

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

185,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



---

## Integrated Care for Heart Failure in Primary Care

---

Monica Lorenzini, Caterina Ricci, Silvia Riccomi, Federica Abate,  
Barbara Casalgrandi, Benedetta Quattrini, Gianbattista Spagnoli,  
Letizia Reggianini and Oreste Capelli

Additional information is available at the end of the chapter

<http://dx.doi.org/10.5772/63946>

---

### Abstract

Chronic heart failure (CHF or simply HF) is a complex clinical syndrome that involves more than 2% of the general population and over 10% of the older people. For people with reduced ventricular function (the classical HFrEF phenotype), the guideline-directed medical therapy (GDMT) (e.g., Ace-inhibitors, beta-blockers, diuretics, rehabilitation or implantable ventricular devices) demonstrated to be efficacious in reducing hospitalisations and prolonging survival. Vice-versa, the HF with preserved ejection fraction (diastolic HF or HFpEF phenotype) is a much more complex syndrome, in which co-morbidities (such as COPD, depression, anemia, and diabetes, CAD) play a significant role in the decompensation episodes.

As the population ages, the HFpEF phenotype is becoming more frequent and puts more management problems, since the conventional HF therapy is less efficacious in the control of symptoms. A multidisciplinary managed approach, based on the principles of Chronic Care Model, is the most effective tool to ensure best clinical and social outcomes, for both phenotypes. It is critical that every health worker should use counselling tools, such as how to recognise characteristics of the disease or early signs of decompensation and whereby to manage them, the proper use of each drug or how to modify progressing risk factor, to improve the compliance of the patients toward the self-management empowerment.

Finally, we propose a plan of care for patients affected with HF, which allows the integration of multidisciplinary teams and ensures a complete and appropriate management of the cases, in respect of therapeutic responsibility entrusted to the GP.

**Keywords:** chronic heart failure, preserved ejection fraction, co-morbidities, integrated care, Chronic Care Model

1. Introduction

1.1. Chronic heart failure: Definition and diagnosis

Chronic heart failure (CHF or simply HF) is one of the main causes of death and disability in the Western world. It is expected that its presence will continue increasing in the future because of the ageing of the population, the diminution of mortality in the acute phase of coronary heart disease, the increased prevalence of predisposing clinical conditions (diabetes mellitus, arterial hypertension, obesity, etc.), as well as the availability of effective drugs in prolonging the patients' survival. HF in developed countries is mainly a disease of the elderly population: the average age of the patients is in fact 75 years [1].

Continuity of care is one of the basic elements for a correct management of HF, both for its characteristic of chronic disease with more or less frequent exacerbations and for its considerable clinical variability, which manifests itself with different levels of complexity and not uniformly progressive in all stages of its evolution, from the very first symptoms of the terminal stages. This aspect results in a diagnostic difficulty that swings the estimate of prevalence of the disease from 2 to 6.7% of the general population [2, 3].

In fact, as defined in the Report of the American College of Cardiology Foundation/ American Heart Association Task Force on Practice Guidelines 'HF is a complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood', but HF should be present as a diastolic dysfunction with a left ventricular ejection fraction (LVEF) greater than 40%. However, some component of diastolic dysfunction is also common in patients with LVEF < 40% [1, 2].





NYHA Class	Level of Clinical Impairment
I 	No limitation of physical activity. Ordinary physical activity does not cause undue breathlessness, fatigue, or palpitations.
II 	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in undue breathlessness, fatigue, or palpitations.
III 	Marked limitation of physical activity. Comfortable at rest, but less than ordinary physical activity results in undue breathlessness, fatigue, or palpitations.
IV 	Unable to carry on any physical activity without discomfort. Symptoms at rest can be present. If any physical activity is undertaken, discomfort is increased.

Figure 1. New York Heart Association (NYHA) Heart Failure Symptom Classification System.

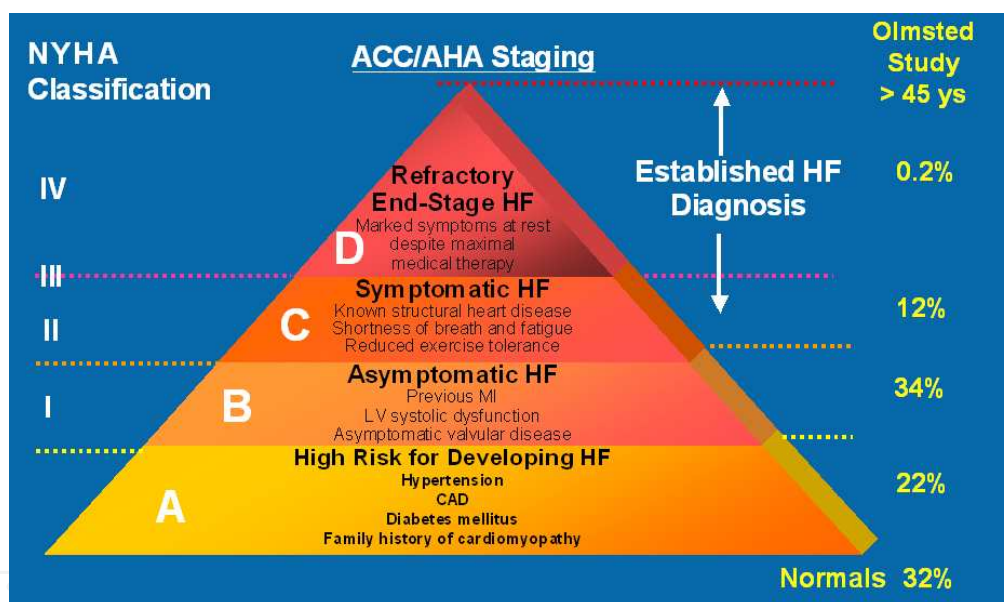
The European Task Force on the Diagnosis and Treatment of Acute and Chronic Heart Failure in 2012 stated that: *HF is defined, clinically, as a syndrome in which patients have typical symptoms (e.g. breathlessness, ankle swelling, and fatigue) and signs (e.g. elevated jugular venous pressure,*

pulmonary crackles, and displaced apex beat) resulting from an abnormality of cardiac structure or function. The diagnosis of HF can be difficult [4].

On the basis of clinical and structural features of the syndrome, the American College of Cardiology (ACC) and American Heart Association (AHA) developed a four-stage classification of heart failure [5].

Stage A includes patients who are at risk of developing HF but who have no structural heart disease at present. Stage B includes patients with structural heart disease but no symptoms. Stage C includes patients with structural heart disease with current or prior symptomatic heart failure. Stage D includes patients with severe refractory HF. The previous classification of HF, based on the NYHA functional scheme (Figure 1), is used to assess the severity of functional limitations and correlates fairly well with prognosis.

The linkage between ACC/AHA structural staging, NYHA functional classification and community epidemiology (estimated from the Olmsted County Study for people aged more than 45 years) is summarised in Figure 2 [5, 6].



**Figure 2.** Structural, functional and epidemiologic linkages in CHF (for courtesy of Prof. Tang, Assoc. Prof. of Medicine, Cleveland Clinic Lerner College of Medicine; adapted from [5,6]).

