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Construction of a Community-Based Intensive Intervention Model of Integrated Traditional Chinese and Western Medicine in the Whole Life Cycle of Diabetes

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Abstract

Diabetic cardiovascular disease, diabetic cerebrovascular disease, diabetic nephropathy, diabetic retinopathy, diabetic neuropathy, diabetic lower limb arteriopathy, Diabetic Foot (DF) are common chronic complications of Diabetes Mellitus (DM). According to the WHO definition, neuropathy and peripheral vascular lesions are essential factors for the occurrence of Diabetic Foot (DF). Therefore, the common chronic complications of DM were classified as diabetic nephropathy, diabetic retinopathy, and DF. At present, the diagnosis and treatment of DM complications are scattered in the departments of endocrinology, vascular surgery, nephrology and cardiovascular disease. With the extension of the course of DM patients, the complications of heart, brain, kidney, eye and foot appear one after another. At present, in terms of the current situation of the management and intervention of complications, no disease is in the community management, mild patients go to community hospitals or secondary hospitals, and severe patients go to the tertiary hospital for diagnosis and treatment. After the symptoms are relieved or effective control of the disease, they still need to go back to the community, presenting the current situation that community management is more important than hospital treatment. However, the specialized and decentralized diagnosis and treatment and even multidisciplinary cooperation in tertiary hospitals cannot improve the treatment efficiency, so it is particularly important to explore the new third-level diagnosis and treatment model benefiting DM patients. This study proposes a Diabetes Life Cycle (DWLC) integrated prevention and treatment management system to improve the comprehensive intervention ability of community DM complications, strengthen the centralized treatment ability of DM complications in secondary hospitals, and smooth the transfer of severe complications to tertiary hospitals. This model emphasizes the integration of traditional Chinese and western medicine, community prevention, secondary integrated treatment and rehabilitation, and tertiary severe intervention. The prevention and rehabilitation management system (prevention-treatment-rehabilitation-rehabilitation) emphasizes the middle and west, giving full play to the advantages of integrated Chinese and western medicine with Chinese characteristics to improve the quality of life of DM patients.

Keywords: Whole life cycle of diabetes; Diabetes complications; New tertiary diagnosis and treatment mode

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Introduction

Diabetes Mellitus (DM) is a metabolic disease caused by various causes, such as insulin deficiency or insulin resistance, which makes the body in a chronic hyperglycemia state. At present, Type 2 Diabetes Mellitus (T2DM) is dominated, and T2DM accounts for more than 90% of all DM patients [1]. With the aging of the population, DM shows an epidemic trend, and the number of sick people increases rapidly, and it is expected that 693 million adults will be involved worldwide by 2045 [1]. The number of DM patients in China has reached the top in the world in 2013 [2], Almost 60% of DM patients are complicated by stroke, coronary heart disease, and Diabetic Retinopathy (DR), Diabetic Lower Extremity Arterial Lesions (Diabetic Lower Extremity Arterial Disease, DLEAD), Diabetic Neuropathy (Diabetic Peripheral Neuropathy, DPN), diabetic renal lesions, and diabetic foot (DF) and other serious complications [3]. The high incidence and recurrence rate of DM complications bring a heavy economic burden on patients, and also generally reduce the quality of life, and social medicine is also under great economic pressure. Under today's healthcare system, the clinical treatment needs for these DM complications is still under met.

At the present stage, China's primary medical institutions have insufficient technical strength, weak comprehensive management awareness, unclear medical responsibilities at higher and lower levels, imperfect two-way referral mechanism, and concentrated superior resources concentrated in top-level hospitals [3]. This situation is not conducive to the prevention and treatment of DM complications. As a result, Chinese DM patients mainly receive passive treatment, lack effective long-term prevention and management, and have not formed a whole life cycle intervention system involving the whole population. In addition, the comprehensive conditioning ability of western medicine is still insufficient, and adverse reactions such as hypoglycemia may occur in the course of treatment. TCM treatment of DM has a long history, and has the advantage of overall conditioning, which makes the body in a dynamic balance, is conducive to solving various adverse reactions in the process of western medicine treatment, and can reduce drug dependence, which is conducive to the long-term management of DM patients. Therefore, the combination of traditional Chinese medicine with modern medical treatment can achieve a better intervention effect. In China's medical ecology, primary health and medical institutions represented by community health service institutions are the first stop for the prevention and treatment of DM and its complications, as well as the focus and difficulty of the hierarchical diagnosis and treatment system. Primary health and medical institutions are an important part in the construction of chronic disease prevention and treatment system represented by DM. Therefore, we propose to construct a community-based intensive intervention model for the whole life cycle of DM.

