Original Article
doi: https://doi.org/10.1590/1983-1447.2023.20220357.en

Predictors of self-care behaviors in individuals with heart failure in Brazil

Preditores de comportamentos de autocuidado em pessoas com insuficiência cardíaca no Brasil

Predictores de conductas de autocuidado en individuos con insuficiencia cardiaca en Brasil

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How to cite this article:
Silva MAG, Brunori EHFR, Murakami BM, D´Agostino F, Lopes CT, Santos VB, Santos ER. Predictors of self-care behaviors in individuals with heart failure in Brazil. Rev Gaúcha Enferm. 2023;44:e20220357. doi: https://doi.org/10.1590/1983-1447.2023.20220357.en

ABSTRACT

Objective: To identify the predictors of self-care behaviors in individuals with heart failure.

Method: A cross-sectional study including 405 patients with heart failure. Self-care behaviors were assessed by the Self-Care of Heart Failure Index. Sociodemographic and clinical characteristics were investigated as predictors of self-care maintenance, management and confidence through logistic regressions.

Results: The predictors of self-care maintenance were number of children ($p<0.01$), left ventricular ejection fraction ($p<0.01$), positive feeling about disease ($p=0.03$), obesity ($p=0.02$) and dialytic chronic kidney disease ($p<0.01$). The predictors of self-care management were having married children ($p<0.01$) and sleep apnea ($p<0.01$). The predictors of self-care confidence were family income ($p<0.01$), number of hospitalizations in the previous 12 months ($p=0.01$), number of daily medication doses ($p<0.01$) and sedentarism ($p<0.01$).

Conclusion: Some predictors related to the self-care behaviors were found, so some intensified education and social aid should be aimed at patients with these specific characteristics.

Descriptors: Heart failure. Self care. Self-management. Health behavior. Nursing.

RESUMO

Objetivo: Deve ser apresentado em tempo verbal no infinitivo, utilizando linguagem coerente com o tipo de pesquisa e mantendo a concisão. É fundamental que o objetivo esteja alinhado com a introdução do artigo, contextualizando o problema de pesquisa e justificando sua relevância.

Método: Estudo transversal incluindo 405 pacientes com insuficiência cardíaca. Os comportamentos de autocuidado foram avaliados pelo *Self-Care of Heart Failure Index*. Características sociodemográficas e clínicas foram investigadas como preditores de manutenção, gerenciamento e confiança do autocuidado por meio de regressões logísticas.

Resultados: Os preditores da automanutenção foram número de filhos ($p<0,01$), fração de ejeção do ventrículo esquerdo ($p<0,01$), sentimento positivo sobre a doença ($p=0,03$), obesidade ($p=0,02$) e doença renal crônica dialítica ($p <0,01$). Os preditores da autogestão foram filhos casados ($p<0,01$) e apneia do sono ($p<0,01$). Os preditores da autoconfiança foram renda familiar ($p<0,01$), número de internações nos últimos 12 meses ($p=0,01$), número de doses diárias de medicamentos ($p<0,01$) e sedentarismo ($p<0,01$).

Conclusão: Alguns preditores relacionados ao autocuidado foram identificados, portanto intervenções educacionais intensificadas e apoio social devem ser direcionadas a pacientes com essas características específicas.

Descritores: Insuficiência cardíaca. Autocuidado. Autogestão. Comportamento relacionados com a saúde. Enfermagem.

RESUMEN

Objetivo: Identificar los predictores de conductas de autocuidado en individuos con insuficiencia cardíaca.

Método: Estudio transversal con 405 pacientes con insuficiencia cardíaca. Se evaluaron comportamientos de autocuidado por el *Self-Care of Heart Failure Index*. Se investigaron características sociodemográficas y clínicas como predictores del mantenimiento, manejo y confianza en el autocuidado a través de regresiones logísticas.

