Disease knowledge, self-care behaviours and life quality in heart failure: Experience of the Taiwan National Health care

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ABSTRACT

Introduction: Heart failure (HF) is associated with poor health-related quality of life (HRQoL). In Taiwan, the medical resources and health-care insurance program for HF patients differs from those available in the West. This study sought to test whether there is any change in knowledge, self-care behaviour and HRQoL during 1-year of follow-up under the Taiwan national health-care insurance programme and education by cardiologists at an outpatient clinic. **Materials and Methods:** 141 HF patients with New York Heart Association (NYHA) class II or III were enrolled at the outpatient clinic three months after stabilisation. Questionnaires on knowledge, self-care, and HRQoL were administered at baseline and after one year. At the end of the study, 36 (26%) patients were lost to follow-up leaving 105 patients in the study. **Results:** Overall, there was improvement in knowledge, self-care, and HRQoL (p<0.0001) of patients with HF (Class II and III combined) after one year of follow up. Subgroup analysis showed that the improvement of HRQoL was significant only in class III patients. Compared to class II patients at baseline, class III patients had poorer knowledge (p=0.03) and HRQoL (p<0.0001), however exhibited significant improvements in knowledge (p=0.02) and HRQoL (p=0.001). Multivariate analysis showed that functional class (p<0.001) and education level (p=0.03) were independent parameters correlated with the improvement in HRQoL. Compared to class II patients, class III patients had better HRQoL at 1-year and this was significantly associated with better self-care (p<0.0001). **Conclusion:** In patients with stable HF followed under the Taiwan national health-care insurance by cardiologists at an outpatient clinic, HRQoL improved modestly but more significantly in the NYHA class III subgroup. In the future, it should be tested whether the interventions specific for self-care behaviour in class III patients may yield substantial improvement in HRQoL.

Keywords: Cardiac failure, quality of life, disease knowledge, self-care behaviour

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INTRODUCTION

Heart failure (HF) is associated with poor quality of life (HRQoL) due to recurrent hospi-

talisation, and symptom-related limitations in functional activities. [1, 2] As patients with HF grow older, survival as the gold standard of care is slowly being replaced by measures of HRQoL. [3] Assessment of HRQoL is now commonly included as an efficacy endpoint in clinical trials of chronic disease management. [4, 5] Furthermore, as reported by recent studies, HRQoL indexes have been shown to provide additional predictive value with respect to both mortality and HF-related rehospitalisations beyond that of traditional predictors. [6, 7] Although investigators are searching for potential interventions to improve HRQoL of patients with HF, progress has been substantially limited due to the lack of a thorough understanding of HF populations with respect to what targets should be sought.

In Taiwan, the medical resources and healthcare environment for HF patients differ from that of Western countries. The population density of Taiwan is 637.29 persons per km^2, the 10^{th} highest in the world. Of 22.9 million citizens, 97% are covered by the National Healthcare Insurance Programme. Under the programme, individuals can visit medical specialists directly, without referral by family doctors. Accordingly, the physicians in charge of the primary care of patients with HF are usually cardiologists instead of general physicians. In this system, patients typically see the cardiologist once a month in the first year after an episode of acute HF. Compared to Europe and the United States, the different insurance plan and medical-searching behaviour in Taiwan may yield different outcomes in patients with HF. However, no related data have been reported on this topic.

Previous reports from Europe demonstrated that the intervention of a HF team improved the HRQoL in patients with HF. [8-11] In contrast, HRQoL worsened in those without intervention. On this basis, this study was designed to investigate: i) Changes of disease knowledge, self-care behaviour, and HRQoL in patients with HF during 1-year of follow-up under the Taiwan National Health Insurance system by cardiologists in a clinic; ii) The relationship of disease knowledge and self-care behaviour to HRQoL; and iii) The subgroup of HF patients with the greatest potential for improvement.

