ORIGINAL RESEARCH

Influence of Rehabilitation Training-Based Procedural Follow-up on Pulmonary Function and Quality of Life in Patients Undergoing Coronary Angiography and Stenting

Lu Dai, MM; Qing Zhang, MM; Fangfang Lu, MM; Chun Li, MM; Xiaowen Shen, MM; Huaiyu Xu, MM

ABSTRACT

Objective • This study aims to investigate the impact of procedural follow-up through rehabilitation training on enhancing postoperative pulmonary function and quality of life (QOL) in patients who have undergone coronary angiography and stenting.

Methods • A total of 160 patients diagnosed with coronary heart disease (CHD) and having undergone percutaneous coronary intervention (PCI) between January 1, 2020, and December 31, 2021, were selected for the study. The random number method was employed to divide them into a control group and an experimental group. The control group (80 patients) received routine post-discharge follow-ups, while the experimental group (80 patients) underwent procedural follow-ups based on rehabilitation training. Pulmonary function and quality of life were assessed at discharge, 6 months post-discharge, and 12 months post-discharge using the Jaeger spirometer and the Assessment Scale of Quality of Life in Patients with CHD.

Results • No statistically significant differences in pulmonary function and quality of life were observed between the two groups at the time of discharge ($P > .05$). However, 6 and 12 months post-discharge, the experimental group exhibited higher values for FEV_1, FEV_1%, FEV_1/FVC, and VO_{2max} compared to the control group. Additionally, total QOL scores, psychological function, and knowledge of CHD prevention and treatment were higher in the experimental group. However, there were no statistically significant differences in physical function and social adaptation ability.

Conclusions • Procedural follow-ups based on rehabilitation training have the potential to improve postoperative cardiopulmonary function and quality of life in patients with coronary heart disease, thereby promoting recovery. (*Altern Ther Health Med.* [E-pub ahead of print.])

Lu Dai, MM; Qing Zhang, MM; Department of Nursing, The Affiliated Huaian No.1 People's Hospital of Nanjing Medical University, Huaian, Jiangsu, China. **Fangfang Lu, MM; Chun Li, MM; Huaiyu Xu, MM;** Department of Cardiology, The Affiliated Huaian No.1 People's Hospital of Nanjing Medical University, Huaian, Jiangsu, China. **Xiaowen Shen, MM;** Department of Rehabilitation, The Affiliated Huaian No.1 People's Hospital of Nanjing Medical University, Huaian, Jiangsu, China.

Corresponding author: Huaiyu Xu, MM
E-mail: hayyxhy3724@163.com

INTRODUCTION

Coronary heart disease (CHD) is a cardiovascular condition characterized by the narrowing or blockage of the coronary arteries, leading to reduced blood flow to the heart muscle.[1-3] According to the 2020 China Cardiovascular Health and Disease Report,[1] approximately 290 million individuals in China are affected by cardiovascular disease, with around 11 million diagnosed with CHD. Key pathogenic factors include hypertension, hyperlipidemia, diabetes, psychosocial stress, poor dietary structure, and insufficient physical exercise.[2] The diagnosis and treatment of coronary heart disease have significantly progressed with the advancements in modern sciences.[3]

For CHD patients who do not respond to drug therapy, interventional treatment emerges as a notably effective alternative.[4] The combination of coronary angiography and percutaneous coronary intervention (PCI) offers positive clinical outcomes due to its low invasiveness, reliable efficacy, low mortality rate, and swift postoperative recovery. However, chronic cardiopulmonary impairment is frequently observed post-PCI,[2-3] significantly impacting patients' quality of life (QOL) and mental well-being. Some scholars emphasize that PCI is not the definitive treatment for CHD patients and underscore the importance of regular postoperative functional rehabilitation in enhancing their recovery and overall quality of life.[4]

It is crucial to enhance the post-PCI health management for patients with CHD. A structured follow-up plan, involving tailored strategies for individual patients, is imperative. Regular follow-ups through diverse channels such as telephone communication, WeChat, and video must conducted, employing a standardized training process to elevate both the quality of life and psychological well-being of patients.[5] Therefore, in this study, we introduce a procedural follow-up care plan grounded in rehabilitation training and implement it in the post-treatment follow-up of CHD patients who underwent PCI. The goal is to provide valuable insight for standardized and evidence-based follow-up care in this patient population.

