



## Chronic heart failure: Role of the GP in management

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### Abstract

The commonest cause of chronic heart failure in China is ischemic heart disease, followed by hypertension and valvular heart disease. Echocardiography is essential in establishing a diagnosis as well as helping to identify a cause and to monitor progress. Management includes nonpharmacological as well as pharmacological treatment, and self-care with careful monitoring of salt and fluid intake as well as regular weight measurement. Care planning and team-based care are essential in managing patients with chronic heart failure, who often have concurrent multimorbidity and are receiving polypharmacy.

**Keywords:** Chronic heart failure; general practice; team based care

**Significance statement:** In keeping with the global rise in the prevalence of chronic and non-communicable disease, the prevalence of chronic heart failure (CHF) is increasing globally, with estimates of 10% of the population older than 75 years affected in developed countries, despite improvements in the management of cardiovascular disease more generally. This article discusses current management of CHF, illustrating the important role played by the GP in coordinating care. Management includes nonpharmacological as well as pharmacological treatment, and self-care with careful monitoring of salt and fluid intake as well as regular weight measurement. Care planning and team-based care are essential in managing patients with CHF, who often have concurrent multimorbidity and are receiving polypharmacy.

### Introduction

In the past 3 decades there has been a dramatic improvement globally in the management of cardiovascular disease, including ischemic heart disease, hypertensive heart disease, and valvular heart disease. This has been due to a range of interventions, including improved medication and treatment of risk factors, improvements in acute care, and the use of surgical interventions, including stents and valve replacements as well as pacemakers. People with heart disease are living longer while at the same time acquiring a range of other comorbidities that may impact

on the management of their cardiovascular disease. In some countries cancer has taken over from cardiovascular disease as the leading burden of disease [1].

Ultimately, despite these interventions and as result of aging and comorbidity, many patients with previously well-controlled cardiac function will develop chronic heart failure (CHF), with its attendant poor prognosis. Patients with cardiac failure have frequent hospital admissions, with average lengths of stay of 7–10 days. This is costly, and there is evidence that shorter stays in observation

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units are possible [2]. End-stage heart failure requires palliative care, which may lead to further hospitalization. The role of the GP in managing heart failure is therefore critical, and includes prevention by careful monitoring of early signs and adherence to medication, early intervention with appropriate medication, and active engagement with other specialists involved with the care team while at all times engaging with the family and caregivers to keep the patient at home and active for as long as possible.

The case study later in this article indicates the nature of the clinical problem confronting the GP managing a patient with cardiac failure with concurrent comorbidities. It demonstrates the difficulties experienced in managing patients with chronic and complex disease in community settings. As this article points out, this can occur in a cost-effective manner only if a proper system of care is put in place that uses a framework such as the Wagner model [3] for chronic disease management, the six elements of which are outlined below:

- Health system organization of health care. This includes planned programs across a population with goals and targets that can be measured. It requires clinical, epidemiological, and policy expertise.
- Self-management support. Health professionals providing health education and empowering patients to monitor their symptoms and signs.
- Decision support. Ensuring that the latest evidence-based guidelines are incorporated into clinical practice while continuing to encourage clinical judgment in decision making.
- Delivery system design. Ensuring a team-based approach to the care of patients with chronic and complex disease while maintaining a pivotal role for the GP as the care coordinator.
- Clinical information systems. Use of IT support at the population level as well as at the clinic level to ensure that patient data are shared by all members of the care team and that local population data are made available to monitor progress.
- Community resources and policies. Developing partnerships with local hospitals, health services, and specialist clinics to support patient needs.

### Prevalence of CHF

The exact prevalence of CHF is unknown and depends on the methods used to establish diagnosis.

Naturally, the use of echocardiography and B-type natriuretic peptide level in population screening will yield higher prevalence rates and will also identify those at risk so early therapeutic intervention may be implemented [4].

