AIHW
AUSTRALIAN INSTITUTE OF HEALTH & WELFARE

6

bulletin

Heart failure… what of the future?

Highlights

- There are no Australian data on the incidence and prevalence of heart failure in Australia. Based on overseas findings, it is estimated that at least 300,000 Australians have chronic heart failure (or about 4% of the population aged 45 or more), with 30,000 new cases diagnosed each year.
- Two major barriers in determining the incidence and prevalence of heart failure in Australia are the lack of a universally agreed definition and difficulties in diagnosis, particularly when the condition is mild.
- In the past decade rates of hospitalisation and deaths from heart failure have fallen for both men and women. Similar trends are also occurring overseas.
- Despite these trends in the total population, rates of hospitalisation and deaths from heart failure among Aboriginal and Torres Strait Islander peoples remain two to three times higher than among other Australians.
- An ageing population, improved survival from heart attack and the increased prevalence of diabetes and obesity may increase the number of people with heart failure in the future. By contrast, recent falls in the incidence of heart attack and continuing improvements in blood pressure control may stem the expected increase.

Introduction

There is concern that heart failure, along with other age-related conditions, such as coronary heart disease, Type 2 diabetes and arthritis, will become an increasingly important burden on the health care system in coming years. But what evidence is there to support this anticipated burden and how will it be monitored? To do that it is first important to identify what we do and don't know about the patterns and trends in heart failure.

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This bulletin begins with an assessment of what we need to know to monitor heart failure effectively in Australia. This is followed by a summary of what we already know as a result of analysing existing national data sets and includes a discussion of issues in monitoring heart failure, particularly in relation to the interpretation of data from existing sources. International comparisons are then made, and the bulletin concludes with a discussion of possible future trends in the incidence and prevalence of heart failure in Australia.

What is heart failure?

A national definition of heart failure needs to be agreed upon.

'Heart failure' describes conditions when the heart functions less effectively to pump blood around the body. It can result from a variety of diseases or conditions that impair or overload the heart, such as coronary heart disease. It can occur suddenly, although it usually develops slowly, often over many years, as the heart gradually becomes weaker and works less effectively. People with mild heart failure may have very few symptoms but in more severe cases it can result in chronic tiredness, reduced capacity to exercise and shortness of breath. Once diagnosed, it is associated with poor survival rates.

In hospital morbidity and mortality data collections heart failure is coded to I50 based on the ICD-10 classification system. It includes congestive heart failure, left ventricular failure and heart failure, unspecified (NCCH 2000).

Chronic heart failure

'Chronic heart failure' is a general term that refers to longstanding heart failure. It can usually be treated to improve a person's quality of life, but not cured. This is because the heart muscle has been irreversibly damaged. Not all heart failure is chronic, however. Heart failure caused by particular impairments, such as defects in a heart valve, can sometimes be cured if detected early enough.

Congestive heart failure

'Congestive heart failure' refers to a specific type of heart failure, although it is often used to describe all people with heart failure. It refers to the 'congestion' or build up of fluid in the lungs, liver or legs that frequently occurs in people with untreated heart failure.

Hypertensive heart disease

'Hypertensive heart disease' applies generally to heart diseases that arise from high blood pressure. These include coronary heart disease (a disease of the vessels that supply blood to the heart muscle) and heart failure. If the pressure in the blood vessels is allowed to remain high the heart has to work against a continual overload. In time, it may not be able to maintain its pumping effectiveness.

Monitoring heart failure

What do we need to know?

To monitor heart failure successfully a number of questions need to be answered. First, how common is it and who is most at risk? Second, since it is a preventable condition, we need to know the extent to which it is being prevented. Third, despite well-known clinical features, heart failure is often difficult to diagnose and experts suspect it is widely under-diagnosed, particularly in women, the elderly and obese people (Watson et al. 2000). Hence, we need to know if it is being diagnosed accurately. Finally, once diagnosed, how well is it being managed?

How big is the problem?

