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## ORIGINAL

### IMPACT OF WECHAT-BASED "HOSPITAL-HOME" INTEGRATED HEALTH EDUCATION ON EXERCISE MINDED PATIENTS WITH CHRONIC HEART FAILURE

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#### ABSTRACT

**Objective** To explore the impact of integrated health education based on WeChat "hospital-family" on exercise-minded patients with chronic heart failure.

**Methods** One hundred and forty exercise-minded patients with CHF hospitalized in the Department of Cardiovascular Medicine from December 2019 to May 2020 were randomly divided into a control group (n=64) and an intervention group (n=65) according to the random number table method. The control group used the traditional preaching model, and the intervention group implemented the integrated hospital-family health education model based on WeChat. After 3 months of intervention, the self-efficacy, self-management ability, quality of life and exercise tolerance of the two groups were compared.

**Results** Exercise-minded Patients in the intervention group had significantly higher dry strength, quality of life and exercise tolerance ( $P < 0.05$ ).

**Conclusion** WeChat-based integrated hospital-family health education can improve self-efficacy and self-management ability of CHF exercise-minded patients, thus improving quality of life cardiac function.

**KEY WORDS:** Chronic Heart Failure; Hospital-family Integration; WeChat

## INTRODUCTION

Chronic heart failure (CHF) is a common cardiovascular disease and a serious end stage of various cardiovascular diseases (Sun, Zhang, Ma, Liu, & Wang, 2019). It is characterized by high morbidity, disability, mortality and readmission rates, and has become a serious public health problem worldwide (van Riet et al., 2016). CHF affects approximately 26 million people worldwide (Ponikowski et al., 2014). It has become a serious public health problem affecting 26 million people worldwide. According to surveys, nearly 1 in 100 people over 65 years of age are affected, and its prevalence is positively correlated with the age of the exercise-minded patient, the older the patient, the higher the prevalence (Mozaffarian et al., 2015). Exercise-minded Patients with CHF have a poor quality of life and a low 5-year survival rate (Tuppin et al., 2014). In addition, they are particularly vulnerable to readmission, with previous studies showing a 30-day readmission rate of 5.6% for CHF exercise-minded patients, more than half of whom are readmitted after one year (Khan et al., 2015). Repeated hospital admissions in a short period not only result in very rapid deterioration of cardiac function, reduced quality of life, and much shorter survival time, but also increase the economic burden on families and society (Bingham, Thompson, & Kell, 2015). It also increases the economic burden on families and society. Therefore, it is imperative to improve the prognosis and survival of CHF exercise-minded patients.

At present, CHF exercise-minded patients are mostly elderly people, and they have poor memory. Although they are given health education by medical staff during hospitalization, they may be hospitalized again after discharge because they forget the health education knowledge related to CHF over time, and as their compliance behavior decreases, they may not take medication on time, live irregularly, and cannot follow up regularly (Gallagher, Donoghue, Chenoweth, & Stein - Parbury, 2008). Implementing the integrated hospital-family health education model can help improve exercise-minded patients' self-management ability and quality of life.

With the implementation of "Internet Healthcare", cell phone software provides a convenient way for effective communication and health education between medical staff and exercise-minded patients (Bender, Yue, To, Deacken, & Jadad, 2013). In recent years, WeChat has become the most popular social networking software platform. WeChat has become the most popular social software platform in recent years, and it is a highly convenient and accessible free application that can display information via video, voice, text and images, providing a viable method for communicating health information to the public (Zhang, Wen, Liang, & Lei, 2017). It is now widely used in the health management of chronic diseases, and it has changed the form of health education and accelerated its implementation.

In this study, we will use WeChat as a carrier to implement continuous and systematic health education for CHF patients, and explore the impact of WeChat-based "hospital-family" integrated health education on CHF exercise-minded patients, with the aim of providing reference for the management of CHF and other chronic diseases.

## Data and Methods

### General data

One hundred and forty exercise-minded patients with CHF who were hospitalized in the cardiovascular medicine department from December 2019 to May 2020 were selected. Inclusion criteria: met the diagnostic criteria of CHF, New York Heart Association (NYHA) cardiac function class II-IV; age  $\geq$  18 years; patients or family members were able to operate smartphones and use WeChat; conscious and able to communicate with the investigator and voluntarily participated in the study. Exclusion criteria: those with consciousness, mental and cognitive impairment; those with combined severe end-stage disease. The study was reviewed and approved by the hospital ethics committee, and all exercise-minded patients participating in the study signed an informed consent form. The 140 exercise-minded patients were numbered according to the order of admission, and a random number table was created using SPSS 20.0 statistical software to randomly divide the patients into a control group and an intervention group. The differences in general information and disease characteristics between the two groups were not statistically significant ( $p > 0.05$ ) and were comparable, as shown in Table 1. Because during the 3-month intervention period, there were 2 deaths and 4 lost visits and withdrawals in the control group and 1 death and 4 lost visits and withdrawals in the intervention group, 64 exercise-minded patients in the control group and 65 exercise-minded patients in the intervention group finally completed the 3-month follow-up.