Hospital data may be accurate but do not represent the true population prevalence. GP data may not represent undiagnosed cases, and the same applies to population surveys. In a systematic review of the literature by Sahle et al. [5], the prevalence in Australia was estimated at 1%–2% of the population. However, in developed countries in people older than 75 years the figure may be as high as 10%, rising to 13.6% in those aged 80–86 years. The prevalence in Australia is higher among indigenous people, women, and those living in rural communities, possibly related to aging for the latter two. In Australia approximately 350,000 people are being treated for CHF and there are approximately 45,000 admissions for CHF annually. In the USA there are approximately 800,000 admissions a year for heart failure [2]; any given patient may have several admissions a year. A population study in Rotterdam involving almost 8,000 participants older than 55 years found a higher prevalence in men, ranging from 0.9% in participants aged 55–64 years to 17.4% in those older than 85 years. The lifetime risk at age 55 years was 33% for men and 29% for women [6].

A 2003 study in China [7] involving self-reporting by a random sample of 15,518 individuals aged 35–74 years revealed a prevalence of 0.9% in the general population, 0.7% for men and 1% for women. The prevalence increased with age (the Chinese population is now aging), and was greater in urban areas than in rural areas. Self-reporting may not reflect the true prevalence, and the prevalence rises sharply in those older than 75 years, so the true number in the whole population may well be greater than the 4 million estimated by the authors.

It is difficult to predict the prevalence going forward. However, the following factors will play a part [8]:

- Aging
- Increased prevalence of obesity, diabetes, hypertension, and ischemic heart disease
- Decreased case fatality rate due to improved management of risk factors for heart failure, in particular



coronary syndromes (stents, grafts), but ultimately CHF develops

- Improved early detection through use of echocardiography or other technologies

### Definition and classification

In simple terms, CHF occurs when cardiac output is insufficient to meet the body's needs at rest or with physical activity [9]. It is a clinical syndrome with symptoms of dyspnea and fatigue that can occur at rest or with effort, and is characterized by objective evidence of an underlying structural abnormality or cardiac dysfunction that impairs the ventricle from filling with or ejecting blood particularly during physical activity.

It may be further subdivided into systolic heart failure, where ejection is impaired, and diastolic heart failure, where cardiac filling is impaired. The former is known as *heart failure with reduced ejection fraction*, and the latter is also known as *heart failure with preserved ejection fraction*. The distinction may have some therapeutic and prognostic implications; for example, beta blockers may not be used in heart failure with preserved ejection fraction.

Table 1 outlines the classification of CHF according to severity as defined by the New York Heart Association (NYHA).

### Causes of CHF

Coronary heart disease with past myocardial infarction is the commonest cause and accounts for more than half of new cases

Table 1. New York Heart Association classification of chronic heart failure (CHF)

Class	Symptoms
I	Asymptomatic left ventricular dysfunction
II	Slight limitation of physical activity. Ordinary activity results in fatigue, palpitations, dyspnea, or angina (mild CHF)
III	Marked limitation of physical activity. Less than ordinary activity leads to symptoms (moderate CHF)
IV	Unable to perform any physical activity without discomfort. Symptoms of CHF present at rest (severe CHF)

of CHF. Essential hypertension undiagnosed or undertreated may be associated with coronary heart disease and CHF.

Other causes include:

- Cardiomyopathy, which may be idiopathic, infective (viral), HIV related, alcohol induced, drug induced (particularly cytotoxic drug used in cancer treatment), or hypertrophic obstructive cardiomyopathy
- Valvular heart disease
- Chronic arrhythmia
- Thyroid dysfunction

In 2000 in China the top three causes of CHF were coronary heart disease (55.7%) hypertension (13.9%), and rheumatic valvular disease (8.9%). In 1980 the number one cause was rheumatic valvular disease (46.8%) [6].

### Diagnosis of CHF

Diagnosis of CHF is made by history, clinical examination, and limited but critical investigations. The telltale signs of raised jugular venous pressure (JVP), clinically evident cardiomegaly, basal crackles, and peripheral edema may not be present especially in NYHA class I and class II disease. The following tests may be undertaken to establish a diagnosis and possibly identify a cause:

- Chest X-ray.
- Electrocardiogram.
- Echocardiography. This is essential to confirm diagnosis, assess left ventricular function, and possibly identify a cause, including valvular abnormalities. It should be repeated every 2 years to monitor progress.
- Stress imaging with concurrent echocardiography study or nuclear study to assess perfusion.
- B-type natriuretic peptide level, which is sensitive in reflecting severity and hence prognosis.

