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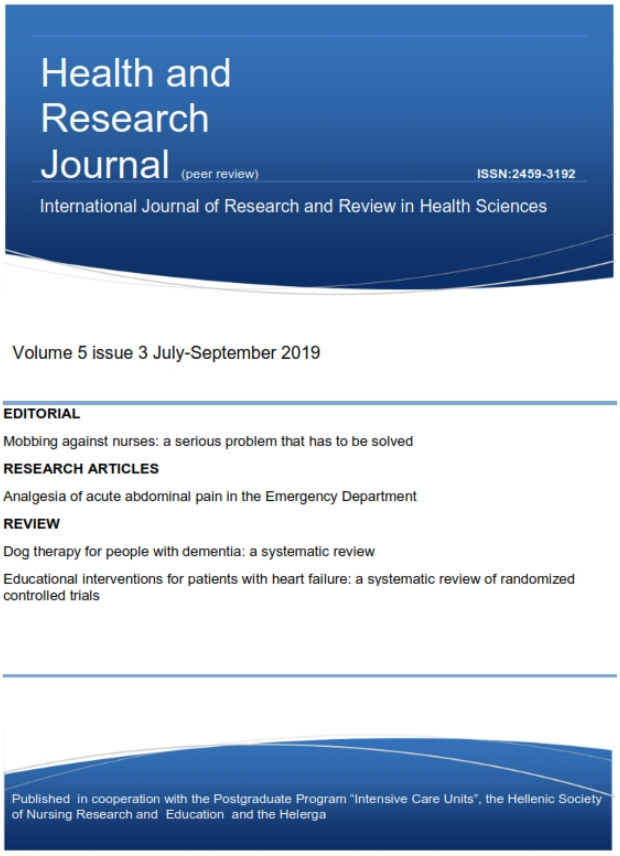

Educational interventions for patients with heart failure: a systematic review of randomized controlled trials

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SYSTEMATIC REVIEW

EDUCATIONAL INTERVENTIONS FOR PATIENTS WITH HEART FAILURE: A SYSTEMATIC REVIEW OF RANDOMIZED CONTROLLED TRIALS

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Abstract

Background: Patient education is an important intervention for the management of heart failure; however, in practice patient education varies considerably. The purpose is to systematically review educational interventions that have been implemented for heart failure patients and assess their effectiveness.
Method and Material: Randomized controlled trials from 2008 to 2018 in MEDLINE were reviewed using the following search terms: nursing teaching, education, intervention, patients with heart failure, hospital. From the Randomized controlled trials 26 abstracts were reviewed.
Results: A total of 2484 patients were included in the 19 studies that met the inclusion criteria. Commonly, the initial educational intervention was a one-on-one didactic session conducted by nurses supplemented by written materials and multimedia approaches. One study referred to a theoretical model as a framework for their educational intervention. Studies used a variety of outcome measures to evaluate their effectiveness. Of the studies reviewed, 17 demonstrated a significant effect from their intervention in at least one of their outcome measures.
Conclusions: Despite improvements in knowledge, we have variable results in outcomes and this is very likely related to the heterogeneity of the studies included in this review. It was difficult to establish the most effective educational strategy as the educational interventions varied considerably in delivery methods and duration as well as the outcome measures that were used for the evaluation. A patient-centered multidisciplinary approach based on educational theory and evaluated appropriately may assist to develop an evidence base for patient education.

Keywords: Heart failure, outcomes, patient education.

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INTRODUCTION

Heart failure is a chronic and progressive clinical syndrome. It is characterized by typical symptoms such as dyspnea, edema and soreness, by incidental findings such as jugular vein dilatation and is caused by structural or/ functional heart disease.[1]

It is afflicting more and more people and it has been singled out as an emerging epidemic. It is a fact that significant progress steps have been made in tackling heart failure. However, it is characterized by extremely high mortality rate and, at the same time, it is combined with a great financial cost to health systems. Heart failure affects approximately 1-2% of the adult population in developed countries, reaching a rate over 10% in those aged over 70. The rate of hospitalization as well as the total cost incurred in treating the disease is expected to increase over 150% in the next 20 years, making heart failure one of the most significant threats to public health. According to the Annual Epidemiological Report of the American Heart Association, about six million people are living with heart disease in the United States and it is estimated that eight million people will be added by the end of the next decade.[1-2]