Resultados: Los predictores de automantenimiento fueron número de hijos ($p<0,01$), fracción de eyección del ventrículo izquierdo ($p<0,01$), sentimiento positivo sobre la enfermedad ($p=0,03$), obesidad ($p=0,02$) y enfermedad renal crónica dialítica ($p<0,01$). Predictores del autogestión fueron hijos casados ($p<0,01$) y apnea del sueño ($p<0,01$). Predictores de autoconfianza fueron renta familiar ($p<0,01$), número de internaciones en los últimos 12 meses ($p=0,01$), número de dosis diarias de medicamentos ($p<0,01$) e inactividad física ($p<0,01$).

Conclusión: Se encontraron algunos predictores relacionados con autocuidado, por lo que se debe intensificar la educación y ayuda social dirigida a pacientes con estas características.

Descriptores: Insuficiencia cardíaca. Autocuidado. Automanejo. Conductas relacionadas con la salud. Enfermería.

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INTRODUCTION

Heart failure (HF) is a systemic clinical syndrome characterized by a cardiac inability to generate cardiac output that is adequate to meet the metabolic needs[1]. It is a chronic condition that has become increasingly frequent worldwide, as a result of increased cardiovascular risk factors, advancements in pharmacological treatment and research, improved treatment of hypertensive patients, advanced delivery of care to patients with coronary artery disease, and ongoing increase of life expectancy in the aged population[1,2].

Exacerbation of HF is associated with disease progression and patients' difficulty in adhering to the complex pharmacological and non-pharmacological therapeutic regimen[3], which can lead to severe reduction of functional capacity for activities of daily living (ADLs), high hospitalization rates and frequent rehospitalizations, resulting in poor quality of life and high mortality rates[4].

Some factors that interfere on the prognosis of HF are age over 60 years, poor knowledge about the disease, poor adherence to pharmacological and non-pharmacological treatment, cognitive deficit, depression, poor confidence in the recommended treatment, multiple comorbidities, among others[5]. These factors impact self-care, which is the cornerstone of a successful HF treatment.

The concept of self-careis associated with the individual responsibility, autonomy, and independence. Self-care is a human function deliberately applied to each person, aiming to maintain health and well-being when affected by an acute or chronic disease, it can be defined as the practice of activities that people perform for their own benefit of life, health and well-being, with actions of self-care comprise the individual's ability to engage in this practice and its development is directly related to the person's activities, physical limitations, values, cultural and scientific rules[6,7].

To avoid exacerbations, individuals with HF must engage in self-care behaviors. Self-care in HF is defined as a naturalistic decision-making process that influences actions to maintain physiologic stability, facilitate the perception of symptoms, and direct the management of those symptoms[6]. The positive decisions that the patients make about health behaviors are called self-care behaviors[8,9]. They include behaviors people use to maintain their health, i.e. treatment adherence and healthy behaviors (self-care maintenance); the detection of physical sensations and the interpretation of meaning (symptom perception) and the responses to symptoms whey they occur (self-care management)[4].

The maintenance of self-care includes behaviors to maintain physical and emotional stability, such as daily weighing, adherence to a low-sodium diet, regular exercise, strict adherence to medication, immunization and regular visits to the doctor. Self-care management, on the other hand, includes the ability to make the right decisions to control symptoms when they arise. Finally, confidence in self-care, or self-efficacy, refers to the patient's perception of their ability to actively participate in each stage of the self-care process. Self-efficacy is a crucial aspect of self-care, which can have a positive impact on the maintenance and management of self-care[6].

The maintenance of self-care is the first step of the self-care model in HF and reflects the behaviours that patients use in their daily lives to maintain physiological stability, monitoring of symptoms and adherence to treatment. Self-care management is the second stage of the self-care model in HF refers to the decision-making response to symptoms when they occur[4].

According to the theoretical model by Riegel and Dickson, the self-care process in HF is categorized into five stages: the first stage corresponds to symptom monitoring and treatment adherence, the second stage is symptom recognition (for example, weight gain or the presence of a new edema in the lower limbs), which constitute the maintenance of self-care. The third stage, or symptom assessment, is a process in which the patient rationalizes why the symptom may have occurred (e.g., increasing dietary sodium or fluid intake during the day). The fourth stage, implementing a strategy of treatment, is a process in which the patient treats a symptom appropriately and the fifth stage is the evaluation of the treatment that has been implemented[4,6].

