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## RESEARCH ARTICLE

## SELF-CARE MANAGEMENT, KNOWLEDGE, SELF-EFFICACY FOR MEDICATION AND QUALITY OF LIFE IN CHRONIC HEART FAILURE PATIENTS

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## Abstract

**Background:** The management of Heart Failure (HF) is the cornerstone for the appropriate therapy and the knowledge obtained concerning the disease is known to affect self-care behaviours.

**Aim:** The aim was to test the association between self-care management, knowledge, self-efficacy for medication and quality of life in chronic HF patients.

**Material and Method:** A cross-sectional study was conducted and four questionnaires were used: Atlanta Heart Failure Knowledge Test (AHFK), Minnesota Living with Heart Failure (HMLHFQ), Self-Efficacy for Appropriate Medication Use Scale (SEAMS), European Heart Failure Self-care Behaviour Scale (EHFScBS-9). Multiple linear regression analysis was performed to identify independently associated variables with study subscales.

**Results:** The sample consisted of 122 Heart Failure patients (102 men-20 women) with mean age 67.1 years (SD=12.3). Scores on Fluid and sodium management, Physical activity and recognition of deteriorating symptoms were significantly greater as compared with scores on Adhering to recommendations ( $p<0.001$ ), indicating that the needs concerning Adhering to recommendations were greater. Linear regression analyses showed that score on knowledge-test and New York Heart Association (NYHA) class were predictive of medication adherence factors. Better knowledge was associated with better medication adherence, while worse scores were found in subjects with NYHA class III or IV as compared to those with NYHA class I or II. Additionally, Knowledge and years of Education were associated with Self-care behaviour factors ( $\beta=0.44$ ,  $SE=0.08$ ,  $p<0.001$ ).

**Conclusions:** Patients at a higher level of HF knowledge show better adherence to the Medication. Self-care behavior and life quality are improved.

**Keywords:** Heart Failure, knowledge, self-care behaviour, quality, adherence.

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## INTRODUCTION

Heart Failure (HF) is a chronic, progressive syndrome that accounts for significant morbidity and mortality.<sup>1-2</sup> The incidence of HF is estimated to enlarge by 25% the next two decades and may drive to a high increase in health care costs.<sup>3</sup> Hospitalizations and HF exacerbations can be reduced with Self-care adherence. The existence of numerous obstacles such as: poverty, lack of or poor health insurance, and low educational level care can contribute to worse HF results. Addressing potential barriers to Self-care behaviour may help patients achieve better outcomes.<sup>4</sup> Common reasons for HF readmissions include poor patient education, insufficient discharge planning, absence of continuation of care, lack of compliance with Medication regimens, and poor adherence to doctor's instructions.<sup>5-6</sup>

The epidemiology of post-acute HF patients and their clinical result need further study in depth. A critical factor of cardiac rehabilitation is the education about heart-healthy living. Multiple studies help the effectiveness of nurse-guided and patient-focused educational interventions to increase cardiac patients' knowledge and personal-care management skills. Patient education has been found to improve knowledge and Self-care skills.<sup>7</sup> Self-efficacy for appropriate Medication use and Medication adherence are thought to be related to health status.

A person's self-efficacy may be the determining factor in coping with, performing, and being successful in health-related behaviours. Self-efficacy is a person-related Self-care factor that may have a moderating or mediating role between health education and health outcomes. Behaviours related to Medication adherence where a person's ability to carry out Self-care behaviours may be determined through the control of HF-related symptoms, thus impacting physical and mental status, are an important self-management factor.<sup>8-9</sup>

Self-Management programs may improve the patient's awareness and his/her ability to manage disease-related symptoms and adhere to Self-care behaviours. Since patients with HF require drug-related interventions and changes in their lifestyle, the improvement of Self-Management abilities make them actively involved in the management of HF. In the Self-

Management program, patients take care of handling their daily activities.

The efficacy of the Self-Management program helps patients deal with problems caused by chronic conditions, improve their symptoms through adherence to the therapeutic regime and choose a better lifestyle.<sup>10-11</sup> In this study, we test the association between patients' knowledge for HF and well being features/or quality of life and investigate how differences in this education, Self-efficacy and/or Self-care behaviour explained the relationship.

