

## ORIGINAL RESEARCH

# Application effect of dual disease management theory in patients with alcoholic cardiomyopathy and heart failure

Jing Qin<sup>1</sup>, Chunjiu Lin<sup>2,\*</sup>, Jing Ye<sup>1</sup>, Mengsheng Wu<sup>2</sup>

<sup>1</sup>Department of Emergency, The Sixth Hospital of Wuhan, 430016 Wuhan, Hubei, China

<sup>2</sup>Department of Vasculocardiology, The Sixth Hospital of Wuhan, 430016 Wuhan, Hubei, China

**\*Correspondence**

18971455689@163.com  
(Chunjiu Lin)

**Abstract**

This paper explores the effect of application of dual disease management theory in the discharge readiness service for patients with alcoholic cardiomyopathy and heart failure. A retrospective study of 70 male patients with heart failure due to alcoholic cardiomyopathy was conducted. All patients were admitted in the hospital from September 2021 to September 2022. The control group was identified through an odd number, and the even number was the observation group, with 35 cases in each group. The control group received routine nursing care, and the observation group received a nursing model based on dual disease management theory, developed on the basis of the control group. The assessment criteria including the discharge readiness, binary coping score, self-efficacy score, self-care ability score and nursing compliance were compared between the two groups. The discharge readiness, patient and caregiver support coping score, self-efficacy and self-care ability scores of the observation group improved, compared to those of the control group, the difference was statistically significant ( $p < 0.05$ ). The nursing compliance of the observation group was 91.4 %, statistically significantly higher ( $p < 0.05$ ), compared to that of the control group (71.4%). The findings in this paper suggest that dual disease management theory applicable to the routine nursing can improve the nursing compliance and self-efficacy of patients with alcoholic cardiomyopathy and heart failure and self-care ability. Therefore, the dual management theory can effectively contribute to improving the level of patient support, response and patient care compliance.

**Keywords**

Dual disease management theory; Alcoholic cardiomyopathy; Heart failure; Compliance

## 1. Introduction

Alcoholic myocardiopathy (ACM) is a specific heart muscle disease prevalent in individuals with a history of long-term heavy alcohol consumption, seriously threatening patients' health [1]. The alcohol-induced cardiac failure appear with alcohol abuse weakening the heart muscle, and reducing its blood pumping ability. Over time, the reduced heart efficiency in delivering oxygen to vital tissues affects their functionality [2]. Patients with ACM and heart failure exhibit high rates of hospitalization, morbidity and mortality. It is estimated that up to 50% of patients die within five years after being diagnosed with ACM [3]. Patients with heart failure and ACM are suggested to halt alcohol consumption to prevent further damage to the heart muscles. Early diagnosis, appropriate treatment and lifestyle changes, can significantly improve patients' prognosis and quality of life [4]. The dual disease management theory (DMT) is a novel concept. The concept of DMT considers disease management as a dual phenomenon in which partners share the experience and management of

diseases such as cancer and chronic diseases [5]. The benefit of the DMT model on the emphasis on the cooperation and co-management of patients and their caregivers rather than only on individualism. DMT stresses the importance of cooperative management to both patients and the caregivers [6]. In such a society with high levels of chronic diseases, dual interventions are more effective than individual interventions in terms of improving social perception and relationships for both patients and their partners [7]. DMT theory emphasizes the process of mutual support and assistance when jointly dealing with disease stress, to promote the recovery of patients. The dual disease management theory has been applied into management of patients with diabetes, hypertension or heart diseases [8]. This study focuses on the application and effect of dual disease management theory in patients with alcoholic cardiomyopathy and heart failure.

## 2. Objects and methods

## 2.1 Objects

A formula of two samples mean was used to calculate the sample size:  $N1 = N2 = 2[(\mu\alpha + \mu\beta)/(\delta/\sigma)]^2 + 0.25\mu\alpha^2$  and  $N1 = N2 = 30$ . When  $\delta/\sigma = 0.74$ , the inspection level  $\alpha = 0.05$ ,  $\beta = 0.1$  and the missing follow-up rate was 20%, the sample size of each group was calculated into 35. 70 male patients with alcoholic cardiomyopathy and heart failure who were admitted in the hospital from September 2021 to September 2022 were retrospectively collected as research objects. Blind method was used to conduct a randomized controlled trial. The patients were numbered sequentially. The odd number was attributed to the control group, and the even number was assigned to the observation group, with 35 cases in each group. The control group received routine nursing care, and the observation group received a nursing model based on dual disease management theory on the basis of the control group.