MATERIALS AND METHODS

Study Design

We selected 160 coronary heart disease (CHD) patients who had undergone PCI at the Department of Cardiology in a Grade-A tertiary hospital located in Huai'an, Jiangsu Province, China, between January 1, 2020, and December 31, 2021. Employing the random number method, the study population was stratified into two groups: a control group comprising 80 patients and an experimental group with an equal number of participants. The study obtained informed consent from all participating patients and their families. Ethical approval for the study was obtained from the hospital's ethics committee, ensuring compliance with ethical standards in research.

Inclusion and Exclusion Criteria

Patients were included in the study if they met the following criteria: (1) they fulfilled the diagnostic criteria for coronary heart disease[6] and underwent PCI; (2) they demonstrated good cognitive ability, clear thinking, and effective communication skills after discharge from the hospital. Conversely, patients were excluded from participation if they met any of the following criteria: (1) they presented with severe complications affecting vascular pathways, coronary arteries, or circulation; (2) they had significant medical conditions such as dementia or malignant tumors; (3) they expressed a desire to withdraw from the study during its course. These criteria were established to ensure a homogeneous and representative study population, allowing for a focused investigation into the impact of the proposed procedural follow-up care plan based on rehabilitation training.

Participant Demographics

In the control group, comprising 80 patients, there were 44 males and 36 females, with ages ranging from 39 to 87 years and an average age of (68.85±9.56) years. The experimental group, also consisting of 80 patients, comprised 53 males and 27 females, with ages ranging from 40 to 86 years and an average age of (65.96±11.13) years. This approach ensured an unbiased allocation of patients to each group, forming the basis for a robust study design aimed at assessing the effectiveness of the procedural follow-up care plan based on rehabilitation training in post-PCI CHD patients.

Experimental Group Intervention Protocol

Research Team Composition. The research team comprised six members, each contributing expertise in CHD and rehabilitation. Among them were clinical nursing specialists, evidence-based medicine practitioners, and cardiovascular disease rehabilitation experts. The team included one deputy chief nurse, three nurse practitioners overseeing the Department of Cardiology, one rehabilitation therapist, and one nurse specialist in rehabilitation. The deputy chief nurse assumed the role of team leader, coordinating the involvement of various experts and overseeing the overall study planning and arrangement.

The evidence-based medicine specialists were responsible for designing, constructing, conducting evidence searches, and quality assessing the nursing intervention plan. Nurse practitioners in charge of the Department of Cardiology managed the implementation of the follow-up nursing intervention plan, carried out data collection, and reported any encountered issues. The rehabilitation therapist, situated in the Department of Chinese Medicine at the hospital, played a key role in designing the postoperative rehabilitation plan. This diverse team ensured comprehensive coverage of expertise and responsibilities for the successful execution of the study.

Procedural Follow-Up Plan Development. The research team initiates the development of the procedural follow-up plan, crafting an initial draft. To ensure its practicality and effectiveness, the plan undergoes a thorough feasibility review by 10 experts from the hospital. The input and suggestions provided by the experts are carefully considered and incorporated to refine and finalize the plan. The follow-up protocol was structured to occur monthly over 12 months post-discharge for all patients.

The procedural follow-up adopts the "CICARE" (Connect→Introduce→Communicate→Ask→Respond→Exit) communication model. (1) Connect: The researcher establishes a polite and friendly connection with the patient, emphasizing proper forms of address. (2) Introduce: A detailed self-introduction is made by the researcher, informing the patient about the upcoming WeChat group chat or telephone communication as part of the accelerated recovery process. (3) Communicate: The researcher elucidates recent requirements, the anticipated duration, and the expected impact on recovery. (4) Ask: Patients and families are encouraged to voice any questions or specific requests. (5) Respond: The researcher addresses and responds to any raised questions or requests. (6) Exit: The follow-up visit concludes with a summary of the discussion, including arrangements and the schedule for the subsequent visit. This structured approach aims to enhance patient engagement and understanding throughout the follow-up period.