Heart failure treatment requires complicated clinical interventions and medical care. It is commonly accepted that the management of heart failure depends mainly on the patient. Many studies, however, show that patients are not able to cope with the impacts of the disease and they do not adjust to their new life situation.[1-3]

Despite the progress in the development of methods of pharmacological treatment of heart failure, professionals interviewed on multidisciplinary disease management pilot projects. In addition to an integrated approach to heart failure management, patient' education is a key element of nursing care to enhance the capacity of patients for self-care.[4]

The fostering of self-care may be achieved through proper education focused on the improvement of knowledge and the enhancement of particular skills.[5] Through well-designed training programs, patients will adopt new life-changing habits in terms of medication, nutrition, exercise, smoking, prevention of infections, self-monitoring of the symptoms of the disease and seeking immediate medical care, following serious symptoms.[1-2,6]

Over the last decade, training projects have been implemented and evaluated. Patients with heart failure have shown improvement in reducing morbidity, fatality and re-admissions in hospitals due to deregulation of health.[7]

Although education provided to heart failure patients and independent nursing intervention to improve patient's behavior concerning disease self-management may be significant, it still remains unclear which interventions are the most effective method for patients with heart failure. To that end, the purpose of this study is to review the educational interventions applied to heart failure patients and evaluate their effectiveness.

AIM

The purpose of this study was to examine the methods and effectiveness of nursing education provided to patients with heart failure.

MATERIAL AND METHODS

A review of Medline online databases was made and the outcomes of randomized studies, published in English, during 2010-2018 period were searched trying to evaluate the effectiveness of education on disease management for patients with heart failure.

More specifically, a literature review was made applying database search filters, as follows: (a) Date of publication: last ten-year period. (b) Species: human population (c) Article type: randomized controlled trial. (d) Language: English. d) Age: Adults. (f) Text availability: Full text. A review of the literature took place in December 2018. The key-words used in the search were: nursing, teaching, education, intervention, patients with heart failure and hospital. In particular, among key-words, AND logical operator was used to increase search reliability. In the articles reviewed, there was no limitation on the training environment, whether inside or outside a hospital, or on the method of educational intervention. Additionally, in this study, the articles that link education with patients' stay in a hospital were considered.

Finally, although the outcomes of monocentric studies may not concern all study- targeted population as a whole and, thus, conclusions may not be reliable, yet they were included in this

review due to pooled homogeneous data.

In this review, pediatric-patient focused studies were examined and adult-patient focused studies were excluded. Also, the studies, which contained samples of patients with heart failure and did not generate distinct results for educational intervention, were excluded.

From the literature review, based on the criteria of introduction to the study, 26 articles were identified. From these articles seven (7) were excluded.[8-11]So, the material of the present study is based on nineteen (19) articles [15-33] (Table1). The methodology of the review is summarized in picture 1.

RESULTS

The reviewed studies (Table 1), as a whole, explored the methods and effectiveness of nursing education in patients with heart failure. Educational intervention, defined as a predetermined learning activity, is assessed by knowledge and self-care skills directly or by hospital readmission rates, mortality, reduction in depression symptoms or quality of life indirectly. More studies have shown significant links among educational intervention and knowledge enhancement, self-care, life quality and reduction of readmissions, mortality and depression. However, the rest of the studies did not statistically state significant relationships between the variables.

Sample Features

A total of 2484 patients were enrolled in nineteen (19) studies. The number of patients enrolled in the studies varies from 31 to 575. Ten (10) studies were conducted in the United States, one in Australia, four in Asia, and four in Europe.

Method of Educational Intervention

In the context of these studies, a number of educational interventions were performed, which are summarized in Table 1. The most common initial educational intervention used was verbal education through lecture made by scientific nursing team member. Although a training session was a common initial approach to educational interventions, many educational variants were used to enhance education.

