Review and Monograph

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Abstract

In recent years, the prevalence of cardiovascular diseases such as coronary heart disease has remained high. As a long-term strategy for systematic health management, the ultimate goal of cardiac rehabilitation is to guide patients in establishing scientific exercise habits as early as possible. Although high-intensity interval training (HIIT) has been widely applied in public exercise and clinical rehabilitation for chronic diseases, the conflict between exercise intensity and safety affects rehabilitation outcomes. Low-volume high-intensity interval training (LV-HIIT) has emerged as an optimized approach that promotes technological innovation and improves efficacy while avoiding the drawbacks of traditional exercise. This article reviews relevant domestic and international literature from recent years and points out that wearable technology is a key enabling tool supporting the safe and precise implementation of LV-HIIT, and that their integration is driving cardiac rehabilitation from "experience-based" toward "precision-based" practice. Meanwhile, it evaluates current issues such as insufficient levels of evidence, low data utilization, and ethical and privacy concerns. Future research should further explore development pathways such as cross-institutional data sharing, policy safeguards, and multidisciplinary collaboration, thereby providing more targeted theoretical support and practical guidance for rehabilitation management in coronary heart disease.

Full Text

Review and Monograph

Application Research and Prospects of Wearable Technology in Supporting Low-Volume High-Intensity Interval Training for Coronary Heart Disease

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【Abstract】 In recent years, the prevalence of cardiovascular diseases such as coronary heart disease has remained high. Cardiac rehabilitation, as a long-term strategy for systematic health management, has the ultimate goal of guiding patients to establish scientific exercise habits as early as possible. Although high-intensity interval training (HIIT) has been widely applied in mass exercise and in the clinical rehabilitation of chronic diseases, the contradiction between exercise intensity and safety affects rehabilitation outcomes. Low-volume high-intensity interval training (LV-HIIT), as an optimized solution, has emerged; it not only promotes technological innovation and improves therapeutic efficacy, but also avoids the drawbacks of traditional exercise. This article reviews relevant literature from China and abroad in recent years and points out that wearable technology is a key enabling tool for supporting the safe and precise implementation of LV-HIIT. The integration of the two promotes the transition of cardiac rehabilitation from "experience" to "precision." Meanwhile, this article reviews current issues such as insufficient levels of evidence, low data utilization rates, and ethical and privacy concerns. Future research should further explore development pathways such as cross-institutional data sharing, policy safeguards, and multidisciplinary collaboration, so as to provide more targeted theoretical support and practical guidance for coronary heart disease rehabilitation management.

【Keywords】 coronary heart disease; low-volume high-intensity interval training; intelligent wearable device; cardiac rehabilitation; precision medicine; exercise rehabilitation

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【Abstract】 In recent years, the prevalence of cardiovascular diseases such as coronary heart disease has remained high. Cardiac rehabilitation, as a long-term strategy of systematic health management, aims to guide patients to establish scientific exercise habits as early as possible. Although high-intensity interval training (HIIT) is widely used in mass exercise and clinical rehabilitation of chronic diseases, the contradiction between exercise intensity and safety affects the rehabilitation effect. Low-volume high-intensity interval training (LV-HIIT) emerged as an optimized solution, which not only promoted technological innovation and improved therapeutic effects, but also avoided the drawbacks of traditional exercises. This paper reviews the relevant literature at home and abroad in recent years and points out that wearable technology is a key enabling tool to support the safe and precise implementation of LV-HIIT. The integration of the two promotes cardiac rehabilitation from "experience" to "precision" . Meanwhile, the current issues such as insufficient evidence levels, low data utilization rates, and ethical privacy were reviewed. Subsequent research should deeply explore development paths such as cross-institutional data sharing, policy guarantees, and multi-disciplinary collaboration, providing more targeted theoretical support and practical guidance for the rehabilitation

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management of coronary heart disease.

【Key words】 Coronary heart disease; Low-volume high-intensity interval training; Intelligent wearable devices; Cardiac rehabilitation; Precision medicine; Sports rehabilitation

The *Report on Cardiovascular Health and Diseases in China 2024: An Overview* shows[1] that cardiovascular disease (CVD) is now the leading cause of death among urban and rural residents. As a core subtype of CVD, the number of patients with coronary heart disease has increased from 1.26 million to 3.5 million, with deaths reaching 1.874 million[2]. At present, although revascularization techniques such as percutaneous coronary intervention (PCI) are widely used, the postoperative restenosis rate remains 10%–20%[3–4], making cardiac rehabilitation a key component of comprehensive treatment for coronary heart disease.