Inclusion criteria: (1) Patients that exhibited symptoms of ACM and heart failure, and diagnosed with ACM and heart failure by electrocardiogram (ECG) and angiocardigraphy (ACG); (2) The ability and willingness of patients to participate in the disease management plan; (3) Patients with left ventricular ejection fraction less than or equal to 40%; (4) Patients with complete data set of clinical information.

Exclusion criteria: (1) Patients with organic diseases of liver, kidney or other important organs were excluded; (2) Patients that developed myocardial infarction or received coronary artery bypass surgery were excluded; (3) Patients with secondary or primary cognitive dysfunction, speech disorders or mental and behavior abnormalities were excluded; (4) Patients participating in other trials or disease management plans were excluded.

## 2.2 Methods

### 2.2.1 Control group

Patients in both groups were constrained to suspend drinking. The whole routine nursing plan for patients with ACM and heart failure contained: (1) Health education for a healthy lifestyle including the adoption of a balanced diet, regular physical exercising, suspension of alcohol and tobacco consumption. Moreover, the health education for disease management included drug management, symptom monitoring and recognition of heart conditions exacerbation symptoms. (2) Drug management: patients with ACM and heart failure potential needed medicines to control the symptoms, such as diuretics, angiotensin-converting enzyme inhibitors and  $\beta$  blockers. Patients understood the tablets application schedules with the assistance of nurses who monitored the potential side effects. (3) Symptom monitoring: patients with ACM and heart failure potential might experience symptoms such as tachypnea, fatigue and swelling in the legs or feet. Nurses trained patients to monitor symptoms, and reported patient changes to health care providers. (4) Emotional support: patients with ACM and heart failure can exhibit anxiety, depression and other emotional distress related to their disease. Nurses eventually provide emotional support to patients and assist identifying other resources, such as counseling or support groups. (5) Follow-up nursing: patients with ACM and heart failure re-

quire continuous monitoring and persistent disease management. Patients were provided with supplementary nursing through telephone to ensure continued support and access to adequate resources for disease management. In conclusion, the whole routine nursing plan for patients with ACM and heart failure potential should be adapted to the particular requirements of every patient and should be continually evaluated and adjusted as the conditions changed over time.

### 2.2.2 Observation group

According to the dual disease management theory, patients and their caregivers in the observation group were considered for the reception of relative nursing and intervention. In this study, the dual intervention plan was divided into the consolidation stage of dual relationships and the intervention stage of the two diseases.

#### 2.2.2.1 Organizing an intervention team

An intervention team was organized to include one head nurse, one associate chief doctor, two charge nurses, one psychological counselor, one nutritionist and one expert in quitting drinking. The head nurse was responsible for coordination, communication and for the intervention quality control; the doctor and counselor were responsible for the development of nursing plans for the treatment and psychological interventions for patients and caregivers, and post-discharge counseling. The charge nurses were to implement the intervention plan, provide discharge nursing plans and conduct follow-up visits.

#### 2.2.2.2 The consolidation stage of dual relationships

Dual supportive coping:

(1) At the time of patients' admissions, the charge nurses collected the basic information of the patients and their caregivers, assessed their readiness for discharge, their level of supportive coping and the caregivers' needs. Moreover, the charge nurses understood the evaluation of symptoms, goals and preferences for care approaches, established a trusting relationship as early as possible, and provided timely answers to the patients' enquiries.

(2) Assessment of the patients' condition. The first step consisted in assessing the patient's condition, including the severity of ACM and heart failure potential, and their complications, which allowed the nurses to consider appropriate interventions and services.

(3) Development of a discharge plan. Based on the assessment results, a discharge plan should be developed, including the patients' goals, interventions and services required to manage the diseases. This plan should be developed in collaboration with the patients, caregivers and the nursing team.

