REVIEW ARTICLE

Adherence to the therapy of patients with Heart Failure and Diabetes Mellitus: A Systematic Review

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ABSTRACT
A comorbidity like diabetes mellitus (DM) complicates heart failure (HF) self-care management and adherence to the therapy and results poorer clinical outcomes. This study aims to examine the various factors influencing adherence to the therapy of patients with HF and DM. A systematic literature search was established in the electronic data basis PubMed, Cochrane Library and Cumulative Index to Nursing and Allied Health Literature (CINAHL) using inclusion and exclusion criteria. The search yielded eight articles. The introduction of empowerment models in the management of patients with HF and DM made patients more involved in their self-care management and their self-monitoring behavior and adherence were increased. Patients with HF and DM during their hospitalization, were less likely to receive smoking cessation counseling and blood pressure control and experienced longer length of stay. Patients with HF preserved ejection fraction (HFpEF) and DM were less likely to receive an angiotensin convertive enzyme (ACE) inhibitor or angiotensin receptor or beta-blockers and had worse blood pressure (BP) control compared with patients with reduced ejection fraction (HFrEF) and DM. Effective self-care management of patients with HF and DM seems to depend on the type and the severity of comorbid conditions and the availability of effective therapies. Adequate support to patients with HF and DM from health professionals (HPs) is important, in order to establish self-management and adherence to the therapy.
Keywords: adherence to therapy, comorbidity, diabetes mellitus, heart failure.

Introduction

Previous reviews showed only 50% of persons suffering from chronic diseases adhere to the recommended therapy[1, 2]. Adherence to the therapy refers not only to the proper behavior on taking medications, but also to the patient following a proper diet, exercise and lifestyle changes [3].

The two conditions, HF and DM are strongly linked[4]. The relationship between HF and DM represents more than just a comorbidity. Each of these two conditions increases the risk for the onset of the other one and has a poorer prognosis than with either disease alone[5]. Almost half of patients with HF develop DM as a comorbidity[6,7,8]. A comorbidity like DM complicates HF self-care management and makes adherence to the therapy less possible[9, 10, 11]. These patients are at greatest risk for rehospitalizations due to complex problems such as fluid overload, insufficient and glycemic control that could be avoided or prevented, with better self-care management[12, 13, 14]. HF when exists with DM requires a complex self-care recommended therapy[11, 15, 16]. Currently, 32-51% of the hospitalized patients with coronavirus disease (COVID-19) was suffering from DM and cardiovascular diseases (CVD). So, is of significant importance for patients with HF and DM to manage their health status the best possible way and adhere to the recommended therapy[17, 18]

Even though self-care management strategies are the key to reduce HF hospitalizations by educating patients on how to manage and monitor HF symptoms and their comorbid conditions at home, not many patients are found to have the opportunity for counselling and education [19].

A special focus is given to the comorbidities of HF and clinical recommendations on the pharmacological therapy of HF and DM[21]. Patients' adherence and self-care management can be improved through health education and support[10, 11, 20, 21, 22]. It seems that current management programs are not effective on patients with comorbidities such as HF and DM[23, 24]. The aim of the study was to systematically review the factors influencing adherence to the therapy of patients with HF and DM.

Methods

STUDY DESIGN

Electronic data basis PubMed, CINAHL and Cochrane Library were used to find studies for the particular topic. The key words used were 'adherence to therapy', 'heart failure', 'diabetes mellitus', 'comorbidity', in different combinations using the word 'AND'. The tool ' similar articles ' of PubMed was also used.

Inclusion and exclusion criteria were predefined. Inclusion criteria were studies published in English language until the end of August 2023 evaluating factors influencing adherence to the therapy of patients with the comorbidity of HF and DM. Exclusion criteria were studies that included populations with other CVD than HF, such as hypertension or coronary artery disease, populations with other comorbidities than of HF and DM, unpublished studies, pilot studies and studies of which the population was children. At first, two of the authors (KP and MK) separately searched the electronic basis, screened the titles of the articles found and selected the potentially appropriate ones. Then, the eligibility of the appropriate article abstracts was assessed by reading the abstract of reviewing relevant titles. The whole procedure included full consensus, after detailed assessment of full text documents and the input of a third author (EL) whenever a query was raised.

