



The Efficacy of a Motivational Nursing Intervention Based on the Stages of Change on Self-care in Heart Failure Patients

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Background and Research Objective: Heart failure (HF) patients experience frequent episodes of decompensation. While medication and behavior change play a major role in maintaining physiological stability, patient adherence to self-care recommendations is not optimal. The Theory of Heart Failure Self-care helped to understand the concepts of self-care and chose a model of intervention. Conviction and confidence are central factors in facilitating self-care. Motivational interviewing (MI), which aims to strengthen conviction and confidence, has been shown to improve self-care. In addition, the Transtheoretical Model, based on patients' readiness to change, also has proven efficacy. The MI based on the stages of change (MISC), a combination of MI and Transtheoretical Model, offers promise for improving self-care. The goal of this pilot study was to evaluate the preliminary effect of an MISC intervention on HF patients' self-care behaviors. **Subjects and Method:** Thirty patients were recruited from an HF clinic and randomly assigned to an experimental (EG) or control group ($n = 15/\text{group}$). Patients from the EG received 3 interventions (1 in person, 2 on the phone). Data were collected at baseline and at 1 month after randomization. The effect of the intervention was assessed on 5 self-care outcomes using analysis-of-covariance models. **Results and Conclusion:** Significant results were obtained regarding the confidence in performing self-care behaviors specific to HF ($P = .005$). Although the results of the other hypotheses were not statistically significant, for the majority, trends were in the expected direction in favor of the EG. The study suggests that an MISC intervention is useful to increase patients' confidence in HF self-care and has potential to improve self-care. Further research is needed.

KEY WORDS: heart failure, motivational nursing intervention, self-care, stages of change

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Heart failure (HF) is a major cause of disability and mortality and is associated with an increasing rate of hospitalization.¹ In Canada, about 400,000 people live with HF,² with that number reaching about 5 million in the United States.³ Primary symptoms associated with HF include fatigue, dyspnea, and edema, all of which significantly decrease the quality of life. Treatments such as medication and behavior change play a major role in maintaining physiological stability and are crucial in preventing episodes of decompensation and rehospitalization. However, patients' adherence to these recommendations is not optimal. Self-care behaviors include liquid restriction, low-salt diet, regular weight monitoring, exercise, and medication. Confidence and conviction in performing these self-care behaviors are central factors in facilitating lifestyle changes. Thus, improving HF patients' conviction and confidence, while taking into account their readiness to change, is a promising avenue for enhancing self-care capabilities. The goal of this pilot

study was to evaluate the preliminary efficacy of a nursing intervention aimed at improving self-care in HF patients.

Literature Review

HF and Self-care

Heart failure is defined as a “syndrome caused by myocardial muscle dysfunction or loss (...) and characterized by inadequate peripheral oxygen delivery at rest or under stress.”^{4(pec10)} The heart’s diminished capacity to pump results in important symptoms including generalized edema or pulmonary edema, which in turn cause respiratory problems and impact the patient’s quality of life.⁴ Not all patients with HF experience the same symptoms. In recognition of this, the New York Heart Association (NYHA) has developed a classification system based on patients’ functional limitations. This classification ranges from 1 to 4 and is based on the patients’ capacity to perform normal activities and severity of dyspnea. Heart failure causes many consequences for the patients. In fact, studies show that 25% to 50% of HF patients present cognitive impairment,⁵ such as memory deficit, attention deficit, and impairment in their concentration capacity.⁶

Heart failure patients have a reduced capacity to eliminate liquid because of their elevated antidiuretic hormones and their heart’s reduced ability to pump. Guidelines from the Canadian Cardiovascular Society,⁷ the Heart Failure Society of America,⁸ and the American College of Cardiology/American Heart Association^{9,10} propose the following recommendations. Heart failure patients are encouraged to limit their liquid intake to 1.5 to 2 L/d and maintain a low-salt diet, which also helps prevent fluid retention. Daily weight measurement is also important to monitor fluid retention. Exercise recommendations are given individually, depending on the severity of illness. And finally, medication adherence is considered essential to maintain and improve clinical stability.¹¹ Studies have shown that problems with these self-care behaviors are key elements in explaining the episodes of decompensation and rehospitalization.^{4,12}

Framework

The Theory of HF Self-care¹³ was developed based on the principles that patients are the main actors in health decision making and that they should have the tools to manage their health problems. For the purpose of this study, the Theory of HF Self-care was adopted to describe the self-care process and to guide the selection of appropriate interventions.¹³ This theory is based on 3 concepts: the concept of *self-care maintenance*, which includes symptom monitoring and

treatment adherence; the concept of *self-care management*, which includes symptom recognition and evaluation and treatment initiation and evaluation; and the concept of *self-care confidence*, which is the patients’ perceived capacity to perform self-care. According to the theory, maintenance of self-care will lead to management of self-care, and these 2 processes will be facilitated if the patient has confidence in performing self-care behaviors.

Motivational Interviewing Based on the Stages of Change Within a Nursing Framework

Because confidence is a central assumption in the Theory of HF Self-care, it was necessary to choose an intervention that would aim to increase confidence in performing self-care. In addition, respecting patients and their responsibilities in the treatment are important aspects of the theory that were considered in the choice of an appropriate intervention. The intervention model, proposed by Bédard et al,¹⁴ is a combination of the Prochaska and DiClemente’s¹⁵ Transtheoretical Model (TTM) and the Miller and Rollnick¹⁶ motivational interviewing (MI) model.