MATERIALS and METHODS

Study Patients

A longitudinal design with a 1-year follow-up was used for the current study. From January 2008 to April 2009, 141 patients were recruited from the outpatient department in a teaching hospital in northern Taiwan. The inclusion criteria were: i) the patient was diagnosed with HF (systolic and diastolic); ii) The diagnosis of HF was based on chest radiograph showing acute pulmonary oedema, and echocardiography which revealed ventricular hypertrophy, abnormal diastolic function, significant valvular abnormality, or left ventricular ejection fraction less than 40%; iii) The patient was conscious, orientated and able to communicate verbally; iv) Discharged from the hospital after a HF-related hospitalisation more than 3 months prior to enrollment; v) No psychiatric or cognitive problems as determined by medical record review and patient interview; vi) Age 20 years and older. Exclusion criteria included being bed-ridden for more than 3 months and/or unable to walk alone, severe vision or hearing disability and life expectancy of less than 6 months.

Patients were followed at the cardiology clinic on a monthly basis with no specific interventions, such as cardiac physiotherapy. At baseline and after one year, questionnaires were administered to test patients with respect to disease knowledge, self-care behavior, and HRQoL. The study was designed and carried out in accordance with the principles of the Declaration of Helsinki and with approval from the Ethics Review Board of Chang Gung Memorial Hospital. Written informed consent was obtained from all subjects.

Measures

Disease knowledge

The Dutch HF Knowledge Scale was used to measure the level of HF knowledge.[12] The instrument is a self – administered questionnaire consists of 15 multiple – choice questions regarding general knowledge of HF (4 questions), incorrect disease knowledge (3 questions), HF treatment knowledge (6 questions on diet, fluid restriction, activity and symptom) and HF symptom recognition (5 questions). The scale has a minimum score of 0 (no knowledge) and a maximum score of 100 (optimal knowledge). The Cronbach's alpha value of the original question was 0.62. After being translated to the Chinese version, the Cronbach's alpha value was 0.88.

Self-care behaviour

The European Heart Failure Self-care Behaviour Scale (EHFScBS) was used to measure self-care behaviour. [13] The EHFScBS scale contains 12 questions in total and its Cronbach's alpha value was 0.81. After being translated to the Chinese version, the Cronbach's alpha value was 0.70. Each question is valued from 1 to 5, and the total score of the questionnaire thus ranges from 12-60. A higher score indicates poorer self-care behaviour.

HRQoL of HF patients

The Minnesota Living with Heart Failure questionnaire (MLWHF) is a disease-specific HRQoL instrument. [5, 14] The contents include two subscales, physical and emotional. The questionnaire aims at obtaining data concerning how patients feel about the changes in their life as a result of HF or related medical treatments in the past month. The instrument includes 21 questions with each question scored from 0 to 5, thus giving a range of total scores of 0-105. A higher score indicates lower HRQoL. Cronbach's alpha value of the questionnaire was 0.88-0.93. After translation to the Chinese version, the Cronbach's alpha value was 0.87. The changes in HRQoL between baseline and at one year follow up were calculated by substrating the HRQoL at 1-year by the HRQoL at baseline. A negative value indicates an improvement in HRQoL.

Other variables

Demographic data (age, educational level, and marital status) and clinical characteristics (New York Heart Association [NYHA] functional classification, comorbidities, and medications) were collected by questionnaires, medical record review, and patient interviews. The NYHA classification was developed to evaluate the effect of cardiac symptoms on the daily activities of a cardiac patient. [2, 15] It consists of four classes ranging from class I (no symptoms that have an impact on ordinary daily activities) to class IV (symptoms occur even at rest). Patient NYHA classification was determined by in-depth interviews using a standardised instrument (clinical characteristics questionnaire) by the investi–

gators or trained nurse research associates.

Statistical Analysis

The Statistic Package for Social Sciences (SPSS version 12.0, Inc., Chicago, IL, USA) was used for all data analyses. Descriptive statistics used included frequency, percentage, mean and standard deviation. Analytical statistics used included paired and unpaired *t*-test, Pearson's Correlation and linear regression analysis. The regression was performed in a stepwise manner. All variables with a univariate *p* value of <0.1 were candidates for inclusion, and those with a multivariable *p* value <0.05 were retained in the multivariate analysis model. Significant level of *p* value was set at <0.05.