QUALITY ASSESSMENT

Two authors (KP and EL) assessed the methodological quality of the included studies. The studies were assessed using the Effective Public Health Practice Project (EPHPP) quality assessment tool for quantitative studies[25, 26].

Results

Current search yielded 987 articles. Finally, eight articles were used for the current systematic review [7, 12, 24, 27, 28, 29, 30, 31]. The study selection is shown in Figure 1.

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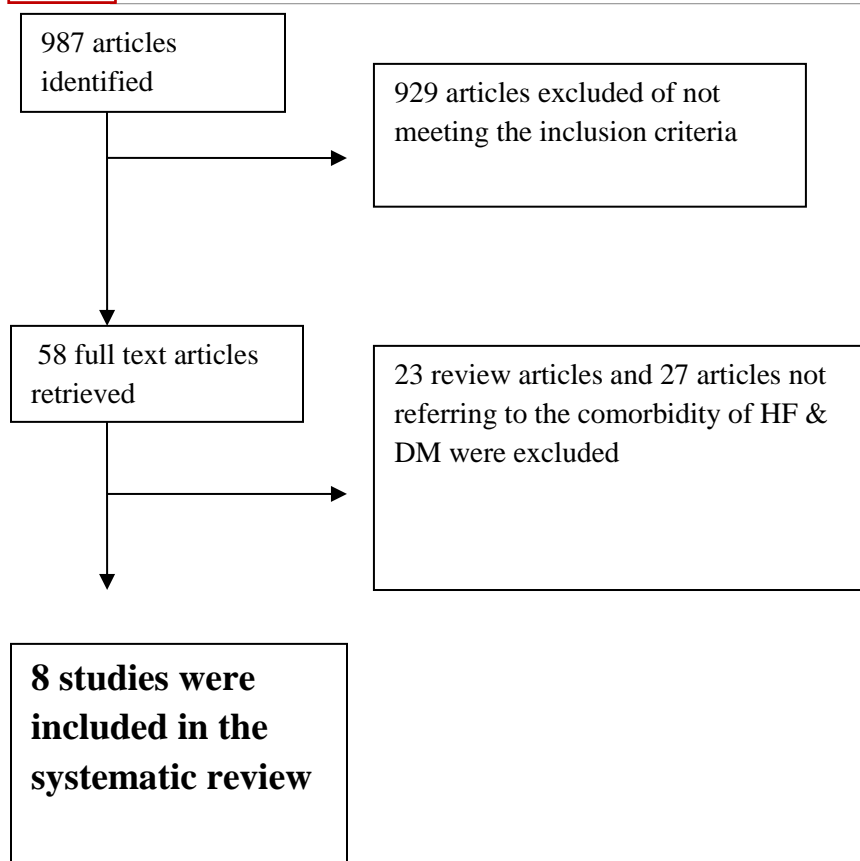
Figure 1. Study selection flowchart

OVERVIEW OF THE STUDIES
From the eight studies included in the current systematic review, five originated from the USA [7, 12, 24, 29, 30], one study was established in Italy[27], one in Germany[28] and one in Brazil[31]. All studies used quantitative methodological approach. Details of the results of the included studies are displayed in Table 1.

Table 1. Overview of the studies

Authors/ Publication date/ Country	Population	Aim	Study design/Methods	Results
1. Greenberg et al, 2007, USA	N=48,612 (Pts with HF and DM) **Pts with Diabetes** n=20,162 $\bar{x}_{age}$ = 71,5 yrs Women (%) =51,6 $\bar{x}$ LVEF (%) = 39,7 **Pts without diabetes** n=28,450 $\bar{x}_{age}$ = 74,4 yrs Women (%) = 51,6 $\bar{x}_{LVEF}$ (%) = 38,5	To provide optimal medical care & education to pts hospitalised for HF The OPTIMIZE-HF (An organized program to initiate lifesaving treatment in hospitalized pts with HF)	Cohort study	-No differences in in-hospital mortality were observed, but HF pts with DM experienced longer length of stay (5.9 vs 5.5 days for Nondiabetic, P <.0001). -In the follow-up cohort DM pts had similar post discharge mortality but increased all-cause rehospitalisation (31.5%. vs 28,2% for non-diabetic pts, P=.006)