The TTM is based on the concept of stages of change, which has proven utility in different studies as a tool to classify patients’ readiness to change.^{17–19} Paul and Sneed²⁰ have used the TTM theory to develop stage-specific interventions and have concluded that this model provides an interesting framework for structuring interventions.

According to Prochaska and DiClemente,¹⁵ the precontemplation stage represents a state of resistance. In this stage, patients are not aware that their behavior could be dangerous to them. In the contemplation stage, patients begin to realize the importance of changing. They may be ready to change in the next 6 months, but currently are ambivalent. Once into the preparation stage, patients are convinced of the dangerous consequences of their behavior and recognize the advantages of change. For patients in the action or maintenance stage, change has already occurred; the action phase is the first 6 months following the behavior change, and the maintenance phase is the subsequent 6 months.

The MI model, used in the present nursing study in combination with the TTM, is based on promoting conviction for the need to change and developing confidence to make a change.²¹ Conviction is about what we are and what we want to be. People usually act in accordance with who they want to be. When faced with a diagnosis of HF and the need for lifestyle change, people often experience a shift regarding who they want to be. This is prompted by the desire to live without the symptoms of HF or at least with

symptom control. Lifestyle change is not easy. To have the conviction to change and be in accordance with what they want to be, people need to be convinced of the advantages of the recommendation and that the advantages outweigh the inconvenience.

Confidence reflects a patient's capacity to perform self-care.²¹ Motivational interviewing is based on 4 principles: the nurse should express empathy, introduce doubt in the patient's mind about the behavior to be changed and the consequences of that behavior, "roll with" the patient's resistance,¹⁶ and reinforce the patient's self-efficacy. Motivational interviewing promotes collaboration with the patient; therefore, it is important for the nurse to avoid confrontation. The nurse guides patients in finding their strengths and solutions rather than proposing ready-made answers. Ultimately, the final decision is the patient's responsibility, and the nurse must allow patient autonomy. Following those principles, the nurse focuses on increasing the patient's conviction to make a change, and when this is done, the nurse helps the patient to become increasingly confident of being able to make the change. In their literature review of exercise for women with heart disease, Perry and Bennett²² report that MI used with stages of change is easy for nurses to learn and takes only a few minutes of intervention. In their literature review on MI, Rubak et al²³ found that MI was more effective than the traditional interventions in 80% of studies. Studies of MI have shown that it has potential for changing behaviors in different fields including cardiac rehabilitation,²⁴ exercise,²⁵ improving lipid profiles,²⁶ and dependence problems.^{27,28} In HF patients, MI has been shown to improve self-care capacity by 71.4%.²⁹ Motivational interviewing has also been provided through telephone intervention in many studies^{22,26,29,30} with proven efficacy.

The MI based on the stages of change (MISC) intervention tested in the present study was based on the theory of Riegel and Dickson¹³ and the intervention model of Bédard et al¹⁴ that combines both the TTM and MI principles and methods. In the present study, patients were invited to participate actively and find solutions for their specific situation. They were seen as collaborators in their care. To facilitate the intervention, we developed tools to evaluate and intervene with patients. Bédard et al¹⁴ proposed an intervention that can be provided in 3 minutes. This model of care and length of intervention has not yet been tested. Other studies have shown that brief MI interventions, usually less than 10 to 15 minutes, are effective in increasing physical activity.^{22,31} Rubak et al²³ also found that brief MI interventions were effective. It is important to distinguish the original MI model, brief or not, from other brief interventions—the latter often includes other strategies that are not part of MI, such as advice giving.³²

Figure 1 presents an adaptation of the theoretical framework of the Theory of HF Self-care, in which the concept of conviction has been added to the concept of confidence and the operationalization of the concepts in terms of measurement. This theory is interesting for the nursing discipline because it proposes that patients need guidance to execute self-care, and nurses are ideally positioned to help patients in this regard. The nurse who follows this theory helps the patient to follow his/her pace in the process of self-care, to define his/her vision of health, and to integrate the changes he/she needs to make in his/her environment.

Overall Goal and Specific Aims

The overall goal of this pilot study was to evaluate the preliminary effect of an MISC intervention on HF patients' self-care behaviors. Our hypothesis was that, at follow-up, patients in the experimental group (EG) would demonstrate better self-care than those in the control group (CG), including:

- H1: higher self-care maintenance specific to HF,
- H2: higher self-care management specific to HF,
- H3: higher general self-care management,
- H4: higher confidence in performing self-care behaviors specific to HF,
- H5: higher confidence in performing general self-care behaviors,
- H6: higher conviction in performing general self-care behaviors.

Method

Procedure and Setting

This was a randomized experimental pilot project (pretest and posttest, with a CG) (n = 15 per group). The study was approved by the Scientific and Ethics Committees of the Montreal Heart Institute Research Center and registered with an International Standard Randomized Controlled Trial number 71548370.³³

Recruitment and Randomization

Participants were recruited from the HF clinic at a tertiary cardiac care hospital. The HF clinic specializes in care for cardiac patients living at home. Usual care for these patients includes regular visits over intervals of 1 week to 6 months, depending on the patient's clinical status. During each visit, patients are evaluated by the nurse and the cardiologist who determine the plan of care. They are also referred to other healthcare professionals if needed, including a dietitian, pharmacist, social worker, or psychiatrist.

