REVIEW

SELF-MANAGEMENT EDUCATION PROGRAMS FOR PATIENTS WITH HEART FAILURE: A LITERATURE REVIEW

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Abstract

Aim: To identify and evaluate self-management education programs. *Design:* A literature review. *Methods:* A search of five databases PubMed, ProQuest, Science Direct, Wiley, and the Cochrane Controlled Register of Trials (CENTRAL) was conducted. Reviewed studies were as follows: articles published from January 2015 to August 2019, with full text in English, featuring randomized controlled trials (RCTs), and patients with a diagnosis of heart failure, and self-management education interventions with follow-up. *Results:* Eighteen articles were reviewed in this study, whose participants were predominantly male patients aged 65 years old. Types of self-management education interventions applied included: Education and Telephone Support, Disease Management Clinics, Telemonitoring, Nurse Case Management, Nurse Visits, Multimedia Based Education, and a combination of Telephone Support and Telemonitoring. Interestingly, 83% of studies involved nurses. *Conclusion:* A variety of choices for self-management education interventions can be applied to improve patient self-care. Patients' conditions, characteristics and needs, follow-up treatment, and the availability of education media and health professionals were important factors supporting the success of self-management education for patients with heart failure. Collaboration across multiple disciplines and professions has been proven to contribute to the success of the program.

Keywords: heart failure, literature review, patient education, self-care, self-management, self-management education.

Introduction

Heart failure (HF) remains a global health problem, as its prevalence is increasing, and it is a major cause of high hospitalization and readmission rates (Ciapponi et al., 2016; Ziaeian & Fonarow, 2016). There was an 8.7% increase in HF prevalence from 5.7 million, between 2009 and 2012, to 6.2 million, between 2013 and 2016 (Benjamin et al., 2019), with readmission rates of 21.4% within 30 days of discharge (Davis et al., 2016), and a mortality rate of 8.6% (Gupta & Fonarow, 2018).

High readmission rates can affect the quality of life of patients with HF (Nieminen et al., 2015), and treatment can result in a high cost burden (Obi et al., 2016). Lycholip et al. (2018) found that patients with lower Left Ventricular Ejection Fraction (LVEF) had inadequate self-care. Thus, the high incidence and readmission rates suggest the need for effective strategies to develop programs that can improve

patient self-care, eventually reducing readmission rates, while, at the same time, increasing quality of life of patients with HF.

One strategy that can be implemented is self-management education (Toback & Clark, 2017; Tung et al., 2013), which is a systematic intervention that facilitates individuals' decision-making and self-monitoring of health parameters to enhance knowledge, attitudes, self-reliance, healthy behavior, and clinical outcomes (McGowan, 2012; Sherifali et al., 2018). The results obtained from previous studies indicate that self-management in patients with heart failure has a positive effect in achieving patient adherence to pharmacological treatment and salt-diet restriction, the improvement of self-monitoring on weight and symptoms of HF, and the maintenance and management of healthy behaviors (Ditewig et al., 2010; Jonkman et al., 2016; Otsu & Moriyama, 2011).

To support effective and successful self-management education, a series of programs, along with appropriate educational methods and topics, should be introduced (Oyanguren et al., 2016). The European Society of Cardiology (ESC) provides

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recommendations relating to topics that can be delivered to patients with HF in self-management education (Ponikowski et al., 2016). However, the guidelines do not explicitly specify the type of programs that can be implemented. Some of the available programs to enhance the self-management of patients with HF seem to lack uniformity in method, program targets, focus of intervention, and length of follow-up (Albert et al., 2015).

Previous studies have focused only on the educational content and effectiveness of programs, especially regarding readmission and mortality rates. On the other hand, there is a lack of in-depth reviews focusing on intervention program type and outcome measurement (related to self-care and quality of life). Therefore, through this up-to-date study, we intended to identify, summarize, and evaluate the latest types of intervention involving self-management education programs for patients with HF, focusing on relevant RCTs from the last five years. In addition, we identified the predominant outcomes measured. The updated synthesis from this review is intended to be an effective care strategy for patients with HF. Hence, the needs for a systematic review of the content of literature on self-management education intervention programs.

Aim

This literature review was conducted in order to identify and evaluate self-management education programs for patients with HF, focusing on: types of self-management education interventions, those making the interventions, the length of follow-up, and outcome measurements needed.

Methods

The protocol used for this study accords with the recommendations of the Preferred Reporting Items for Systematic Review and Meta-Analysis (Moher et al., 2009; Shamseer et al., 2015), which can be freely accessed via the PRISMA Website (http://www.prisma-statement.org/). A number of earlier studies used PRISMA guideline when conducting their studies (Latif & Irwan, 2019; Winardi & Irwan, 2019).

Design
A literature review.

Eligibility criteria
The following inclusion criteria were applied to select relevant research articles:
1. Randomized Controlled Trial (RCT).
2. Articles published in full text, and in English.
3. Participants were patients with a diagnosis of HF.
4. Self-Management Intervention of HF accompanied by follow-up.
5. Articles published in 2015–2019.

The exclusion criteria were: review studies, protocol studies, abstract published only, and articles from conference proceedings.