Authors/ Publication date/ Country	Population	Aim	Study design / Methods	Results
2. Kerr et al, 2007, USA	N=1,901 (Pts with DM and comorbidities) **Pts with HF and DM** n = 256	To understand how the number, type and severity of comorbidities influence the self-management and treatment priorities of pts with DM The framework for understanding the interplay of DM and comorbidities to access the role of the number, type and severity of comorbid conditions in diabetes prioritization and self-management.	Cross-sectional Observational /Data were used from the HRS (The Health and Retirement Study) Interviews with HRS respondents every 2 yrs. Either by telephone or in person.	Severe but not mild HF was associated with lower DM prioritization and self - management scores.-Mild HF (DM prioritization p=.24 Self-management ability p=.27)-Severe HF (DM prioritization p=.001 Self- management ability p=.003)

Authors/ Publication date/ Country	Population	Aim	Study design /Methods	Results
3. Ciccone et al, 2010, Italy	N=573 (Pts with HF and DM)	To evaluate the impact of a disease and care management model and the introduction of 'care manager' nurses, trained in this specialized role, into the primary health care system	Interventional study with convenience sample/ -Project Leonardo used as an 18-month, (baseline, 6 months, 12 months and final measures). -Care managers were provided with a home visit kit with paper copies of the study assessments, patient education booklets and handouts, screen shots of the data fields and feedback reports from the Informal Care software to use in the pt's home.	- Patient self-monitoring behavior increased during the study period with an additional 20%-27% of patient in each condition taking a more active role on the management of their condition. -There was statistically significant increase in the number of days per week employed for physical training, from 2.54 to 4.18 days (p<0.0001) and increase time spent doing physical activity, from 19.87 to 32.90 minutes (p<0.0001) per session. -There was statistically significant increase in both diastolic and systolic BP values (p<0.0001) from initial to final measurements.

Authors/ Publication date/ Country	Population	Aim	Study design / Methods	Results
4. Edelmann et al, 2011, Germany	N=994 (Pts with HF and DM) 622 pts were treated with diet or oral antihyperglycaemic drugs 372 pts were treated with insulin inj **EF< 50%** n= 824 $\overline{x}_{age}$ = 67,2 yrs Female = 28,9 % **EF ≥ 50%** n=170 $\overline{x}_{age}$ = 69,4 yrs Female = 51,2%	To compare HF therapy in pts with DM and HFrEF or HFpEF	Cross-sectional observational / -U/S was performed according to the guidelines of the American Society of Echocardiography.	-The majority of pts with HF and DM and HFrEF were treated with ACE inhibitor or angiotensin receptor blocker or beta-blockers. -Pts with HF and DM and HFpEF were less likely to receive an ACE inhibitor or angiotensin receptor or beta-blockers and had a worse BP control (p < 0.001). -In comparison to patients without DM the probability to receive these therapies was increased in patients with DM and HFpEF patients (p < 0.001) but not on pts with DM and HFrEF.