For the present study, potential participants were screened for eligibility based on the following inclusion

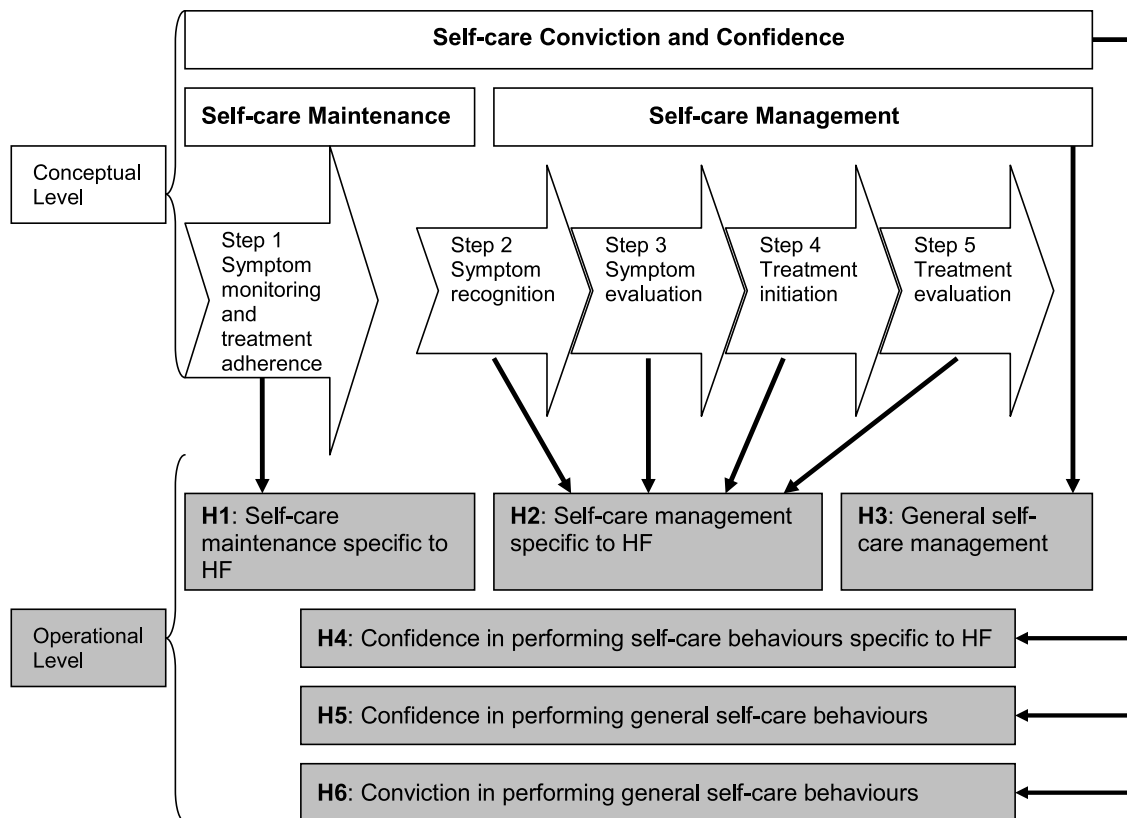


Figure 1. Theoretical framework. Adapted from Conceptual Model of Heart Failure Self-care⁹ with the addition of conviction and confidence from the MI.¹²

criteria: (1) age 18 years or older, (2) diagnosis of HF, (3) having difficulties with at least 1 self-care behavior, (4) cognitive and physical ability to participate, (5) ability to speak and read French, (6) not followed regularly by professionals who could provide lifestyle change interventions (eg, psychiatrists, nurse practitioners), or (7) not transferred to the emergency room or hospitalized after the screening visit. The third criteria, patient's difficulties with self-care behavior, was evaluated by the project nurse. Patients were met by the project nurse who presented the 5 self-care behaviors targeted by the intervention (fluid restriction, low-salt diet, daily weight measurement, exercise, and medication). They were then asked if they had any difficulties with any of these behaviors. If they were not sure, they were invited to describe their habits with the different self-care behaviors to determine if they had any problem.

At the end of a regular clinic visit, patients were given information about the study and time to ask questions. Those who agreed to participate signed a consent form and completed the baseline questionnaire. They were then randomly assigned to either the CG or EG using sealed opaque envelopes.

Patients in the CG returned home after the baseline visit and continued with their regularly scheduled

follow-up visits at the HF clinic. After the baseline visit (time 1 [T1]), those in the EG received the intervention that consisted of an initial face-to-face encounter before returning home. This encounter took place in a private room with a trained project nurse and was an MISC intervention scheduled to last between 5 and 10 minutes. Two subsequent encounters occurred by telephone at 5 and 10 days after the initial encounter. Outcome data were collected at 1 month after randomization (time 3 [T3]) by a blinded research assistant. In the remainder of the text, the first encounter is identified by time 2a (T2a), the second encounter is identified by time 2b (T2b), and the third encounter is identified by time 2c (T2c). The intervention protocol is described in detail below.

Training of the Project Nurse

The project nurse received training that included 4 hours of instruction with Dr Bédard, another 4-hour session with a nurse practitioner specializing in the Bédard model of intervention,¹⁴ and an 8-hour session on MI and smoking cessation. The project nurse also gained extensive experience using the MISC intervention with HF patients while preparing the study and developing the tools for the research project.

