Setting up the Back Home Program for Heart Failure Patients: Perception by Health Professionals and Patients and Outcomes

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Abstract: Heart failure is a challenge in reducing re-admissions and deaths, particularly high during the first month following hospitalization. In our study, the majority of health professionals seem to support educational programs. The rate of hospital re-admission was 50% and 21.6% for heart failure. Among the factors of re-admission, none corresponded to a therapeutic break or a diet gap. Thus, there was a trend toward shorter re-admissions. These results suggest that the therapeutic education sessions were successful. (Curr Probl Cardiol 2021;46:100745.)

Introduction

Heart failure (HF) accounted for 370,000 hospitalizations in 2008 and mainly concerns a population over 75 years of age.[1] In 2015, HF was responsible for 14.2% of deaths with an annual cost of 1.6 billion euros,[2] a disease that is growing rapidly regarding the increase in life expectancy of our population, the more systematic screening for cardiovascular risk factors and the regular monitoring of other comorbidities.[3,4] Many recommendations have been implemented to reduce mortality,[5] but mortality and re-hospitalization rate remain high in the first months after hospitalization, particularly during the first one.[6,8-12] The PRADO program has been implemented by the health insurance for heart failure in France since 2013.[13] The primary objective of our study was to

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evaluate health professionals (general practitioners, cardiologists, and nurses) feeling when implementing the PRADO HF program. Secondary objectives were to determine the impact of the PRADO program on the number of re-admissions and deaths within 6 months and to evaluate patient's feedback included in the program.

Materials and Methods

This is a retrospective monocentric observational study of patients hospitalized for heart failure in the cardiology department, from June 1, 2016 to October 31, 2017 and discharged home with the implementation of the PRADO program. The acceptance in the program was made by the French health care organism. Feedback surveys from health professionals were created and sent by mail, fax email for practitioners, telephone call for nurses and patients, 6-month follow-up data were collected from patients (or their trusted third party). Sphinx software was used for statistical tests with chi-square and Student tests.

Results

Sixty physicians of the 200 respondents participated to our study: 50 general practitioners, 10 cardiologists (response rate of 30%). The average age of general practitioners and cardiologists was 51.9 years (±9.0 years) and 53.4 years (±11.1 years). Of the 46 nurses included in the PRADO program, 36 (78.3%) responded by telephone to our survey, the vast majority of the workforce was female (91.7% of FDIs) and their average age was 44.2 years (±10.8 years).

As for patients, of the 67 approached, 6 had their final referral to a nursing home and 3 refused to answer the survey. Fifty-eight patients were included in our study (86.6%). Their average age was 81.4 years (±9.6 years), and they were mostly male. High blood pressure was very widely represented with a rate of 85.5%, atrial fibrillation was present in almost half of the cases (49.1%) and 20% of the population had a coronary artery disease. Two-third were malnourished on the Albuminemia assay, half of the patients was overweight on the basis of body mass index (overweight 30.9% and obese 21.8%). In addition, according to the new classification, the ejection fraction was preserved (>50%) in 49% of cases. The Brain Natriuretic Peptid of exit, when it was performed (in 87.2% of cases), was elevated (greater than 400 pg/mL) for 51% of patients (Table 1).

Table 1. Clinical and paraclinical characteristics of patients

	Population	%
Epidemiologic characteristics	Male	56.4%
	Female	43.6%
	<65 years	7.3%
	65-74 years	14.5%
	75-84 years	34.5%
	>85 years	43.6%
Cardiovascular risks	High blood pressure	85.5%
	Dyslipidemia	29.1%
	Diabetes	24%
	Weaned tobacco	20%
	Active tobacco	5.5%
	Heredity	0%
Heart failure	Less than 5 years	80%
	Between 5 and 15 years	16.4%
	More than 15 years	3.6%
Chronic pathologies	Atrial fibrillation	49.1%
	PMK/DAI	21.8%
	Coronary disease	20%
	Valvulopathy	9.1%
	Pulmonary disease	14.5%
	Chronic obstructive pulmonary disease without O_2	14.5%
	Chronic obstructive pulmonary disease with O_2	1.8%
	Sleep apnea paired	5.5%
	Sleep apnea not paired	1.8%
	Chronic respiratory insufficiency with O_2	5.5%
	Chronic respiratory insufficiency without O_2	1.8%
	Chronic renal insufficiency	25.5%
	Stroke	23.6%
	Neoplasia	23.6%
	Cognitive disorders	14.5%
	Hypothyroidism	5.5%
	Chronic alcoholism	1.8%
Clinical characteristics	Denutrition	60%
	Normal BMI	43.6%
	Overweight	30.9%
	Obesity	21.8%
	Thinness	3.6%
LVEF	LVEF $\geq$ 50%	49.1%
	40% $\leq$ LVEF $<$ 49%	16.4%
	LVEF $<$ 40%	34.5%
Outcome BNP	BNP $<$ 100 pg/mL	12.7%
	100 pg/mL $\leq$ BNP $\leq$ 400 pg/mL	21.8%
	BNP $>$ 400 pg/mL	50.9%
	NT pro BNP $>$ 1800 ng/L	1.8%
	Nondosed parameter	12.8%