Current Epidemiological Status of DM-Related Complications

The blood vessels caused by the progression of DM seriously affect the prognosis and quality of life and increase the risk of premature death [4]. With the development of DM, multiple complications develop. DF is one of the common complications of DM, mainly showing neurological and vascular lesions of the lower limbs. The prevalence of DF in diabetic patients was 6.3% worldwide, while the prevalence of Diabetic Foot Ulcer (DFU) was 4.1% in the Chinese population [5]. The study found that the incidence of new ulcers in Chinese DM patients was 8.1% and the recurrence rate was 31.6% [6]. The course of DM shows a high correlation with the onset of DF, and DM patients with a course of more than 10 years are more likely to develop DF [7]. DLEAD It is an arterial ischemic lesion with intermittent claudication, resting pain and ischemic gangrene as the main clinical manifestations. The prevalence of LEAD increases with age. Some studies show that the prevalence of LEAD in Chinese patients over 50 years of age is 21.2% [8]. Two epidemiological surveys in China found that DF and LEAD were 62.9% and 59.0%, respectively, indicating that DLEAD is one of the important causes of the occurrence of DFU [9]. DPN is another common complication in DM patients, with limb sensory abnormalities as the main manifestation, such as pain, numbness, etc. A cross-sectional study showed that the prevalence of DPN in the T2DM population was up to 67.6% [10], patients with the disease for more than 10 years are prone to appear more obvious clinical manifestations of neuropathy [11]. DR is one of the most common types of microvascular complications in DM, mainly leading to vascular damage and retinal neuron destruction, and is the key cause of vision loss and even blindness in patients with DM [12]. According to the figure statistics, the incidence rate of DR is 27% worldwide, while the incidence rate in China is as high as 22.4%, and there is a trend of increasing year by year [13,14]. Currently, DM complications have become one of the important reasons affecting the quality of life of DM patients. In the case of lower limb vascular changes caused by DM, the number of lower limb amputations has increased in the past 10 years in the statistics based on the data of higher income countries [15]. Therefore, it is important to actively control blood glucose, delay the progression of disease in the DM patients, and establish a whole-lifetime intervention model for DM patients.

Current Status of the Prevention and Treatment of T2DM Complications

At present, DM cannot be cured. On the basis of diet control, it mainly relies on long-term oral hypoglycemic drugs or insulin injection to control blood sugar, and delay the time of complications. The occurrence of DM complications is closely related to the patients' own basic diseases, eating habits, life schedule and self-management ability. Early diagnosis and early treatment are important measures to reduce DM complications.

At the current stage, the number of DM people in China is increasing, and the awareness rate, treatment rate and treatment standard rate are still low, which is more prominent at the grass-roots level. In order to improve the DM prevention and treatment system at the grass-roots level, guide the DM prevention and treatment work of grass-roots medical personnel, and provide diversified prevention and treatment means, the state has issued the National Guidelines for the Prevention and Treatment of TCM at the Grassroots Level of Diabetes (2022) [16]. The guidelines advocate non-pharmacological therapies, with an emphasis on addressing common symptoms and improving the quality of life. Although great progress has been made in the prevention and treatment of DM complications, a preliminary prevention and treatment system of "screening-diagnosis-treatment-prevention" has been formed [17], But there are still challenges. First of all, the most important point is that China still lacks a DM intervention system based on multi-level hospitals or health institutions. DM is difficult to heal, troubles patients throughout life, and the phased treatment or prevention effect is not satisfactory, so the intervention model of the whole life cycle is urgently needed. Secondly, the primary medical and health institutions have insufficient awareness of the disease. Due to the slow update of diagnosis and treatment technology and diagnosis and treatment concept, as well as the shortage of specialized treatment drugs, grassroots medical staff do not timely screen and evaluate DM and other diseases, and the intervention for complications in the progressive disease is not in place [18]. This also leads to the loss of the best treatment time for patients to move to secondary hospitals; moreover, insufficient linkage between primary hospitals or community medical institutions and superior hospitals [19]. Cause a delay in patient referral timing. In addition, the poor publicity, poor compliance of patients, and different control goals of different groups all bring great challenges to the prevention and treatment of DM and its complications. In short, the current treatment and prevention of DM and its complications are relatively scattered, with poor unity or integrity, and lack of the consistency, coordination and coherence of the management of multi-level healthcare institutions.