Intervention Protocol

The 3 Encounters

During the initial encounter, patients were invited to identify one behavior that they would like to change among the 5 behaviors proposed: fluid restriction, low-salt diet, daily weights measurement, exercise, and medication. If they had difficulties with more than 1 self-care behavior, they were invited to choose the behavior that they perceived as the easiest, or most important for them to change, as suggested by Bédard et al.¹⁴ This gave them control of the situation and allowed some choice, which is important in the theoretical orientation of the intervention. Using an algorithm to evaluate the stages of change and the conviction and confidence level (ALEGrO) described below, the nurse evaluated the patients and then selected a stage-specific intervention from the list of Nursing intervention specific to the conviction and confidence level and the stages of change (INOVA). For example, if a patient had a low level of conviction, the intervention was aimed at improving his/her conviction. If the patient had a strong conviction, but a low level of confidence, the intervention was aimed at increasing his/her confidence. If both confidence and conviction were low, conviction was targeted first, and once it was acquired, the intervention was directed toward increasing confidence. It was emphasized that the nurse should follow the patient's pace during the encounter.

During the second and third encounters, which were done on the phone, the nurse started the encounter by going through the ALEGrO algorithm again to evaluate the level of conviction and confidence and the stage of change. There was no need for the patient to identify a new behavior to change because the same behavior was targeted for all 3 encounters. The nurse then used the INOVA list to direct the encounter.

Intervention Protocol Tools

ALEGrO algorithm. To maintain procedural consistency, the project nurse used an algorithm at the beginning of each of the 3 encounters to evaluate each patient's level of conviction and confidence and stage of change. The algorithm was modified from a previous version used to assess the stages of change in smoking cessation.¹⁷ The final version was reviewed for content validity by a clinical nurse specialist and a nurse practitioner, both specialists with MI and the TTM. The ALEGrO algorithm has been presented at the *Ordre des infirmières et infirmiers du Québec* annual congress.³⁴ The algorithm is shown in Figure 2.

INOVA list. A list of potential interventions specific to each stage of change was used during each of the encounters. The INOVA list was originally developed for a previous study aimed at smoking cessation

in cardiac patients³⁵ and was adopted to incorporate interventions more specific to changing conviction and confidence based on the MI model. The list was adopted in the context of a health problem, with items such as "describe the changes in your life associated with this health problem," and was also adopted to formulate the items in a general way to be used with any behavior chosen by the patient (eg, "answer the questions regarding the behavior to be changed"). For the precontemplation stage, 14 interventions were listed (eg, "create a doubt in the patient's mind"). In the contemplation stage, 10 interventions were proposed (eg, "discuss the advantage of changing the behavior"). In the preparation stage, 12 interventions were possible (eg, "discuss strategies, alternatives, and relapse prevention"). In the action stage, there were 6 potential interventions (eg, "ask the patient if he faces problems regarding the new behavior").

Nominal validations of the algorithm and the list of interventions were performed by a clinical nurse specialist and a nurse practitioner specialized in MI and TTM. Both tools were also pilot tested with hospitalized HF patients prior to the present study.

Instrument/Measurements

Baseline demographic and clinical information such as health history, follow-ups, comorbidities, and clinical data including ejection fraction and NYHA classification were obtained from the patient charts. Information about social/educational/marital status and need for assistance in activities of daily living was collected from questions included in the baseline questionnaire.

Outcomes

There were 6 outcomes, as proposed in the hypotheses. Each outcome was assessed with a scale that was administered to both groups at baseline (T1) and then again at 1 month (T3). For the independence in self-care behaviors and the confidence to perform self-care, 2 types of outcome measures, general and specific, were used. For the conviction in performing self-care behaviors, only 1 general scale was used because no specific scale evaluating conviction was found in the literature.

- H1: Self-care maintenance was assessed with the Self-care of HF Index (SCHFI)³⁶ using subscale A. Ten behaviors were assessed on a 4-point Likert scale, with a higher score indicating a higher frequency of self-care behaviors specific to HF ($\alpha = .56$ and $.54$ in the present study). The SCHFI subscale raw scores were standardized to a scale varying from 0 to 100 as recommended by Riegel and Dickson.¹³ Riegel and Dickson¹³ have defined an adequate score for the SCHFI subscales as being