Different studies have attempted to elucidate difficulties encountered by individuals with HF in performing self-care behaviors. The factors influencing self-care of HF are widely variable across settings and countries, and may include age, gender, education, employment status, physical functioning, health-related quality of life, cognitive deficit, patterns of physical symptoms, social support, HF functional classification, depressive symptoms, left ventricular ejection fraction, limited knowledge about the disease, low confidence in the recommended treatment, number of medications, multiple comorbidities, feelings towards the disease/treatment[10–12].

There is limited knowledge about self-care behaviors and factors associated with self-care in Brazilian patients with HF[13–15]. A meta-analysis on the self-care status in patients with heart failure found that the mean sample size in studies on the subject was 230 participants[11]. Therefore, there is a need for more robust Brazilian studies with greater sample representativeness, so that we can have a better understanding of the factors associated with self-care in this population and greater generalization of the results. Furthermore, studies are needed to increase nurses' knowledge of this construct so

that, when identifying these possible predictors in patients, they can implement interventions more individualized and sensitive to each patient. This study aimed to identify the predictors of self-care behaviors in individuals with HF.

METHOD

This is a quantitative, analytical, cross-sectional study reported based on the STROBE (Strengthening the Reporting of Observational studies in Epidemiology) guidelines. The study was conducted between June 2018 and March 2019 at a Cardiology Institute in an outpatient service in São Paulo, SP, Brazil. The outpatient service belongs to a Clinical Division, with nearly 100 rooms. The HF outpatient service assists stable patients for clinical treatment with a multidisciplinary approach. During the data collection period,7,973 appointments were carried out.

A simple random sampling consisted of patients with a documented HF diagnosis for at least 6 months regardless of etiology, aged 18 years old or older.Patients presenting with clinical signs of HF decompensation (such as dyspnea, pulmonary congestion, fatigue, or low cardiac output symptoms) were excluded, as well as those who scored 24 points or less in the Montreal Cognitive Assessment (MoCA) test.For the application of the MoCA test, it was initially explained to the patient that a test would be performed to assess memory and some cognitive skills and to verify whether the patient understood the guidelines before starting the test. Then the test was performed in the specified order and the patients' responses and scores were recorded. During data collection, there were no participants with visual acuity problems that prevented the application of the test.

For the collection of sociodemographic and clinical data, an instrument was developed by the authors based on the Brazilian Guideline on Heart Failure and previous studies on the treatment of HF by the authors[1,9,16]. This instrument was not submitted to content validity evidence analysis because it is an instrument with variables of interest specifically to this study.

The sociodemographic variables of interest were: gender, age, self-declared ethnicity, marital status, number of children, years of education, religion, professional category, current professional status, family income, household arrangements, type of caregiver (family member or professional), number of people in the household and having married children. These data were collected during an interview with the patients, in addition to the question "Which feeling defines your disease?", which was categorized as either negative, positive or neutral.

The following clinical data were collected through the analysis of medical records: time since diagnosis, hospitalization in the previous 12 twelve months (yes/no), HF etiology, HF functional class, echocardiogram data, comorbidities, presence of ventricular assistive devices, and HF medications.

The instrument used to assess self-care was the Brazilian version of the Self-Care of Heart Failure Index version 6.2 (SCHFI v 6.2). The instrument consists of 22 questions divided into three dimensions, namely: *self-care maintenance* (10 items); *self-care management* (6 items); and *self-care confidence* (6 items). The answers for each item range from "never or rarely" to "always or daily" for the "self-care maintenance" dimension; from "not likely" to "very likely" for the "self-care management" dimension; and from "not confident" to "extremely confident" for the "self-care confidence" dimension. The scores for each dimensions range between 0 and 100. Higher scores represent greater self-care abilities and scores ≥70 represent appropriate self-care[17].

Based on the medical appointment scheduling, the principal researcher checked patients for eligibility and invited them to participate based on a random sequence generated by the *Certified True Randomizers* mobile app. Considering that it would not be possible to evaluate all eligible patients on that day, we chose to randomize the sample and, thus, avoid interference by the researcher in the choice of participants. Patients were approached individually by the researcher, who explained the study objectives. Those who agreed to participate signed a consent form and were subsequently interviewed for sociodemographic characteristics and self-care behaviors. Clinical data were collected from the medical charts.

