Factors predicting treatment adherence among patients with heart failure in Vietnam

Nguyen Ba Tam[1] M.N.S., Kanoknuch Chunlestskul [2] Ph.D, Wannee Deoisres [3] Ph.D and Ed. Rosenberg [4] Ph.D.

Abstract: Reducing the rate of re-hospitalization among heart failure (HF) patients is a major public health challenge. Treatment non-adherence is a crucial factor shown to trigger re-hospitalization. This study describes treatment adherence and explores the predictive ability of education, knowledge, depression and nurse support on treatment adherence among adult Vietnamese HF patients. Convenience sampling was used to recruit 82 subjects, diagnosed as HF class II and class III, who were assessed during treatment follow-up visits to the outpatient cardiovascular department of Namdinh General Hospital, Vietnam. Structured interviews and questionnaires were used to collect data via the Personal Information Questionnaire, Treatment Adherence Heart Failure Questionnaire, Dutch Heart Failure Knowledge Scale, Beck Depression Inventory-II and Nurse Support Treatment Adherence Questionnaire. Data were analyzed via descriptive statistics and standard multiple regression. The findings showed that the majority of participants were age 50-60 (61.0 %) and nearly two-thirds (64.6%) were in HF class III. Overall treatment adherence was moderate (Mean = 3.55, SD = .61). Medication adherence was high (Mean = 4.01, SD = .77) and lifestyle change adherence was moderate (Mean = 3.45, SD = 6.1). Standard multiple regression analysis indicated that education, knowledge, depression and nurse support significantly predicted treatment adherence (R2 =.708, F4, 77 = 46.59, p <.001). Depression, negatively related to treatment adherence, was the strongest predictor (β =-.35, p <.001). Education (β =.15, p <.05), knowledge (β =.34, p <.001) and nurse support (β =.16, p <.05) were significantly and positively related to treatment adherence. The results suggest that nurses, although they cannot affect patient educational attainment, can develop appropriate nursing intervention programs focusing on the other predictors to improve treatment adherence in HF patients.

Keywords: Heart failure/Treatment adherence/Vietnam

———————— ◆ ————————

[1] Nguyen Ba Tam, Master Degree student, Faculty of Nursing, Burapha University, Thailand; Lecturer in Namdinh University of Nursing, Vietnam.
Email: nguyenbatam@gmail.com
[2] Kanoknuch Chunlestskul, Assistant Professor Faculty of Nursing, Burapha University, Thailand. Email: ckanoknuch@hotmail.com
[3] Wannee Deoisres, Associate Professor, Faculty of Nursing, Burapha University, Thailand. Email: wannee@buu.ac.th
[4] Edwin Rosenberg, Professor, Department of Sociology, Appalachian State University, USA. Email: rosenberge@appstate.edu

Introduction

Heart failure (HF) is a major public health issue, currently affecting over 23 million people worldwide. It has been estimated that 1.6 million Vietnamese were affected by HF in 2008 [1], and 1.97% of the population in 2012 [2]. To resume a normal lifestyle and prevent high levels of morbidity and mortality, patients have to adhere to prescribed treatments, including medication regimens and numerous lifestyle changes that often require substantial personal investment by patients [3]. Medication adherence is typically defined as patients using medications as prescribed by the physician. Lifestyle changes can include diet (e.g. sodium restriction, fluid restriction, low fat-cholesterol), exercise, weight control, alcohol use, smoking, stress management, blood pressure monitoring, symptom recognition and follow-up treatment appointments [4, 5].

Treatment adherence clearly affects health outcomes; treatment non-adherence has been confirmed as a cause of re-hospitalization; pathologic changes; worsening cardiac functioning, signs and symptoms; disease complications; reduced functional abilities; increased severity of health problems; increased healthcare costs; and overall increased risk of mortality and morbidity [6, 7]. Treatment adherence among HF patients has led to significant reductions in hospital readmission rates as well as substantial increases in survival rates and in patient quality of life [8]. Previous studies found that HF patient hospital readmission rates remain high due to poor treatment adherence and the patient's inability to identify the signs and symptoms of cardiac decompensation [9, 10]. Therefore treatment adherence is an important factor in the long-range health status of HF patients.