Educational material was used to complete educational intervention through lectures. [15-16,28-30] Brochures, guidelines and supervisory material were used among other material. Especially, Koberich et al.,[18] created cards to choose patient training issues. Telephone contact with patients in the home was frequently made to monitor their health and repeat them the necessary instructions in order to enable them to cope with their disease. Some researchers paid visits to the house of the patients in the context of the project. Nursing personnel monitored the symptoms, the general health status of the patients in the home and the demand for other health and social care. Then, contact was made with the rest members of the team during the period of intervention for the holistic respond to the medical needs of patients.[23,25-29,33.]Lofvenmark et al.,[19] completed the training using a support Web site for patients in the home. Gellis et al.[25] monitored the weight, blood pressure, heart rate, oxygen saturation and temperature of the patients in the home on a daily basis using a medical device. Hwang et al.[20] formulated a computer-based educational strategy based on videoconferencing with patients in home. Contrary to the interventions which improved the education using written material, the White et al.,[24] strategy focused on a fitness logbook for patients in the home to write down their body weight.

Learning theories

Educational interventions are guided by a theoretical model of one study. Masterson Creber R et al.,[27]incorporated the principles for patients' education in the theory: "*The Situation-Specific Theory of Heart Failure Self-Care*" according to which patient-centered advice is given based on the psychology of cognitive and social behavior. Nursing personnel assess if patient is willing to change the behavior and then develop strategies to change the behavior of the patient. The daily self-care goals were considered important for the participant because they were similar to his/her wishes.

Content of educational intervention

During the training sessions, the researchers included in their teaching method the following: Personalized training with signs and symptoms of the disease, factors and symptoms of deregulation, compliance with medication regiment, weight control, exercise, nutrition, saltand fluid intake volumemanagement as well as self-care promotion. In addition, Palme et al.[15] going after self-management of lower urinary tract symptoms in patients with heart failure, focused on

the control of caffeine, constipation, chronic cough and bladder re-training. Lofvenmark et al.,[19]focused on psychological support to reduce patient depression using the web-communication platform they created. Having the same goal, Cockayne et al.,[29] used sessions method for patients in the home providing personalized advice. Tsuchihashi-Makaya et al.,[23] also tried to reduce stress levels with the support of a psychologist, member of the interdisciplinary team, during the intervening period for the holistic approach to patients' needs. In the study by Chang et al.,[33] patients enrolled in an intervention team and received a twelve-week follow-up training, including personalized sleep training plan, self-care, emotional support through monthly home visits and telephone counseling conducted every two weeks.

Evaluation of the effectiveness of educational intervention

A key-element of patients' education is the assessment of the effectiveness of interventions. Pal et al.,[15] following patients' education on self-management concerning lower urinary tract symptoms, concluded that 30% of the intervention group reported improvement in self-management of lower urinary tract symptoms, compared with 25% of the attention control group.

Hwang et al.,[20] attempted to describe patients' experiences and perspectives concerning a rehabilitation program by videoconference home care. The participants expressed the benefits of videoconferencing in health care and social support. They emphasized the need to improve sound quality and connectivity as well as to provide further computer training to those patients with little or no computer navigation skills. The majority of participants expressed their preference to a combined model of face-to-face meetings and web conferencing.

Domingues et al.,[16] evaluated the effectiveness of education and knowledge, readmissions and mortality of patients within three months. Control and intervention team showed levels of progression of knowledge and self-care skills. In addition, Chen et al,[17] in a research study conducted on the effectiveness of an interdisciplinary readmission management program, found that quality of life and self-care was improved significantly while depressive symptoms were decreased in the intervention group within six months. No differences in physical status (fitness) and mortality or readmission were observed in the two groups.

Wu et al.,[21] having studied the impact of health literacy on the age and health of adults with heart failure, concluded that older patients had low level of health literacy compared to younger patients (47% vs 21%) and it was associated with a higher risk for cardiovascular events (1.8 times greater). Patients, according to the New York Heart Association (NYHA) Functional Classification (Class III / IV), had more than twice the risk for cardiovascular events than those with NYHA I / II. The main finding of this study was that health literacy mediates the reltionship between age and health.

Moreover, Kommuri et al.,[31] investigated the effect of an educational nursing intervention on the patient's knowledge about disease. They concluded that education improved patient knowledge and the risk of patients to readmit into the hospital was reduced.