(4) Development of an individualized nursing plan: an individualized nursing plan was devised based on the patient's requirements, including specific goals and interventions for the management of ACM and heart failure potential. The nursing plan should be adapted to the patients' unique conditions, considering the medical conditions and the treatments particular to each patient.

(5) Share experience between patients and their caregivers

and encourage mutual communication. Human-centric care activities were organized twice a week to encourage patients and their caregivers to engage in communication with each other and reveal their ideas and understanding of the approaches towards disease management. Before determining the discharge nursing plan, nurses gathered the patients and caregivers' opinions to provide health guidance and encourage participation in the formulation of the disease management plan. Three months after discharging, the nurses conducted telephone investigations to track patients' diseases management and emergencies.

### 2.2.2.3 The intervention stage of the two diseases

ACM and heart failure are complex diseases. The control of the symptoms and potential complications are essential. Nurses played videos about ACM and heart failure every Wednesday and Friday in the cardiology demonstration room to raise awareness of the two diseases among patients and caregivers. The following six aspects were included:

(1) Disease knowledge: patient education is an important part of dual disease management theory. The content included education in drug management, symptom recognition, self-monitoring techniques and lifestyle changes implementations. Patients with ACM and heart failure should recognize their conditions, including signs and symptoms of heart failure exacerbation, drug management and lifestyle changes. The educational methods should be understandable and appealing and combined with other techniques and tools. Through the establishment of goals, the development of plans, self-monitoring and solving problems; patients were encouraged to participate in the self-management activities which met their goals and preferences.

(2) Medication knowledge: 1. Patients with ACM and heart failure require medications to control the symptoms and improve heart function. During hospitalization, the charge nurses consistently monitored patients for side effects of drugs, and carefully managed drugs to ensure optimal treatment outcomes. Furthermore, nurses ensured that patients followed the prescribed medication. Nurses monitored adverse medicine reactions and drug interactions and ensured that patients complied with prescribed treatment plans. 2. Patients with ACM and heart failure must restrict their intake of liquid and sodium to control the symptoms. During hospitalization, the charge nurses needed to conduct health education and monitor patients' compliance. 3. Patients with ACM and heart failure potential require supplemental oxygen to improve respiration and oxygenation of vital tissues. The charge nurses ensured the consistent supply of oxygen to the patients to prevent any oxygen deprivation cases.

(3) Nutritional guidance: nutritional support: sufficient and effective nutrients inputs are essential for patients with ACM and heart failure potential. The charge nurses in collaboration with the nutritionists, developed personalized nutrition plans and provided the diet suggestions to meet the needs of the patients.

(4) Daily life guidance: health education is also an important part of dual disease management theory. During hospitalization, patients should receive regular education on the causes

and symptoms of ACM and heart failure. The awareness of the importance of medication and lifestyle changes, as well as the risks associated with drinking are essential. Lifestyle changes including the adoption of healthy diet, physical exercise and quitting smoking, could improve heart function and other chronic diseases. The nursing team should work with patients and their caregivers to develop a personalized lifestyle change plan.

(5) Exercise guidance: 1. The nursing team ensure patients experience appropriate intervention and services, such as drugs, heart rehabilitation and alcohol quitting support. 2. In terms of intervention, the dual disease management theory highlights the importance of recognizing and solving the fundamental causes of the disease.

(6) Home follow-up: 1. Follow-up: the medical service providers should conduct regularly visit to patients with ACM and heart failure to monitor their conditions, assess the effectiveness of treatment and adjust the treatment plan as needed and provide ongoing education and support. Patients should receive regular follow-up appointments. 2. Monitoring the conditions: the medical service providers should regularly monitor patients' conditions to ensure that intervention measures and services can effectively manage the diseases (heart failure potential). The nursing team are required to perform adjustments to the discharge plan according to patients' conditions. Mobile apps or online resources can be used to support patients tracking their symptoms, monitor their conditions and receive reminders for medications or appointment schedules.

## 2.3 Indicators

(1) Readiness for Hospital Discharge Scale (RHDS) [9] is a general tool and approach used to assess readiness for discharge from the patient's viewpoint.