Authors/ Publication date/ Country	Population	Aim	Study design / Methods	Results
5. Cha et al, 2012, USA	N= 116 (Pts with HF and DM)	To explore the needs for self-monitoring and self-care education in pts with HF and DM (HF-DM pts) by describing cognitive and affective factors to provide guidance on developing effective self-management education	Cross-sectional correlation /A baseline patient data and 12-week Patient and family dyad intervention to improve dietary and medication taking self-management behaviors in pts with HF, <u>Demographic and co-morbidity</u> were assessed regarding age, gender, ethnicity, marital status etc. The Charlson Comorbidity Index was used to assess co-morbid conditions. <u>Physical function</u> was assessed with the assessed with 6MWT <u>Health care resource use</u> was assessed with a Health Resources Utilization Questionnaire <u>Previous HF education</u> measured with 8 yes/no questions. <u>Depressive symptoms</u> were measured with the Beck Depression Inventory II <u>Social support</u> like the relationship with health care provider (Health Care Climate Questionnaire) <u>HF knowledge</u> was assessed with a 27-item scale using multiple choice questions <u>Medication taking self-efficacy and low sodium diet self-efficacy</u> were measured by two self-efficacy scales derived from the perceived competence scales developed by Williams and al <u>Medication taking behavior</u> was measured by subjective and objective scales <u>Dietary intake</u> was assessed with a three-day food record maintained by the participant who recorded all meals and snacks including beverages over three days, preparation techniques and details of condiments	- Pts with HF and DM had higher rates of sleep apnea, (45.7%, p=.003) and depression (43.5%, p=.046) than those with only HF - Pts with HF and DM were found that they consumed more saturated fat (182.89±99.58), protein (77.00±25.52), dietary fibers (16.38±8.90), and lower carbohydrate (187.33±81.66) than pts with HF without DM - Pts with HF and DM consumed higher levels of sodium, greater than 250 mg each day, more than those patients without DM

Authors/ Publication date/ Country	Population	Aim	Study design / Methods	Results
6. Kapoor et al, 2011, USA	N = 54,352 (HF pts hospitalized with a history of DM) Age (y), mean ± SD= 71±13 (with DM) Women= 50% (with DM) HF-55.1 % (History of HF with DM) EF< 40% = 46.6 %	To clarify the influence of DM on health care quality and in-hospital outcomes in a contemporary cohort of pts hospitalized with HF	Prospective observational study/ -The follow up time was between January 2005 and January 2010 comparing pts with HF, with and without DM ,methodology not applicable	--Patients with DM were less likely to receive smoking cessation counseling (OR 0.89, 95% CI 0.81-0.98) (p =.022) and blood pressure control (OR 0.81, 95% CI 0.78-0.84) (p <.001). -Patients with DM were more likely to receive an aldosteron antagonist for reduced left ventricular ejection fraction (OR 1.05, 95% CI 1.00-1.11) (p=.035) , lipid-lowering agent (OR 1.33, 95% CI 1.26-1.41) (p <.001), and influenza vaccination (OR 1.05, 95% CI 1.01-1.09)(p=.024). -DM was independently associated with longer hospital stay (p<.001) but not within-hospital mortality (p=.111).

Authors/ Publication date/ Country	Population	Aim	Study Design / Methods	Results
7.Dunbar et al 2015, USA	N= 134 (patients with HF and DM)	To test an integrated self-care intervention for pts with HF and DM	RCT / -The control group received standard HF and DM educational brochures with follow up phone contact -The intervention group received education/ counselling on HF-DM self-care (diet, medications, self-monitoring, symptoms and physical activity) with follow up home visits and phone counselling. - Questionaires for HF and DM specific and overall QoL, Physical activity frequency and Physical function (6MWT), at baseline, 3 and 6 months.	-patients with HF and DM in the intervention group improved HF total(p=.002) and physical (p<.001) QOL scores at 3 months with improvement at 6 months and improve QOL scores compared with control group at 3 months(p=.04). -There was also improvement of the health status ratings (p=.04) at 6 months compared to baseline. -The intervention group also improved the 6MWT distance (p=.03) while control declined (p=.01). -The intervention group increased self-reported physical activity between the baseline and the 6 months (p=.01).

Authors/ Publication date/ Country	Population	Aim	Study Design / Methods	Results
8. Peres et al 2019 Brazil	N= 200	The exploration of cardiovascular consequences associated with compliance and no-adherence among DM 2 in Brazilian pts	- Cross –sectional study / -The tests were used: Morisky-Green modified (MGT), Diabetes Complication(DC), Complexity of Pharmacotherapy(CP), MedTake(MT) and Auto-Comliance Test(ACT).	-The 35% of the patients who did not follow the recommendations of the treatment were those with the comorbidity of HF and DM.