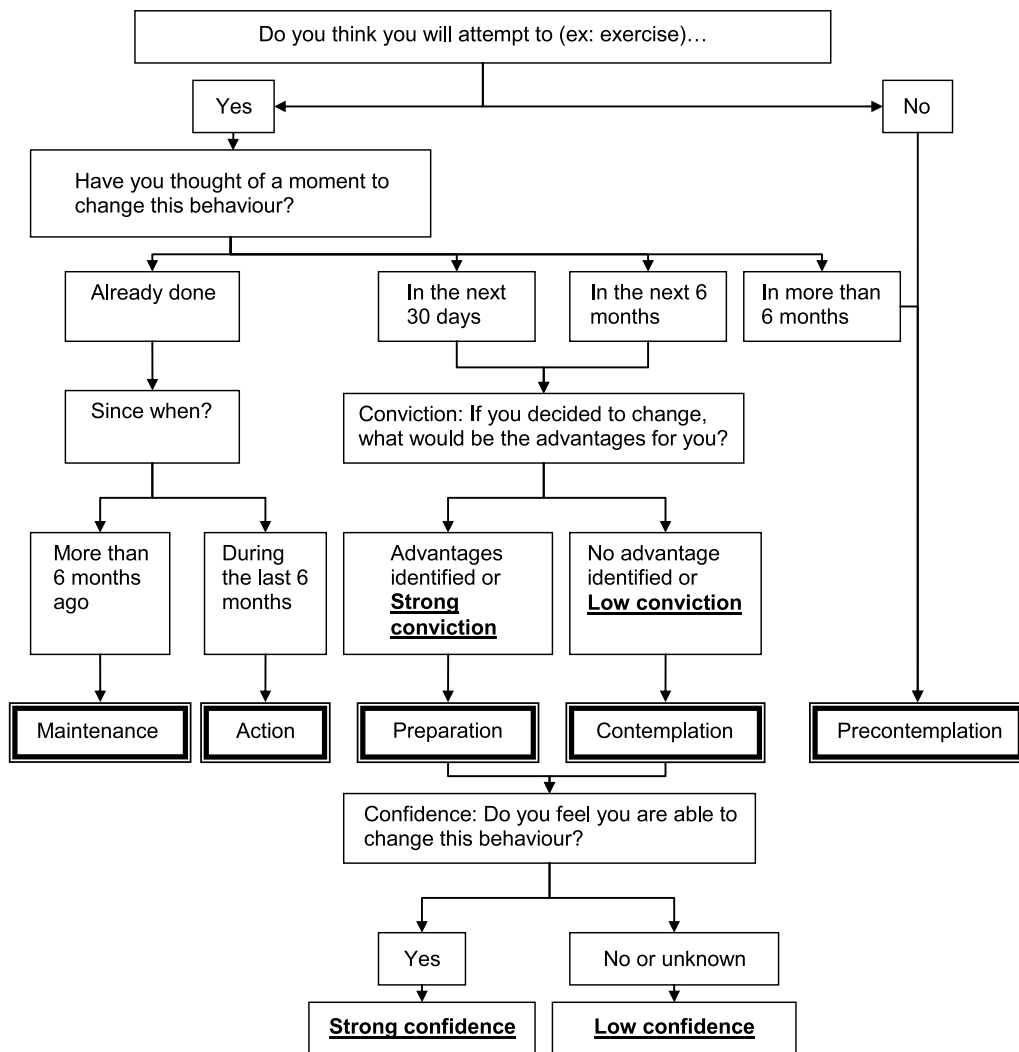


Figure 2. ALEGrO algorithm.

above 70. The SCHFI, as well as the other scales that needed translation, was translated into French using the back-translation method and verified by the research team.³⁷

■ H2: Self-care management specific to HF was assessed using the SCHFI subscale B.³⁶ The subscale is divided into 3 sets of questions. The first part assesses the capacity to identify and evaluate symptoms, the second part evaluates treatment initiation, and the third part evaluates the capacity to evaluate treatment ($\alpha = .70$). The first and third sets of questions are assessed on a 5-point Likert scale. The second set of questions evaluates 3 items using a 4-point Likert scale, with higher scores indicating a higher level of self-care management specific to HF. In the present study, we omitted the item, “take an extra water pill,” which was part of the original scale, because patients in the HF clinic are not instructed to change diuretic dosages by themselves. Riegel et al³⁸ indicate that the management of self-

care can be analyzed only in patients who have experienced HF symptoms in the past month. In the present study, only 14 patients complained of HF symptoms in the past month at T1 and T3; thus, this subscale was not retained in the analysis.

■ H3: General self-care management was assessed using the 12-item Therapeutic Self-care Scale,^{39,40} using a 6-point Likert scale. This instrument was developed to measure the action taken by a patient to promote, maintain or improve health, prevent sickness, detect and manage symptoms, and regain normal functioning. A higher score indicates a higher independence in general self-care behaviors ($\alpha = .88$ and $.93$ in Doran et al^{39,41} and $.88$ in the present study).

■ H4: Confidence to perform self-care behaviors specific to HF was assessed using the 6-item SCHFI subscale C³⁶ using a 4-point Likert scale, with a higher score indicating a higher confidence in performing self-care behaviors specific to HF ($\alpha = .82$ and $.63$ in the present study).

- H5: Confidence to perform general self-care behaviors was assessed using the Confidence and Conviction (C & C) scale,⁴² subscale 1. This subscale assesses the 8 perceived barriers to self-care and uses a 5-point Likert scale, with a higher score indicating higher confidence in performing general self-care behaviors ($\alpha = .85$ and $.83$ in the present study).
- H6: Conviction to perform general self-care behaviors was evaluated by the C & C scale,⁴² subscale 2. This subscale contains 4 items representing the perceived benefit of treatment adherence and uses a 5-point Likert scale, with a higher score indicating higher conviction to perform general self-care behaviors ($\alpha = .82$ and $.88$ in the present study).

Sample Size and Statistical Analysis

In the present pilot study, sample size was not calculated to achieve an adequate statistical power, but rather to give an indication of the direction and amplitude of the differences between groups in preparation for a larger, adequately powered clinical trial.⁴³ A total of 15 participants per group were considered adequate to achieve this goal. The effect sizes were calculated with the difference between the mean score at T3 for the EG and the CG compared with the common SD at T3. Results were interpreted with a small effect size being less than 0.2, a medium effect size being about 0.5, and a large effect size being around 0.8.⁴⁴

Sociodemographic and clinical variables were summarized using means, SDs, and percentages. As recommended by the CONSORT statement,⁴⁵⁻⁴⁹ no statistical tests were performed to evaluate the differences at baseline between groups. The hypotheses were tested using analysis-of-covariance (ANCOVA) models including the baseline score as a covariate. We did not perform ANCOVA for H2 because the score for the outcome measure was available only for 14 patients (4 in the EG and 10 in the CG).

