Non-Pharmacological Management of Patients Hospitalized with Heart Failure at a Teaching Hospital

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Objective

To describe non-pharmacological management of patients admitted with heart failure (HF) in a teaching hospital.

Methods

A cohort longitudinal study of patients diagnosed with HF according to the Boston score. Within the first 72 hours of admission, the nursing staff of the HF clinic conducted structured interviews and medical chart reviews.

Results

Two hundred and eighty-three admissions of 239 patients (age = 64 ± 15 years) were evaluated; approximately 50% of the patients were male and 37% had heart failure of ischemic etiology Non-pharmacological measures included salt restriction in 97%, urine output monitoring in 85%, fluid balance in 75%, weight monitoring in 61%, and fluid restriction in only 25% of the patients. However, they were often not carried out by the team in charge ($p < 0.01$ for all comparisons). Irregular use of prescribed drugs in the week prior to admission was 22% and 21% in non-readmitted and readmitted patients, respectively ($p = 1.00$). Readmitted patients ($n = 38$) had severe systolic dysfunction, more previous hospitalizations, and longer duration of HF symptoms, as compared to those non-readmitted; in addition they had better knowledge related to self-care (p values < 0.05). In the multivariate analysis, only duration of symptoms remained as an independent predictor of re-admissions.

Conclusion

Our data suggest that, even at a teaching hospital, important gaps exist between prescribing non-pharmacological measures for HF patients and their being carried out. Readmitted patients seem to have good understanding of their condition; this finding, however, is significantly associated with HF severity and time of onset.

Key words

Heart failure, non-pharmacological management, readmissions.

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Heart failure (HF) has emerged as a major public health problem, affecting 1% to 2% of the world's population. This syndrome is estimated to affect 4 to 5 million people in the United States, with 550,000 new cases reported each year. According to American statistics, overall prevalence of HF in the elderly population is 1% to 2%,[1] and costs about 38 billion dollars a year, more than 60% of which are spent on patients during hospital stay.[2] In Brazil, according to data from the Sistema Único de Saúde (Brazilian national health care system), about 11.5 million hospitalizations were reported in 2004, and cardiovascular diseases alone accounted for over 1.2 million. Heart failure was the most frequent cardiovascular cause, amounting to 339,770 admissions.

In spite of the advances in pathophysiology of heart failure, leading to the development of new treatment strategies, hospitalization rate for this syndrome has continued to increase over the last decade.[4] A number of studies have emphasized the importance of identifying the causes of readmissions for recurrent HF.[1,4-7] Among these are unfamiliarity with non-pharmacological measures, poor adherence to drug therapy and failure to recognize predictive signs and symptoms of decompensation. Some studies suggest that these aspects account for 15% to 64% of readmissions for decompensated heart failure.[6-9]

The scarcity of original descriptive data published in Brazil on non-pharmacological management of patients admitted with HF prompted us to report our experience in a public tertiary hospital. This study was conducted in a large teaching hospital for a period of 36 months and profiles the approach focusing HF patients in regard to prescription of non-pharmacological measures and previous self-care education. The purposes of this prospective, observational study were to determine the frequency of non-pharmacological measures in medical prescription and draw comparisons between the periods studied, to evaluate the actual implementation of prescribed measures and to identify differences between patients with multiple hospital readmission, with regard to prior knowledge about HF and self-care measures to control this syndrome.

Methods

Patients at least 18 years old admitted for decompensated heart failure between August 2000 and June 2003 were eligible for the study. Diagnosis of heart failure was confirmed using the Boston criteria, which range from 0 to 12 and consist of clinical and radiological variables. Patients who scored 8 or higher and showed no evidence of another disease or condition to which the signs, symptoms and radiographic findings could be attributed (especially chronic obstructive pulmonary disease, respiratory infections, primary pulmonary hypertension, pericardial disease, obesity, pulmonary thromboembolism, and anxiety disorders), were invited to participate in the study and enrolled after signing an informed consent. Patients with history of acute coronary syndrome, myocardial revascularization or cardiac surgery three months prior to hospitalization, in addition to those unable to answer a questionnaire on knowledge of known non-pharmacological measures, were excluded from the study.