Exercise rehabilitation, as the core of cardiac rehabilitation, can reduce risk factors for coronary heart disease, lower all-cause mortality, and improve prognosis[5-6]. On this basis, the American Heart Association has explicitly listed it as a Class I, Level A recommendation for secondary prevention of CVD[7].

Traditional cardiac rehabilitation exercise is mostly based on moderate-intensity continuous training, but it is often time-consuming, has low adherence, and yields limited functional improvement[8]. Low-volume high-intensity interval training (LV-HIIT), as an optimized approach, has significant advantages in time efficiency, scenario adaptability, and rehabilitation effectiveness[9–10]. Exercise intensity is the core factor ensuring the therapeutic effect of this exercise. Intelligent wearable devices can monitor physiological parameters in real time, enabling precise control of exercise intensity, early warning of cardiovascular risk, and dynamic evaluation of rehabilitation outcomes[11–12], thereby providing technical support for the safe implementation of LV-HIIT.

At present, practical application studies of LV-HIIT have not yet been widely carried out in China. Exercise protocols lack unified standards, and clinical studies are mostly small-sample, short-term follow-up designs. In view of this, based on the concept of "data-driven precision rehabilitation," this article reviews the progress of wearable technologies in exercise rehabilitation for coronary heart disease, providing a theoretical reference for the clinical formulation of individualized, safe, and efficient rehabilitation programs.

1 Literature Search Strategy

Computer-based searches were conducted in Chinese databases: China National Knowledge Infrastructure (CNKI), Wanfang Data Knowledge Service Platform, VIP, and SinoMed; and in English databases: PubMed, Web of Science, Scopus, Embase, Cochrane Library, and others. The search period was from database inception to July 2025. For Chinese databases, the search terms included intelligent wearable devices, wearable technology, wearable devices, remote monitoring, Internet, artificial intelligence, exercise rehabilitation, cardiac rehabilitation, coronary heart disease, high-intensity interval training, and low volume. For English databases, the keywords included smart wearable devices, wearable technology, wearable devices, Remote Monitoring, Internet, Internet, AI, exercise rehabilitation, Cardiac Rehabilitation, Coronary Heart Disease, High-

Intensity Interval Training, and Low-Volume. Inclusion criteria were: studies whose topic concerned the application of intelligent wearable technologies in cardiac rehabilitation for patients with coronary heart disease; interventions involving high-intensity interval training; and original studies for which the full text was available. Exclusion criteria were: literature unrelated to the topic of this article; duplicate publications; literature with low data reliability; and literature published in non-academic journals or with major defects in study design.

2 Development of Intelligent Wearable Devices and Their Application Value in Exercise Rehabilitation

2.1 Concept and Development Stages of Intelligent Wearable Devices

Intelligent wearable devices (smart wearable devices)[13–14] refer to portable health-monitoring systems that integrate multiple sensors—such as optical, bioelectrical, accelerometer, and temperature-humidity sensors—with microprocessors and wireless communication modules to collect, intelligently analyze, and remotely transmit human physiological parameters in real time. Their forms include smart watches, wristbands, flexible patches, and implantable devices. Their core function is to achieve noninvasive, continuous, and dynamic tracking of health data, providing data support for chronic disease management, exercise rehabilitation, and clinical decision-making[15].

Early devices mainly focused on step counting and basic heart-rate monitoring. With the rapid development of microelectronics, sensor technology, and wireless communication technology, monitoring of complex ECG signals, automatic identification and early warning of abnormal heart rhythms, and even health-risk assessment and intervention recommendations through integrated AI algorithms have gradually been realized[16].

Their developmental course has undergone an evolution from basic physiological-parameter monitoring to multimodal data integration: (1) Basic monitoring stage: dominated by pedometers and simple heart-rate wristbands, with single functions, mainly used in public fitness scenarios and lacking medical-grade precision[13]. (2) Multimodal integration stage: with the maturation of sensor technologies such as photoplethysmography (PPG), single-lead electrocardiography (ECG), and oxygen saturation (SpO_2), devices can synchronously monitor multidimensional physiological indicators such as heart-rate variability (HRV), sleep structure, and exercise intensity, and have gradually penetrated into the field of health management[17–18]. (3) Precision medicine and intelligent decision-making stage: some devices have been certified by the National Medical Products Administration (NMPA) or the U.S. Food and Drug Administration (FDA) and possess medical-grade monitoring capabilities[19]. For example, implantable devices such as Cardio MEMS can monitor pulmonary artery pressure[20]. The integration of cutting-edge technologies such as flexible electronic skin, ultrasonic sensing, and sweat biomarker detection can further improve device comfort and the dimensions of monitoring[16].