Mussi et al.,[22] compared the effect of educational nursing intervention, using phone contact and computer, to conventional patient monitoring. Six months later, a significant improvement in self-care and disease knowledge was observed in the intervention group. Compliance to treatment was significantly higher in the intervention team than in the other one.

Tsuchihashi-Makaya et al.,[23] identified the effect of home-based disease management program to improve the psychological state of patients. The intervention team had significantly lower depression and anxiety compared to the group receiving "usual care". There were no significant differences in mortality in both teams. However, readmission of patients into the hospital were significantly less in the intervention team than in the control team.

White et al.,[24] evaluated the degree of compliance, holding patients' logbooks in which the weight of patients, the reasons of non-compliance and the advices provided, following weight gain, were logged. Increased compliance concerning body weight management was performed by patients who participated in training sessions. Logbooks provide significant help in managing symptoms and encouraging patients to participate in self-care programs.

Gellis et al.,[25] performed a telemedicine intervention to improve chronic diseases and reduce depression. The study

demonstrates that an integrated telemedicine service can improve clinical and home health care. In the intervention team, depression rate was 50% after three and six months and patients significantly improved their solving-problems abilities. A decrease in emergency department visit was found. However, hospitalization time within a twelve- month period from the beginning of treatment was not monitored.

Aguado et al.,[26] observed that heart failure patients who received home-based intervention had fewer hospital readmissions and emergency department visits and paid less for health care services.

Creber et al.,[27] made individualized interventions to improve self-care, symptoms and quality of life within three months. Patients who received the intervention had clinically significant self-care improvement during that period.

Wang et al.,[30] determined the effectiveness of weight management intervention in reducing readmission in hospitals. The educational intervention was associated with patient' greater compliance concerning weight monitoring and the reduction of readmissions.

In the study by Chang et al.,[29] the intervention group had significantly much better sleep quality and decreased depression levels than the control group, following a twelve- week educational intervention.

However, several researchers did not manage to correlate education and outcomes incorporated in the studies. Cockayne et al., for example, in controlling personalized intervention to improve self-care, patients and caregivers quality of life as well as readmissions. The intervention group had statistically major level of depression. There were no differences in readmission in both groups.

Leventhal et al.,[32] studied the effects on the period of hospitalization, the mortality as well as the quality of a heart failure program but they did not report any significant impact concerning intervention on quality of life.

Koberich et al.,[18]observed the impact of an in-hospital training program on the attitude of patients during self-care, the compliance to the treatment and the quality of life. They concluded that individualized education provided to patients had a significant impact on heart failure self-care, but it did not significantly influence the quality of life and the ability of the patients to comply with the treatment.

Finally, Löfvenmark et al.,[19] evaluated the effect of an educational program for the family members of patients with chronic heart failure in terms of quality of life, depression and anxiety. There were no significant differences in anxiety, depression or quality of life between the intervention team and the control team. The younger members of the family were found to have a higher quality of life. The adequacy of the social network was the only independent variable that explained levels of anxiety and depression.

DISCUSSION

Nineteen randomized controlled studies on educational intervention specifically designed for heart failure patients, published from 2008 to 2018, were reviewed in this study. Educational strategies have many forms, the most common of which is verbal patient education. Since lecture-based verbal patient education is demonstrated as a less effective method, it is suggested that this education should be combined with another means to be more effective. Some of the means of the enhancement, as we have demonstrated, are educational material such as brochures, cards and digital disks. Some interventions pertained to other strategies, such as the use of computer, remote monitoring device, videoconferencing, and participation in an online portal as a team.

