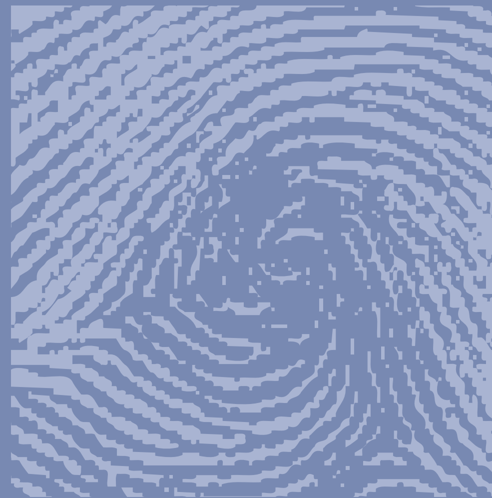
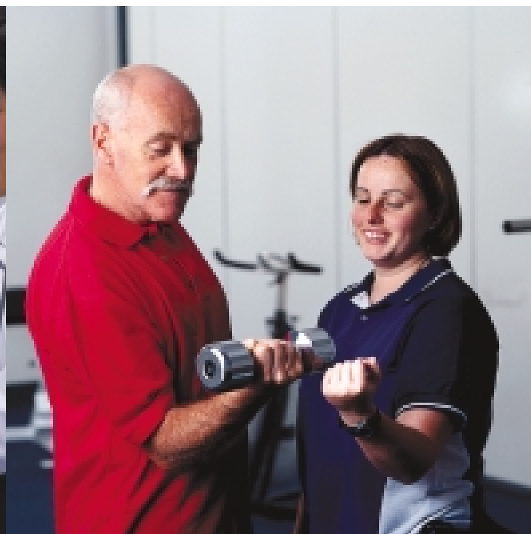


Hospital admission risk program (HARP) Chronic heart failure working party report



Victoria
The Place To Be

Hospital admission risk program (HARP)
Chronic heart failure working party report

March 2003

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Level 16, 555 Collins St, Melbourne Vic 3000
Facsimile: (03) 9616 8347
Email: paul.williamson@dhs.vic.gov.au

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Preface

The Hospital Admission Risk Program (HARP) was established in 2001 as the prevention component of the Hospital Demand Management (HDM) Strategy.

The HARP Reference Group, chaired by Professor John Funder, oversees the implementation of HARP, including the allocation of funds to service providers, and advises on how hospital admissions and emergency department presentations can be prevented. HARP focuses on tertiary prevention – that is, avoiding unnecessary emergency presentations and hospital admissions and readmissions. HARP targets people who have manifest health need, often where their disease or condition is chronic or complex.

In July 2002, the HARP Reference Group formed seven working parties to undertake analysis in priority areas that provide opportunities to have a significant impact on preventing the avoidable use of hospitals.

These working parties were:

- Chronic Heart Failure
- Chronic Obstructive Pulmonary Disease
- Community–Hospital Interface
- GP–Hospital Interface
- Integrated Care for Clients with Complex Needs
- Mental Health, and
- Technology

This report presents the findings of the Chronic Heart Failure Working Party.

The working party reports build on the information presented in the HARP Background Paper and have been produced to assist in designing projects for the 2003-04 HARP funding round.

The Department of Human Services would appreciate any comments, suggestions for further work or other feedback you may have on the contents of the working party reports. These can be forwarded to the HARP Project Officers, Ian Coverdale at ian.coverdale@dhs.vic.gov.au or Paul Williamson at paul.williamson@dhs.vic.gov.au and will be considered as we further develop the evidence around preventive initiatives.

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Glossary

Term	Definition
Alpha blocking agent	Medication which leads to relaxation of blood vessels, lowering blood pressure, and often leading to increased heart rate.
Angina	"Angina pectoris" is "strangling in the chest" – a classical type of chest pain arising from ischaemic heart disease. The pain is commonly a choking feeling which may spread to the arms or jaw. Pain is commonly induced by effort and eased by rest.
Angiography (eg arteriography)	The process of producing a radiograph to demonstrate pictorially the state of blood vessels (eg coronary arteries).
Angiotensin converting enzyme (ACE) inhibitor	Medication to inhibit the enzyme which converts naturally occurring angiotensin I into the active substance angiotensin II. The effect of the medication is to dilate blood vessels, thereby reducing blood pressure and the load on the heart.
Angiotensin receptor blocker (ARB)	Medication which blocks the effect of angiotensin on cells particularly in the blood vessel walls, thereby lowering blood pressure and reducing the work of the heart.
Antiarrhythmic agent	Medication used to stabilise the heart's rhythm or to prevent the occurrence of arrhythmias
Anticoagulant	Medication used to prevent blood from clotting.
Arrhythmia	Irregularity of the heartbeat.
Atheroma	The deposition of fatty plaques responsible for atherosclerosis, coronary heart disease and other manifestations of arterial disease.
Atrial fibrillation	Chaotic heart irregularity arising from the atria (reservoir chambers of the heart), common in patients with HF and in the aged.
Beta blocker (beta adrenergic antagonist)	Medication which reduces adrenalin stimulation of the heart, leading to slowing of heart rate and lower blood pressure. This double effect (double product) reduces the work of the heart.
Calcium antagonist (or blocker)	Medication reducing movement of calcium across cell membranes. Used to lower blood pressure and to treat angina.
Cardiac catheterisation (eg coronary arteriography)	The method used to inject radio opaque contrast medium into the heart or blood vessels, using a catheter, into an artery or vein in the arm or leg.

Cardiac rehabilitation	A program of education, exercise and support, usually lasting several weeks, mainly during convalescence following an acute cardiac event or intervention, usually conducted in groups, aiming to maximise early physical and psychological recovery and to facilitate improved health behaviours to slow or reverse the progress of heart disease.
Cardiomyopathy	A condition in which heart muscle becomes weakened or its contraction becomes less effective. Its origin may be from viral infection (myocarditis), from heredity (familial cardiomyopathy), or unexplained (idiopathic cardiomyopathy). Some physicians include ischaemic heart disease with HF as being “ischaemic cardiomyopathy”.
Carer	Spouse, family member or significant other with primary responsibility for assisting and supporting the CHF patient
Chronic HF (CHF)	Often previously referred to as congestive HF (also CHF). While congestion with fluid retention is commonly present, in some patients congestion is absent so that the term “congestive HF” has been replaced by the broader term “chronic HF”.
Coronary angioplasty	The procedure in which a narrowing or blockage within a coronary artery is opened by use of a balloon at the end of a catheter.
Coronary artery bypass graft surgery	The operation whereby stenoses (narrowings) are bypassed in the coronary arteries using other arteries from within the chest, arteries from the forearm, or veins from the leg as the bypass graft conduits.
Coronary artery disease	The condition in which coronary arteries develop fatty cholesterol-containing deposits in their walls, coupled with reaction to that deposit with scarring and inflammation.
Coronary artery stenting	The procedure in which a narrowing in a coronary artery is opened by coronary angioplasty and held open by a stent or mesh to assure continued patency (prevention of restenosis). The stent is left in place and the balloon catheter is removed.
Coronary artery thrombosis	The occurrence of blood clotting in a coronary artery. The precursor to acute coronary syndromes of unstable angina and myocardial infarction.
Diabetes mellitus	A condition in which there occurs failure of production of insulin (type I diabetes) or resistance to the effect of insulin (type II diabetes). A major feature is elevation of the glucose level in the blood.

Digoxin	An antiarrhythmic drug and inotropic agent, digoxin reduces heart rate in patients with atrial fibrillation and improves cardiac output in patients with symptomatic HF.
Diuretic	Medication ("fluid tablet"), the effect of which is to increase urinary flow, thereby reducing the amount of fluid in the body and reducing the blood volume.
Dyspnoea	Shortness of breath or difficulty in breathing.
Echocardiogram	A visual definition of the heart chambers and valves, either as a static picture or as moving structures. The images are created by the bouncing back of ultra sound waves from a hand-held source.
Electro–cardiogram	A recording or display of the heart's electrical activity as the staged stimulating electrical impulse passes through each phase of contraction of the heart.
Ejection fraction (EF)	The proportion of blood volume ejected from the heart during each systolic contraction (usually greater than 55%). EF is determined from the end diastolic volume and end systolic volume of the left ventricle. EF is reduced in those with systolic dysfunction but may be normal or near normal in those with diastolic dysfunction.
Fatigue	A symptom of tiredness or lethargy but also a description of impaired muscle function or reserve noted during activity. In many patients with CHF, muscular or general fatigue may be more prominent than dyspnoea.
Hypertension	High blood pressure.
Hypotension	Low blood pressure.
Inotropic agent	Medication to increase the force of the heart's contraction (some refer to this as "whipping a tired horse").
Ischaemic heart disease	A product of coronary artery disease in which symptoms or signs appear which declare that the heart muscle (usually part of the left ventricle) is inadequately nourished with blood (including oxygen).
Left ventricular diastolic dysfunction	The pattern of HF or abnormal heart function where there is impaired relaxation of the left ventricle.
Left ventricular systolic dysfunction	The pattern of HF or abnormal heart function where there is impaired contraction of the left ventricle (either general or local).

Myocardial infarction	Death of heart muscle which arises from coronary artery occlusion. The dead tissue is replaced over time by scar formation.
Oedema	The accumulation of fluid in the tissues due to insufficient passage of urine. Oedema is usually noted first at the ankles.
Paroxysmal nocturnal dyspnoea	An attack of severe breathlessness awaking a person from sleep, due to HF which induces fluid retention in the lungs during the night. Being somewhat similar in character to an asthmatic attack, it is also referred to as "cardiac asthma".
Pulmonary oedema	The accumulation of fluid in the lungs producing profound breathlessness, often at rest, and coupled with cough, chest rattling and moist sounds over the lungs.
Vasodilator	Medication used to relax blood vessels, thereby lowering blood pressure and reducing the work of the heart.

Foreword

The Hospital Admission Risk Program (HARP) is a project of the Victorian Department of Human Services. It aims to avoid unnecessary use of emergency departments by implementing models of care through alternatives that involve the hospital and the community. The program applies particularly to those persons with chronic diseases, who are most likely to need recurrent attendance at, and admission to, public hospitals.

Chronic heart failure (CHF) falls into the above disease category. CHF is one of the most disabling medical conditions. It is the end stage of heart disease, often following recurrent heart attacks or long-standing high blood pressure. It is common among older people, both men and women. Episodes of acute heart failure punctuate the last few months or years of life of those with CHF. These episodes necessitate emergency department attendance and the occupation of acute hospital beds.

Modern pharmacological treatment markedly improves the condition. Further, a multi-disciplinary approach to the management of CHF patients (as distinct from medical care alone) also produces better outcomes. Studies demonstrate that these measures, properly applied, reduce symptoms and disability, reduce hospital attendances and use of hospital beds, prolong lives, and significantly improve the quality of life of patients and their carers.

Unfortunately, the application of evidence-based knowledge is often less than optimal in practice in both the pharmacological and non-pharmacological treatment and care of CHF patients. It is only starting to be implemented through multi-disciplinary care. Failure to institute best practice management of CHF patients arises, to some extent, because health care providers are not fully aware of recent advances in pharmacological treatments and non-pharmacological approaches to the management of CHF patients. Poor discharge planning and inadequate liaison between hospital and community service providers are also responsible for sub-optimal care of CHF patients.

As part of the HARP process, funds will be made available in the 2003-2004 round for the development of new programs aimed at providing better care of patients with CHF and other chronic diseases. The HARP CHF Disease Management Working Party was established to generate a report to be used as a resource for those submitting proposals for funding and for those reviewing the proposals. This report explores the scientific evidence underpinning the guidelines for improving the care of patients with CHF. On the basis of that evidence, recommendations are made in the report regarding optimal management. Suggested indicators to assess processes of care and patient outcomes are also included. The recommendations and indicators apply particularly to metropolitan and regional centres. They are

not necessary applicable to rural or remote health services. Findings of focus groups and a survey of health care providers in the field support the major recommendations of this report.

Dr Jan Davies

Chair

Chronic Heart Failure Disease Management Working Party

1 Executive summary

This report presents an overview of chronic heart failure (CHF) and a discussion of the major problems recognised to confront all who are concerned with the management of the disease, namely patients, carers and health care providers. It addresses how these problems are being approached throughout industrialised countries, directing attention towards those interventions and supports which have now been demonstrated to be effective in the management of CHF patients. Additional detail pertaining to evidence for best practice management of CHF is available in a supplementary report located at www.health.vic.gov.au/hdms/harp/index.htm.

Recommendations are made about how to improve standards of care, based upon published scientific evidence. Perceptions of practitioners regarding deficiencies in current services are also referred to, together with reports of strategies which have been used to overcome weaknesses across the current health service system. Indicators to use in assessing the delivery of services and patient outcomes are suggested.

Key recommendations for standards of care

Chapter 2 presents the report's key recommendations for standards of care of patients with CHF, which are as follows:

All patients presenting with CHF require an accurate clinical diagnosis and confirmation of that diagnosis.

All patients with established CHF require:

- seamless progression through each stage of education, management and support
- optimal pharmacological management, directed by national and international guidelines
- non-pharmacological management in the form of an integrated management program (IDM), supported or managed by a heart failure (nurse) co-ordinator
- a continuing program of activity and exercise based upon walking and maintenance of muscle strength for activities of daily living.

All patients and carers require education and support in achieving and maintaining a program of self care.

Any patient with any form of heart disease may progress to CHF. Prevention of CHF is possible by following guidelines appropriate to the underlying condition.

Each of the recommendations and standards of care is covered in some detail in the ensuing chapters and appendices.

Background

As discussed in Chapter 3, CHF is a major source of continuing disability, particularly in older people, both male and female. It contributes to frequent emergency department attendances and urgent hospital admissions, representing one of the greatest demands for hospital beds. After discharge from hospital, early readmission is required within one month for 20% of patients. The death of 50% of patients is expected during the ensuing three years following first presentation with an episode of an acute heart failure (HF). The problem is increasing with an ageing population and the costs associated with CHF are considerable. The prevention or more effective control of episodes of acute HF should lead to better outcomes for patients and a significant decrease in health care costs.

Diagnosis and classification of CHF

Chapter 4 describes CHF as a complication and sometimes pre-terminal state of heart disease, which has often been of long standing. The diagnostic and other difficulties facing medical practitioners are discussed and features of recent guidelines are outlined. Appendices 1 to 3 provide further details about the classification of CHF, levels of evidence for the effectiveness of treatment, and a summary of guidelines recently produced by the National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand.

- All patients with CHF:
- Presenting with an episode of CHF or acute HF require confirmation of diagnosis by clinical assessment and investigation
- Assessment of severity of CHF by symptoms (eg NYHA functional class or other)
- A diagnosis of the underlying cause of CHF
- Assessment of left ventricular function by echocardiogram
- Patients presenting with an acute HF episode require exploration of precipitating cause/s of that episode, and
- Require documentation of significant co-morbidity.

