole population in 2049 will be 9.651 per 1,000 population, 11.419 per 1,000 population for women, and 7.302 per 1,000 population for men. Alzheimer's disease has become the fifth cause of death in the elderly. Taking care of elderly people

with this disease will become a huge social challenge, and is an urgent issue that society has to face nowadays [1].

The happiness index of the elderly directly affects the happiness index of the whole society. Paying attention to the elderly, paying attention to the group of Alzheimer's disease patients is a topic we must do in the aging society [2]. In the technological progress, how to take care of the needs of this part of the group, so that the elderly can also enjoy the convenience of intelligent life brought about by technological progress, is an important topic in front of society. Concern about the life of the elderly, about social justice issues, social intelligence, digitalization is a kind of progress, technology "convenience" should not be the young people's "patent", cannot form a "digital divide! The "convenience" of technology should not be the "exclusive right" of young people, and a "digital divide" should not be formed. Elderly people should also enjoy the convenience brought by this kind of intelligence and digitization.

The year 2023 has been dubbed as the year of AI explosion [3], with the global AI market reaching \$196.63 billion, and AI continuing to make significant contributions in the biomedical field. Society as a whole needs to provide effective care and support for Alzheimer's disease, relying on digital-intelligent technology to enhance the well-being of this population.

2. Literature review

2.1 Status of research

As shown in Figure 1, according to Web of Science, international research on Alzheimer's disease started at the end of the 20th century, reached a peak in the number of studies in 2019, and has maintained a wide range of research fervor in the last decade.

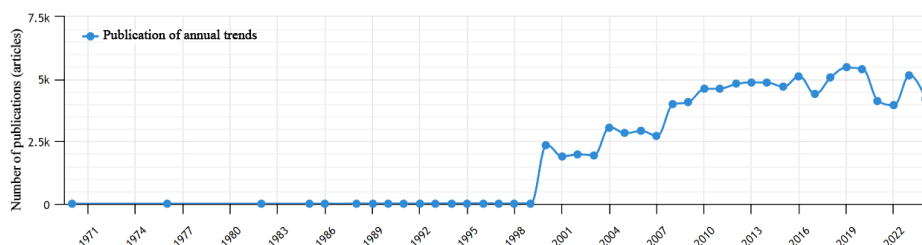


Figure 1: International volume of Alzheimer's disease publications

As shown in Figure 2, in terms of the distribution of disciplines and the focus of the research, more than 90% of the research centered on the biomedical field, with only 1.4% of the research in the field of computer science, and fewer studies in sociology.

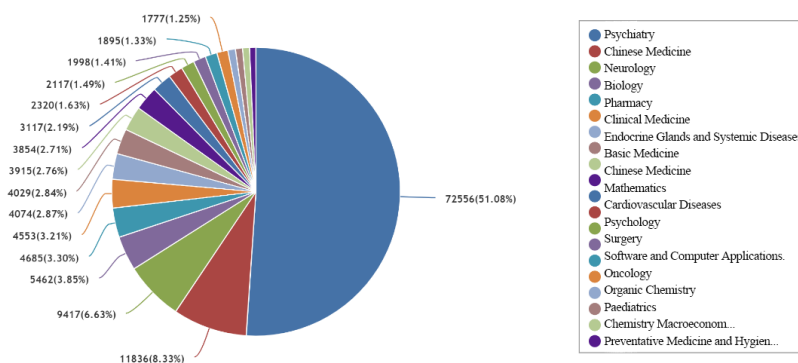


Figure 2: Distribution of international research disciplines

Social care for Alzheimer's disease from the perspective of digital intelligence is mostly reflected in early prevention and prediction services for Alzheimer's disease, e.g., research on early diagnosis of Alzheimer's disease and prediction of disease progression by using deep learning algorithms, mainly in terms of biomarkers, online databases, intelligent diagnostic methods, and multimodal image diagnosis. Italy has also researched new algorithms for AI diagnosis that may detect Alzheimer's disease 10 years earlier [4]. In Japan, a "network service system" has been established to help Alzheimer's patients [5].

As shown in Figure 3, research data from CNKI show that research on Alzheimer's disease in China started late and only began to enter the research field of view after 2010, and the degree of research attention has increased greatly after 2019.