Search strategy
We searched for articles in electronic databases: PubMed, ProQuest, Science Direct, Wiley, and CENTRAL. The search was conducted July–August 2019. The search strategy in this review used a combination of medical subject titles, keywords, and free text words depending on the database, along with the use of Boolean "AND" and "OR".

The keywords used were specifically determined for journals written in English according to the PICO (Problem, Intervention, Comparison, and Outcome) method, with "Heart Failure" as the Problem, and "Self-Management" or "Self-Management Education" or "Patient Education" or "Self-Care" as the Intervention. While no Comparison was used, the Outcomes were "Patient Readmission" and "Quality of Life". In addition, we also made a secondary search outside the databases in Google Scholar, based on the list of references in the article. A record of the search process for each individual electronic database can be seen in Table 1.

Study selection inc. PRISMA flow diagram
The selection of studies was made according to PRISMA guidelines (Moher et al., 2009). Two reviewers (EZ and ELS) screened the title and abstract to obtain relevant studies according to the inclusion and exclusion criteria. If the reviewers disagreed over an inclusion, it was discussed with a third reviewer (AMI) until consensus was reached. In total, 10,832 titles / abstracts were identified in the databases, and an additional three titles / abstracts were identified in manual searches outside databases. After removal of duplicates, 10,805 titles / abstracts were obtained. Screening was then performed, eliminating 10,703 articles (99%) and leaving a total of 102. Next, full-texts were thoroughly assessed by EZ to determine eligibility. Of the 102 screened articles, 83 were excluded (30 were non-RCTs, 49 did not meet the inclusion criteria, and four papers were protocol studies). Therefore, only 18 articles met the predetermined criteria and were evaluated by AMI and ELS. A PRISMA flow chart (see Figure 1) illustrates the inclusion process carried out in this study.

Table 1 Search strategy of electronic databases (n = 18)

Database	Search terms	Result	Search screening	Screening result	Included studies
PubMed	(heart failure[MeSH Terms]) AND self-management[MeSH Terms]) OR self-management education[MeSH Terms]) OR self-care[MeSH Terms]) OR health knowledge[MeSH Terms]) OR patient education[MeSH Terms]) AND patient readmission[MeSH Terms]) OR quality of life[MeSH Terms]	179,368	fulltext: 149,594 publication dates 5 years: 52,911 human: 52,702 English: 50,528 clinical trial: 8,157	8,157	11
ProQuest	ab(heart failure) AND ab(self-management) OR ab(self-management education) OR ab(Self-Care) OR ab(patient education) OR ab(health knowledge) AND ab(patient readmission) OR ab(quality of life)	713,121	fulltext: 181,268 scholarly journal: 50,215 last 5 years: 21,247 subject patient: 5,310 document type: 5,065 English: 5,045 publication title: 2,136	2,136	1
Science Direct	"heart failure" AND self-management OR self-management education OR self-care OR patient education OR health knowledge AND patient readmission OR quality of life	150,879	research article: 103,090 5 years: 36,695 publication title: 388	388	1
Wiley	"heart failure" in Keywords and "self-management education OR self-care OR patient education OR health knowledge" anywhere and "patient readmission OR quality of life" anywhere	350	5 years: 139 journal: 138	138	2
CENTRAL	heart failure in Title Abstract Keyword AND self-management in Title Abstract Keyword AND self-education in Title Abstract Keyword AND patient readmission in Title Abstract Keyword AND quality of life in Title Abstract Keyword	15	5 years: 13	13	2
Secondary search outside of database				2	1

Evaluation of quality of articles

For critical appraisal of the studies included, EZ and AMI used the Critical Appraisal Skills Program (CASP) Randomized Controlled Trial Checklist (CASP, 2018), checking the feasibility of each study (Table 2). We also assessed the quality of the methods of each RCT study. We used a form of structured data collection from the Cochrane Collaboration tool for assessing risk of bias in RCTs (Higgins et al., 2011). This tool has been widely used in reviewing studies to assess the risk of bias in any type of RCT, with parameters consisting of six domains: selection bias (random sequence generation and allocation concealment), performance bias (blinding of participants and personnel), detection bias (blinding of outcome assessment), attrition bias (incomplete

outcome data), and reporting bias (selective reports). Assessment criteria used to assess the risk of bias were: high/low/unclear. Studies with high risk of bias for all parameters were regarded as low quality studies. If high risk of bias appeared in at least one of the other criteria, the study was regarded as moderate in quality. Studies that had a low risk of bias in all parameters were regarded as high quality studies. The bias quality of each study was independently determined by EZ. The studies were then referred to AMI and ELS and consensus was reached.