Key principles of management

In Chapter 5, key principles of the management of CHF patients are set out from the time of hospital admission to follow-up after discharge from hospital and management in the community. In summary, it is recommended that all patients presenting with CHF require:

- Confirmation of an accurate clinical diagnosis
- Seamless progression through each stage of education, management and support
- Optimal pharmacological management, directed by national and international guidelines

- Non-pharmacological management in the form of an IDM program, supported or managed by a heart failure (nurse) co-ordinator
- A continuing program of activity and exercise based upon walking and maintenance of muscle strength for activities of daily living, and
- Education and support in achieving and maintaining a program of self care.
- Any patient with any form of heart disease may progress to CHF. Prevention of CHF is possible by following guidelines appropriate to the underlying condition.

Pharmacological management

Chapter 6 covers pharmacological interventions, based largely upon national and international guidelines. Pharmacological treatments have advanced greatly in the past decade, with several therapeutic options demonstrated in clinical trials to reduce mortality, acute events and disability markedly. Scientific literature reviews and large randomised prospective clinical trials now present strong evidence for best practice in the pharmacological management of patients. While the importance of proper pharmacological management of CHF patients is now being recognised and information about appropriate medications widely disseminated, there is a definite need for more education among both general practitioners and specialist physicians.

Acute events continue to occur at the same rate as before, despite recent advances. Inadequate, even inappropriate medication, is often still being prescribed, indicating that evidence is only slowly extending into clinical practice. However, it is acknowledged that prescription of appropriate drugs is sometimes problematic because of the complex nature of the disease and the presence of co-morbidities among many CHF patients. Studies producing evidence of the effectiveness of particular medications usually excluded older patients with multiple co-morbidities. Non-adherence to recommended regimens is another major problem and remains high among CHF patients, many of whom are old, have multiple co-morbidities, impaired memory and impaired cognitive function. Carers can play a vital role in ensuring adherence to prescribed medication. It is recommended that CHF patients:

- who have symptomatic or other evidence of congestion should receive diuretic treatment
  - with loop diuretic if an acute episode
  - with loop or thiazide diuretic if not an acute episode
- receive treatment with an angiotensin converting enzyme (ACE) inhibitor unless contraindicated
- who are unable to take ACE inhibitor should be considered for treatment with angiotensin receptor blocker (ARB)
- treated with ACE inhibitor or ARB should be also treated with a beta-blocker unless contraindicated

- who are symptomatic should be treated with digoxin unless contraindicated
- with severe CHF, despite appropriate dosage of ACE inhibitor and diuretic, should receive spironolactone
- have additional medication to control the causes of CHF (eg lipid-lowering agents, aspirin, hypotensive agents as indicated)
- at time of institution of treatment with ACE inhibitor, should have renal function assessed
- receive a low dosage of selective ACE inhibitor as a start and be titrated upwards to the dosage used in clinical trials, if possible
- receive a low dosage of selected beta-blocker as a start and be titrated upwards to dosage used in clinical trials, if possible
- have standing blood pressure recorded, additional to lying or sitting
- who have atrial fibrillation (AF) should be considered for treatment with aspirin or warfarin

Non-pharmacological management

To achieve maximal benefit from effective interventions, multi-disciplinary care is required in addition to pharmacological treatment. Non-pharmacological interventions provide support and education for both patient and carer. They may include telephone calls or home visits by a health care provider, referral to an exercise or other community program, and review by a specialist, either in individual practice or at a hospital-based outpatient HF clinic or chronic disease management unit.

The value of non-pharmacological programs of integrated care is less well recognised. In consequence, Chapter 7 of this report presents in some detail an analysis of the now very strong evidence for benefit from integrated care or management. Non-pharmacological interventions have been shown to reduce the occurrence of acute events and hospital admissions significantly. These improvements are probably associated with a greater understanding of the condition and improved health care by patients, better adherence to regimens, and support from carers. Scientific literature review demonstrates from repeated, although small studies, that multi-disciplinary care with education programs for patients and carers favourably affects outcomes. Adequate follow-up and support generate significant additional benefits. Unfortunately, most of the literature does not report fully on the nature of the interventions beyond general description of the programs. Hence, there remain significant deficiencies in the evidence base of what works best in prevention of recurrent episodes of acute HF.

Personal education of patient and family is imperative for optimising the patient's capacity to manage their condition. This education should be delivered while the patient is in hospital and reinforced following discharge and include:

- Education should be interactive with full participation of patient/carer, questions answered, and explanation and reasons given for each therapeutic intervention
- Questions should be asked to ensure that patients and carers understand advice
- Formal discharge plan should be arranged with assurance of all appointments and procedures
- Telephone calls should be made to identify those needing further assistance, especially a home visit
- Home visits should be undertaken early, preferably within one week of discharge, to patients identified at risk of relapse with reinforcement of advice given during home visits
- Follow-up by telephone or visits should be arranged for missed appointments
- Patients have GP appointments confirmed
- Patients have referral to cardiologist or physician (individual or in clinic)
- Patients understand need for adherence to medication with consideration of dose and compliance aids
- Patients should understand the significance of weight gain (greater than 1.5kg in one day or 2kg in two days)
- Patients should cease smoking
- Patients should be aware of risks of infection, particularly respiratory, and have annual influenza vaccinations and 3-5 yearly pneumococcal immunisation.

This information should be reinforced with simple educational materials such as booklets, pamphlets, fact sheets, videos, tapes etc.

Exercise programs

Exercise training programs for CHF patients are discussed in Chapter 7. The physical and psychosocial benefits of exercise for CHF and other cardiac patients are widely acknowledged. Attendance at a group program following discharge from hospital also provides an opportunity for further education of patients and carers regarding medication and other aspects of their rehabilitation. It is recommended that:

- A dynamic (aerobic) exercise program, starting at low level and slowly increasing in duration, frequency, intensity and of preferably daily activity should be devised for each patient
- The level of activity should be supported by assessment of progress through verbal report, observation and possibly formal measurement of walking capacity (eg Six Minute Walk Test)
- Strength training, with use of muscle groups against resistance (similar to many activities of daily living), should be incorporated into the exercise program
- Long term support, enquiry and supervision are required to assure adherence to home activity and exercise

- Formal group exercise training programs are recommended where there are heart failure management programs
- Group exercise may be limited to patients with CHF or may be grafted on to a mainstream cardiac rehabilitation exercise program, and
- Home exercise is important for all CHF patients, especially older patients, those without transport and those from culturally and linguistically diverse backgrounds who may not participate in group programs.

Staffing and facilities in integrated disease management programs

Chapter 7 also describes the multidisciplinary team and discusses the roles of each team member. CHF patients require input from several different health care providers. Included in the multi-disciplinary team are a nurse, physiotherapist, occupational therapist, social worker, dietician, pharmacist, cardiologist or general physician, general practitioner, psychologist and others. Above all, an efficient and committed case manager or program co-ordinator is required to ensure good linkages between hospital and community so that patients receive a continuum of care from hospital admission to their return into the community. While each health care provider in the team has specific expertise and training, many tasks may be shared. The following recommendations are made:

- A co-ordinator is required for effective non-pharmacological management of CHF patients
- Other health professionals and community care staff should be available, as required. Some have special expertise appropriate to patients with specific difficulties (eg pastoral care worker, respite care worker, community care services)
- The co-ordinator requires good access to the regional cardiologist/physician or clinic and hospital support
- The co-ordinator needs to establish bi-directional supportive interactions with regional GPs
- Special training of potential nurse co-ordinators is required, through courses, to expand rapidly the accessibility of the knowledge base required for the specific nature of the work
- Administrative and other supports are required, sited in the community centre or hospital through which the integrated management program is delivered.

Self-care

As discussed in Chapter 8, comprehensive education of patients and carers is essential for management of CHF. Patients and carers need to understand and embrace the following recommendations concerning self-care:

- Undertaking daily recording of weight

- Response to weight gain greater than 1.5 kg in 24 hours
- Response to weight loss
- Limitation of fluid intake to 1.5 litres per day (2.0 litres per day in hot weather)
- Establish pattern of best timing of diuretic medication and of drugs used, in consultation with their GP
- Understanding of the need for long term medication rather than course of treatment
- Control of total caloric intake, persistence of saturated fat restriction
- Salt restriction through no added salt at table nor in cooking, plus avoidance of highly salted foods
- Persistence with activities (walking and activities of daily living) despite induction of dyspnoea with attempt to be active to level of awareness of breathing (not breathlessness) at least half an hour per day
- When in doubt about any aspect of management or behaviour, ask.

Palliative care

While Chapter 9 of this report addresses the ultimate development of the need for terminal or palliative care, its importance is recognised by all health care providers caring for CHF patients. Unfortunately, this aspect of the management of patients with CHF has not been adequately investigated and much research remains to be undertaken. It is recommended that:

- The principles of palliative care should be applied to patients with advanced CHF similar to those appropriate for patients dying of cancer
- Mechanisms for support from carers, community groups and health professionals should be developed, and
- Where possible, patients with end stage CHF should be assessed by a palliative care team to generate either consultative advice regarding patient management or continuing palliative care.

Confounding problems

Chapter 10 reviews the confounding problems affecting management and outcomes arising from psychological, social and environmental factors.

Perceptions of health care providers

International scientific literature presents a pattern of management of CHF that is deficient in many areas. The deficiencies, oversights, and errors of management appear to be widespread and entrenched in the pattern of medical care of the past. Many of these problems have been recognised by health care providers participating in CHF programs in Victoria.

2 Key recommendations for standards of care

The need for defined standards of care and indicators of best practice arises from the complicated management required for patients with CHF. Failure to achieve quality management occurs because of weaknesses or oversights in the delivery of care to patients, or failure of comprehension or adherence to recommended programs by patients.

The most apparent outcome indicator of failed or sub-standard care is recurrence of acute heart failure (acute HF) with the need for urgent attention, commonly with hospital emergency department attendance and hospital admission. While such crises may be unavoidable in many cases, the cause or causes of acute HF can be identified in the majority of cases. The potential causes have been largely defined and comprehensively reviewed[1-3]. The management oversights and patient misunderstandings apply to both pharmacological and non-pharmacological treatments.

The basic recommendations for standards of care are summarised below. These recommendations are developed throughout the text and followed, where appropriate, with a list of suggested indicators which may be used to assess how well standards of care are being met. Those indicators which are considered most important or easy to collect should be chosen for process or outcome evaluation.

Table 1 Recommendations for standards of care

1. All patients presenting with CHF require confirmation of an accurate diagnosis.
2. All patients require seamless progression through each stage of education, management and support.
3. All patients require optimal pharmacological management, directed by national and international guidelines.
4. All patients require non-pharmacological management in the form of an integrated management program, supported or managed by a HF (nurse) co-ordinator.
5. All patients require a continuing program of activity and exercise based upon walking and maintenance of muscle strength for activities of daily living.
6. All patients and carers require education and support in achieving and maintaining a program of self care.
7. Any patient with any form of heart disease may progress to CHF. Prevention of CHF is possible by following guidelines appropriate to the underlying condition.

3 Background

3.1 The increasing burden of chronic heart failure (CHF)

CHF currently affects 300,000 Australians, with about 30,000 new cases diagnosed annually[3]. In 1996-97, 41,000 patients were admitted to hospital with a primary diagnosis of CHF[4]. Most patients were aged 70 years or older. CHF accounted for 2% of all hospital deaths[4,5].

The major factor leading to CHF is older age. In Australia, the average life expectancy continues to rise and for females is now 82 years and for males 76.6 years[4].

Much of the survival into older age is a result of advances in the medical care of those with heart disease, particularly following acute myocardial infarction[5]. There has also been a significant improvement in life expectancy of those receiving treatment for hypertension. Medical and surgical treatment of other causes of heart disease (rheumatic heart disease, congenital heart disease, cardiomyopathy) also prolong life and contribute to the increasing occurrence of CHF in older age. This pattern is occurring throughout the industrialised world[6-9] .

Of patients who present with CHF, 50% are dead within three to four years[9]. Hospital stay, which was averaging eight days a few years ago[10], has now been reduced to approximately six days. Importantly, after discharge from hospital, unplanned readmission within 28 days is as high as 20% for CHF patients[11].

The cost of a single hospital admission in Australia is currently approximately $6,000. Repeated admissions are common, as are attendances for acute management in emergency departments, followed by a return home within 24 hours. The reasons for attendance at emergency departments and for readmission are quite well defined and most are considered preventable or controllable. However, management approaches demonstrated to be beneficial in studies are commonly poorly executed by patients, carers and health professionals[1-3]. Thus, acute episodes of CHF commonly occur, precipitating patients into a need for urgent care. Despite pharmacological advances in the care of CHF, there remain common oversights in management.

More effective management of patients with CHF provides for significant benefits to patients and their families. These may include increased life expectancy, reduced hospital admission, retention of income and employment amongst those in the workforce, minimisation of disability and dependency, with consequent improvement in quality of life of patients and carers, reduction or delay of interventions and a decrease in deaths.

- Improved management models also provide for more effective use of costly resources through:
- Reduced emergency department attendance
- Reduced hospital admission
- Reduced days in hospital
- Reduced medical attendances

- Improving prescribing habits
- Delivery of improved community services
- Improved adherence by patients to recommended regimens.

All of the above issues have been addressed in national and international guidelines for best practice management of CHF[1-3].

3.2 Implications for Victoria

The Hospital Admission Risk Program (HARP) is directed towards reducing the load on emergency departments and hospital acute care beds. It is recognised that these pressures could be reduced through developing continuum of care regimens whereby care is improved at all levels outside hospitals to avoid emergency attendance and admission to hospital. In 2001-02 in Victoria, CHF was the tenth most common diagnosis at hospital separation, with over 6,000 separations in 16 out of 18 hospitals admitting adult patients[12]. Over 5,000 of these patients were aged over 65 years. CHF has the highest separation volume of all conditions in this age group. Average length of stay (ALOS) for CHF patients varies between hospitals from 4.7 days to 8.6 days, with overall ALOS greater than six days.

Thus, with the progressive increase in the number of patients over 65 years in Victoria (currently estimated to be 625,000 from a total population of 4,810,000), one can expect an ever increasing load upon hospital facilities, unless the quality of care can be improved to prevent acute episodes of CHF.

Methods whereby such improvement may arise are now well defined, confirmed in the scientific literature and published in best practice guidelines. However, guidelines remain poorly implemented at all levels of patient care. Improved implementation has the potential to improve the health status of people with CHF while reducing the avoidable use of hospital facilities.

3.3 The incidence of CHF in Victoria

This section provides:

- an overview of the dataset which has been used to summarise the emergency admissions data for 1999-00, 2000-01 and 2001-02 at the 13 major metropolitan public hospitals, the Royal Children's Hospital and the 5 major rural hospitals,
- a definition of patients with CHF for the purposes of this analysis, and
- a map of the Victorian postcode areas showing where patients with CHF predominate.