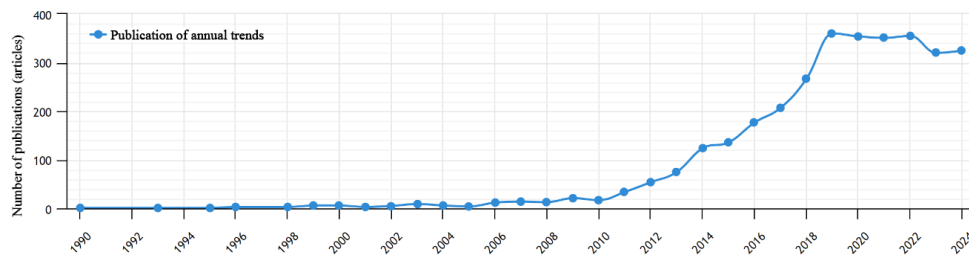


Figure 3: Number of Alzheimer's disease publications in China

As shown in Figure 4, in terms of the distribution of research disciplines and research focus, more than 60% of the research is centered on psychiatry and clinical medicine, while 4% of the research is in the field of computer science and only 0.5% of the research is in the field of sociology. This shows that there is a lack of research on social care for Alzheimer's disease. Thinking about social care from the technological aspect of the digital age has a huge research space.

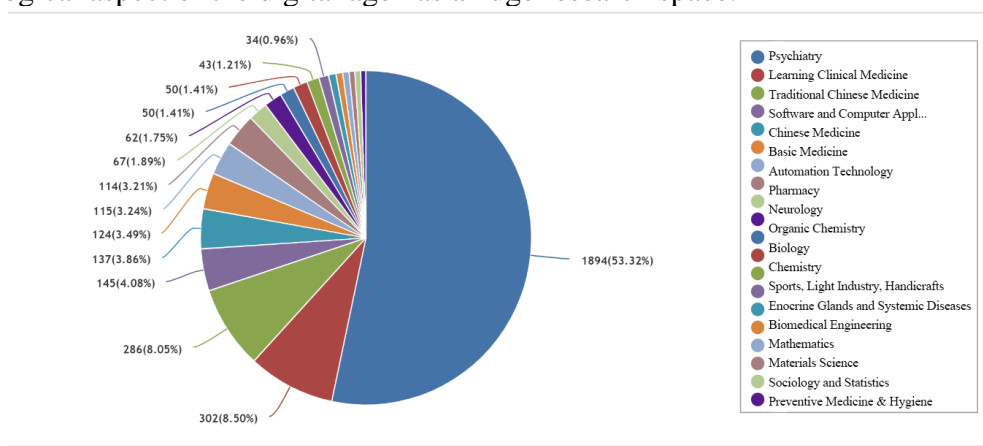


Figure 4: Distribution of research disciplines in China

The social care of Alzheimer's disease from the perspective of digital intelligence is reflected in the design and development of smart wearable devices for demented elderly to help patients with lost orientation, self-care, assisted socialization, etc.; early identification of precursor actions of Alzheimer's disease based on the temporal and spatial dual-streaming network technology through the video monitoring of daily activities [6]; and the use of virtual reality technology to assist in the cognitive function training for Alzheimer's patients, etc. [7].

2.2 Basic concepts

2.2.1 Alzheimer's disease

Alzheimer's disease (AD) is a progressive neurodegenerative disease with an insidious onset, discovered and first reported by German physician Alzheimer in 1906 [8]. It is clinically characterized by generalized dementia with memory impairment, aphasia, dysarthria, dyscognition, visuospatial impairment, executive dysfunction, as well as personality and behavioral changes, the cause of which is still unknown. Also known as: Alzheimer's disease, Alzheimer's disease, dementia, dementia, cognitive disorders.

2.2.2 Social care

Social care is a social and moral practice based on the intergenerational rational allocation of social material resources and their effective supply to the elderly group, and through the systematic ethical construction to safeguard the basic rights and interests of the elderly group and continuously improve their quality of life. Families, communities and governments play different roles and bear different responsibilities in the practice of social care for the elderly, but they are resource supply elements and support subjects with complementary functions and shared responsibilities, thus constituting a trinity of social care network of family filial piety, community care and government good governance.

2.2.3 The age of digital intelligence

The era of digital intelligence is a brand-new era consisting of two core concepts: digitalization and intelligence. This era is characterized by the application of data and intelligence reaching new heights, marking a further deepening of the informatization of human society. Digital intelligence is the application of information technology such as artificial intelligence, Internet of Things, robotics, cloud platforms, gene editing and other information technologies to all kinds of work based on data technology. The development of the Digital Intelligence era is not only reflected in technological and industrial changes, but also includes far-reaching impacts on all levels of society, such as economic development, biomedicine, social governance, and cultural innovation.