## METHODOLOGY

### Patients' information

This study was a cross-sectional. A convenience sampling method was applied to recruit the patients with HF. All patients in the department of HF in hospital participated in the target population for the present study. The inclusion criteria were: (1) diagnosis of HF; (2) no diagnosis of cognitive or psychiatric impairments in a review of the medical record (participants' mental capabilities were verified by their physicians); (3) age 18 years and older; (4) agreement to participate. The ethical approval to implement the study was taken from the ethical research committee from Medical School National and Kapodistrian University of Athens as well as the HF clinic.

Patients' medical files were evaluated by the primary investigator of the "Korgialenio-Benakio Hellenic Red Cross" General Hospital and patients who met the eligibility criteria were invited to complete the consent form in the department of HF. Prior to participation, all participants were given an explanation of the research objectives, the methods of data collecting and reassurance about issues of confidentiality. Furthermore, they were informed about their right to leave the study at any phase and without reason. Data were collected of participants' appointments in the department of HF.

The primary researcher met with participants and filled in the questionnaire based on participants' responses. Time for completing the questionnaire was estimated to be approximately 15–20 min.

This study was a secondary data analysis of baseline-only data

from a randomized controlled trial in patients with HF for the doctoral degree thesis. For this design and after pilot study, 122 participants achieve a power of 0.95 for the within-subjects main effect at an effect size of 0.15; a power of 0.95 for the between-subjects main effect at an effect size of 0.27 and a power of 0.95 for the interaction effect at an effect size of 0.15. The data collection was undertaken between October 2018 and April 2019.

### Instruments

1. AHFKT: Since its first publication in 2009, the Atlanta Heart Failure Knowledge Test (AHFKT) has proven to be a reliable and valid instrument. Given the advances in the Self-care of Heart Failure (HF), we proposed to reassess the psychometric properties of AHFKT in these recent studies and update the instrument. For purposes of this analysis, total scores ranged from 0 to 27 with higher scores rejecting better knowledge, but could also be converted to a 0% to 100% scale for standardization.<sup>12</sup>

2. EHFSBS-9: The European Heart Failure Self-care Behavior Scale or European scale of Self-care in Heart Failure has recently been developed to evaluate the Self-care of patients. Factor 1: Adhering to recommendations. Factor 2: Fluid and sodium management. Factor 3: Physical activity and recognition of deteriorating symptoms.<sup>13-14</sup>

3. MLHFQ: The Minnesota Living with Heart Failure Questionnaire (MLHFQ) is the most widely used instrument for assessing the Quality of Life in patients with Heart Failure. It contains 21 items and 2 dimensions: physical and emotional. It is a six-point Likert scale (scored 0-5), resulting in a total score in the range of 0-105, with higher scores rejecting poorer QoL.<sup>15</sup>

4. SEAMS: Validation of Belief Medicines Questionnaire and Self-efficacy for the appropriate use of medicines Scale to measure adherence to pharmacological treatment. Two dimensions of medication self-efficacy. The first was self-efficacy for taking medications under difficult circumstances, such as when patients are busy, away from home, or have multiple medications to take. The second was self-efficacy for taking medications under uncertain or changing circumstances, such as when the patient is unsure about how to take the medications or

changes are made to the regimen. The lowest possible score of the 13-item questionnaire was 13, and the highest possible score was 39; the high score indicated that the participants were highly confident about taking medication.<sup>16</sup>

### Statistical analysis

Linear regression is a way to model a relationship between two sets of variables, so was used to make predictions about data.

Quantitative variables were expressed as mean values (SD).

Qualitative variables were expressed as absolute and relative frequencies. Student's paired t-tests were used for the comparison among Self-care behaviour scales. Pearson correlation coefficients were computed to explore the association of two continuous variables. A stepwise multiple linear regression analysis (p for removal was set at 0.1 and p for entry was set at 0.05) was performed to identify independently associated variables with score on Atlanta Heart Failure Knowledge test, Self-Efficacy for Appropriate Medication Use Scales, Self-care behaviour scales and quality of life dimensions.

Adjusted regression coefficients ( $\beta$ ) with Standard Errors (SE) were computed from the results of the linear regression analyses. All reported p values are two-tailed. Statistical significance was set at  $p < 0.05$  and analyses were conducted using SPSS statistical software (version 22.0).