Most patients affected with HF have signs and symptoms of fluid overload and pulmonary congestion, including dyspnea, orthopnea and paroxysmal nocturnal dyspnea. Patients with right ventricular failure have jugular venous distention, peripheral oedema, hepatosplenomegaly and ascites. Others, however, do not have congestive symptoms but have signs and symptoms of low cardiac output, including fatigue, effort intolerance, cachexia and renal hypoperfusion (Table 1).

On physical examination, patients with decompensated heart failure may be tachycardic and tachypneic, with bilateral inspiratory rales, jugular venous distention and oedema. Patients

with compensated heart failure will likely have clear lungs but a displaced cardiac apex. Patients with decompensated diastolic dysfunction usually have a loud S4 (which may be palpable), rales and often systemic hypertension.

SYMPTOMS	SIGNS
TYPICAL	MORE SPECIFIC
Breathlessness	Elevated jugular venous pressure
Orthopnoea	Hepatojugular reflux
Paroxysmal nocturnal dyspnoea	Third heart sound (gallop rhythm)
Reduced exercise tolerance	Laterally displaced apical impulse
Fatigue, tiredness, increased time to recover after exercise	Cardiac murmur
Ankle swelling	
LESS TYPICAL	LESS SPECIFIC
Nocturnal cough	Peripheral oedema (ankle, sacral, scrotal)
Wheezing	Pulmonary crepitations
Weight gain (>2 kg/week)	Reduced air entry and dullness to percussion at lung bases (pleural effusion)
Weight loss (in advanced heart failure)	Tachycardia
Bloated feeling	Irregular pulse
Loss of appetite	Tachypnoea (>16 breaths/min)
Confusion (especially in the elderly)	Hepatomegaly
Depression	Ascites
Palpitations	Tissue wasting (cachexia)
Syncope	

**Table 1.** Diagnostic symptoms and signs for chronic heart failure (modified from ESC 2012 [4])

In ambulatory patients suspected of having HF, for an initial working diagnosis and treatment plan, the recommended investigations are [4] **electrocardiogram (ECG)**, **echocardiogram** and some **haematological investigations**:

1. **The ECG** shows the heart rhythm and electrical conduction, i.e. whether there is sinoatrial disease, atrioventricular (AV) block or abnormal intraventricular conduction.
2. **The echocardiogram** provides immediate information on chamber volumes, ventricular systolic and diastolic function, wall thickness and valve function.
3. **Routine biochemical and haematological investigations** are also important, partly to determine whether renin–angiotensin–aldosterone blockade can be initiated safely (renal

function, sodium and potassium) and to exclude anaemia (which can mimic or aggravate HF). Other measurements of blood chemistry, such as calcium, liver enzymes, bilirubin, ferritin and thyroid function, should detect reversible/ treatable causes of HF (e.g. hypocalcaemia, thyroid dysfunction) and co-morbidities (e.g. iron deficiency).

Natriuretic peptide (BNP, NT-proBNP or MR-proANP) dosage and a **chest radiograph (X-ray)** should be useful, but their use for diagnostic purposes is not clearly defined [4].

## 2. Two phenotypes of chronic HF: reduced or preserved ejection fraction

Most of the evidence supporting interventions in heart failure comes from trials that recruited patients with left ventricular systolic dysfunction (LVSD). However, about 50% of patients with chronic heart failure (CHF) have a preserved ejection fraction (HFpEF), which is especially common in elderly people with highly prevalent co-morbid conditions, and its prevalence is expected to increase over the next decades [7, 8].

The necessary criteria for diagnosing heart failure with reduced ejection fraction (HF-rEF) or preserved ejection fraction (HF-pEF or diastolic heart failure) are reported in Table 2. Echocardiographic evaluation is essential to differentiate the structural abnormalities of the two phenotypes: HFpEF is usually defined as an ejection fraction equal to or greater than 50%, while the reduced ejection fraction phenotype (HF-rEF) has an LVEF less than 40%. Both ESC and ACC/AHA guidelines define a mild left ventricular systolic dysfunction (for EF 35–50%) that probably represents another phenotype in HF spectrum [8, 9].

Therapies that improve outcome in people with HFrEF have not been found to help people with HFpEF, further supporting the idea that these two kinds of HF are fundamentally different [9].

The diagnosis of <b>HF-rEF (reduced ejection fraction)</b> requires <b>three</b> conditions to be satisfied:	The diagnosis of <b>HF-pEF (preserved ejection fraction)</b> requires <b>four</b> conditions to be satisfied:
1. Symptoms typical of HF	1. Symptoms typical of HF
2. Signs typical of HF (may not be present in the early stages and patients treated with diuretics)	2. Signs typical of HF (especially in HF-pEF they may not be present in the early stages and patients treated with diuretics)
3. Reduced left ventricular ejection fraction (LVEF): < 40%	3. Normal or only mildly reduced LVEF (35–50%) and left ventricle not dilated
	4. Relevant structural heart disease (left ventricular hypertrophy/left atrial enlargement) and/or diastolic dysfunction

**Table 2.** Criteria for diagnosing and differentiate CHF phenotypes (modified from ESC 2012 [4])

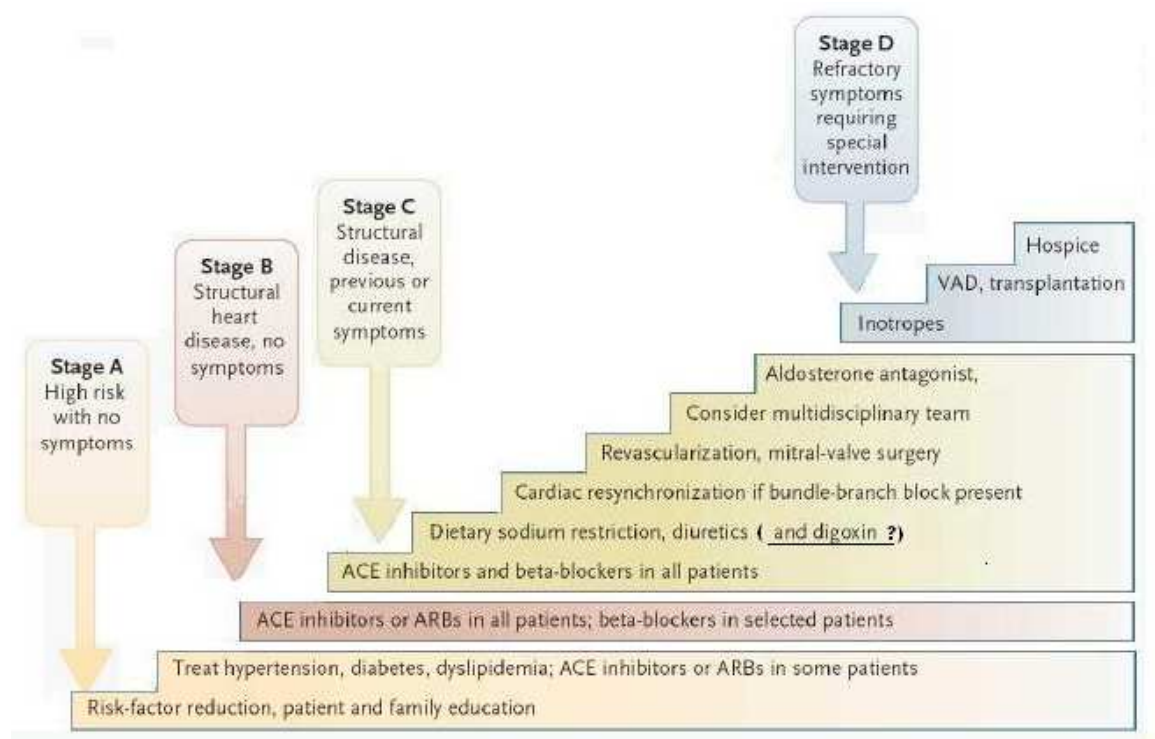


Exercise intolerance is the principal clinical feature in HFpEF. People complain of debilitating symptoms: the elevation of filling pressures during even modest exercise causes significant dyspnea and fatigue [7, 9]. NICE guidelines recommend the implementation of exercise training in HFpEF, but the evidence only evaluates surrogate endpoints such as exercise capacity and quality of life [10].