3. Research Method

3.1 Literature research method

By reviewing the relevant literature to understand the relevant basic theoretical knowledge and the problem to be researched, to understand the current status of research on Alzheimer's disease, research trends and problems. In order to determine the object and goal of the research, and to clarify the entry point of the problem and the framework of ideas.

3.2 Comparative analysis

By analyzing and comparing the social care initiatives for Alzheimer's disease in developed countries such as Europe, the United States, Japan, and China, we will comprehensively explore what China can learn from and develop in the development of social care for Alzheimer's disease and digital intelligence.

3.3 Field observation method

To enter the nursing home to observe the daily life situation and rehabilitation of Alzheimer's

seniors, to participate in the interaction between Alzheimer's seniors and their caregivers as well as with other seniors, and to observe Alzheimer's seniors from an insider's point of view through joint activities with Alzheimer's seniors.

3.4 In-depth interview method

Through talking with the families of Alzheimer's patients, we objectively understand the daily life and treatment status of Alzheimer's patients. To ensure the authenticity and relevance of the interviews, we adopt a strict structured interview, and draw up an outline of the interview in advance, listing out all the questions we want to know. Through observation and analysis, the needs and difficulties of caregivers of Alzheimer's patients were identified, and recommendations for social support services were made.

4. Research analysis

4.1 Cognition - humanistic flavor of naming to reduce stigma

Alzheimer's disease in China is in the predicament of "three lows": low awareness, low consultation rate and low treatment rate, which has a lot to do with the public's knowledge of the disease. Alzheimer's disease is often called "dementia", and data from the 2012 World Alzheimer's Disease Report released by Alzheimer's Disease International (ADI) show that about 40% of people with dementia feel ostracized and stigmatized in their daily lives. The negative impression that the name of the disease brings to the public is one of the major sources of stigma.

Etymology of the "demented" explanation is: not intelligent, crazy, hobby to obsession, "dull" and "demented" synonymous, but also can mean "frothing", which means that a person is stupid or foolish, dementia and stupidity, clumsiness, etc., since ancient times are pejorative terms. The word "dementia" is enough to hit the patient's self-esteem, making them feel inferior and helpless, and also bring psychological pain to the family, which is not conducive to the early treatment of patients. Aversion and fear also exacerbate the marginalization and social isolation of Alzheimer's disease patients. The suspicion of "stigmatization" is likely to cause secondary psychological trauma to the elderly, breeding pessimism and disappointment, and causing inconvenience to the diagnosis, treatment and care of the disease. According to a survey conducted by the Alzheimer's Association covering 12 countries, 59% of respondents incorrectly believe that Alzheimer's disease is a typical manifestation of aging, and 40% believe that Alzheimer's disease is not fatal.

In 2004, the Ministry of Health and Welfare of Japan officially decided to change the name of "dementia" to "cognitive disorders" and decided to use "cognitive disorders" as a legal term in the Japanese insurance system in 2005. In 2010, Hong Kong, China, also changed the name of "Alzheimer's disease" to "cerebral degenerative disease". In September 2012, CCTV joined hands with a number of media outlets to call for the elimination of social discrimination and to give a proper name to "Alzheimer's disease". "In September 2012, CCTV and a number of media outlets called for the elimination of social discrimination and the proper naming of dementia. In October of the same year, the Ministry of Health said that the standardized translation of AD should be "Alzheimer's disease". However, to this day, the term "Alzheimer's disease" is still widely used in various contexts.

Widespread public awareness and attention to the disease is the prerequisite and foundation for positive and effective social care for Alzheimer's disease. Giving the disease a name in a humanistic flavor and reducing stigma are the keys to facing the disease, understanding it, and detecting and preventing it in a timely manner.

4.2 Prevention - early intervention and popularization of digital intelligence technology

The most effective way to deal with Alzheimer's disease is prevention. Wang Jun, president of the China Alzheimer's Disease Prevention and Control Association, told China Economic Weekly that there is no complete cure for Alzheimer's disease, and that early identification and intervention are very important in order to delay the development process, and that we should encourage the whole society and more organizations to do a good job in preventing Alzheimer's disease through education and early screening.

There is no cure for Alzheimer's disease, only temporary relief, to reduce the risk of Alzheimer's disease, active prevention is the key. Alzheimer's disease or 10 years in advance there are signs, "The Lancet - Healthy Longevity" magazine has published a study: high levels of low-density lipoprotein cholesterol in middle age, and 10 years after the risk of dementia increased.