### RESULTS

The sample consisted of 122 patients (102 men and 20 women) with mean age 67.1 years (SD=12.3). Sample characteristics are presented in table 1. Most of the patients were classified as New York Heart Association (NYHA) II (46.7%) or NYHA III (39.3%). The mean Ejection Fraction (EF) was 36.6 (SD=9.9). 62.3% of the HF patients had reduced ejection fraction (HFrEF) and 19.7% preserved ejection fraction (HFpEF). The mean Body Mass Index (BMI) was 29.0 (SD=5.7). Diabetes, hypertension and dyslipidemia were present in 40.2%, 45.9% and 36.9%, respectively. 23% of the patients had more than 4 hospital admissions.

Detailed statistics for the study subscales are included in table 2. Scores on Fluid and sodium management and Physical activity and recognition of deteriorating symptoms were signifi-

cantly greater as compared with scores on Adhering to recommendations ( $p < 0.001$ ), indicating that the needs concerning Adhering to recommendations were greater.

Most of the correlations between Atlanta Heart Failure Knowledge test, Self-Efficacy for Appropriate Medication Use Scales, Self-care Behaviour scales and QoL dimensions were significant (table 3). Multiple linear regression analysis for score in knowledge test revealed that educational level was the only significant factor to be associated. Specifically, more years of education or higher educational level were associated with better knowledge ( $\beta = 0.44$ ,  $SE = 0.08$ ,  $p < 0.001$ ). Results from linear regression analyses in a stepwise method, with dependent variables Self-Efficacy for Appropriate Medication Use Scales are shown in table 4. Scores on knowledge-Test and NYHA class were predictive for both Medication adherence factors. Increased knowledge was associated with better Medication adherence, while worse scores were found in subjects with NYHA class III or IV as compared to those with NYHA class I or II. Linear regression analyses with dependent variables Self-care Behaviour indicated that better Knowledge was associated with better results on all three Self-care behaviour factors (table 5).

Additionally, it was found that educational years were associated with better scores on Adhering to recommendations and Physical activity and recognition of deteriorating symptoms subscales. Furthermore, patients with stroke and those with NYHA class III or IV had worse scores on Physical activity and recognition of deteriorating symptoms subscale. Concerning quality of life dimensions (table 6) it was found that sex, NYHA class, renal failure, score on Physical activity and recognition of deteriorating symptoms were associated with Physical subscale.

Specifically, greater scores indicating lower levels on Physical subscale were found in women, in patients with renal failure and those with NYHA III to IV. Also, worse scores on Physical activity and recognition of deteriorating symptoms factor were related to low outcome concerning Physical subscale. Sex, NYHA class and score on Physical activity and recognition of deteriorating symptoms were also independently associated with

Physical subscale. NYHA class was also predictive for Total score on Minnesota, along with educational years.

More years of education or higher educational level was found to be associated with greater levels on total QoL score.

## DISCUSSION

In this study, we examine the link between patients' knowledge for HF and QoL, Self-efficacy and Self-care behaviour. The results led to the conclusion that patients with higher level of Heart Failure knowledge, present better adherence to the Medication, resulting in the improvement of self-care behavior and quality of life. Also, the current study showed the notion that HF self-care is prospectively associated with health-related QoL. Studies in different contexts have evaluated the relationship between knowledge of HF and Self-care behaviour or quality of life.

Patients with lack of knowledge of HF appear bad results regarding their depression and functional position in questionnaires related to a range of health circumstances. Based on numerous reports patients with low literacy levels were less likely to answer correctly questions involving HF, suggesting that their knowledge on how to handle the syndrome was insufficient. It has been suggested that low literacy may limit information retention, making the learning of essential HF Self-care skills more difficult thus, leading to a poorer health outcome.<sup>17-18</sup>

Self-care confidence reflects one's confidence in practicing Self-care. The association between cognitive impairment and poor self-care, even if evaluated with different assessment tools, was confirmed in further studies. A significant component of HF management is self-management.<sup>7</sup> The effect of patients' education and "telemonitoring" in improving self-care knowledge and management of disease in adults with HF was figured out and evaluated. The tablet computer significantly improved self-care behaviour and health related quality of life, enhanced HF knowledge, and reduced hospitalization.<sup>19</sup> Concerning "telemonitoring", scientists' opinions differ. For some, "telemonitoring", in addition to information-and-communication-technology, does not provide a benefit on