Overview of Dataset

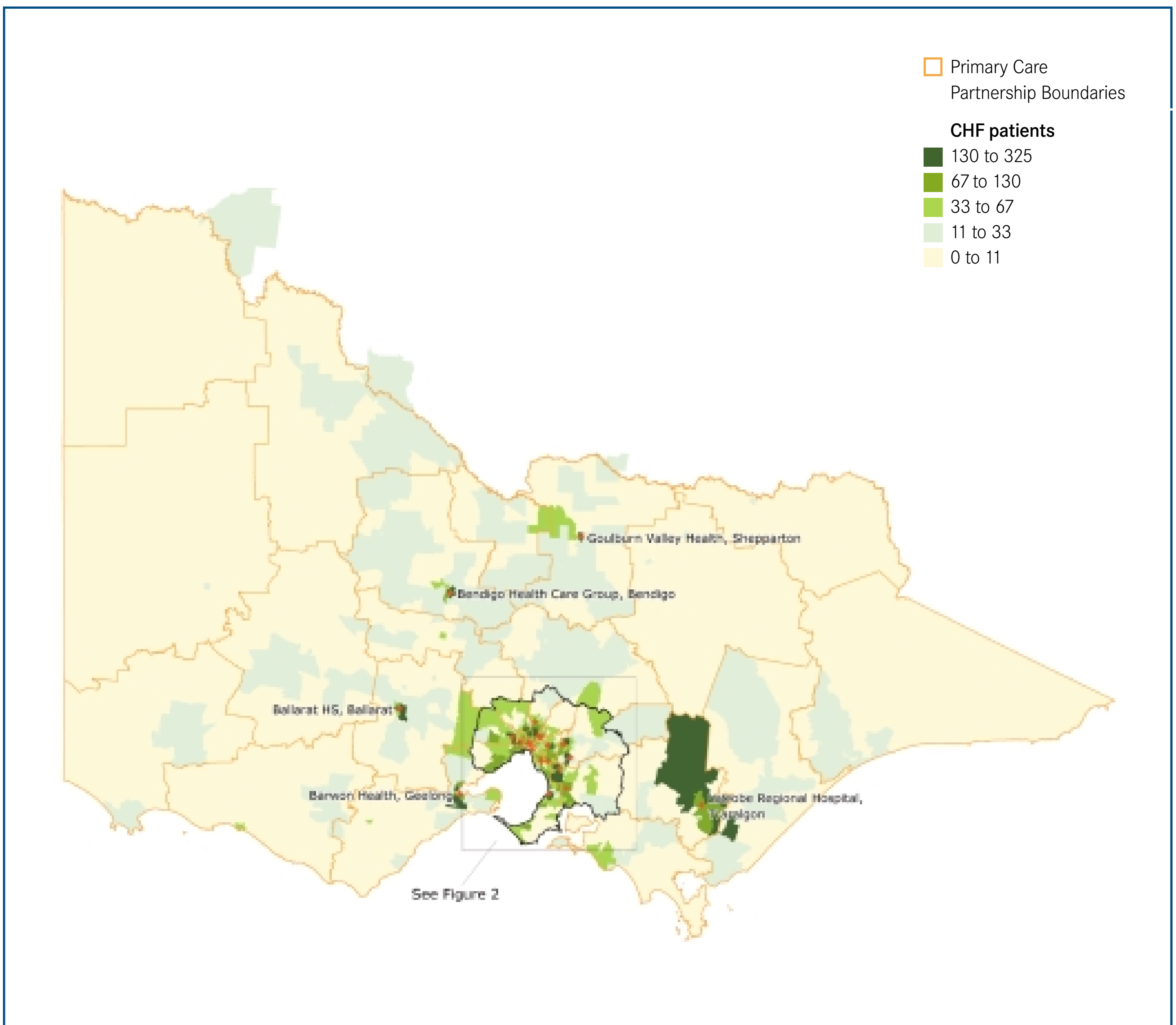
To transform the Victorian Admitted Episodes Dataset (VAED) from episodes of care level data into case level records for the financial years 1999-00, 2000-01 and 2001-02, a linkage algorithm based on all available variables for matching (date of birth, medicare number, country of birth, postal code, gender, hospital record number) was used. After this process was completed, a new identification number was assigned to the case-groups. The new identification number was not based on any original variable found within the VAED. All the variables noted above, other than date of birth and gender, were removed in order to de-identify the case level records.

This dataset provides the opportunity to analyse hospital utilisation data by individual patient over a 3 year period. In particular, this approach identifies overall hospital utilisation where patients were admitted to more than 1 hospital. In considering utilisation patterns for patients with CHF, along with their potential to be admitted to more than one hospital, this analysis provides a more comprehensive representation of patterns of hospital admission for individual patients than is possible through routine analysis of the VAED.

For the purpose of this analysis, patients with CHF were defined as those patients who have had at least one emergency hospital admission for which they were assigned a diagnostic related group (DRG) of heart failure and shock. The two DRGs used were F62A and F62B.

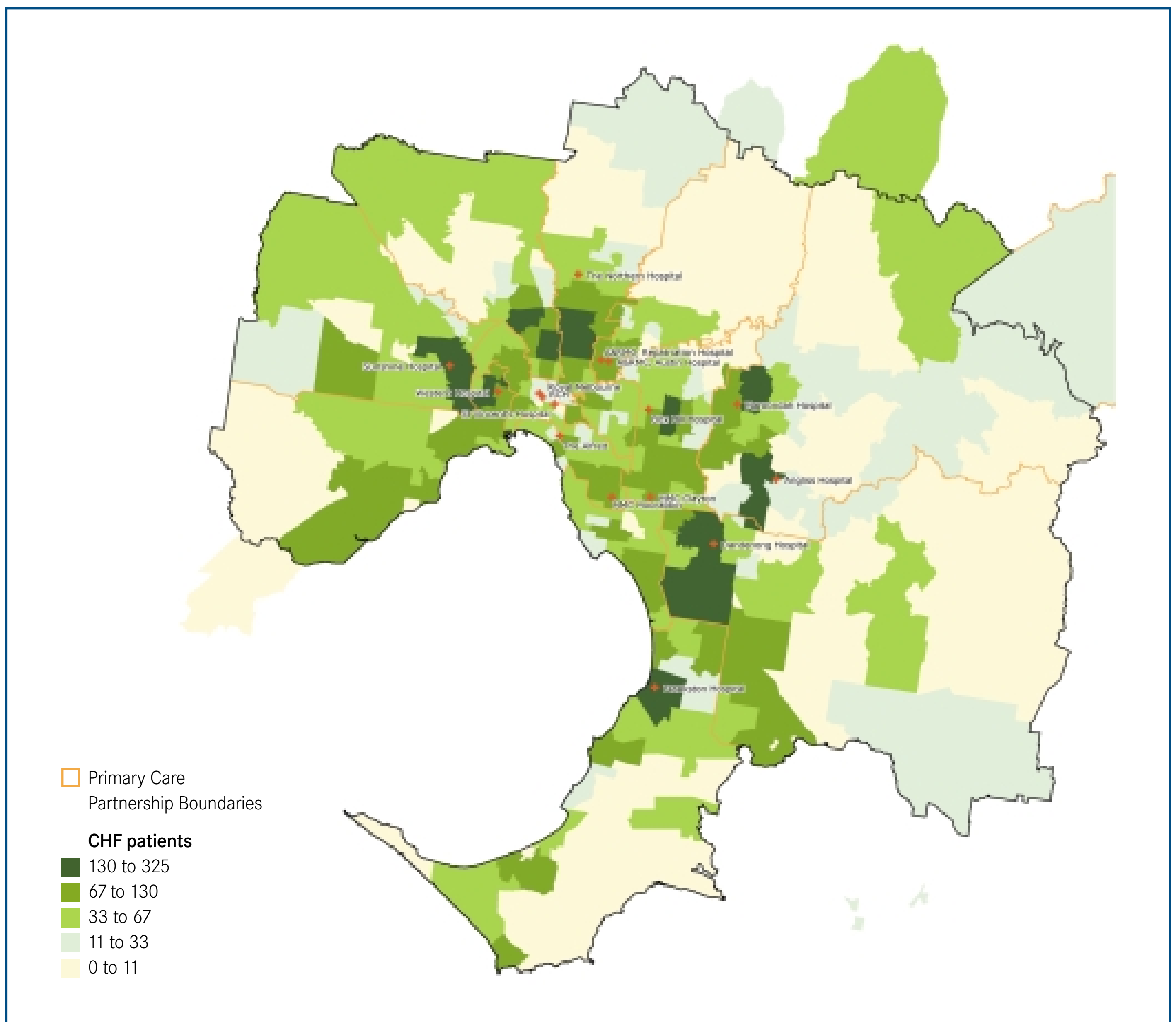
The following maps show the volume of patients with CHF within each postcode in Victoria along with the Primary Care Partnership boundaries.

Figure 1: Map of Victorian postcode areas showing where patients with CHF predominate



Footnote: The range breaks are determined according to a calculation that puts similar clusters of data into each range. This ensures that the ranges are well represented by the averages and that the data values in each range are fairly close together.

Figure 2: Map of metropolitan postcode areas showing where patients with CHF predominate



As indicated on these maps, the postcode areas with the highest number of patients with CHF are Reservoir (325), Frankston (282), St Albans (256), Sunshine (245), Dandenong (227) and Bendigo (211). A full listing of postcodes with more than 67 patients with CHF is at Appendix 4.

4 Diagnosis and classification of chronic heart failure (CHF)

4.1 Definition of CHF: clinical syndrome and pathophysiological state

Summarised below are definitions of CHF by major professional body, followed by the definition used for the purposes of this report.

The European Society of Cardiology Task Force Report: Guidelines for the Diagnosis and Treatment of Chronic Heart Failure[2] states: "HF is a pathophysiological state in which an abnormality of cardiac function is responsible for the failure of the heart to pump blood at a rate commensurate with the requirements of the metabolising tissues. This Task Force recommends that there should be symptoms of HF at rest, or during exercise, and objective evidence of cardiac dysfunction (at rest) and (in cases where the diagnosis is in doubt) response to treatment directed towards HF."

The ACC/AHA Guidelines for the Evaluation and Management of Chronic Heart Failure in the Adult[1] discusses the characterisation of CHF as a clinical syndrome, as a symptomatic disorder and as a progressive disorder. It states "HF is a complex clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of ventricle to fill with or eject blood. The cardinal manifestations of HF are dyspnoea and fatigue, which may limit exercise tolerance, and fluid retention, which may lead to pulmonary congestion and peripheral oedema. Both abnormalities can impair the functional capacity and quality of life of affected individuals, but they do not necessarily dominate the clinical picture at the same time. Some patients have exercise intolerance, but little evidence of fluid retention, whereas others complain primarily of oedema and report few symptoms of dyspnoea of fatigue. Because not all patients have volume overload at the time of initial or subsequent evaluation, the term 'HF' is preferred over the older term 'congestive HF' ".

The Guidelines for the Contemporary Management of the Patient with Chronic Heart Failure in Australia[3] presented by the National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand discuss the condition without the formation of a clear definition.

The Task Force on HF Education of the World Health Organisation and Council of Geriatric Cardiology[13] presents two definitions of HF, as follows:

Pathophysiological definition

"Cardiac failure is an inability of the heart to deliver blood (and therefore oxygen) at a rate commensurate with the requirements of the metabolising tissues at rest or during light exercise. This leads to characteristic systemic pathophysiological responses (neural, hormonal, renal and others), symptoms and signs."

Clinical definition

"Clinically the term 'HF' is applied to the syndrome of breathlessness and fatigue associated with cardiac disease. It is often accompanied by fluid retention (congestion), as indicated by an elevated jugular venous pressure and oedema. Conditions leading to a mismatch between tissue oxygen delivery and demand (eg anaemia) may mimic the clinical signs of HF, as may conditions causing fluid retention (eg renal or hepatic failure). The clinical diagnosis of HF, therefore, necessitates both the presence of significant cardiac disease and typical symptoms and signs."

Current definition of heart failure

For the purposes of this report, the term "heart failure" means chronic heart failure (CHF) and is a synonym for congestive heart failure. It includes systolic heart failure, diastolic heart failure and combined systolic and diastolic heart failure. These terms are discussed further in the section dealing with echocardiography.

4.2 Diagnosis

Symptoms and signs

The major presenting symptoms include shortness of breath and fatigue during little effort or normal activities, waking from sleep with breathlessness, swelling of ankles due to oedema coupled with unexpected weight gain, muscular fatigue, abdominal distension and upper abdominal discomfort due to liver engorgement.

Clinical signs include evidence of pulmonary congestion with moist sounds audible over the lung bases on auscultation, rapid heart action, usually sinus tachycardia, but often with pulse irregularity due to atrial fibrillation or frequent ventricular premature beats. Added 4th or 3rd heart sounds are commonly heard producing a triple or 'gallop rhythm' at the apex – (gallop cadence is dependent on the associated tachycardia), cardiac enlargement demonstrated by displacement, laterally, of the apex beat. There may also be diffuse or dyskinetic anterior palpable lift inside the apex. Raised venous pressure, most commonly evident in the internal and external jugular veins, is another marker of congestion. In addition to the above, there is usually a history of underlying heart disease. The most common abnormalities include evidence of coronary heart disease, particularly of past myocardial infarction, evidence of hypertension, usually of long-standing and evidence of diabetes (most commonly Type II or adult onset diabetes), usually coupled with obesity. There may be evidence, sometimes equivocal, of past or recent cardiomyopathy or myocarditis, valvular heart disease, either as a cause of, or complication from, myocardial dysfunction, congenital heart disease or pericardial disease.

Secondary features

In addition, there may be evidence of changes arising in individuals who have established HF. These changes may be both physical and psychological, including generalised muscle wasting from disuse and enforced inactivity, and reduced muscular strength, also due to disuse, which is sufficient to interfere with performance of normal activities of daily living and self care. Increasing weight may occur due to reduced physical activity, independent of weight gain from fluid retention. Decreasing weight can occur from loss of appetite, nausea and abdominal discomfort on eating because of hepatic and gastric congestion. A similar decrease in weight may also occur due to dehydration.

Weight loss may also occur because of a loss of interest in eating associated with psychological depression. Features of psychological depressive illness may include blunted affect, a sense of despair, even hopelessness, and thoughts of death or further life being of little value. Anxiety symptoms and manifestations usually accompany the depressive reaction and may dominate the symptom presentation. The above features are variably discussed in the four sets of guidelines referred to above[1-3, 13].

Tests

Confirmation of diagnosis and its causes is required in each case. This is usually dependent upon tests. Rarely does HF come without recognised cause. Hence recognition of an underlying cause is important in establishing the diagnosis.

Radiology

A chest x-ray commonly demonstrates cardiac enlargement and the presence of pulmonary venous congestion.

Electrocardiography

An electrocardiograph helps in defining evidence of past myocardial infarction or persisting ischaemia from coronary heart disease, or of left ventricular hypertrophy from hypertension and may also help in defining arrhythmias.

Blood tests

Urea, creatinine and electrolyte patterns are often disturbed by CHF itself, or by medications to control the CHF.