Adjusted analyses were also performed in which baseline variables that were thought to possibly influence the results were included as covariates in the ANCOVA models. Analyses were conducted under the intention-to-treat principle. Missing follow-up data for the outcomes were imputed using the last-observation-carried-forward (LOCF) technique.⁵⁰ $P < .05$ was considered statistically significant.

Results

Recruitment

Data collection took place over a 4-month period from December 2008 to March 2009. While a total of 261 charts were screened for eligibility, 82 patients met the inclusion criteria, and 36.6% of these eligible

patients were randomly assigned (Figure 3). Non-eligibility was mainly due to not reporting any difficulties with self-care ($n = 83$), having a regular follow-up that could interfere with the intervention ($n = 37$), and cognitive or physical impairment ($n = 25$). Twenty-eight patients of the 82 eligible patients refused to participate. All EG patients completed the 3 encounters. Five questionnaires were not completed at 1 month because patients refused ($n = 2$), were not reached ($n = 2$), or were too tired to complete the questionnaire ($n = 1$). Missing follow-up data were replaced by using the LOCF method, that is, the corresponding baseline score to allow an intention-to-treat analysis.

Sample Characteristics

Thirty HF patients living at home and registered at the HF clinic were recruited for the study. The characteristics of the EG and CG are presented in Table 1. The principal differences between groups were that the mean age of the EG was 74 years, and for the CG, 67 years. Twelve patients in the EG were married/common-law, compared with 6 in the CG. The NYHA classification ranged from I to III, with two-thirds of the EG in class II and half of the CG in class III. Thus, although the EG patients were older, CG patients were at a less advantage in terms of family support and illness severity. Therefore, age, NYHA, and marital status were considered in the hypothesis testing.

Hypothesis Testing

The results of the 5 ANCOVA models are presented in Table 2 and described below. Because age, NYHA, and marital status, known as potential factors affecting self-care behaviors,⁵¹ differed between groups and were thought to possibly influence the results, these were included as covariates in the ANCOVA models for all hypothesis testing. P values were similar controlling for these covariates. Analyses with treated patients, that is, without imputation, provided similar results (see bottom of Table 2).

Patients in the EG obtained significantly higher scores than those of the CG patients for H4 on the confidence to perform self-care behaviors specific to HF ($P = .005$). For the 3 other hypotheses, H1, H3, and H5, the results were not significant, but the pattern of differences between groups showed that the EG had numerically higher scores at T3 than those of the CG. For H6, results showed nonsignificantly higher scores for the CG compared with the EG at T3.

Patients in the EG obtained adequate scores (>70) for confidence in self-care specific to HF (73.62), which was not the case for the CG. For self-care maintenance, both groups did not reach level 70 points.

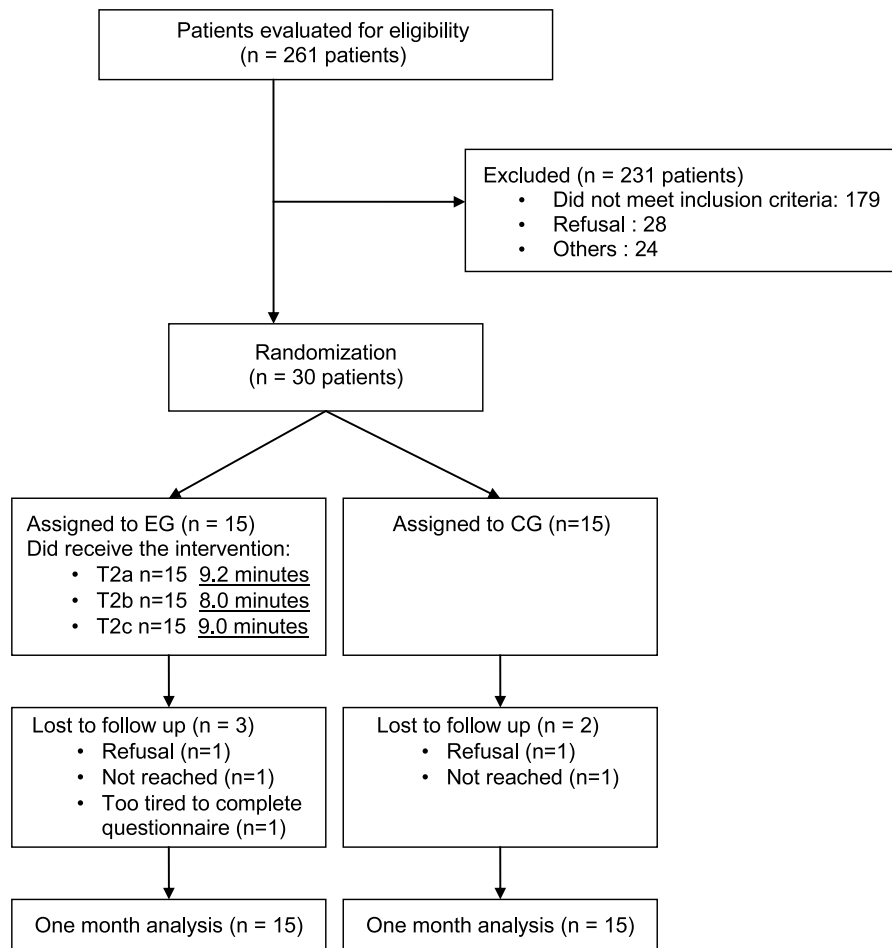


Figure 3. Flowchart. Represent recruitment, randomization and follow up during the pilot project.