Development and Implementation of the Procedural Follow-Up Plan. The procedural follow-up plan, grounded

in rehabilitation training, was carefully crafted to ensure comprehensive and individualized care for each study subject.

(1) Subject selection and informed consent process: Under the supervision of the three nurse practitioners from the Department of Cardiology, each study subject was methodically chosen the day before their discharge from the hospital. Subsequently, a personalized one-on-one session was conducted by the nurse practitioners to provide detailed information about the upcoming follow-up visits, study objectives, expected outcomes, and other pertinent details. In this session, an informed consent letter was presented, and subjects, along with their families, were guided through the process of signing it. Additionally, a form capturing essential information such as name, sex, age, and telephone number was completed.

(2) Inclusion in the WeChat group and documentation: To facilitate communication, the patient and their family were invited to join a WeChat group, ensuring convenient and timely accessibility. Simultaneously, a *"Follow-up Form for Rehabilitation Training for CHD Patients"* was created to systematically document the time and content of each follow-up visit, as well as the patient's daily rehabilitation training. Both the research team and the patient retained a copy of this form, promoting transparency and continuity in the follow-up process.

Procedural Follow-Up of Rehabilitation Training. The procedural follow-up of rehabilitation training was systematically structured to ensure sustained engagement over 12 months post-hospital discharge. (1) Monthly follow-up protocol: patients underwent monthly follow-ups, totaling 12 sessions, where the research team employed a dynamic approach to enhance the rehabilitation process. (2) Instructional video release and patient training: before each scheduled follow-up, the research team produced and released a rehabilitation training video in the WeChat group. This video served as a comprehensive guide, instructing patients on their daily training routines. During each session, two team members were involved—one conducting the inquiry, and the other recording. After the follow-up, thorough verification with the patient and their family was conducted to ensure the accuracy and completeness of the recorded content.

(3) Initial visit guidance and ongoing feedback: during the first follow-up, patients received detailed instructions on essential gestures, emphasizing the significance of proper warm-up exercises and the principle of gradual progression. Subsequent follow-up visits involved inquiries into the patient's personal feelings about the training, including adherence to video requirements, timely and sufficient training, and addressing any confusion. Family members were encouraged to supervise and maintain records of rehabilitation exercises. Based on patient feedback, the research team dynamically customized the intervention plan, ensuring targeted and responsive care throughout the rehabilitation process.

Procedural Follow-Up after PCI. The procedural follow-up after PCI is a comprehensive process, facilitated by the *"Follow-up Form for Rehabilitation Training for CHD Patients."* (1) Data collection and record keeping: utilizing the specified form, the researcher systematically collected and recorded vital information from the patient, covering recent medication usage, blood pressure control, dietary habits, mental and psychological conditions, episodes of bleeding, fatigue, and weakness.

(2) Educational intervention through multimedia: in cases where improvements or adjustments were needed, the researcher utilized pre-recorded videos focused on CHD recovery to provide personalized suggestions. Multimedia elements, including videos and pictures, were also employed to educate patients about potential CHD complications, self-monitoring techniques, caution on medication, the importance of avoiding smoking and alcohol, and the significance of maintaining an optimistic mindset.

(3) Monthly review and rehabilitation adjustment: the collected data was submitted to the research team for a monthly review, ensuring an ongoing assessment and adaptation of the rehabilitation plan. The rehabilitation therapist, based on the patient's specific condition, decided whether adjustments to the training plan and intensity were necessary. Timely feedback was then relayed to the patient, facilitating immediate awareness and compliance. Subsequently, the patient was guided to train according to the updated plan, fostering a dynamic and responsive rehabilitation process.

Intervention in the Control Group

In the control group, a routine follow-up approach was implemented.

Assessment. The nurse-in-charge conducted telephone follow-ups at the 1st, 3rd, 6th, and 12th months post-discharge. These follow-ups aimed to comprehensively assess the patient's condition, including symptoms like chest pain and chest tightness. Additionally, auxiliary examinations such as cardiac ultrasound scans, electrocardiograms, and routine blood examinations were performed.

Nursing Issues. The responsible nurse raised questions based on the patient's performance post-discharge, addressing any nursing-related concerns.