Main Objective

Regarding practitioner's knowledge of the program, it was unknown for two-third of our total staff. For one-third of those familiar with the PRADO device (36.7%), it was significantly better known by cardiologists than by general practitioners. Eighty percent of cardiologists were aware of the program compared to 28% of general practitioners ($P < 0.01$). Sixty-seven percent of practitioners under 35 years of age were aware of the PRADO program (all specialties combined).

The PRADO program was easily implemented for 100% of cardiologists compared to 57% of general practitioners. Among the difficulties mentioned by the latter, 33.3% concerned patients, 16.7% were inherent to administrative burdens, no clarification was provided in 50% of cases. Two-third believed that it has improved the quality of life of patients, whether the practitioner was a general practitioner or a cardiologist.

Concerning our cohort of nurses, nearly half was in favor of this program (47.2%). About 44.4% felt that the program was useful and relevant. About 30.6% felt that the system did not show any change from the daily care provided. About 13.9% and 8.3% of nurses showed that it was inadequate and insufficient. The main difficulty encountered by these health professionals during the PRADO program was related to the medical profession since they regretted the lack of exchange with the cardiologist (75% of the workforce) or the general practitioner (50%). Eight percent of cases did not honor medical appointments. For 72% of the nursing workforce, the PRADO program had improved their patient's quality of life, and more specifically in terms of reinsurance for one-third of them (Fig 1).

Secondary Objectives

Re-hospitalization for all causes within 6 months concerned 29 patients (50%) for a total of 37 re-admissions. Eight hospitalizations concerned a recurrence of HF (ie, 21.6%), 6 hospitalizations in cardiology for another reason (coronary artery disease, ICD insertion, rhythm disorders), and 23 hospitalizations in another department for an extracardiac cause. We observed an exponential growth during the 6 months with a hinge zone corresponding to 2 months in our study (Fig 2).

The average duration of re-admission at 6 months of inclusion was 11 days (±9.3 days), whereas it was 8.7 days (±4.4 days) during the initial stay. It should be noted that one of the re-admissions for HF was 34 days due to heavy co-morbidities and in particular an exacerbation of Chronic Obstructive Pulmonary Disease and a sepsis at urinary starting

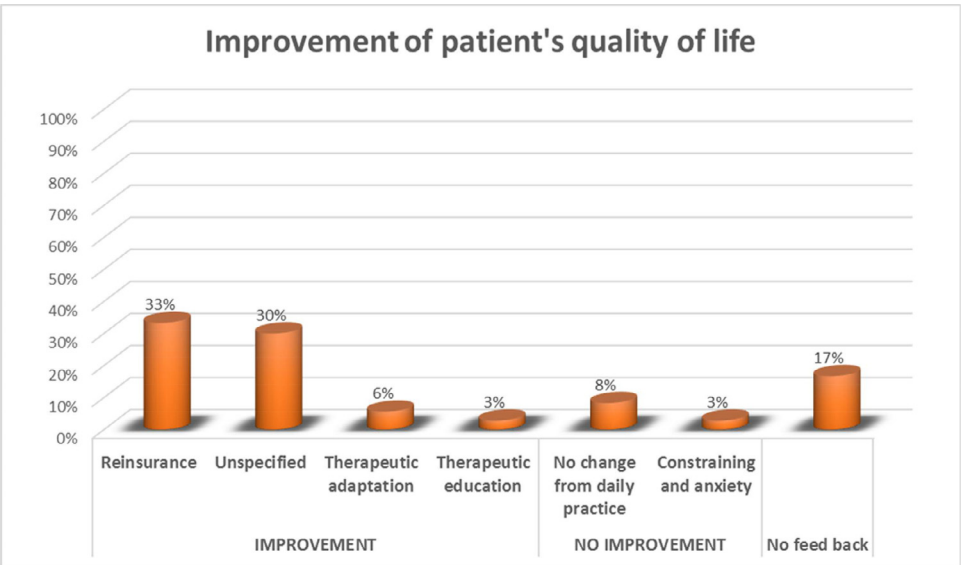

FIG 1. Improvement of patient's quality of life according to nurses.