RESULTS

At baseline, 141 patients with chronic HF were enrolled at the outpatient clinic. Most of the patients had NYHA class II HF and were older than 65 years (Table 1). At the end of the one year, 36 (26%) patients were lost to follow-up (13 patients died, 8 patients refused to participate, and 15 patients were lost). The demographic data were compared between the patients with complete follow-up and those with loss to follow-up (Table 1). There was a trend that the patients who dropped out had a higher prevalence of NYHA class III (p=0.05). There were no significant differences in the other demographic variables. The final analysis was performed with 105 patients.

At one year follow-up, there were significant improvements in knowledge (from 24.8 ± 19.8 to 35.0 ± 24.1, p<0.0001), behaviours (from 37.4 ± 8.6 to 29.2 ± 8.2, p<0.0001), and HRQoL (from 38.4 ± 20.2 to 29.4 ± 18.8, p<0.0001) compared to baseline. A better HRQoL at baseline was associated with a higher monthly income, a lower NYHA functional class, and the absence of chronic kidney disease (p<0.001) (Table 2). At the end of the one year, a better HRQoL was correlated with male gender, a higher educational level, a lower NYHA functional class, living with spouse, and the absence of chronic kidney disease (p<0.0001). The change in HRQoL from baseline to one year was related to baseline NYHA class only (p< 0.001). The improvement of HRQoL in class III patients was significantly higher than that in class II patients.

Between class II and III patients, class III patients had a lower disease knowledge level at baseline (p=0.03), worse HRQoL at baseline (p<0.0001) and at one year (p<0.0001), but greater improvement in disease knowledge (p=0.02) and HRQoL (p=0.001) from baseline to one year (Table 3). However, there was no significant difference between class II and III patients in self-care behaviour at baseline and one year, and in the improvement from baseline to one year.

HRQoL at baseline was not associated with knowledge and self-care behaviour at baseline in the whole cohort or in the subgroups of class II or III patients (Table 4). HRQoL at one year was related to the HRQoL at baseline in class II patients (p<0.0001), but not in class III patients. However, in class III patients HRQoL at one year was significantly related to self-care behaviour at one year (p<0.0001), but not related to knowledge and self-care behaviour at baseline or knowledge at one year. In class II patients,

Table 1. Comparison between patients with complete follow-up and patients with loss to follow up

	Complete follow-up (n=105)	Loss to follow up (n=36)	p value
Variables			
Age (> 65 years)	64 (61.0)	26 (72.2)	0.32
Gender: Male	54 (51.4)	19(52.8)	1.00
Education			0.14
Primary school	69 (65.7)	29 (80.6)	
Juniour high school	36 (34.3)	7 (19.4)	
Spouse			0.44
Yes	66 (62.9)	20 (55.6)	
Personal economic (USD/month)			0.64
< 580	83 (79.0)	27 (75.0)	
≥ 580	22 (21.0)	9 (25.0)	
Living arrangement			0.47
Live alone	11 (10.5)	8 (22.2)	
Living with spouse, relatives relatives, n(%)	94 (89.5)	28 (77.8)	
Clinic visits			1.00
Family accompanies	55 (52.4)	19 (52.8)	
Comes alone	50 (47.6)	17 (47.2)	
Disease characteristics			
Disease history (years)	3.4±2.4	3.3±2.5	0.69
Functional classification			**0.05**
NYHA Class II	65 (61.9)	15 (41.7)	
NYHA Class III	40 (38.1)	21 (58.3)	
Comorbidity			
Hypertension	74 (70.5)	23 (63.9)	0.53
Old stroke	11 (10.5)	5 (13.9)	0.56
Chronic kidney disease	22 (21.0)	13 (36.1)	0.78
Diabetes mellitus	52 (49.5)	18 (50.0)	0.90
Chronic lung disease	23 (21.9)	8 (22.2)	1.00
Medication			
ACEI or ARB	68 (64.8)	25 (69.4)	0.69
β-blocker	54 (51.4)	20 (55.6)	0.70
Diuretic	75 (71.4)	31 (86.1)	0.12
Continuous variables			
Knowledge (baseline)	24.5 ± 19.9	28.5 ± 22.9	0.32
Self care Behaviour (baseline)	43.0 ± 9.4	43.7 ± 9.3	0.69
HRQoL (baseline)	38.1 ± 20.0	40.8 ± 18.0	0.48

Data are presented as number (percentage). ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor type 1 antagonist; HRQoL, health-related quality of life; LVEF, left ventricular ejection fraction; NYHA, New York Heart Association.