In actuality, treatment adherence has been found to be low in HF patients [11, 12]. In Vietnam, 37% of HF patients do not take their prescription medication, 10% of participants do not monitor their symptom regularly, a similar percent did not appear for recommended follow-up visits, and over half (52.5%) continued their normal salty diet after discharge [13].

Therefore full treatment adherence is unlikely. Understanding treatment adherence is also important because patients with more than one condition to manage are at a higher risk of preventable hospital re-admission [8, 12]. According to the World Health Organization's Multidimensional Adherence Model (MAM), treatment adherence can be conceptualized as a phenomenon comprised of five sets of interacting dimensions: socioeconomic factors, health care system factors, condition factors, therapy factors, and patient factors [14]. Based on the literature review, the variables most often linked to the remarkably high rates of non-adherence were education (socioeconomic factors), patient's knowledge (patient factors), depression (condition factors) and nurse support (health care system factors) [15].

In Vietnam, treatment adherence has been found to be low and in need of management; interventions may well improve this situation. The study and knowledge of treatment adherence of HF patients are still limited, and Vietnamese cultural characteristics differ from those of other countries. Therefore, this study, describing treatment adherence and examine the predictive power of education, knowledge of HF, depression, and nurse support on treatment adherence of adult patients with HF in Namdinh General Hospital, Vietnam, will add to the quantity and cross-cultural quality of the treatment adherence knowledge base.

Material and methods

This predictive correlation research was designed to describe HF patient treatment adherence, and to examine the ability of education, knowledge of HF, depression, and nurse support to predict treatment adherence.

Population: The population for this study was adult Vietnamese patients with chronic HF. The sampling frame was members of the population who were receiving prescribed treatment at the cardiovascular department of Namdinh General Hospital, Vietnam.

Sample: For this predictive correlation design study, the formula of Tabachnick and Fidell was used to calculate the smallest acceptable sample size [16]. Sample size depends on a number of factors, including desired power, alpha level, number of predictors and expected effect size. Since this study has four predictors, the sample size was calculated to be 82.

Instruments: The data were collected by using five structured interview questionnaires. Those questionnaires originally in English were translated into Vietnamese by an accepted back-translation technique [17]. The procedure was carried out by three bilingual translators who were fluent in English and Vietnamese.

The Personal Information Questionnaire contained seven items asking about personal characteristic and health information: age, gender, educational attainment, marital status, method of payment for treatment, HF classification level, and co-morbidities.

The Treatment Adherence of Vietnamese Adults with HF Questionnaire (TA-VA-HFQ) was developed by the researcher based on the literature review and adapted for Vietnamese culture and context [4, 5, 18, 19, 20, 21]. This instrument was composed of two main dimensions: medication adherence and lifestyle change. The latter assessed adherence to prescriptions/recommendations for diet, fluid intake, stimulant avoidance, self-monitoring, exercise, stress control, preventing respiratory infection, and contact with healthcare providers. It used 5-point Likert type items, where: 1 = never, 2 = almost never, 3 = sometimes, 4 = often and 5 = always. Items were phrased so that higher scores represented higher levels of treatment adherence. The level of treatment adherence was based on mean scores, which were classified into three groups: 1 – 2.33 = Low adherence, 2.34 – 3.66 = Moderate adherence and 3.67 – 5 = High adherence. This categorization was also used for scale, dimension and sub-dimension. The content validity of the TA-VA-HFQ was assessed via the Content Validity Index (CVI). Five Thai experts in nursing rated content validity, language suitability, and criteria for scoring for the entire questionnaire. The accepted CVI score was used [22]. The content validity of TA-VA-HFQ was 0.97, with a Cronbach's alpha coefficient of .89.