2.2 Application Value of Intelligent Wearable Devices in Exercise Rehabilitation

With the increasingly mature development of Internet of Things and artificial intelligence technologies, the application of intelligent wearable devices in cardiovascular monitoring has shown explosive growth[19]. Especially for patients undergoing cardiac rehabilitation for coronary heart disease, wearable devices, with their portability, real-time capability, and precision, have become important tools for improving rehabilitation outcomes. Their clinical application value is mainly reflected in the following three aspects:

2.2.1 Precise Control of Exercise Intensity Traditional monitoring methods, such as manual heart-rate counting and the Rating of Perceived Exertion (RPE), are highly subjective and have delayed responses, making it difficult for them to reflect patients' cardiac load status in real time and accurately during exercise. By monitoring heart rate in real time and integrating prediction models for oxygen uptake and the anaerobic threshold, intelligent wearable devices can dynamically adjust exercise prescriptions to ensure an appropriate intensity [11, 20]. This stands in sharp contrast to the subjective ambiguity of the traditional RPE scale.

2.2.2 Real-Time Warning of Cardiovascular Risk Patients with coronary heart disease have an increased risk of myocardial ischemia or arrhythmia during high-intensity exercise. Intelligent wearable devices can continuously monitor electrocardiographic signals, promptly detect manifestations of myocardial ischemia such as ST-segment depression and T-wave inversion, as well as arrhythmias such as premature ventricular contractions and atrial fibrillation, and issue immediate alerts. Clinical data show that intelligent remote ECG monitoring devices can transmit data to the cloud in real time, reducing the incidence of exercise-related cardiovascular events from 17.04% to 6.39% [12].

2.2.3 Dynamic Evaluation and Feedback of Rehabilitation Effects Intelligent devices can record data such as the duration of each training session, intensity distribution, and heart-rate recovery time, and generate visualized reports. This not only helps medical staff objectively evaluate rehabilitation progress and remotely adjust the program, but also enhances patients' sense of participation and adherence through data feedback. Studies have confirmed that patients using intelligent wearable devices can view their own exercise data through built-in apps or cloud platforms, thereby strengthening rehabilitation confidence and adherence; the proportion exercising $\geq$ 5 d per week reached 88%, far higher than the 47% in the control group [21].

In summary, the essential role of intelligent wearable technology is to shift cardiac rehabilitation from qualitative management that relies on medical workers' experience and patients'subjective feelings to real-time, quantitative, and precise management based on continuous and objective physiological data. By monitoring key indicators such as heart rate, electrocardiography, and blood oxygen in real time, it enhances the efficacy of exercise intensity while continuously ensuring exercise safety, thereby successfully resolving the core contradiction between efficacy and safety in the process of exercise rehabilitation.

3 Origin and Rehabilitation Advantages of LV-HIIT

3.1 Origin of LV-HIIT

Exercise rehabilitation systems mainly include multiple types such as aerobic exercise, resistance exercise, and flexibility training. Among them, aerobic exercise has become the most commonly used form of exercise in the field of cardiac rehabilitation because it can significantly improve cardiopulmonary function [22]. Among the many aerobic exercise modalities, they can be classified according to exercise intensity into low-intensity continuous training (LCT), moderate-intensity continuous training (MCT), and high-intensity interval training (HIIT) [23]. Because MCT is relatively moderate in intensity, the American College of Sports Medicine (ACSM) often regards it as the basic recommended exercise-training program for patients with coronary heart disease. However, MCT has disadvantages such as a relatively long training duration and a monotonous, tedious training process, leading to poor patient adherence; moreover, its improvement of cardiopulmonary function is relatively limited. This has become a major shortcoming of applying MCT to exercise training in patients with coronary heart disease [24]. In comparison, a study of healthy populations showed that high-intensity exercise improves cardiopulmonary function more effectively than low- or moderate-intensity exercise [25]. The greatest advantage of HIIT is its short time requirement, while it also has features such as good adherence and interest [26]. Therefore, in recent years, HIIT has been applied in the field of clinical rehabilitation for chronic diseases.

HIIT mainly refers to repeated, multiple bouts of high-intensity exercise performed over several seconds to several minutes, usually at an intensity of "all-out" effort or "near maximal oxygen uptake (VO_2 max) ($\geq$ 90% of VO_2 max)," with each high-intensity bout separated by one interval period in the form of low-intensity exercise or complete rest [9].