From this extensive review, outcomes concerning heart failure patients under telemonitoring or telephone communication support program are encouraging. Structured communication is associated with reduced readmissions in hospitals, improved quality of life and self-care behavior.[16,18,20,22-23,25,27] The reason is that both the collection of data and the evaluation of patients' clinical status can reveal disorders before the deregulation in heart failure and the hospitalization of patients.[34] However, the provision of modern digital media, as patients have clearly noticed, should not reduce the ability for an interpersonal communication, since devices may not act as a direct tool substitute of direct communication which has many advantages, such as the expression of the emotions (active listening).[20]

Although it is commonly believed that patient received theoretical training (knowledge) to a great extent, there is an effort to develop patients education programs based on one or more educational learning theories. Hence, it is a great disappointment that only one study mentions the use of a learning theory that guides the enhancement of educational intervention for patients.[27]

In most studies, the evaluation was made by the researcher through questionnaire-research tools. However, the above mentioned do not set aside the need for an educational theory on the development of educational intervention.Learning is facilitated by the integration into an existed conceptual framework and is received through the autonomous activity and active involvement of trainee patients. It also demands the utilization of the existing knowledge structures. Patients may have different learning needs affected by various factors such as the time period between symptoms diagnosis and their education in the past. Educational philosophy widely recognizes that effective education programs are based on a comprehensive assessment of needs. Patient-centered education entered into a commitment to ensure adjustment to the needs and preferences of the patients as well as to enable the patients to change their attitudes through this participation approach.[35-36]

An important element of education success is the assessment of its effectiveness. However, the outcomes of patient education systems rely on the expectations for intervention. Improving knowledge is a key goal of educational intervention. A continuous improvement was clear in the studies that measure knowledge.[16,22,31] However, increased knowledge does not necessarily mean patient behavior change.Information provided may oftenaffect patients' behavior. Several studies evaluated the changes of self-care behaviors while health failure management programs have emphasized that the improvement of self-care is the success factor for reducing mortality and hospital readmissions due to deregulation. In this review, six studies, that evaluated self-care, reported statistically significant mprovements.[15,17,18,22,24,27] The use of quality of life measures to evaluate education is difficult, since there is no clear evidence of the causal link between education and quality of life. However, reported outcomes show that educational interventions can improve quality of life.[37] Measuring quality of life, only two out of ten studies reported a positive outcome.[17,26] The Minnesota Living with Heart Failure Questionnaire (MLHF) was used in these two studies. MLHFQ is the instrument developed to evaluate heart failure impact on the physical, emotional, social and mental dimensions of quality of life, using a specific disease assessment scale.[38]

In the review, seven studies reported low readmission rates for the intervention team.[21,23,25-26,28,30-31]It is clear that research showed that there has not been gradual improvement of the other measures, such as quality of life and mortality despite the fact that educational interventions can affect the improvement of patients' knowledge.[39] While there is no strong evidence to support the impact of education on mortality reduction, positive results may be obtained if intervention was specifically designed and monitoring was performed in a long term period. It was difficult to compare the effectiveness of different strategies in these reviewed studies because each researcher used different outcome measures and each intervention showed at least one positive result, demonstrating the effectiveness of each program.

Disease management, as part of the educational intervention in patients' psychological status, was important.[17,23,25] Patients with heart failure and their families have different psychosocial needs. Depression is associated with an increased risk of mortality and it has more negative effects on elderly patients with no close medical follow-up. Depression may serve as an indicator of a more severe form of heart failure.[40] The compliance to treatment was an important and positive determining measure of intervention which was pointed out in the studies.[22,24,28,30] The effort to reduce patients' non-adherence at the lowest level is an important issue, taking into consideration the outcomes of the research on the negative consequences of patients' non-adherence to their treatment, concerning the course of the treatment, the potential direct clinical consequences and the significant economic impact on society.[41]

CONCLUSIONS

It has been clearly demonstrated that patient education is vital for a better health-related quality of life, but much research remains to be made to define strategies that will give the best results for these patients. Research should focus on the implementation of training programs based on a theoretical framework that includes an assessment of the needs and preferences of trainee patients on the provision of education. Educational interventions should be systematically evaluated to determine their effectiveness. Patients should be treated as unique psychosomatic entities through interdisciplinary programs of holistic approach. We do not reject the educational intervention methods used since the outcomes from research variables in every study are related to the heterogeneity of the educational methods included in this review.

It is difficult to determine the most effective educational strategy as educational interventions considerably vary in methods and results of the measures used to evaluate them. It is necessary to re-examine patient-centered education approach, committed to adapting education to identified needs and preferences of patients. Concluding, we stress that the treatment of patients with heart failure should be provided into properly organized medical clinics, by specialist nursing personnel, members of an interdisciplinary team, taking into consideration that planning of educational intervention should be based on the background health information, the level of knowledge deficit, and the clinical status of patients, making personalized intervention to patient with heart failure.