The Dutch HF Knowledge Scale (DHFKS), developed by van der Wal et al., was used to measure subjects' HF knowledge [23]. This instrument is composed of 15 multiple-choice items divided into three content areas: 1) four items concerning HF in general; 2) six items on diet, fluid restriction and activity (which measure HF treatment), and; 3) five items measuring symptoms and symptom recognition. Each item has three response options, only one of which is correct. A correct answer is worth one point, whereas wrong or missing answers receive zero points. The possible total scores thus ranges from 0 to 15. Van der Wal et al. recommended aggregating HF knowledge into high and low categories, with a cutoff at the median score of 11[23].

Thus subjects' DHFKS scores in this study were interpreted as follows: ≤ 10 = Low level of knowledge, and 11+ = High level of knowledge. The reliability of the DHFKS was .62. Although this is slightly low, the instrument can be used because it has been demonstrated to be a valid and reliable scale [23]. This questionnaire had been translated to Vietnamese by Huyen, who used it to assess HF knowledge among older HF adults in Vietnam [24]. The Cronbach's alpha coefficient was .67.

The *Beck Depression Inventory (BDI–II)* was used to measure depression. The BDI–II includes 21 items and was created by Beck et al. based on Response Theory [25]. The BDI–II was designed to assess severity of depression among psychiatric patients as well as possible depression in the non-diagnosed ("normal") population. This inventory measures cognitive, affective, and somatic symptoms, as well as neurovegetative and endogenous aspects of depression**.** The self-report questionnaire is rated on a four-point scale ranging from 0 (no symptoms) to 3 (severe symptoms). The overall depression scores range from 0 to 63 and are typically divided into four categories: 0 – 9 = Normal, 10 – 15 = Mild depression, 16 – 23 = Moderate depression and 24 – 63 = Severe depression. The internal consistency reliability of BDI–II was acceptable with Cronbach's Alpha of .92. The BDI–II has been translated into several languages; the Vietnamese version was translated by the Vietnam National Institute of Mental Health and has been used to assess depression in Vietnam.

The Nurse Support of Treatment Adherence Questionnaire (NS-TAQ) for Vietnamese adults with HF was developed by the researcher based on the literature review [4, 5, 23]. This instrument was composed of two main dimensions -- information and emotional encouragement -- regarding nurse support of treatment adherence in adult HF patients. The NS-TAQ is composed of 5-point Likert type items with the following ratings: 1 = never, 2 = almost never, 3 = sometimes, 4 = often and 5 = always. Average scores were then calculated, with higher average scores representing higher levels of nurse support. Average scores were then classified into three groups: 1 – 2.33 = Low support, 2.34 – 3.66= Moderate support and 3.67 – 5 = High support. The content validity of NS-TAQ was 1.00, and the Cronbach's alpha coefficient was .89.

Ethical considerations: This study was approved by the Ethics Committee of Graduate Studies of the Faculty of Nursing, Burapha University, Thailand. Permission for data collection was received from the Director of Namdinh General Hospital, Vietnam. Written informed consent was obtained from all participants.

Data collection procedures: Data were collected by the researcher. The list of HF outpatients was obtained from the hospital's patient database. The researcher used convenience sampling to select outpatient subjects inform the list of outpatients who met inclusion criteria and were in the outpatient cardiovascular clinic. The researcher clearly explained the research objectives, ethical issues, and protection of the human rights of the participants. Participants were asked to sign a consent form acknowledging their willingness to participate in the study. The researcher then administered the questionnaires via face-to-face interviews. Once data had been collected from 82 subjects, the data were checked for completeness and entered into a computer database for analysis.

Data analysis: The data were analyzed via descriptive statistics to describe treatment adherence and standard multiple regression to examine the predictive power of education, HF knowledge, depression, and nurse support on treatment adherence.

Results

The 82 participants ranging from 20-60 years of age. The majority were age 50-60 (61.0 %) and female (56.1 %).Most were married (80.5%), 32,9% of participant had completed secondary school and 23,2% completed high school, and 69.5 % were using insurance to pay for treatment. Nearly two-thirds (64.6%) of participants had Class III HF. All participants had at least one co-morbidity, the most common being hypertension (78.0%). (See Table 1).