During the first 72 hours of admission, HF clinic nurses performed interviews and medical chart reviews, using structured standard forms, and collected information on clinical and demographic data; past medical history; ongoing medication; signs, symptoms and laboratory tests at admission; ventricular function analysis; functional class; medical prescription; and familiarity with therapeutic measures and the mechanisms of the condition prior to hospitalization. Data identified in medical prescriptions and nursing charts were salt restriction, fluid control, fluid balance, and daily weight monitoring.

Patients' comorbidities were summarized using the Charlson Index, a previously validated score that predicts the risk of mortality related to concomitant diseases based on the number and severity of comorbidities.[11] Frequency of non-pharmacological care in medical prescriptions was later compared with nurse charts to verify compliance. Patients with subsequent readmissions during follow-up were later identified and stratified in the database.

Hospitalizations were divided into three distinct twelve-month periods, categorized as: period 1 (2/2000 to 1/2001), period 2 (2/2001 to 1/2002), and period 3 (2/2002 to 1/2003).

Statistical analysis - Continuous variables were described as mean ± standard deviation and categorical variables were demonstrated as absolute frequency and percentage. Nominal data were compared using Pearson's chi-square test, Fisher's exact test, and the Mantel-Haenszel test (trend analysis). Quantitative variables were analyzed, according to distribution, using Student's t test, ANOVA, and Kruskal-Wallis test. Readmission predictors were identified by means of the logistic regression model, including clinical variables that were statistically significant in the univariate analysis. In all cases, a two-tailed p value < 0.05 was considered significant.

To evaluate the number of non-pharmacological self-care measures previously known by readmitted patients a variable composed of non-pharmacological care was created, including dietary salt control, fluid intake control, and weight monitoring.

Results

Patients and hospitalizations - Two hundred eighty-three hospitalizations of 239 patients admitted for decompensated heart failure from August 2000 to June 2003 (36 months) were evaluated. Mean age of patients included was 64 ± 15; approximately half of them were male and 37% had ischemic etiology. One-fourth of the patients had preserved systolic functions, and the majority were either in New York Heart Association (NYHA) functional class III or IV. Clinical characteristics of patients were similar in the three periods studied (Table 1).

Frequency of non-pharmacological care prescription - Salt restriction was the most frequently prescribed non-pharmacological measure. Fluid balance and urine output monitoring were also common; weight monitoring and fluid restriction, however, were found in only 61% and 25% of all admissions, respectively. Overall, there was a slight decline in non-pharmacological care frequency during the three periods studied, but no statistically significant difference was found in this comparison, other than dietary salt (Table 2).

Execution of prescribed care - Although non-pharmacological measures were part of the medical prescription, they were not carried out with the same frequency. Only 51% of fluid balance and 66% of urine output monitoring were performed by the nursing staff ($p < 0.0001$ for both) (Fig. 1). This difference remained significant when the three periods were comparatively analyzed ($p < 0.0001$ for both measures).

Knowledge of non-pharmacological measures and readmissions - Thirty-eight patients were readmitted at least once throughout the study (1.2 ± 0.5 hospitalization/patient). Readmitted patients were found to have lower mean age and lower ejection fraction when compared to those non-readmitted (Table 3). In addition, they reported higher number of previous hospitalizations and longer-standing symptomatic heart failure. Regarding previous knowledge of non-pharmacological measures and basics of HF, no significant difference was found between groups when measures were considered separately, with the exception of fluid control. Yet, when both kinds of awareness were grouped in a self-care variable, readmitted patients usually were found to be more knowledgeable about non-pharmacological measures (13% versus 29%; $p = 0.02$). With respect to adherence to HF medication, 22% and 21% of readmitted and non-readmitted patients, respectively, said that they did not take the prescribed drugs regularly during the week prior to hospitalization ($p = 1.00$). In a multivariate logistic regression analysis