Serum atrial naturetic peptide or central (brain) naturetic peptide may be estimated as markers of elevated atrial pressures, indicating the likely presence of CHF and supplying an additional measure of its severity.

Liver function tests may indicate disturbance of hepatic function.
Lipid levels are required as baseline measures for control of coronary heart disease.
Haemoglobin estimation, with or without full blood examination, is undertaken

to exclude anaemia as a cause of the symptoms, or as contributing to the degree of CHF.

Thyroid function tests are performed to exclude both hyperthyroidism and hypothyroidism which may mimic or aggravate CHF.

Echocardiography

Echocardiography is now regarded as a requirement, both in the diagnosis and assessment of CHF, to determine the size and contractility of the ventricle, with measurement of end-systolic and end-diastolic volume from which ejection fraction is also calculated. Further, it assesses the integrity or otherwise of valve function. Echocardiography is used to determine whether CHF is due to impaired left ventricular contraction (systolic dysfunction) or impaired relaxation (diastolic dysfunction). The former is most commonly found in those with past myocardial infarction or dilated cardiomyopathy as the underlying cause of CHF. The latter is more common in those with long standing hypertension.

These clinical and investigative methods are widely endorsed and reviewed in the scientific literature and in clinical practice guidelines, as referred to above[1-3, 13].

4.3 Causal diagnosis

To have CHF it is necessary to have cardiac disease. Hence the causal diagnosis is also required for categorisation, description and management. In most cases, particularly amongst those with systolic dysfunction, CHF is due to ischaemic heart disease with past myocardial infarction. Commonly it is due to longstanding hypertensive heart disease, particularly in the elderly and particularly in women where diastolic dysfunction is most commonly found. Rheumatic, congenital, cardiomyopathic and other heart diseases account for a small proportion of patients with CHF. Conduction disturbances may also account for CHF in some patients.

4.4 Classification of CHF

Category

The ACC/AHA categorised impaired ventricular function into four stages[1].

Level A High risk of left ventricular dysfunction

This means that HF is not yet present, but that existing heart disease (usually hypertension or ischaemic heart disease) is present and this may lead to left ventricular dysfunction and HF.

Level B Left ventricular dysfunction without symptoms

Left ventricular dysfunction without symptoms is extremely common following myocardial infarction and in long-standing hypertension where systolic or diastolic dysfunction respectively may be present, but symptoms of breathlessness and fatigue are not yet apparent.

Level C Left ventricular dysfunction with current or prior symptoms

Level C deals with CHF as commonly found in practice, with left ventricular dysfunction (systolic, diastolic or mixed). Prior symptoms indicate that the patient, previously presenting with significant symptoms, has had symptoms which responded to appropriate treatment and the passage of time.

Level D Refractory end stage CHF

This refers to advanced CHF, present in those needing palliative care.

For practical purposes, further discussion of CHF in this report concerns Category C. However, it is important to consider Categories A and B in terms of prevention of first presentation with CHF.

Functional class

The New York Heart Association (NYHA) functional class classification has been used for many years and is a simple measure or recording of symptomatic status[14].

Table 2 presents the ACC/AHA categories of ventricular dysfunction in abbreviated format, and NYHA functional class. The NYHA functional class is set out in greater detail in Appendix 1, together with the alternative Specific Activity Scale[15].

Table 2 Classification of CHF

ACC/AHA category of left ventricular (LV) dysfunction

Level	Status (summarised)
A	High risk of LV dysfunction
B	LV dysfunction without symptoms
C	LV dysfunction with current or prior symptoms
D	Refractory end-stage CHF

NYHA functional class

Functional class	Status (summarised)
I	No symptoms with normal effort
II	Symptoms with normal effort
III	Symptoms with slight effort
IV	Symptoms at rest

(Symptoms generally refer to dyspnoea and fatigue. For details, see Appendix 1)

The initial assessment of severity may rapidly improve following institution of medication, either at home or with a short period of hospital care. This explains how patients can be categorised as suffering from CHF but, when seen subsequently, may have no symptoms, having reverted to Class I, despite having impaired ventricular function.

4.5 Acute heart failure (acute HF)

It is episodes of acute HF that necessitate urgent medical care. These episodes of acute HF lead to hospitalisation of patients with CHF. Acute HF may appear for the first time, or may appear repeatedly throughout ensuing months or few years prior to death. Usually presentation is with acute pulmonary oedema. This is preceded by recognisable fluid retention, often overlooked.

Causal factors for acute HF have been widely investigated and reported. Of greatest importance is non-adherence to medication and modification of dosage or timing of diuretic regimens. The precipitating factor for acute HF is most commonly failure to take a diuretic because the diuretic interferes with activities expected during the day, and then forgetting to take the diuretic on return home in the afternoon or evening. Under these circumstances pulmonary oedema is likely to occur during the night. This produces a need for urgent medical care, commonly with emergency department attendance and often with hospital admission. Hospital admission under these circumstances is usually for several days (five to eight days). Response to hospital treatment is usually rapid, with reinstitution and re-evaluation of regimens of care but, as widely reported elsewhere,[1-3] these regimens are likely to be inadequately administered and supervised.

4.6 Factors affecting patient outcomes

As indicated earlier, 20% of patients are likely to be readmitted within 28 days following first admission to hospital with acute HF[11]. 50% of patients are likely to be dead within three years[9].

There are many factors affecting adverse outcomes, including:

- non-adherence to medication
- non-adherence to self care regimens
- older age
- more severe CHF
- infection
- arrhythmia
- recurrent myocardial infarction or ischaemia
- pulmonary embolism
- anaemia
- co-morbidity
- treatment of co-morbidity

The severity of CHF, as reflected by ventricular dysfunction, and also by symptoms while taking treatment, are major markers of adverse outcome.

The age of the patient is also very important. The older the patient, the greater the risk of disability, dependency and death. As women develop CHF approximately 10 years later than men on average (because of their older age and the later onset of heart disease), women have a worse prognosis than men.

Prognosis, particularly in terms of disability, is partly related to co-morbidity, including chronic obstructive pulmonary disease, arthritis, obesity and diabetes. Treatment of co-morbidity and the effects of such treatment may interfere with the management of CHF itself, for example, the adverse effects of non steroidal anti inflammatory drugs (NSAID), steroidal treatment, neurotrophic medication, beta agonists and other medication.

4.7 Table 3 Recommendations: diagnosis and assessment of CHF

	Level of evidence
Patient with CHF or presenting with an episode of acute HF require:	EO
• confirmation of diagnosis by clinical assessment and investigation	
• assessment of severity of CHF by symptoms (eg NYHA functional class or other)	
• a diagnosis of the underlying cause of CHF	
• assessment of left ventricular function by echocardiogram	
• documentation of significant co-morbidity	
Patients with an acute HF episode require exploration of precipitating cause/s of that episode	EO

EO= expert opinion

4.8 Table 4 Suggested indicators: diagnosis and assessment of CHF

1. Proportion of patients with provisional diagnosis of CHF confirmed to have correct diagnosis
2. Proportion of patients with rating of symptom severity (eg NYHA class or other) recorded on admission, on discharge and at follow-up
3. Proportion of patients with underlying cause of CHF established
4. Proportion of patients who have had an echocardiogram during hospital admission or convalescence
5. Proportion of patients with acute HF in whom probable precipitating cause(s) is recorded
6. Proportion of patients with co-morbidity noted in medical record

5 Management of CHF

ACC/AHA Categories C & D

5.1 Key principles of management

For patients with CHF, careful integrated management, both pharmacological and non-pharmacological, has been demonstrated to delay or prevent acute episodes, significantly reduce emergency department attendances and hospital admissions, with significant benefits to patients, families, emergency departments and hospital bed loads. To achieve these outcomes, it is necessary to have a continuum of care, extending between hospital and community and into the patients' homes.

Evidence-based best practice is set out in guidelines[1-3] and appropriate standards are now defined. The clearest evidence arises from pharmacological interventions.

Physical interventions, in the form of transplantation, mechanical assist devices, some other surgical interventions and biventricular pacing have been successfully applied to subsets of patients.

Considerable attention has now been directed to non-pharmacological interventions. These include adequate education of patients and carers, assurance of understanding by patients and carers and competent discharge planning, with good communication between hospital, general practitioners (GPs) and others involved in the patient's care. Basically, the management remains under the care of the GP. However, consultation is highly beneficial, either through a hospital clinic, a cardiologist with appropriate experience in the management of CHF, or a general physician with similar experience and training in the management of CHF. The place of telemetry and telemedicine remains uncertain. These non-pharmacological approaches are described in Chapter 7.

In all of the above, co-ordination is critically important and hence the employment of a nurse co-ordinator is highly desirable to ensure adequate performance of all of the above. With additional training, it is possible that multi-disciplinary program co-ordination could be undertaken by other health professionals. The roles of various health professionals are discussed below.

5.2 Hospital presentation

Patients presenting to hospital with CHF are most commonly significantly short of breath, because of acute pulmonary oedema. Acute pulmonary oedema is usually due to fluid overload: it presents with pulmonary rales and sometimes with wheezing. Other evidence of fluid retention is usually present (oedema, raised venous pressure, abdominal distension).

Transport to hospital is usually by ambulance, although some patients are brought by car. Urgent care may have been started beforehand by GP or ambulance personnel.

5.3 Emergency department

Emergency department care is directed toward resuscitation measures including:

- intranasal oxygen
- intravenous line insertion
- intravenous diuretic administration (usually frusemide)
- other medication, as required
- opioids and nitrates for patients with acute pulmonary oedema
- continuous positive airways pressure for some patients

Electrocardiographic monitoring is instituted and venipuncture may be undertaken for blood chemistry measurements. The diagnosis is confirmed, based upon history, including discussion with carer, physical findings and investigations.

5.4 Ward admission

On transfer to the ward management of the above is continued:

- monitoring is continued
- fluid balance is established
- diagnosis is confirmed
- the cause of HF is defined

The underlying cause of HF is most likely to be coronary artery disease with past myocardial infarction or long-standing hypertension. The precipitating cause is also defined: this is commonly related to lapses in adherence to medication or behavioural advice. The principal aim of management is to achieve an appropriate euvolaemic state with control of fluid balance. This is achieved with a therapeutic regimen based upon diuretic, ACE inhibitor (or angiotensin receptor blocker) often with digoxin and possibly other drugs and consideration of warfarin, particularly for patients with atrial fibrillation. The patient is mobilised, usually within a day or two. Patient education is commenced. Family education is best coupled with patient education. The patient is prepared for future management which is documented in a discharge plan.

5.5 Discharge plan

The discharge plan involves communication with the GP and the making of an appointment for the patient to be seen by the GP. Appointments are also made for a review by a specialist physician or cardiologist, either at a hospital outpatient clinic or independent of the hospital, but preferably by a cardiologist or physician who has participated in the patient's management. The patient is given a hand-held record for transfer of information between medical practitioners and others. Materials (fact sheets or booklets) are provided to support the advice given and arrangements are made for continued care. An assessment should be made of environmental and

social factors that may affect the patient's recovery after discharge. Services which the patient uses or may require need to be discussed, particularly if it appears that the spouse or principal carer may have difficulty in adequately supporting the patient.

5.6 Home arrangements

Home arrangements include assurance that the patient can and does keep appointments. If this does not occur, then reasons need to be explored and further appointments made by telephone. A home visit is made to ensure that regimens are understood, achievable and adhered to. Arrangements are made for regular reviews by a GP and a specialist.

An exercise program is advised for each patient tailored to individual needs. Such programs mostly consist of simple activities of daily living at home and exercises directed toward improving the patient's capacity to undertake those activities. Patients may attend a program designed for cardiac patients following acute myocardial infarction or coronary bypass surgery, with exercises appropriately modified to suit the HF patient. However, referral to a specific HF exercise program is preferable, if one is available.

Self care, often supported by the carer, is reviewed including dietary regimens, reduction of salt intake and careful control of fluid intake. Additional advice regarding modification of diuretic regimens depending on weight can be instituted. Long-term follow-up, either by telephone or by a home visit, is undertaken to assure adherence to regimens of care and self care, and to identify those patients and carers requiring further assistance.

Patients and carers are advised about what to do if deterioration occurs through increasing shortness of breath or fatigue and what to do in emergencies.

5.7 Program (nurse) co-ordinator

The above are best achieved with proper co-ordination of delivery of programs. All successful multi-disciplinary programs reported in the literature have involved the participation of a nurse co-ordinator. That co-ordinator is linked to the hospital from which patients have been discharged or to which they will be referred. Health care providers participating in fieldwork for this report agreed that many difficulties could be overcome with improved co-ordination of services and the availability of a designated case manager for CHF patients. Unfortunately, several practitioners claimed that case managers or co-ordinators were often not made aware of CHF patients about to be discharged from hospital. Failure of referrals in hospital were partly attributable to frequent changes in staff, particularly medical registrars, who were often not aware of the existence of a CHF co-ordinator. Even where in-hospital referrals were working satisfactorily, it was thought that more CHF case managers were needed to handle the increasing workloads. Feedback from practitioners also highlighted the fact that referral of CHF patients to other health professionals in hospital and after discharge frequently did not occur, both because of poor communication and a lack of allied health staff.

5.8 The role of the GP

The GP is the key person in the management of patients with CHF. The GP may have made the diagnosis in the first place and is likely to know the cardiological background of the patient and the family and social circumstances of the patient. The GP gives behavioural advice, prescribes medication, enquires into its effects and modifies treatment, as required. The GP recommends transfer to hospital when necessary. It is to the GP that the patient returns for continued management after discharge from hospital for continued management. The continuum of care is therefore closely linked to the GP. The quality of the care is linked to the training of the GP and acceptance by the GP that referral is required to a hospital clinic or clinician (physician or cardiologist with appropriate interest, training and experience in the care of patients with CHF) for specialist additional advice regarding best management of individual patients. A good relationship between the program co-ordinator and GP is also helpful.

5.9 Comment

It was widely recognised by health care providers participating in the recent survey and focus groups that additional services in the community were required and currently available services needed improvement. Discharge planning was considered to be poor and the need for careful follow-up of CHF patients after hospital discharge was emphasised.

It was claimed by focus group participants that depression and other psychological problems of CHF patients often went unnoticed and were not adequately managed by GPs or others. Referral of patients with psychological problems to appropriate health care providers is required, as well as attendance at a group program for psychosocial support and interaction with other patients. Practitioners in the focus groups all recognised the considerable physical and psychological benefits of exercise. Unfortunately, there were too few formal group programs, which health care providers identified as one of the major gaps in post-hospital services. In particular, there were too few physiotherapists available to conduct exercise sessions for CHF patients.

As well as their physical and psychosocial benefits, group programs provide opportunities for further education of patients and carers following discharge from hospital. Patients usually need information reinforced and further clarification about their complex medication regimens.