Currently, most of the public lacks the basic knowledge that Alzheimer's disease is a disease, leading many family members to passively choose to "let the disease develop naturally". The early diagnosis rate of Alzheimer's disease in China is still relatively low, and in many hospital neurology outpatient clinics, many patients are already in moderate to severe stages of the disease, making treatment more difficult. Many family members only bring the elderly to the clinic when they are lost or have hallucinations, etc. The 2022 China Alzheimer's Disease Awareness and Needs Survey Report shows that the total awareness rate of Alzheimer's disease in China exceeds 90%, but the willingness to actively seek medical treatment is only about 10%. The reason for the low willingness to seek treatment for Alzheimer's disease is that there is a lack of early screening and diagnostic tools, and the majority of older people are reluctant to go to the hospital after being diagnosed with the disease in the middle or late stages of the disease. Therefore, it is necessary to focus on publicizing the importance of early screening, early identification and early prevention of Alzheimer's disease, and to establish a scientific concept of early screening and prevention.

The use of digital intelligence is significant for the early prevention and detection of Alzheimer's disease. Researchers at the University of Bari, Italy, have developed a new AI algorithm that can detect minute structural changes in the brain caused by the disease 10 years before the onset of Alzheimer's symptoms for the purpose of early detection of Alzheimer's disease. Spatio-temporal dual-stream network-based method for recognizing aura movements of Alzheimer's disease, which can recognize Alzheimer's disease early through video surveillance of daily activities. Japanese community pharmacies offer Alzheimer's prevention self-tests by wearing virtual glasses that answer questions by moving the gaze from side to side. Measured values such as the number of times the tester blinks, the average time it takes for the gaze to reach the correct answer, and the average time it takes to gaze at the correct answer become the basis for judging attention, memory, computational proximity, and cognitive integration skills. Using naturalistic driving data and machine learning techniques, Columbia researchers have developed highly accurate algorithms for detecting the presence of mild cognitive impairment and mild Alzheimer's disease in older drivers, which could provide a novel screening tool for early detection and management of mild cognitive impairment and Alzheimer's disease in older drivers.

4.3 Help services - community agency services and web platform assistance

The development and utilization of smart devices and technologies can prevent Alzheimer's patients from getting lost and have a great help and service function in helping to restore memory, carry out rehabilitation training, improve cognitive ability, and improve the quality of life.

Enterprises through increased research and development, relying on warm scientific and technological innovation, smart home aging transformation, in the home, community and institutional three scenarios for the elderly to provide a safer, more comfortable and dignified recreational life.

Through the home aging transformation, the elderly can enjoy professional medical services, rehabilitation care, health management and emergency rescue services at home, such as emergency call, remote diagnosis and treatment of medical interaction, as well as infusion warning and other types of emergency warnings, as well as environmental monitoring and control, location monitoring services, health home appliances and other types of equipment management, etc.

The Survey Report on the Lost Situation of the Elderly in China released by the Zhongmin Social Assistance Research Institute in October 2016 said that about 500,000 elderly people are lost every year nationwide, with an average of about 1,370 people lost every day, and about 72% of the lost elderly people suffer from memory impairment. Developing and designing intelligent elderly anti-lost device, and all kinds of intelligent anti-lost wearable products, with tracking, protection and health detection functions, to avoid patients from getting lost and being hurt. Smart Wheelchair with Face Recognition and Obstacle Avoidance Function, this smart wheelchair adds RGB-D sensor, GPS positioning module and human-machine interaction module to the electric wheelchair, so that the wheelchair has face recognition and obstacle avoidance function. 15-year-old Kenneth Shinozuka, an Asian teenager, learns to program a pair of anti-wandering loss prevention socks in order to prevent his grandfather, who is suffering from dementia, from wandering off. Kenneth won the American Scientist in Action Award for his invention, which has sensors on the bottom of the socks' feet to detect the pressure rise caused by his weight when he gets out of bed, and then transmits the signal to a cell phone app.

Japan, as the country with the most serious aging problem, has realized more than 70 per cent of elderly people ageing at home in the community through the establishment of a geographically integrated care network, and public cultural institutions, such as libraries, have supported the construction of the care network through the embedding of resources and services, which is an important experience for China to learn from. A private company in Japan helps Alzheimer's patients to establish a "network service system" by sharing the location of Alzheimer's patients through a cloud-based network service, scanning codes to read the information of patients who have logged in with dementia, and developing a software system - "location-tagged message boards" - to help Alzheimer's patients. The software system, "Location Tag Message Board", is a network system that provides services based on a cloud database by scanning QR codes.

