

Health Management Service Models for the Elderly with Visual Impairment: A Scoping Review

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Background: The incidence of visual impairment(VI) in older people is gradually increasing. This review aimed to summarise the evidence on existing health management models and strategies for older adults with VI to improve health-related and vision-related quality of life (QoL) in older people.

Methods: Based on the framework of the scoping review methodology of Arksey and O'Malley (2005), a comprehensive literature search of relevant literature published between January 2010 and June 2022 in PubMed, CINAHL, EMBASE, Web of Science, Cochrane Library, CNKI, VIP, Wanfang database, Sinomed and the grey literature.

Results: Finally, 31 articles were included. The health management model had a multidisciplinary team low vision rehabilitation model, medical consortium two-way management model, low vision community comprehensive rehabilitation model, medical consortium-family contract service model, screening-referral-follow-up model, and three-level low vision care model. The health management strategy covers nine aspects, the combination of multi-element strategies is feasible, and network information technology has also shown positive results.

Conclusion: In the future, under the Internet and hierarchical management model, we should provide demand-based personalized support to rationalize and scientifically achieve hierarchical management and improve resource utilization efficiency and eye health outcomes.

Keywords: visual impairment, health management models, strategies, the elderly, scoping review

Background

Visual impairment (VI) refers to low vision or a reduced visual field of both eyes caused by various reasons, which cannot or temporarily not restore visual function through multiple drugs, operations, and other treatments so that it is impossible to carry out work, learning or other activities.¹ In China, people with disabilities due to blindness and visual loss rank second among all disabilities, second only to hearing loss.² As of 2020, 43.3 million people in the world were blind, 295 million people had moderate and severe VI, 258 million people had mild VI, and 510 million people had uncorrected near VI due to a lack of reading glasses.³ By 2050, due to the aging population, it is estimated that 61 million will be blind, 474 million people will suffer from moderate and severe VI, 360 million will suffer from mild VI, and 866 million p will suffer from uncorrected near VI.

Due to social and economic development and the increase in average life expectancy in various countries, the burden of diseases is changing from infectious diseases to noninfectious and aging-related conditions. VI has become an urgent and increasingly severe global public health problem.³ According to the seventh national census results, 264.02 million elderly people aged 60 or above, accounting for 18.70% of the total population; there were 190.64 million people aged 65 and above, accounting for 13.50% of the total population.⁴ The prevalence of presbyopia, cataract, glaucoma, and senile macular degeneration increases rapidly with age.⁵⁻⁷

For the elderly, VI may lead to social isolation,⁸ limited social activities, and inconvenient walking,⁹ and the risk of falls and fractures, especially hip fractures, is higher.^{10,11} VI may also increase other physical challenges, such as cognitive decline,^{12,13} reduced vision-related quality of life (VRQoL),¹⁴ and increased risk of chronic disease and death.^{15,16} The elderly

with VI will also have psychological problems,¹⁷ such as anxiety and depression.^{18,19} The incidence of depression and anxiety of the elderly with VI is twice that of the general elderly.²⁰ For family members and caregivers, it will lead to physical and mental diseases²¹ and increase the risk of anxiety and depression.²² Patients with VI will also cause a substantial financial burden to society; for example, they are more inclined to live in nursing institutions²³ and are more likely to move into nursing institutions in advance,²⁴ which increases the burden on nursing institutions. Previous studies have shown that VI also poses a substantial financial burden to the world.^{25,26}

The VI of most elderly people can be prevented and treated.²⁷ Effective intervention measures can significantly reduce or eradicate the VI or reduce or eliminate the related living capacity limitations. Therefore, access to eye care services is a significant risk affecting eye disease development and treatment outcomes.^{28,29} Health management refers to the monitoring, evaluation, intervention, re-monitoring, re-evaluation, and re-intervention of health risk factors, which is a continuous cycle of movement state, in which intervention to solve health problems is the core.³⁰ The health management model of visual impairment refers to the combination of ophthalmic examination, assessment, rehabilitation, health education, and other ways to carry out systematic, continuous and personalized health services for patients, thereby reducing the recurrence rate and mortality of diseases, improving the survival rate of patients, and improving their quality of life. World Health Organization (WHO) 《World report on vision (2019)》 also proposes to integrate people-oriented comprehensive eye care into the health system.³¹ Due to aging and changes in lifestyle, the demand for eye care will increase sharply in the next few years. If the demand is unmet elderly people will face the risk of VI.