Practitioners strongly endorsed the need for telephone calls soon after hospital discharge to find out how patients and carers were coping. Home visits were particularly recommended for those pzatients identified during telephone discussions to be most in need of receiving additional services. Such visits are ideally followed by contact with the patient's GP and further development of the care plan and revision. Community services, including home visits, are especially important for patients with CHF who were older, sick with other problems and generally unwilling to go to hospitals.

6 Pharmacological management of CHF

The key principles of the management of CHF involve appropriate pharmacological interventions. Such interventions have now been demonstrated to improve symptoms, functional capacity and quality of life significantly, coupled with reduction in hospital costs and prolongation of patient lives. The benefits of pharmacological intervention and maintenance treatments for patients with CHF have been reported in clinical practice guidelines in the United States of America[1], Europe[2] and Australia[3] and in many other review papers. The advances are clearly demonstrated in large, well funded, prospective randomised double blind clinical trials and are well reviewed in each of the above guidelines. In summary, very large, multi-centred trials have demonstrated benefits from angiotensin converting enzyme inhibitors (ACE inhibitors) and the addition of beta blockers. The place of diuretics, aldosterone antagonists, digoxin, and angiotensin receptor blockers (ARB) treatments are also reasonably well defined.

6.1 Diuretics

No randomised trials of diuretic use in CHF have been undertaken. However, it is clearly recognised that withdrawal of a diuretic regimen in those with moderate or severe CHF leads to fluid retention, marked increase in breathlessness and potential death. The recent ALLHAT study[16] (of over 33,000 randomised patients with systemic hypertension) showed that treatment with a diuretic had benefits greater than treatment with ACE inhibitor or with calcium channel blocker, particularly in the delay of onset of CHF.

6.2 Angiotensin converting enzyme (ACE) inhibitors

ACE inhibitors have become standard recommended medication for all patients with CHF. By inhibiting the conversion of angiotensin I to angiotensin II, they reduce the effect of angiotensin II on arterioles. Hence they are powerful vasodilators and effective hypotensive agents which reduce the work of the left ventricle and reduce the progress of adverse left ventricular remodelling. Many randomised clinical trials of these drugs (captopril, enalapril, fosinopril, lisinopril, perindopril, quinapril, ramipril) have demonstrated their efficacy compared with placebo in improving life expectancy, functional capacity, functional class and quality of life[17-21]. In some patients, adverse effects occur. These include hypotension, renal dysfunction, hyperkalaemia and cough.

6.3 Angiotensin receptor blockers (ARB)

In those patients who cannot take an ACE inhibitor, the substitute use of ARB is recommended. While these drugs (candesartan, eprosartan, irbesartan, telmisartan, losartan) have been demonstrated to be effective hypotensive agents, their role in CHF remains uncertain[22, 23]. Their efficacy is presumed rather than securely established.

6.4 Vasodilator drugs and nitrates

The combination of a vasodilatation regimen, using hydralazine and long acting nitrates[24, 25] (usually isosorbide dinitrate), is another possible alternative for use amongst those patients with CHF who are unable to take an ACE inhibitor.

6.5 Digoxin

The recent DIG study[26] showed that amongst those patients with CHF receiving standardised other treatments, the group who were randomly allocated to receive digoxin died (or survived) at exactly the same rate as those allocated to placebo. Important, however, was the marked difference in the manner of death, and to some degree, the quality of life between the two groups. Those who received digoxin tended to die suddenly at home. Those taking placebo tended to die with progressive CHF in hospital. Further, those taking digoxin had somewhat better functional capacity and better quality of life. Thus, the place of digoxin in the management of CHF is currently established and recommended for all or almost all patients. The possibility that fewer sudden deaths may occur with use of digoxin if higher levels of serum potassium are maintained still merits investigation.

6.6 Spironolactone

The suppression of the effects of aldosterone by treatment with an ACE inhibitor was initially assumed. However, it later emerged that escape from suppression occurred and that the metabolic and fluid retaining effects re-emerged after continued medication with an ACE inhibitor. The aldosterone antagonist (spironolactone) was resurrected as a treatment, additional to the ACE inhibitor regimen. It was found that the addition of spironolactone was effective compared with placebo in a randomised double blind clinical trial[27]. Hence, small doses of spironolactone are now recommended for patients with CHF, particularly those who have a lowered serum potassium level and a tendency to continued fluid retention. The potential hazard is the risk of hyperkalaemia, particularly amongst those with renal failure and especially those with diabetes.

6.7 Beta adreno-receptor blocking agents

Beta blocker treatment of CHF was initially introduced because it was recognised that the tachycardia coupled with CHF (driven by catecholamine stimulation) was often excessive. Hence, it was thought that treatment with a beta blocker could lead to more efficient cardiac function, with production of slower heart rate and consequent improved stroke volume, despite the otherwise cardio-inhibitory effects of beta blockade. Trials have demonstrated more favourable outcomes in patients in NYHA functional class II and III who received metoprolol[28], carvedilol[29, 30] or bisoprolol[31] than amongst those who received placebo, additional to otherwise best treatment with an ACE inhibitor and diuretic.

6.8 Levels of evidence for the effectiveness of treatments

Levels of evidence for the effectiveness of treatments, following NH&MRC ratings, are set out in Table 5. Further details of NH&MRC ratings appear in Appendix 2.

Table 5 Levels of evidence for effectiveness of treatments (summarised)

I.	Randomised controlled trials (RCTs), consistent, from different sources
II	At least one RCT without conflicting evidence (or a favourable balance of RCTs)
III	Observational and controlled studies, consistent and repeated from different sources
IV	Case series
EO	Expert opinion

6.9 Levels of evidence for effectiveness of drug treatments

Levels of evidence for drug treatment of patients with CHF are summarised in Table 6.

Table 6 Levels of evidence for pharmacological management of CHF

	Levels of evidence for effectiveness Outcome measures			
Medication	**Survival**	**Hospital readmission**	**Functional capacity**	**Quality of life**
Diuretic	IV/EO	IV/EO	IV/EO	IV/EO
ACE inhibitor	I	I	I	I
Beta blocker	I	I	I	–
A2A	II	II	II	II
Aldactone	II	II	II	II
Digoxin	–	II	II	II
Vasodilators	II	II	II	II

EO = expert opinion

While, in general, each outcome measure runs equally across the table for each type of drug, there are two exceptions. Quality of life on beta blocker may be improved in many patients because of functional improvement, while in others the blunting side effects of the beta blocker interfere with quality of life. In the case of digoxin, the

drug favorably affects hospital readmissions, functional capacity and quality of life through reducing recurrence of episodes of CHF which may also lead to death. However, treatment with digoxin is associated with occurrence of sudden death, usually at home. Hence, there is no overall mortality difference. On balance taking digoxin is likely to be preferred by most patients as their levels of function are better through the last few months or years of life.

6.10 Dosages

In major placebo controlled prospective clinical trials of pharmacological agents, there is an established target dosage, pre-set before the trial, often with a run in schedule of increasing dosage up to the target dose. Hence levels of evidence of effectiveness apply to a given dosage of a particular drug, not to a lesser dose (which may be ineffective) or to a higher dose (which may induce serious adverse effects).

The opinion is widely expressed in guidelines that dosages of drugs used should be equivalent to the dosage used in clinical trials. It has been found that such dosages can be achieved in up to 90% of patients treated with an ACE inhibitor and greater than 50% in patients treated with a beta blocker.

6.11 Adherence

A major problem in practice is the insecurity regarding patient adherence to the prescribed medication or dosage of that medication. Hence, although appropriate medication is demonstrated to achieve the anticipated outcomes, this is often not the case in practice. Advice and support are required for many patients to ensure adherence to medication so that the desired benefits of drug treatment can be achieved.

With respect to the treatment of symptomatic CHF, the guidelines of the National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand[3] present recommendations for pharmacological management which are summarised in Appendix 3.

6.12 Upward dosage titration

It is recognised that upward dosage titration is required in the introduction of ACE inhibitor medication. The aim is to avoid hypertension, renal failure or other adverse effects which can occur in some patients if the drug is introduced rapidly. It is usual to start with a small dose, possibly a quarter or less, of the target dose of the drug and then increase the dose over a few days while the patient is in hospital up to the target dose. Once that is achieved, it is then desirable to introduce a beta blocker in a minimal dose and gradually increase the dose of that up to the target dose used in clinical trials. This usually extends into the convalescent period after the patient has been discharged from hospital, although as a rule, it started while the patient is in hospital, once some stability has been achieved.

6.13 Combination therapy

The combination of drugs used for treatment of CHF is most likely to be more effective than the use of single drugs. Thus, beta blockers and spironolactone may be added to a diuretic and ACE inhibitor to achieve maximal effect. However, adverse effects may also occur. These adverse effects include renal failure, hyperkalaemia, hypovolaemia, postural hypotension and in the case of some drugs (eg some calcium channel blockers and at times beta blockers), worsening of CHF.

6.14 Comment

Poor pharmacological management of patients with CHF was identified as a major gap by health care providers who gave feedback for this report. Some practitioners stated that drugs were misprescribed and patients were frequently given sub-maximal doses of their medication. It was claimed that GPs commonly failed to review the patient's medication following hospital discharge, including optimising ACE inhibitors, beta blockers and other medication. According to focus group participants, GPs were often reluctant to interfere with medication regimens prescribed by specialists.

Pharmacological management was thought to be particularly poor among elderly medical patients with co-morbidities, including CHF. Some medical practitioners participating in the focus groups said it was difficult to be confident about the appropriate pharmacological management of older patients who were not well represented in many of the randomised controlled trials which had specific exclusion criteria including older age.

GPs attributed some of the difficulties in managing CHF patients to poor discharge planning and inadequate information they received from hospitals about the pharmacological management of patients, including ways of uptitrating their medication. GPs stated that discharge summaries were often sent too late and frequently were illegible if they had been sent by facsimile. The pharmacological management of CHF patients by GPs could be improved with better communication between GPs and hospital specialists, particularly during the discharge planning and assessment phase.

Focus group participants stated that non-adherence to medication was often because the patients and carers did not understand why it was needed. They suggested that part of the difficulty patients had in understanding their medication was that the hospital pharmacy was only advised late about a patient's impending discharge. Thus, there was often inadequate explanation by the pharmacist about the prescribed medication. Home visits were therefore usually needed within a week of discharge to explain the medication further to the patient. The benefit of receiving a home visit by a pharmacist to review medication was recommended, in particular, by focus group participants.

6.15 Table 7 Recommendations: pharmacological management of CHF

	Level of evidence
1. All patients with CHF who have symptomatic or other evidence of congestion should receive diuretic treatment - with loop diuretic if an acute episode - with loop or thiazide diuretic if not an acute episode	EO/IV
2. All patients with CHF should receive treatment with an ACE inhibitor unless contraindicated	I
3. All patients unable to take ACE inhibitor should be considered for treatment with ARB	II
4. All patients treated with ACE inhibitor or ARB should be also treated with a beta-blocker unless contraindicated	I
5. Symptomatic patients with CHF should be treated with digoxin unless contraindicated	II
6. All patients with severe CHF, despite appropriate dosage of ACE inhibitor and diuretic, should receive spironolactone	II
7. All patients with CHF should have additional medication to control the causes of CHF (eg lipid-lowering agents, aspirin, hypotensive agents as indicated)	EO
8. At time of institution of treatment with ACE inhibitor, renal function should be assessed	EO
9. Dosage of selective ACE inhibitor should start low and be titrated upwards to the dosage used in clinical trials, if possible	EO
10. Dosage of selected beta-blocker should start low and be titrated upwards to dosage used in clinical trials, if possible	EO
11. All patients with CHF should have standing blood pressure recorded, additional to lying or sitting	EO
12. All patients with CHF and AF should be considered for treatment with aspirin or warfarin	EO

EO = expert opinion

6.16 Table 8 Suggested indicators: pharmacological management of CHF

Proportion of patients taking • loop diuretic (eg frusemide) • thiazide or other diuretic
Proportion of patients taking ACE inhibitor
Proportion of patients taking: • ARB • vasodilator treatment
Proportion of patients taking beta-blocker
Proportion of patients taking digoxin
Proportion of patients taking spironolactone
Proportion of patients taking medication where indicated • to control underlying causes of CHF • to address defined co-morbidities aggravating CHF
Proportion of patients whose renal function has been checked
Proportion of patients taking target dose (clinical trials dosage schedule) of ACE inhibitor
Proportion of patients taking target dose (clinical trials dosage schedule) of beta blocker
Proportion of patients whose standing blood pressure is recorded
Proportion of patients with CHF and AF taking aspirin or warfarin

7 Non-pharmacologicl management of CHF

7.1 Integrated disease management (IDM)

The non-pharmacological management of patients is currently addressed in the framework of IDM. Sections 7.1 to 7.5 provide an overview of the evidence for the effectiveness of IDM programs which have been shown to have multiple benefits to patients, with levels of evidence for effectiveness set out in Table 9.

7.2 Table 9 Levels of evidence for effectiveness of IDM of CHF

	Levels of evidence of effectiveness Outcome measures			
Program ingredients	**Survival**	**Hospital readmission**	**Functional capacity**	**Quality of life**
Comprehensive	II	I	I	I
Patient education	III	III	III	III
Telephone follow-up	–	III	III	III
Home visit	II	II	II	II
Exercise program	II	II	I	I
Special clinic	II	I	I	I

7.3 Cost

Cost saving, cost benefit and cost effectiveness are claimed by some to arise from their IDM program for CHF. Theoretically, such cost saving and effectiveness should accrue. However, the implementation of a comprehensive program, if it includes a special management clinic, may lead to costs which counter the savings that arise from reduced hospital readmissions. Not considered in any costing is the reality that living longer has its own delayed costs. Savings over 12 months may then be followed by added costs in the next year or years. The question of costing needs to be further addressed.

7.4 Evidence for the effectiveness of IDM

Randomised controlled trials

Fifteen randomised controlled trials (Table 10) were identified for this review[32-47]. In these studies, a total of almost 2,000 patients were randomised. The average age of patients was approximately 70-75 years. The most common period of follow-up to outcome measure was six months.

The outcome measures included symptoms or functional status (NYHA functional class or other measure of symptoms and function), reduction of readmissions to hospital, improvement in quality of life and cost saving within the period up to follow-up.

Three studies reported improvement in symptoms or functional class while the remaining twelve did not specifically report on symptoms or functional class as an outcome.

Hospital readmissions were reduced in 13 of the studies in which this outcome was included. In one, there was no reduction in admission rate and in one it was not reported.

Improved quality of life was reported in all five studies where it was an outcome measure.

Cost savings were considered significant in five out of the six studies where this was investigated. In one study, there was no cost saving because the cost of the program nullified the cost savings achieved through hospital admissions. In the remaining five studies, cost savings was not an outcome measure.

In summary, there is persuasive evidence from these randomised controlled trials, that an IDM program (almost irrespective of its nature) results in significant improvement in symptoms, markedly reduces readmissions to hospital (at least for 6 or 12 months) and leads to significant improvement in quality of life. Cost savings over the time of the intervention are also significant.