Other descriptive data showed that treatment adherence was moderate (*Mean* = 3.55, *SD* = .61). Medication adherence was high (*Mean* = 4.01, *SD* = .77), and lifestyle change was moderate (*Mean* = 3.45, *SD* = 6.1).

Within the lifestyle change dimension, the stimulant avoidance mean score (*Mean* = 4.61, *SD* = .50) indicated a high level of adherence. Variables presenting a moderate level of adherence were diet adherence (*Mean* = 3.17, *SD* =.82), drinking fluids per recommendations of health care providers (*Mean*= 3.26, *SD*= .84), self-monitoring (*Mean* = 3.12, *SD* =.67), exercise (*Mean* = 3.19, *SD* = .79), stress control (*Mean*= 3.11, *SD*= .90), prevented of respiratory infection (*Mean*= 3.09, *SD*= .82), and contact with healthcare provider (*Mean* = 3.55, *SD* = .71). (See Table 2.)

Pearson Product-Moment Correlations were calculated to determine relationships between variables. Table 3 shows that treatment adherence was significantly and positively correlated with education (r =. 55, $p < .001$), nursing support (r = .63, $p < .001$), and knowledge (r =.74, $p < .001$). It was significantly and negatively correlated with depression (r = -.76, $p < .001$). (See Table 3.)

Standard multiple regression showed that education, knowledge, depression and nurse support predicted 70.8% of the variation in treatment adherence (R^2 = .708, $F_{4,77}$ = 46.59, $p < .001$). The strongest predictor of treatment adherence in HF patients was depression (β = -.35, $p < .001$). (See Table 4.)

Discussion

This study found that Class III patients outnumber Class II patients (64.6% to 35.4%). Although this study used a convenience sample, the observed difference is consistent with a previous study that found 56.9% of patients in class III [26]. This could also be because Class II patients, with relatively slight limitations in physical activity, are less likely to view those mild limitations as worth a visit to a physician. It is also noteworthy that 100% of the sample had at least one co-morbidity, with the modal condition (78.0%) being hypertension. It is logical that any co-morbidity has the potential to hinder treatment adherence among HF patients.

Standard multiple regression indicated that the model, which included education, knowledge, depression and nurse support, explained 70.8 % of the variance in treatment adherence (R^2 = .708, $F_{(4, 77)}$ = 46.59, $p < .001$). Education, knowledge, and nurse support were positively related to overall treatment adherence, while depression was negatively related. This result is consistent with the MAM model.

Education

Education was a significant predictor of treatment adherence (β = .15, p < .05, with higher education linked to higher treatment adherence. Additional education could improve patients' ability to discern more symptoms, improve their ability to successfully adapt to challenges to their functional status and daily activities, and thus improve their perception of their health. More education could raise awareness of the features of chronic diseases and make it more likely patients are aware of ways to cope with the HF's physical symptoms and treatment effects. Extant research has established that education is significantly and positively related to adherence in patients with HF [27, 28].

Knowledge

Findings of this study also indicated that knowledge could predict treatment adherence (β = .34, p < .001), with greater knowledge being associated with increased treatment adherence. High levels of HF knowledge could lead to increased ability to make health-related adaptations, e.g., one's response to unexpected symptoms of heart failure. HF knowledge seems a necessary foundation for adherence [29]. This finding reflects those of previous studies, where higher levels of HF knowledge were linked to higher levels of adherence [28, 29].

Depression

This study also found that depression was significantly and negatively related to treatment adherence (β = -.35, p < .001). Depression is not only a debilitating mental illness itself, but also could negatively affect such HF challenges as medication adherence and lifestyle changes (e.g., diet, smoking, alcohol use). Patients with difficulty taking medications were 60% more likely to have significant depressive symptoms than patients without difficult taking medications [25]. In this study, depression had the highest correlation with treatment adherence (r = -.76, p < .001). Similarly, other research found that depression was the best predictor of overall self-ratings of medication memory and treatment adherence [30]. Depression should not be ignored as a predictor of treatment adherence.