The effect sizes obtained in the present study are presented in Table 2. The largest effect size was observed for the level of confidence in self-care specific to HF patients (ie, 0.86). The other effect sizes were moderate except for the conviction to perform general self-care behaviors, where a small negative effect size was obtained (-0.17).

Discussion

The direction and the amplitude of differences observed between the EG and CG suggest that the MISC intervention is a potentially important way of increasing self-care behaviors. The intervention is particularly useful for increasing confidence in self-care specific to HF.

The medication was not chosen by any patients in the EG as a target of intervention, whereas the 4 other behaviors were roughly equally selected. At the beginning of the study, patients had to choose 1 of the 5 behaviors targeted by the intervention: fluid restriction, low-salt diet, daily weights measurement, exercise, and medication. One hypothesis to explain this

observation is that patients were recruited after their regular visit to the HF clinic during which all their concerns about medication might have been dealt with. Therefore, any additional interventions regarding medication may not have been needed. However, because medication compliance was self-reported, patients may have been reluctant to reveal any problems. Results of a recent study indicate that HF patients often self-report medication as a self-care behavior they frequently perform.⁵²

According to the Theory of HF Self-care,¹³ confidence is essential in maintaining and managing self-care behaviors. The intervention model proposed by Bédard et al¹⁴ suggests that patients need to have a high level of conviction to change a behavior before attempting to increase their level of confidence. Throughout the 3 encounters in the present study, most patients were in preparation or action stages, which show a higher level of conviction than confidence. Most interventions were aimed at increasing confidence, and fewer interventions focused on conviction. This may have contributed to the significant results obtained for confidence but not for conviction

TABLE 1 Sociodemographic and Clinical Characteristics of the Sample

Characteristic	Experimental (n = 15)	Control (n = 15)
Age, mean (SD), y (range, 50–91 y)	73.93 (7.84)	67.07 (9.54)
Sex, % (n)		
Male	66.7 (10)	80.0 (12)
Female	33.3 (5)	20.0 (3)
Occupation, % (n)		
Working	6.7 (1)	13.3 (2)
Not working	93.3 (14)	86.7 (13)
Education, % (n)		
High school	66.7 (10)	60.0 (9)
Beyond high school	33.4 (5)	40.0 (6)
Marital status, % (n)		
Married or common-law	80.0 (12)	40.0 (6)
Other	20.0 (3)	60.0 (9)
Assistance in ADL, % (n)		
None	66.7 (10)	60.0 (9)
≥1	60.0 (5)	40.0 (6)
Causes of HF, % (n)		
Ischemic	66.7 (10)	86.7 (13)
Other	33.3 (5)	13.3 (2)
NYHA class, % (n)		
I	6.6 (1)	0
II	66.7 (10)	46.7 (7)
III	26.7 (4)	53.3 (8)
Ejection fraction, mean (SD) (range, 15–55)	33.67 (11.85)	30.20 (8.88)
No. of medications, mean (SD) (range, 6–12)	9.50 (1.55)	9.20 (1.78)
Having a pacemaker/ defibrillator, % yes (n)	60.0 (9)	66.7 (10)
No. of comorbidities, mean (SD) (range, 2–12)	7.20 (2.73)	8.33 (2.69)
Types of comorbidities, ^a % (n)		
Arrhythmia	80.0 (12)	73.3 (11)
Dyslipidemia	60.0 (9)	93.3 (14)
Previous myocardial infarction	73.3 (11)	66.7 (10)
Hypertension	46.7 (7)	60.0 (9)
Diabetes	40.0 (6)	60.0 (9)

Abbreviations: ADL, activities of daily living; HF, heart failure; NYHA, New York Heart Association.

^aOnly comorbidities affecting more than 50% of the total sample are reported.

outcomes. Improving levels of confidence is a strong predictor of performing self-care behaviors for HF patients as reported by 2 studies.^{52,53} Similarly, the qualitative study by Meyerson and Kline⁵⁴ reported that confidence encouraged the adoption of self-care behaviors such as medication, fluid and salt restriction, and daily weight measurement.

The novel aspect of this MISC intervention for HF self-care is the combination of the MI and TTM models as proposed by Bédard et al¹⁴ with the Theory of HF Self-care by Riegel and Dickson.¹³ In addition, the ALEGrO algorithm and the INOVA list are tools developed specifically for the MISC intervention and contribute to the novelty of the project. To our

knowledge, other authors have used algorithms to measure the stages of change^{17,20,31} and to design MI interventions,⁵⁵ but the combination of the TTM and MI in a single algorithm seems unique to this MISC intervention. Lists or examples of interventions were also found in the literature,^{12,20,31,55} but the combination of stages of change and an intervention specific to conviction and confidence also seems unique. These tools allowed the intervention to be consistent with the theoretical framework across all patients and encounters. They are user-friendly and can be translated easily into practice. The model of intervention and the Theory of HF Self-care encouraged the nurse to intervene with collaboration and to follow the objectives of the patients. Patients were considered as the center of the intervention, and the goal of our care was the patient's well-being.