### Principles of management

- Application of the Wagner model [3] for chronic disease management to the individual patient
- Active management of risk factors to prevent onset or recurrence (tertiary prevention)
- Appropriate treatment of CHF on the basis of the best available evidence tailored to the patient's condition and needs



- Prevention of acute exacerbations
- Palliative care in end-stage CHF (50% mortality within 3 years of first hospital admission unless the cause is found and rectified)

A number of well-designed studies in China have demonstrated the benefits of team-based care in the management of CHF. These studies have included the GP at the center of the care team. They have demonstrated improvements in medication adherence, clinical parameters, and clinical outcomes, reduction in hospital admissions, improved quality of life, and in some cases reduction in all-cause mortality [10, 11]. In some cases traditional Chinese medicine was part of the treatment.

### Specific treatment

- General measures (self-management is vital in this condition, hence the importance of patient education and ensuring adherence to nonpharmacological as well as pharmacological treatment).
- Fluid restriction to usually less than 1.5 L/day.
- Daily weighing and notification of the clinic if there is a weight gain or decrease of more than 1.5 kg/day.
- Salt restriction to less than 2 g/day. No salt added to food or cooking.
- Regular low-level exercise.
- Management of cardiovascular risk factors, including weight control and smoking cessation.
- Vaccination against influenza annually and pneumococcal pneumonia every 5 years.
- Management of depression if present.

### Pharmacological management

- Angiotensin-converting enzyme inhibitors (ACEIs) can prevent progression of disease and prolong survival [10]. Where ACEIs are not well tolerated, especially because of cough, then angiotensin II blockers may be used; however, they have not been shown to prolong survival [12].
- Beta blockers in symptomatic patients in addition to ACEIs may also prolong survival [9].
- Diuretics maintain normal blood volume and provide symptomatic relief.

- Aldosterone antagonists (spironolactone) may be added to the previously mentioned medications.
- Digoxin in some patients especially for control of ventricular rate in atrial fibrillation.
- Pacemaker in patients with NYHA class III or IV disease.
- Implantable defibrillator in patients with CHF and severe systolic dysfunction of the left ventricle.
- Surgical procedures, including revascularization, insertion of devices, and cardiac transplant.

### Management of the individual patient: The biopsychosocial approach

The following case study illustrates the challenges faced by the GP in whole patient care for a patient with CHF who like many in this category has multisystem disease and lives in difficult social circumstances [8].

### Case study

Mr. W is 76 years old and has a 15-year history of hypertension, ischemic heart disease, atrial fibrillation, obesity, type 2 diabetes, COPD, and osteoarthritis of his hips. He stopped smoking 12 years ago when he had four coronary artery bypass grafts. He lives with his 72-year-old wife, who also has type 2 diabetes, but is mainly concerned about her rheumatoid arthritis, which limits her activities. They have a son and daughter, who live in another province, and have two grandchildren, who they see only during holiday times. In the past 12 months Mr. W has had three hospital admissions for CHF. He is dyspneic on walking 50 m, is worse in the cold, and also periodically gets angina while walking. He was assessed for further coronary revascularization or stents but was found on angiogram to have diffuse small vessel disease not suitable for intervention.

#### Clinical Examination Findings

- Pulse 68 and irregular (atrial fibrillation)
- Blood pressure 110/70 mm Hg
- JVP 3 cm, apex beat sixth left intercostal space 12 cm from midline, loud ejection systolic murmur at apex, normal heart sounds
- Occasional basal crackles persisting after coughing
- No peripheral edema



#### Medication (daily dose)

- Digoxin PG 0.0625 mg
- Frusemide 80 mg
- Enalapril 10 mg
- Metoprolol 50 mg
- Spironolactone 75 mg
- Warfarin 5 mg
- Glyceryltrinitrate patch 50 mg
- Metformin 1000 mg
- Celecoxib 200 mg (occasionally)
- Paracetamol 2 g
- Sertraline 100 mg
- Temazepam 10 mg
- Glucosamine 1500 mg
- Salbutamol prn
- Fluticasone 400 µg