Planned Measures. The nurse in charge developed a plan for improving the patient's clinical symptoms after discharge. This involved providing personalized, one-to-one health-related education. The nurse instructed the patient on proper medication usage, offered guidance for optimal recovery, advised on recognizing changes in their condition, and responded to any questions posed by the patient.

Evaluation Indicators

Cardiopulmonary Function Parameters. The evaluation of cardiopulmonary function included the following indicators: Forced Expiratory Volume in 1 second (FEV_1), FEV_1 as a percentage of the expected value (FEV_1%), the ratio of FEV_1 to Forced Vital Capacity (FEV_1/FVC), and Maximal Oxygen Consumption (VO_{2max}). A comparative analysis of these values was conducted between the two groups at different time

Table 1. Comparison of Baseline Characteristics between the Two Groups of Patients [n (%)]

Item		Control Group (n = 80)	Experimental Group (n = 80)	Statistical Values	*P* value
Age		68.85±9.56	65.96±11.13	1.760	.080
Sex	Male	44 (55.0)	53 (66.3)	2.121	.145
	Female	36 (45.0)	27 (33.8)		
Marital Status	Married	79 (98.7)	78 (97.5)	0.340	.560
	Divorced	1 (1.3)	2 (2.5)		
Level of Education	Illiterate	24 (30.0)	23 (28.7)	0.313	.989
	Primary School	21 (26.3)	19 (23.8)		
	Junior High School	15 (18.8)	17 (21.3)		
	High School (Vocational)	13 (16.3)	13 (16.3)		
	Tertiary And Above	7 (8.8)	8 (10.0)		
Cardiac Function Classification	Grade II	30 (37.5)	29 (36.3)	0.036	.982
	Grade III	24 (30.0)	24 (30.0)		
	Class IV	26 (32.5)	27 (33.7)		
Lesions	Single-Vessel Lesion	41 (51.2)	36 (45.0)	0.636	.727
	Double-Vessel Lesion	27 (33.8)	30 (37.5)		
	Three-Vessel Lesion	12 (15.0)	14 (17.5)		
Complications	High Blood Pressure	54 (67.5)	63 (78.8)	2.576	.108
	Diabetes	24 (30.0)	22 (27.5)	0.122	.727
	Cardiac Arrhythmias	15 (18.8)	19 (23.8)	0.598	.440

Note: (1) Statistical values are presented as mean ± standard deviation for continuous variables and as frequencies (percentages) for categorical variables. (2) $P < .05$ are considered statistically significant.

Table 2. Comparison Of Pulmonary Function Indicators Between the Two Groups at Different Times ($\bar{x} \pm s$)

Group	n	FEV_1 (L)			FEV_1 %			FEV_1 /FVC (%)			VO_{2max} (ml/min/kg)		
		At Discharge From Hospital	6 Months After Discharge	12 Months After Discharge	At Discharge From Hospital	6 Months After Discharge	12 Months After Discharge	At Discharge From Hospital	6 Months After Discharge	12 Months After Discharge	At Discharge From Hospital	6 Months After Discharge	12 Months After Discharge
Experimental group	80	1.32±0.45	1.43±0.48	1.83±0.52	52.27±8.63	68.69±11.75	73.29±13.62	56.95±11.78	70.41±13.29	76.24±12.80	16.83±5.79	25.72±5.63	28.61±8.16
Control	80	1.29±0.31	1.32±0.30	1.56±0.47	51.53±6.79	60.57±12.47	66.51±11.20	55.86±8.62	63.17±14.66	70.16±10.92	16.11±6.26	22.36±5.18	25.40±6.13
F_{group} / *P* value		15.671/ 0.000			16.852/ 0.000			37.364/ 0.000			78.026/ 0.000		
F_{time} / *P* value		23.367/ 0.000			35.266/ 0.000			24.563/ 0.000			14.269/ 0.000		
$F_{interaction}$ / *P* value		6.269/ 0.004			7.620/ 0.003			5.639/ 0.010			16.027/ 0.000		

Note: Statistical values are presented as mean ± standard deviation. $P < .05$ are considered statistically significant. ANOVA was used for comparison across groups and times, and the interaction term assesses the impact of time on the group differences.

points. The measurements were performed by the researchers utilizing a Jaeger spirometer, precisely at 6 and 12 months following the patient's discharge. This allowed for a comprehensive assessment of the cardiopulmonary function over the specified post-discharge period.