The use of virtual reality technology to establish a virtual environment to help Alzheimer's disease to carry out the memory of objects and characters, regain their interests and hobbies at the same time continue to train their daily life ability, through the simulation of the scene of dementia of the patient intervention therapy, delay the patient's memory decline, and help patients to rebuild the joy of life and confidence. Computer-assisted cognitive rehabilitation (CACR), technology CACR training can improve the cognitive and daily life ability of AD patients and improve their quality of life.

4.4 Caring - emotional warmth humanistic care and dignity maintenance

A society's attitude towards the elderly largely reflects the temperature of the society itself. Governments at all levels, social groups, community organizations and media organizations should establish a warm and humane social atmosphere that protects the lives of the elderly while preserving the dignity of life.

4.4.1 Government policy support

As the problem of population ageing has become increasingly prominent, the Chinese Government has begun to implement a project for the construction of community-based elderly care service complexes, accelerating the formulation of planning measures for the retirement or long-term care of persons with Alzheimer's disease, increasing the number of specialized Alzheimer's disease care

institutions, upgrading the professional standards of Alzheimer's disease caregivers, improving the social support system, and supporting and assisting Alzheimer's disease family caregivers.

The Japanese government has made public its "National Strategy for Cognitive Disorders". In Japan, Alzheimer's disease is referred to as cognitive disease. "The goal of the National Strategy for Alzheimer's Disease is "to enable people with Alzheimer's Disease to be respected and to live independently in the environment to which they have become accustomed". Specific measures include the addition of a curriculum to school education to enhance young people's understanding of people with cognitive disorders, and nationwide activities to help people with cognitive disorders acquire self-expression skills. At the same time, the Government will formulate policies that emphasize the wishes of people with cognitive disorders and their families.

4.4.2 Guidance on institutional services

Negative caregiving experiences in the psychological, physical, economic and social aspects of family caregivers in the process of caring for Alzheimer's disease patients are manifested in the occurrence of a physical health crisis, excessive physical exertion, and the impact on physical health; suffering from negative psychological experiences, anxiety and depression, fear and anxiety, self-blame and low self-esteem, and helplessness; and facing a social health crisis, with the increase in the economic burden of the family, the restriction of the scope of social interaction, and the lack of coping ability of specialized caregiving. Caregiving coping skills are lacking. Caregivers need to be instructed to acquire rich stress management skills, access diverse social resources for dementia care, and participate in multiple forms of Alzheimer's disease knowledge guidance and health education activities. More psychological support can be given to patients and their families. A sound service system should be established, health education should be strengthened, and professional companions should be trained, with a view to improving the quality of life of Alzheimer's disease patients and improving their survival status. The "respite service" is a family caregiver support program launched by western countries in the face of the aging society. In recent years, this program has been hailed in developed countries as the most effective and practical way of assisting the elderly in their homes, supporting not only home care by volunteers, but also the provision of short-term daytime or nighttime care for the elderly by community organizations and nursing homes.

4.4.3 Building public discourse in the media

The mass media has a role in providing information and educating the public, "it frequently serves as the public language interpreter of some research", and the public's attitudes and knowledge on certain topics are largely influenced by media reports.

The mass media should reflect the humanistic concern for patients in their reports. Emphasis on suffering and detailed portrayal of the patient's defects to gain sympathy is not humanistic care; humanistic care focuses on human emotions, so that the living can experience the nobility and dignity of mankind and awaken the conscience and morality of mankind.

This requires the media to report on patients in a way that presents the public with the full range of people with Alzheimer's disease: people with feelings, dignity, and a desire to be treated with respect. Constructive journalism, with its problem-solving orientation, can provide both conceptual and practical insights and support for Alzheimer's disease health communication.

5. Conclusions

In the prevention and treatment of Alzheimer's disease and social care services, the use of digital intelligence technology to serve this special group is the trend of the future. Early and accurate diagnosis of Alzheimer's disease through the use of digital intelligence can effectively prevent the

onset of the disease and improve the lives of patients. In addition, the development of accurate tools to predict the risk of Alzheimer's disease, using readily available routine data, will then have the potential to be used in clinical practice, thus expanding into biological disease detection and management. Digital intelligence technology is a top priority that needs to be vigorously developed and is bound to bring great benefits and contributions to society.

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