Based on the assessment of Bias Risk (Figure 2 and Figure 3), the overall quality of the included RCT studies were moderate. As presented in Figure 3, several studies indicated high-risk of bias in blinding
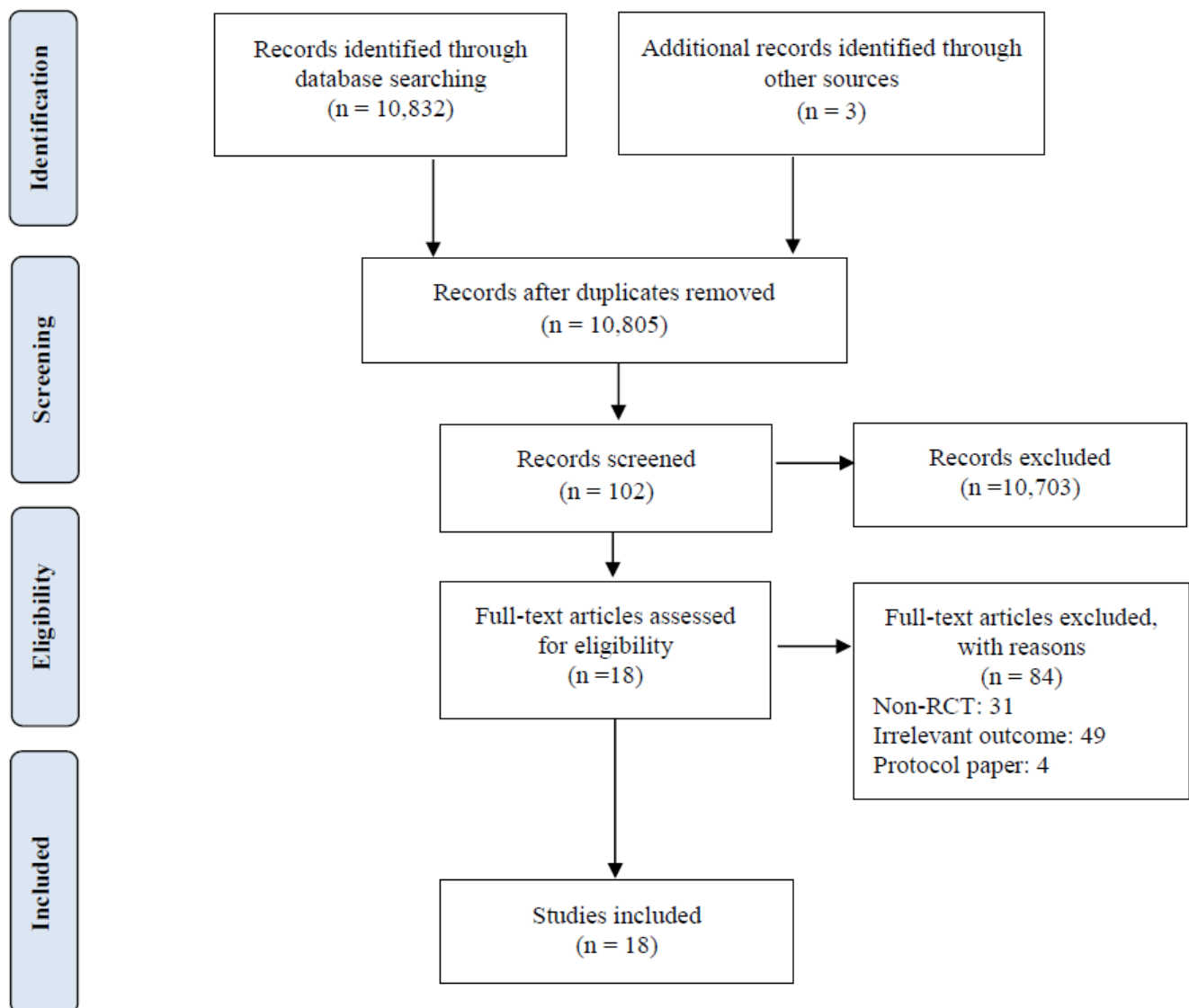
Figure 1 PRISMA Flow Chart

of outcome assessment (three studies / 16.67%), and in blinding of participants and personnel (five studies / 27.78%).

Data extraction

The interventions included in these articles were grouped according to type of intervention. Furthermore, additional data, such as researcher, year, location, study characteristics, description of intervention, length of follow-up, intervener, and outcome measurement were synthesized using extraction tables (Table 3), developed by EZ.

Results

Study characteristics

Eighteen RCT articles were included, published in 2015–2019 (with approximately 38.8% published in 2015). These studies were conducted in various countries: 38.8% in Asia, 38.8% in America, 16.67% in Europe, and 5.55% in Australia. The total number of participants involved in these 18 studies was between 50–1,437 people (in total: 5,242 participants), predominantly male (64.47%), ranging from young adults to elderly adults (i.e., between 29–87 years), with a mean value of 65 years.

	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome	Selection bias	Other bias	Overall risk-of-bias judgment
Köberich et al. (2015)	+	+	-	?	+	+	+	high
Dinh et al. (2019)	+	+	?	+	+	+	+	moderate
Young et al. (2016)	+	+	-	+	+	+	?	high
Abbasi et al. (2018)	?	?	-	-	+	+	?	high
Sherwood et al. (2017)	+	+	?	+	+	+	?	moderate
Smith et al. (2015)	+	?	+	?	+	+	+	moderate
Chen et al. (2017)	+	+	-	+	+	+	?	high
Bekelman et al. (2015)	+	+	?	+	+	+	+	moderate
Meng et al. (2016)	+	+	?	?	+	+	+	moderate
Kalter-Leibovici et al. (2017)	+	+	-	-	+	+	?	high
Hägglund et al. (2015)	?	?	+	-	-	?	?	high
Dang et al. (2017)	+	?	+	?	+	+	?	moderate
Yu et al. (2015)	+	+	?	?	-	?	?	high
Wong et al. (2016)	+	+	+	?	+	+	+	moderate
Clark et al. (2015)	?	?	?	?	+	+	+	moderate
Wang et al. (2016)	+	+	?	+	+	+	?	moderate
Boyde et al. (2018)	+	+	?	+	+	+	+	moderate
Ong et al. (2016)	+	+	?	?	+	+	?	moderate