The possible benefit from IDM programs on mortality reduction did not reach statistical significance in the trials, with up to one year follow-up, although a trend was apparent. Early meta-analysis of trials by McAlister et al[48] confirmed the trend, but 95% confidence intervals were not convincing.

The 297 patients in the two randomised trials conducted by Stewart et al[38, 39, 43] were followed up for three to six years[49]. The report demonstrated a significant difference in cumulative mortality over time. These benefits may not be attributable only to the single home visit undertaken soon after discharge. The home visit necessitated more formal discharge planning in hospital, opening up an additional avenue for communication and help throughout the trial and follow-up period and further facilitated access to a hospital cardiology clinic. Nevertheless, the outcome remains most impressive. It underlines the overall benefits of education, discharge plan, home visit, open avenues of communication and availability of a specialist clinic with good co-ordination by trained cardiac nurses.

7.5 Table 10 CHF integrated management: prospective randomised controlled trials

Authors	Number of patients	Average age	Follow-up (months)	Symptoms, function	Reduction of re-admissions	Improved quality of life	Cost saving
Rich et al 1993[32]	98	79	3	nr	27%	nr	nr
Schneider et al 1993[33]	54	nr	1	nr	73%	nr	nr
Kostis et al 1994[34]	20	66	3	yes	nr	yes	nr
Rich et al 1995[35]	282	79	3	nr	44%	yes	yes
Cline et al 1998 36	190	75	12	nr	35%	nr	yes
Serxner et al 1998[37]	109	71	6	nr	52%	nr	yes
Stewart et al 1998, 1999[38, 39]	97	75	18	nr	42%	nr	yes
Ekman et al 1998[40]	158	80	6	nr	-5%	nr	nr
Jaarsma et al 1999[41]	179	73	9	nr	49%	nr	nr
Gattis et al 1999[42]	181	55-77	6	yes	yes	nr	nr
Stewart et al 1999[43]	200	75.5	6	nr	42%	yes	nr
Blue et al 2001[44]	165	75	12	nr	62%	nr	nr
Kasper et al 2002[45]	200	63.5	6	yes	41%	yes	nil
Doughty et al 2002[46]	197	73	12	nr	41%	yes	nr
Krumholtz et al 2002[47]	88	73	12	nr	39%	nr	yes

nr = not recorded

7.6 Comprehensive IDM program – program description

IDM programs usually involve a nurse co-ordinator/case manager working with the patient, family, general practitioner (GP), physician or cardiologist and other health professionals. IDM of CHF is recommended for effective:

- in-patient education
- assessment and risk screening
- discharge planning
- communication between hospital, community, patients and carer, and health professionals

Risk screening in hospital will help to identify patients and carers who are likely to need additional help following the patient's discharge from hospital, especially an early home visit or social services assistance.

An integrated disease management program also needs to include:

- early telephone follow-up and continued telephone availability
- home visit for those identified to be most in need
- home based walking and exercise program
- group physical, social and supportive activities through community health centres or elsewhere
- long-term follow-up and support for patient and carer through community health centres or other organisations
- multi-disciplinary case management plans, with team meetings

Programs including most or more than one of the ingredients of IDM listed above are clearly effective in each of the four outcome measures based upon evidence from multiple randomised clinical trials, and confirmed by observational studies. These outcome measures are survival, hospital readmission, functional capacity and quality of life.

7.7 Patient education

The benefits of patient education programs alone (in-patient education) are relatively weak in affecting the outcomes listed, although they may lead to improved patient knowledge, at least in the short term. Some programs have shown further benefits, while others have shown no statistically significant benefits. Patient and carer education should include general counselling, including:

- inpatient education (if an inpatient)
- physician advice and nurse co-ordinator explanation (if not an inpatient)

Specific education and instruction is needed regarding the following:

- Medication, purposes, side effects (eg, problems related to diuretic treatment)
- Recognition of need for medication and continued adherence to the prescribed medication
- Recognition of fluid retention related to weight gain (eg, two kilograms over two days)[50]
- Awareness of weight loss, which may indicate other problems and increase the risk of falls
- Encouragement of patients/families to enquire about any recognised changes or any recognised concern
- Explanation and understanding of the need for fluid restriction and salt restriction
- Understanding of the effects of tobacco and alcohol
- Need for control of weight, diabetes, blood pressure and cholesterol
- Understanding of mood disturbance and behavioural or personality change
- Maintenance of activity and exercise
- Patient education should be conducted, when possible, together with the carer or other family member

There was agreement among focus group participants that patients generally had a poor understanding of their condition and their regimens, especially their medication. It was recommended by participants that patients should be encouraged to question their GPs about the purpose of their medication and whether it was necessary to continue the medication. Further, patients need to be empowered to ask their GP about their long-term management, rather than receiving advice relating only to the first few weeks following hospital discharge. According to feedback from practitioners, patients also need further education about diet, especially salt restriction and fluid restriction. Some patients may benefit from referral to a service such as Quitline if they continue to smoke. Patients also need to have a better understanding of their prognosis and the things which they should look for to identify whether their CHF was well controlled or not.

7.8 Home visit

A home visit by a nurse has been shown in one study to be as effective as a comprehensive program[43]. However, patients in this trial who were randomised in hospital to receive the intervention, needed preparation and understanding of the reasons for the visit. Thus, those in the intervention group received information in hospital and a more comprehensive discharge plan, in addition to the post-discharge home visit. Home visits, however, do appear to be the most powerful single ingredient of comprehensive programs. Further, home visits offer an additional communication line during follow-up. The comprehensive approach, pioneered by Rich[32], was largely based on home visits by nurses and was clearly beneficial in all outcome measures.

7.9 Telephone follow-up

Telephone follow-up alone appears to have limited benefits. It is, however, useful for enquiry and support and can help to identify patients who particularly need an early home visit. The place of telemedicine for CHF patients remains uncertain. According to practitioners who participated in the focus groups, a particular gap in current management is the failure to provide patients with access to help in emergencies, particularly at night. In practice, few services are available after hours. Further, patients and carers also need the name of a particular contact person and a designated phone number for follow-up, should help be required.

7.10 Exercise program

As presented in section 7.19, evidence from multiple randomised clinical trials demonstrates that the same or similar benefits are produced by attending an ongoing supervised exercise program as are obtained from an IDM program. Unfortunately, participants in the focus groups reported that attendances at currently available group exercise programs are low, with only about 20% of referred patients attending. Poor attendances were attributed, to some extent, to a lack of awareness of the existence of such services by GPs, patients, and others, and of their demonstrated benefits. Practitioners emphasised that it is essential for GPs and other health care providers to reinforce the importance of attending available programs and to motivate patients to attend. Home based programs are also necessary for those who may not be able or willing to attend group programs, particularly older patients, those with limited access to community programs, and patients from culturally and linguistically diverse backgrounds.

7.11 Designated HF clinic

A designated HF clinic is an effective means of centralising an integrated management program and providing patients with expert advice and management. These benefits have been demonstrated in randomised clinical trials and were endorsed by practitioners involved in the focus groups. They considered both specific heart failure clinics and chronic disease management units to be valuable.

7.12 Medical management

Observational studies have demonstrated that management by experts in the field (eg cardiologist) is likely to reflect closer adherence to practice guidelines than management by general physicians or family physicians[51]. It has also been noted that those patients whose management is shared between GP and specialist cardiologist have better outcomes than those managed by GP alone[52]. While these better outcomes may partly be related to patterns of prescribing particular doses of drugs, there may also be greater targeting of advice regarding behaviours and their importance. The guidelines produced in the United States of America review and endorse six papers which demonstrate the need for expert cardiologist input into

all phases of management of patients with CHF[1]. These reports are of observational studies undertaken in different health care systems. Further, the reports are written by cardiologists. Generally cardiologists see patients who present with a single major cardiac condition, often to a coronary care unit. Such patients are less likely to have multiple co-morbidities. They commonly have a clearer diagnosis and defined management pattern than those patients seen by geriatricians and general physicians. Thus, while cardiologists may appear to manage CHF in a manner closer to the propagated guidelines, they may not be adequately experienced in the management of patients presenting in older age with highly complicated problems and multiple co-morbidities.

7.13 Comments

In summary, IDM for all patients with CHF should aim to ensure availability of a comprehensive multi-disciplinary approach to the care of each patient. Each patient is likely to have needs in common with others but will also have individual needs. The IDM program should be co-ordinated by a nurse co-ordinator.

It would seem most appropriate that the direction of the IDM program should be co-ordinated, at least initially, from the hospital from which patients have been discharged or to which they would be likely to be readmitted or admitted. The core features of such an IDM plan should include:

- patient and carer education
- provision of literature with explanation
- hand-held record of diagnoses, medication, recommended behaviours, interventions, admissions
- discharge plan including written (verbally confirmed) appointments with:
  - GP
  - cardiologist/physician/clinic
  - exercise group
  - community services
  - other services
- home visit shortly after hospital discharge preferably within one week that addresses:
  - medication review
  - review of health behaviours
  - checking of scales at home (or elsewhere)
  - activity review
  - review of psychosocial functioning
  - review of coping by carer and carer's needs

- telephone contact for follow up of
  - missed appointments
  - emergency patient needs
  - weight and symptoms
  - physiotherapist, occupational therapist or other allied health needs
  - community health centre attendance and other group activities
  - GP attendance and reinforcement of importance of that attendance
  - whether planned services or assessment have actually been implemented

  These approaches should be understood by all who are involved in the patient's management.

7.14 Table 11 Recommendations: integrated disease management of CHF _

Level of evidence (reduction of recurrent acute HF)	
1. Personal education of patient and carer is delivered while in hospital	II
2. If not admitted to hospital, the same personal education is delivered to the patient and carer at home	EO
3. Education should be interactive with full participation of patient/carer, questions answered, and explanation and reasons given for each therapeutic intervention or advice	EO
4. Questions should be asked to ensure that patient and carer understand advice	EO
5. Formal discharge plan should be arranged with assurance of all appointments and procedures	II
6. Telephone call made to assess progress and identify need for further assistance	II
7. Early home visit should be made (preferably within one week of discharge), ideally to all patients but at least to those identified as needing further assistance	II
8. Further education and reinforcement of advice should be given during home visit	II
9. Follow-up by telephone should be arranged for missed appointments	EO
10. All patients must have GP appointments confirmed	II
11. All patients should have referral to cardiologist or physician (individual or in clinic)	II
12. All patients should have a hand-held record of medical conditions and medication.	
Education	EO
13. All patients should receive simple education material regarding their condition (booklets, pamphlets, fact sheets, videos, tapes)	EO
14. All patients should understand need for adherence to medication with consideration of dose and compliance aids	III
15. Patients should keep a diary to record: – taking of medication – daily weight	EO
16. All patients should understand the significance of weight gain (greater than 1.5kg in one day or 2kg in two days).	EO
17. All patients should understand the risks of smoking and patients who smoke should be referred to smoking cessation programs	II
18. All patients should be aware of risks of infection, particularly respiratory, and have annual influenza vaccinations and 3-5 yearly pneumococcal immunisation.	EO
_ includes patients and carers	

EO = expert opinion

7.15 Table 12 Suggested indicators: integrated disease management of CHF

1.	Proportion of patients receiving education while in hospital
2.	Proportion of patients receiving education at home
3&4.	Proportion of patients asking appropriate questions & responding to questions
5.	Proportion of patients receiving formal documented discharge plan
6-8	Proportion of patients receiving telephone call, home visit and accepting further advice or asking further questions
9.	Proportion of patients missing appointments and proportion being telephoned to
	establish cause and make new appointment
10.	Proportion of patients who have GP appointment confirmed
11.	Proportion of patients who attend cardiologist/physician or clinic by appointment
12.	Proportion of patients accepting hand-held record
13.	Proportion of patients accepting education materials
14.	Proportion of patients with an established understanding of their medication & the need for adherence
15.	Proportion of patients keeping a diary of daily weight and medication
16.	Proportion of patients understanding significance of weight gain
17.	Proportion of patients with a history of smoking who are still smoking
18.	Proportion of patients currently vaccinated for influenza and pneumocants

7.16 Staff and facilities

Nurse co-ordinator

All integrated or multi-disciplinary programs which have demonstrated significant benefit in patient well-being and have led to reduction of episodes of acute HF (which lead to hospital admissions) have been dependent upon a nurse co-ordinator, trained in the management and support of patients with CHF. Without such skilled nursing support, added to usual care (GPs, specialist and hospital ED and inpatient management), programs are ineffective. Clinical trials have demonstrated repeatedly that usual care alone is much inferior to IDM programs.

Other health professionals

Personnel, additional to those involved in usual care and the nurse co-ordinator, may include pharmacist, social worker, psychologist, district nurse, community health centre staff, cardiac rehabilitation program co-ordinators, physiotherapists, dietitians and others, as required.