Health management services are needed to address these issues in older people with VI. Li Shuqin et al³² used conjoint analysis to identify six health management strategies and analyze the preferences of elderly VI patients for different health management services, aiming to assist healthcare providers in tailoring appropriate health management strategies for them. However, the conjoint analysis method has limitations such as a maximum of six attributes and 2–4 levels per attribute, which may not be comprehensive enough to cover all services. This paper adopts the scope review method framework proposed by Arksey and O'Malley et al³³ in 2005 and improved by Levac et al³⁴ to comprehensively search the existing research on the health management models and strategies of the elderly with VI, to provide a reference for formulating a management service system for the elderly with VI in the future.

Methods

Identifying the Research Questions

The research questions reviewed in this study are as follows: What were the health management models of the elderly with VI? What were the health management strategies? What was the effect?

Identifying Relevant Studies

Relevant studies published between January 2010 and June 2022 were identified using PubMed, CINAHL, EMBASE, web of science, Cochrane Library, CNKI, VIP, Wanfang, sinomed, and the grey literature database. The search terms used were: “old people”/ “elder”/ “older adults”/“aged”/“geriatrics”, “glaucoma”/“macular degeneration”/“diabetic retinopathy”/ “cataract”/ “vision disorders”/“visual impairment”/“vision impairment”/“vision loss” /low vision, “rehabilitation”/“management”/ “intervention”/“model”/“strategy”/“system”. ([Supplementary Material](#) “Pubmed search strategy”)

Study Selection

Based on the participants, concepts, and context (PCC) principles for the scoping review. P: It complies with WHO's grading standards for VI. C: It involves the health management model and strategy of the elderly with VI. C: 60 years old or older. Exclusion criteria: non-Chinese and English literature; unable to obtain full-text literature; conference papers, research programs, guides, single case reports and book chapters; repeated published articles; the research did not mention the management content and effect. The search studies were imported into EndnoteX9 for reduplication. Two trained researchers independently screened the titles and abstracts of the articles according to the inclusion and exclusion

criteria, indicating the reasons for exclusion, and then further screened the full text of the included articles to indicate the reasons for exclusion. Disagreements that arose during the screening process were discussed by a third person, and the final decision was made on the included literature.

Charting the Data

The main extraction contents include author, publication year, country, study type, sample size, time, management strategies, outcome indicators, measurement tools and management effects.

Collating, Summarizing, and Reporting the Literature

We outlined and analyzed the health management models and strategies of the included literature, and extracted the data in the form of tables.

Results

Study Selection and Characteristics

6153 articles were retrieved, and 3834 studies remained after removing duplicate articles using EndnoteX9. 2319 studies were removed after reading titles and abstracts. The remaining 92 studies were read in full text and screened for a second time, and 31 studies were finally included. The PRISMA flow diagram shows the studies' screening process and the reasons for exclusion. The study selection process is shown in Figure 1.