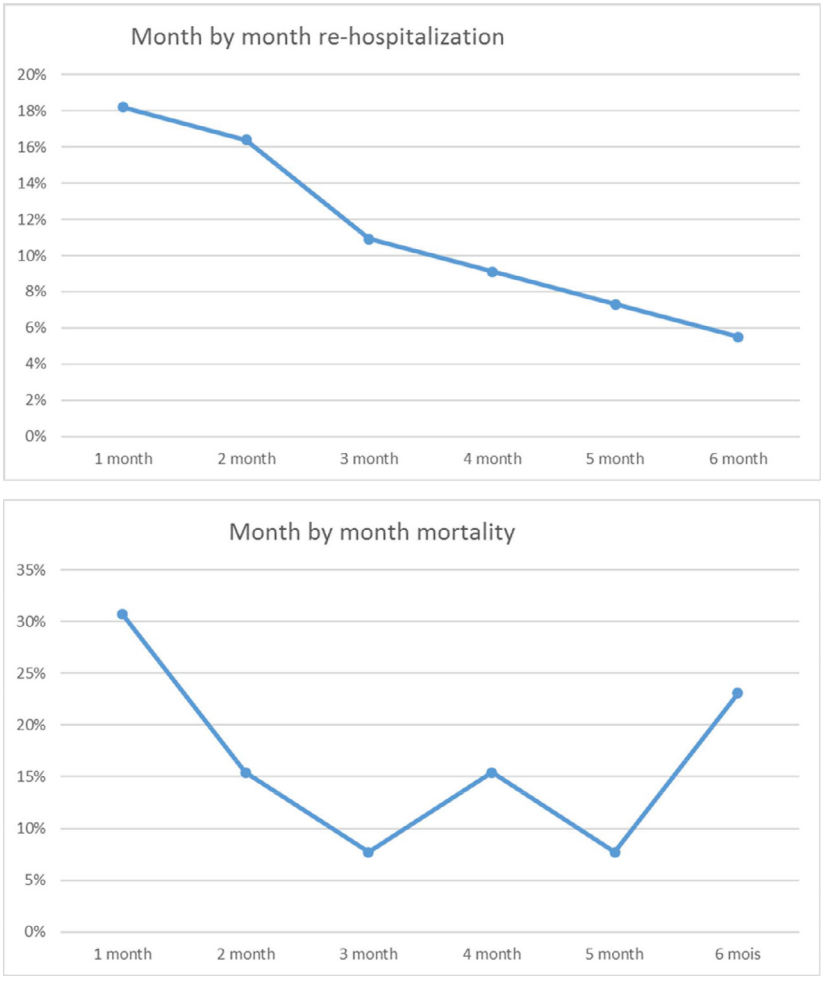

FIG 2. Month by month re-hospitalization and mortality after beginning the PRADO program.

point which extended the stay in the cardiology department. Without this, the average duration of re-hospitalization would have been 7.7 days.

No significant relationship could be found, although trends indicate that an advanced age (62.5% of patients over 85 years of age were re-hospitalized) and an elevated discharge BNP (all re-hospitalized patients had an anterior discharge BNP greater than 400 pg/mL) are associated with a higher risk of re-hospitalization.

The triggers for HF re-admissions were classified into 3 groups: cardiac or extracardiac organ failure, factors accessible to therapeutic education, and absence of a found triggering factor. It should be noted that factors accessible to therapeutic education, namely therapeutic rupture