As research has continued to deepen, HIIT has been further subdivided into high-volume high-intensity interval training (HV-HIIT) and LV-HIIT. HV-HIIT refers to a total high-intensity exercise duration greater than 15 min, namely traditional HIIT [27]. However, for some patients with insufficient physical activity or severe functional impairment, traditional HIIT has the problem that its high intensity makes it difficult for most patients to persist for more than 15 min [28]. Therefore, in response to such difficulties, low-volume high-intensity interval training emerged as an optimized form of traditional HIIT.

LV-HIIT is based on the framework of traditional HIIT and precisely controls the exercise dose, representing a further refined classification and improvement of traditional HIIT exercise programs for development in the field of chronic disease rehabilitation. Its core characteristic is a cumulative high-intensity exercise duration of $\leq$ 15 min. It generally takes the form of a structured exercise program, including warm-up; repeated alternation of high-intensity exercise periods and low-intensity recovery periods (active recovery or complete rest); and final cool-down stretching [29].

3.2 Rehabilitation Advantages of LV-HIIT

3.2.1 Time Efficiency The total training duration of LV-HIIT is only 30%-50% that of MICT and 44%-67% that of HV-HIIT [9]. This efficiency in time arrangement makes it better suited to modern people' s fast-paced lifestyles and fragmented exercise patterns, thereby helping to improve patients' adherence to long-term training.

3.2.2 Contextual Adaptability The cardiac rehabilitation system covers three phases: phase I in-hospital rehabilitation, phase II early out-of-hospital rehabilitation, and phase III long-term out-of-hospital rehabilitation. Constrained by traditional medical concepts, patients are often afraid to exercise after surgery, which commonly delays the initiation of phase I rehabilitation; meanwhile, because phases II and III rehabilitation last for a relatively long time and patients are in an out-of-hospital environment, coupled with the limited types of cardiac rehabilitation programs, patients' adherence to rehabilitation programs is generally low. In contrast, LV-HIIT has rich and diverse exercise forms, mainly including power cycling, jumping jacks, lunges, and similar activities; it does not rely on complex large-scale equipment and is highly suitable for implementation in community and home settings. Yang Zixuan [10] designed a no-equipment LV-HIIT training program specifically for sedentary populations, integrating simple and feasible movements such as quick-step running and seated knee-to-chest abdominal contractions. It can be carried out without professional training equipment, significantly improving the operability and dissemination of LV-HIIT training programs.

3.2.3 Rehabilitation effectiveness

Existing studies have shown that there is not a simple positive correlation between exercise duration and rehabilitation benefit. TAYLOR et al. [30] conducted a 12-month home follow-up study of patients with coronary heart disease. The results showed that, after 4 weeks of high-intensity interval exercise, the improvement in patients' peak oxygen uptake was 6% greater than that achieved with moderate-intensity continuous aerobic exercise; at the 12-month follow-up, this improvement remained 3% higher. Liu Zhaozhi et al. [29] found that LV-HIIT can effectively alleviate oxidative stress responses by downregulating Kelch-like ECH-associated protein 1 (KEAP1) signaling factors, thereby reducing patients' serum cardiac troponin I level by 38.7%, with a greater reduction than that achieved by traditional HV-HIIT. These findings suggest that, while achieving efficient rehabilitation benefits, LV-HIIT may have unique cardioprotective mechanisms. In addition, a Swedish study also suggested that high-intensity exercise can reduce smoking-cessation costs more markedly than low-intensity exercise [31]. Because smoking cessation is an important treatment in cardiac rehabilitation and is closely associated with the prognosis of coronary heart disease, this finding indirectly reflects that LV-HIIT, by virtue of its high-intensity characteristics, may have more distinctive therapeutic effects in the field of cardiac rehabilitation intervention for coronary heart disease.

In summary, the rise of LV-HIIT reflects that the concept of exercise rehabilitation has shifted from "accumulation of duration" to "priority of quality." A low-volume, high-intensity training model shows great potential in improving cardiopulmonary function, increasing patient adherence, adapting to multiple scenarios, and providing potential myocardial protection, suggesting that, under specific circumstances, optimization of exercise quality—such as intensity—may be more important than the mere accumulation of total volume.