There is no universally agreed definition of heart failure, nor is there a 'gold standard' for confirming the diagnosis, particularly when the condition is mild. Despite these limitations, the mortality, morbidity and health care costs of heart failure are known to be considerable. Monitoring the incidence and prevalence of the condition over time and its distribution among various population sub-groups provides an opportunity to determine the proportion of people with heart failure who receive appropriate care and whether strategies to prevent the condition are working.

What is being done to prevent heart failure?

The most common causes of heart failure are coronary heart disease (especially prior heart attack), and high blood pressure. Other common causes are excessive alcohol intake, diseases of the heart muscle (cardiomyopathy) and diseases of the heart valves (such as rheumatic heart disease) (NHF & CSANZ 2001, Cohn 1998). People with diabetes also have a two to eight times greater risk of heart failure compared with people without diabetes (NHBLI 1997). It is possibly outside the scope of a heart failure monitoring system to assess prevention strategies aimed at reducing the causes of heart failure, but monitoring the incidence and prevalence of the condition can help to indirectly assess the effectiveness of prevention strategies.

Is heart failure being diagnosed accurately?

To confirm a diagnosis, the National Heart Foundation and the Cardiac Society of Australia and New Zealand Chronic Heart Failure Clinical Practice Guidelines Writing Panel (NHF & CSANZ 2001) recommend that all patients with suspected heart failure have an objective measurement of ventricular function, preferably by transthoracic echocardiography (an ultrasound of the heart), in addition to noting clinical signs and symptoms. Monitoring trends in the use of diagnostic tools, such as echocardiography, helps assess not only adherence to the clinical practice guidelines, but also diagnosis and management of the condition in the community, particularly among those most at risk.

Is heart failure being managed effectively?

The role of GPs in diagnosing and managing people with heart failure is critical in reducing hospital admissions for the condition. The NHF & CSANZ guidelines are aimed at relieving symptoms, slowing progression of the condition, and maximising

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quality of life. This can be achieved by drug, non-drug and surgical approaches (NHF & CSANZ 2001). With the exception of surgery, much of this management can be done in the primary care setting.

Episodes of hospital care are expensive, and heart failure patients often require readmission within the first year after discharge. Hospitalisation accounts for a large proportion of health care expenditure (38%) in managing patients with heart failure in Australia (AIHW: Mathers & Penm 1999), although the proportion is not as high as it is for coronary heart disease (64%) and stroke (45%), respectively. Depending on trends in incidence, lower hospitalisation rates could suggest more effective community management of heart failure. Monitoring the cost of heart failure might also provide economic justification for efforts to prevent the condition.

Classification of the severity of heart failure is based on symptoms and exercise capacity. International observations suggest that the risk of death from all grades of symptomatic chronic heart failure is high, with a 20–30% one-year mortality in mild to moderate heart failure and over 50% one-year mortality in severe heart failure (Watson et al. 2000). Analysis of survival rates in an Australian context would provide an indication of successful diagnosis, treatment and management of the condition.

The National Institute of Clinical Studies: congestive heart failure program

The National Institute of Clinical Studies (NICS) was established in December 2000 by the Commonwealth Department of Health and Aged Care to promote continuous improvement in the quality and delivery of clinical practice to the Australian community.

NICS has identified several priority action areas and one of them is congestive heart failure. The aim in this area is to improve the diagnosis, treatment and secondary prevention of congestive heart failure in Australia by focusing on the following four aspects of management:

- accurate diagnosis;
- prescription of appropriate drugs at optimal doses;
- patient recognition of worsening symptoms;
- patient self-management.

To monitor the effectiveness of the program, NICS held a workshop in Sydney on 1 August 2002 to develop heart failure data definitions and clinical indicators, and to explore options for achieving more routine and systematic collection of clinical practice information in different health care settings. As a result of this initiative, NICS has been working with others toward the development of a nationally agreed definition of heart failure for inclusion in the *National Health Data Dictionary*. The use of standard definitions and data sets should provide the means to assess the quality of care and help clinical practice improvement initiatives.

Source: NICS 2002.

What do we know about heart failure?