HRQoL at one year was not associated with knowledge or self-care behaviour at baseline or at one year.

Since the improvement of HRQoL at one year was significantly related to better self-care behavior for controlling HF, variables and potential interventions to improve self-care behavior at one year were analysed. A better self-care behaviour at one year was found to be significantly correlated with male gender (p=0.02), better disease knowledge at baseline (p=0.04) and one year (p<0.001), and the improvement in knowledge from baseline to one year (p=0.01) (Table 5).

In univariate analysis (Table 2), NYHA functional class was associated with the improvement of HRQoL from baseline to one year. Multivariate analysis was performed to test whether NYHA functional class at baseline was an independent variable in predicting

Table 2. Clinical variables associated with HRQoL at baseline and at 1-year and change from baseline to 1-year in all patients (n=105)

Variables	HRQoL Baseline	p value	HRQoL 1-year	p value	HRQoL Change	p value
Demographic variables						
Age		0.97		0.70		0.69
≤ 65 (n=41)	38.5 ± 22.1		28.8 ± 19.7		-9.7 ± 23.1	
> 65 (n=64)	38.3 ± 19.0		30.2 ± 18.4		-8.1 ± 19.0	
Gender		0.56		**0.02**		0.10
Male (n=53)	37.2 ± 20.2		25.2 ± 14.2		-11.9 ± 19.2	
Female (n=52)	39.5 ± 20.3		34.1 ± 21.8		-5.38 ± 21.6	
Education		0.67		**0.05**		0.19
Primary school (n=69)	39.0 ± 18.5		32.2 ± 19.0		-6.8 ± 20.5	
Junior high school (n=36)	37.1 ± 23.3		24.7 ± 17.7		-12.4 ± 20.6	
Marital status		0.15		**0.04**		0.63
Yes	36.1 ± 19.7		26.7 ± 18.9		-9.5 ± 18.5	
No	42.0 ± 20.7		34.5 ± 17.9		-7.5 ± 23.9	
Personal economics (USD/month)		**0.01**		0.22		0.12
< 580 (n=76)	41.7 ± 20.5		31.1 ± 19.2		-10.6 ± 20.6	
≥ 580 (n=29)	29.6 ± 13.6		26.0 ± 17.5		-3.7 ± 20.1	
Living arrangement		0.42		0.79		0.59
Live alone (n=10)	33.4 ± 14.6		28.1 ± 16.8		-5.3 ± 18.6	
Live with family (n=95)	38.9 ± 20.7		29.8 ± 19.1		-9.1 ± 20.9	
Clinic visits		0.10		0.20		0.68
Family accompanies (n=55)	41.4 ± 20.6		31.9 ± 19.6		-9.5 ± 20.7	
Comes alone (n=50)	35.0 ± 19.4		27.2 ± 17.8		-7.8 ± 20.7	
Functional status		**<0.001**		**<0.001**		**<0.001**
NYHA class II (n=65)	28.4 ± 15.3		24.7 ± 17.2		-3.7 ± 17.1	
NYHA class III (n=40)	54.6 ± 16.4		37.8 ± 18.7		-16.8 ± 23.4	
Comorbidity						
Hypertension		0.76		0.15		0.11
Yes (n=75)	38.0 ± 19.5		31.3 ± 19.0		-6.6 ± 20.3	
No (n=30)	39.3 ± 22.1		25.5 ± 17.9		-13.9 ± 21.5	
Old stroke		0.91		0.65		0.76
Yes (n=11)	37.7 ± 23.2		27.2 ± 19.0		-10.5 ± 15.3	
No (n=94)	38.4 ± 19.9		30.0 ± 18.9		-8.5 ± 21.2	
Chronic kidney disease		**<0.001**		**<0.001**		0.24
Yes (n=23)	49.0 ± 17.9		44.9 ± 20.1		-4.2 ± 24.8	
No (n=82)	35.4 ± 19.9		25.4 ± 16.1		-10.0 ± 19.3	
Diabetes Mellitus		0.64		0.87		0.76
Yes (n=51)	37.4 ± 19.9		29.4 ± 18.1		-8.1 ± 19.5	
No (n=54)	39.3 ± 20.6		29.9 ± 19.7		-9.3 ± 21.8	
Chronic lung disease		0.41		0.57		0.77
Yes (n=22)	41.6 ± 20.6		31.7 ± 18.2		-9.9 ± 25.0	
No (n=83)	37.5 ± 20.1		29.1 ± 19.0		-8.4 ± 19.4	
Medications						
ACEI or ARB		0.52		0.59		0.90
Yes (n=68)	37.4 ± 20.7		28.9 ±17.0		-8.5 ± 20.3	
No (n=37)	40.1 ± 13.6		31.0 ± 21.9		-9.1 ± 21.5	
β-blocker		0.51		0.98		0.53
Yes (n=55)	36.8 ± 19.6		29.9 ± 17.7		-6.9 ± 20.0	
No (n=48)	39.4 ± 20.7		29.9 ± 20.1		-9.5 ± 20.4	
Diuretic		0.19		0.65		0.39
Yes (n=75)	40.0 ± 21.0		30.2 ± 19.0		-9.8 ± 21.4	
No (n=30)	34.3 ± 17.8		28.3 ± 18.5		-5.9 ± 18.6	

ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor type 1 antagonist; HRQoL, health-related quality of life; LVEF, left ventricular ejection fraction; NYHA, New York Heart Association.

Table 3. Differences in disease knowledge, self-care behaviour and HRQoL between NYHA class II and III patients.

Variables	NYHA Class II (n=65)	NYHA Class III (n=40)	*p* value
Knowledge			
Baseline	28.1 ± 20.9	19.5 ± 16.8	**0.03**
1-year	36.4 ± 23.8	32.7 ± 24.5	0.44
Change in knowledge	8.3 ± 22.6	13.2 ± 23.4	**0.02**
Self-care behaviour			
Baseline	37.4 ± 10.8	37.4 ± 6.4	0.99
1-year	29.7 ± 8.7	28.5 ± 7.6	0.59
Change in self-care behaviour	-7.7 ± 12.9	-8.9 ± 9.4	0.59
Health related quality of life (HRQoL)			
Baseline	28.4 ± 15.3	54.6 ± 16.4	**<0.0001**
1-year	24.7 ± 17.2	37.8 ± 18.7	**<0.0001**
Change in HRQoL	-3.7 ± 17.1	-16.8 ± 23.4	**0.001**

the improvement in HRQoL after adjusted for education, gender, personal economics, the presence of chronic kidney disease, and knowledge and self-care behaviour at base-line. The linear regression model demon-strated that NYHA functional class (odds ratio: -14.74, 95% CI: -6.86 to -22.61, $p<0.001$) and education level (odds ratio: -8.50, 95% CI: -0.45 to -16.55, $p<0.03$) were the two significant and independent parameters correlated with improvement in HRQoL from baseline to one year later.

Table 4. Relationship of disease knowledge and self-care behaviour to HRQoL in all patients and subgroups.

Variables	HRQoL (baseline) r, *p* value	HRQoL (1-year) r, *p* value
All (n=105)		
HRQoL (baseline)	-	0.44, p <0.0001
Knowledge (baseline)	-0.14, p = 0.15	-0.11, p = 0.26
Self-care behaviour (baseline)	-0.03, p = 0.79	0.01, p = 0.92
Knowledge (1-year)	-0.08, p = 0.44	0.04, p = 0.69
Self-care behaviour (1-year)	-0.05, p = 0.63	0.14, p = 0.16
NYHA class II (n=65)		
HRQoL (baseline)	-	0.44, p <0.0001
Knowledge (baseline)	-0.13, p = 0.30	-0.11, p = 0.39
Self-care behaviour (baseline)	-0.05, p = 0.71	0.00, p = 0.98
Knowledge (1-year)	-0.14, p = 0.27	0.17, p = 0.16
Self-care behaviour (1-year)	-0.01, p = 0.92	0.12, p = 0.36
NYHA class III (n=40)		
HRQoL (baseline)	-	0.17, p = 0.29
Knowledge (baseline)	0.01, p = 0.93	0.07, p = 0.69
Self-care behaviour (baseline)	0.16, p = 0.33	0.03, p = 0.87
Knowledge (1-year)	-0.06, p = 0.71	0.04, p = 0.80
Self-care behaviour (1-year)	0.03, p = 0.87	0.34, p = 0.03