METHODOLOGICAL QUALITY ASSESSMENT

The eight studies were assessed to find the degree to which the selected quantitative studies follow the quality features of selection bias, study design, confounders, blinding, data collection methods, withdrawals and drop-outs, intervention integrity and analyses. The EPHPP quality assessment[25] yielded 'strong' ratings for 2 /8[12, 30], 'moderate' ratings for 3/8[24, 27, 31] and 'weak' ratings for 3/8 [7, 28, 29] of the eight studies selected for the current review. More details on the rating of each study are shown in Table 2.

Table 2. Quality assessment components and ratings for EPHPP instrument (Thomas et al (2004)

COMPONENTS	STRONG	MODERATE	WEAK
Selection bias	Very likely to be representative of the target population and greater than 80% participation rate	Somewhat likely to be representative of the target population and 60–79% participation rate	All other responses or not stated
Design	RCT and CCT	Cohort analytic, case-control, cohort, or an interrupted time series	All other designs or design not state
Confounders	Controlled for at least 80% of confounders	Controlled for 60–79% of confounders	Confounders not controlled for, or not stated
Blinding	Blinding of outcome assessor and study participants to intervention status and/or research question	Blinding of either outcome assessor or study participants	Outcome assessor and study participants are aware of intervention status and/or research question
Data collection methods	Tools are valid and reliable	Tools are valid but reliability not described	No evidence of validity or reliability
Withdrawals and dropouts	Follow-up rate of >80% of participants	Follow-up rate of 60–79% of participants	Follow-up rate of <60% of participants or withdrawals and dropouts not described

ADHERERENCE, HEALTH CARE SYSTEM AND THERAPY RELATED FACTORS

Patients with HF and DM were less likely to receive smoking cessation counseling (OR 0.89, 95% CI 0.81-0.98) and blood pressure control (OR 0.81, 95% CI 0.78-0.84) and to attain the all-or-none composite measure (OR 0.96, 95% CI 0.93-0.99) during their hospitalization[29]. In addition, HPs found it difficult to apply measures in patients with HF, with or without DM and control their optimal BP [7].

Patients with DM were more likely to receive an aldosterone antagonist for reduced left ventricular ejection fraction (OR 1.05, 95% CI 1.00-1.11), lipid-lowering agent (OR 1.33, 95% CI 1.26-1.41), and influenza vaccination (OR 1.05, 95% CI 1.01-1.09)[29]. The percentage of HF patients with DM that received b-blocker therapy and angiotensin converting enzyme inhibitor/angiotensin receptor blocker (ACEi/ARB) at the 60-to 90 –day follow up period was higher than that between HF patients without DM[8]. Patients with DM and HF with HFpEF, were less likely to receive recommended medical regimen, ACEi or ARB or beta-blockers, compared with patients with HFrEF and DM[7, 28]. They had also worse BP control, compared with patients with HFrEF and DM, who received the above medical regimens.

ADHERENCE, SELF-CARE MANAGEMENT AND CONDITION RELATED FACTORS

Patients with DM and severe HF were found to have lower self-care management scores, giving priority in managing their HF and showing DM self-management to have less priority and effectiveness [24, 31]. Patients with severe HF (classes II-IV) and DM were found to need more support for self-care management activities and care priorities of their conditions [24]. In contrast, HF patients of classes I and II did not show differences on prioritization and self-care management of the two chronic diseases on physical activity and diet. In addition, HF as a comorbidity and severe and not mild HF were found to increase the difficulty for self-care management in patients with DM[24]. Patients with diabetes mellitus type II (DM2) and HF were 2.3 times more likely not to follow the medication adherence[31]. Patients with HF and DM were found to consume more saturated fat, protein, dietary fibers, lower carbohydrate and higher levels of sodium than HF patients without DM[12].

ADHERENCE, SELF-CARE MANAGEMENT AND PATIENT RELATED FACTORS

Self-care intervention for HF and DM patients had effects on improving health related quality of life (HR- QoL) [30]. Patients with HF and DM in the intervention group improved HF total (p=.002) and physical (p<.001) HR- QoL scores at three months and at six months (p=.04), compared with the control group. There was also improvement of the health status ratings (p=.04) at six months compared to baseline. The intervention group also improved the 6 Minute Walking Test (MWT) distance (p=.03) while control declined (p=.01).The intervention group increased self-reported physical activity between the baseline and the 6 months (p=.01)[30].