**Table 1** Comparison of baseline information between the two groups of exercise-minded patients

Projects	Control group (n=64)	Intervention group (n=65)	t/Z/ $\chi^2$	p
Age (Mean $\pm$ SD)	60.83 $\pm$ 8.854	62.86 $\pm$ 8.807	1.308	0.193
Gender				
Male	39(60.9)	35(53.8)	0.663	0.415
Female	25(39.1)	30(46.2)		
Residence				
Living with a partner	47(73.4)	42(64.6)	1.282	0.527
Living with children	16(25.0)	21(32.3)		
Living alone	1(1.6)	2(3.1)		
Academic qualifications				

Elementary/Junior high school	28(43.8)	31(47.7)	0.867	0.386
High school/ junior high school	17(26.6)	21(32.3)		
College	13 (20.3)	9(13.8)		
Bachelor's degree and above	6(9.4)	4(6.2)		
Monthly income per capita				
<3000	20(31.3)	29(44.6)	2.445	0.118
≥3000	44(68.8)	36(55.4)		
Number of previous heart failure hospitalizations				
1-3	34(53.1)	29(44.6)	0.935	0.334
>3	30(46.9)	36(55.4)		
Cardiac function classification				
II	21(32.8)	19(29.2)	0.543	0.587
III	34(53.1)	35(53.8)		
IV	9(14.1)	11(16.9)		
CHF years/duration of disease				
<1	6(9.4)	3(4.6)	1.311	0.190
1-4	19(29.7)	18(27.7)		
5-10	24(37.5)	22(33.8)		
>10	15(23.4)	22(33.8)		

## Methodology

### Intervention methods

Conventional education, i.e., verbal education, was used, while the CHF exercise-minded patients were issued the "CHF Health Education Manual" upon admission, which included in-hospital education (admission guidance, guidance on various medical and technical examinations, safety protection, basic knowledge related to CHF, etc.) and out-of-hospital education (guidance on medication, diet, exercise, indications for deterioration and emergency medical treatment, etc.). The content of the manual was consistent with the content of the health education text pushed by the intervention group. Telephone follow-up was conducted once a month after discharge to give verbal health instructions. In the intervention group, on the basis of the control group, integrated health education based on WeChat "hospital-family" was implemented, as follows.

### Establish a hospital-family integrated health education team

An integrated hospital-family health education team was formed, including two attending cardiovascular medicine physicians, one nurse practitioner, and two nurse practitioners in charge. According to the treatment and care process of CHF exercise-minded patients at the stage of disease development, and guided by the key themes of CHF patient education and self-care skills

proposed by the European Society of Cardiology (ESC) in 2016, senior cardiovascular physicians and nurses searched for exercise-minded patients from admission to discharge and after discharge for each session where health education was needed (Malkin, 2014). The team members then work together to develop a disease/health management program, with the specialist reviewing or developing a CHF medication management program to guide the patient's medications and the specialist nurse reviewing or developing a non-medication management program to guide the patient's self-management. The compiled contents are reviewed by the health education team members together one by one, and the logic and rigor of the contents are checked, and then the content of the CHF Health Education Manual is determined after organizing a centralized discussion with experts.

### **Establishment of WeChat public number and WeChat group**

The public number of CHF health education and the corresponding WeChat group were established, and the members of the group were all members of the "hospital-family" integrated health education team and exercise-minded exercise-minded patients and family members of the intervention group, and the group leader was the researcher. On the day of admission, the researcher and nursing staff instructed the exercise-minded patients and their families to scan the QR code to join the WeChat group and add the WeChat public number with the exercise-minded patients' informed consent. During hospitalization, patients and family members were instructed by the nurse in charge to properly master communication platforms such as WeChat and WeChat groups.