Self-care improvement. The highest self-care improvement is related to low or medium initial Self-care level and the lack of depression. In patients with HF self-care was connected with better disease-specific health-related QoL. Psychological distress should be considered in order to address self-care and health-related QoL.<sup>8</sup> Computerized cognitive trainings show promise in enhancing the cognition of patients with HF.<sup>20</sup>

In HF patients, background Cognitive impairment is extremely prevalent. As a result, this can negatively affect Self-care and increase mortality rates.<sup>6</sup> The health education of both patient and family members needs to be considered when designing interventions to foster self-care. Patients with insufficient health literacy were more likely to have lower HF knowledge and tend to poorer Medication adherence.

It is logical that without understanding patients' condition, it is hard for members of family to provide adequate support and care to patients with a chronic condition.<sup>10</sup> Higher consistent adherence with great consulting behaviour, characterized younger patients, with better formal education and upper income level, less clinically compromised, with the best physical and mental QoL and lowest hospitalization rates.<sup>21</sup> Heart Failure patients' loyalty to Self-care recommendation was horribly low, while medication and appointment keeping were high.<sup>8</sup> Adhering to low sodium diet, limiting fluid intake, doing regular physical activity and monitoring weight was insufficient.

Better adherence is linked with the absence of chronic comorbidities, male gender, and sufficient level of HF knowledge.<sup>22</sup> Physical exercise, after the recommendations, is the biggest problem since it is opposed to the low-sodium diet and medication receiving.<sup>9</sup> The approach of treatment also affects the efficiency for Self-care cardiac resynchronization is related with the high level of the efficiency for Self-care.<sup>23</sup>

Some of the factors that are associated with negative attitude towards medication include marital status, nationality, having lower education level, and greater illness severity.<sup>24</sup> Medication adherence was associated with fewer HF symptoms and lower rates of hospitalization and death.<sup>10</sup> Comparing HF patients who followed rehabilitation programs to non-participants, the first appeared to have better knowledge on the disease.<sup>25</sup> The

improvement of exercise capacity, following exercise training, was associated with a lower level of depression and anxiety and greater level of QoL in patients with HF.<sup>26</sup>

A great percentage of patients with progressed HF suffer from strong symptoms, such as breathlessness, persistent cough, fatigue, and limitation in physical activity. In addition, many patients suffer from pain, anxiety, depression, nausea and constipation.<sup>27</sup> Interventions or treatments that improve the physical condition relieve the pains, enhance the effectiveness of therapies, and reduce the mortality.

Symptoms as dyspnea at night, edema, difficulties in everyday activities, the belief that they were taking a lot of medicines and the failure to maintain their ideal weight after the initial diagnosis have a significant negative effect on the patients self-efficacy and QoL.<sup>28</sup> Improvement in HF symptoms was associated with the improvement in overall QoL.<sup>29</sup> In HF, QoL is dependent on both the severity of physical and depressive symptoms and the level of engagement in HF self-care behaviours.<sup>30</sup> Studies exploring the impact of Renal function on stroke risk in HF, showed an expanded risk of ischemic stroke and intracranial bleeding in HF patients with constant chronic kidney disease, but this association could only be found in patients without Renal replacement therapy.<sup>31</sup> These findings are related to the results of another study demonstrating an association between expected glomerular filtration rate and stroke risk in HF patients.<sup>32,33</sup>

#### **Limitations of our study:**

The study is based on cross-sectional data and this may affect the patients exact level of adherence to self-care behaviors and also difficult to conclude a causal relationship. Knowledge, behaviours, location, and symptoms were assessed using self-report measures administered orally. Hence, the items could be subject to a social desirability bias.

Concerning the null for Self-care behaviour and Self-management items, results might be biased by these factors. Therefore, causality cannot be implied.

The findings from this study add to our understanding of the patient's knowledge of HF, and how effects the quality of life,



the Self-efficacy, and Self-care behavior.

## CONCLUSIONS

Findings of this study showed that patients with higher level of Heart Failure knowledge adopt better to the adhering to the medication. Summarizing the key points, Self-care Behaviour and quality of life have been enhanced.