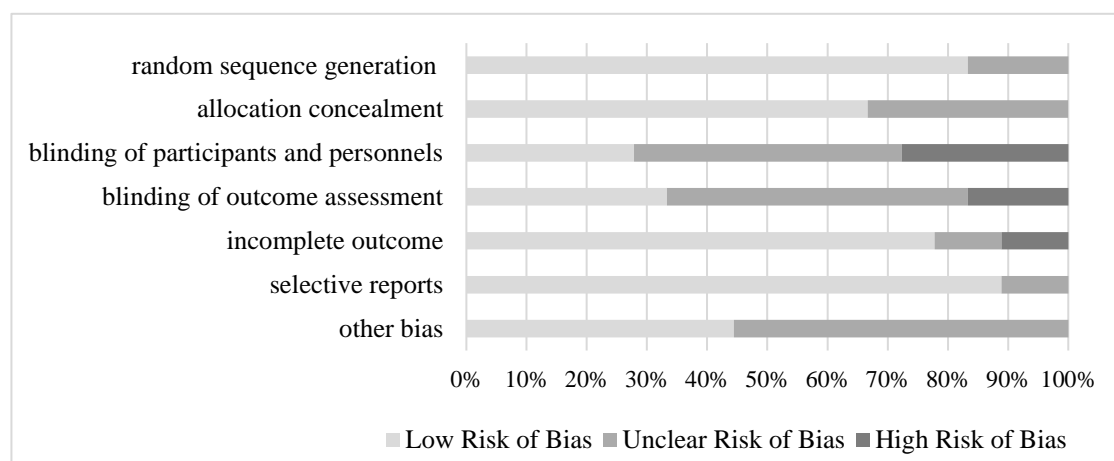| +	Low risk of bias
-	High risk of bias
?	Unclear risk of bias

Figure 2 Risk of bias summary

Figure 3 Risk of bias assessment graph

Description and type of intervention

Of the 18 RCT studies reviewed, only one study compared two interventions without the usual / standard treatment group. Meanwhile, based on type of self-management intervention, the studies were assigned to seven categories (Table 3), including the following types:

1. Education and telephone support (n = 5)
   All studies in this category began with the provision of structured education related to HF and health behaviors that had the potential to improve participants' self-management abilities, and 80% of them were conducted by nurses (Abbasi et al., 2018; Dinh et al., 2019; Köberich et al., 2015; Young et al., 2016). After provision of education, each study continued with telephone calls to patients at home, as a form of patient follow-up, with one study providing education related to coping strategies for 16 weeks by telephone (Sherwood et al., 2017). All studies provided instruction books (booklets / workbooks / modules) in the educational stage, although one of them only provided a selection of modules related to assertiveness training and depression as part of the second phase of telephone calls (Sherwood et al., 2017).

2. Disease Management Clinics (DMCs) (n = 5)
   This type of intervention was characterized by professional multidisciplinary collaboration (generally between cardiologists, nurses, and dietitians), various educational methods (both single and combined), and comprehensive follow-up (Bekelman et al., 2015; Chen et al., 2017; Meng et al., 2016; Smith et al., 2015).

3. Telemonitoring (n = 2)
   Telemonitoring, featured in two studies, focusing on body weight and HF symptoms (Dang et al., 2017; Hägglund et al., 2015). One study used mobile phones to monitor these factors through ten daily questions (Dang et al., 2017), while other study employed special software, and a tablet computer connected wirelessly to a weight scale (Hägglund et al., 2015).

4. Nurse Case Management (NCM) (n = 3)
   NCM includes a combination of home-visit programs and telephone calls from nurses post-discharge. Three studies were conducted by nurses who had experience of treating patients with HF, two of which involved follow-up activities continued for up to nine months with three evaluation measurements (Clark et al., 2015; Yu et al., 2015), while in the third study, follow-up continued for up to three months (Wong et al., 2016).

5. Other interventions (n = 3)
   In one review, 16.7% of the research reviewed used various types of intervention. One study involved a nurse visit with follow-up by means of a home visit or a visit to the education room in the outpatient department (Wang et al., 2016). Another study was based on multimedia education using DVDs to provide education (Boyde et al., 2018), while yet another study employed telephone support and telemonitoring (Ong et al., 2016).

Length of follow-up

In the articles reviewed, most of the participants were pre-discharge patients, and continued with follow-up post-discharge. Follow-up was executed individually or in groups. All reviewed studies included follow-up, 38.8% of which continued it for three months, 27.7% for six months, and 11.1% for nine months, and 22.4 % for more than 12 months.

Intervener

The intervention involved health professionals, such as nurses, general practitioners, cardiologists, dietitians, psychiatrists, and physiotherapists. Interestingly, 83% of the studies involved nurses.

