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A Home-Based Heart Failure Nursing Intervention Supporting Self-Management and Lives

Motohiro Sano and Tomoko Majima

Abstract

In the era of a super-aged society, along with the rapid development of medical techniques to treat cardiovascular disease, there are an increasing number of aged patients with heart failure (HF). To cope with this near pandemic, coordinated-HF management combining hospital-based optimal therapy and home-based care is required. Accordingly, the concept of “living with HF” is advocated and is widely accepted as a key to improve patients’ quality of life as well as prognosis. To achieve it, home visiting nursing services are essential. But these services have some difficulties. This chapter shows the importance of promoting self-management for patients with heart failure and intervention strategies in the home care setting.

Keywords: heart failure, self-management, re-hospitalization, home-based intervention, home visiting nursing

1. Introduction

HF is the quintessential cardiovascular syndrome of aging that results from age-related cardiovascular conditions and age-associated changes in cardiovascular structure and function. The prevalence of HF among approximately 1–2% of the adult population in developed countries, rising to $\geq 10\%$ among those over 70 years of age and the most common reason for hospitalization in older adults. Usually, as studies only include diagnosed HF cases, the true prevalence is likely to be higher [1, 2]. Although some progress has been made in reducing mortality in patients with HF, rates of rehospitalization continue to rise and approach 40–50% within 1 year after discharge [3, 4]. To reduce mortality and rehospitalization rate, it is widely recognized that, in addition to optimizing medical and device therapies for HF, attention should also be given to how HF care is delivered. Several position papers that cover non-pharmacological management, discharge planning, and standards for delivering HF care.

Appropriate self-management by patients with HF plays an important role in the prevention of HF decompensation and improvement of survival and quality of life (QOL) [5]. A literature review stated that most HF treatment figure on self-management intervention and focus on self-management strategies, such as to become more informed about their illness and be actively engaged in their own care, which

is necessary to improve the impact of self-management on long-term heart failure outcomes [6]. Therefore, nurses should play a key role in improving self-management by comprehensive patient assessment, patient-centered goal setting, evaluation of outcomes, encouraging health promotion, and self-management education. In addition, self-management for patients with HF support should be a part of routine health care, and effective strategies still need to be embedded into routine care. However, a study that surveyed the knowledge of community nurses revealed that they had a basic understanding of HF but scored poorly on weight assessment, blood pressure management, and reporting to physicians of dizziness [7]. This chapter focuses on self-management and lifestyle advice for patients with HF to prevent exacerbation and rehospitalization in the home setting.

2. Types of HF

Traditionally, HF has been divided into three phenotypes based on the measurement of left ventricular ejection fraction (LVEF). Reduced LVEF is defined as $\leq 40\%$, and left ventricular systolic dysfunction. This is designated as heart failure with reduced ejection fraction (HFrEF). Mildly reduced LVEF is defined as between 41% and 49%. Clinical features and prognosis have not yet been fully characterized. This is designated as heart failure with mildly reduced ejection fraction (HFmrEF). Those with symptoms and signs of HF, with evidence of structural and/or functional cardiac abnormalities and/or raised natriuretic peptides (NPs), and with an LVEF $\geq 50\%$, have heart failure with preserved ejection fraction (HFpEF). No effective treatments have been established. The simplest terminology used to describe the severity of HF is the New York Heart Association (NYHA) functional classification.

The etiology of HF varies according to geography. In western countries and developed countries, coronary artery disease and hypertension are predominant factors. With regard to ischemic etiology, HFmrEF resembles HFrEF, with a higher frequency of underlying CAD compared to those with HFpEF. **Table 1** shows the definition of HF based on LVEF [1].

The simplest terminology used to describe the severity of HF is the New York Heart Association (NYHA) functional classification. The NYHA functional classification was developed by the New York Heart Association as a system to classify patients with heart diseases according to the severity of symptoms resulting from physical

Type		HFrEF	HFmrEF	HFpEF
Criteria	1	Symptoms ± signs	Symptoms ± signs	Symptoms ± signs
	2	LVEF $\leq 40\%$	LVEF 41–49%	LVEF $\geq 50\%$
	3	Mainly contractile insufficiency. Many current studies include her cases of decreased LVEF under standard heart failure treatment as HFrEF	The presence of elevated natriuretic peptides and other structural heart diseases	Objective evidence of cardiac structural and/or functional abnormalities consistent with the presence of LV diastolic dysfunction/ raised LV filling pressures, including raised natriuretic peptides

HF, heart failure; LV, left ventricular; LVEF, left ventricular ejection fraction.