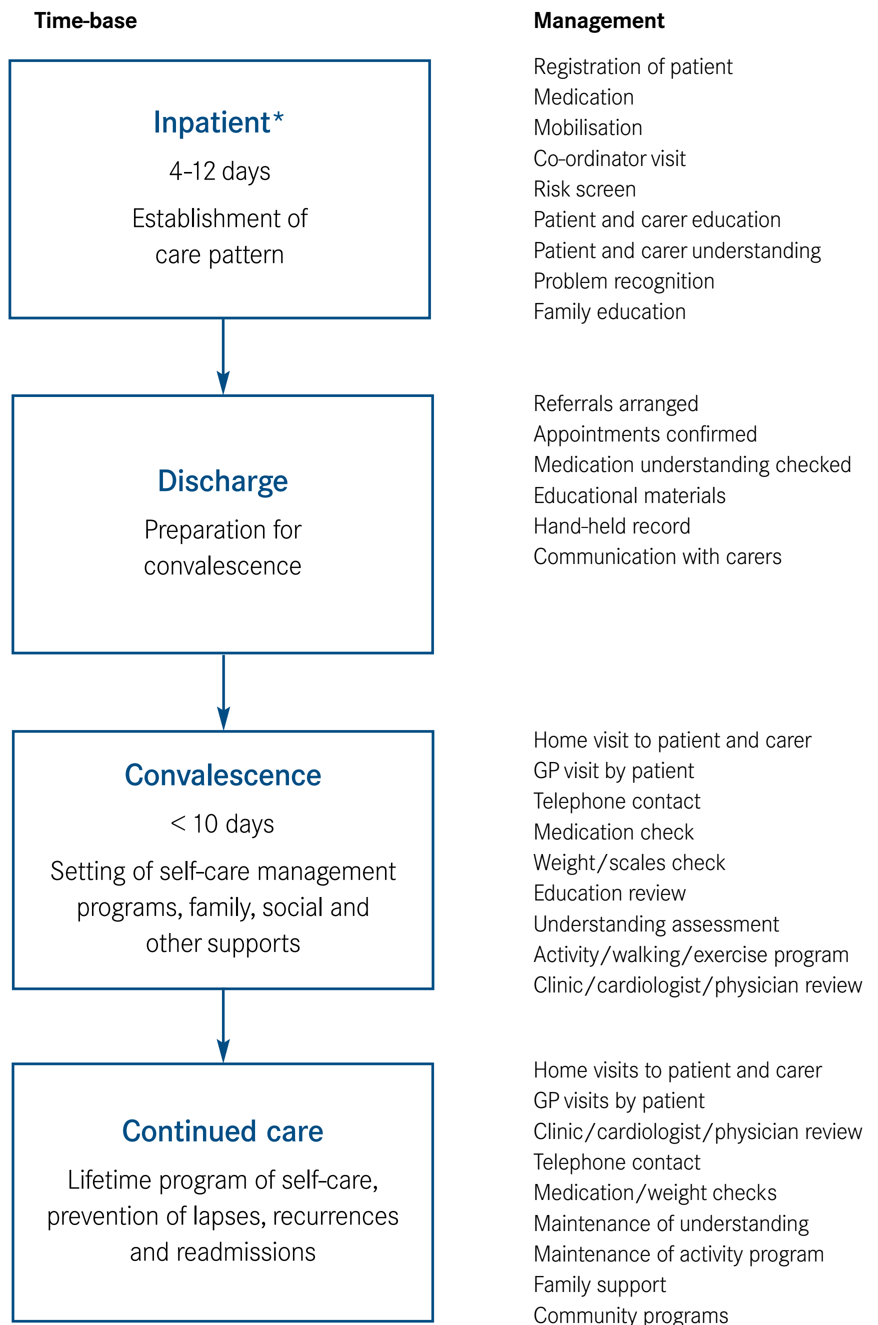
7.17 Table 13 Recommendations: staff and facilities for IDM of CHF patients

1. A program (nurse) co-ordinator is required for effective IDM of CHF patients
2. Other health professionals and community care staff should be available, as required Some may have special expertise appropriate to patients with specific difficulties (eg pastoral care worker, respite care worker, council support staff, community care services)
3. The nurse co-ordinator requires good access to cardiologists/physicians or clinics in the region and hospital support
4. The nurse co-ordinator needs to establish bi-directional supportive interactions with GPs in the region
5. Special training of potential nurse co-ordinators is required, through courses, to expand rapidly the accessibility of the knowledge base required for the specific nature of the work
6. Administrative and other supports are required, best sited in the hospital or community centre through which the IDM program is delivered

7.18 Continuum of care: possible evidence-based pathway

The need for a continuum of care is clear from the literature and is accepted as best practice. This is represented in Table 14.

Table 14 CHF IDM



* Patients referred from general or specialist practice, or from outpatients may enter at registration or at any other appropriate point.

7.19 Exercise training and rehabilitation

In reviewing the evidence of the effectiveness of exercise training in IDM of CHF, it is apparent that almost none of the randomised clinical trials of IDM includes a formal exercise program. The evidence of benefits from exercise in patients with CHF comes from studies demonstrating improvement in functional capacity, well-being, life expectancy and reduced hospital readmissions from formal exercise training programs, usually without any report of education or patient support. These programs are similar to many physically oriented programs of cardiac rehabilitation in USA and Europe. They are very different from the cardiac rehabilitation program pattern of exercise and education as in Australia, United Kingdom and New Zealand. The evidence, however, is extended in some studies to show benefits from home exercise programs and the suggestion that patients may be enrolled in a comprehensive program from which there may be additional benefits.

Traditionally, exercise has been regarded as disadvantageous for patients with CHF. Rest was recommended and prolonged rest was recommended by some. This advice was reasonably well received by patients who noted that, with exertion, they became uncomfortable with breathlessness and fatigue. Patients naturally became progressively more inactive. It has also been shown that patients tend to relapse and return to a state of relative physical inactivity after attending an exercise program, guided by their symptomatic disability. Physical inactivity leads to muscular wasting, muscular weakness and progressive impairment of functional capacity that can be corrected by aerobic exercise. Exercise training, involving both aerobic activity and strength training exercise, results in progressive improvement in functional capacity. The physiological basis for this is now well understood. It is not induced by changes in pulmonary or cardiac function, but in peripheral muscle efficiency. Peripheral muscles increase in size and cellular structural change has been demonstrated. More efficient oxygen extraction and utilisation has been demonstrated, so that venous blood leaving the muscles is more deoxygenated and contains more carbon dioxide. This is readily handled in the lungs. Thus, although some talk of cardio-pulmonary training or cardio-pulmonary conditioning, it should be recognised that such conditioning or training in patients with CHF has little or nothing to do with the heart and lungs (as indeed is the case in most middle-aged people enrolled in exercise training programs. Prolonged endurance training is required to modify maximal cardiac output.)

There are now many studies which demonstrate the clear benefits of exercise training in patients with CHF. These have all been essentially physiologically monitored studies, observing improvements in functional capacity, measured by direct gas analysis, heart rate and secondarily by symptoms, functional capacity and quality of life. Suggested instruments to use to assess functional status and outcomes, including quality of life, are listed in Appendix 5.

For patients with CHF, it remains problematic how best to deliver an activity/exercise program. One concept is to use the cardiac rehabilitation (CR) model of group exercise and education. Some suggest that patients with CHF may be included among patients attending a group program during convalescence following a cardiac event. One must be careful about adopting such a policy, however. One major reason for non-attendance of younger convalescing patients at a CR program is that the group of patients includes a large number of older or more disabled patients than themselves. The inclusion of patients with CHF could markedly worsen the position for younger patients. While some practitioners participating in the focus groups thought it was appropriate to include CHF patients in a mainstream group exercise program, others considered that CHF patients, particularly older CHF patients, might be better handled in a separate group. They pointed out that CHF patients need close monitoring and have different educational needs from other cardiac patients. They also have more disabling symptoms and slower rates of improvement. It was suggested that CHF could attend a program with other cardiac patients, provided patients with CHF were separated from the others.

7.20 Table 15 Recommendations: exercise and activity program

	Level of evidence
1. A dynamic (aerobic) exercise program, starting at low level and slowly increasing in duration, frequency and intensity of preferably daily activity should be devised for each patient	I
2. The level of activity should be supported by assessment of progress through verbal report, observation and possibly formal measurement of walking capacity (eg 6 Minute Walk Test)	II
3. Strength training, with use of muscle groups against resistance (similar to many activities of daily living), should be incorporated into the exercise program	I
4. Long term support, enquiry and supervision are required to assure adherence to home activity and exercise	III
5. Formal group exercise training programs are recommended where there is a sizeable HF management program	I
6. Group exercise may be limited to patients with CHF or may be grafted on to a cardiac rehabilitation exercise program	EO

EO expert opinion

7.21 Table 16 Suggested indicators: exercise and activity program

Process
1. Proportion of patients receiving inpatient education regarding benefits of activity
2. Proportion of patients with a written home activity and exercise program
3. Proportion of patients participating in a home activity and exercise program
4. Proportion of patients referred to group exercise ("rehabilitation") program
5. Proportion of patients attending a group exercise program
Outcome (eg at 3 months and at 12 months)
6. Patient activity
7. Functional class (eg NYHA functional class, Specific Activity Scale or 6 Minute Walk Test)

8 Self care in CHF

The regimens of care for CHF patients are often complex and demanding. As such, they are commonly difficult for patients and carers to follow. To encourage adherence, patients and carers need education about these regimens, particularly those concerning medication. They also need to acquire skills for self-management. Self-management education and training, incorporating self-efficacy principles, can lead to many positive outcomes for people with chronic conditions. The Commonwealth Department of Health and Ageing recently funded a number of projects under the Chronic Disease Self-Management initiative to test self management service delivery models for patients with chronic conditions, including CHF.

The following areas of self management are particularly relevant for patients with CHF. Major medical problems may occur if simple errors are made in these regimens.

8.1 Weight

The need for patients to weigh themselves daily is often poorly understood by patients. Weight gain is commonly due to fluid retention, which precedes the appearance of symptomatic failure with pulmonary or systemic congestion. Hence patients need to understand the sequence and the hazards. A gain of greater than 1.5kg over 24 hours suggests developing fluid retention[1, 23] and an increase of greater than 2.0kg over two days does likewise[24] . This weight increase necessitates an increase in loop diuretic medication as a semi-urgent matter. Patients may be trained to respond by taking more diuretic with general practitioner (GP) agreement. Alternatively, an urgent appointment is required with the GP.

Weight loss by patients should be reported to the GP. Weight loss may occur because of a loss of appetite, induced by renal or hepatic failure, hepatic congestion, or it may be a marker of psychological depression. Weight loss may foreshadow significant postural hypotension and falls.

8.2 Fluid intake

Most guidelines have consensus views that fluid intake should be limited to 1.5 litres per day (or 2 litres in hot weather)[1-3]. Specific advice to drink only when thirsty may have similar benefits. Excess fluid intake may not be coupled with greater urinary output and hence may tip a patient into acute HF.

8.3 Diuretic variation

With loop diuretics (eg frusemide), the diuresis commonly is considerable and lasts for just a few hours. Hence if the patient plans on being out during the day, the morning dose of the diuretic may not be taken. The patient may intend to take the diuretic in the evening but, not uncommonly, forgets. As a result, pulmonary oedema may occur during the night.

For patients with rapid diuresis, it is often better to take a thiazide diuretic in the morning and a half dose of frusemide in the evening, either on a regular or

opportunistic basis. Alternatively, the frusemide dose may be divided into a morning and afternoon dose.

Another problem with some patients is that they take their diuretic in the morning and their fluid intake in the evening. Thus, they may be dehydrated in the morning and volume overloaded in the night.

8.4 Medication adherence

Independently of the problems which may arise from diuretic management, other medication may be ceased. Some patients consider that a prescription represents a course of treatment which is terminated when the supplied medication runs out. Other patients note that they feel well and hence consider medication is no longer required. Some cease taking their medication because the drugs are too costly. It is common for patients to reduce the dosage of prescribed medication. With an ACE inhibitor or beta blocker, that can also lead to acute HF.

Carers of patients with impaired attention, memory or recall may take responsibility for medication usage to ensure adherence by the patient.

8.5 Nutrition

With episodes of acute HF, appetite is much reduced and weight loss may occur. With recovery from failure, recovery of appetite leads to regain of weight, usually slowly. However with perceived enforced inactivity, progressive weight gain may occur and contribute to occurrence of acute HF.

The demoralising effect of CHF and consequent disability commonly leads to psychological depression, with abandonment of dietary fat or other restriction to which the patient may have previously adhered. Combined increases in saturated fat intake and weight, and increasing insulin resistance and blood pressure, may lead to further episodes of myocardial infarction or ischaemia with severe adverse consequences.

Salt restriction, in the form of no added salt at the table and no added salt in cooking, plus avoidance of salty foods, tends to reduce fluid retention and decreases the incidence of congestion and worsening CHF.

8.6 Activity

Following awareness of symptoms, the natural tendency for patients is to do whatever seems reasonable to avoid those symptoms. Hence, recognition that effort induces undue dyspnoea leads to progressive physical inactivity. That may lead to further impairment of functional capacity due to muscular inefficiency and a worsening physical state. Patients need to understand that they would be better off being somewhat active rather than following the restrictive suggestion arising from breathlessness on effort.

8.7 Comments

Learning and retaining information, such as that outlined above, is a very considerable requirement imposed on patients, carers and health professionals. The individual patient's response to such complex and demanding regimens may significantly influence outcomes, particularly inability to control CHF. Family members or carers may face difficulties in encouraging the patient to follow these regimens, or may be overprotective, potentially inducing adverse outcomes. It is therefore important to involve them in the patient's education and to discuss any difficulties arising.

8.8 Table 17 Recommendations: self care

Patient and carer education and understanding should embrace the following:
1. Daily record of weight. Response to weight gain greater than 1.5 kg in 24 hours. Response to weight loss
2. Limitation of fluid intake to 1.5 litres per day (2.0 litres per day in hot weather)
3. Establish pattern of best timing of diuretic medication and of drugs used, with GP agreement
4. Understanding of need for long term medication rather than course of treatment
5. Control of total caloric intake, persistence of saturated fat restriction
6. Salt restriction through no added salt at table nor in cooking, plus avoidance of highly salted foods
7. Persistence with activities (walking and activities of daily living) despite induction of dyspnoea, with attempts to be active to level of awareness of breathing (not breathlessness) at least half an hour per day
8. When in doubt about any aspect of management or behaviour, seek advice from professionals engaged in their care eg GP

8.9 Table 18 Suggested indicators: self care

1. Proportion of patients recording daily weight
2. Proportion of patients who measure (directly or indirectly) daily fluid intake
3. Proportion of patients aware of possible variation in diuretic timing and dosage
4. Proportion of patients aware of need for and adherence to regular medication intake
5. Proportion of patients avoiding high calorie and high saturated fat foods
6. Proportion of patients not having salt in cooking and at table
7. Proportion of patients adhering to walking and other activity pattern
8. Proportion of patients seeking advice regarding any of the above

9 Palliative care

9.1 Perceptions of illness

The perceptions of patients regarding their illness have been an important focus of research in recent years. This has arisen through the gradual recognition that delivery of all aspects of care in patients with advanced CHF has been poorly directed, poorly co-ordinated and poorly delivered. Problems confronting patients had not previously been adequately investigated. Conclusions arising from recent studies are outlined in this section.

Murray et al[53] from Edinburgh undertook qualitative interviews with patients, carers and others concerned in advanced CHF and lung cancer. They concluded that patients with advanced CHF had a different illness trajectory, with uncertain outcomes and prognosis compared with the linear and predictable course of patients with lung cancer. They reported that patients with CHF had less information about and poorer understanding of the condition and were less involved in decision making. While the major issue confronting those with lung cancer was facing death; frustration, progressive losses, social isolation and the stress of balancing and monitoring a complex medication regimen dominated the lives of patients with cardiac failure. Further, they found that cardiac patients received less help, social and palliative care services and care was often poorly co-ordinated.

The authors present experiences of patients with CHF compared with those of patients with lung cancer:

- gradual decline punctuated by episodes of acute deterioration; sudden, usually unexpected death with no distinct terminal phase
- feel ill but told you are well
- little understanding of diagnosis and prognosis
- “I know it won’t get better but I hope it won’t get any worse”
- relatives isolated and exhausted
- daily grind of hopelessness
- much co-morbidity to cope with; heart often not seen as main issue
- shrinking social world dominates life, little contact with health and social services
- feel better on treatment: work of balancing and monitoring in the community
- less access to benefits with uncertain prognosis
- specialist services rarely available in the community
- less priority as a “chronic disease” and less priority later as uncertain if yet “terminally ill”

These problems are recognised by many health professionals and carers. This paper clearly sets out the deficiencies in management of those patients with advanced CHF, who are approaching or requiring palliative care. It addresses the profound problems of patients, carers and professionals in addressing illness trajectory,

delivery of information and understanding of illness and prognosis, losses and uncertainties affecting living with the illness and the grave deficiencies of service provisions. Focus group participants confirm the similarity in perceptions of people with CHF in Victoria.