Outcome measurement

Twenty-eight different outcomes were measured in the 18 studies reviewed. The predominant outcomes measured were: quality of life in 14 studies (77.78%), self-care levels in ten studies (50%), knowledge in eight studies (44.4%), and readmission rates in five studies (27.7%). In addition, other outcomes were measured: mortality rate, self-efficacy, depression level, activity level, compliance level, satisfaction, cost intervention, all causes of hospitalization, time span of admission, length of stay (LoS), and HF biomarkers. To measure quality of life, the Kansas City Cardiomyopathy Questionnaire (KCCQ) (Clark et al., 2015; Hägglund et al., 2015; Köberich et al., 2015; Meng et al., 2016; Sherwood et al., 2017; Smith et al., 2015), and Minnesota Living Heart Failure Questionnaire (MLHFQ) (Chen et al., 2017; Dang et al., 2017; Ong et al., 2016; Wang et al., 2016; Yu et al., 2015) were used. The outcome measures used to assess patient self-care were the European Heart Failure Self-care Behavior Scale (EHFScBS) (Chen et al., 2017; Dang et al., 2017; Hägglund et al., 2015; Köberich et al., 2015; Smith et al., 2015), and the Self-Care Heart Failure Index (SCHFI) (Boyde et al., 2018; Clark et al., 2015; Dinh et al., 2019; Yu et al., 2015).

Table 2 Critical Appraisal RCT Studies

Appraisal Checklist	Köberich et al. (2015)	Dinh et al. (2019)	Young et al. (2016)	Abbasi et al. (2018)	Sherwood et al. (2017)	Smith et al. (2015)	Chen et al. (2017)	Bekelman et al. (2015)	Meng et al. (2016)	Kalter-Leibovici et al. (2017)	Hägglund et al. (2015)	Dang et al. (2017)	Yu et al. (2015)	Wong et al. (2016)	Clark et al. (2015)	Wang et al. (2016)	Boyde et al. (2018)	Ong et al. (2016)
Focused issue	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Randomization	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
All patients properly accounted for at its conclusion	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Blind	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	?	Y	Y	Y
Groups similar at start of the trial	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Groups treated equally	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Intervention effect accounted	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Accuracy of the estimated effect of the intervention can be accounted	Y	?	Y	?	Y	Y	Y	Y	Y	Y	Y	?	Y	?	Y	Y	Y	Y
Results can be applied to the local population, or in your context	Y	Y	?	Y	?	Y	?	?	Y	?	?	Y	Y	Y	Y	?	?	?
All clinically important outcomes considered	Y	Y	Y	Y	Y	?	Y	Y	Y	?	Y	Y	Y	Y	Y	Y	?	Y
Are the benefits worth the harm and costs?	Y	Y	Y	Y	Y	Y	Y	?	Y	?	?	Y	Y	Y	Y	Y	Y	?

? – Can't tell; N – No; Y – Yes

Table 3 Evaluated studies of literature review (Part 1)

Type of intervention	Researcher (year), country	Study characteristic	Intervention description	Follow-up period	Intervener	Outcome measurement
Nurse visits (home visits or visits to outpatient department)	Wang et al. (2016), Taiwan	mean age: 65.74 female: 35 male: 57 NYHA II: 57 (62%)	part 1: assessment and monitoring fatigue part 2: education management part 3: outcome evaluation	3 months	cardiovascular nurse	primary outcome: - fatigue measured by Chinese version of PFS secondary outcome: - QoL measured by Chinese version of MLHFQ
Multimedia based education	Boyde et al. (2018), Australia	mean age: 64 female: 54 male: 146 NYHA III: 124 (62%)	Patients received HF education and self-management through guidelines and DVD's. Teach-backs then conducted to ensure patient understanding.	6 months	nurse	primary outcome: - readmission rate secondary outcome: - knowledge measured by DHFKS, self-care by SCHFI

Table 3 Evaluated studies of literature review (Part 2)

Type of intervention	Researcher (year), country	Study characteristic	Intervention description	Follow-up period	Intervener	Outcome measurement
Education and telephone support	Köberich et al. (2015), Germany	mean age: 61.7 female: 19 male: 91 mean LVEF: 28.20 NYHA II: 73 (66%)	inpatient: patients received educational session, booklet and diary to write weight scale, BP, HR, and edema outpatient: patients received telephone in follow-up	3 months	nurse	primary outcome: - self-care behavior measured by using the German version of 9-EHFScBS secondary outcome: - care dependency by CDS, QoL by KCCQ
	Dinh et al. (2019), Vietnam	mean age: 54.4 female: 65 male: 75 mean LVEF: 45.25 NYHA III: 78 (55.71%)	inpatient (prior to discharge): a face-to-face education session using teach-back method (60 minutes)	3 months	nurse	primary outcome: - HF knowledge measured by Vietnamese language version of DHFKS secondary outcome: - self-care by SCHFI version 6.2 - hospitalization rate
	Young et al. (2016), USA	mean age: 54.4 female: 65 male: 75 mean LVEF: 45.25 NYHA III: 78 (55.71 %)	phase I (education program at hospital): self-management education program, and participants received workbook and toolkit phase II (education session by telephone post-discharge) A total of 11 telephone contacts were made with patients.	6 months	nurse	primary outcome: - SM adherence readmission rate measured at 30, 90, and 180 days secondary outcome: - knowledge by AHFKT-V2 - self-efficacy by self-efficacy for heart failure self-management: SCHFI Section C - patient activation by PAM - strategy self-management, measured by 29-item RSCB 4
	Abbasi et al. (2018), Iran	mean age: 48.76 female: 31 male: 29 mean LVEF: 29.84 NYHA I: 33 (55%)	a series of educational self-management programs, continued follow-up by telephone post-discharge over 3 months	3 months	nurse	primary outcome: - QoL was measured by IHF-QOL secondary outcome: -
	Sherwood et al. (2017), USA	mean age: 57.7 female: 48 male: 131 mean LVEF: 30.0 (9.6%)	group 1: CST consisted of cognitive behavior therapy and motivational interviewing, beginning with education on health behavior by telephone. group 2: HFE provided control through weekly patient contact	3 years	CST: clinical psychologist HFE: doctor's assistant	primary outcome: - QoL measured by KCCQ, Six Minute Walking Test, BDI-II - HF biomarker disease - follow-up clinical events secondary outcome: - health behaviors and HF self-management The relationship between improvement in quality of life and clinical outcomes.