Table 1.
Definition of HF with reduced ejection fraction, mildly reduced ejection fraction, and preserved ejection fraction.

activity and has been used in the severity classification of HF. NYHA class II patients were further classified into those with slight limitation of physical activity (II_s) and those with moderate limitation of physical activity (II_m).

NYHA I is “No limitation of physical activity. Ordinary physical activity does not cause severe fatigue, palpitations, dyspnea or angina.”

NYHA II is “Slight or moderate limitation of physical activity. Comfortable at rest, but ordinary physical activity causes fatigue, palpitations, dyspnea or angina.”

NYHA III is “Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, palpitations, dyspnea or angina.”

NYHA IV is “Unable to carry on any physical activity without symptoms of HF, or symptoms of HF and angina at rest. Even slight activity worsens symptoms.”

3. Risk factors of exacerbation of HF

HF can be prevented from developing, exacerbating, or recurring by various interventions, such as appropriate treatment and medication for risk factors for heart failure, in addition to lifestyle-related management such as diet and exercise. Smoking is a risk factor for cardiovascular disease, and smoking cessation is strongly recommended for smokers because quitting reduces the mortality rate and readmission rate for cardiovascular disease, including HF [8]. Obesity and diabetes are associated with the development of HF, and insulin resistance-based diabetes and metabolic syndrome are both major risk factors for cardiovascular disease and are commonly used in weight loss and exercise therapy. In addition to improving lifestyle habits, comprehensive risk management through comprehensive treatment is required [9]. To prevent the exacerbation of HF, nurses need to understand risk factors and prevention strategies. **Table 2** shows risk factors of exacerbation of HF.

Risk factors	Prevention strategies
Sedentary habit	Regular physical activity
Obesity	Physical activity and healthy diet
Cigarette smoking	Smoking cessation
Excessive alcohol	No/light alcohol intake is beneficial
Influenza	Influenza vaccination
Hypertension	Lifestyle changes, antihypertensive therapy
Dyslipidemia	Healthy diet, statins
Diabetes mellitus	Physical activity and healthy diet, SGLT2 inhibitors
Microbes	Early diagnosis, specific antimicrobial therapy for either prevention and/or treatment
CAD	Lifestyle changes, statin therapy
Chest radiation	Cardiac function and side effect monitoring, dose adaptation
Cardiotoxic drugs	Cardiac function and side effect monitoring, dose adaptation, change of chemotherapy

CAD, coronary artery disease; SGLT2, sodium-glucose co-transporter 2.

Table 2.
Risk factors of exacerbation of HF.

4. Importance of self-management for patients with HF

HF is one of the most common causes of hospital admissions and readmissions. A recent review revealed that nurse-led hospital-to-home transitional care interventions reduced the risk of all-cause mortality and heart failure-related hospitalizations, and improved health-related quality of life (HRQOL) and heart failure knowledge compared to usual care. The narrative summary of evidence for self-care behaviors showed positive intervention effects [10, 11]. Generally, nurse-led hospital-to-home transitional care interventions may play a beneficial role in decreasing mortality and improving HRQOL and self-care behaviors for patients with HF. Therefore, self-management is the cornerstone of HF management. Self-management comprises adherence to behaviors, such as maintaining a low sodium diet and medication regimen, as well as symptom monitoring to maintain physiological stability and response to symptoms when they occur [12]. However, there are some concerns. First, previous studies have different contents and modes of intervention, evaluation tools, and there is a publication bias in the outcome of quality of life, which might lead to selection bias, detection bias, and attention bias. Second, due to the diverse durations of interventions and length of follow-up, these factors may affect the long-term effects of self-management interventions. As stated above, further considerations are needed to show the optimal self-management interventions in patients with HF.