Two types of outcome measures (general and specific) were used to explore the patients' response to the intervention. For self-care maintenance specific to HF and the confidence in performing self-care specific to HF, a slightly higher effect size was observed for the scale specific to HF (0.70–0.86) compared with the general scale (–0.17 to 0.55), suggesting that the specific scale (SCHFI, subscale A; or SCHFI, subscale C) may be more sensitive than the general scale (Therapeutic Self-care Scale or C & C subscale 1). The comparison of a specific and a general scale was not done with the other outcomes because these different types of scales were not available. On the other hand, specific scales showed lower α coefficients than the general ones. Although specific scales may be more sensitive, their reliability is not demonstrated here.

Limitations of the Study

This pilot study was not designed to be adequately powered, and this may have contributed to the non-statistically significant results for 4 of the 5 hypotheses tested. Also, all encounters were scheduled over a short period (10 days) which could have contributed to the nonsignificant results because behavior change may take more time to occur. Because brief MI intervention has proven efficacy in other studies,^{22,23,31} we do not think that the brief intervention was responsible for the nonsignificant results.

Another limitation of the study is the fact that it was not possible to carry out the analysis for the hypothesis of self-care management specific to HF because only 14 patients provided data. With a larger sample, this subscale could provide additional insight on the whole process of self-care as described in the theoretical framework.

To our knowledge, noncompliance with treatment recommendations has never been used as an eligibility

TABLE 2 Analyses of Covariance for Hypothesis Testing (n = 15 per group)

Variables (Observed Ranges at T1; Observed Ranges at T3)	Baseline		1 mo ^a		P LOCF ^b	Effect Sizes
	EG	CG	EG	CG		
H1: frequency of self-care behaviors specific to HF (23–87; 10–77 [standardized scores])	61.10 (11.66)	49.99 (14.80)	56.88 (10.94)	47.55 (14.05)	.64	0.70
H2: independence in self-care behaviors specific to HF	NA	NA	NA	NA	NA	NA
H3: independence in general self-care behaviors (18–60; 21–60) ^c	49.80 (7.74)	45.29 (12.5)	52.07 (8.03)	48.79 (9.96)	.83	0.55
H4: confidence to perform self-care behaviors specific to HF (50–100; 39–100 [standardized scores])	68.57 (17.03)	70.06 (11.06)	73.02 (15.37)	58.56 (15.13)	.005	0.86
H5: confidence to perform general self-care behaviors (7–31; 9–31) ^c	21.86 (7.22)	17.35 (7.33)	21.60 (7.18)	19.36 (6.90)	.99	0.36
H6: conviction to perform general self-care behaviors (0–12; 4–16) ^c	10.33 (5.65)	13.57 (2.73)	12.73 (3.33)	13.21 (2.22)	.81	–0.17

Abbreviations: CG, control group; EG, experimental group; HF, heart failure; LOCF, last observation carried forward; NA, not analyzed. Values are mean (SD).

^aLOCF technique for the imputation of end-of-study scores for the 5 patients lost to follow-up.

^bP values for treated patients-only scores were .72, .57, .003, .74, and .83 for H1 and H3 to H6 respectively (n = 12 in the EG and n = 13 in the CG). ^cn = 14 in the control group because of incomplete data for 1 patient at baseline.

criterion in studies concerning self-care behaviors. Traditionally, difficulties in respecting medical recommendations have been regarded in a paternalistic manner by healthcare professionals.⁵⁶ Therefore, patients who experience difficulties with self-care might hesitate to report them. The novelty of non-compliance in our inclusion criteria could have negatively influenced recruitment. In fact, the refusal rate was 34%, which could be due to the non-compliance criterion. On the other hand, the number of patients excluded because of the absence of difficulties with self-care was high, considering that a percentage may have falsely reported no difficulties. There are other ways to assess compliance such as counting pills or specific blood sampling, but we did not include these measures. Thus, a limitation of our study is that compliance was self-reported.

Finally, 5 patients could not be reached to collect outcome data at 1 month. The LOCF method was used to impute scores at T3 to replace the missing information. However, the analysis with the 25 patients with complete data gave similar P values, suggesting minimal bias resulting from these missing data.

In nursing intervention studies, it is not possible to blind patients and the intervener. A 3-arm trial with a placebo group, that is, a nurse providing “presence only” intervention, could have strengthened our study design; however, this might have made recruitment and cost less feasible.

The pilot project was conducted with 1 nurse intervening with all patients. The strength of this design is that it allowed all patients to receive a similar intervention. However, the weakness related to this design is that the results cannot be attributed exclusively to the intervention.

Conclusion

The purpose of this pilot study was to evaluate the preliminary effect of an MISC intervention on HF patients' self-care behaviors. The Theory of HF Self-care proposed by Riegel and Dickson¹³ was used to describe the self-care process and to select the intervention.

The result suggests that an MISC intervention that combines MI and the TTM, as well as specifically designed intervention tools, has the potential to encourage self-care behaviors in HF patients. Future research is needed to confirm these preliminary results.

Summary and Implications

The goal of this pilot study was to evaluate the preliminary efficacy of a nursing intervention aimed at improving self-care in HF patients.

Patients in the EG obtained a significantly higher score on the confidence to perform self-care behaviors specific to HF in comparison to the CG. The MISC intervention, which combines MI and the TTM, as well as specifically designed intervention tools, has the potential to encourage self-care behaviors in HF patients.

Future research is needed to confirm these preliminary results.

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