### 3. The guideline-directed medical therapy (GDMT) for chronic heart failure

The treatments for heart failure become progressively more complex, gradually the clinical picture worsens (Figure 3) [11]. However, there is a high overall annual mortality (up to 20%), both for HFrEF or HFpEF [12] particularly in patients with higher NYHA Classes symptoms [13].

General measures, such as the attention to diet and good lifestyle, weight monitoring, patient education and close medical follow-up, should be done on all patients, while medical therapy is based on progressive staging and symptoms classification [13].



**Figure 3.** The progression and complexity of treatments for HF (Modified from [11]).

The term guideline-directed medical therapy (GDMT) has been conjugated by the ACCF/AHA Task Force on Practice Guidelines to represent optimal medical therapy as defined by ACCF/

AHA guideline recommended therapies (primarily Class I evidence) [1]. The GDMT for patients with CHF is resumed in Figure 4 [13].

Even if the recommendations for the use of drugs in HF derived principally from studies that recruited patients with left ventricular systolic dysfunction (LVSD) (HFrEF), treatments with same principles are also useful for patients with HFpEF and relevant cardiovascular co-morbidities, such as hypertension and coronary artery disease (CAD).

Unfortunately, trials using the same medications employed for the treatment of HFrEF have not shown any significant improvements on survival [8, 12].

AOC/ AHA Stage	B	C		D
NYHA Classification	I	II – III		IV
Symptoms <sup>a</sup>	Asymptomatic	Symptoms, Current or Prior		Recurrent or Ongoing Rest Dyspnea
Treatments		Never Hospitalized	History of Hospitalization	
ACE	Yes	Yes	Yes	Yes
Beta blocker (BBs)	Yes <sup>a</sup>	Yes	Yes	Yes <sup>b</sup>
Aldosterone antagonist		Yes	Yes	Yes
Isosorbide dinitrate-hydralazine		Selected patients <sup>c</sup>	Selected patients <sup>c</sup>	Selected patients <sup>c</sup>
Diuretic		If congestion PRN	If congestion PRN	Yes
ARB		PRN <sup>d</sup>	PRN <sup>d</sup>	PRN <sup>d</sup>
Digoxin		PRN <sup>d</sup>	PRN <sup>d</sup>	PRN <sup>d</sup>
Consider AICD/ Bi-V pacemaker	Selected patients <sup>a</sup>	Yes	Yes	Yes
Abbreviations: ACE: Angiotensin converting enzyme inhibitor    ARB: Angiotensin receptor blocker PRN: as needed    AICD: Automatic Implantable Cardioverter Defibrillator				
Green: Recommended		Orange: To be considered.		
Notes:				
<sup>a</sup> No explicit evidence of benefit exists for BBs among asymptomatic patients, although many patients in this class will have other indications for BBs, such as coronary artery disease (CAD).				
<sup>b</sup> BBs may be continued safely for patients with rest dyspnea except in patients with signs of congestion or hemodynamic instability.				
<sup>c</sup> The combination of isosorbide dinitrate and hydralazine benefited patients self-reported as African American. This combination may be added for patients who remain symptomatic despite therapy with ACEs and BBs and as tolerated without reducing the doses of ACE or BBs to subtarget doses.				
<sup>d</sup> These interventions may provide symptomatic benefit. If no benefit is perceived, the medications may be withdrawn. In the case of digoxin, however, withdrawal may lead to clinical deterioration and should be done with caution. Little evidence exists to support the safety of ACE/aldosterone antagonists/ARBs in the same patient. All these agents can increase potassium levels.				
<sup>e</sup> Indication only for asymptomatic patients with ischemic cardiomyopathy.				

Figure 4. GDMT for patients with HFrEF (adapted from [13], with permission).



The only indication to the use of diuretics in chronic HFpEF is for symptomatic relief of acute or chronic congestion (see Figure 3). The doses of diuretics should be adjusted continuously, especially when the patient achieves euvolaemia, as further diuresis and dehydration may decrease preload and cardiac output [8].

The role of the multidisciplinary team in the continuing management of heart failure patients is pivotal and all the principal guidelines on HF management underline that the complexity of both the diagnostic process and the therapeutic options, as well as the continuing difficulties in the diagnosis and management of HFpEF, dictate the recurrent involvement of specialists [1, 4, 5, 10, 14].

#### **4. Rehabilitation for patients with chronic heart failure**

A rehabilitation program has three main components: education, counselling and exercise [10]. Education and counselling are usually incorporated into standard care (see below), while the role of exercise-based rehabilitation programs in the management of patients with HF is not completely defined. There is some evidence that cardiac rehabilitation can be useful to improve functional capacity, exercise duration, health-related quality of life and mortality [1, 4], particularly in patients with HFrEF [15]. Despite the paucity of direct evidence in HFpEF, recommendations for rehabilitation should relate to all patients with heart failure without contraindications, since symptoms and prognosis of patients with HFpEF do not differ significantly from those with heart failure due to LVSD [7, 10]. A program of rehabilitation should include patients with symptomatic heart failure, NYHA class II–III, without limitations for age or sex. A psychological and educational component in the program would assure better results of the intervention [10].

The optimum exercise ‘prescription’ is uncertain: it ranges from walking to intensive gym-based activity including resistance and aerobic exercises and exercises within the swimming pool [4, 10]. In the absence of specific programs for patients with HF, they can also be enrolled in rehabilitation within other existing cardiac rehabilitation programs (i.e. post-myocardial infarction and post-cardiac surgery [10]).

Healthcare-based rehabilitation programs are likely to be cost-effective in different populations and for different healthcare systems [16].

#### **5. Integrated care for heart failure: The Chronic Care Model**

In 2009 Jencks et al [17] demonstrated that heart failure is the most frequent cause of rehospitalisation in Medicare: about 27% of patients discharged with HF were re-admitted within 30 days. The majority of them did not receive a visit from a doctor in the period they stay at home, after discharge. Discharge planning (i.e. an individualised plan for a patient before the patient leaves hospital to home) combined with additional post-discharge support can reduce unplanned readmission to hospital for patients with congestive heart failure [18, 19].