(2) Dyadic Coping Inventory Scale (DCI) [10] is a self-report and assessment questionnaire that measures stress and challenge management in couples. The DCI consists of 52 items that assess the various approached of partners for coping with stress as a team.

(3) Comparison of self-efficacy [11] General Self-Efficacy Scale (GSES) is a 10-item psychometric scale designed to assess optimistic self-beliefs to handle a variety of challenges. Scores range from 10 to 40, the higher the scores, the stronger the patient's self-efficacy.

(4) Evaluation of Self-care Ability Scale (ESCA) was used to measure the four domains of self-concept, health perception, self-responsibility and self-care ability. ESCA consists of a 5-point scale with a total of 172 points. Higher scores correspond to higher self-care ability of patients.

(5) The Questionnaire for Nursing Compliance of Patients with ACM and Heart Failure developed by the hospital was used to assess patients' nursing compliance. It comprises of six items, including complete compliance (>5), partial compliance (4–5), general compliance (2–3) and non-compliance (<2). Compliance = (complete compliance + partial compliance)/total number × 100%.

## 2.4 Quality control

A standardized procedure for patient registration, data collection and follow-up were developed to ensure consistency in the application of the dual disease management theory. Researchers involved in the investigation should be trained to implement the standardized procedure, including the use of measurement tools or instruments to ensure accuracy and consistency of data collection process. The accuracy of the data can be investigated by verifying source files, entering double data or other methods. The team should monitor the research progress to prevent any potential problems.

## 2.5 Statistics

Statistical software SPSS 21.0 (V21.0, IBM Corporation, Armonk, NY, USA.) was used for the analysis of the collected data. The measurement data were expressed as ( $\bar{x} \pm s$ ) and subjected to  $t$ -test. The continuous variable of the data set was expressed as rate (%) and tested by  $\chi^2$  test.  $p < 0.05$  indicates differences were considered as statistically significant.

## 3. Results

### 3.1 Comparison of basic information

Tables 1 and 2 show that the difference between basic information of patients and their caregivers in the two groups was not statistically significant ( $p > 0.05$ ).

### 3.2 Comparison of discharge readiness

Table 3 compares the discharge readiness of patients in both the control and observation groups. The findings suggest that after intervention, the discharge readiness of patients in observation was significantly better than that in control group, and the difference was statistically significant ( $p < 0.05$ ).

### 3.3 Comparison of dual supportive coping scores

The dual supportive coping scores of the control and observation groups of both patients and caregivers are compared in Table 4. The results show that after intervention, the dual supportive coping scores of patients in the observation group were significantly higher than those in the control group, and the difference was statistically significant ( $p < 0.05$ ).

### 3.4 Comparison of self-efficacy and self-care ability

Table 5 provides the comparison of self-efficacy and self-care ability scores before and after intervention. The scores of self-efficacy and self-care ability of patients in observation group were significantly higher than those in the control group, and the difference was statistically significant ( $p < 0.05$ ).

### 3.5 Comparison of nursing compliance

Table 6 shows the comparison of nursing compliance levels in the observation and control groups. The nursing compliance of patients in the observation group was significantly better than

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

## 4. Discussion

The hospital discharge plan based on the dual disease management theory contributes to patients' preparation for discharging. The process combines patient and caregiver management [12]. The findings in this paper shown that, discharge readiness of patients in the observation group was better than that in the control group, with a statistically significant difference was significant ( $p < 0.05$ ). The results suggest that the hospital discharge plan based on the dual disease management theory can improve patients' discharge readiness. The improvement of the discharge readiness was related to the dual disease management theory, focusing on the combination of patients and their caregivers. The hospital discharge plans could improve patients' overall health, reduce re-admission rates and enhance patients' ability to manage their health after discharging by addressing psychical and mental problems [13]. The awareness of medicines management of patients and their caregivers was improved, hospital appointment and following nursing that patients needed after discharging during the process of jointly making the discharging plan [14]. Furthermore, the hospital discharge plan based on the dual disease management theory provided a comprehensive nursing method by educating patients about the management of drugs, recognition of symptoms and change their lifestyle *via* exercising and the adoption of a healthier diet. Through this method, patients could manage their diseases after discharging, have healthier results and smoothly transmit to post-hospitalization nursing [15]. Therefore, the plan can improve patients' discharge readiness.