4 Current status of the clinical application of intelligent wearable devices and LV-HIIT

At present, with the development of "Internet + rehabilitation," CVD diagnosis and treatment are undergoing an intelligent and precision-oriented transformation. Artificial intelligence (AI) and machine learning (ML) technologies have played a key enabling role and have vigorously promoted the construction of personalized rehabilitation systems. Digital therapeutics represented by virtual reality and augmented reality have successfully broken through the limitations of traditional cardiac rehabilitation models and achieved dynamic optimization of the treatment process [32]. Such optimization is reflected not only in innovations in therapeutic methods, but also in the precise grasp of patients' individual conditions and dynamic adjustment. In practical application, medical teams can use wearable devices to obtain detailed and accurate data such as patients' heart rate, step count, and exercise intensity in real time, and can scientifically and rationally optimize rehabilitation programs, making the rehabilitation process more precise and easier to control.

The *Statistical Report on China' s Internet Development* shows that, by 2022, the number of mobile Internet users in China had reached 1.047 billion, providing convenience for continuous symptom monitoring and the promotion and application of wearable devices [33]. In the cardiovascular field, common modes of wearing wearable devices include contact-type, implantable, and externally attached devices [18]. WEWEGE et al. [34] conducted a large-scale systematic review. Under the premise of using digital technology to monitor and ensure exercise intensity, the review analyzed 23 studies, including 1,117 CVD patients with coronary artery disease and heart failure, who completed a total of 17,083 training sessions; the results reported only one cardiovascular safety event. It can therefore be seen that using LV-HIIT as a cardiac rehabilitation training program for CVD patients has extremely high safety. However, influenced by traditional concepts, many people express doubts about whether patients with coronary heart disease can tolerate high-intensity training. THUM et al. [35] further examined this issue by randomly assigning participants to an LV-HIIT group and an MICT group. After the exercise intervention, the Physical Activity Enjoyment Scale (PAES) was administered, and the final results showed that 92% of participants, according to PAES scores, preferred LV-HIIT exercise. Meanwhile, a randomized controlled trial monitored with 24-hour dynamic electrocardiographic intelligent equipment [36] divided 42 middle-aged male patients after coronary artery bypass grafting into an LV-HIIT group, an MICT group, and a control group for intervention. After 6 weeks, the improvement in resting heart rate (HRrest) was most significant in patients receiving LV-HIIT. HRrest is an indicator reflecting autonomic nervous activity, and elevated HRrest is a recognized risk factor for cardiovascular events in patients with coronary heart disease [37].

Overall, in an era of widespread electronic information technology, digital therapeutics combined with wearable real-time monitoring can effectively realize precise and dynamic optimization of cardiovascular rehabilitation. In related research fields, domestic practice has often made good use of the existing Internet ecosystem—such as Tencent Meeting, WeChat group chats, and intelligent apps —for rapid integration of resources, demonstrating greater application agility than that seen abroad. Large-scale studies have also confirmed that LV-HIIT is safe, effective, and well accepted by patients.

5 Current problems and challenges

5.1 Insufficient level of evidence

Between technological development and clinical application, there is a certain degree of disconnect, manifested specifically as clinical application often lagging behind the pace of technological development. At present, although the types of products on the market are relatively abundant, few products can be applied to clinical research, and high-quality studies are even more insufficient—especially evidence from cohort studies or randomized controlled trials. Specifically, the sample sizes of most existing studies are generally fewer than 100 cases, and multicenter, large-sample validation is lacking [10,38–39]. This limitation directly affects the representativeness and reliability of study results, making it difficult to comprehensively and accurately evaluate the real-world effects of LV-HIIT in different populations and diverse environments. In addition, follow-up periods in studies are generally short; most studies have follow-up durations of less than 1 year, resulting in a lack of data on the effects of LV-HIIT interventions over 2 years or more on major adverse cardiovascular event incidence and all-cause mortality [40]. The absence of long-term outcome data undoubtedly hinders comprehensive evaluation of LV-HIIT in terms of the long-term health benefits for patients with coronary heart disease, thereby limiting the long-term application and broad promotion of this training method in clinical practice.

5.2 Low data utilization rate and lack of a payment system

The data formats and algorithms collected by devices of different brands are inconsistent, and unified standards are lacking, making it difficult for data to be mutually communicated and mutually recognized among medical institutions, thus creating "data silos." At the same time, although some wearable devices can accurately collect physiological data, the intelligence of parameter calculation is insufficient. Most data are raw data and still require professionals to extract the original data, verify them, and then make a manual diagnosis, which reduces data usability [41]. In addition, intelligent wearable devices and related remote monitoring services have not yet been included in the scope of medical insurance payment, and their high costs limit their popularization in primary care settings and among economically disadvantaged groups [42–43].