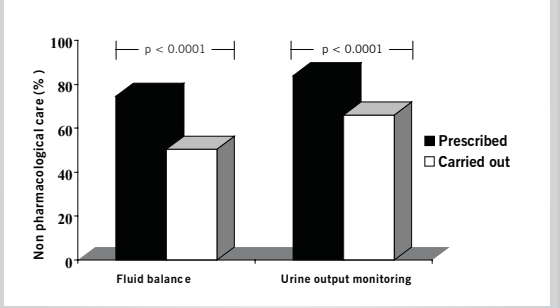

Fig. 1 *– Non-pharmacological measures prescribed and carried out.*

Table 1 – Clinical characteristics of patients studied, stratified by the periods of analysis

Period	All	2000/2 – 2001/1	2001/2– 2002/1	2002/2 – 2003/1	p
Patients, n	239	66	108	65	
Age, years	64 ± 15	66 ± 14	63 ± 16	64 ± 13	0.57
Gender, male	123 (51)	34 (51)	59 (54)	30 (46)	0.55
Previous admissions ≥ 3	123 (51)	39 (59)	51 (47)	30 (51)	0.24
Onset of symptoms, years	3.0 ± 1.8	3.0 ± 1.8	3.1 ± 1.8	2.9 ± 1.9	0.68
NYHA functional class III-IV	221 (92)	62 (94)	100 (92)	59 (91)	0.51
Ischemic etiology	90 (37)	30 (45)	39 (36)	21 (32)	0.36
LVEF, %	41 ± 17	40 ± 17	41 ± 17	41 ± 16	0.89
CAF	57 (24)	17 (26)	24 (22)	16 (24)	0.87
SAH	124	33	56	35	0.89
Comorbidites, Charlson	1.87 ± 1.3	1.78 ± 1.3	1.80 ± 1.3	2.07 ± 1.3	0.29
Creatinine; mg/dl	1.3 ± 0.8	1.5 ± 1.1	1.2 ± 0.6	1.2 ± 0.9	0.29
Sodium, mEq/l	136 ± 4	136 ± 5	136 ± 4	137 ± 4	0.11
Ongoing drugs					
Diuretics	179 (75)	46 (70)	82 (76)	51 (78)	0.48
ACEI	147 (61)	36 (54)	73 (67)	38 (58)	0.26
Beta-blocker	35 (14)	10 (15)	19 (17)	6 (9)	0.34

Continuous variables expressed as media ± standard deviation and categorical variables, as n (%).n (%). NYHA- New York Heart Association; LVEF- left ventricular ejection fraction; CAF- chronic atrial fibrillation; SAH- systemic arterial hypertension; ACEI- angiotensin-converting enzyme inhibitors.

including age, ejection fraction, self-care variable, and onset of symptoms, only duration of symptomatic disease remained as an independent predictor of readmissions. For every additional year of symptoms, patients were 27% more likely to be readmitted (p = 0.04; CI 95% 1.00-1.60).

Table 4 describes patients' clinical characteristics according to previous knowledge of non-pharmacological measures for the management of heart failure. Patients more knowledgeable about characteristics such as salt restriction, fluid restriction, and weight monitoring were those with more severe and longer-standing condition

Table 2 – Prescription frequency for non-pharmacological care stratified by the periods of analysis

Period	All	2000/2 – 2001/1	2001/1 – 2002/1	2002/2 – 2003/1	p*
Admissions, n	283	70	126	87	
Salt restriction	275 (97)	70 (100)	123 (97)	82 (94)	0.03
Urine output monitoring	238 (84)	63 (90)	106 (84)	69 (79)	0.07
Fluid balance	211 (75)	49 (70)	95 (75)	67 (77)	0.32
Weight monitoring	174 (61)	47 (67)	80 (63)	47 (54)	0.10
Fluid restriction	71 (25)	18 (25)	38 (30)	15 (17)	0.18