On average, 10 to 12 patients were approached daily at the heart failure clinic, but only 6 to 8 of them were interviewed. Patients were approached after their appointments in the physician and/or nurse in a private room where the research objectives were explained. During the interview, some patients had the presence of companions, family caregivers and/or significant others who stayed during data collection. To complete the data collection instruments, it took an average of 25 to 30 minutes.

Sample calculation was based on the previous validation study of the Brazilian version of the SCHFI v 6.2[17]. In this study, the highest standard deviation was found in the score of *self-care confidence,* with a value of 27.3 points. Considering a significance level of 5%, it was divided by the number of hypotheses to be tested, in this case, 45 variables that resulted in a significance level of 0.0011 and a required sample number of 405 patients.

Categorical variables were described in absolute and relative frequencies and quantitative variables were summarized

through means, median, standard deviation and/or interquartile range, depending on the normality distribution, which was evaluated by means of the *Shapiro-Wilk test*. Self-care was considered as a dichotomous variable, with scores ≥ 70 being considered as adequate and scores < 70 as inadequate for each of the SCHFI v 6.2 dimensions. The internal consistency of the SCHFI v 6.2 was analyzed through the Cronbach's alpha. The association between the dimension scores and the categorical variables was assessed by Pearson's Chi-square test or Fisher's Exact test and the association between the dimension scores and the quantitative variables was assessed by Mann-Whitney's U test.

All sociodemographic and clinical variables with p-values < 0.20in a univariate analysis (data available upon request to the authors) were included as potential predictors of self-care in a simple logistic regression. The stepwise method was adopted for the multiple regression model, seeking to maintain only the variables with a Wald statistic with p-values <0.05 in the final model. The research was approved by the Ethics Institutional Review Board at the Educational Institution under the number 2.678.512 and by the Ethics Institutional Review Board at the hospital under the number 2.809.819.

RESULTS

A total of 790 patients were eligible for this study, of which 385 were excluded because 350 did not agree to participate, 25 had a score equal to or below 24 points in the MoCA test and 10 patients decided to leave the study at the end of the interview and revoked the consent given, totaling 405 participants included. The main sociodemographic and clinical characteristics are shown in Table 1 and Table 2.

The negative feelings about the disease included anguish, sadness, loneliness, and fear of death. The positive feelings included optimism, happiness for valuing life.

Table1 – Sociodemographic characteristics of the patients with heart failure. São Paulo, São Paulo, Brazil, 2020

Variable	N(%)
Male Gender	232(57.3)
Age	54.77(10.83)*
Self-declared ethnicity	
Mixed (Caucasian + African American)	146(36.0)
Caucasian	142(35.1)
African American	115(28.4)
Asian	2(0.5)
Marital Status	
Married or in a stable union	262(64.7)
Single	67(16.5)
Divorced	45(11.1)
Widowed	31(7.7)
Number of children	2(2;3) †
Schooling	
Complete or incomplete High School	193(47.7)

Table1 – Cont.

Variable	N(%)
Complete or incomplete Elementary School	166(41.0)
Complete or incomplete Higher Education	46(11.3)
Religion	
Catholic	230(56.8)
Evangelical	120(29.6)
Candomblé	31(7.6)
Atheist or no religion	16(4.0)
Others	8(2.0)
Work situation	
Retired, unemployed, does not work or pensioner	209 (51.6)
Self-employed, employee or housewife	157 (38.8)
Medical leave	39(9.6)
Family income	
1-3 minimum wages	305 (75.3)
Up to 1 minimum wage	66 (16.3)
3 or more minimum wages	34 (8.4)
Lived alone	
Yes	40 (12.1)
Number of people living in the household	
3-4	190 (46.9)
1-2	154 (38.0)
<5	61 (15.1)
Family care	
Does not require care	348 (85.9)
Spouse	38 (9.4)
Children	19 (4.7)

Source: Database, 2020
Note: * mean (standard deviation) ; † median (interquartile range).