Table 3 Evaluated studies of literature review (Part 3)

Type of intervention	Researcher (year), country	Study characteristic	Intervention description	Follow-up period	Intervener	Outcome measurement
DMCs	Smith et al. (2015), USA	mean age: 62.3 female: 75 male: 123 LVEF: 30%	clinical group appointments (2 hours / week) consisted of 4–8 participants / group: DVD screening of HF self-management skills, daily HF monitoring checklist, and early symptom reporting list, and other materials prepared as part of group sessions	12 months	multidisciplinary professionals: nurse practitioners, mental health nurses, social work case managers, and dietitians	primary outcome: - rating evaluation of patient clinical assistance using Group Appointment Helpfulness Evaluation Scale secondary outcome: - HF rehospitalization rate - QoL by KCCQ - HF Self-care by EHFScBS - knowledge of HF by the HF knowledge questionnaire - intervention cost
	Chen et al. (2017), China	mean age: 61.7 female: 25 male: 37 mean LVEF: 43.5 NYHA III: 31 (50%)	the intervention group received physical education discharge training, follow-up home visits, and telephone calls	6 months	HF team: 3 cardiologists, 1 coach nurse, 10 nurses, 1 dietitian and psychiatrist	primary outcome: - QoL (MLHFQ) secondary outcome: - physical performance (Short Physical Performance Battery) - depressive symptoms (PHQ-9) - Self-care Behaviors (EHFScBS)
	Meng et al. (2016), Germany	mean age: 61.55 female: 107 male: 368 LVEF: 32.30% NYHA II: 130 (59.1%)	cardiac rehabilitation clinic: educational program with a combination of didactic methods for groups (15 participants or less / group) for 60–75 minutes / meeting	6 months	multidisciplinary professions: doctor, nurse, psychologist and physiotherapist	primary outcome: - subjective patient self-management competency measured by the Two scales of the German version of the heiQ - self-efficacy with KCCQ secondary outcome: - new measure of monitoring symptoms - physical activity measured by modifying the version of the Godin Leisure-Time Exercise Questionnaire - compliance measured by the German version of the MARS-D scale - HRQL with KCCQ - treatment satisfaction measured by patient-centered educational criteria, on a 6-point scale

Table 3 Evaluated studies of literature review (Part 4)

Type of intervention	Researcher (year), country	Study characteristic	Intervention description	Follow-up period	Intervener	Outcome measurement
DMCs	Kalter-Leibovici et al. (2017), Israel	mean age: 70.75 female: 374 male: 986 NYHA III: 1,071 (78.75%)	Nurses arranged regular time to visit the HF center, through telephone calls or computer video sessions, and provided comprehensive care and support to patients and caregivers. Telemonitoring also used in monitoring weight, blood pressure, and heart rate. All monitoring activities and results recorded in the Electronic Medical Record. Patients evaluated by cardiologists and nurses regarding the presence or absence of treatment changes. Consultations by dietitians and social workers also prepared.	2.7 years median follow-up	multidisciplinary teams: nurses, cardiologists, dietitians, social workers	primary outcome: - time span until hospital admission was caused by exacerbation of HF or death after intervention secondary outcome: - total number of admissions and day of care, - follow-up assessment with 6 Minute Walking Test - QoL with SF-36 (Short Form-36) - depression level with PHQ-9
	Bekelman et al. (2015), USA	mean age: 48.76 female: 13 male: 371 mean LVEF: 29.84% NYHA I: 33 (55%)	screening and treatment for depression, followed by daily telemonitoring with patient self-care support	12 months	multidisciplinary collaborative care: nurse coordinator (registered nurse), primary care physician, cardiologist, and psychiatrist	primary outcome: - health status measured by KCCQ secondary outcome: - mortality rate - hospitalization rates - symptoms of depression measured by PHQ-9
Combination of telephone support and telemonitoring	Ong et al. (2016), USA	mean age: 73.50 female: 764 male: 673 LVEF: 42.85% NYHA III: 942 (65.60%)	pre-discharge education of HF included booklet and explanation about telephone coaching, and telemonitoring, body weight, blood pressure, heart rate, and symptoms	6 months	nurse	primary outcome: - readmission rate after 180 days secondary outcome: - readmission rate 30 days - mortality rate 30 days and 180 days - QoL with MHLFQ