DISCUSSION

Our data showed significant improvements in disease knowledge, self-care behaviour, and HRQoL from baseline to one year among patients with HF followed in the outpatient setting under regular health-care covered by the Taiwan National Health Insurance. Compared to NYHA class II patients, class III patients had a lower knowledge level and lower HRQoL at baseline; however, the improvement in HRQoL was demonstrated more remarkably in class III patients. Actually, NYHA class is an independent predictor of the improvement in HRQoL after one year follow-up. Further analysis revealed that the HRQoL at one year in the class III patients was associated with self-care behaviour. To achieve better self-care behaviour at one year, as suggested by our study, one of the potential interventions to be tested is to upgrade disease knowledge level of HF.

There are a few reports with respect to longitudinal follow-up of the HRQoL in patients with HF stabilised at least three months after an acute HF episode. Martensson *et al.*[9] performed a one year follow-up of 75 HF patients with average age of 75 years, mostly

Table 5. Clinical variables associated with the self-care behavior at one year in patients with New York Heart Association functional classification III (*n* = 40).

	n	Behaviour at 1-year	p value
Dichotic variables			
Age (< 65 years / > 65 years)	11 / 29	25.5 ± 7.7 / 29.6 ± 7.3	0.12
Gender (Male / Female)	22 / 18	25.9 ± 6.1 / 31.6 ± 8.2	0.02
Education (Primary school / Junior high school)	31 / 9	28.6 ± 7.9 / 27.9 ± 6.6	0.80
Marriage (Yes / No)	19 / 21	27.8 ± 5.7 / 29.1 ± 9.0	0.61
Personal economics (USD/month)			0.99
< 580 / > 580	33 / 7	28.5 ± 7.7 / 28.4 ± 7.5	
Living arrangement			0.30
Lives alone / with spouse, children or relatives	5 / 35	31.8 ± 12.3 / 28.0 ± 6.8	
Clinic visit			0.31
Family accompanies / Comes alone	25 / 15	29.4 ± 6.2 / 26.9 ± 9.4	
LVEF (%) (< 40% / > 40%)	19 / 21	28.6 ± 6.9 / 28.3 ± 8.3	0.92
Co morbidity			
Hypertension (Yes / No)	28 / 12	29.3 ± 8.0 / 26.6 ± 6.4	0.31
Old stroke (Yes / No)	5 / 35	25.8 ± 4.3 / 28.8 ± 7.9	0.66
Chronic kidney disease (Yes / No)	12 / 28	29.3 ± 9.1 / 28.1 ± 6.9	0.64
Diabetes Mellitus (Yes / No)	21 / 19	30.1 ± 8.2 / 26.7 ± 6.6	0.16
Chronic lung disease (Yes / No)	13 / 27	29.7 ± 6.2 / 28.9 ± 8.2	0.48
Medications			
ACEI or ARB (Yes / No)	22 / 18	29.2 ± 7.6 / 27.6 ± 7.7	0.51
β-blocker (Yes / No)	16 / 22	30.0 ± 6.8 / 28.3 ± 7.8	0.48
Diuretic (Yes / No)	31 / 9	28.4 ± 7.3 / 28.6 ± 8.8	0.96
Continuous variables		***r* value**	
Knowledge (baseline)		-.31	0.04
Knowledge (1-year)		-.57	<0.001
Change in knowledge		-.42	0.01

94%) NYHA class II or III, stabilised one month after acute HF. Without intervention, their data demonstrated significant deterioration in physical function after both three and 12 months. Carson *et al.*[16] studied 1050 African Americans (inclusive of patients with NYHA class III and class IV) three months after hospitalisation for an acute HF episode. In their control group, there was also significant improvement in HRQoL, albeit minimally at 12 months even without specific educational intervention. The different results of these two studies suggest that a worse functional class may reinforce the sense of disease and thus lead to an increased desire for self-education to improve HRQoL. A worse functional class does not indicate a lower potential to improve. Our data support this notion based on the findings that significant improvement in HRQoL was noted only in class III patients.