Evidence suggests that systems of care for patients with HF improve adherence to published guidelines and clinical outcomes if involve collaborative care with specialists, multidisciplinary teams (including primary care), with a focus on transitions of care and chronic disease management [19–23].

All the guidelines on HF management recommend a coordinating care along the continuum of HF and throughout the chain-of-care delivered by the various services, within the healthcare system [1, 4, 10, 14]. The natural setting to develop this coordination of care is the Chronic Care Model (CCM), developed by Wagner and colleagues at the end of the nineties, ‘to bridge the gap and translate knowledge between evidence-based chronic disease care and actual care practices’ [24]. The framework, which is centred in primary care, posits six interrelated elements that are key to high quality chronic disease care: self-management support, redesigning delivery systems, decision support that is system wide, clinical information technology, linkages to community resources and health care system organisation [24].

Recently, the National Heart Foundation of Australia published guidance on policy and system changes to improve the quality of care for people with chronic heart failure (CHF). The recommendations point to reduce emergency presentations, hospitalisations and premature death among patients with CHF [14]. Among the most critical points to overcome there are:

- To ensure equity of access for everyone in disadvantaged areas, including the most vulnerable people in socio-economic frailty and the cultural minorities.
- Lack of data and inadequate identification of people with CHF: this leads to ineffectiveness in measuring outcomes and evaluating the CHF care provided. The development of mechanisms to promote data linkage across care transitions is essential.
- The enhanced community-based management of CHF, across the empowerment of general practitioners to lead care.
- Future research activity needs to ensure the translation of valuable knowledge and high-quality evidence into practice.

The practical application of these principles is included in the recommendation n. 10.2 from ACCF/AHA guidelines [1]: *Every patient with HF should have a clear, detailed, and evidence-based plan of care that ensures the achievement of GDMT goals, effective management of co-morbid conditions, timely follow-up with the healthcare team, appropriate dietary and physical activities, and compliance with secondary prevention guidelines for cardiovascular disease. This plan of care should be updated regularly and made readily available to all members of each patient’s healthcare team.*

A management program for patients with HF (both with reduced and preserved ejection fraction) needs particular characteristics and components (Figure 5) [4].

Primary care plays a central role in the early identification of HF, transitions to and from acute care settings, self-care promotion, managing co-morbidities and end-of-life care [23, 25]. However, a recent systematic review of 22 studies has pointed out barriers and facilitators of implementing the chronic care model in primary care. The inner setting of the organisation, the process of implementation and characteristics of the individual healthcare providers are

Characteristics	<ol style="list-style-type: none"><li>1. Based on a multidisciplinary approach (cardiologists, primary care physicians, nurses, pharmacists, etc.)</li><li>2. Targeted to high-risk symptomatic patients</li><li>3. Including competent and professionally educated staff</li></ol>
Components	<ul style="list-style-type: none"><li>• Optimized medical and device management</li><li>• Adequate patient education, with special emphasis on adherence and self-care</li><li>• Patient involvement in symptom monitoring and flexible diuretic use</li><li>• Follow-up after discharge (regular clinic and/ or home-based visits; possibly telephone support or remote monitoring)</li><li>• Increased access to healthcare (through in-person follow-up and by telephone contact; possibly through remote monitoring)</li><li>• Facilitated access to care during episodes of decompensation</li><li>• Assessment of (and appropriate intervention in response to) an unexplained increase in weight, nutritional status, functional status, quality of life, and laboratory findings</li><li>• Access to advanced treatment options</li><li>• Provision of psychosocial support to patients and family and/ or caregivers</li></ul>

**Figure 5.** Management programmes for patients with HF rEF and HFpEF: essential characteristics and components (adapted from [4]).

the major emerging themes. The importance of assessing organisational capacity and needs is crucial prior to and during the implementation of the CCM, as well as gaining a better understanding of health care providers and organisational perspective [26].

6. Management of co-morbidities

Frailty and multiple co-morbidities contribute to non-compliance, leading to higher rate of hospitalisation, rehospitalisation, and ultimately institutionalisation and death [27].

Co-morbidities are important in patients with HF for four main reasons [4]:

1. They may affect the use of some drugs for HF (e.g. in some patients with renal dysfunction the use of renin–angiotensin system inhibitors may be discouraged);
2. Some drugs, useful for co-morbidities symptoms, may decompensate HF (e.g. NSAIDs for pain in arthritis);
3. The drugs for different conditions may interact and reduce patient compliance to treatments: e.g. beta-blockers for HF and beta-agonists for obstructive pulmonary disease;
4. Most co-morbidities are associated with worse clinical status and are predictors of poor prognosis in HF (e.g. diabetes). Some co-morbidities become subject to treatment (e.g. anemia) to improve HF.

Management of co-morbidities is particularly critical in HF patients with preserved ejection fraction (the so-called diastolic heart failure or HFpEF) who are older and often affected with multimorbidity. Patients with HFpEF should be managed with an integrated approach by their clinical features, addressing underlying co-morbidities known to cause or exacerbate HF [28]. Predisposing and precipitating factors for patients with HFpEF are reported in Table 3.

PREDISPOSING FACTORS	PRECIPITATING FACTORS
Advanced age	Recurrent ischemia
Female sex	Atrial fibrillation
Obesity	Renal failure
Hypertension	Sepsis
Diabetes	
Coronary artery disease	

**Table 3.** Predisposing and precipitating factors for HFpEF in older [28]

Other significant co-morbidities are anemia, COPD, depression, cachexia, gout, and hyperlipidemia [4]. Cardiovascular deaths constitute the majority of deaths in both HFpEF and HFrEF. However, the proportion of total deaths that are cardiovascular related is higher in HFrEF than in HFpEF. Conversely, non-cardiovascular deaths constitute a larger proportion of deaths in HFpEF than in HFrEF [12].

### 7. Counselling and patient’s empowerment

In chronic illness, patient- centred care (PCC) has a beneficial effect on healthcare professional-patient concordance regarding treatment plans, patient health outcomes and patient satisfaction and respects patients’ desired level of involvement in healthcare decisions [30]. Patient education is focused on the patient’s knowledge about his pathology in making the right choices about his/her health and not just decisions about the disease, how the disease affects his/her role in working life, couple or community life [31]. Counselling is the better professional activity to guide, support and develop the self-management and empowerment both of the patient and his/her caregiver(s), promoting knowledge and skills to self-care, and stimulating the ability to make self-choices.

The self-management of chronic disease is essential for optimising health outcomes [32–34]. A patient-centred approach for CHF management is widely recommended [4,10, 29].

Counselling for CHF management should be focused on simple actions that the patient and / or the caregiver should practice Table 4.

<b>A. Characteristics of disease</b>	Explain the origin of symptoms;
<b>B. How to identify early signs of decompensation and what to do with them</b>	Identify specific signs and symptoms such as increasing fatigue, worsening dyspnea, appearance of edema; Daily weight and how to proceed in case of significant increase: contact details of the care manager, variation of the diet , fluid intake and diuretics;
<b>C. Instructions on the proper use of each drug</b>	Explain the rationale for each drug, adverse effects and possible consequences of a missed dose. Repeat the treatment pattern;
<b>D. Modify risk factors progressing</b>	Smoking cessation, glycemic, blood pressure and weight control, motor activity, alcohol intake;
<b>E. Importance of therapeutic adherence</b>	Detect and try to solve any obstacle to the compliance with drug therapy and lifestyle.