The introduction of the empowerment models in the management of patients with HF and DM made patients to have more involvement in their self-care management, which increased their motivation to manage several of their problems raised[27]. Self-monitoring behavior was found to be increased during the study period with an additional 20%-27% of patients in each condition taking a more active role on the management of their condition. In addition, patients were taking more action to adopt healthier eating habits, increase their physical activity and quit smoking p =.01)[27].

Discussion

This review is the first systematic review that examined the various factors that influence adherence to the therapy of patients with HF and DM. The factors influencing adherence to the therapy found in eight studies[7, 12, 24, 27, 28, 29, 30, 31] may be divided to three categories: a. Health Care System and Therapy Related Factors, b. Condition Related Factors and c. Patient Related Factors.

a. HEALTH CARE SYSTEM RELATED FACTORS AND THERAPY RELATED FACTORS

Health Care system related factors refer to the proper functioning of the health care system and is one of the factors influencing adherence to the therapy of patients with HF and comorbid DM. Empowerment models by the HPs in the Health Care System can assist patients to arrange their visits with the medical doctors and can give them the necessary support based on their level of care. A good patient-HPs relationship seems to improve adherence to the therapy and clinical parameters of patients with HF and DM who show better control of their conditions[27, 32] so they can develop a 'partnership' between them with which the patients gradually manage to feel motivated and self-confident. A good relationship among patient-HPs

can help the patients to improve their intensity of physical training, take more action, quit smoking and adopt healthier eating habits. These factors may develop the necessary feelings for behavior changes to better control their health status and their clinical indicators, such as low-density lipoprotein levels, body mass index rating and BP values [27, 33]. Such management programs may motivate patients to make behavior changes that can affect their health status. Through motivation, HPs guide patients to find their confidence, take action, and not just give ready-made answers[34, 35]. Motivational interviewing emphasizes the humanistic perspective and person-centred approach when people are normally motivated for further and self-acting development [36, 37]. Person-centred care is the way to demonstrate how symptoms could be integrated into clinical practice [37, 38, 39].

The health care system and HPs must understand better the various needs of patients with HF and DM adapt health care strategies and provide services to balance both; the benefits and the risks of the medical recommendations, as well as patients' preferences[24, 40, 41]. The HPs must have specific knowledge and training on managing chronic comorbid diseases, such as HF with DM. Patients with HF and comorbid DM generally receive only little help by HPs in setting priorities about self-care management of their comorbid condition[42]. The introduction of telemedicine or telemonitoring in the community, may give nurses a new decision-making tool in the immediate follow up of the chronic patients[43, 44].

Supportive programs by HPs that promote problem solving and develop coping skills, may develop effective behaviors in patients with HF and DM[45] and increase their self-efficacy and access to social support [24, 41, 46]. Effective management of HF and DM was the most important factor during the COVID-19 pandemic since DM was found to be correlated with high mortality, showing that patients with DM are more vulnerable to infections or other diseases in general[17, 18].

Therapy related factors is another important factor that influences the adherence to therapy in patients with HF and DM. The use of evidence-based therapies for patients with HF and DM must be used for better management of the disease and to reduce the risk of mortality for HFrEF and HFpEF[7]. Also, guideline-recommended therapies are fundamental to be followed for HF and DM patients for better control and not only for patients with HFrEF[28]. HF is a factor that is associated with non-adherence to the pharmacotherapy in DM2 patients and this can be improved through the screening for

HF and the interventions[31, 47]. The medication adherence measures can be used as important tool or quality indicator that can improve the performance of health care providers and contribute to health care services improvement and effectiveness [48, 49].

b. CONDITION RELATED FACTORS
Condition-related factors are strong determinants of adherence and include the clinical conditions (physical, psychological, social and vocational), the type and the severity of the disease and the availability of effective therapies[24]. In addition, the impact of the condition related factors depends on how these factors influence patients' risk perception, the importance of adherence treatment, and the priority placed on adherence [50].