Given the importance of Self-care in reducing HF morbidity and mortality, healthcare professionals should play an important/key/crucial role in improving knowledge and Self-care behaviours among patients with HF. Healthcare providers should consider various educational approaches in the process of patient education. Furthermore, they need to consider patient's preferences for education to increase patients' quality of life.

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## Disclosure

The authors have no financial conflicts of interest. The authors declare that they have no competing interests.

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## ANNEX

**Table 1.** Sample demographics and clinical characteristics

	N (%)
<b>Sex</b>	
Men	102 (83.6)
Women	20 (16.4)
<b>Age (years), mean (SD)</b>	
Married	98 (80.3)
<b>Living</b>	
With family	91 (74.6)
Alone/single	31 (25.4)
<b>Working status</b>	
Employed	28 (23)
Unemployed	9 (7.4)
Pensioner	74 (60.7)
Household	1 (0.8)
Incapable of working	10 (8.2)
<b>Educational years, mean (SD) Educational level</b>	
Primary/ Middle school	66 (54.1)
High school	19 (15.6)
University	37 (30.3)
<b>Monthly income</b>	
<600	45 (36.9)
600-1000	53 (43.4)
>1000	24 (19.7)
<b>Body Mass Index (BMI)</b>	
<b>BMI (kgr/ m<sup>2</sup>), mean (SD) BMI</b>	
Normal	34 (27.9)
Overweight	43 (35.2)
Obese	45 (36.9)
<b>Smoking</b>	
Alcohol	13 (10.7)
<b>Duration of disease (years)</b>	
Less than a year	22 (18)
1-2 years	19 (15.6)
More than two years	81 (66.4)
<b>Number of hospital admissions</b>	
None	16 (13.1)
1	45 (36.9)
2-4	33 (27)

>4	28 (23)
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Ejection fraction (EF), mean (SD)	36.6 (9.9)
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EF levels	
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<40	76 (62.3)
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40-49	24 (19.7)
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>= 50	22 (18)
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New York Heart Association (NYHA)	
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I	10 (8.2)
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II	57 (46.7)
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III	48 (39.3)
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IV	7 (5.7)
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Aetiology of Heart Failure	
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Ischemic	59 (48.4)
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Valvar and congenital heart disease	14 (11.5)
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Hypertension	38 (31.1)
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Cardiomyopathy	3 (2.5)
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Arrhythmias	3 (2.5)
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Appliances	
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Pacemaker	10 (8.2)
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Cardiac Resynchronization Therapy (CRT)	0 (0)
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Defibrillation	25 (20.5)
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None	87 (71.3)
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Co-morbidities	
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Hypertension	56 (45.9)
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Atrial Fibrillation	46 (37.7)
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Stroke	5 (4.1)
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Diabetic mellitus	49 (40.2)
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Thyroiditis	18 (14.8)
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Dyslipidemia	45 (36.9)
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Peripheral angiopathy	20 (16.4)
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Chronic kidney disease	20 (16.4)
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Pneumonological	18 (14.8)
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Pulmonary hypertension	7 (5.7)
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Cancer	9 (7.4)
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Psychological disorders	13 (10.7)
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**Table 2.** Descriptive statistics for the study subscales

	Minimum	Maximum	Mean	Median	SD
<i>Minnesota QOL scale</i>					
Physical subscale	1.0	40.0	25.6	25.0	10.4
Emotional subscale	0.0	25.0	13.2	14.0	6.3
Total score	1.0	98.0	59.2	64.5	23.3
<i>Atlanta Knowledge score</i>	4.0	27.0	15.8	14.0	4.9
<i>SEAMS</i>					
1 <sup>st</sup> factor <sup>  </sup>	7.0	21.0	17.0	18.0	4.2
2 <sup>nd</sup> factor <sup>¶</sup>	6.0	18.0	14.1	15.0	3.5
<i>Self-care behaviour scale</i>					
Adhering to recommendations	3.0	15.0	7.7	9.0	3.1
Fluid and sodium management	3.0	15.0	9.9	11.5	3.4
Physical activity and recognition of deteriorating symptoms	3.0	15.0	9.6	11.0	3.6

|| self-efficacy for taking medications under difficult circumstances; ¶ self-efficacy for continuing to take medications when circumstances surrounding medication-taking are uncertain