Table 3 Evaluated studies of literature review (Part 5)

Type of intervention	Researcher (year), country	Study characteristic	Intervention description	Follow-up period	Intervener	Outcome measurement
NCM: combination of nurse home visits and telephone support	Yu et al. (2015), Hong Kong	mean age: 78.65 female: 76 male: 102 LVEF: 40.05% NYHA III: 103 (57.80%)	transitional care consisting of multiple programs, including pre-discharge visits, home visits, intensive telephone follow-up, and telephone access to a cardiac nurse	9 months	cardiac nurse	primary outcome: - mortality and readmission rates, - survival rates, - LoS secondary outcome: - self-care measured by SCHFI Chinese Version 4.0 - knowledge of HF measured by Chinese version of DHFKS - QoL by Chinese version of MLHFQ and Chinese version of EQ-5D
	Wong et al. (2016), Hong Kong	mean age: 78.35 female: 41 male: 43 LVEF: 38 % NYHA III: 53 (63%)	nurse case managers performed home visits and telephone calls post-discharge.	3 months	nurses case managers assisted by trained student nurse volunteers	primary outcome: - readmission rates post-discharge secondary outcome: - symptom intensity measured by the ESAS - functional status measured by PPS - QOL measured by palliative-specific scale, the MQOL-HK version and Chronic Heart Failure CHQ version - satisfaction with care measured by 11-item questionnaire
	Clark et al. (2015), USA	mean age: 62.4 female: 26 male: 24 NYHA III: 22 (44%)	phase 1: home visit phase 2: phone calls and/or emails with APRN as a follow-up, without home visits phase 3: without home visits, telephone calls, or emails	9 months	APRN	primary outcome: - health status outcome: -- functional status was measured by KCCQ -- metamemory measured by MAQ - self-care outcome knowledge by HFKT self-care outcome: - SM / self-care ability measured by SCHFI
Telemonitoring	Dang et al. (2017), USA	mean age: 55.3 female: 28 male: 39	cell phone technology system offered automatic daily monitoring of body weight and HF symptoms through 10 daily questions	3 months	physician	primary outcome: - self-efficacy measured by the chronic disease SM scales program with the subscale Self-Efficacy for Managing Chronic Disease and HFSE-30 secondary outcome: - self-care measured by EHFScBS - knowledge measured by DHFK - QoL measured by MLHFQ and SF-36

Table 3 Evaluated studies of literature review (Part 6)

Type of intervention	Researcher (year), country	Study characteristic	Intervention description	Follow-up period	Intervener	Outcome measurement
Telemonitoring	Hägglund et al. (2015), Sweden	mean age: 75 female: 23 male: 49 NYHA III: 53 (74%)	home-based intervention post-discharge: patients received basic HF information and HIS – consisting of special software and tablet computer connected wirelessly to a weight scale. Tablets contained information about HF and lifestyle advice.	3 months	health care provider	primary outcome: - self-care measured by the 9-item EHFScB secondary outcome: - HrQoL measured by (KCCQ) and the Swedish version of the Health Survey (SF-36) - HF knowledge measured by DHFK Scale - hospitalization rate

AHFKT-V2 – Atlanta Heart Failure Knowledge Test; APRN – Advanced Practice Registered Nurse; BDI-II – Beck Depression Inventory II; BP – Blood Pressure; CDS – Care Dependency Scale; CHQ – Chronic Heart failure Questionnaire-Chinese version; CST – Coping Skill Training; DHFKS – Dutch HF Knowledge Scale; DMCs – Disease Management Clinics; DVD – Digital Video Disc; EHFScBS – European Heart Failure Self-Care Behaviour Scale; ESAS – Edmonton Symptom Assessment Scale; heiQ – Health Education Impact Questionnaire; HF – Heart Failure; HFE – HF Education; HFKT – Heart Failure Knowledge Test; HFSE-30 – Heart Failure Self-Efficacy Scale-30; IHFQOL – Iranian Heart Failure Quality of Life Questionnaire; HIS – Home Intervention System; HR – Heart Rate; HRQL – Health-related Quality of Life; KCCQ – Kansas City Cardiomyopathy Questionnaire; LVEF – Left Ventricle Ejection Fraction; NYHA – New York Heart Association (Classification of HF); HFSE-30 – Heart Failure Self-Efficacy Scale-30; MARS-D – Medication Adherence Report Scale; MAQ – Metamemory Adulthood Questionnaire; MLHFQ – Minnesota Living with Heart Failure Questionnaire; MQOL-HK – McGill Quality of Life Questionnaire-Hong Kong; NCM –Nurse Case Management; PAM – Patient Activation Measure; PFS – Piper Fatigue Scale; PHQ-9 – Patient Health Questionnaire-9; PPS – Palliative Performance Scale; QoL – Quality of Life; RSCB – Revised Heart Failure Self-Care Behavior Scale; SCHFI – Self Cae Heart Failure Index; SF-36 – 36-Item Short Form Survey; SM – Self-Management