5. Processes of self-management and restructuring own lifestyles

To promote self-management for patients with HF and support their lives, nurses need to understand patients’ perspectives. Sano et al. described the process of self-management among elderly patients with HF who had avoided re-hospitalization for over 2 years [13]. They identified three sub-concepts and one core-concept. **Table 3** shows core-concept and three sub-concepts of self-management of patients with HF [13].

Core-concept	
Balance between preventing decompensation and preferences	Begin new exercise or hobby within capabilities Adjust physical activity to reduce heart failure symptoms Modify diet to prevent decompensation. Tell friends and acquaintances about their own illness to avoid overeating or overwork. Choose how to modify their old lifestyle Make personal choices on how to avoid stress. Manage CHF without decompensation
Sub-concepts	
Perception of HF	Sudden development of heart failure symptoms. Cognition that heart failure contributes to uncomfortable feeling or cough, etc. Understanding of causes of heart failure from rehospitalization experience
Encountering a new situation	Understanding that heart failure can be caused by lifestyle Desire not to repeat rehospitalization or necessity for early consultation Daily activity evokes heart failure symptoms
Life coordination for HF	Thinking about lifestyle modification to avoid the discomfort associated with heart failure and additional treatment Limit activities to reduce heart strain Maintain a job or hobby to live meaningfully

Table 3.
Core-concept and sub-concepts.

The sub-concepts were perception of heart failure, encountering a new situation, and life coordination for heart failure. The sub-concepts yielded a single core-concept—balance between preventing decompensation and preferences. Patients with HF experience each sub-concept in no particular order and acquire a lifestyle tailored to the condition of HF. Then, when the state of HF becomes stable, not only actions for preventing the worsening of HF but also their own values and preferences are taken in, and the balance between them is maintained. A conceptual model was developed to illustrate the interactive relationships among the sub-concepts and the core-concept (**Figure 1**). **Figure 1** shows a conceptual framework of self-management among patients with HF [13].

5.1 Perception of HF

This sub-concept means that patients with HF experienced the onset of HF by sudden dyspnea and abnormal changes in their bodies. As a result of seeking medical care, they subsequently learned that their abnormal changes were symptoms of HF. Sources of HF information included inpatient and outpatient settings, from medical staff and laypeople, they encountered in daily life. After hospitalization, patients with HF understand that the onset of HF and deterioration of symptoms was related to several factors, such as living habits, work and overwork, fluid retention, excessive salt intake, and untreated high blood pressure.

5.2 Encountering a new situation

This sub-concept means that once the patients with HF understood how HF was related to their lifestyle, they noticed how the hospital environment was different from their own life at home in terms of activity, reducing salt intake, and management of blood pressure. They began confronting the reality that simple acts, like putting on their socks or cutting their nails, would become more difficult after hospitalization.

Figure 1.
Conceptual framework.

5.3 Life coordination

This sub-concept means that patients with HF reported that they did not want to experience that painful experience again. They believed that it had been a bad decision to just endure the pain and accept the abnormal physical changes as their condition became more severe. At the same time, they began to look back on their lifestyle selections; these led to behavioral modifications to avoid both painful experience and re-hospitalization. They understand that they could not continue living as they had before hospitalization; they could not avoid re-hospitalization if they did not change their lifestyle.

They also reported limiting their work. They began to adapt their lifestyle to one compatible with HF by limiting activities they had previously engaged in. Meanwhile, they were determined to continue living a worthwhile and energetic life.

5.4 Balance between preventing decompensation and preferences

This core-concept means that patients with HF try to maintain their age-long preferences to give their life a purpose, such as by maintaining long-term friendships and continuing to engage in interests. Instead of limiting all their activities, they stop engaging in activities that they learn would be bad for their heart and choose to continue those activities not be harmful.

They seek medical guidance to determine which activities were considered good for the heart or feasible within the scope of their limited lifestyle. They begin to reassemble their life into ones that do not put a strain on the heart while making up for lost parts of their life as a result of HF. They describe taking walks, singing a song, and engaging in new physical activities or hobbies within their realm of possibility. They determine which activities caused symptoms to appear and how far they could push themselves even if these were vacation activities or when invited by acquaintances. They make an effort to exercise at their own pace and master how to regulate their amount of exercise so as to avoid placing strain on the heart and causing symptoms.