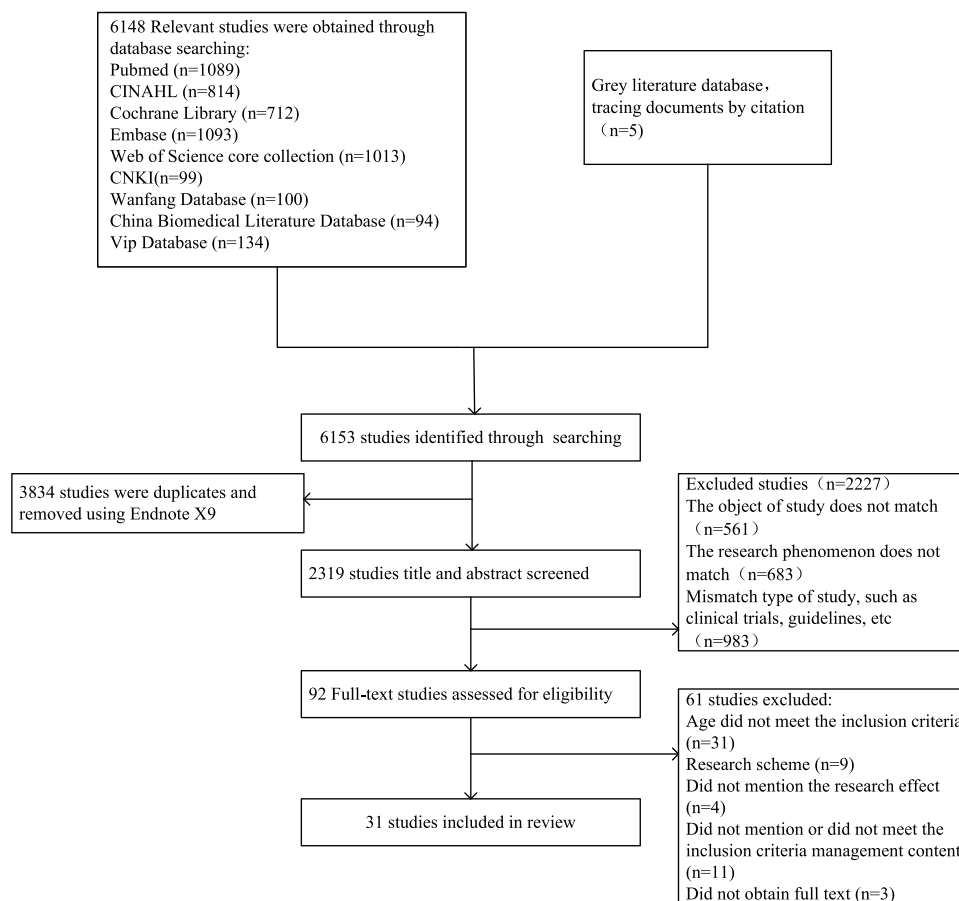


Figure 1 PRISMA flow diagram.

Basic Characteristics of Included Studies

The types of studies included randomized controlled trials (n=23) and quasi-experimental trials (n=8); In China (n=11), the United States (n=5), Australia (n=4), Britain (n=3), Germany (n=2), Iran (n=1), India (n=1), Canada (n=1), France (n=1), Hungary (n=1) and Brazil (n=1). The basic characteristics of the included studies are shown in [Supplementary Table 1](#).