### **Implementation of integrated health education based on WeChat "hospital-family"**

(1) Release health information: All the contents of the missionary topics are conveyed verbally, in text, pictures, cartoons, voice and video, etc., and the missionary contents are displayed in a lively and easy-to-understand manner. We also communicate with exercise-minded patients on the day of admission, in the middle of hospitalization, on the day of discharge, and after discharge from the hospital, promptly according to the treatment and care process of CHF exercise-minded patients' disease development stages. (2) Heart failure online live class: Heart failure exercise-minded patients' disease management is particularly important, and the most important thing is that "knowing oneself and one's enemy is the key to a hundred battles". The content includes self-assessment, medication management, diet management, exercise management and emotional management for heart failure in exercise-minded patients, and provides online consultation after the class. (3) Disease monitoring and feedback: After discharge, according to the disease/health management plan, exercise-minded patients need to self-monitor their

condition (including blood pressure, heart rate, weight, medication), fill out a weekly monitoring schedule, conduct a weekly self-assessment, and feedback the information in the form of pictures to the nurse in charge of the group between 2 and 4 p.m. every Sunday, and doctors and nurses will give answers and feedback within 6 hours. (4) Online interaction: 1-2 health topics related to exercise-minded patients' conditions are organized every week to guide exercise-minded patients' participation and discussion, while 2 cardiologists and 2 cardiology nurses form a health consultation team to answer questions and solve problems for CHF patients in the WeChat platform in their free time. (5) Patients' circle: To provide a platform that patients can use to exchange their experiences of illness and prevention and treatment experiences so that they can gain communication with their patients, enhance their confidence in disease recovery, and obtain support from their peers and society. In addition, they can pass on their experiences, feelings and doubts by posting articles, personal moods, etc. Patients can praise and comment on each other, as well as forward and collect useful information. (6) Strengthen follow-up management: WeChat follow-up visits are combined with home visits to complete a monthly follow-up visit to understand the current health status of patients and provide corresponding health guidance.

### **Quality control**

The researcher used the backstage of WeChat public number to know the length, frequency and online interaction frequency of each patient's health education content every week, and used the incentive mechanism (rewarding patients with online learning length, frequency and online interaction frequency > 90% with free appointment for specialist clinic and free review) to urge patients to learn health education content. At the same time, the researcher inspected the implementation of health education every week, including whether the missionary staff conducted health education for exercise-minded patients according to the health education intervention plan; and randomly selected two patients to check the mastery of health education content.

### **Evaluation indicators**

#### **General self-efficacy scale (GSES)**

The general self-efficacy scale (GSES) was adopted from Schwarzer et al (Schwarzer, Born, Iwawaki, & Lee, 1997). The General Self-Efficacy Scale (GSES) was developed by Schwarzer et al. It consists of 10 items, including the perception of oneself and the observation of self-efficacy when encountering difficulties. The scale is relatively mature and has been widely used by domestic scholars, and previous studies have shown

that(Gharacholou et al., 2016) The general self-efficacy scale has an internal consistency coefficient of 0.87 and a Cronbach's 183 alpha coefficient of 0.788-0.901.

### **Minnesota Living with Heart Failure Questionnaire (MLHFQ)**

This scale was developed by the University of Minnesota in the United States and has been translated into several languages and is widely used around the world. The MLHFQ contains 8 items in the physical domain such as fatigue, 5 items in the emotional domain such as depression, and 8 items in the other domains, for a total of 21 items. The items are scored on a scale of 0 to 5, with a maximum score of 105, with higher scores indicating greater impact on exercise-minded patients' quality of life and worse quality of life. Previous studies have shown that(van Tol, Huijsmans, Kroon, Schothorst, & Kwakkel, 2006) The Chinese version of MLHFQ has good reliability and validity, with Cronbach's alpha coefficient of 0.79-0.90.

### **Heart failure self-management scale**

The 2012 Shi Xiaoqing et al(Hicks & Holm, 2003). The scale was developed by Shi Xiaoqing et al. in 2012, including 4 dimensions of medication management, diet management, symptom management, and psychological and social adaptation management, with a total of 20 entries. The Likert 4-point scale was used to assess the exercise-minded patients' self-management level, with a total score of 80. The content validity of the scale was 0.98 and the Cronbach's alpha coefficient was 0.78, which had good reliability and validity.

### **Six-minute walk test (6-MWT)**

The 6-MWT is a simple and practical test that is performed in a 30-meter flat, straight corridor, with a set starting point and a set return point, and the patient walks back and forth along the set point. The longer the distance measured, the better the exercise tolerance of the patient(Vetrovsky et al., 2017). The longer the distance measured, the better the exercise tolerance of the patient. The longer the distance measured, the better the exercise tolerance of the patient. If the patient has severe dyspnea, shortness of breath or pallor during the test, the test should be terminated immediately.