Indicator of Patient Quality of Life. The quality of life across the two patient groups was compared at different intervals. The measurements employed the *"Assessment Scale of Quality of Life in Patients with Coronary Heart Disease,"* developed by Guo et al.[7] This comprehensive scale encompasses four dimensions: psychological well-being, physical health, social adaptability, and knowledge of coronary heart disease prevention and treatment. Consisting of 30 items, the Likert 5-point scale ranges from "1 ~ 5," corresponding to "very poor ~ very good." A higher score indicates a better quality of life for the patient. We conducted measurements using this scale at 6 and 12 months post-patient discharge. The scale demonstrated favorable reliability, with Cronbach's alpha coefficient ranging between 0.7 and 0.9 during the specified assessment periods.

Statistical Analysis

Statistical analyses were conducted using SPSS 21.0 (International Business Machines, Corp., Armonk, NY, USA). The presentation of count data involved expressing frequencies and percentages, which were subsequently tested using the chi-squared test (χ^2). Ranked data underwent assessment through the rank sum test. For measurement data conforming to a normal distribution, the mean ± standard deviation ($\bar{x} \pm s$) was employed, and comparisons were made using the *t* test. Furthermore, comparisons of measurement data at various time points were executed using repeated measures ANOVA. A $P < .05$ was deemed indicative of a statistically significant difference. This comprehensive approach ensured a robust statistical analysis of the study findings.

RESULTS

Comparison of Baseline Characteristics between the Two Groups

This study comprised a total of 160 study subjects, evenly distributed with 80 patients in both the control and experimental groups. A meticulous examination of key demographic factors, including sex, age, marital status, level of education, cardiac function classification, lesion status, and comorbidities, revealed no statistically significant differences between the two groups ($P > .05$), refer to Table 1. This careful assessment ensured the homogeneity of baseline characteristics, establishing a robust foundation for subsequent comparative analyses.

Comparison of Cardiopulmonary Function Indicators between the Two Groups at Different Times

As indicated in Table 2, the cardiopulmonary function of both patient groups exhibited improvement at 6 and 12 months post-discharge compared to the baseline discharge values, with the difference proving statistically significant ($P < .05$). Notably, the experimental group demonstrated a more significant improvement compared to the control group, and

this difference reached statistical significance ($P < .05$). The observed enhancements in cardiopulmonary function underscore the positive impact of the intervention, with the experimental group yielding particularly noteworthy results. These findings contribute to a comprehensive understanding of the comparative effectiveness of the interventions over time.

Comparisons of Psychological and Physiological Functions between Two Groups at Different Times

The results revealed a statistically significant difference in the dimensions of psychological function ($P < .05$), as depicted in Table 3. Conversely, there was no statistically significant difference observed in physiological function ($P > .05$). This nuanced exploration of psychological and physiological dimensions provides valuable insights into the distinct impacts of the interventions over time. The noticeable differences in psychological function highlight the intervention's efficacy in this domain.

Table 3. Comparisons of Psychological and Physiological Functions between Two Groups at Different Time ($\bar{x} \pm s$, n=80)

Group	n	Psychological Function (Points)			Physiological Function (Points)		
		At Discharge From Hospital	6 Months After Discharge	12 Months After Discharge	At Discharge From Hospital	6 Months After Discharge	12 Months After Discharge
Experimental Group	80	30.61±4.29	34.15±7.18	36.26±9.12	24.97±2.83	25.11±4.88	26.77±3.62
Control Group	80	31.58±5.71	33.06±6.86	35.10±6.28	24.62±2.59	24.90±2.89	25.35±4.81
F_{group} / P value		2.367/0.033			0.694/0.516		
F_{time} / P value		4.364/0.014			0.467/0.415		
$F_{interaction}$ / P value		5.367/0.010			0.692/0.582		

Note: Statistical values are presented as mean ± standard deviation. $P < .05$ are considered statistically significant. ANOVA was used for comparison across groups and times, and the interaction term assesses the impact of time on the group differences.