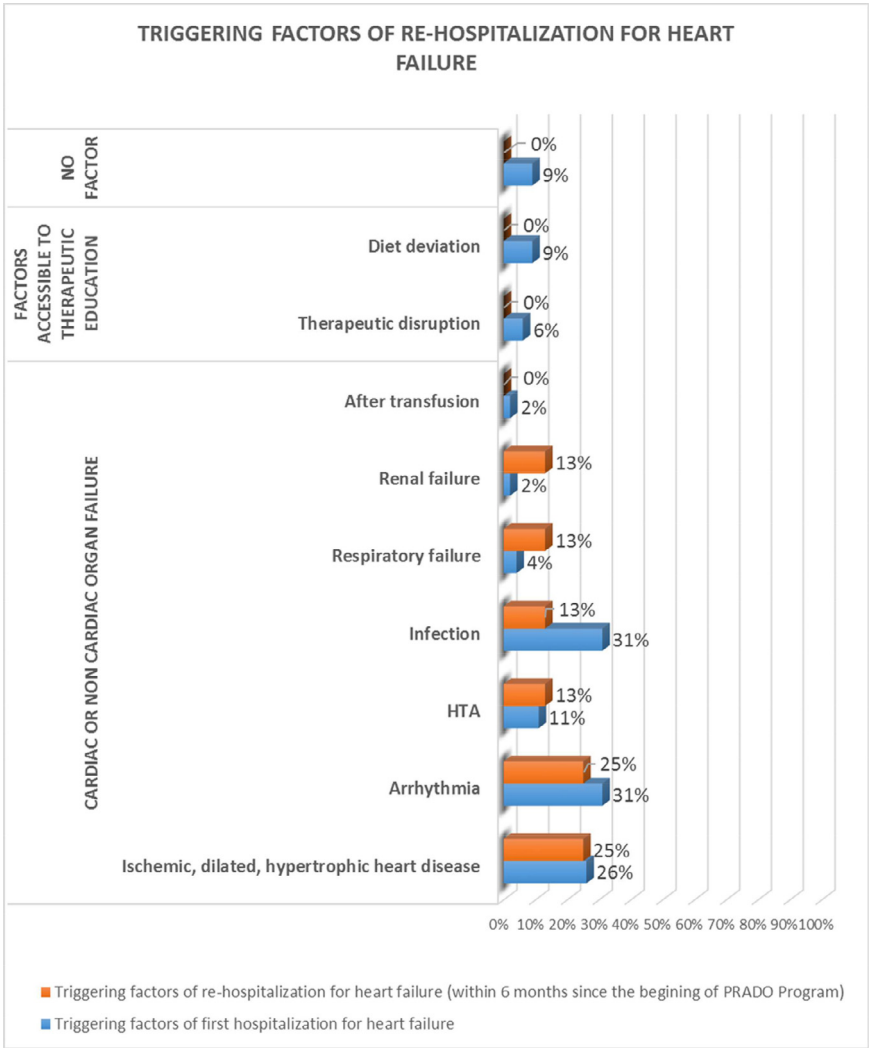

FIG 3. Triggering factors of re-hospitalization for heart failure.

and diet gap, were initially responsible for 11% of HF hospitalizations but were no longer found after the implementation of the PRADO program (Fig 3).

Concerning mortality in 6 months, there were 13 deaths (22.4% of our workforce), 8 of which were due to cardiovascular causes. Thirty-one percent of deaths occurred in the first month (Fig 2).

The same criteria cited above in the re-admissions were applied to analyze the characteristics of deceased patients and we found that all

Table 2. Patients felt about the PRADO program

Questions about		%
Comprehension	Yes	83.8%
	No	16.2%
Apprehension	Yes	94.6%
	No	5.4%
Acceptance	Without reluctance	94.6%
Home set up	Easy	100%
Intensity	Adapted	89.2%
	Not enough visits	8.1%
	Too much visits	2.7%
Content	Useful	83.8%
	Useless	16.2%
	Insufficient/nonadjusted	0%
Contribution	Beneficial	83.8%
	Useless	16.2%
Interest in extending the program	Yes	37.8%
	No	62.2%

cardiovascular deaths were significantly associated with patients over 85 years of age (5 patients; $P = 0.04$). A high BNP at discharge was not significantly associated with 80% of deaths.

Regarding patient's feelings about the program, the majority was in favor of this initiative, both in terms of understanding the program (84% of patients) and ease of implementation (100% of the cohort) or content (in 84% of cases; Table 2).