Incidence and prevalence

There are no Australian data on the incidence and prevalence of heart failure in the Australian population or among at-risk population sub-groups. However, based on overseas findings, NHF & CSANZ (2001) report that at least 300,000 Australians have chronic heart failure (or about 4% of the population aged 45 or more) with 30,000 new cases diagnosed each year.

Jamrozik et al. (AIHW 2001) recommend the use of data on hospital admissions and deaths for estimating the incidence of some forms of cardiovascular disease. However, they do not recommend this method for determining the incidence of heart failure because of poor recording of signs and symptoms in medical records, variations in diagnostic criteria and the potential impact of coding changes on estimating trends. The likelihood of multiple readmissions for heart failure further limits the estimation of incidence using hospital data.

The National Health Survey conducted by the Australian Bureau of Statistics includes questions about the presence of cardiovascular conditions, but these are self-reported (which limits their validity) and are unlikely to provide reliable estimates of heart failure prevalence. For example, heart failure is not one of the categories included in the survey so it would depend on the respondent reliably reporting this information to the interviewer.

Risk factors and primary prevention

There are some national data available on the risk factors and conditions associated with heart failure (Table 1, page 6). For adults, both the prevalence of high blood pressure and the incidence of acute coronary events (such as heart attack) at a particular age, notably younger age groups, have declined considerably. However, the number of Australians with Type 2 diabetes is estimated to have trebled in the last two decades. There are no comparable data to assess trends in excessive alcohol consumption, but in 2001 about 9–10% of Australians aged 14 years and over drank sufficient quantities to risk long-term harm to their health.

A follow-up study involving participants in the Framingham Heart Study linked obesity with an increased risk of heart failure (Kenchaiah et al. 2002). The association was considered to be an independent risk factor for heart failure and was above and beyond the impact of obesity on high blood pressure, diabetes and heart attack. This suggests that recent increases in the prevalence of overweight and obesity in the Australian community (AIHW 2002a) may work against the favourable trends in the incidence of high blood pressure and heart attack in coming years. In addition, the number of older people with high blood pressure and heart disease is also projected to increase (Kelly 1997).

Analysis of GP encounters (AIHW: Senes & Britt 2001) showed that the majority of patients (64%) managed for heart failure were 75 years and over. These patients frequently had accompanying health conditions, with high blood pressure and diabetes being the most common. The rate of diabetes in patients managed for heart failure was

far higher on average, indicating a clear association between both conditions. Diabetes was also common among newly diagnosed cases of heart failure.

Further information about trends in risk factors and conditions that can lead to heart failure can be found at AIHW's web site www.aihw.gov.au.

Table 1: Changes in the incidence of risk factors and health conditions that can lead to heart failure

Risk factors for heart failure	Population	Baseline year	Most recent year	Proportional change
High blood pressure—prevalence[1]	Men (25–64 years) Women (25–64 years)	1980: 45% 1980: 29%	1999–00: 22% 1999–00: 16%	23% fall 13% fall
Excessive alcohol intake—prevalence[2]	Males (14 years and over) Females (14 years and over)	n.a. n.a.	2001: 10% 2001: 9%	n.a. n.a.
Major acute coronary events (including heart attack)—incidence[3]	Men (40–90 years)	1993–94: 1,009 per 100,000	1999–00: 818 per 100,000	20% fall for men and women
	Women (40–90 years) per 100,000	1993–94: 480 per 100,000	1999–00: 381	
Type 2 diabetes—prevalence[4]	Men (25 years and over) Women (25 years and over)	n.a. n.a.	1999: 7.6% 1999: 6.7%	Estimated to have increased threefold since 1981
Obesity—prevalence[5]	Men (25–64 years) Women (25–64 years)	1980: 8% 1980: 7%	1999–00: 17% 1999–00: 19% M	More than doubled for both men and women since 1980

n.a. not available.

Sources

1. AIHW 2001: 'High blood pressure' is defined as systolic BP >= 140 mmHg and/or diastolic BP >= 90 mmHg and/or receiving medication for high blood pressure.
2. AIHW 2002a: 'Excessive alcohol consumption' is defined as consumption of 29 or more standard drinks per week for males and 15 or more standard drinks per week for females.
3. AIHW: Mathur 2002: 'Major acute coronary events' are calculated as the sum of non-fatal hospital admissions for acute myocardial infarction (heart attack) and deaths from coronary heart disease.
4. 1999–2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab).
5. AIHW 2001: Obesity is defined as a BMI of 30 or more.