Advantages of Integrated Intervention in DM and its Complications

Traditional Chinese medicine and modern medicine have

their own advantages in DM intervention. The implementation of integrated Chinese and western medicine program can give full play to their respective advantages, effectively control blood sugar, and delay or even reduce the occurrence of complications. The National Guidelines for the Prevention and Management of Traditional Chinese Medicine in Diabetes (2022) clearly requires that "actively support and encourage TCM to be integrated into the comprehensive diabetes prevention and treatment system, give full play to the advantages of holistic view and syndrome differentiation and treatment", and carry out comprehensive prevention and treatment. Therefore, it is the general trend and the urgent need of patients to integrate the means of modern medical intervention in DM and its complications into TCM.

First of all, in the diagnosis of DM, various examination indicators of modern medicine can objectively evaluate whether patients' hematology and other indicators meet the diagnostic criteria of DM. Meanwhile, combined with the syndrome differentiation and clinical manifestations of traditional Chinese medicine, it can achieve better judgment effect, and make patients better understand their own situation and choose the appropriate lifestyle. Western medicine has the advantage of rapid speed in treating DM, but lacks the ability of comprehensive conditioning, and adverse reactions such as hypoglycemia may occur in the process of treatment. TCM treatment of DM has a long history, which has the advantage of comprehensive conditioning of various factors, which makes the body in a stable state, is conducive to solving various adverse reactions in the process of western medicine treatment, and can reduce drug dependence, which is conducive to the long-term management of DM patients. The treatment of diabetes through the combination of traditional Chinese and western medicine can more effectively reduce and stabilize patients 'blood sugar, improve the quality of life of patients, and make patients' body in a balanced state. At present, relevant clinical studies have preliminarily proved the advantages of combining traditional Chinese and western medicine. Willow forest et al. [20] the study found that compared with insulin treatment alone, bupleurum thirst soup combined with insulin could significantly reduce HbA1c, fasting glucose and 2 h postprandial glucose levels in patients with DM. Zhu Fengchun et al. [21] by studying the combination of metformin, it was found that the combination treatment could improve the treatment efficiency, and the blood glucose control level was better than that of metformin alone. The above studies show that the combination of traditional Chinese and western medicine can enhance the efficacy and improve the living condition of patients. In addition, the bi directional regulation function of TCM can also prevent the hypoglycemia caused by drugs. Wang Jing et al. [22] compared with the combination of insulin and insulin alone, it was found that the combination of TCM treatment group could significantly reduce the frequency of hypoglycemia, and the effect of maintaining the stability of blood glucose was achieved.

In the treatment of DM complications, TCM syndrome differentiation is conducive to the chronic complications and overall conditioning of DM patients. When the patient has clinical symptoms or abnormal laboratory indicators, the urgency of the patient should be determined in the emergency. In the stable period, TCM therapy can be used for overall conditioning and long-term management. The advantages of combining traditional Chinese and western medicine intervention DM complications has been reflected in clinical, such as DM patients poor glucose control or after trauma, DFU, if conform to the indications, western medicine treatment, such as amputation, but some patients cannot accept amputation, TCM treatment reflects the advantage, using a variety of theoretical system of traditional Chinese medicine and all kinds of traditional Chinese medicine preparations for debridement, dressing, clinical often can get good curative effect, in the treatment at the same time, also cannot leave the various kinds of western medicine examination methods and treatment, such as all kinds of therapeutic instruments and the necessary surgical treatment. In the treatment of diabetic peripheral vascular lesions, it was found that the addition of TCM medicine nourishing Yin, activating blood and dredging collaterals on the basis of conventional treatment could significantly improve the peripheral vascular lesions and reduce the levels of IL-6, TNF-α and CRP [23]. Shi Wei et al. [24] Combined with the pathogenesis of TCM syndrome differentiation and blood stasis, it is found that using leech injection in the treatment of diabetic nephropathy can improve the efficiency of treating patients with diabetic nephropathy and delay the progress of complications.