Table 2 – Clinical characteristics of the patients with heart failure. São Paulo, São Paulo, Brasil, 2020

Variable	n (%)
Etiology of Heart Failure	
Idiopathic dilated cardiomyopathy	154(38.0)
Chagas' disease	117(28.9)
Hypertensive cardiomyopathy	37(9.1)
Ischemic cardiomyopathy	31(7.7)
Others (alcoholic cardiomyopathy, peripartum cardiomyopathy, restrictive cardiomyopathy, amyloidosis, myocarditis and hypertrophic cardiomyopathy)	66(16.3)
Functional class	
I	189(46.7)
II	188(46.4)
III	28(6.9)
Comorbidities*	
Arterial hypertension	332(82.0)
Dyslipidemia	268(66.2)
Diabetes mellitus	119(29.4)
Obesity	118(29.1)
Chronic kidney disease	46(11.3)
Hypothyroidism	41(10.1)
Cancer	20(4.9)
Iron deficiency anemia	13(3.2)
Sleep apnea	8(2.0)
Lifestyle	
Sedentarism	196(48.4)
Smoker	
Ex-smoker	256(63.2)

Table 2 – Cont.

Variable	n (%)
Never smoked	115(28.4)
Smoker	34(8.4)
Alcohol consumption	
Ex-alcoholic	200(49.4)
Never drank	134(33.1)
1- 4 weekly doses	51(12.6)
5+ weekly doses	20(4.9)
Hospitalized or sought medical care due to HF symptoms in the previous months	191(47.2)
Feeling about the disease	
Negative	277(68.4)
Positive	41(10.1)
Did not know what to answer	87(21.5)
Time since diagnosis (years)	8.54±8.52†
Left ventricular ejection fraction (%)	42.20 ±13.76†
Number of hospitalizations	1(1-20))§
Number of medications per day	8(0-26))§

Source: Database, 2020
Note: * variable allowing for more than one answer; †mean (standard deviation); § median (minimum – maximum);

331 patients (81%) had inadequate self-care maintenance and 304 patients (75%) had inadequate self-care confidence. Of 231 patients who reported HF symptoms, 219 (94%) had inadequate self-care management. In the internal consistency analysis, the self-care maintenance dimension had a Cronbach's alpha value of 0.58, the self-care management dimension had a Cronbach's alpha value of 0.61, and the self-care confidence dimension had a Cronbach's alpha value of 0.83.

Table 3 shows the variables significantly associated with self-care maintenance, management and confidence levels in the simple logistic regression analysis.

In the multiple regression analysis, in the maintenance subscale, each extra child was associated with a 28.5% reduction in the chance of having adequate of self-care maintenance; for each 1% increase in the left ventricle ejection fraction, there was a 5% increased chance of adequate of self-care; patients with positive or neutral feelings towards the disease had twofold greater chances of increased self-care maintenance; obesity was associated with a 57.5% decreased chance of self-care maintenance, whereas having dialytic renal failure was associated with a 15-fold greater chance of adequate self-care maintenance, although with a large confidence interval (see Table 4).

Table 3 – Simple logistic regression of sociodemographic and clinical characteristics and heart failure self-care. São Paulo, São Paulo, Brazil, 2020

Variable	OR*	95% CI †	p-value
Self-care maintenance			
Montreal Cognitive Assessment test	1.30	1.09-1.55	<0.01
Number of children	0.66	0.53-0.83	<0.01
Years of study			
(In)Complete Elementary School§			
(In)complete High School	0.29	0.13-0.64	0.002
Family income			
Up to 1 minimum wage§			
1-3 minimum wages	2.98	1.15-7.76	0.02
3 or more minimum wages	4.39	1.33-14.41	0.01
Hospitalization or seeking medical care in in the previous 12 months	0.40	0.23-0.69	<0.01
Number of hospitalizations due to HF in the previous 12 months	0.44	0.20-0.95	0.03
Left ventricular ejection fraction	1.06	1.04-1.08	<0.01
Total number of daily medication doses	0.83	0.77-0.94	<0.01
Arterial hypertension	0.43	0.24-0.77	<0.01
Dialytic chronic kidney disease	6.95	1.14-42.36	0.03
Non-dialytic chronic kidney disease	0.10	0.01-0.73	0.02
Dyslipidemia	0.37	0.22-0.63	<0.001
Obesity	0.36	0.18-0.72	<0.01
Sedentarism	0.35	0.20-0.61	<0.01
Smoker			
Never smoked§			
Ex-smoker	0.54	0.31-0.92	0.02
Smoker	0.27	0.07-0.96	0.04
Self-care management			
Number of children	0.55	0.33-0.92	0.02
Family income			
Up to 1 minimum wage§			
1-3 minimum wages	2.36	0.28-19.39	0.04
3 or more minimum wages	10.84	1.04-113.16	0.04