**Table 4.** Counselling for CHF management: what it is basic for patient and caregiver

## 8. Integrated care for HF in Italy: a clinical pathway implementation

Patients suffering from HF exhibit different clinic characteristics and care needs depending on the stage of the disease [5, 11]. The effective management of this disease should be related to a territorial- and hospital- integrated approach, adapted to the needs of the individual patient [13, 30, 35, 36].

If the clinical condition is stable, the patient should be followed on an outpatient basis with the integrated involvement of general practitioners (GPs), nurses and specialists [20, 22, 23, 37–41]. In advanced stages, a more intensive support like the hospital one and/or integrated home it might be necessary [42–48].

As reported by Vedel and Khanassov [18], transitional care interventions (TCIs) and high intensity- integrated management models significantly reduce risks of rehospitalisation and emergency department visits. A long duration (more than 6 months) involvement of GPs, nurses, and cardiologists is better than a shorter one.

We propose an integrated management care for patients affected with HF, which is based on the recommendations of the European Society of Cardiology [4]. This model allows the integration of multidisciplinary teams, ensuring a complete and appropriate management of the cases, in respect of therapeutic responsibility entrusted to the GP. For each stage of the ACC/AHA classification [1], functions, activities and tasks of each professional are identified. In stage A (Table 5) and D (Table 6) the professionals involved, despite being the same, often operate with different levels of integration, while the real multiprofessional integration occurs in stages B and C. For this reason the latter are presented in comparison (Table 7).

Finally, in Table 8, a synoptic planning of different programmed activity is reported.

STAGE A	According to the ACC/AHA classification, patients in stage A are those at risk of developing a structural heart disease for the presence of cardiovascular risk factors or particular clinical situations, such as:	
	<ul style="list-style-type: none"> <li>• Hypertension</li> <li>• Multi system atherosclerosis</li> <li>• Diabetes mellitus</li> <li>• Metabolic syndrome or obesity</li> <li>• Chronic renal failure</li> <li>• Prolonged intake of cardiotoxic drugs</li> <li>• Familiarity of cardiomyopathy</li> </ul>	
	<b>Role and tasks of the professionals</b>	
	<ul style="list-style-type: none"> <li>• <b>GP:</b> <ul style="list-style-type: none"> <li>◦ Identification of patients with risk factors (e.g. hypertension , diabetes, dyslipidemia, obesity, sedentary)</li> <li>◦ Non-pharmacological control of risk factors (e.g. promoting physical activity, weight control, alcohol consumption)</li> <li>◦ Setting and titration of personalised drug therapy</li> <li>◦ Clinical and instrumental follow-up</li> </ul> </li> </ul>	
	<ul style="list-style-type: none"> <li>• <b>Nurses:</b> <ul style="list-style-type: none"> <li>◦ Group health education for patients and their families, in particular oriented to the promotion of healthy lifestyles, proper nutrition and to the adherence of pharmacological and non-pharmacological therapeutic prescription</li> </ul> </li> </ul>	
	<ul style="list-style-type: none"> <li>• <b>Specialists:</b> <ul style="list-style-type: none"> <li>◦ Counselling for patients with problems inadequately controlled by first-level interventions</li> </ul> </li> </ul>	

**Table 5.** Integrated activities on HF stage A, divided for different professional tasks

STAGE D	Stage D is characterised by patients suffering from HF with frequent exacerbations despite maximal medical therapy, which may require, in highly selected cases, specialised treatments such as mechanical support to the circulation, fluid removal procedures, continuous inotropic infusions and heart transplant. In most cases, however, the patient benefits from a palliative care program (integrated home assistance, hospice).	
	<b>Roles and tasks of the professionals</b>	
	<ul style="list-style-type: none"> <li>• <b>GP:</b> <ul style="list-style-type: none"> <li>◦ Request of hospitalisation when indicated</li> <li>◦ Adjustment of drug therapy based on therapeutic needs of individual patient</li> <li>◦ Clinical and instrumental follow-up based on the clinical</li> </ul> </li> </ul>	



	<p>characteristics of the individual patient, in agreement with the specialist</p> <ul style="list-style-type: none"><li>◦ Early diagnosis of aggravations of heart failure conditions with identification of precipitating factors</li><li>◦ Evaluation and control of co-morbidities</li><li>◦ Activation of integrated home care services and access to patient's home</li></ul>
STAGED	<p>• <i>Nurses:</i></p> <ul style="list-style-type: none"><li>◦ Periodic evaluation of the parameters (e.g. blood pressure, cardiac frequency and body weight)</li><li>◦ Individual health education of the patient and his family, in particular verification of patient's adherence and persistence to the therapeutic drug prescription, lifestyle and to the correct alimentation</li><li>◦ Periodic telephone contact (from half-yearly to weekly) for information on taking the drugs, patient's subjective symptoms, ability to perform daily activities, changes in the quality of sleep, changes in body weight, onset of intercurrent diseases</li><li>◦ Ambulatory monitoring (from half-yearly to monthly) or periodic home (from monthly to weekly) for the relief of the parameters completed by the judgement of the specialist/GP on patient's condition</li><li>◦ Nursing interventions on related symptoms based on the personalised care plan</li></ul>
	<p>• <i>Specialists:</i></p> <ul style="list-style-type: none"><li>◦ Request of hospitalisation when indicated</li><li>◦ Recognition of aggravation of heart failure conditions with identification of precipitating factors</li><li>◦ Adjustment of drug therapy based on therapeutic needs of individual patient</li><li>◦ Clinical and instrumental follow-up based on the clinical characteristics of the individual patient, in agreement with GP</li><li>◦ Intervention in case of clinical worsening without prompt response to therapy or any complications</li><li>◦ Indication for AICD (automatic implantable cardioverter defibrillator)</li><li>◦ Indication to ultrafiltration</li><li>◦ Home access on request of the GP</li></ul>