Discussion

The epidemiological characteristics of the doctors interviewed (general practitioners and cardiologists) as well as those of nurses confirm the data in the literature.[14-18]

Knowledge of the PRADO program represents only 28% of general practitioners compared to 80% of cardiologists, with a statistically significant difference between the specialties. This difference can be explained by the fact that the majority of cardiologists responding were from the hospital center, a center that recruits patients in the PRADO program and therefore by extension informed of this device. It is also interesting to note that in our cohort, the youngest practitioners were those who were most familiar with the PRADO program. It can be assumed here that doctors under 35 years of age are particularly receptive and aware of continuing medical training. These data are in line with those established by a DRESS study in 2009 when analyzing physician's opinions on good

practice recommendations and continuing medical education. We noted that the main difficulties encountered by practitioners were related to patients and administrative burdens arising from the device. In the literature, 1 in 10 General Practitioner is against this type of device, according to the 2011 DRESS report on therapeutic patient education. The reasons given in this study are not so much related to a lower personal investment in continuing medical education or the evaluation of professional practices, but rather in the majority of cases related to the fact that these doctors consider that patients who would need a therapeutic education program are not receptive to learning methods. The same 2011 study also reports that 42% of doctors did not know the results of the actions of existing education programs and 34% said that patients are already sufficiently trained in the management of their pathology and that it is not necessary to raise their awareness.[13] Physicians in our cohort, regardless of their specialties, seem to have confidence in the PRADO system since more than half of general practitioners and 100% of cardiologists believe that there has been an improvement in their patient's quality of life.

As for our nurses, they were in almost half of the cases in favor of this educational initiative (47.2%) and 44.4% considered it useful and relevant, although the literature seems divided on this point. Indeed, according to an article published in 2017 in a paramedical journal, the nurse's opinion was mixed regarding the implementation of PRADO programs, with nurses indicating that they regret being poorly informed by the health insurance, some of them not even knowing about the existence of these protocols and therefore being surprised when such a request is received. The main concerns in this article were the risk of patient's diversion by trained nurses and the need to train for certain PRADO protocols.[27] These last 2 remarks are not found in our study, quite the contrary, nurses regret that there is no more training on heart failure at the local hospital level. On the other hand, almost a third of nurses consider that this program did not present any modification compared to the daily care provided. In a little more than half of the cases, nurses had a daily visit among these HF patients, and in the same proportions, nurses believe that the number of visits should be adapted to patient's environment and co-morbidities, thus raising the question of adapting the program to the patient and setting up a personalized care plan, as the management of a HF patient should be both global and individual, focusing on managing all co-morbidities.[20] Indeed, the main limitation in this management strategy is linked to the heterogeneity of patients (comorbidities, environment, social context), making it difficult to apply the same monitoring model to all patients. According to French National Authority for

Health's recommendations, it is proposed to establish a multiprofessional protocol to define roles of each actor and interventions to be carried out; this protocol can be developed locally and adapted to resources available in the territory.[21] Thus, multidisciplinary management of the patient prevails. The literature reports similar results: Maisel et al have shown the impact of multiprofessional protocols in hospitals on the risk of re-hospitalization of HF patients, and in particular on the importance of BNP monitoring and home weight gain, which is significantly related to an increased risk of re-hospitalization.[21] We can also think that external cardiological monitoring is all the more important as its intervention contributes to the titration of therapeutics, but also to the introduction of certain therapeutics indicated in stabilized situations (eg, Ibravadine [Procoralan] or Sacubitril-Valsartan [Entresto]) outside the hospital context, thus reducing the re-admission's rate, all in addition to clinical monitoring.[22] However, the interrogation of the nurses in our study shows that the greatest difficulties that they encountered are related to the medical profession. In addition, 8.3% report that appointments are not kept, even though it is well established that early medical follow-up in posthospitalization as part of treatment reassessment are both associated with better outcomes in HF patients as described in a Canadian study conducted in 2013.[24]

Patients included in our study did not have epidemiological and clinical characteristics totally similar to those of the latest 2015 Health Insurance data on HF patients.[1] Our patients were older, the sex ratio was reversed with male gender more represented, and cardiovascular diseases were more represented in our cohort (85% of our sample vs 68% in the literature), partly due to the fact that 79.1% of our population were over 75 years old compared to 64.9% in the literature. In fact, it is established that the prevalence of co-morbidities is closely linked to age, according to the latest figures published by the French National Authority for Health in March 2015. It should be noted that other co-morbidities of our cohort were comparable to Health Insurance's data.[2] For Left Ventricular Ejection Fraction , the new classification of heart failure in the latest European recommendations (dated in 2016) makes difficult comparison with the literature.[19] Moreover, median BNP was lower than that found in other studies (451 pg/mL in our cohort against 956 in the literature).[10] The difference is probably explained by the much larger size of this study comprising 1658 patients.