*Data expressed in n (%). * p value for trend.*

Table 3 – Self-care knowledge for controlling HF and readmissions

	With no new admissions	With new admissions	p
Patients, n	201 (84)	38 (16)	
Age, years	65 ± 15	59 ± 14	0.04
Gender, male	103 (51)	20 (52)	1.00
Ischemic etiology	75 (37)	15 (39)	1.00
LVEF, %	42 ± 17	36 ± 14	0.04
Prior admissions = 3	97 (48)	26 (68)	0.03
Onset of symptoms, years	2.9 ± 1.8	3.6 ± 1.8	0.02
Comorbidities, Charlson score	1.8 ± 1.3	2.0 ± 1.2	0.30
ACE inhibitors at discharge	136 (67)	24 (63)	0.17
Target dose	59 (29.5)	13 (34)	0.56
Beta-blockers at discharge	52 (26)	11 (29)	1.00
Target dose	4 (2)	0 (0)	1.00
Knowledge prior to admission			
1. Salt control	151 (75)	33 (87)	0.20
2. Fluid control	64 (32)	20 (52)	0.02
3. Weight monitoring	48 (24)	13 (34)	0.13
4. Name of drugs	106 (52)	26 (68)	0.10
5. Notions about the disease	72 (36)	19 (50)	0.14
Composite knowledge (1+2+3)	27 (13)	11 (29)	0.02

Continuous variables expressed as media ± standard deviation and categorical variables, as n (%). HF- heart failure; LVEF- left ventricular ejection fraction; ACE- angiotensin-converting enzyme.

Table 4 – Clinical characteristics of the studied patients, stratified by HF self-care

		Self-care with HF		p value
	All (3/3)	Some (1-2/3)	Not one (0/3)	
Prior admissions	3.7 ± 1.4	2.9 ± 1.6	2.0 ± 1.2	< 0.001
Comorbidities, Charlson score	2.1 ± 1.1	2.0 ± 1.2	1.4 ± 1.3	0.01
Time of symptoms, years	3.6 ± 1.6	3.2 ± 1.8	1.9 ± 1.4	< 0.001
Ejection fraction, %	32 ± 13	44 ± 18	40 ± 15	< 0.001

*Data expressed in mean ± standard deviation * salt restriction, fluid restriction, and weight control.*

Discussion

Even though evidence exists that heart failure patients consistently benefit from non-pharmacological measures, they are not fully incorporated into our clinical practice.[14] In this observational study, both prescription pattern and actual execution of non-pharmacological measures with patients admitted for decompensated heart failure were evaluated over a three-year period. While the assistant team often remembered some prescribed measures, such as salt restriction, others, such as fluid restriction and weight control, they frequently overlooked. Additionally, overall no substantial difference was found in non-pharmacological care prescription during the follow-up period, demonstrating that HF patient treament approach remained similar in our institution.

Reduced hospitalization rates and costs plus improved quality of life have been demonstrated by a number of randomized studies reporting the experience of multidisciplinary teams specialized in the management of patients with heart failure in several countries.[5,12,15] The amount of medication used, maintenance of drug regimen, and number of daily doses all directly affect adherence to treatment. In our study, about 20% of the patients discontinued at least one drug in the week prior to hospitalization. It is well known that the greater the amount of medication, number of doses, and change in drug regimen, the greater the chances of drug discontinuation by the patient.[16] A recent study suggests that adherence to medication ranges from 20% to 58%;[17] therefore, simple and practical strategies (use of charts emphasizing drug name, dose, and time of administration, as well as potential side effects for each medication) have been advocated in the literature.[18]

Salt restriction - Dietary salt restriction was found in nearly all the medical prescriptions. To date, available literature fails to establish whether a light sodium chloride restriction (4 g/day) is adequate for the majority of patients with heart failure or whether a moderate restriction (2 g/day) may be necessary. Even in patients with no clinical signs of congestion, it has already been found that high-sodium diet is associated with increased size of the left ventricular cavity.[19] In addition, it has been already demonstrated that high sodium intake is an independent risk factor for the development of heart failure in obese patients.[20] Conversely, in a recent study euvolemic HF patients under diuretics and low-salt diet (100 mmol Na^+/day) responded with volume depletion, renin-angiotensin-aldosterone system activation, and decreased B-type natriuretic peptide levels.[21] The strategy of increasing diuretic dosages to compensate a free-sodium diet may worsen the neuro-humoral and fluid/electrolyte imbalance commonly associated with these patients. Failure to adhere to salt and fluid restrictions is one of the causes of the so-called diuretic resistance.

Weight control - Daily weighing was one of the less prescribed non-pharmacological measures. As body weight changes are a relevant aspect and are directly related to fluid retention and efficacy of prescribed diuretic dosages, failure to comply with this measure may compromise treatment monitoring and adjustment in patients admitted for decompensated heart failure.