Health Management Models for the Elderly with VI

The health management models of the elderly visually impaired population mainly include: (1) Multidisciplinary team low vision rehabilitation model:^{35–39} a multidisciplinary team composed of optometrists, ophthalmologists, rehabilitation therapists, nurses with rich clinical experience, community medical staff, social workers, nutritionists, etc., to assess the residual functional vision and determine patients' visual needs. According to the difficulties, requirements, and patient goals reported, create a unique visual rehabilitation plan with appropriate visual aids for each patient, provide non-optical interventions such as screening, family environment safety modification, optical interventions such as refraction, glasses, magnifying glasses, and personalized low vision rehabilitation such as orientation and mobile training, referral, and appointment medical services. (2) Medical consortium two-way management model:^{40–42} the ophthalmologist of the tertiary hospital conducts knowledge training for the medical staff of the community health service center, the community medical staff conducts health education, individualized risk factor intervention guidance, telephone follow-up, and community outpatient follow-up, and the patients who cannot complete the ophthalmic examination in the community or have complications and whose visual acuity recovery effect is not significant are transferred to the ophthalmology department of a tertiary hospital of the medical union, and after the treatment is completed, they are transferred to the community outpatient for follow-up. Ophthalmologists in tertiary hospitals and medical personnel in community health service centers jointly manage to achieve hierarchical diagnosis and treatment and a two-way referral model. (3) Low vision community comprehensive rehabilitation model:^{43–46} the patients with poor vision found in the daily outpatient service and physical examination in the community are transferred to the low vision joint outpatient service for vision screening, optometry, evaluation and classification, and then rehabilitation management measures are implemented. Remote optical aids, use training and health education measures are provided. Medical optometry and glasses are provided for ametropia, and surgery is required to refer them to the superior hospital for surgery. If the patient's condition is unstable, he will be treated with traditional Chinese and western medicine in the ophthalmology department. The responsible doctor in the community will follow up for a long time. (4) Medical consortium-family contract service model:^{47,48} the family and the general practice service team sign a service agreement to jointly develop and implement targeted and personalized family support programs for patients, and encourage family members to do an excellent patient support, assistance and treatment. (5) Screening-referral-follow-up model:⁴⁹ it provides closed-loop eye health management services. The community conducts screening and decides whether to go to the local hospital or a tertiary hospital for treatment according to the condition of the patient. After the referral, the patient's treatment-related data will be returned to the community hospital for follow-up and management. (6) Three-level low vision care model:^{40,45} according to the three-level low vision care recommended by WHO, the primary level provides non-optical interventions, including vision screening, family environment safety transformation, and the secondary level provides patients with the limited scope of optical interventions such as magnifying glasses. The tertiary level is provided by multidisciplinary teams with optical, non-optical, and electronic low vision aids, including visual function assessment, refraction, prescription, multidisciplinary rehabilitation, and visual skills and mobility training. See [Supplementary Table 2](#).

Health Management Strategies for the Elderly with VI

The health management strategy for people with VI involves 9 topics, including self-management,^{36,38,39,50} health education,^{41–43,47,48,50–55} rehabilitation training,^{35,37,38,40,44–46,56–65} ophthalmic examination,^{36,42,43,59,64} evaluation^{37,38,40,42,59} and treatment,^{35,44,45,49,56} regular follow-up,^{35–37,42–44,47,49,54,55,60} environmental safety improvement,^{39,60–62} referral and transfer treatment,^{40,41,43,46,49} psychological support,^{46,47,50,63} medical service appointment and reminder.^{35,42,46,52,54} See [Figure 2](#).

- Self-management
- Rehabilitation training
- Regular follow-up
- referral and transfer treatment
- Appointment and reminder
- Health education
- Early ophthalmic screening, assessment and treatment
- Environmental safety transformation
- psychological support



Figure 2 Health management strategies for the elderly with VI.

Evaluation Indicators

The evaluation of the control effect of visually impaired people mainly involves 10 aspects, including psychological state (n=10), quality of life (n=10), compliance (n=8), patient safety (n=4), adaptability (n=5), satisfaction (n=2), reading function (n=3), social participation (n=2), knowledge, attitude, behavior (n=5) and physiological function (n=19).

Discussion

The Advantages and Disadvantages of the Multidisciplinary Low Vision Rehabilitation Model

Multidisciplinary low vision rehabilitation maximizes residual vision through the use of visual aids and visual adaptation exercises. It is usually goal-oriented to develop personalized rehabilitation according to the needs of patients. There is no standardized rehabilitation plan, and it is not intended to generally improve all aspects of patients' lives. After rehabilitation, the overall functional ability and QoL of patients with impaired vision were enhanced.³⁷ However, the study found that the overall functioning capacity of visual rehabilitation improved in the 30-day follow-up, but recovered to the level before rehabilitation in the 3-month follow-up.⁴⁰ The overall visual ability of patients may deteriorate over time due to the progress of visual impairment. Other studies have shown that multidisciplinary rehabilitation has a little or uncertain impact on VRQOL.⁶⁶ Differences in patient needs, rehabilitation programs, and components of multidisciplinary low vision rehabilitation can also contribute to differences in management outcomes.⁶⁷ Therefore, the long-term benefits of multi-disciplinary low vision rehabilitation need to be further verified. There may be a need to make better use of low vision rehabilitation and to integrate low vision services into the holistic care of older persons.⁶⁸