The hospital discharge plan promotes and supports patients, fosters collaboration among medical service providers, patients and carers, and increases supportive resilience by addressing psychical and mental difficulties [16]. The findings in this paper have shown that, coping ability of patients and their caregivers in the observation group was better than that in the control group ( $p < 0.05$ ). The results suggest that the hospital discharge plan based on the dual disease management theory could improve the supportive coping ability. The later was due to the ability of the plan to improve patients and caregivers confidence and improved preparations for healthy management after discharging [17]. Another reason was that the discharge plan could provide education and support for symptom recognition and management, drug management and lifestyle changes to patients and caregivers. Such education empowered patients and caregivers and allowing improved control of their own health, improving patients and caregivers supportive coping ability and overall wellbeing [18]. Therefore, by addressing psychical and mental problems, the hospital discharge plan provided education and support to patients, promoted collaboration between medical service providers, patients and caregivers, and improved the supportive coping ability.

The hospital discharge plan can improve patients' self-efficacy and self-care ability by providing education, resources and support to support patients manage their own physical

**TABLE 1. Comparison of basic information.**

Group	Control group	Observation group	$\chi^2/t$	<i>p</i>
Age	63.54 ± 6.251	65.17 ± 5.507	-1.157	0.252
Education background			1.696	0.428
No more than primary school	19	25		
Secondary school	12	8		
High school and above	4	2		
Medical payment			0.402	0.526
Health insurance	28	30		
Self-paying	7	5		
Chronic diseases			0.286	0.867
No	4	3		
1	20	22		
No less than 2	11	10		

**TABLE 2. Comparison of basic information of caregivers.**

Group	Control group	Observation group	$\chi^2/t$	<i>p</i>
Age	67.00 ± 6.32	65.54 ± 6.721		
Education background			1.439	0.487
No more than primary school	29	25		
Secondary school	5	9		
High school and above	1	1		
Medical payment			0.729	0.393
Health insurance	31	33		
Self-paying	4	2		
Chronic diseases			3.867	0.145
No	9	6		
1	16	24		
No less than 2	10	5		

**TABLE 3. Comparison of discharge readiness.**

Group	Individual condition		Adaptive capacity		Anticipatory support		Total scores	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group	17.34 ± 1.697	17.43 ± 1.119	33.57 ± 0.778	36.86 ± 1.458	25.57 ± 0.887	29.20 ± 1.922	76.83 ± 1.654	83.49 ± 2.628
Observation group	17.79 ± 2.065	20.49 ± 1.121	33.74 ± 1.067	41.63 ± 1.308	26.34 ± 1.027	32.34 ± 1.127	78.06 ± 1.520	94.46 ± 2.694
<i>t</i>	-1.391	-11.418	-0.768	-14.411	-1.868	-6.485	-2.412	-14.249
<i>p</i>	0.169	0.002	0.445	0.003	0.066	0.012	0.190	0.026

**TABLE 4. Comparison of dual supportive coping scores.**

Group	Patients		Caregivers	
	Before intervention	After intervention	Before intervention	After intervention
Control group	102.54 ± 3.175	108.54 ± 3.175	110.74 ± 4.408	114.89 ± 4.794
Observation group	103.76 ± 3.760	114.71 ± 4.932	109.43 ± 2.993	121.06 ± 4.869
<i>t</i>	-0.653	-6.224	1.459	-5.343
<i>p</i>	0.516	<0.001	0.149	<0.001