Similar conclusions have been reached by many authors in different countries with different health care systems, although the bulk of work appears to be coming from the United Kingdom. The need for a more open approach to palliation are highlighted in many papers and reports[54-68].

9.2 Modification of medication regimens

While optimisation of pharmacological management of patients with CHF who are close to death is important, several of the above papers report the inadequate use of medication to reduce pain (not necessarily cardiac pain, but pain from joints, muscles, leg oedema and the like). The resumption of NSAID treatment to ease pain may be offset by additional other medication, despite NSAID use being generally contraindicated for HF patients. Inadequate medication (including use of opioids) is noted amongst those patients suffering from breathlessness or leg oedema. The principles of palliative care for patients with terminal cancer and other severe illnesses are considered to be appropriate for patients dying with CHF.

9.3 Inotrope therapy

The possible use of IV inotrope therapy in severe or near terminal CHF is addressed in a review by Felker and O'Connor[69]. They assert that, on the basis of available evidence, there is no place for routine inotrope therapy. There may be a place for temporary inotrope medication in patients refractory to diuretics, as a bridge to transplantation. They also consider that a case may be made for IV inotrope therapy in palliation of end-stage HF.

9.4 Complicating problems

With progressive CHF, there is impaired perfusion of all organs and hence, there may occur not only circulatory but respiratory, renal, hepatic or other organ failure. The most important amongst these is the development of hypotension. To maintain the circulation is extremely difficult and some physicians prefer non-interference. The patient is usually administered oxygen, may receive intravenous inotropes and other forms of support. A comprehensive medication review is necessary in case the patient is receiving excessive medication which contributes to hypotension and renal failure.

The presence of persisting dyspnoea at rest may be addressed by use of nitrates in addition to standard medication. Continuous positive airways pressure may be used. The patient may well prefer relief through death. It is necessary to discuss this possibility with patients and carers so that patient choices can be respected. The use of morphine and other opioids has to be considered.

Uncontrolled oedema is occasionally significantly improved, with massive diuresis following change of a diuretic regimen (say, from a large dose of frusemide to a single dose of a thiazide diuretic, utilising a different diuretic pathway).

Renal failure with rising creatinine and the development of anuria may be addressed by inotropic treatment unless there is a planned transplantation (or circulatory assistance program, unlikely to be instituted in the elderly). Little can be done about this.

Respiratory failure may lead to sputum retention. Confusion may occur and hepatic failure may occur. Venous thrombosis and urinary infection are common in patients who are chronically immobilised.

9.5 Sudden cardiac death

Sudden cardiac death may occur at any time in patients with significant CHF, even if it is apparently clinically controlled. The mechanism is usually through ventricular tachycardia degenerating to ventricular fibrillation. Some consider that all patients with an arrhythmic tendency (this really means most patients with CHF) should receive anti-arrhythmic drug treatment in the form of amiodarone. The possible use of an automatic cardioverter defibrillator may also be considered. Neither is usual practice. It is recognised that digoxin is possibly pro-arrhythmic in these patients but the benefits of digoxin in other areas are well documented. Hence, most patients with CHF receive digoxin as standard therapy if they are symptomatic.

In patients who are highly electrically unstable, it is clearly desirable to discuss the problem with the patient, the principal carer and other family members.

9.6 Home, nursing home or hospital

Some patients quite firmly elect to die at home, provided that there is adequate support. Others clearly appreciate being in hospital to receive whatever care seems most appropriate at any given moment. The place of a nursing home for such patients is insecure. Medical care is significantly less than in hospital and so also is family support. This is another area in which knowledge of the patient, the patient's family and patterns of support in the community is desirable. The major problem in patients with HF is the uncertainty of prognosis because of the possibility of sudden cardiac death. The more gradual deterioration into severe uncontrollable HF usually presents a clearer prognosis which can be readily imparted and understood by the family.

9.7 Table 19 Recommendations: palliative care

1. The principles of palliative care should be applied to patients with advanced CHF similar to those appropriate for patients dying of cancer
2. Mechanisms for support of carers, community groups and health professionals should be developed
3. Where possible, patients with end stage CHF should be assessed by a palliative care team to generate either consultative advice regarding patient management or continuing palliative care

9.8 Table 20 Suggested indicators: palliative care

1. Proportion of patients with advanced CHF assessed by palliative care team
2. Proportion of patients transferred to management by palliative care team

10 Confounding problems: psychological, social and environmental factors

It is important to recognise that psychological, social and environmental factors influence the pattern of delivery of medical care, the utilisation of medical services, the availability of supports for patients and the attitudes and behaviours of the patients themselves. The importance of these influences has been progressively recognised in recent years. These confounding problems significantly influence the evidence base upon which best practice recommendations are made. This is because of the selection of patients for entry into clinical trials.

Problems of depression, disability and death markedly influence patients' attitudes, including their attitudes to medical care and their attitude to the way they see the future. Levels of social support and socio-economic status are important in determining outcomes. They also influence the quality of care the patients receive.

It is important to note that patients developing CHF commonly have progressive cognitive impairment which influences not only their adherence to regimens but also may have important implications for patterns of management which have not yet been investigated.

Racial differences have been little studied, although it is recognised that the dispossessed and disadvantaged suffer more from all diseases than do the better off.

The pattern of cardiac failure in women is similar to that in men but death rates are higher because women develop CHF at a later age than do men, consistent with the later development of the underlying heart disease[70]. Age is an important factor in co-morbidity and functional capacity and can influence the effectiveness of many interventions.

These confounding problems are of extreme importance to patients, to carers and to the community. As with so much else, those who need the most often receive the least, because of psychological, social and environmental influences. While the evidence regarding the management of these factors is ambiguous or absent, health professionals should be mindful of these factors in planning and reviewing the care of individual patients.

Appendix 1 Classification of functional status

A. New York Heart Association Functional Class

Class I	No limitations. Ordinary physical activity does not cause undue fatigue, dyspnoea or palpitations (asymptomatic LV dysfunction)
Class II	Slight limitation of physical activity. Ordinary physical activity results in fatigue, palpitation, dyspnea or angina pectoris (mild CHF)
Class III	Marked limitation of physical activity. Less than ordinary physical activity leads to symptoms (moderate CHF)
Class IV	Unable to carry on any physical activity without discomfort. Symptoms of CHF present at rest (severe CHF)

B. Specific Activity Scale (Goldman et al, 1981)

	Any yes	**No**
1. Can you walk down a flight of steps without stopping?	go to 2	go to 4
2. Can you carry something up a flight of 8 steps without stopping? Or can you: (a) have sexual intercourse without stopping? (b) garden, rake, weed? (c) walk at 6km/hr on level ground?	go to 3	Class III
3. Can you carry at least 10kgs up 8 steps? Or can you: (a) carry objects that are at least 36 kgs? (b) ski, play basketball, squash?	Class I	Class II
4. Can you shower without stopping? Or can you: (a) mop floors? (b) hang out wet clothes? (c) clean windows? (d) walk 4km/hr? (e) play golf walk and carry clubs? (f) push power lawn mower?	Class III	go to 5
5. Can you dress without stopping?	Class III	Class IV

Appendix 2 NH&MRC designation of levels of evidence

NH&MRC Designation of Levels of Evidence (1995)

Level	Explanation
I	Evidence obtained from a systematic review of all relevant randomised controlled trials
II	Evidence obtained from at least one properly designed randomised controlled trial
III	Evidence obtained from any of the following: • well-designed pseudo-randomised controlled trials (alternate allocation or some other method) • comparative studies with concurrent controls and allocation not randomised (cohort studies), case-control studies, or interrupted time series with a control group • comparative studies with historical control, two or more single-arm studies, or interrupted time series without a parallel control group
IV	Evidence obtained from case series, either post-test or pre-test and post-test
EO	Opinions of respected authorities based on clinical experience, descriptive studies or reports of expert committees

Appendix 3 Australian guidelines for pharmacological management of CHF

(Guidelines on the Contemporary Management of the Patient with Chronic Heart Failure. National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand, 2002)

Recommendations for treatment of symptomatic CHF

	Level of evidence*
First Line agents	
ACE inhibitors, if tolerated, are mandatory in all patients with systolic HF (LV ejection fraction < 40%), whether symptoms are mild, moderate or severe	I
Every effort should be made to up-titrate to the highest tolerated dose of ACE inhibitor. If this is not possible, a lower dose of ACE inhibitor is preferable to none at all	II
Diuretics should be used if necessary to achieve euvolaemia in fluid-overloaded patients. In patients with systolic LV dysfunction, diuretics should never be used as monotherapy but should always be combined with an ACE inhibitor to maintain euvolaemia	EO
Beta-blockers are recommended therapy, unless not tolerated or contra-indicated, for all patients with systolic CHF who remain mildly to moderately symptomatic despite appropriate doses of ACE inhibitors and diuretics.	I
Beta-blockers can also be recommended for patients with symptoms of advanced CHF	II
Spironolactone is recommended for patients who remain severely symptomatic despite appropriate doses of ACE inhibitors and diuretics	II
Angiotensin receptor blockers (ARB) may be used as an alternative to ACE inhibitors for patients who are ACE-intolerant due to kinin-medicated adverse effects, eg cough	II
Second Line Agents	
Digoxin can be considered in patients with advanced CHF for relief of symptoms and reduction of hospitalisation. It remains valuable therapy in CHF patients with atrial fibrillation	II
Hydralazine-isosorbide dinitrate should be reserved for patients who are truly intolerant of ACE inhibitors or for whom these agents are contraindicated and no other therapeutic option exists	II
Other agents	
Amlodipine and **felodipine** can be used for the treatment of co-morbidities in patients with systolic CHF, as they have been shown not to increase mortality	II

* Evidence levels adapted from NH&MRC Guidelines

EO = expert opinion

Appendix 4 Table of patients with CHF by postcode

Post Code	Suburb/Town	Patients
3073	Reservoir	325
3199	Frankston	282
3021	St Albans	256
3020	Sunshine	245
3175	Dandenong	227
3550	Bendigo	211
3072	Preston	186
3058	Coburg	177
3350	Ballarat	165
3630	Shepparton	160
3046	Glenroy	158
3012	West Footscray	150
3215	North Geelong	146
3825	Moe	140
3156	Ferntree Gully	139
3130	Blackburn	138
3136	Croydon	137
3216	Belmont	136
3844	Traralgon	131
3174	Noble Park	130
3150	Glen Waverley	117
3084	Heidelberg	115
3011	Footscray	113
3128	Box Hill	112
3074	Thomastown	110

Post Code	Suburb/Town	Patients
3070	Northcote	109
3134	Ringwood	109
3163	Carnegie	108
3025	Paisley	107
3840	Morwell	104
3214	Mitcham	103
3555	Kangaroo Flat	102
3056	Brunswick	100
3071	Thornbury	100
3168	Clayton	99
3219	East Geelong	99
3166	Oakleigh	98
3030	Werribee	97
3075	Lalor	97
3196	Chelsea	97
3047	Broadmeadows	96
3192	Cheltenham	95
3125	Burwood	94
3204	Ormond	94
3939	Rosebud	93
3081	Heidelberg West	92
3131	Nunawading	92
3044	Pascoe Vale	91
3018	Altona	88
3040	Essendon	88

Post Code	Suburb/Town	Patients
3182	St Kilda	87
3195	Mordialloc	87
3013	Yarraville	86
3162	Caulfield	86
3152	Wantirna	84
3060	Fawkner	83
3181	Prahran	81
3931	Mornington	81
3083	Bundoora	78
3039	Moonee Ponds	75
3135	Heathmont	75
3121	Richmond	73
3165	Bentleigh East	73
3977	Cranbourne	73
3185	Elsternwick	72
3015	Spotswood	71
3032	Ascot Vale	71
3149	Mt Waverley	71
3068	Clifton Hill	68
3079	Ivanhoe	68
3155	Boronia	68
3171	Springvale	68
3198	Seaford	68

Appendix 5: Tools for assessing functional status and outcomes

The following instruments are commonly used in assessing functional status, quality of life and psychological status of patients with chronic heart failure (CHF).

Functional status

While commonly a part of quality of life assessments, functional status may be measured independently.

6 Minute Walk Test [71, 72, 73]

The 6 Minute Walk Test is an inexpensive and simple test used for objective assessment of exercise capacity of cardiac patients. In this test, patients are asked to walk as fast as they can. The 6 Minute Walk test is of particular use with older patients. It has good reliability, particularly with patients who have CHF.

New York Heart Association (NYHA) functional classification[74]

Despite some flaws, the functional classifications of the New York Heart Association (NYHA) is a commonly used observer rated classification for quantifying the degree to which symptoms limit the performance of everyday physical activities.

Minnesota Living with Heart Failure Questionnaire(LIHFE)[75]

The LIHFE has 21 items and assesses physical, socio-economic and psychological impairment in patients with heart failure. It has been widely used, particularly in pharmacological trials.

Kansas City Cardiomyopathy Questionnaire (KCCQ)[76]

The Kansas City Cardiomyopathy Questionnaire (KCCQ) is another tool for assessing health related quality of life in patients with CHF.

Specific Activity Scale[77]

This easily administered scale is used to evaluate performance by CHF patients based on the metabolic equivalents of oxygen consumption required for activities the patient actually performs.

Quality of life

Generic measures and disease specific measures represent the two basic approaches to assessing health related quality of life (HRQL). Generic HRQL instruments are designed as outcome measures to allow comparisons across populations and interventions, while disease specific HRQL instruments focus on symptoms and problems relating to a particular disease and are thus used as outcome measures in specific populations.

SF-36

A generic measure, the Medical Outcomes Study Short Form 36(MOS SF-36)[78] is a shortened version of the Medical Outcome Survey (MOS)[79]. It has 36 items measuring eight health concepts, namely: physical functioning, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems and mental health.

SF12

This 12-question survey generates an abbreviated health profile consisting of two summary measures describing health-related quality of life. The SF-12 has been shown to yield summary physical and mental health outcome scores that are interchangeable with those from the SF-36 in both general and specific populations[80].

Psychological functioning

Several instruments are available to measure specific psychological states, such as anxiety and depression. Most are generic tools. Some of the more commonly used questionnaires include the following:

State Trait Anxiety Inventory (STAI)

The STAI is a 40 item questionnaire consisting of a 20 item scale assessing state (current) anxiety and a 20 item scale measuring trait (general) anxiety[81]. It can be completed quite quickly and has been used in previous studies of cardiac patients.

Hospital Anxiety and Depression Scale (HADS)

The HADS is a 14 item scale with separate subscales for anxiety and depression[82]. Developed for use with medically ill patients in hospital, it is commonly used as a screening tool to detect psychological disturbance.

Beck Depression Inventory (BDI)

The BDI is a 21 item scale for measuring depression[83]. A short version has also been produced. It is commonly used to assess depression in cardiac patients.

Cardiac Depression Scale (CDS)

The CDS was produced to provide a more sensitive depression scale for cardiac patients.[84] Its 26 items reflect the range of depressive symptoms seen in cardiac patients.

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