The Advantages and Disadvantages of the Medical Consortium Two-Way Management Model

The two-way referral model has been widely used in managing patients with diabetes and chronic heart failure, but less used in the health management of people with VI.^{69,70} Through cooperation with hospitals and community organizations, the current low vision model tries to provide services that conform to the people-oriented nursing principle to the greatest extent.⁷¹ This model combines the advantages of general hospitals and community hospitals, which can significantly alleviate the burden of diagnosis and treatment in general hospitals, reduce the waste of medical resources and the loss of staff in grass-roots hospitals,⁷² and greatly promote compliance behavior, emotion and QoL of cataract patients in communities.⁷³ Based on community service, combined treatment for patients and focusing on health education can significantly reduce medical expenses and strengthen patient compliance. Community doctors and residents can maintain a close relationship through close community intervention, and patients' strangeness and psychological barriers to doctors will weaken.⁷⁴ Patients can better understand disease-related health knowledge, and community doctors' clinical skills can also be improved.⁶⁹ However, some patients are still skeptical of general community practitioners. The work enthusiasm of community healthcare needs to be improved, and communication with patients should be strengthened to gain the trust of patients. At the same time, their professional standards should be improved.⁶⁹

The Advantages and Disadvantages of Low Vision Community Comprehensive Rehabilitation Model

Community rehabilitation services for low vision patients include multiple rehabilitation services such as medical treatment, evaluation, rehabilitation training and visual aid examination, which can meet the personalized needs of patients with VI. The community health service center is relatively close to facilitating the low vision patients' rehabilitation and medical treatment. Community-based screening programs provide convenience for seniors and increase affordability and continuity of access to much-needed essential vision screening and care.⁷⁵ The World Health Organization (WHO) also recommends promoting community-based rehabilitation and providing comprehensive rehabilitation services to people in under-resourced settings, such as rural areas.⁷⁶ In addition, there is a capable management team of local physicians who are more in touch with the workers and inhabitants of the community, which helps the growth of rehabilitation work. It achieved promising results for clinical outcomes, function, and QoL, but could not provide clear evidence due to the heterogeneity of interventions and the quality of the included studies.⁷⁷ Community-based Rehabilitation coverage is typically poor and seldom had in social security or health systems.⁷⁸ Community general practitioners are generally of low professional quality and cannot accurately assess and provide individual services for chronic diseases of the elderly.⁷⁹ The World Health Organization also agrees that no single community-based rehabilitation model is applicable globally and recommends using existing community-based rehabilitation as a framework.

The Advantages and Disadvantages of the Medical Consortium-Family Contract Service Model

Family contract service is a kind of family support treatment, which is to sign service contracts, service contents, service methods, responsibilities and obligations of both parties based on families, and establish a stable service relationship with patients' families in the form of contracts.⁸⁰ Through the health evaluation of patients, a personalized health management plan is formulated to enable the whole family to actively participate in and provide support, encouragement and supervision for patients to the maximum extent. The signing of a family doctor solidifies the contractual relationship between community residents and general practitioners through a contract, which can effectively improve the continuity of patient nursing.⁸¹ Family doctors provide primary care services and community health education can reduce the disease burden by up to 70%.⁸² The community health service agency factor is the factor that affects the effect of the family contract service model.⁸³ During the implementation process, there may be some complex problems, such as team organization structure not being in line with the actual work, easy to become a mere formality, and supervision, assessment and incentive mechanism challenging to get rid of institutional constraints,⁸⁴ low enthusiasm of doctors,⁸⁵ and information system can not play a better role in helping. Community healthcare institutions should establish and improve supporting performance appraisal systems and incentive mechanisms, increase the enthusiasm of family doctors, and help them better provide health services for patients.⁸⁶ The family doctor team should provide high-quality personalized services for patients⁸³ and actively communicate with patients, so that patients can receive continuous psychological counseling, to better control the patient's condition.⁸⁷ The contract between the family doctor and the service provider and the service content needs to be improved.⁸⁸ National government factors are the main trigger for family contract services. Public health services provided by family doctors should be included in the scope of health insurance and linked to health insurance to assist family doctor health management.