### **Statistical methods**

Statistical software SPSS 20.0 was used for statistical analysis. General data were compared using t-test, chi-square test or rank sum test. Two independent samples t-test was used to compare GSES, MLHFQ, 6-MWT and self-management changes between the control group and the intervention group. The test level  $\alpha = 0.05$  ( $\alpha$  is the two-sided probability), and



P<0.05 indicates that the difference is statistically significant.

## Results

### Comparison of self-efficacy between the two groups

There was no statistically significant difference between the general self-efficacy scores of the two groups before the intervention (P>0.05). After 3 months of intervention, the self-efficacy scores of the intervention group were significantly higher than those of the control group, and the difference was statistically significant (P<0.05). See table 2.

**Table 2** Comparison of general self-efficacy between two groups of patients

Time point	Control group (64 cases)	Intervention group (65 cases)	t	P
Pre-intervention	20.50±4.883	21.91±5.645	1.514	0.133
Intervention for 3 months	22.31±6.128	29.77±5.095	7.520	<0.001

### Comparison of quality of life between the two groups

There was no statistically significant difference between the scores and total scores of the physical domain, emotional domain, and other domains of the exercise-minded patients in the two groups before the intervention (P>0.05). After 3 months of intervention, the scores and total scores of each dimension in the intervention group were significantly lower than those in the control group, and the difference was statistically significant (P< 0.05). See Table 3.

**Table 3** Comparison of quality of life between two groups of patients

Projects	Time point	Control group (64 cases)	Intervention group (65 cases)	t	P
Physical area	At the time of admission	27.30±5.852	25.52±6.860	1.579	0.117
	Intervention for 3 months	23.45±6.128	19.05±6.271	4.036	<0.001
Emotional domain	At the time of admission	13.64±5.109	12.94±4.802	0.804	0.423
	Intervention for 3 months	9.77±4.898	7.97±4.714	2.123	0.036
Other areas	At the time of admission	24.28±7.146	23.23±7.512	0.814	0.417
	Intervention for 3 months	18.56±6.870	15.65±6.367	2.501	0.014
Total score	At the time of	65.22±	61.69±15.007	1.367	0.174



admission	14.288			
Intervention for 3 months	51.78±12.313	42.66±10.366	4.554	<0.001

### Comparison of self-management ability between the two groups

There was no statistically significant difference in the total score of self-management and the scores of each dimension of medication management, diet management, symptom management, psychological and social adjustment management between the two groups before the intervention ( $P > 0.05$ ). After 3 months of intervention, the total score and the scores of each dimension in the intervention group were significantly higher than those in the control group, and the difference was statistically significant ( $P < 0.05$ ). See Table 4.

**Table 4** Comparison of patients' self-management ability between the two groups

Projects	Time point	Control group (64 cases)	Intervention group (65 cases)	t	P
Medication management	Pre-intervention	11.22±2.566	11.03±2.872	0.392	0.696
	Intervention for 3 months	11.13±2.517	12.98±3.243	3.635	<0.001
Diet management	Pre-intervention	8.27±1.535	7.82±1.310	1.793	0.075
	Intervention for 3 months	8.84±1.545	9.66±1.554	2.997	0.003
Symptom management	Pre-intervention	14.13±3.416	13.74±3.369	0.647	0.519
	Intervention for 3 months	14.73±3.138	16.46±3.636	2.886	0.005
Psychological and social adaptation	Pre-intervention	12.30±3.151	11.58±2.738	1.371	0.173
	Intervention for 3 months	12.50±3.207	14.25±2.806	3.292	0.001
Total score	Pre-intervention	45.53±6.500	44.03±6.227	1.339	0.183
	Intervention for 3 months	47.20±6.729	53.35±7.983	4.728	<0.001

### Comparison of 6-MWT distances between the two groups

There was no statistically significant difference in the comparison of 6-MWT distances between the two groups before the intervention ( $P > 0.05$ ). After 3 months of intervention, the 6-MWT distance in the intervention group was

significantly higher than that in the control group, and the difference was statistically significant ( $P < 0.05$ ). See Table 5.