#### Case commentary

Patients such as Mr. W are becoming increasingly common in general practice, particularly in those practices caring for a large elderly population. These patients do not have a single condition but have multimorbidity and are subjected to polypharmacy with the possibility of side effects from drugs or from their interactions, including possible interactions with nonprescribed or herbal medicines. Elderly patients often live in compromised social circumstances with little disposable income, with their caregiver or partner also being unwell or in some way disabled. Nutrition may be compromised, and attention to proper self-management and adherence to complex medical regimens may be generally affected or specifically affected as a result of cognitive impairment. The role of the GP in these instances is complex and multifaceted. Essential elements of that role are listed below in the context of caring for Mr. W:

1. *Acute care.* The GP must be aware of the possible complications which could arise. In terms of the NYHA classification, he has class III disease but this could progress to class IV and require hospitalization if there is no intervention. His last echocardiogram, obtained 6 months previously, showed an ejection fraction of 36% (heart failure with reduced ejection fraction). Mr. W's cardiac failure does not appear to be optimally controlled. His JVP is elevated and he has basal crackles. It will be necessary to check his electrocardiogram and echocardiogram for any recent changes that may have resulted in further cardiac damage and his renal function (estimated glomerular filtration rate 1 month previously was 46 mL/min/1.73 m<sup>2</sup>). His fluid intake may need to be restricted to less than 1.5 L especially if he is hyponatremic. He may also need to increase the dose of the ACEI enalapril. He should be weighing himself daily, and recording and notifying weight changes. He should be discouraged from using celecoxib for arthritis of the hips; although it may reduce hip pain, it causes fluid retention and may exacerbate CHF. It will be important to ensure that his cognitive function is good and to involve his wife in aspects of his management. Some discussion by telephone with his cardiologist or referral back to the cardiologist or local hospital may help in these circumstances. The new European Society of Cardiology guidelines for the treatment of heart failure recommend a new drug, LCZ696, where current treatment with an ACEI is inadequate. This drug is a member of a new class of angiotensin receptor neprilysin inhibitors that was shown in the PARADIGM-HF trial to be more effective than the ACEI enalapril, which Mr. W is currently taking [13].
2. *Preventive care.* Mr. W needs to be seen by his GP on a regular basis, possibly monthly. Apart from full physical examination, including weight monitoring, he should have 3-monthly checks of his renal function and 2-yearly echocardiography. He has type 2 diabetes, so he should be monitoring his glucose level at home and have 3-monthly checks of hemoglobin A<sub>1c</sub> fraction along with regular eye checks and checks on foot care. Exacerbations of COPD due to infection may worsen CHF. Annual influenza injections and 5-yearly pneumococcal vaccination are in order. Regular inquiry into his mental state is essential. He is already being treated for depression, and this needs careful monitoring. Comorbid depression is common in chronic disease. Psychological strategies including engaging in enjoyable activities should be in place. The GP should also enquire into the well-being of Mrs. W. In many cases the partner will also be a patient of the GP, so this is known. Changes in social circumstances may



lead to deterioration of the CHF. The CHAT study demonstrated the benefits of monitoring patients with CHF by telephone in rural and remote areas. This required patients to self-monitor symptoms and weight gain and report changes to a nurse-led call center, enabling early intervention [14].

3. *Care coordination and care planning.* Mr. W cannot be managed by the GP alone. The following health professionals may also be involved in his care, with that care coordinated by the GP as the gatekeeper: cardiologist, respiratory physician, endocrinologist, clinic nurse, pharmacist, social worker, psychologist, and local hospital staff.

Careful care planning and ensuring that all health professionals are included in the care plan improves outcomes. Care plans should be documented and shared as a hard copy or electronically. Software programs such as CDM-Net [15] can achieve this.

Despite the best efforts, in time Mr. W's condition is likely to deteriorate. While there is no need to discuss end-of-life issues at this stage of his management, the GP may need to think ahead about these matters and how they will be handled. Eventually palliative care may be required.