Nurse Support

Care provided by specialist nurses has been shown to improve outcomes for patients with HF [11]. In this study, more nurse support was related to better treatment adherence (β = .16, p < .05). This result could be explained by the role of nurse, which includes counseling and reminding patients about treatment adherence; in fact this is no different from the physician's role. The nurse is in position to directly assessment HF patients' treatment adherence and to provide information and emotional encouragement regarding medication management and lifestyle changes [11, 18, 27, 29]. Other research found that instructions provided by nurses had a positive impact on treatment adherence [11]. In one case treatment adherence scores increased significantly between the first and third home visits, i.e., from 16.0±2.6 at the first home visit to 20.4±2.7 at the third home visit[11]. More nurse support, therefore, should yield greater treatment adherence.

HF is a serious chronic condition.Treatment is necessary and usually of long duration. Treatment adherence is problematic yet vitally important in successfully adapting to the patient's new health status. Consistent with prior research on HF patient treatment adherence, this Vietnamese study found that educational attainment, HF knowledge, depression and nurse support are all strongly linked to treatment

adherence. Nurses cannot affect patient educational attainment, but they are well positioned to make a positive difference in patient knowledge, patient depression and nurse support.

Recommendations

The findings of this study contribute to nursing practice and nursing education, and suggest further nursing research. Based on a survey of adult Vietnamese HF patients, the results show that education, knowledge, depression and nurse support could predict treatment adherence. In practice, nurses can use these predictors to develop appropriate nursing intervention programs and nursing care plans to improve treatment adherence of HF patients, particularly in ways amenable to Vietnamese culture and lifestyle. Nursing intervention programs and nursing care plans should focus on prevention/reduction of depression, increasing HF knowledge and enhancing nurse support. The results also can be applied in designing nurse training programs that teach nursing students how to improve treatment adherence in patients with HF. Finally, beneficial future studies should be conducted in other nations and cultures, be longitudinal in design, and employ larger, probability-based samples to expand our understanding of treatment adherence among HF patients in various settings.

Figures and tables

Table 1. Characteristics of the sample (n = 82).

Demographic characteristics	**Frequency**	**Percentage (%)**
Age Range = 20-60, $\overline{X}$ = 47.95, *SD* = 10.58		
20-29	5	6.1
30-39	13	15.9
40-49	14	17.1
50-60	50	61.0
Gender		
Male	36	43.9
Female	46	56.1
Marital status		
Married	66	80.5
Divorced/ separated	8	9.8
Single	2	2.4
Widowed	6	7.3
Education		
Primary school	14	17.1
Secondary school	27	32.9
High school	19	23.2
Some College	9	11.0
Bachelor's Degree	13	15.9
Paying		
By health insurance	57	69.5
By self	20	24.4
Other	5	6.1
New York Heart Association Classification		
Class II	29	35.4

Demographic characteristics	Frequency	Percentage (%)
Class III	53	64.6
Co-morbidities		
Hypertension	64	78.0
Diabetes	38	46.3
COPD	6	7.3
Other (Stroke, gout, hypothyroid, pneumonia, asthma, arthritis)	48	59.8

Table 2. Scores and levels of dependent variables (n = 82).