**Table 5** Comparison of 6-MWT distances between the two groups of patients

Time point	Control group (64 cases)	Intervention group (65 cases)	t	P
Pre-intervention	169.86 ± 23.523	171.66 ± 25.299	0.419	0.676
Intervention for 3 months	181.52 ± 34.879	223.62 ± 37.310	6.618	<0.001

## Discussion

The WeChat-based "hospital-family" integrated health education model has changed the old model of receiving regular and passive nursing education, and depicts a blueprint for optimizing CHF health education through the joint efforts of hospitals, families and patients, from the perspective of hospitals providing medical services to exercise-minded patients, family members providing care services to patients, and mutual cooperation and information sharing between hospitals and families. It meets the needs of exercise-minded patients at different stages of hospitalization and discharge, especially at home after discharge, from multiple perspectives, such as mutual cooperation and information sharing (Guo et al., 2019). The model has two main advantages. The model has two main advantages: first, the dual participation of hospitals and families and the provision of health information through the WeChat platform; second, it ensures the continuity of health education and, to a certain extent, a seamless transition from hospital to home (Garnier et al., 2018).

Some studies have shown that (Yeh, Mu, Davis, & Wayne, 2016) that self-efficacy levels play an important role in decision making to improve exercise-minded patients' poor health behaviors (e.g., diet and exercise adherence), which in turn affects health outcomes. Patients with high self-efficacy tend to be more confident in self-management of their illness (Greenhawt & DunnGalvin, 2018). In this study, we applied an integrated WeChat-based "hospital-family" health education for cardiac rehabilitation interventions and management, and provided a family intervention-centered health education program for CHF patients, which allows for interaction and communication between health care providers and patients and families through the WeChat platform by pushing pictures, videos, and audios (Do, Young, Barnason, & Tran, 2015). At the same time, exercise-minded patients can communicate with each other, and by sharing their experiences of illness and prevention, commenting and liking interactions, exercise-minded patients become more confident in achieving their self-management goals, thus improving their self-efficacy. The results showed that after 3 months of intervention, the self-efficacy level of patients in the intervention group was significantly higher than

that of the control group, and the difference was statistically significant ( $P < 0.05$ ).

The goal of CHF treatment is not only to improve symptoms, but most importantly to reduce mortality and readmission rates through standardized self-management programs (e.g., medication, diet, exercise, and emotional management), thereby improving self-management skills and quality of life. The "hospital-home" integrated health education team has received strong support from patients and their families in guiding patients to learn about CHF self-management. With the convenience of mobile terminals across time and space, CHF patients can continue to receive health education in their daily lives at home and gradually build up confidence to adhere to long-term self-management. "Weekly self-monitoring and feedback" is an effective means to continuously monitor the self-management behaviors of CHF patients after discharge from the hospital (Aamodt et al., 2020). During hospitalization, nurses taught patients to self-manage. During hospitalization, nurses taught patients to self-monitor their blood pressure, heart rate, weight, and medication compliance. During the intervention period, patients were required to give feedback in the form of pictures to the nurse in charge of the group between 2 and 4 pm every Sunday, and the nurse and doctor would give feedback within 6 hours to ensure the accuracy of the monitoring content. The results of this study showed that after 3 months of intervention, the scores of medication management, diet management, symptom management, and psychological and social adjustment management were significantly higher in the intervention group than in the control group, and the difference was statistically significant ( $P < 0.05$ ).

Compared with traditional health education, the WeChat-based "hospital-family" integrated health education model enables patients to receive more dynamic and easy-to-understand health guidance, providing more direct, rapid, dynamic and "friendly" interaction between hospital and family. Communication between healthcare professionals and patients can be achieved through the WeChat platform, including not only voice communication, but also text reading, image sharing and video consultation (Lyu et al., 2016). This includes not only voice communication, but also text reading, image sharing and video consultation. The results of the study showed that the integrated WeChat-based "hospital-family" health education significantly improved the quality of life and cardiac function of CHF patients. After 3 months of the intervention, the quality of life scores of patients in the intervention group were significantly higher than those in the control group, and the difference was statistically significant ( $P < 0.05$ ). After 3 months of intervention, the distance of 6-minute walk test in the intervention group was significantly higher than that in the control group, and the difference was statistically significant ( $P < 0.05$ ).

## Conclusion

In conclusion, the integrated WeChat-based "hospital-home" health education model can help improve self-efficacy, self-management, quality of life, and exercise tolerance of CHF exercise-minded patients. However, the representativeness of the sample was limited by the recruitment of subjects from only one hospital, and a multicenter sampling study is recommended to expand the sample beyond that hospital. In addition, other outcome indicators should be considered to provide more objective information about health status, such as VO<sub>2</sub> peak, left ventricular ejection fraction (LVEF), and NT-pro BNP.

## Declaration of Competing Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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