They also utilize the knowledge they have acquired on limiting alcohol consumption and on excessive fluid and salt intake, which are related to water retention and edema. In doing so, they can prevent exacerbating their HF by modifying their diet. Nonetheless, they are faced with many situations that are difficult to avoid, such as opportunities to go drinking or eating out with others. In these situations, they make an effort to mitigate factors that would exacerbate their HF by avoiding overeating and overexertion, and by informing the people around them of their limits in advance. This allows patients to maintain their work and harmonious social lives while avoiding a diet that might lead to the exacerbation of HF.

Although they are aware of the need to modify their lifestyle, they believe that stress is worse and that it would be better to reduce stress by eating what they liked. Thus, they believe in prioritizing values over exacerbating their condition and giving priority to their preferences to avoid stress instead of respecting their limitations. They acknowledge having chosen to avoid stress over causing HF symptoms and pain. These thoughts, actions, and lifestyle choices demonstrate the complexity of symptom management in HF even when patients want to avoid exacerbating their condition. Apparently, they accept some deterioration because they want to act on their preferences and avoid the stress of compliance.

In summary, nurses need to recognize and value patients' views and experiences to support their self-care management.

6. Assessments of patients with HF for promoting self-management and supporting their lives

The self-management process is a process of living life such that symptoms do not worsen while balancing good choices and preferences. By trial and error, the patients with HF try to find the limits of physical capacity and dietary choices that would lead to the worsening of symptoms, while also trying to maintain quality of life to the extent possible [13]. Based on the process of self-management of patients with HF, it is possible to guide the assessment viewpoints to support self-management and their lives. It is important to understand the components of self-management. Components of self-management are “Experience and knowledge about HF,” “Self-monitoring and Early perception,” and “Life coordination for HF and to live meaningfully.” The examples of the assessment viewpoints are shown below.

6.1 Experience and knowledge about HF

Acquisition and experience of knowledge about HF strongly contribute to the improvement of self-care skills, and lack of knowledge may decrease adherence and be a barrier to starting self-care behavior [12, 14]. In addition, patients with HF who understand and recognize the advice of medical professionals benefit the preventing worsening symptoms and readmission that can tend to have good adherence and perform self-care behavior [15]. In the process of self-management, knowledge and understanding of heart failure affect the entire self-management process and need to be continually confirmed even after moving from hospital to home. Assessment viewpoints include—(1) cognition that HF, (2) understanding of causes of HF (**Table 4**).

Assessment viewpoint	Example
Experience of the onset of HF, exacerbation, and hospitalization	How does the patient recognize the symptoms of heart failure?
	How does the patient perceive the symptoms of exacerbation of heart failure? (e.g. lower limb edema, shortness of breath, reduction of urine output, nocturnal cough, etc.)
Understanding causes of HF	Does the patient understand the behaviors/actions that lead to the exacerbation of heart failure? (e.g. inadequate physical activities, long haul travel, overactive, etc.)
	Does the patient understand the lifestyles that lead to the exacerbation of HF? (e.g. excessive alcohol and/or fluid and/or salt intake, smoking)

Table 4.
Assessment of experience and knowledge about HF.

6.2 Self-monitoring and early perception

It is said that less than half of the patients with HF regularly perform self-monitoring, such as measuring weight and confirming the degree of edema. The receiving treatment tends to be delayed due to the disagreement between the present HF symptoms and the patient’s perception, but utilizing past knowledge and experience and receiving high-quality social support, it is possible to respond appropriately and early to the symptoms [16]. Symptom monitoring behavior is also a predictor of appropriate self-care management,

Assessment viewpoint	Example
Self-monitoring behaviors	Does the patient regularly measure his/her own weight and blood pressure?
	Does the patient regularly check the symptoms of HF? (e.g. lower limb edema, shortness of breath, reduction of urine output, nocturnal cough, etc.)
Self-monitoring circumstance	Does the patient has a sphygmomanometer and scale?
	Does the patient has a habit of maintaining track of his/her own conditions?
	Has the patient devised a way to remember the measurement and tracking?