Discussion

Characteristics of the study

The majority of participants in the reviewed study were men (64.47%), with an age of 65 years. Based on factual data from studies conducted in Asia, America, Europe, and Australia, the reported prevalence is higher in men than women (Reyes et al., 2016; Savarese et al., 2019), with incidence of HF occurring more in the elderly, at 65 years and above (Savarese et al., 2019). This indicates that age is a risk factor for increasing prevalence of HF as a chronic disease (Dhingra & Vasan, 2012; Niccoli & Partidge, 2012). Other research has indicated that gender, both male and female, can also become a potential risk factor for cardiovascular disease with increasing age (Rodgers et al., 2019). Since age is an irreversible risk factor, appropriate interventions are needed to improve the quality of life of patients with HF, one of which is self-management-based education – an intervention that can be applied, not only in young and middle adult patients, but also inpatients in late adulthood.

Description and type of intervention

The study found several programs suitable for use in the implementation of self-management education for patients with HF, such as Education Telephone Support, Disease Management Clinics, Telemonitoring, NCM, Nurse Visits, Multimedia Based Education, and a combination of Telephone Support and Telemonitoring. Interventions might show slight differences in terms of educational content, follow-up, and the intended outcome; however, the conditions, characteristics, and needs of patients, and the availability of educational media and health professionals to monitor seemed to make important contributions to effective self-management. In line with this view, previous research also showed that participants' age, health professional teams, educational content, and monitoring played important roles in the success of self-management education (Oyanguren et al., 2016).

Length of follow-up

This review indicated that most follow-ups were continued for three months and six months. A meta-analysis concluded that the longer the duration, the more positive the effect of self-management interventions on several outcomes, supporting

ongoing contact over time between healthcare professionals and patients with HF (Jonkman et al., 2016). This means that the self-management education undertaken requires follow-up to ensure the effectiveness of an intervention.

Intervener

The involvement of nurses seems to be very important in the application of self-management education. A study conducted by La Sala et al. (2017) reported that nurses who carried out self-management and therapeutic education were major elements in the secondary prevention of cardiovascular disease. However, multidisciplinary collaboration can be a factor in the successful implementation of self-management education (Oyanguren et al., 2016). Each health professional makes a specific contribution, according to their scientific field, to provision of education and consultation, in private or group discussions, according to the needs of each patient.

Outcome measurement intervention

This review found that the majority of self-management education interventions led to quality of life and self-care outcomes, and there was a significant difference in the level of quality of life and self-care after intervention, with both tending to increase. As pointed out by Riegel et al. (2016), self-management is part of a process that can enhance self-care, affecting how a person can respond to the symptoms of HF following education. Hence, knowledge, skills, belief, and experience are the basis for those making the decision to improve self-care (Riegel et al., 2016). Adequate self-care can improve the quality of life of patients with HF (Kessing et al., 2017). Thus, self-management education programs can increase the knowledge, skills, and self-confidence of patients with HF, helping them to live better lives, with lifestyle changes, and to respond to the symptoms they experience.

However, exacerbation of HF experienced by patients can be a factor inhibiting the realization of self-care. This is in line with research by Lycholip et al. (2018), who reported that low LVEF was closely related to poor self-care. Therefore, collaboration between various professions in the application of self-management education is needed.

With regard to outcome measurements, instruments frequently used to measure the quality of life of patients with HF were KCCQ and MLHFQ, while self-care was measured by EHFScBS and SCHFI. Systematic studies related to quality of life instruments reported that KCCQ and MLHFQ are standardized tools with the highest EMPRO (Evaluating Measures of Patient-Reported Outcomes)

scores compared to other instruments, and this evaluation seems to support the use of these instruments in assessing the quality of life for patients with HF (Garin et al., 2014). For self-care, EHFScBS and SCHFI have undergone more rigorous psychometric testing in the HF population than other instruments (Cameron et al., 2009; Sedlar et al., 2017). The evaluation supports the use of the KCCQ and MLHFQ instruments to assess quality of life of patients with HF, and the EHFScBS and SCHFI to assess the level of self-care.

Limitation of study

The limitation of this study relates to inadequate analysis of the effects of interventions on all outcomes, to determine the most appropriate interventions and effective length of follow-up. For this reason, future researchers are encouraged to perform meta-analyses to determine the most appropriate interventions and length of follow-up in the most recent RCT research on self-management education interventions.

Conclusion

Regarding the results of the review of the 18 studies, there are a variety of self-management education intervention options that can be applied in improving patient self-care, including: Education and Telephone Support, Disease Management Clinics, Telemonitoring, Nurse Case Management, Nurse Visits, Multimedia Based Education, and a combination of Telephone Support and Telemonitoring. In the implementation of these programs, conditions, characteristics and needs of patients, the intensity of follow-up, and the availability of educational media and health professionals are important factors that determine the success of self-management education for patients with HF. Multidisciplinary collaboration across professions also seems to contribute to the success of programs.

Implications for Nursing

Nursing professionals are recommended to consider self-management education, as featured in this literature review, as a means of improving patient self-care by adjusting the conditions and situations of patients with HF.

Ethical aspects and conflict of interest

All sources used in the review are cited. The authors declare that they have no conflict of interest. This literature review received no specific funding from either commercial or not-for-profit sectors.

Funding

Author contributions

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