Variables	Mean	*SD*	Response level
Treatment Adherence	3.55	.61	Moderate
Medication adherence	4.01	.77	High
1. Take all medications	4.07	.78	High
2. Take medications on time	4.02	.80	High
3. Never forget to take medications.	3.96	.82	High
4. Never stop medications without symptoms	3.98	.98	High
Lifestyle change	3.45	.61	Moderate
- Healthy diet	3.17	.82	Moderate
5. Low salt diet	3.22	.93	Moderate
6. Low fat and cholesterol diet	3.12	.88	Moderate
- Fluid intake	3.26	.84	Moderate
7. Follow recommendations of health care providers			
- Stimulant avoidance	4.61	.50	High
8. Avoid drinking alcohol	4.52	.63	High
9. Avoid smoking	4.70	.49	High
- Self-monitoring	3.12	.67	Moderate
10. Monitoring body weight	2.91	.85	Moderate
11. Check Blood Pressure	3.26	.81	Moderate
12. Record and report symptoms	3.18	.89	Moderate
- Exercise	3.19	.79	Moderate
13. Exercise 5+ times/week	3.05	.85	Moderate
14. Exercise 30+ min/time	3.33	.90	Moderate
- Stress control			
15. Practice relaxation to reduce stress.	3.11	.82	Moderate
- Infection prevention	3.09	.89	Moderate
16. Prevented respiratory infection			
- Contact with healthcare provider	3.55	.71	Moderate
17. Contact healthcare provider about unexpected symptoms	3.30	.78	Moderate
18. Treatment follow up	3.79	.78	High

Table 3. Correlation matrix (n = 82)

Variables	1	2	3	4	5
1. Treatment Adherence	-				
2. Education	.55***	-			
3. Knowledge	.74***	.48***	-		
4. Depression	-.76***	-.48***	-.68***	-	
5. Nurse support	.63***	.41***	.53***	-.63***	-

***$p < .001$

Table 4. Multiple regression analysis (n = 82)

Predictors	*B*	*SE*	β	*t*	*p* - value
Education	.42	.20	.15	2.09	.040
Knowledge	1.33	.34	.34	3.94	<.001
Depression	-.50	.13	-.35	-3.76	<.001
Nurse support	.19	.09	.16	2.02	.047

Intercept = 42.55, $R^2 = .708$, $F_{4,77} = 46.59$

Acknowledgement

The lead author gratefully acknowledges Namdinh University of Nursing and the Health and Human Resource Development program under the Vietnam Ministry of Health, who gave me the funding to complete this study. I also thank the director of Namdinh General Hospital for permission and support for data collection.

Reference

1. Giang D. Need to detect soon the heart failure disease. 2010. Available from http://nhaquanly.vn/suckhoevip/detail/can-phat-hien-som-benhsuy-tim.html.
2. Huong T. The Vietnam population in 2012. 2012. Available from http://www.qdnd.vn/qdndsite/vi-VN/61/43/7/24/24/171764/Default.aspx.
3. Davidson PM, Inglis SC, Newton PJ. Self-care in patients with chronic heart failure. Expert Rev Pharmacoecon Outcomes Res. 2013;13(3):351-9.
4. Douglas, Peter, Robert. Levels of depression. Journal of Clinical Psychology. 2014;51(6).
5. MacDomagh, Gardner, Clark, Dargie. Heart Failure; Findings from university of north carolina in heart failure reported. Hospital and nursing home week. 2009;9(151).
6. van der Wal MH, van Veldhuisen DJ, Veeger NJ, Rutten FH, & Jaarsma T. Compliance with non-pharmacological recommendations and outcome in heart failure patients. Euro Heart Journal. 2010; 31(12), 1486-1493.
7. Zablocki E. Non-adherence contributes to poor outcomes in CHF. Managed Healthcare Executive. 2013; 4(3), 56-67.
8. Lambrinou E, Jaarsma T, Piotrowicz E, Seferovic PM, Piepoli MF, Physiology HFACoE, et al. Exercise in heart failure patients: why and how should nurses care? Eur J Cardiovasc Nurs. 2014;13(3):198-200.