The Advantages and Disadvantages of the Three-Level Low Vision Care Model

The three-level low vision rehabilitation model is divided into primary, intermediate and three-level management according to the severity of visual impairment. The primary low vision service should be able to meet the needs of 30% of the low vision population, the other 20% of the low vision service should be completed by tertiary care, and the needs of the remaining 50% of the low vision population should be met adequately in secondary care. Primary health workers can treat simple eye diseases at the primary level and prevent large numbers of patients from going to overburdened secondary hospitals, thereby saving patient costs and freeing up the capacity of specialist eye staff to treat more complex eye diseases. Compared with other health management models, this model is conducive to hierarchical management and rational use of resources. However, not all multidisciplinary centers can provide comprehensive tertiary services, and the distinction between secondary and tertiary levels may not be evident.⁸⁹ Difficulties in transportation, service distance, low referral rate, insufficient understanding of services, lack of equipment and facilities, lack of trained staff and other issues will affect the best cost-effectiveness.^{90,91}

The Advantages and Disadvantages of the Screening-Referral-Follow-Up Model

Grassroots hospitals are responsible for large-scale primary screening, and superior hospitals are accountable for eye disease prevention and treatment, which can prevent and delay the occurrence and development of eye diseases in high-risk groups, and effectively reduce the waste of resources in grade A tertiary hospitals.⁹² At the same time, it improves the patient's awareness of early screening and treatment of eye diseases as early as possible and reduces medical and health expenditures.⁹³ Recruitment - screening - referral - turnaround - follow-up model can improve the diagnosis and treatment of patients and reduce the burden on patients and society. In transmitting large-scale screening results to the superior hospital, due to the huge workload, the resulting feedback may be delayed in time (especially in rural regions), resulting in long waits. How to save time and cost in the future so as not to delay the development of the disease is worth considering.

The Health Management Strategy of Combining Multiple Elements is Feasible

Only a few studies provided a single health management strategy such as self-management education, environmental safety modification, and reading training.^{39,57} The majority also offered health services that combined multiple management strategies such as eye screening, assessment, and psychological support. The health management mode combined with multiple strategies

has significantly improved patients' self-reported mental state, QoL, visual function, etc. In contrast, a single strategy, such as only providing family reform suggestions, has not changed QoL,⁶⁰ only providing reading training, has not changed the visual function of patients,⁵⁷ and only providing daily exercise and directional and directional walking mobile training. The patient's emotional state, falls, and quality of life have not changed.^{39,58} 90% of people who are blind or have poor vision still have some useable residual vision, which can benefit from professional low vision rehabilitation.⁹⁴ In light of this, comprehensive vision rehabilitation should be carried out through multidisciplinary teamwork combined with multiple management strategies.