Table 4. Comparisons of Social Adaptation Ability and Coronary Heart Disease Prevention and Treatment Knowledge between Two Groups at Different Time ($\bar{x} \pm s$, n=80)

Group	Social Adaptability (Points)			Knowledge of Coronary Heart Disease Prevention And Control (Points)		
	At Discharge From Hospital	6 Months After Discharge	12 Months After Discharge	At Discharge From Hospital	6 Months After Discharge	12 Months After Discharge
Experimental Group	24.42±3.93	26.77±5.83	26.86±7.12	19.63±2.45	31.42±4.97	33.36±6.65
Control Group	25.17±2.53	25.69±6.17	26.45±3.25	20.57±2.19	24.50±3.81	26.17±5.82
F_{group} / P value	0.437/0.636			23.294/0.000		
F_{time} / P value	0.522/0.404			53.267/0.000		
$F_{interaction}$ / P value	0.836/0.859			4.692/0.012		

Note: ANOVA Results: Social Adaptability: F(0.437/0.636); Knowledge: F(23.294/0.000). Values are presented as mean ± standard deviation. $P < .05$ are considered statistically significant. ANOVA was utilized for comparison across different times, and the interaction term evaluates the impact of time on the group differences.

Comparisons of Social Adaptation and CHD Knowledge between Groups at Different Times

A statistically significant difference was evident in the dimensions of CHD prevention and treatment knowledge ($P < .05$), refer to Table 4. Conversely, there was no statistically significant difference observed in the dimensions of social adaptability ($P > .05$). This examination of social adaptation and knowledge related to CHD prevention and treatment contributes to a comprehensive understanding of the intervention's impact on these specific aspects over time. The distinct outcomes shed light on the varied effects of the interventions in different dimensions, providing valuable insights for future research and clinical applications.

Comparisons of Quality of Life between Two Groups at Different Times

A statistically significant difference in the total scores of quality of life ($P < .05$) was observed, refer to Table 5. This finding underscores the noteworthy impact of the interventions on the overall quality of life, providing a concise and clear summary of the comparative outcomes.

Table 5. Comparisons of Quality of Life between Two Groups at Different Time ($\bar{x} \pm s$, n=80)

Total Score In Quality of Life (Points)		
At DischargeFrom Hospital	6 Months After Discharge	12 Months After Discharge
90.08±8.73	116.42±12.87	132.51±9.43
91.26±6.41	103.66±10.17	122.79±11.57
F-statistic	14.267/0.000	
	37.269/0.000	
	9.367/0.000	

Note: Total Score in Quality of Life: F(14.267/0.000). Values are presented as mean ± standard deviation. $P < .05$ are considered statistically significant. ANOVA was utilized for comparison across different times. The interaction term assesses the impact of time on the group differences in quality of life.

DISCUSSION

CHD is characterized by inadequate blood supply to the heart, leading to heart dysfunction.[6] Enhancing the blood supply to the heart muscle is crucial in preventing recurrent attacks. Despite the success of PCI in achieving favorable therapeutic outcomes, the patient's cardiopulmonary functions are inevitably influenced by both the disease itself and the surgical intervention, subsequently impacting their overall quality of life.[7] Chen et al.[8] highlighted the positive correlation between the prognosis of coronary heart disease and the patient's cardiopulmonary, physical, and immune functions. It suggests the multifaceted nature of CHD management, emphasizing the importance of addressing the primary cardiovascular concerns and the broader impact on patients' overall well-being.

In recent years, the multi-disciplinary treatment (MDT) model has gained endorsement from contemporary international medical institutions, offering patients a diverse array of options and customized treatment approaches.[9] Research by Kent et al.[10] revealed that implementing multidisciplinary follow-up management for diabetes patients proves effective in fostering patient self-management, particularly in the realms of exercise, diet, and lifestyle. This approach contributes to enhanced diabetes control. Additionally, rehabilitation exercises are advantageous for

the recovery of patients with cardiovascular diseases. Embracing a multi-disciplinary approach broadens the spectrum of available interventions and also tailors treatment strategies to individual patient needs, reflecting a progressive paradigm in modern medical care.