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ANNEX

FIGURE 1. Flow Chart picturing the steps conducted for the review

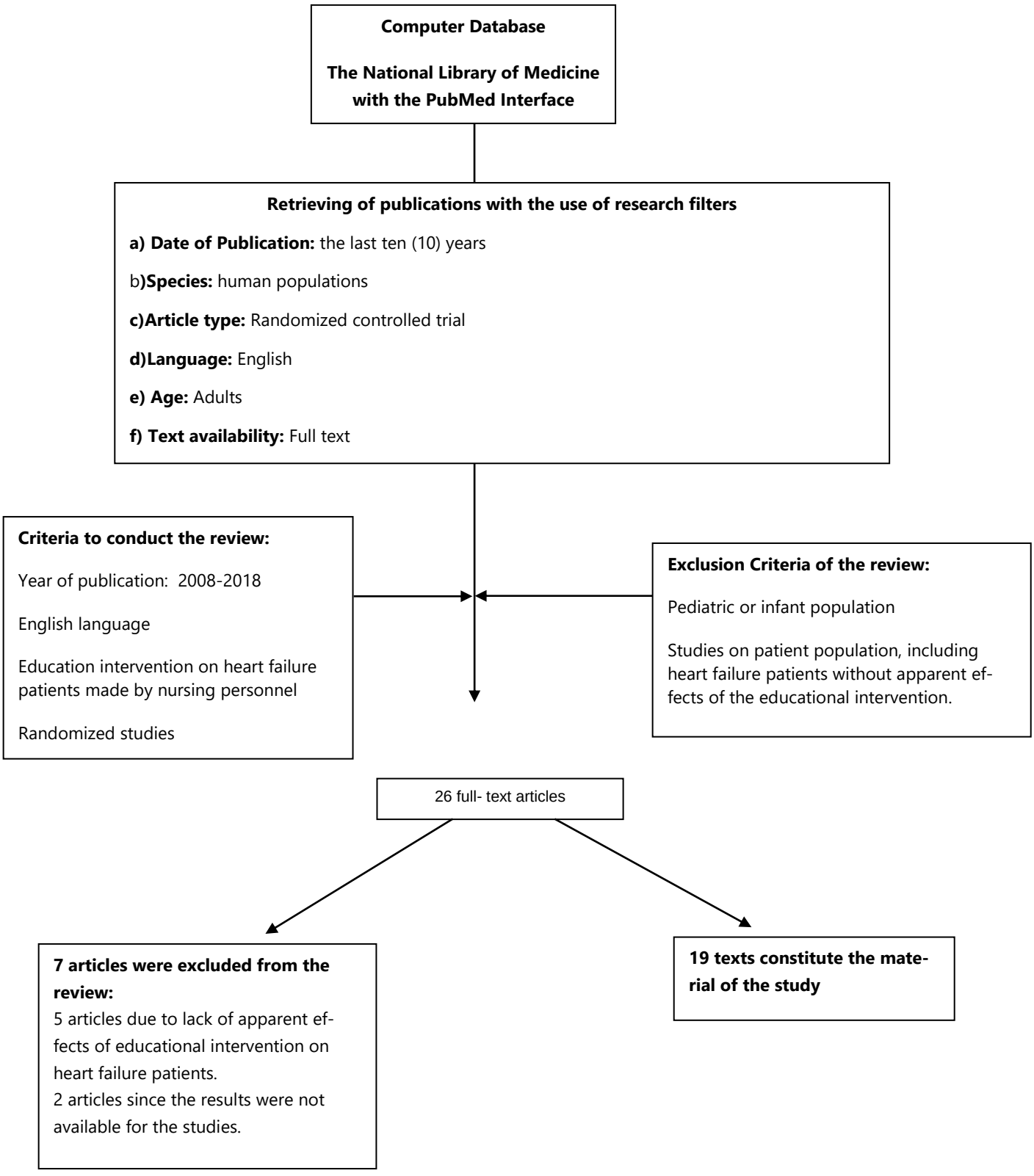

TABLE 1. Characteristics of the studies investigating the effect of education in the management of patients with heart failure