**Table 6.** Integrated activities on HF stage D, divided for different professional tasks

Professionals	STAGE B	STAGE C
GP	<ul style="list-style-type: none"> <li>• Identification of patients with stage B: <ul style="list-style-type: none"> <li>▪ Echocardiographic diagnosis of structural heart disease that does not present and have not applied in the past signs and symptoms of HF;</li> <li>▪ patient with previous myocardial infarction;</li> <li>▪ patient with valvular heart disease at least moderate;</li> </ul> </li> <li>• setting and adjustment of personalised drug therapy, personalised clinical and instrumental follow up, according to the specialist,</li> <li>• Transmission of the names at the computerised archive.</li> </ul>	<ul style="list-style-type: none"> <li>• clinical evaluation and request of medical instrumental/laboratory examinations of I level in presence of signs/symptoms of HF;</li> <li>• specialist referral for diagnostic confirmation; hospitalisation when indicated;</li> <li>• first etiological identification and prognostic stratification;</li> <li>• activation of integrated care program and transmission of patient names in the computer archive;</li> <li>• setting and / or adjustment of the therapy;</li> <li>• personalised clinical and instrumental follow up;</li> <li>• early detection of exacerbations and diagnosis of precipitants factors.</li> </ul>
Nurse	<ul style="list-style-type: none"> <li>• health education (patient/family) oriented to the promotion of healthy lifestyles and nutrition and pharmacological and non-pharmacological therapeutic adherence;</li> <li>• education of the patient to the self-control of arterial pressure parameters, cardiac frequency, body weight;</li> <li>• periodic evaluation of clinical and care parameters;</li> <li>• reporting to the general practitioner (GP) of the patient with relevant issues and collaboration for the diagnostic and therapeutic management;</li> <li>• opening and updating the computerised clinic folder.</li> </ul> <p>In this stage other resources can be activated (e.g. anti-smoking centres, gyms safe) in order to better control the risk factors.</p>	<ul style="list-style-type: none"> <li>• health education (patient/family), in particular pharmacological and non-pharmacological therapeutic adherence;</li> <li>• periodic evaluation of clinical parameters such as arterial pressure, cardiac frequency, body weight;</li> <li>• monitoring of the patient by phone contact (from half-year to weekly or as needed – for evaluation therapy compliance, symptoms, weight, intercurrent diseases);</li> <li>• ambulatory monitoring (from semi-annual to monthly or as needed) or periodic home visits (from monthly to weekly);</li> <li>• point of reference for the patient (it is specified that in the role of disease manager, the nurse becomes a reference for the patient for issues related to pathology).</li> </ul>
Cardiologist/ internist	<ul style="list-style-type: none"> <li>• diagnostic/therapeutic confirmation of structural heart disease;</li> <li>• setting of clinical and instrumental follow-up, in agreement with the GP; consulting for issues not adequately controlled by the first level interventions;</li> <li>• indication for hospitalisation for</li> </ul>	<ul style="list-style-type: none"> <li>• clinical, instrumental (echocardiography) and laboratory evaluation for confirmation/exclusion of the diagnosis of HF;</li> <li>• etiological identification of precipitating/favouring factors and prognostic stratification;</li> </ul>

Professionals	STAGE B	STAGE C
	<p>screening of the causes of myocardial damage/evaluation of any indications in non-pharmacological strategies (revascularisation, correction of valve disorders, device implant);</p> <ul style="list-style-type: none"> <li>• each surgery should have a reference specialist/ambulatory;</li> <li>• if the patient has a different reference doctor, the GP is responsible to verify that inspections are carried out with similar cadences to those of the structured path.</li> </ul>	<ul style="list-style-type: none"> <li>• custom setting and / or adjusting drug therapy;</li> </ul> <p>clinical and personal instrumental follow up in collaboration with the GP;</p> <ul style="list-style-type: none"> <li>• programming non-pharmacological therapeutic procedures (e.g. implantable devices, such as AICD, CRT-P, CRT-D);</li> <li>• intervention in case of clinical worsening without prompt response to therapy or to the appearance of complications.</li> </ul>

**Table 7.** Integrated activities on HF stages B and C, divided for different professional tasks

Stage ACC/AHA and NYHA grading	Care's goals	Action	At least X times/ year follow –up*			Notes
			3	2	1	
STAGE A	Hypertension treatment, smoking cessation, dyslipidemia treatment, promoting regular physical exercise, abolition of alcohol and drugs, metabolic syndrome control	GP visit				Unplanned evaluation
		Nursing assessment				Unplanned evaluation
		ECG+ specialistic visit				Unplanned evaluation
		Echocardiogram				As needed (hypertension and/or diabetes and/or chronic renal failure with signs of organ damage)
						to each chemotherapy cycle (in patients receiving cardiotoxic drugs) every 3–5 years in case of family history of cardiomyopathy
STAGE B	As stage A + pharmacological therapy of the structural heart disease, non -pharmacological therapy, if indicated (revascularisation, AICD, correction of valvulopathy)	GP visit		x		And as needed
		Nursing assessment		x		Evaluation in alternation at GP
		ECG+ specialistic visit			x	And as needed
		Echocardiogram				Every 2 years/as needed (if clinic modifications/exacerbations)
STAGE C NYHA I–II	As stages A + B + reducing salt intake, heart failure therapy, implantable devices	GP visit	x			And as needed

Stage ACC/AHA and NYHA grading	Care's goals	Action	At least X times/ year follow -up*			Notes
			3	2	1	
STAGE C NYHA III	(such as AICD, CRT-P, CRT-D) when indicated	Nursing assessment	x			Monitoring of clinical parameters (blood pressure, cardiac frequency, weight) in alternance with GP
		ECG+ specialistic visit			x	And as needed
		Echocardiogram				As needed (if clinic modifications/ exacerbations)
		Blood tests (blood count, creatinine, Na +/K+, glycemia, transaminases)			x	Other surveys according to research
		GP visit	x			And as needed
		Nursing assessment	x			Quarterly monitoring of clinical parameters (blood pressure, cardiac frequency, weight) in alternance with GP
		ECG+ specialistic visit		x		
		Echocardiogram				As needed (if clinic modifications/exacerbation)
		Blood tests (blood count, creatinine, Na +/K+, glycemia, transaminases)			x	Other surveys according to research
STAGE D (Home visits)	Palliative care program or transplantation program					

\*The follow-up planning should consider the following variables: NYHA class, clinical and therapeutic instability, repeated hospital admissions, echocardiographic features and exam values.

**Table 8.** Managed planning for integrated assistance in all HF stages

## 9. Conclusions

To be effective, an integrated assistance program for the patient with heart failure needs the continuous cooperation of the multidisciplinary team. Integrated care programs have defini-

tively demonstrated a significant reduction in mortality, hospital admissions and readmissions, as well as visits to the emergency department [49].

However, lack of communication between hospital and primary care seems to be the principal critical issue in the continuity of care, both for hospital discharge or for the specialist outpatient report [18, 37].

The general practitioner (GP), with the nurses' collaboration, should manage patients with stable conditions with periodical checks focused on the active involvement of the patient, the constant adaptation of the therapy, the verification of clinical stability, the early detection of worsening of the disease and its causes.

Following every consultation, the health professional should check the patient's understanding of what they have been told. They should ask patients with similar questions: *To be sure that I have explained everything correctly, could you explain to me how you will take your medication?* or *Can you tell me what you found most important from our conversation?* The patients should be able to explain or demonstrate, using their words, what has just been discussed with them [50].

In patients with advanced disease, the specialist monitoring must be flexible, and the consultation should provide clear indications, preferably written, to the patient and family members on when to request the intervention of GP and on signs/symptoms of destabilisation that require specialist advice (Table 9).

Information sending by the GP (patient's summary)	Specialist outpatient report
• Current therapy regimen	• Objectivity at visit time and disease stability
• Patient's compliance level	• Stratification of the risk of events after instrumental tests
• Adverse drug events (if any)	• Prescribed treatment with any eventual change compared with the previous treatment and Indications for drug titration
• Major recent intercurrent events, also about co-morbidities	• Evaluation of the presence of co-morbidity about instrumental/ laboratory outcomes
• Results of blood tests (e.g. renal function monitoring)	• Program of specialistic follow-up and indications of instrumental/ laboratory controls
	• Indication and contents of specific training activities directed to the patient and caregiver(s), about the disease, therapy set, and principles of self-management
	• Preferential telephone contacts to communicate with the centre for acute problems

**Table 9.** Fundamental aspects of the communication between specialist/general practitioner (GP) in the follow-up of patients with heart failure

To standardise multidisciplinary dialogue and assess the effectiveness of clinical pathway, the local health authorities should organise recurrent multiprofessional audit on data collected locally and training on path troubles and care results.