Patients stand to gain enhanced benefits from the expertise of a dedicated rehabilitation team. In a study by Lin et al.,[11] rehabilitation emerged as a safe and effective measure for individuals post-PCI. The research conducted by Wu et al.[12] demonstrated that post-PCI patients with coronary heart disease, who followed personalized exercise plans crafted using cardiopulmonary function measurements and complemented with conventional medication, experienced no significant discomfort or cardiovascular events. These findings highlight the positive impact of tailored rehabilitation interventions, emphasizing their safety and efficacy in promoting the well-being of patients undergoing PCI.

Hence, tailoring rehabilitation exercises through detailed assessments proves to be a safe and dependable approach. This personalized intervention demonstrated the potential to reduce platelet activity, enhance quality of life, and warrant widespread clinical adoption. The present study employed a rehabilitation-based procedural follow-up for PCI patients with CHD. The outcomes were then systematically compared with those of the control group, which underwent routine telephone-based and outpatient follow-up. This methodical examination seeks to provide valuable insights into the comparative effectiveness of rehabilitation-focused follow-up strategies, contributing to the broader understanding of optimal post-PCI patient care.

The findings align closely with the study conducted by Jiao et al.[13] In the experimental group, the involvement of a dedicated professional rehabilitation team throughout the follow-up process, along with collaborative efforts from cardiovascular nurse specialists in communication, coordination, and information organization, facilitated seamless follow-up management. This unified approach underscores the positive impact of a multidisciplinary team, emphasizing the importance of specialized expertise in rehabilitation and effective communication strategies in optimizing the follow-up care process.

The "CICARE" communication model, employed in this study, represents a process-oriented communication approach that has gained popularity in Western Europe and the United States. This model offers the distinct advantage of guiding healthcare professionals in communicating with patients systematically, fostering a sense of involvement and trust among patients in their healthcare providers.

Chinese scholars, such as Shen et al.,[14] have successfully applied the "CICARE" model to patient follow-ups, resulting in a notable reduction in missed follow-up visits. The model enhances patients' adherence to follow-up appointments, enabling them to more effectively engage in rehabilitation training and self-management, ultimately contributing to the improvement of cardiopulmonary functions. The adoption of such a communication model proves instrumental in promoting patient engagement, adherence, and overall health outcomes.

The traumatic stress reaction to surgery, combined with the chronic impairment of cardiopulmonary function following PCI, can predispose patients to experiences of depression, self-abasement, anxiety, and tension, significantly impacting their overall quality of life. This study systematically compares the quality of life among the two patient groups at both 6 and 12 months post-discharge. The findings indicate that procedural follow-up, embedded in rehabilitation training, has the potential to ameliorate the quality of life for patients with coronary heart disease who have undergone PCI. This insight highlights the importance of tailored follow-up strategies in addressing not only the physical aspects of recovery but also the psychological well-being of patients in the aftermath of surgery.

This correlation may be attributed to the enhancement of patients' physical fitness through rehabilitation training. Such training facilitates improved communication between patients and healthcare professionals, offers valuable learning opportunities, and boosts patients' confidence in overcoming the disease. These positive outcomes collectively contribute to an enhanced quality of life, aligning with findings reported by Li et al.[15] The interdependent relationship between rehabilitation training, patient engagement, and overall well-being underscores the multifaceted benefits of incorporating tailored interventions to promote physical health and psychosocial aspects of patients' recovery.

Study Limitations

It is important to acknowledge certain limitations of our study. Firstly, the study's reliance on a specific geographical location and a single healthcare setting may limit the generalizability of the findings to broader populations and diverse healthcare environments. Additionally, the study duration of 12 months may not capture long-term effects or variations that could emerge over an extended follow-up period. Furthermore, while efforts were made to standardize procedures, variations in individual patient adherence to the rehabilitation plans and follow-up protocols might introduce confounding factors. These limitations highlight the need for caution in interpreting the results and emphasize the importance of future research with larger, more diverse samples and extended follow-up periods to better understand the broader implications and potential variations in the outcomes observed.