With regard to congestion status, weight control is a more objective and accurate parameter than fluid balance, because it is less dependent on patient cooperation. Adherence to daily weight measurement ranges from 12%[23] to 75% in literature. Periodic outpatient evaluations by trained nurses increase the frequency of patients' weighing themselves and contribute to the understanding that weight gain in a few days may indicate fluid retention.[25] Therefore, daily weight monitoring during hospitalization is a way of stimulating patients to incorporate it into their daily routine, understanding that sudden weight gains may indicate an early sign of decompensation.[26]

Fluid restriction - Fluid restriction was not frequently prescribed, somewhat reflecting the fact that the evidence level of this non-pharmacological care is not well known and accepted by the professionals involved in the management of patients with heart failure. The maximal amount of 1.5 L/day is often recommended for patents with moderate to severe heart failure; yet the amount of fluid intake to be prescribed is not clearly stated either in national[14] or international[27,28] guidelines. Poor adherence to fluid intake control may also be justified by the higher interference in patient's autonomy and quality of life represented by such measure. In severe heart failure, in which circulating antidiuretic hormone (ADH) may be increased and the ability to eliminate water is impaired, fluid restriction is advised to prevent plasma sodium concentration from dropping to levels below 139 mEq/L.[14] An ongoing study using adaily fluid restriction of 1.500 mL/ compared to an individualized amount per day (30-35 mL/kg/day) may yield more objective results concerning guidelines for fluid restriction and management of heart failure.[29]

When prescription and delivery of care were analyzed, it was found that the assistant teams often did not follow the prescribed measures. The little importance given to non-pharmacological measures may reflect the lack of nursing staff knowledge regarding current management of hospitalized patients, unlike the relevance attributed to the armamentarium of drugs available for heart failure treatment. In this respect, measures that depend on the patient's direct cooperation and on medical and nursing team orientation, such as urine output monitoring, may sometimes not be implemented.

Comparing the profile of patients with a history of readmissions during the three-year follow-up, we noted

that they were younger, associated with a higher number of previous admissions, showed lower ejection fraction, and reported longer-standing symptomatic disease. This subgroup of patients showed better knowledge of non-pharmacological care. These seemingly paradoxal aspects may indicate that patients had more severe heart failure, considering the degree of systolic dysfunction and longer-lasting symptomatic disease. It may be plausible, however, to assume that knowing the disease does not necessarily imply dealing appropriately with the many clinical, pharmacological, and non-pharmacological aspects related to it. Thus, knowing these aspects seems to be not enough to prevent readmission, indicating that being aware may not imply really complying with these measures.

Studies conducted by our group analyzing heart failure outpatients' knowledge after a systematic education focusing on self-care, with serial visits over 24 months, suggest that instructions provided and reinforced during those visits are not enough for understanding and implementing the necessary measures.[30] Therefore, the use of a hospital setting, including daily visits to assess and reinforce adherence, gives support both to the patient and his relatives, and emphasizes signs and symptoms associated with the disease's progression, may produce good results to reach these objectives.[1,31,32] In addition, the days following recovery are extremely useful for the adaptation of the patient and his family regarding the understanding of these measures and their importance to the maintenance of clinical stability.

The results of this observational study demonstrate that, even at a teaching hospital, crucial gaps exist between the prescription and implementation of non-pharmacological measures for patients admitted for heart failure. They also demonstrate that patients with higher rates of readmissions seem to know a good deal about the disease, and this finding is significantly related to the severity and time since the onset of the heart disease. However, it is also possible that knowledge alone does not lead to the recommendations being really incorporated into daily routine.

These data indicate that strategies to strengthen multidisciplinary team adherence to prescription, orientation and execution of non-pharmacological measures for HF patients should be consistently implemented and evaluated. Finally, prospective studies are needed to evaluate whether the effectiveness of these strategies to reduce morbidity and mortality in HF may truly be generalized in the Brazilian social, economic, and cultural context.

Potencial Conflict of Interest

No potential conflict of interest relevant to this article was reported

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