There is the necessity for HPs to inform patients with HF and DM, of the importance of setting priorities to their DM self-management and keep their glycosylated hemoglobin (HbA1c) in normal levels, to avoid the hospitalizations [12, 13]. Hyperglycemia can produce many and serious macrovascular complications such as coronary artery disease, peripheral arterial disease and stroke and /or microvascular complications such as diabetic neuropathy, diabetic nephropathy, and retinopathy[13].These complications lead to the reduction of the HR-QoL and to long-term hospitalizations for patients with DM[4, 12, 13].

c. PATIENT RELATED FACTORS
Patient related factors such as patients' knowledge and beliefs about their illness, motivation and confidence (self-efficacy) for self-care management and expectations on the outcomes of the therapy and the consequences of poor adherence, interact in ways not yet fully understood to influence adherence behavior[14, 16, 50]

Patients with HF and DM decrease their prioritization for DM management due to the lack of knowledge and information about their illness and its complications. They also ignore how the poor adherence affect their outcomes including mortality and complications[5, 6, 24]. It is common for patients to underestimate the management of DM because DM usually does not cause acute events like those that HF does, such as dyspnea[24] , so they pay more attention to the management of HF. This makes sense since being short of breath is felt, whereas a high sugar is not associated with severe symptoms. Therefore, a well-prepared health professional (HP) team is crucial to achieve the best care and adherence to therapy for patients with HF and DM as indicated by the guidelines and clinical trials[19]. Motivational multidisciplinary programs should be promoted, in order to achieve the proper adherence for these patients[10, 12]. A motivational interview program using the stages of change may increase patients' confidence and improve self-care management[22, 51]; and patients may be motivated for lifestyle modification e.g. healthy diet and exercise[27].

The introduction of empowerment models in the management of patients with HF and DM seem to allow the patients the ' partnership' model with the HPs and this will help them to build their self-confidence and the motivation to make lifestyle modification, increase self-monitoring and become more adherence to treatment recommendations[14, 27, 36]. HF and DM management programs including patient empowerment and support, show better outcomes of adherence and help to promote confidence and enhance safety of chronic patient management at home.

Self-care management is a cognitive and behavioral process, which refers to regular maintenance tasks like being adherent to medications, engaged in physical activity, following proper diet, monitoring weight gain and management of the symptoms[52, 53]. The educational interventions, which involve patients' collaboration, seem to be more effective that the didactic ones in improving glycemic control, lipids and the weight of the patients. Evidence shows that the involvement of the patients according to their individual needs supports the effectiveness of self-care management, in chronic diseases[21, 22, 54]. Therefore, a comorbidity approach to self-care education like focusing on behavior approach and developing strategies for maintaining the knowledge about the two diseases seems to be vital for HF-DM patients and more effective in achieving the proper adherence to therapy[30, 55].

LIMITATIONS
Limitations of this review are confounded regarding the sample size of the participants in the studies. By the observational nature of the studies, unobserved variables may have been present[29].

When studies are not designed as randomized trials, the unmeasured confounders may influence the clinical outcomes in comorbid conditions like in patients with HF and DM[7]. This review could not move forward for meta-analysis due to the heterogeneity of the studies.

Conclusions
Still, the main reason of deterioration is no adherence to the therapy and many patients feel

they are not supported enough to do so. Patients with HF and DM are confronting serious challenges in self-care management of their comorbid condition. The HPs should apply management programs in a long-term duration for HF-DM population with the scope to increase their HR-QoL and make patients actively participants in the management of their chronic conditions, in a continues and long-term support.

Future directions

It is important that HPs do understand and recognize those challenges in self-care management of comorbid conditions and find strategies and ways to introduce empowerment in the care of the particular population and activate them to participate more in their health care management especially when ageing of population increases the prevalence of comorbidities. In addition, the era of the pandemic of COVID - 19 emerged more than ever and researchers may contribute with interventional studies following similar methodology and evaluating same outcomes. A well-designed care may give the opportunity to the persons with HF and DM to enjoy the best possible quality of care.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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