Diagnosis

GPs do not widely use objective diagnostic tests (such as echocardiography) to assess patients with possible heart failure (Horowitz & Stewart 2001). In a recent analysis of GP encounters (AIHW: Senes & Britt 2001) just 3.8 per 100 new heart failure problems were referred to imaging centres for an echocardiogram. However, slightly higher numbers were referred to cardiologists (8.6 per 100 new heart failure problems) and for admission to hospital (8.0 per 100 new heart failure problems) where these diagnostic tests can also be carried out.

Results from the Australian CASE Study of patients aged 60 years and over presenting to their GP showed that if appropriate diagnostic tests were used along with clinical assessment, around 2% of new patients would be diagnosed with heart failure (Krum et al. 2001). Another 11% of those aged 60 years and over already had diagnosed heart failure. This finding suggests that heart failure among the older Australian population is under-diagnosed in the general practice setting.

Trend data are available on the use of echocardiography in hospitals where heart failure has been diagnosed either as the main reason for admission or as an additional diagnosis. However they have not been included in this bulletin because of concerns about data quality.

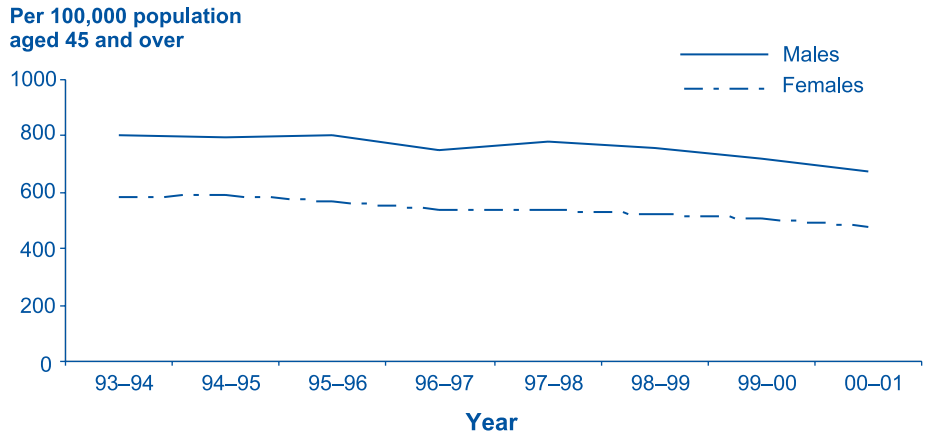
Management

Hospital admissions

Investigation of hospital records in Perth (AIHW: Jamrozik et al. 2001) showed that documentation of heart failure is particularly poor when the condition develops as a complication of acute myocardial infarction and among patients with longstanding heart failure who are prone to frequent readmission during acute periods. This is a particular concern among people aged 65 years and over since they account for over 80% of hospital separations attributed to heart failure. The authors concluded that the data's questionable validity (particularly when compared to other cardiovascular diseases such as heart attack or angina) limits its usefulness in analysing hospital records. Despite these limitations, analysis of hospital data to monitor general trends in hospital admissions is considered useful where heart failure or hypertensive heart disease (a major cause of heart failure) is the principal diagnosis (Assoc. Prof. M. Hobbs, pers. comm. 1 August 2002).

Over the period 1993–94 to 2000–01, reported rates of hospitalisation for heart failure or hypertensive heart disease (principal diagnosis only) declined slightly among males and females aged 45 years and over (Figure 1). The decline is evident across all age groups over 45, with falls greatest among those aged 55–64 years. Among the very elderly (those aged 85 and over) the decline in hospitalisation was less apparent.