Study-Country-Sample study	Intervention method	Comparison of the method of intervention	Results
Palmeretal.[15] United States of America n=31 average age: 66,3 ±9,8	Verbal education Educational material Telephone Educational sessions	**Intervention team** Caffeine intake. Constipation. Chronic cough. Urinary bladder training **Control team** Healthy diet. Sun protection and skin care. Healthy sleep habits. Stress/ anxiety management	Intervention team reported an improved self-management of lower urinary tract symptoms compared to the control team.
Domingues et al.[16] Brasilia n=11 average age: 63 ±13	Verbal education Educational material. Telephone Educational sessions	**Intervention Team** Monitoring signs and symptoms of potential deregulation **Control team** Educational material before hospital discharge process	Both teams reported much higher scores concerning knowledge and self-care, following a three-month period.
Chen et al.[17] China n=62 average age: 61,1 ±14,2	Verbal education provided by interdisciplinary team	**Intervention team** Personalized education on signs and symptoms of disease. Body weight control. Self-care. Medication adherence **Control team** Treatment-as-usual. No standardized approach in treatment.	Quality of life and self-care were greatly improved and depression symptoms were reduced in intervention team at six (6) months. No variation in physical status, mortality rates or hospitalizations were found in both teams.

Study-Country-Sample of study	Intervention method	Comparison of the method of Intervention	Results
Koberichetal.[18] Germany n=31 average age: 60±2	Verbal education. Phone Contact Teaching Cards	**Intervention team** Heart anatomy and physiology. Heart failure pathophysiology. Medication treatment effect. Diet. Change of life habits. Signs and symptoms of deregulation. **Control team** Treatment-as-usual. No standardized approach to treatment	Personalized education played an important role in heart failure self-care concerning heart failure. It did not play an important role in quality of life and the adherence to the treatment for the intervention team.
Löfvenmark et al.[19] Sweden n=128 average age: 65±12	Verbal education Support website	**Intervention team** General information on the disease. Self-care. Nutrition (diet). Physical activities. Psychological support. **Control team** Treatment-as-usual. No standardized approach to treatment.	No particular differences concerning anxiety, depression or the quality of life for both the intervention and control team. Younger family members reported to have better quality of life.
Hwang et al.[20] Australia n=31 average age: 69±12	Teleconference Aerobic exercises Verbal education	**Intervention team** Self-management. Nutrition (diet) and physical activity. Medication treatment effect. Management of life **Control team** Treatment-as-usual. No standardized approach to treatment.	Enrolled patients expressed the benefits of the use of teleconferences on health, treatment access and social support. They suggested a model that would combine face-to-face communication and teleconferencing.
Wuet al.[21] United States of America n=575 average age: 66 ±13	Phone contact	**Intervention team** Health education topics **Control team** Treatment-as-usual. No standardized approach to treatment.	Patients in NYHA classes III / IV had more than two times higher risk for a cardiovascular incident compared to those in NYHA classes I / II.

Study-Country-Sample of study	Intervention method	Comparison of the method of Intervention	Results
Mussi et al.[22] **Brasilia** **n=200** **Average age:63,37±12,05**	Telephone contact Computer use	**Intervention team** Body weight control. Self-care. Nutrition (diet). Physical activity. Psychological support. Monitoring signs and symptoms for potential deregulation. **Control team** Treatment-as-usual. No standardized approach to treatment.	Following six (6) months, an improved self-care and knowledge of the disease were reported for the intervention team. Adherence to treatment was higher in the intervention team.
Tsuchihashi-Makaya et al.[23] **Japan** **n=168** **Average age:75,8±12,1**	Verbal education Home visits. Telephone Contact	**Intervention team** Contact with interdisciplinary team during intervention period for a holistic approach to requirements. **Control team** Treatment-as-usual. No standardized approach to treatment.	Intervention team had low level of depression and stress (anxiety) compared with control team. However, readmissions were reduced significantly in the intervention team rather than in the control team.
White et al.[24] **United States of America** **n=36** **Average age: 70±14,7**	Verbal education. Logbook logging body weight.	**Intervention team** Education to monitor signs and symptoms of potential deregulation. Fluid management. **Control team** Treatment-as-usual. No standardized approach to treatment.	Greater adherence to body weight management was reported for the control team. Body weight logbooks are useful to better manage disease symptoms.
Gellis et al.[25] **United States of America** **n=115** **Average age:78,3±6,9**	Telemedicine device	**Intervention team** Body Weight, vital organs and pulse oximetry monitoring. Psychological support provided by experts. **Control team** Treatment-as-usual. No standardized approach to treatment.	Depression rates were reduced within three (3) and six (6) months as well as skills in solving disease-related problems were improved in the intervention team. Additionally, visits to the emergency rooms were highly reduced.