Table 5.
Assessment of self-monitoring abilities.

and regular symptom monitoring for appropriate self-management practice is recommended [17]. To maintain and promote self-monitoring in patients with HF, we need to support patients with HF by performing daily monitoring, integrating knowledge, and past experiences regarding HF to determine how to evaluate their own conditions and take actions. **Table 5** shows the viewpoint of assessment of self-monitoring abilities.

6.3 Life coordination for HF and living meaningfully

In the stable period, excessive rest causes a decrease in exercise capacity and exacerbates fatigue and dyspnea during exertion, so moderate exercise increases exercise capacity, and it has been clarified that it leads to improvement of symptoms and improvement of QOL [5]. Appropriate exercise tolerance, evaluation of activities of daily living, and correction of physical activity and living behavior in consideration of physical function and living environment for each heart failure patient are required. **Table 6** shows the viewpoint of assessment of lifestyle and life circumstance.

6.4 Evaluation of exercise tolerance

Specific activity scale (SAS) specifies the metabolic equivalents (METs) for each physical activity, and it is possible to estimate the physical activity level from the

Assessment viewpoint	Example
Lifestyle and values	What are the long-standing hobbies and/or tastes?
	What about housework?
	What about regular exercise? (e.g. frequency, intensity, times, etc.)
	What about social activities and/or neighborhood relationships?
	Scheduled long-haul travel?
Life circumstance	Bedroom location (1st floor or 2nd floor? Using stairs?)
	How about installing bedding and handrails?
	Type and amount of seasoning
	What is the transportation for shopping and going out?
	Is there a steep slope in the neighborhood?

Table 6.
Assessment of lifestyle and life circumstance.

Ask questions about the following items and ask them to answer either “yes” or “no.” The amount of exercise (METs) of the item for which the answer “no” appears for the first time is used as an index of the minimum amount of exercise in which symptoms appear		
Have a good sleeping	1MET	NYHA IV
Feel better when lay on the bed	1MET	
Eat something and wash face by yourself	1.6METs	
Could go to the toilet by yourself	2METs	NYHA III
Could change clothing by yourself	2METs	
Could prepare food and clean room	2-3METs	
Could prepare the bed by yourself	2-3METs	NYHA II
Could clean the floor	3-4METs	
Could take shower by yourself	3-4METs	
Could walk 100-200 m on the ground as normal people	3-4METs	
Could clean the grass in the garden	4METs	
Could take a bath by yourself	4-5METs	
Could go upstairs as a normal people	5-6METs	NYHA I
Could do some light farm working	5-7METs	
Could walk fast on the ground	6-7METs	
Could play tennis	6-7METs	
Could do jogging (8 km/h) 300–400 m	7-8METs	
Could do swimming	7-8METs	NYHA I
Could skip rope	8METs	

Table 7.
SAS, METs, and the NYHA classification.

questionnaire [18]. METs are often used in clinical practice as a simple indicator of exercise intensity. NYHA classification is classified according to the degree of restriction of daily activities, and this classification is widely used for heart disease, especially in the stable period of HF. Its usefulness is high, and many reports have been made regarding its association with exercise tolerance and prognosis. The NYHA classification is simple and useful, but the content of the activity that is the basis of judgment is not clear, so SAS was developed to supplement it. SAS has tested the reproducibility and validity of the NYHA classification and METs. It is said to be more closely related to exercise tolerance and prognosis than the NYHA classification [19]. Physical activity that triggers the onset of HF symptoms is quantified by METs. **Table 7** shows the correspondence table between SAS, METs and NYHA classification [19].

7. Conclusions

HF is a severe public health problem all over the world. Adequate patient self-management is essential in the effective management of HF. Patients with HF who report more effective self-management have better QOL, lower readmission rates, and reduced mortality.

This chapter gives an overview of the current situation of patients with HF and self-management and shows the viewpoint of promoting self-management and supporting lifestyle. Supporting patient's life in the home setting, it is necessary to focus on their lifestyle, circumstance, and values before educational interventions. We believe that this chapter can be used not only for nurses in the home setting but also nurses in hospital settings who are involved with patients with HF at the time of discharge support.

Conflict of interest

The authors declares no conflict of interest.

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