The Role of Community, Secondary Hospitals and Tertiary Hospitals in Hierarchical Diagnosis and Treatment in the Prevention and Treatment of DM Complications

At present, the prevention and treatment of DM complications in China is still in the initial stage of "emphasizing treatment rather than prevention" and "emphasizing drugs rather than management". DM group mainly take passive treatment, and the long-term prevention and treatment management effect is not good. In view of the lack of technical strength and resources, weak awareness of comprehensive management, unclear medical responsibilities of the upper and lower levels, and the imperfect mechanism of two-way referral [2], National level since 2015 issued "about promoting the construction of hierarchical diagnosis system guidance", to promote the comprehensive system, implementation, sustainable slow disease prevention system construction, in order to promote chronic diseases such as DM management by "disease treatment" to "health management", form "upper and lower linkage, medical fusion" of the whole population, the whole cycle of slow disease service system construction [25,26].

Grassroots community doctors are the managers of medical resources and are directly responsible for the establishment of all DM patient information files in their communities. The diagnosis of DM is confirmed by a specialist or a qualified general practitioner at the initial diagnosis. Once the diagnosis is confirmed, the community should immediately register according to the basic information of the patient, and the main clear questions are: whether the condition is serious; whether it can be treated in the primary medical and health institution; what treatment plan is needed to correct blood glucose. After the evaluation of qualified doctors, DM patients who can be treated in primary health care can immediately develop a follow-up table, which mainly includes patients' blood glucose control, control of cardiovascular risk factors, assessment of diabetes complications, and management of hypoglycemic drugs, etc. Some community hospitals where conditions permit can implement family medical services, provide family doctors for home visits or telephone follow-up, and provide continuous medical care for patients with mobility difficulties. However, community doctors should also be aware of the limitations of community treatment. For patients whose follow-up finds that the blood glucose or management is not up to standard, or even those with serious complications, they should be actively referred to secondary or above hospitals for treatment. Another community

should be associated with secondary and tertiary hospitals, to provide patients with more comprehensive medical tertiary referral services, even in DM emergency or cardiovascular events, can be directly referred to the tertiary hospital to receive more professional treatment, in order to maximize the convenience and feasibility of medical services.

Secondary hospital as a "bridge" of hierarchical diagnosis and treatment system, is the important component of two-way referral channel, mainly bear the receiving community is difficult to give treatment of DM patients, and to the tertiary hospital referral has complicated, serious complications need surgery or more advanced treatment needs of DM patients, is a link in the tertiary medical system. First secondary hospitals need to provide guidance and support for grassroots care, in the secondary hospital jurisdiction to the community need to provide the corresponding health hardware, regular specialist doctors guidance and help grassroots doctors to identify the early DM complications, but also need to provide corresponding software referral docking system to realize information sharing, the first time to obtain DM patients in the grassroots community clinic records, clinic records mainly include basic information, follow-up records, related test results and medication situation, so that secondary hospital doctors carefully adjust medication plan, and timely feedback to the grassroots community physicians. In addition, the secondary hospital should provide common drugs and some special drugs, this measure needs to be in secondary hospital drug centralized supply platform, by the grassroots community registration of diabetes patients, a point-to-point drug supply docking, then distributed by the community within the jurisdiction, for special storage conditions such as insulin injection drugs, a special medicine designed, strictly guarantee drug storage conditions. Finally, the secondary hospital undertakes the task of assist patients with referral and interval follow-up, for grassroots DM diagnosis is not clear, or long-term blood glucose level control and acute and chronic complications of diabetes, the secondary hospital diagnosis or treatment after stable patients, by the secondary hospital will be the corresponding treatment and evaluation results feedback to the basic community, the grassroots doctors according to the secondary hospital treatment guide patients. However, for those with serious target organ damage caused by chronic complications of DM, the effect is not obvious after emergency treatment or there is no corresponding conditions, they should be sent to the tertiary hospital for treatment as soon as possible. In addition, secondary hospitals should regularly call or follow up the community and patients to clarify the treatment effect of DM patients. In addition, secondary hospitals should undertake the task of training and assessing grass-roots doctors. Those who succeed in the assessment can be assessed to have the qualification of DM specialized diagnosis and treatment. Secondary hospitals should conduct specialized in-depth study in tertiary hospitals to improve the prevention and treatment level of DM complications.