A challenge for the future assistance to the patient with heart failure would be the diagnosis and management of the HF with preserved ejection fraction (HFpEF). As a matter of fact, HFpEF is predicted to be the dominant phenotype of heart failure in the next decade, and the principal intervention is to identify and treat risk factors and co-morbidities associated, first of all, arterial hypertension.

## Author details

Monica Lorenzini<sup>1</sup>, Caterina Ricci<sup>1</sup>, Silvia Riccomi<sup>1</sup>, Federica Abate<sup>2</sup>, Barbara Casalgrandi<sup>2</sup>, Benedetta Quattrini<sup>2</sup>, Gianbattista Spagnoli<sup>3</sup>, Letizia Reggianini<sup>4</sup> and Oreste Capelli<sup>1\*</sup>

\*Address all correspondence to: [o.capelli@ausl.mo.it](mailto:o.capelli@ausl.mo.it)

1 Primary Health Care Department, Local Health Authority of Modena, Italy

2 Clinical Governance, Local Health Authority of Modena, Italy

3 Health Director, Local Health Authority of Modena, Italy

4 Heart Failure Clinic, University of Modena and Reggio Emilia, Italy

## References

- [1] Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Drazner MH, Fonarow GC, Geraci SA, Horwich T, Januzzi JL, Johnson MR, Kasper EK, Levy WC, Masoudi FA, McBride PE, McMurray JJ, Mitchell JE, Peterson PN, Riegel B, Sam F, Stevenson LW, Tang WH, Tsai EJ, Wilkoff BL. (2013): American College of Cardiology Foundation; American Heart Association Task Force on Practice Guidelines. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol.* 62(16):e147-239. Epub 2013 Jun 5.
- [2] Owan TE, Hodge DO, Herges RM, Jacobsen SJ, Roger VL, Redfield MM. (2006): Trends in prevalence and outcome of heart failure with preserved ejection fraction. *N Engl J Med.* 355(3):251-9.
- [3] Roger VL. (2013): Epidemiology of heart failure. *Circ Res.* 113(6):646-59. Review.
- [4] McMurray JJ, Adamopoulos S, Anker SD, Auricchio A, Böhm M, Dickstein K, Falk V, Filippatos G, Fonseca C, Gomez-Sanchez MA, Jaarsma T, Køber L, Lip GY, Maggioni



- AP, Parkhomenko A, Pieske BM, Popescu BA, Rønnevik PK, Rutten FH, Schwitter J, Seferovic P, Stepinska J, Trindade PT, Voors AA, Zannad F, Zeiher A; ESC Committee for Practice Guidelines. (2012): ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. Developed in collaboration with the Heart Failure Association (HFA) of the ESC. *Eur Heart J*. 33(14):1787-847. Epub 2012 May 19. Erratum in: *Eur Heart J*. 2013 Jan;34(2):158.
- [5] Jessup M, Abraham WT, Casey DE, Feldman AM, Francis GS, Ganiats TG, Konstam MA, Mancini DM, Rahko PS, Silver MA, Stevenson LW, Yancy CW, writing on behalf of the 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult Writing Committee. (2009): Focused update: ACCF/AHA guidelines for the diagnosis and management of heart failure in adults: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*. 119:1977-2016.
- [6] Ammar KA, Jacobsen SJ, Mahoney DW, Kors JA, Redfield MM, Burnett JC Jr, Rodeheffer RJ. (2007): Prevalence and prognostic significance of heart failure stages: application of the American College of Cardiology/American Heart Association heart failure staging criteria in the community. *Circulation*. 115(12):1563-70. Epub 2007 Mar 12.
- [7] Palau P, Núñez E, Domínguez E, Sanchis J, Núñez J. (2016): Physical therapy in heart failure with preserved ejection fraction: a systematic review. *Eur J Prev Cardiol*. 23(1):4-13. Epub 2014 Dec 8. Review.
- [8] Irizarry Pagán EE, Vargas PE, López-Candales A. (2016): The clinical dilemma of heart failure with preserved ejection fraction: an update on pathophysiology and management for physicians. *Postgrad Med J*. pii: postgradmedj-2015-133859.
- [9] Borlaug BA. (2016): Defining HFpEF: where do we draw the line? *Eur Heart J*. 37(5):463-5. doi: 10.1093/eurheartj/ehv561. Epub 2015 Nov 3.
- [10] National Clinical Guideline Centre (UK). (2010): Chronic Heart Failure: National Clinical Guideline for Diagnosis and Management in Primary and Secondary Care: Partial Update [Internet]. London: Royal College of Physicians (UK); Aug. <http://www.nice.org.uk/nicemedia/live/13099/50517/50517.pdf>.
- [11] Jessup M, Brozena S. (2003): Heart failure. *N Engl J Med*. 348(20):2007-18. Review.
- [12] Chan MM, Lam CS. (2013): How do patients with heart failure with preserved ejection fraction die? *Eur J Heart Fail*. 15(6):604-13. Epub 2013 Apr 21. Review.
- [13] Nicklas JM, Bleske BE, Van Harrison R, Hogikyan RV, Kwok Y, Chavey WE. (2013): Heart failure: clinical problem and management issues. *Prim Care*. 40(1):17-42. Review.
- [14] Page K, Marwick TH, Lee R, Grenfell R, Abhayaratna WP, Aggarwal A, Briffa TG, Cameron J, Davidson PM, Driscoll A, Garton-Smith J, Gascard DJ, Hickey A, Korczyk D, Mitchell JA, Sanders R, Spicer D, Stewart S, Wade V. (2014): National Heart

Foundation of Australia. A systematic approach to chronic heart failure care: a consensus statement. *Med J Aust.* 201(3):146-50.