9. Ambardekar AV, Fonarow GC, Hernandez AF, Pan W, Yancy CW, Krantz MJ. Characteristics and in-hospital outcomes for nonadherent patients with heart failure: Findings from get with the guidelines-heart failure. American Heart Journal. 2009; 158(4):644-52.
10. Diaz A, Ciocchini C, Esperatti M, Becerra A, Mainardi S, Farah A. Precipitating factors leading to decompensation of chronic heart failure in the elderly patient in South American community hospital. Journal Geriatric Cardiovascular. 2011; 8(1):12-4.
11. Mantovani VM, Ruschel KB, Souza ENd, Mussi C, Rabelo-Silva ER. Treatment adherence in patients with heart failure receiving nurse-assisted home visits. Acta Paul Enferm. 2015;28(1):41-7.
12. Wu JR, Frazier SK, Rayens MK, Lennie TA, Chung ML, Moser DK. Medication adherence, social support, and event-free survival in patients with heart failure. Health Psychol. 2013;32(6):637-46.
13. Kieu TTH, Nguyen TH. The first step in using SCHFI scale to assess self care on heart failure patients in Cardiovascular hospital. . Hanoi: Hanoi Medical University; 2011.
14. World Health Organization (WHO). Adherence to long term therapies: evidence for action. 2003. Avaiable from: http:// www. WHO. Com /WHO Library Cataloguing- in-Publication Data.
15. Berben L, Dobbels F, Engberg S, Hill MN, De Geest S. An ecological perspective on medication adherence. West Journal Nurs Res, 2012; 34(5), 635-653.
16. Tabachnick BG, Fidell L. Using multivariate statistics multiple regression (Vol. 5th). New York: Pearson: 2007.
17. Cha ES, Kim KH, Erlen JA. Translation of scales in cross-cultural research: issues and techniques. Journal Advance Nursing, 2007; 58(4), 386-395.
18. American Heart Association. 2013 ACCF/AHA guideline for the management of heart failure. Circulation. 2013;128(16).
19. Katz,T., Randall, W., & Starling, J. 2010. Living with advance heart failure. Avaiable from: http://www.webmd.com/heart-disease/heart-failure/features/living-with-advanced-heart-failure.
20. Ho TH, Caughey GE, Shakib S. Guideline compliance in chronic heart failure patients with multiple comorbid diseases: evaluation of an individualised multidisciplinary model of care. PLoS One. 2014;9(4):e93129.
21. Sánchez R, Zoraya L, Correa E, Eduardo L, Figuera C, Alberto F. Adherence to phararmacological and non-pharmacological treatment in patients with heart failure. Enfermería Global. 2014.
22. Waltz D, Strickland OR, Lenz E. Measurement in Nursing and Health Research, (4thed). Springger Publishing Company, LLC: 2010.
23. van der Wal MH, Jaarsma T, Moser DK, van Veldhuisen DJ. Development and testing of the Dutch Heart Failure Knowledge Scale. Eur J Cardiovasc Nurs. 2005;4(4):273-7.
24. Huyen, NN. Factors related to self-care behaviors among older adults with heart failure in Thai Nguyen gGeneral hospital, Vietnam. Thailand: Burapha University; 2010.

25. Beck AT, Steer RA, Brown GK. BDI-II: Beck depression inventory manual (2nd ed.). San Antonio, TX: Psychological Corporation: 1996.
26. Schweitzer RD, Kathryn Head, Psychol B, Dwyer JW. Psychological Factors and Treatment Adherence Behavior in Patients With Chronic Heart Failure. Journal of Cardiovascular Nursing. 2007;22(1):76-83.
27. Jaarsma T, Nikolova-Simons M, van der Wal MH. Nurses' strategies to address self-care aspects related to medication adherence and symptom recognition in heart failure patients: an in-depth look. Heart Lung. 2012;41(6):583-93.
28. Riegel B, Driscoll A, Suwanno J, Moser DK, Lennie TA, Chung ML, Cameron J. Heart failure self-care in developed and developing countries. Journal Cardio Failure. 2009; 15(6), 508-516.
29. Artinian NT, Magnan M, Sloan M, Lange MP. Self-care behaviors among patients with heart failure. Heart Lung. 2002; 31(3), 161-172.
30. Bonin CD, Santos RZ, Ghisi GL, Vieira AM, Amboni R, Benetti M. Construction and validation of a questionnaire about heart failure patients' knowledge of their disease. Arq Bras Cardiol. 2014;102(4):364-73.