Tertiary hospital as the last station of hierarchical diagnosis and treatment system, is the solid backing of Chinese DM complications prevention and control work, is the key to the hierarchical diagnosis system, its role is to provide more professional and advanced medical services, tertiary hospitals with advanced medical technology and equipment, with regional medical resources, for complex, difficult, critical cases has the advantage of multidisciplinary collaborative diagnosis and treatment. The tertiary hospital is responsible for receiving patients with acute complications of DM that cannot be handled by community hospitals, as well as difficult and complex cases whose diagnosis in secondary hospitals cannot be specified, or with poor results after diagnosis and treatment, or complicated and serious complications requiring surgical treatment. For example, for obese T2DM patients with poor long-term blood glucose control, the metabolic surgery treatment is carried out by the multidisciplinary team of endocrinology department, general surgery department and anesthesiology department in tertiary hospitals [27]. Patients with diabetic nephropathy progressing to stages 4 to 5 requiring dialysis therapy and kidney transplantation [28]. Patients with high-risk, value-added diabetic retinopathy and some severe non-proliferative diabetic retinopathy were treated with laser therapy [29]. Medical conservative treatment of diabetic lower extremity arteriopathy requires revascularization surgery [30]. Patients with diabetic foot complicated with osteomyelitis infection requiring surgical removal of bone tissue or amputation [31]. On the other hand, in the era of comprehensive popularization of the Internet, diabetes in the classification diagnosis and treatment system, should form in tertiary hospital as the center, secondary hospital as the hub, grassroots community health institutions for the radiation point of hierarchical diagnosis and treatment, relying on Internet + medical platform construction, tertiary hospital lead drive at all levels of hospital community linkage, improve the quality of coverage and prevention and control of diabetes patients, to further strengthen the DM complications prevention and treatment research and education, cultivate medical experts and talents in diabetes field [32].

DM patients need to return to their families after phased treatment, so community health service institutions have become an indispensable link in the prevention and treatment of the whole life cycle of DM patients. DM patients will choose to go to secondary or even tertiary hospitals after poor blood glucose control or difficult to control complications. After a stage of treatment, the patients will be discharged and continue to take drug treatment according to the plan. Community health medical institutions in the process of DM classification diagnosis and treatment, is the most critical part of the reasonable construction of classification diagnosis system, is to realize the rational allocation of medical resources, promote the important measures of equal basic medical services, is to deepen the reform of the medical and health system, establish the important content of social basic medical and health system with Chinese characteristics, to the country to promote the healthy development of medical and health undertakings, improve the level of people's health, ensuring and improving people's livelihood is of great significance.

Establish Community Integrated Prevention, Secondary Integrated Treatment and Rehabilitation, and Tertiary Severe Intervention Models of Integrated Traditional Chinese and Western Medicine

Based on the above mentioned, we proposed to construct "community prevention with integrated Chinese and western medicine, secondary integrated treatment and rehabilitation, and tertiary severe intervention mode". In terms of community prevention, a health education system integrating traditional Chinese and western medicine should be established to improve residents' health awareness and health knowledge level through publicity and training, so as to prevent the occurrence and development of common chronic diseases. Comprehensive diagnosis and treatment centers or departments of integrated Chinese and western medicine have

been established in secondary medical institutions, and a diagnosis and treatment team with the participation of traditional Chinese medicine doctors and western doctors is set up. Comprehensive diagnosis and treatment of integrated Chinese and western medicine are carried out in the diagnosis and treatment centers. According to the specific conditions of patients, Chinese and Western medical methods are used for individualized treatment plans. In combination with rehabilitation medicine, rehabilitation treatment, including physical therapy, traditional Chinese medicine rehabilitation, and exercise therapy, is carried out to improve patients' functional recovery and quality of life. An intensive care department integrating traditional Chinese and western medicine has been established in tertiary medical institutions, with a team composed of Chinese and western medicine experts participating in the diagnosis and treatment of severe patients. For severe patients, the comprehensive use of traditional Chinese and western medicine diagnostic means, combined with western medicine and western monitoring equipment and technology, timely intervention and treatment. In the process of severe intervention, the treatment plan is adjusted in combination with the syndrome differentiation and treatment methods of TCM to improve the treatment effect and survival rate of patients. In the construction of the medical model of integrated traditional Chinese and western medicine, it is necessary to strengthen the training and communication of relevant personnel, establish an interdisciplinary cooperation mechanism, promote the common development of traditional Chinese and western medicine, and ensure the quality of medical treatment and patient safety.