In our work, the average length of hospitalization was 8.7 days. This duration was significantly higher in case of re-admission within 6 months. This average length of re-admission was higher because we recorded a

34-day long hospitalization, said re-admission initially due to a HF but burdened following a Chronic Obstructive Pulmonary Disease exacerbation and a urinary tract infection. Without this, the average duration of re-admission would have been 7.7 days. Thus, even if the PRADO program does not make it possible to avoid all re-admissions, it seems to have the advantage of reducing duration of subsequent stays, probably because of a more rapid detection of new cardiac failure.

The predictive factors of re-admission (income not significant in our study) were advanced age and increased exit BNP (>400 pg/mL), which is consistent with the literature since an age greater than 79 years or 80 years according to the studies is considered one of the main risk factors for cardiac failure.[24] If natriuretic peptides have obviously proven their added value, in the case of LVEF, our results are not in line with the data in the literature. As so, paradoxically, patients with better LVEF (≥50%) presented the most re-hospitalizations for HF. The literature reports that the risk of re-admission and death increases with the decrease in LVEF,[21] while we found that the duration of re-admission was shorter at any age, BNP, or LVEF, which is probably related to earlier detection and early management, a result that is supported in the literature.[21] Among the precipitating factors toward cardiac failure, we note at the top of the list failure of cardiac or extracardiac organ responsible for 79.9% of re-admissions at 6 months. In our study, we found above all that factors accessible to therapeutic education, namely therapeutic breaks and differences in diet, initially responsible for 11% of hospitalizations for HF, and forming an integral part of hospitalization's causes against which the PRADO program is fighting, are not among the causes of re-admissions within the 6 months of our cohort.

In our study, the all-cause mortality rate within 6 months was 22.4%, with half of the deaths secondary to a cardiovascular cause. Thirty-one percent of deaths in the first month of hospitalization were due exclusively to cardiovascular causes, and mortality rate is essentially the same as that of the ESCAPE study. All deaths from cardiovascular causes occurred in patients over 85 years of age with a statistically significant result, in line with the literature. A 2014 French study found that age was a risk factor for mortality for patients over 70 years of age.[7] Another American study reports predictive mortality risks with age being mentioned as the leading cause with an increased risk per decade.[23] Surprisingly, patients in our cohort with impaired LVEF had a lower cardiovascular death rate than patients with moderately impaired or conserved LVEF. BNP made data equally paradoxical, since against all expectations among deaths in our study, the majority of patients had a

normal exit BNP. Again, these results should be weighted because of the very small size of this subcohort of deceased patients and their higher age than other published studies. In literature, after integration of key patient variables (age, sex), mortality increases when LVEF is less than 35%.[23] On the other hand, data in literature are not formal about the place of BNP in HF. According to the 2016 ESC recommendations on the management of insufficiency, BNP has a central place in the diagnosis and prognosis of the disease. However, there are still studies that highlight the lack of significant improvement in mortality and morbidity even though BNP decreases during hospitalization.[25,26]

Nevertheless, there is a clear interest in intensifying the management of chronic HF patients by implementing personalized care plans such as the "health pathway for elderly people at risk of loss of autonomy," which mainly affects elderly people with a high risk of loss of autonomy. Of course, other means of monitoring exist and we could mention here the interest of remote monitoring for patients with HF, in particular the concept of connected scales, all the more so when we know that weight gain is a precursor to cardiac failure.[27]

Conclusion

The PRADO HF program remains little known to general practitioners, which justifies intensifying the implementation of effective means of dissemination on this device. It provides a mean of support during the return home validated by health professionals and patients, and has an impact on triggering factors of HF accessible to therapeutic education, and allows shorter re-hospitalization times, regardless of the clinical, biological, and echocardiographic patient's characteristics. Management of HF patients must be global and multidisciplinary, and in particular in the prevention of loss of autonomy, and must be adapted to patient's field and environment with an assessment of his quality of life, itself significantly associated with adherence to the therapeutic project. Thus, other HF patient's home support projects should emerge in the coming years. The demand for coordination between nurses and the medical profession could be met by the creation of multidisciplinary communities in health territory in France.

Authors' Contribution

F. Bouriche: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Software; Supervision; Validation; Visualization; Writing original draft, review & editing

S. Warrak: Data curation; Formal analysis; Investigation; Software; Writing original draft

S. Yvorra: Conceptualization; Methodology; Project administration; review & editing

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