CONCLUSION

In conclusion, the procedural follow-up plan formulated in this study, centered on rehabilitation training for post-PCI patients with coronary heart disease, demonstrates significant enhancements in both cardiopulmonary function and quality of life. The plan enhances communication between patients and healthcare professionals while integrating customized rehabilitation training. It improved the respect, diversity, and specialization of follow-up procedures. This approach effectively elevates patients' adherence to follow-ups and self-management capabilities. The outcomes emphasize the

clinical applicability and merit of promoting such specialized procedural follow-up plans, emphasizing their potential to positively impact the holistic well-being of patients post-PCI.

CONFLICTS OF INTEREST
The authors report no conflict of interest.

AUTHOR CONTRIBUTION
Qing Zhang and Lu Dai contributed equally to this work and are co-first authors.

AVAILABILITY OF DATA AND MATERIALS
The data that support the findings of this study are available from the corresponding author upon reasonable request.

FUNDING
None.

REFERENCES
1. Summary Of The China Cardiovascular Health And Disease Report. 2020. Chinese. *Circ J*. 2021;36(06):521-545.
2. Liu Xuemeng, Wu Leiming, Du Binbin, et al. Efficacy and short-term prognosis of percutaneous coronary intervention in elderly patients with chronic total occlusion of coronary arteries. *Henan Medical Research*. 2021;30(08):1391-1395.
3. Wang Minmin, Shi Yujiey, Cui Zhenshuang, et al. Analysis of risk factors for in-stent restenosis of coronary arteries. *Chinese Journal of Evidence-Based Cardiovasc Med*. 2021;13(06):716-718.
4. He Cuizhu, Liang Xin, Su Fei. et al. Observation of the effect of continued care after PCI in patients with coronary artery disease. *Journal of Hebei Medical University*. 2016;37(08):893-896.
5. Ding B, Xu YL, Peng Y, et al. Investigation of current selfmanagement ability and influencing factors for patients with the first percutaneous coronary artery stent implementation. *Chin J Mod Nurs*. 2015;21(16):1867-1871.
6. Li Xia. Diagnostic value of dynamic electrocardiography and coronary angiography in patients with hypertension and coronary artery disease. *Journal of Medical Forum*. 2020;41(01):172-174.
7. Guo Lan, Feng Jianzhang, Li He, et al. Development of a quality-of-life scale for patients with coronary heart disease. *South China Journal of Cardiovascular Diseases*. 2003;(04):229-231.
8. Chen Haimiao, Lei Lu, Lin Ning, et al. Depression and anxiety and influencing factors after coronary intervention in elderly patients with coronary heart disease. *Zhongguo Laonianxue Zazhi*. 2019;39(01):213-215.
9. Li Shanshan. *Study on the status quo of the multidisciplinary collaboration (MDT) service model*. [D] Guangzhou University of Chinese Medicine; 2017.
10. Kent D, D'Eramo Melkus G, Stuart PM, et al. Reducing the risks of diabetes complications through diabetes self-management education and support. *Popul Health Manag*. 2013;16(2):74-81. doi:10.1089/pop.2012.0020
11. Lin Aicui. Kong Mingya. Current status of the application of exercise in the rehabilitation treatment of coronary heart disease. *Medical Recapitulate*. 2015;21(2):281-283.
12. Wu Yafang. Guo Yongjun. Effect of rehabilitation exercise on platelet activity and quality of life in patients with coronary heart disease after stenting. *Zhongguo Yundong Yixue Zazhi*. 2019;38(9):735-740.
13. Jiao Haixu. He Yafei, Lin Wenhua. Study on the application of continued self-management education in the cardiac rehabilitation of patients with coronary interventions. *Chinese General Practice*. 2020;23(S2):266-267.
14. Shen Mingyan, Lu Fangyan, Wang Renfang, et al. Development of a procedural follow-up plan and its application in patients with pancreatic tumors. *Chung Hua Hu Li Tsa Chih*. 2016;51(11):1330-1334.
15. Li Lingrui, Jiang Yunlan, Zhou Yue, et al. Meta-analysis of the effect of continued care on the angina attacks and quality of life in patients with coronary artery disease. *J Nurs Adm*. 2019;19(05):337-341.