Table 3 – Cont.

Variable	OR*	95% CI †	p-value
Married children	0.124	0.027-0.58	<0.01
Sleep apnea	8.56	1.47-49.66	0.01
Chronic obstructive pulmonary disease	5.27	0.98-28.14	
Self-care confidence			
Montreal Cognitive Assessment	1.43	1.21-1.68	<0.001
Ethnicity			
Caucasian§			
Non-Caucasian	0.61	0.38-0.97	0.040
Number of children	0.78	0.64-0.94	0.009
Years of study			
(In)Complete Elementary School§			
(In)complete High School	1.78	1.07-2.97	0.02
(In)complete Higher Education	3.32	1.63-6.76	<0.01
Family income§			
Up to 1 minimum wage§			
1-3 minimum wages	5.70	2.01-16.16	0.001
3 or more minimum wages	12.37	3.62-41.31	<0.001
Hospitalization or seeking medical care in the previous 12 months	0.20	0.122-0.35	<0.001
Left ventricular ejection fraction	1.08	1.06-1.10	<0.001
Total number of daily medication doses	0.72	0.66-0.79	<0.001
Arterial hypertension	0.48	0.28-0.83	0.009
Diabetes Mellitus	0.33	0.18-0.61	<0.001
Non-dialytic chronic kidney disease	0.13	0.03-0.57	0.007
Dyslipidemia	0.32	0.20-0.52	<0.001
Obesity	0.40	0.22-0.72	0.002
Sedentarism	0.25	0.15-0.42	<0.001
Smoker			
Never smoked§			
Ex-smoker	0.46	0.28-0.75	<0.001
Smoker	0.30	0.10-0.83	0.02

Source: Database, 2020
Note: *OR: Odds ratio; † Confidence interval; § reference used for each value for the calculation of the simple logistic regression.

Patients with married children were 90.6% less likely to have adequate self-care management and those with sleep apnea were 17 times more likely to have adequate self-care management, although with a large confidence interval (see Table 4).

Patients with a family income of more than 3 minimum wages were 12 times more likely to have adequate self-care confidence, although with a large confidence interval; with each hospitalization there was and estimated reduction of 39.4% in the chance of adequate self-care confidence; for each 1% increase in the left ventricle ejection fraction, a mean reduction of 5.1% in the chance of adequate self-care confidence was found; for each additional dose of medication, a mean reduction of 14% in the chance of adequate self-care confidence was identified; and sedentary patients had a 62.2% lower chance of adequate self-care confidence (see Table 4).

Table 4 – Multiple regression analysis for adequacy of self-care maintenance, self-care management and self-care confidence. São Paulo, São Paulo, Brazil, 2020

Predictor	OR*	95% CI†	p-value
Self-care Maintenance‡			
Number of children	0.71	0.560-0.913	<0.01
Left ventricular ejection fraction	1.05	1.025-1.075	<0.01
Feeling about disease			
Negative§			
Positive	2.49	1.05-5.88	0.03
Neutral	2.24	1.11-4.49	0.02
Obesity	0.42	0.020-0.90	0.02
Dialytic chronic kidney disease	15.69	2.24-109.85	<0.01
Self-care management¶			
Married child	0.09	0.01-0.50	<0.01
Sleep apnea	17.07	2.03-143.30	<0.01
Self-care confidence**			
Family income			
Up to 1 minimum wage§			
1-3 minimum wages	5.26	1.66-16.67	<0.01
3 or more minimum wages	12.67	3.07-52.27	<0.01
Number of hospitalizations in the previous 12months	0.60	0.40-0.90	0.01
Left ventricular ejection fraction	1.05	1.02-1.07	<0.01
Number of daily medication doses	0.86	0.78-0.94	<0.01
Sedentarism	0.37	0.20-0.69	<0.01