**TABLE 5. Comparison of self-efficacy and self-care ability.**

Group	GSES		Self-concept		Healthy cognition	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group	18.17 ± 1.978	27.37 ± 1.972	19.94 ± 0.968	23.83 ± 1.150	32.37 ± 1.972	39.63 ± 1.330
Observation group	18.91 ± 2.501	31.66 ± 3.298	20.11 ± 1.301	25.77 ± 0.91	32.23 ± 2.102	43.57 ± 1.975
<i>t</i>	-1.378	-6.598	-0.605	-7.837	0.293	-9.797
<i>p</i>	0.173	<0.001	0.534	<0.001	0.770	<0.001
Group	Self-responsibility		Self-care ability		Total scores of ESCA	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group	11.86 ± 0.845	17.79 ± 2.065	25.57 ± 0.815	32.03 ± 1.636	69.80 ± 2.260	89.63 ± 3.126
Observation group	12.06 ± 0.802	20.17 ± 1.071	25.94 ± 0.998	43.69 ± 2.049	70.24 ± 2.059	106.83 ± 3.434
<i>t</i>	-1.015	-5.596	-1.705	-24.940	-0.829	-21.913
<i>p</i>	0.314	<0.001	0.093	<0.001	0.410	<0.001

GSES: General Self-Efficacy Scale; ESCA: Evaluation of Self-care Ability Scale.

**TABLE 6. Comparison of nursing compliance (n, %).**

Group	Complete compliance	Partial compliance	Average	Non-compliance	Treatment compliance
Control group	14	18	2	1	32 (91.4%)
Observation group	11	15	6	4	25 (71.4%)
<i>t</i>					4.629
<i>p</i>					0.031

and mental health [19]. In this study, the results have shown that, the self-efficacy and self-care ability of patients in the observation group were better than that in the control group, and the difference was significant ( $p < 0.05$ ). The findings indicated that the hospital discharge plan based on the dual disease management theory could help patients develop confidence to manage their own health and improve their self-efficacy [20]. For instance, the discharge plan provided patients with support groups and exercises plans to help them keep health after discharging [21]. The discharge plan also promoted the collaboration between medical service providers, patients and caregivers to ensure that patients had access to support for self-care [22]. Thus, the hospital discharge plan could improve patients' management of their psychical and mental health and improve self-efficacy and self-care ability after discharging.

Patients' nursing compliance measures the patients' acquisition of the treatment plan, which is critical for managing patients with chronic diseases and preventing patients from readmission [23]. In this study, the results have shown that, the nursing compliance of patients in the observation group was better than that in the control group, and the difference was significant ( $p < 0.05$ ). It indicated that the hospital discharge plan based on the dual disease management theory allowed patients to improve the understanding of their treat-

ment plan and motivated compliance in the treatment implementation. The approach included educational programs on symptom recognition and management, drug management and lifestyle changes *via* a healthier diet and exercises [24], which improved patients' understanding of their treatment plans and the associated advantages [25]. The other reason was that the hospital discharge plan promoted the collaboration between the medical service provider, the patients and the caregivers, allowing patients to understand their treatment plans and gain resources and support [26]. For instance, the discharge plan included appointments with health care providers, phone or video consultations, and access to communities such as support groups. Such social interactions could provide education and support to patients and promote collaboration *via* addressing physical and mental problems [27]. Therefore, the hospital discharge plan based on the dual disease management theory can improve patients' nursing compliance.

## 5. Conclusions

The dual disease management theory has been proved to be effective in the disease management of patients with ACM and heart failure. The approach highlights the interaction between excessive alcohol consumption and cardiovascular diseases and aims at a simultaneous treatment of ACM and

heart failure. Previous studies have shown that, compared with patients who received traditional management, patients receiving dual disease management exhibits lower admission rates, higher quality of life and lower death rates [28]. In conclusion, the dual disease management theory is effectively applicable to patients with ACM and heart failure [29]. The approach provides a comprehensive method to manage the diseases and results in effective outcomes. Further research is needed to optimize the dual disease management method.

## AVAILABILITY OF DATA AND MATERIALS

The authors declare that all data supporting the findings of this study are available within the paper and any raw data can be obtained from the corresponding author upon request.

## AUTHOR CONTRIBUTIONS

JQ, CJL—designed the study and carried them out; JQ, JY, MSW—supervised the data collection, analyzed the data, interpreted the data, prepare the manuscript for publication and reviewed the draft of the manuscript. All authors have read and approved the manuscript.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The ethics committee of the “The Sixth Hospital of Wuhan”, approved the study and waived the requirement for Ethical Approval. Written informed consent was obtained from a legally authorized representative for anonymized patient information to be published in this article.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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