**Table 3.** Correlation coefficients of the study subscales

		1	2	3	4	5	6	7	8	9
	<i>Minnesota QOL scale</i>									
1.	Physical subscale	1.00	.77***	.96***	-.06	-.26**	-.27**	.24**	.14	.32***
2.	Emotional subscale		1.00	.86***	-.17	-.29**	-.26**	.30**	.25**	.39***
3.	Total score			1.00	-.08	-.30**	-.27**	.25**	.16	.35***
4.	<i>Atlanta Knowledge score</i>				1.00	.33***	.39***	-.54***	-.51***	-.60**
	<i>SEAMS</i>									
5.	1st factor					1.00	.89***	-.38***	-.34***	-.38***
6.	2nd factor						1.00	-.39***	-.28**	-.36***
	<i>Self-care behaviour scale</i>									
7.	Adhering to recommendations							1.00	.76***	.82***
8.	Fluid and sodium management								1.00	.78***
9.	Physical activity and recognition of deteriorating symptoms									1.00

\*p&lt;.05; \*\*p&lt;.01; \*\*\*p&lt;.001

**Table 4.** Results from linear regression analyses in a stepwise method, with dependent variables Self-Efficacy for Appropriate Medication Use Scales

		$\beta$ +	SE++	P	95,0% Confidence Interval	
<b>Medication adherence (factor 1)</b>					Lower Bound	Upper Bound
Atlanta-HF-Knowledge-Test		0.26	0.07	0.001	0.11	0.4
NYHA	I/II (reference)					
	III/IV	-1.99	0.71	0.006	-3.4	-0.58
<b>Medication adherence (factor 2)</b>						
Atlanta-HF-Knowledge-Test		0.26	0.06	<0.001	0.14	0.38
NYHA	I/II (reference)					
	III/IV	-1.60	0.57	0.006	-2.74	-0.47

+regression coefficient; ++standard error

**Table 5.** Results from linear regression analyses in a stepwise method, with dependent variables Self-care Behaviour

		$\beta$ +	SE++	P	95,0% Confidence Interval	
<b>Adhering to recommendations</b>					Lower Bound	Upper Bound
Atlanta-HF-Knowledge-Test		-0.28	0.05	<0.001	-0.4	-0.18
Educational years		-0.13	0.05	0.015	-0.24	-0.02
<b>Fluid and sodium management</b>						
Atlanta-HF-Knowledge-Test		-0.36	0.06	<0.001	-0.47	-0.25
<b>Physical activity and recognition of deteriorating symptoms</b>						
Atlanta-HF-Knowledge-Test		-0.35	0.06	<0.001	-0.46	-0.23
Educational years		-0.14	0.06	0.012	-0.25	-0.03
Stroke	No (reference)					
	Yes	2.88	1.25	0.023	-5.35	-0.4
NYHA	I/II (reference)					
	III/IV	1.07	0.50	0.035	0.08	2.07

+regression coefficient; ++standard error

**Table 6.** Results from linear regression analyses in a stepwise method, with dependent variables quality of life dimensions

		$\beta$ +	SE++	P	95,0% Confidence Interval	
<b>Physical subscale (Minnesota)</b>					Lower Bound	Upper Bound
Sex	Men (reference)					
	Women	4.61	2.14	0.033	0.38	8.83
NYHA	I/II (reference)					
	III/IV	7.86	1.69	<0.001	4.51	11.21
Renal failure	No (reference)					
	Yes	4.74	2.22	0.035	0.35	9.15
Physical activity and recognition of deteriorating symptoms		0.58	0.23	0.013	0.13	1.03
<b>Emotional subscale (Minnesota)</b>						
Sex	Men (reference)					
	Women	3.12	1.32	0.019	0.51	5.72
NYHA	I/II (reference)					
	III/IV	4.38	0.99	<0.001	2.40	6.34
Physical activity and recognition of deteriorating symptoms		0.49	0.14	0.001	0.21	0.78
<b>Total score (Minnesota)</b>						
NYHA	I/II (reference)					
	III/IV	18.89	3.63	<0.001	12.50	27.04
Educational years		-1.30	0.37	0.001	-1.98	-0.50

+regression coefficient; ++standard error