Source: Database, 2020

* OD – Odds Ratio; † Confidence interval;‡ Model's fit: Nagelkerke R Square =0.0.273; Sreference used for each value for the calculation of the simple logistic regression; ¶ Model's fit: Nagelkerke R Square =0.0.194; **Model's fit: Nagelkerke R Square = 0.43; Omnibus Test OF Model Coefficient: p-value <0.001

DISCUSSION

Self-care reflects the patients' ability to improve behavioral choices to maintain physiological stability, monitoring and recognize symptoms and make decisions in response to these symptoms[6,13]. Adequate self-care practice translates into beneficial outcomes[10], thus contributing to improved quality of life. In this study, most patients reported inadequate performance of self-care maintenance and management, along with impaired self-care confidence. These worrisome findings are in line with the results of a previous Brazilian study[14] and corroborate a recent metanalysis showing that self-care behaviors in patients with herat failure are inadequate regarding maintenance, management and confidence[11].

In this context, identifying predictive factors for self-care behaviors is of uttermost importance to establish specific multidisciplinary interventions, with a focus on achieving the best health outcomes. As previously found in the literature, patients with a higher educational level in our sample were more likely to adopt self-care maintenance and management behaviors and to have higher confidence levels, according to the simple logistic regression[18]. Nevertheless, education did not remain an independent predictor in the multiple regression analysis, unlike other social characteristics, such as number of children, and clinical variables, such as comorbid conditions. These findings indicate that other socioeconomic factors and clinical characteristics surpass education when influencing engagement in self-care behaviors.

The predominance of non-Caucasian ethnicity is common in our population[8,14]. This characteristic was associated with greater chances of inadequate self-care confidence in the simple regression. Because ethnicity did not remain significant in the multiple analysis, we conclude that these findings are possibly confounded by unfavorable socioeconomic factors, such as low family income. These results corroborate a previous study conducted in the US, in which African-American patients had lower adherence to pharmacological therapy, diet and monitoring of HF symptoms when compared to Caucasian patients, even after interventions were implemented to improve self-care[19].

Having more children and having married children (away from home) were associated with lower levels of self-care maintenance and management, respectively. Because most of our sample had family incomes ranging from 1 to 3 minimum wages, these findings might be related to greater financial restraints when raising more children[20]. In fact, higher monthly incomes have been positively correlated with the self-care level in Jordan[18]. When children grow up, they might function as a source of social support to improve self-care practices[21,22] but this function might be made difficult when they leave their parents' houses. Also, self-care appears to be a linear process starting with maintenance skills, to symptom perception knowledge skills, to management behaviors[18]. Therefore, if patients do not master self-care maintenance due to additional concerns with raising children, they are less likely to master symptom perception and management.

These results indicate that both multidisciplinary educational and social interventions should be implemented towards socioeconomically disadvantaged individuals and their families/social support networks[20–22]. It has been previously shown that self-care confidence influences the performance of self-care maintenance and management[16]. Moderate levels of comorbidity moderate the relationship between self-care confidence and treatment adherence (self-care maintenance), but not between self-care confidence and symptom management (self-care management)[23]. Therefore, aiming at self-care confidence might impact all dimensions of self-care for patients with HF, especially marginalized populations with comorbidities leading to decompensation.

In fact, having dialytic chronic kidney disease and sleep apnea were predictors of adequate self-care maintenance and self-care management in our study, although these results should be carefully considered, given their wide confidence intervals. There are common lifestyle changes required for patients with chronic kidney disease, sleep apnea and HF, such as exercising regularly, adopting a healthy diet, and attending healthcare appointments[24,25]. Therefore, we believe that the illness experience and threat related to these comorbidities, in addition to overlapping education from different healthcare professionals, might have contributed to treatment adherence, symptom recognition and decision-making. Awareness of the patients' need to manage multiple diseases and their therapeutic targets should integrate a fundamentally holistic approach of patients with HF[1].