The construction of the integrated life cycle management model for DM patients requires the participation of community, secondary and tertiary hospitals. Family doctors should actively play the role of "health gatekeeper", pay attention to the risk screening and disease management of the contracted families, and strengthen the health follow-up management. If the risks are found, they should be timely informed of the risks and filed in the community, and the community health and medical institutions should actively evaluate and treat the patients' conditions. If patients and certification or recurrence, health medical institutions and cannot effectively control patients, patients can be timely referral to secondary hospital for integrated treatment, patients back to community health institutions after follow-up treatment or home treatment, during the family treatment mainly by the family doctor risk assessment, medication guidance, etc. If patients progress to severe stage, has beyond the secondary hospital treatment capacity, can timely referral to tertiary hospital, "out" by tertiary hospital, tertiary hospital comprehensive intervention for patients, patients can return to the secondary hospital functional rehabilitation, after periodic treatment, patients return to the family, family contract doctors continue to risk assessment of patients. DM whole life cycle intervention mode adhere to the "no disease prevention, disease prevention, Chai after complex" concept, the construction of the model to on community health institutions as the key promotion service ability, to cure to promote health as the center, earnestly implement the implementation of the three-level diagnosis and treatment system.

The Role of the Information System in the Management

At present, there are still inconvenient management problems in the application of the three-level diagnosis and treatment system. The introduction of the information system can improve the management level and increase the operation efficiency. Information system has shown a good auxiliary role in many fields, such as Wang Ning et al. [33] by the information management system into the management of the Chinese medicine decocting room, it is found that the standardized management level of the decocting room is improved and the quality of the Chinese medicine decocting is improved, so as to obtain the high satisfaction of the decocting personnel and patients. Information system plays an important role in the management. Information system can collect, store and manage a large amount of data, and provide a comprehensive and accurate information basis. These data can be used for analysis and prediction, to provide scientific basis for decision making and help managers to make more informed decisions; information system can help managers to track the status of patients and disease progress, to coordinate resources, and provide real-time feedback and monitoring, to improve the information system provides a variety of communication and collaboration tools, such as online meeting, remote consultation, these tools promote the instant communication and collaboration between tertiary medical institutions, solve the limitation of time and space, improve efficiency. In short, the role of information system in management is multifaceted. It can provide accurate data to support decision-making, optimize the process and improve efficiency, promote knowledge sharing, strengthen communication and collaboration, real-time monitoring and feedback of risks, and manage risks. All of these effects can help to improve the management level and organizational performance.

Conclusion

The construction of the community-based intensive intervention model for the whole life cycle of diabetes is of great significance. Through the intensive intervention in the community, the whole-process management of diabetic patients can be better realized, including prevention, early diagnosis, treatment and rehabilitation. This helps to improve the treatment effect, reduce the incidence of complications, and reduce the burden of the disease on patients. Community is the first stop for patients to seek medical treatment, and disease risk assessment and early screening can be conducted through community medical institutions. Early detection of the disease can take more effective interventions to delay the progression of the disease and improve the success rate of treatment. While carrying out disease management, community medical institutions can also carry out health education and self-management guidance to help patients better understand the disease, master self-management skills and improve their quality of life. The intensive intervention model can give full play to the role of community medical institutions and family doctor teams in disease management, reduce the pressure on large hospitals, optimize the allocation of medical resources, and improve the efficiency of medical services. Through the intensive intervention model, a closer doctor-patient relationship can be established, so as to increase patients' compliance with medical services and improve patient satisfaction. Disease management based on the community can effectively reduce medical costs and reduce the number of hospitalizations for patients, while reducing the burden of the disease on the family and society. Therefore, the construction of community-based intensive intervention model for the whole life cycle of diabetes can not only improve the treatment effect, but also optimize the allocation of medical resources, reduce medical costs and improve the quality of life of patients, which has positive social and economic significance.

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