Study-Country-Sample study	Intervention method	Comparison of the method of Intervention	Results
Aguadoet.al.[26] **Spain** **n=106** **Average age: 77,8 ±5,8**	Verbal education at home.	Self-management. Nutrition (diet). Body exercise. Medication. Managing life changes. **Control team** Treatment-as-usual. No standardized approach to treatment.	Patients with heart failure, who received educational intervention at home, had fewer visits in emergency department, fewer hospitalizations and reduced costs for health care.
Creberetal.[27] **United States of America** **n=67** **Average age: 62±12,8**	Verbal education. Home visits. Telephone contact	**Intervention team** Attitude change. Development of an action strategy to face the disease. **Control team** Treatment-as-usual. No standardized approach to treatment.	Patients, who received intervention, reported to have great improvements concerning self-care, for a 90-day period; an intervention which was other than the treatment-as-usual.
Smithet. al.[28] **United States of America** **n=198** **Average age: 62,1 ±12.5**	Verbal education. Home visits. Educational material.	**Intervention team** Self-control logbook logging on a daily basis the body weight and fluid/ sodium balance management. Physical activity. Emotion management **Control team** Treatment-as-usual. No standardized approach to treatment.	Educational intervention was associated with the necessity to take selected medicines for heart failure and with a prolonged life without medical treatment, during the intervention period.
Cockayneet. al.[29] **United States of America** **n=250** **Average age: 70,7 ±10,8**	Verbal education at home. Home visits. Educational material.	**Intervention team** Self-management. Nutrition (diet). Body exercise. Medication. Monitoring signs and symptoms of potential deregulation. **Control team** Treatment-as-usual. No standardized approach to treatment.	Intervention team had statistically higher rates of depression. No differences in readmissions were found in both teams.

Study-Country-Sample study	Intervention Method	Comparison of the method of Intervention	Results
Wang et. al.[30] China n=66 Average age: 69,7±7,8	Verbal education. Telephone contact. Educational material.	**Intervention Team** Self-control logbook logging on a daily basis the body weight and fluid/ sodium balance management. Proper skills to act when serious fluid retention occurs. **Control team** Treatment-as-usual. No standardized approach to treatment	Educational intervention was associated with patients' adherence to monitor their body weight and reduced rates of readmissions in hospitals.
Kommuriet.al.[31] United States of America n=265 Average age: 55,7	Verbal education.	**Intervention team** Self-care. Disease self-management. Nutrition (diet). Bodyexercise. Medication. The role of sodium and the role of limited fluid volume. **Control team** Treatment-as-usual. No standardized approach to treatment.	Better education for patients in intervention team and reduced readmissions in hospital.
Leventhal et.al.[32] Switzerland n=44 average age: 77,6±6,1	Verbal education Telephone contact. Home visits.	**Intervention team** Psychosocial status and (work-family) environment assessment made by an expert. Provision of educational and behavior support as well as supportive care to build self-maintenance skills. **Control team** Treatment-as-usual. No standardized approach to treatment.	No particular effect of intervention concerning quality of life was reported.
Chang et.al.[33] Taiwan n=88 Average age: 72,8 ±13,3	Verbal education. Home visits. Telephone contact	**Intervention team** Personalized education on healthy sleep and self-care. **Control team** Treatment-as-usual. No standardized approach to treatment.	Intervention team had much better improvement concerning healthy sleep as well as on depression, following a twelve-week intervention.