- [15] Taylor RS, Sagar VA, Davies EJ, et al. (2014) : Exercise-based rehabilitation for heart failure. *Cochrane Database Syst Rev.* 4: CD003331.
- [16] Hagberg LA, Lindholm L. (2006): Cost-effectiveness of healthcare-based interventions aimed at improving physical activity. *Scand J Public Health.* 34(6):641-53.
- [17] Jencks SF, Williams MV, Coleman EA. (2009): Rehospitalizations among patients in the Medicare fee-for-service program. *N Engl J Med.* 360(14):1418-28. Erratum in: *N Engl J Med.* 2011 Apr 21;364(16):1582.
- [18] Vedel I, Khanassov V. (2015): Transitional care for patients with congestive heart failure: a systematic review and meta-analysis. *Ann Fam Med.* 13(6):562-71. Review.
- [19] Gonçalves-Bradley DC, Lannin NA, Clemson LM, Cameron ID, Shepperd S. (2016): Discharge planning from hospital. *Cochrane Database Syst Rev.* 1:CD000313. Review.
- [20] Zwarenstein M1, Goldman J, Reeves S. (2009): Interprofessional collaboration: effects of practice-based interventions on professional practice and healthcare outcomes. *Cochrane Database Syst Rev.* (3):CD000072. doi: 10.1002/14651858.CD000072.pub2.
- [21] Parekh A K, Goodman RA, Gordon C, Koh HK, for The HHS Interagency Workgroup on Multiple Chronic Conditions. (2011): Managing multiple chronic conditions: a strategic framework for improving health outcomes and quality of life. *Public Health Rep.* 126:460-71.
- [22] Smith SM, Soubhi H, Fortin M, Hudon C, O'Dowd T. (2012): Interventions for improving outcomes in patients with multimorbidity in primary care and community settings. *Cochrane Database Syst Rev.* 4:CD006560.
- [23] Wallace E, Salisbury C, Guthrie B, Lewis C, Fahey T, Smith SM (2015): Managing patients with multimorbidity in primary care. *BMJ* 350:h176 doi: 10.1136/bmj.h176.
- [24] Bodenheimer T, Wagner EH, Grunbach K. (2002): Improving primary care for patients with chronic illness. *JAMA.* 288:1775-79.
- [25] Mills GD, Chambers CV. Effective strategies to improve the management of heart failure. *Prim Care.* 39(2):393-413.Epub 2012 Apr 24. Review.
- [26] Kadu MK, Stolee P. (2015): Facilitators and barriers of implementing the chronic care model in primary care: a systematic review. *BMC Fam Pract.* 6;16:12.
- [27] Murad K, Kitzman D. (2012): Frailty and multiple comorbidities in the elderly patient with heart failure: implications for management. *Heart Fail Rev.* 17(0): 581-588. doi: 10.1007/s10741-011-9258-y.
- [28] Alagiakrishnan K, Banach M, Jones LG, Datta S, Ahmed A, Aronow WS. (2013): Update on diastolic heart failure or heart failure with preserved ejection fraction in the

- older adults. *Ann Med.* 45(1):37-50. doi: 10.3109/07853890.2012.660493. Epub 2012 Mar 13.
- [29] Allen LA, Stevenson LW, Grady KL, Goldstein NE, Matlock DD, Arnold RM et al. (2012): Decision making in advanced heart failure: a scientific statement from the American Heart Association. *Circulation.* 125:1928-52. doi:10.1161/CIR.0b013e31824f2173.
- [30] Kane PM, Murtagh FE, Ryan K, Mahon NG, McAdam B, McQuillan R, Ellis-Smith C, Tracey C, Howley C, Raleigh C, O'Gara G, Higginson IJ, Daveson BA. (2015): The gap between policy and practice: a systematic review of patient-centred care interventions in chronic heart failure. *Heart Fail Rev.* 20(6):673-87.
- [31] Santurri LE. (2006): Patient Empowerment: Improving the Outcomes of Chronic Diseases Through Self Management Education. The MPHP 439 Online Text Book. Cleveland, Ohio: Case Western Reserve University.
- [32] Battersby M, Von Korff M, Schaefer J, Davis C, Ludman E, Greene SM, Parkerton M, Wagner EH. (2010): Twelve evidence-based principles for implementing self-management support in primary care. *Jt Comm J Qual Patient Saf.* 36(12):561-70.
- [33] Higgins R, Murphy B, Worcester M, Daffey A. (2012): Supporting chronic disease self-management: translating policies and principles into clinical practice. *Aust J Prim Health.* 18(1):80-7.
- [34] Nolte S, Osborne RH. (2012): A systematic review of outcomes of chronic disease self-management interventions. *Qual Life Res.* 27. PMID: 23184454.
- [35] Bartlett YK, Haywood A, Bentley CL, Parker J, Hawley MS, Mountain GA, Mawson S. (2014): The SMART personalised self-management system for congestive heart failure: results of a realist evaluation. *BMC Med Inform Decis Mak.* 14:109.
- [36] Coulter A, Entwistle VA, Eccles A, Ryan S, Shepperd S, Perera R. (2015): Personalised care planning for adults with chronic or long-term health conditions. *Cochrane Database Syst Rev.* 3:CD010523.
- [37] De Maria R, Misuraca G, Milli M, Filippi A. (2010): Role of outpatient heart failure clinics and primary care physicians in the tailored follow-up of heart failure patients. *G Ital Cardiol (Rome).* 11(5 Suppl 2):38S-44S. Italian.
- [38] Cawley J, Grantham CC. Building a system of care: integration across the heart failure care continuum. *Perm J.* 15(3):37-42.
- [39] Bentley A. Case management and long-term conditions: the evolution of community matrons. *Br J Community Nurs.* 19(7):340, 342-5. Review.
- [40] Centeno MM, Kahveci KL. (2014): Transitional care models: preventing readmissions for high-risk patient populations. *Crit Care Nurs Clin North Am.* 26(4):589-97. Epub 2014 Sep 16.

- [41] Dorling G, Fountaine T, McKenna S, Suresh B. (2015): The evidence for integrated care. *Healthcare Practice*.
- [42] Murthy S, Lipman HI (2011): Management of end-stage heart failure. *Prim Care*. 38(2):265-76, viii. Review.
- [43] Kul S, Barbieri A, Milan E, Montag I, Vanhaecht K, Panella M. (2012): Effects of care pathways on the in-hospital treatment of heart failure: a systematic review. *BMC Cardiovasc Disord*. 12:81. doi: 10.1186/1471-2261-12-81. Review.
- [44] Erceg P, Despotovic N, Milosevic DP, Soldatovic I, Zdravkovic S, Tomic S, Markovic I, Mihajlovic G, Brajovic MD, Bojovic O, Potic B, Davidovic M. (2013): Health-related quality of life in elderly patients hospitalized with chronic heart failure. *Clin Interv Aging*. 8:1539-46. Epub 2013 Nov 15.
- [45] Feitell S, Hankins SR, Eisen HJ. (2014): Adjunctive therapy and management of the transition of care in patients with heart failure. *Cardiol Clin*. 32(1):163-74, x. Review.
- [46] Louis DZ, Robeson M, McAna J, Maio V, Keith SW, Liu M, Gonnella JS, Grilli R. (2014): Predicting risk of hospitalisation or death: a retrospective population-based analysis. *BMJ Open*. 4(9):e005223.
- [47] Fendler TJ, Swetz KM, Allen LA. (2015): Team-based palliative and end-of-life care for heart failure. *Heart Fail Clin*. 11(3):479-98. Review.
- [48] Jaarsma T, Larsen T, Strömberg A. (2013): Practical guide on home health in heart failure patients. *Int J Integr Care*. 13:e043. eCollection 2013.
- [49] Martínez-González NA, Berchtold P, Ullman K, Busato A, Egger M. Integrated care programmes for adults with chronic conditions: a meta-review. *Int J QualHealth Care*. 26(5):561-70. Epub 2014 Aug 9. Review.
- [50] Scottish Intercollegiate Guidelines Network (SIGN). Management of chronic heart failure. Edinburgh: SIGN; 2016. (SIGN publication no. 147). [March 2016]. Available from URL: <http://www.sign.ac.uk>.