A greater number of doses of medication/day and number of hospitalizations in the previous 12 months were identified as independent predictors of inadequate self-care confidence, but not self-care maintenance and management. On the other hand, a study reported that Italian patients taking fewer medications had worse self-care maintenance and confidence levels, and considered that those patients who do not perceive themselves as ill might not be motivated to perform self-care[26]. Our data suggest that Brazilian patients do not feel confident about their self-care abilities when taking an increased number of medications or after multiple hospitalizations, but their negative influences on confidence are not enough to affect treatment adherence and symptom monitoring and recognition[12]. As stated above, illness experience, perceived threat, and overlapping education

towards some comorbidities, such as chronic kidney disease and sleep apnea, might contribute to self-care maintenance and management.

While patients with higher LVEF had adequate self-care confidence and maintenance, they did not have adequate self-care management. Prochota, Szwamel and Uchmanowicz also found improved self-care significantly along with increasing LVEF values (in a sample whose mean LVEF was 44.60%)[11]. Another study found that patients with higher LVEF reported worse consulting behaviors (in a sample whose mean LVEF was 28.4)[27]. Therefore, we believe that awareness of higher LVEF provides patients with more self-confidence, thereby influencing treatment adherence. Nevertheless, these patients might not yet be driven by symptoms or functional impairment, therefore they lack experience to recognize and manage symptoms, i.e., perform self-management.

While HF treatment establishes challenges related to self-care, it also represents an emotional struggle, including a new life situation, monitoring body signals, difficult transitions and feelings of guilt and these emotional challenges can affect self-care ability. In our sample, neutral and positive feelings towards the disease were independent predictors of adequate self-care confidence, as opposed to negative feelings. In line with our findings, a multicentric study argued that poor psychological health associated with poor physical health are barriers for patients who have to be engaged in self-care[28]. Also, patients with HF experiencing symptoms associated with physical and psychological deterioration are less likely to engage in self-care behaviors.

Our findings are limited by data collection in a single center, which might not be representative of the populational characteristic. Also, the cross-sectional design of the study limits understanding of the predictive relationships. However, this is the first study with a large sample that investigated multiple potential factors associated with HF self-care behaviors in the country. We acknowledge the relevance of new studies to identify factors related to HF self-care in Brazil, which are still limited. Different sociodemographic and clinical characteristics are related to self-care and can support educational nursing interventions. Therefore, nurses directly influence self-care maintenance and management, which is essential for the progress of patients' knowledge about HF, making them experts on their own self-care.

The predictors of self-care maintenance were number of children ($p<0.01$), left ventricular ejection fraction ($p<0.01$), positive feeling about disease ($p=0.03$), obesity ($p=0.02$) and dialytic chronic kidney disease ($p<0.01$). The predictors of self-care management were having married children ($p<0.01$) and sleep apnea ($p<0.01$). The predictors of self-care confidence were family income ($p<0.01$), number of hospitalizations in the previous 12 months ($p=0.01$), number of daily medication doses ($p<0.01$) and sedentarism ($p<0.01$).

CONCLUSION

Social and clinical characteristics of individuals with heart failure are independent predictors of self-care. Favorable social characteristics, i.e., having less children and higher income, are associated with better treatment adherence (self-care maintenance) and confidence, whereas undesirable clinical characteristics, such as sedentarism and obesity, hospitalizations and a greater number of daily medication doses, are associated with worse self-care maintenance and confidence. A potential lower level of support, as represented by having married children, was associated with worse decision-making (self-care management).

These predictors of self-care can be useful in clinical practice to identify patients at high risk of not adopting adequate self-care behaviors, thereby supporting individualized interventions. Further studies with a longitudinal design should be conducted to test the direction of the relationships between the variables and investigate effective interventions to improve self-care.

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Associate editor:
Adriana Aparecida Paz

Received: 01.17.2023
Approved: 05.30.2023

Editor-in-chief:
João Lucas Campos de Oliveira