5.3 Ethics and Privacy

In the era of big data, information is not only enormous in quantity but also highly diverse in form. This has increasingly blurred the boundary between data security and privacy, undoubtedly further increasing the difficulty of ensuring data confidentiality and security [44]. The development of big data relies on frontier technologies such as cloud computing and the Internet of Things. In the process of carrying out data management and utilization, strictly complying with relevant regulations such as the EU General Data Protection Regulation (GDPR) and the Personal Information Protection Law has become a dual ethical and legal challenge that must be faced today [11,45].

PAUL et al. [46] proposed that the ownership of data from mobile medical wearable devices must be clarified; a data classification method suitable for wearable-device health monitoring in clinical application scenarios should be constructed; and custodial authority over data storage should be clearly specified. Because such devices continuously perform physiological monitoring, they inevitably collect and process large amounts of patients' personal health data. Therefore, while fully mining the value of medical data and realizing full-process health management, it is also imperative to build a rigorous data privacy protection system.

6 Future Prospects

6.1 Big-Data Optimization

Most current studies have already verified the feasibility of collaboration between wearable devices and high-intensity exercise. In future research, greater attention should be paid to users' experiences, with deeper investigation of existing problems in research and evaluation of the implementability and effectiveness of such methods. Multimodal sensors should be actively developed—such as salivary biomarkers, real-time automatic adjustment of physiological signals, and flexible electronic skin technologies—and machine learning should be incorporated to continuously optimize the exercise-use experience. In addition, in conjunction with clinical needs, products or models with relatively mature technologies may be selected, while economic benefits should also be considered, and broader validation trials should be carried out as early as possible.

Individualized diagnostic data models based on age, sex, underlying diseases, exercise tolerance, and genetic characteristics should be established, so as to promote seamless integration between intelligent devices and hospital systems, ultimately realizing a fully digitalized rehabilitation pathway of "precise in-hospital assessment—home-based data monitoring—cloud-based intelligent analysis—remote human feedback—dynamic prescription adjustment."

6.2 Multidisciplinary Collaboration and Policy Support

As the core implementation settings for cardiac rehabilitation, communities and families require closer collaborative coordination among tertiary hospitals and community health institutions. At the same time, innovation through the integration of medicine and engineering should be promoted, and in-depth collaboration among clinicians, rehabilitation therapists, engineers, and data scientists should be strengthened to jointly manage patients undergoing cardiac rehabilitation.

At present, most domestic rehabilitation guidance programs remain in the unpaid-service stage, which is unsustainable. In view of the marked developmental disparities among different regions in China, in the field of intelligent rehabilitation, the selection and configuration of equipment and site planning should be closely aligned with regional realities and should follow the principle of adapting measures to local conditions. In this process, strong support at all levels of government policy should be actively sought to fully promote the inclusion of intelligent rehabilitation equipment and services in medical insurance. Meanwhile, in-depth investigations and analyses should be carried out, guidelines and standards suited to China' s national conditions should be formulated, and their popularization and promotion should be guided, thereby creating a favorable policy environment for industry development.

7 Summary

Owing to changes in diet and lifestyle, the number of patients with coronary heart disease is growing rapidly. In the face of this situation, cardiac rehabilitation has become a necessary condition for improving patients' long-term prognosis. Exercise rehabilitation has been internationally confirmed as the core of cardiac rehabilitation prescriptions. Among available approaches, low-volume high-intensity interval training, compared with traditional moderate-intensity continuous training, shows advantages in time efficiency, scenario adaptability, and improvement of therapeutic effects. However, its clinical promotion in China remains constrained by studies that lack unified protocols, have small sample sizes, and feature short follow-up periods. At the same time, because intensity and efficacy are correlated, effectively and intensively controlling intensity is also a basic condition for its implementation. Wearable devices, with the ability to monitor physiological indicators in real time, provide technical support for intensity control, risk warning, and rehabilitation-effect evaluation in low-volume high-intensity interval training, and thus serve as a cornerstone for its safe and efficient implementation. Nevertheless, the integration of the two still faces multiple challenges. In the future, efforts should be made to expand clinical research, improve evidence from the evidence chain, and innovate service models. Through the coordinated development of "technology-clinic-policy," cardiac rehabilitation should be promoted in its transformation from "experience-based medicine" to "data-driven precision medicine," which is an important direction for further improving benefits.

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The authors declare no conflicts of interest.

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