Network Information Technology Shows Positive Effects

The difficulties of timely information transmission and health education have been solved by new solutions made possible by information technology. Daily text messages from mobile phones have increased patients' awareness of eye information and compliance with routine eye exams.⁵² The patient's blood sugar was reduced, and their self-management behavior and knowledge awareness increased after their relatives adopted WeChat interactive follow-up, health education, and follow-up reminder. Electronic health records can ensure that patients can easily view their records. The tertiary-level hospitals' medical staff and the community's accountable doctors can assess the condition of patients and their families at any time, conduct in-depth analyses, send individualized education materials as required based on the various needs of patients, and conduct long-term follow-ups. It is a convenient way to strengthen the communication between patients, communities and hospitals.⁹³

Differences and Linkages Between Health Management Models in Different Countries

Multidisciplinary low vision rehabilitation services have been widely used in developed countries such as Australia³⁸ and France.³⁵ The multidisciplinary team initially assesses residual functional vision, determines the patient's visual needs, develops a personalized visual rehabilitation program and equips it with visual aids such as orientation and mobility training, independent living training, recreational and leisure improvement, use of adaptive techniques and equipment, and modification of the living environment. Multi-disciplinary teams in different countries have different workplaces and flexible working styles, such as Australia and Brazil. Training can occur in specialized low vision rehabilitation centers or medical facilities, or rehabilitation management can be carried out at home or in the community through home rehabilitation therapists, community low vision service teams, and social volunteers. Whether the visually impaired are in a hospital, community, or family, they can receive systematic and standardized low-vision rehabilitation services. Low vision rehabilitation self-management has been empirically studied in Australia,^{38,39} Iran,³⁶ and other countries. The main contents include life skills training and regular evaluation, learning to apply problem-solving models, increased recreational activities and exercises, and more. Participants are encouraged to leverage and share their wealth of life experiences, coping mechanisms, and develop new skills and strategies to apply and learn new skills in everyday life. Girdler et al³⁹ showed significant improvements in depression, social engagement, visual impairment adaptability, and self-efficacy. Rees et al³⁸ differed from Girdler in that no differences were found between groups in vision-specific quality of life, emotional well-being, adaptation to vision loss, or self-efficacy. Community-based health management is more effective in developing countries such as China. Health education programs are particularly prominent in management methods, including the importance of disease knowledge, diet, exercise, medication, and regular follow-up through the Internet. Lack of awareness and understanding of vision loss is one of the barriers to using low vision services, as older people tend to perceive deterioration of vision as a natural part of aging,⁹⁵ so the health education is particularly important, especially in rural areas.⁹⁶ Community health management has also been used to promote the independence of persons with disabilities through assisted living projects. In developing countries, community-based health management is feasible.⁹⁷ In countries such as the UK,^{58,60} the focus on providing home-based services is more prominent, with more home exercise, home environment assessment, and modification so that older people with low vision in everyone's community can access rehabilitation services and reduce the incidence of falls. However, the cost of such training is usually not reimbursable by Medicare or private insurance in the USA.⁹⁸ In short, the availability of low vision services in developing countries such as China is limited; although the service models of various countries are different, there are some common characteristics and practices. We should improve community-based rehabilitation, learn from the experience of multidisciplinary and hierarchical diagnosis and treatment in developed countries, solve the difficulties of regional and cultural differences in a demand-oriented manner, formulate regional and flexible health management methods that meet China's national conditions, and improve the effectiveness of policy implementation.

Conclusion

The five health management models' efficacy and viability have already been shown, but further cost-effectiveness analysis will be required in the future. In the future, we should explore the hospital-community-family linkage support service system under a hierarchical management model, actively use artificial intelligence technology to provide demand-based personalized support, rationalize and scientifically implement hierarchical health control, improve resource utilization efficiency, and improve eye health outcomes.

Abbreviations

VI, Visual impairment; VRQoL, Vision-related quality of life.

Data Sharing Statement

All data is displayed in text or uploaded as [Supplementary Material](#).

Acknowledgments

The poster's abstract was published in "Poster Abstracts" in [Research Square: [hyperlink with DOI:10.21203/rs.3.rs-2770331/v1](#)].

Funding

This study was funded by the National Natural Science Foundation of China (No.71974198). The funding source does not participate in the study design, data collection, analysis, manuscript writing, or decision to submit the manuscript for publication.

Disclosure

The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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