Similar to our results, Carson *et al*. [16] reported that in class III-IV patients a higher functional class was related to worse HRQoL at baseline. The improvement in HRQoL was noted only in class III patients, who demonstrated a 4-fold improvement compared to class II patients, although the HRQoL in class III patients was still worse than in class II patients at the end of one year. Despite having a lower level of baseline disease knowledge, class III patients obtained significantly more improvement in knowledge at one year compared to class II patients possibly due to the sense of disease related to a worse HRQoL.

Our data revealed improvements in disease knowledge, self-care behaviour, and HRQoL during one year of outpatient follow-up in NYHA class II and III patients. Although the definitive reason is not clear, the distinct national health-care insurance system with low payment by the patients, and cultural medical care-searching habits in Taiwan may be partially related. Frequent interactions resulting from visiting cardiologists directly on a monthly basis may provide appropriate medication adjustments and a basic level of cardiologist-delivered education. On the other hand, the finding that HRQoL at the end of one year was only related to self-care behaviour suggests a future intervention targeting improvement of self-care behaviour level. Behavioural self-management in patients with HF may help to control symptoms, maintain function, avoid preventable re-hospitalisation, and ultimately decrease morbidity and mortality. [11, 17, 18] However, only a few groups have reported behavioural interventions specific to HF. [19-21]

Educating patients about HF treatment and the consequences of HF has been shown to improve self-management behaviour. [19-21] Our data supports the role of upgrading disease knowledge levels in improving self-care behaviour. The improvement of self-care behaviour was associated with HF disease knowledge levels at baseline and 1-year, and the knowledge improvement from baseline to one year. However, the impact of disease knowledge improvement on self-care behaviour could not be translated to the relationship between self-care behaviour and HRQoL. The discrepancy suggests that self-care behaviour represents a global factor with direct effect on HRQoL, and contains other factors independent of disease knowledge level. Further studies may need to explore other modifiable variables, such as psychoso-

cial status and physical factors.

In our study, patients with functional classes I and IV were not included. Physical activity was not influenced by HF in patients with functional class I, who were supposed to have a good HRQoL at the baseline with minimal changes after one year. In contrast, physical activity was remarkably impaired in those with functional class IV leading to a very poor HRQoL. Since patients in our study were enrolled in our outpatient clinic, their severely impaired activity, short life expectancy, and high mortality rate would interfere with the long-term follow-up protocol. Accordingly, these patients were not enrolled in our study, although we expected that their HRQoL would also improve as demonstrated by patients with functional class III under the current health-care policy and guideline-based HF medications. Nevertheless, in this special population, changes in disease knowledge, behaviours, and HRQoL are interesting and should be further investigated in the future.

There were a few limitations to our study. Our data revealed that a significant improvement in the HRQoL was noted only in class III patients. This finding is limited by the fact that patients who dropped out tended to be class III. However, similar baseline HRQoL scores between patients with complete follow-up and those who dropped out suggest that our findings are still meaningful. On the other hand, both patients with impaired and those with preserved left ventricular systolic function were included in the present study. Whether disease knowledge, behaviour, and HRQoL would differ between these two populations still needs to be elucidated.

In conclusion, in patients with stable HF followed up by cardiologists at an patient clinic under the Taiwan national health-care insurance, HRQoL improved modestly but more significantly in the NYHA class III subgroup. In the future, whether interventions specific for self-care behaviour, such as upgrading disease knowledge level of HF, in class III patients yield substantial improvements in HRQoL should be determined.

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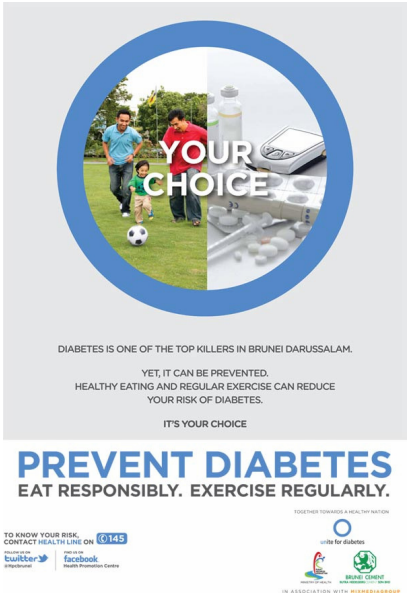

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