### Key point summary

- In keeping with the global rise in the prevalence of chronic and noncommunicable disease, the prevalence of CHF is increasing globally, with estimates of 10% of the population older than 75 years affected in developed countries, despite improvements in the management of cardiovascular disease more generally.
- The commonest cause of CHF in China is ischemic heart disease, followed by hypertension and valvular heart disease.
- Echocardiography is essential in establishing a diagnosis as well as helping to identify a cause and to monitor progress.
- Management includes nonpharmacological as well as pharmacological treatment, and self-care with careful monitoring of salt and fluid intake as well as regular

weight measurement. Care planning and team-based care are essential in managing patients with CHF, who often have concurrent multimorbidity and are receiving polypharmacy.

- The case study of Mr. W illustrates the important role played by the GP in managing patients with NYHA class III or IV CHF as well as concurrent multimorbidity using a biopsychosocial approach.

### Conflict of interest

The authors declare no conflict of interest.

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### Author contributions

Leon Piterman was responsible for conceptualization, literature search, production of the first draft, adoption of reviewers comments, revision, and final draft. Hui Yang was responsible for inclusion of epidemiological data from Australia and China, translation into Chinese, and revision of early drafts. Zhaoxia Yin provided expert clinical information on treatment of cardiac failure, including pharmacological treatment in the Chinese setting.

### References

1. Australian Institute of Health and Welfare. Cancer in Australia 2017. Canberra: Australian Institute of Health and Welfare; 2017.
2. Collins SP, Pang PS, Fonarow GC, Yancy CW, Bonow RO, Gheorghiu M, et al. Is hospital admission for heart failure really necessary? The role of the ED and observation unit in preventing hospitalisation and rehospitalisation. *J Am Coll Cardiol* 2013;61:121–6.
3. Wagner E, Austin B, Davis C, Hindmarsh M, Shaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Aff* 2001;20:64–78.
4. Jorge AL, Rosa ML, Martins WA. The prevalence of stages of heart failure in primary care: a population based study. *J Card Fail* 2016;22:153–7.



5. Sahle BW, Owen AJ, Mutowo MP, Krum H, Reid CM. Prevalence of heart failure in Australia: a systematic review. *BMC Cardiovasc Disord* 2016;16:32.
6. Bleumink GS, Knetsch AM, Sturkenboom MC, Straus SM, Hofman A, Deckers JW, et al. Quantifying the heart failure epidemic: prevalence, incidence rate, lifetime risk and prognosis of heart failure. The Rotterdam Study. *Eur Heart J* 2004;25:1614–9.
7. Gu D, Huang G, He J. Investigation of the prevalence and distribution features of chronic heart failure in a Chinese adult population. *Chin J Cardiol* 2003;26:3–6.
8. Piterman L, Zimmet H, Krum H, Tonkin A, Yallop J. Chronic heart failure – optimising care in general practice. *Aus Fam Phys* 2005;34:547–53.
9. National Heart Foundation of Australia, Cardiac Society of Australia and New Zealand (Chronic Heart Failure Guidelines Expert Writing Panel). Guidelines for the prevention, detection and management of heart failure in Australia. Updated 2011. National Heart Foundation of Australia; 2011.
10. Yin Z, Xiao T, Jin X, Zhang Y, Chen Y. Effect of integrated management on death from chronic heart failure and analysis of influencing factors on death. *J Chin Gen Pract* 2016;19:4392–6.
11. Qin R, Xu J. Community based management strategies for chronic heart failure. *Chin Community Dr* 2013;15:111–2.
12. Gring C, Francis G. A hard look at angiotensin receptor blockers in heart failure. *J Am Coll Cardiol* 2004;44:1841–6.
13. McMurray JJ, Packer M, Desai AS, Gong J, Lefkowitz MP, Rizkala AR, et al. Angiotensin-neprilysin inhibition versus enalapril in heart failure. *N Eng J Med* 2014;371:993–1004.
14. Clark R, Yallop J, Piterman L, Croucher J, Tonkin A, Stewart S, et al. Adherence, adaptation and acceptance of elderly chronic heart failure patients receiving health care via telephone monitoring. *Eur J Heart Fail* 2007;9:1104–11.
15. Jones KM, Dunning T, Costa B, Fitzgerald K, Adaji A, Chapman C, et al. The CDM-Net Project – the development, implementation and evaluation of a broadband-based network for managing chronic disease. *Int J Fam Med* 2012;2012:1–7.