Figure 1: Trends in hospitalisation rates where heart failure or hypertensive heart disease was the principal diagnosis, by sex, 1993–94 to 2000–01



Notes

1. Heart failure refers to ICD-9-CM code 428 and ICD-10 code I50; hypertensive heart disease refers to ICD-9-CM codes 402 and 404 and ICD-10 codes I11 and I13.
2. Hospitalisation rates have been age-standardised to the 1991 Australian population aged 45 years and over.

Source: National Hospital Morbidity Database.

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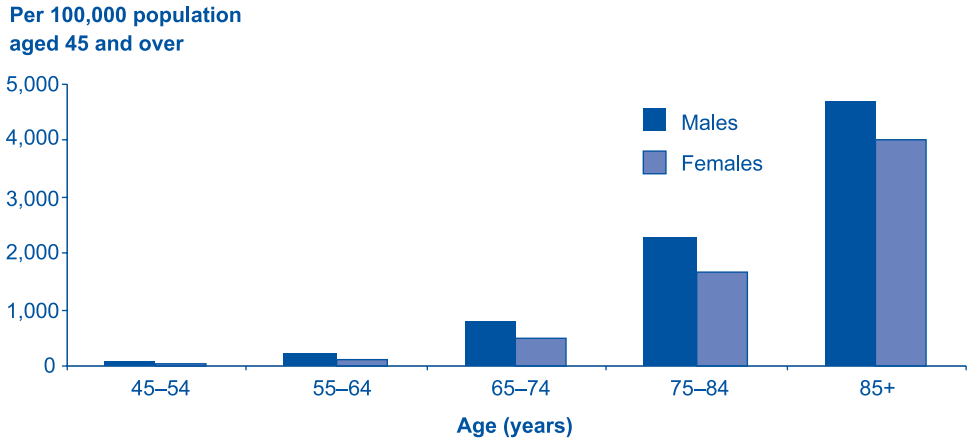
With an ageing population this downward trend is unexpected but may reflect better out-of-hospital management of the condition by GPs and heart specialists. By contrast hospitalisation rates where heart failure was an additional diagnosis increased slightly for both men and women over the same period.

Rates of hospitalisation where heart failure is the primary reason for admission rise dramatically with increasing age for both males and females. The rate among people aged 75–84 years is three times higher than for people aged 65–74 years (Figure 2).

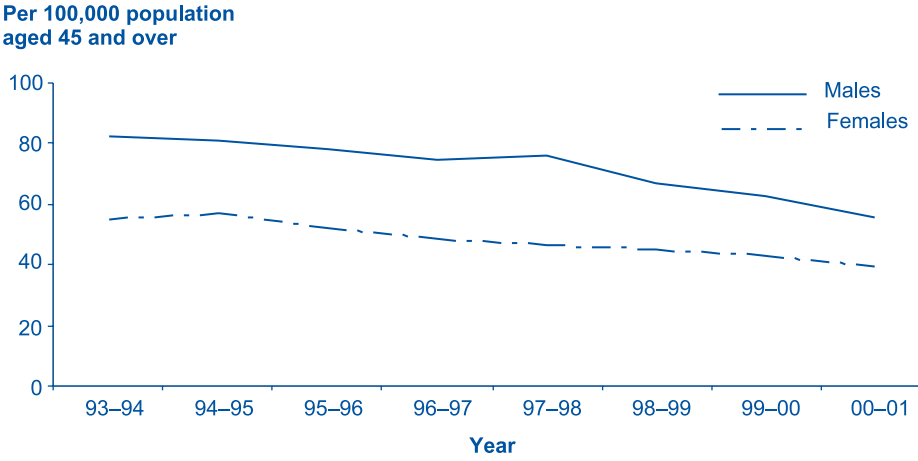
Figure 2: Age-specific hospitalisation rates where heart failure was the principal diagnosis, by sex, 2000–01



Note: Heart failure refers to ICD-9-CM code 428 and ICD-10 code I50.

Source: National Hospital Morbidity Database.

Figure 3: Trends in in-hospital death rates where heart failure or hypertensive heart disease was the principal diagnosis, by sex, 1993–94 to 2000–01



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2. Hospital death rates have been age-standardised to the 1991 Australian population aged 45 years and over.

Source: National Hospital Morbidity Database.

The average length of stay in hospital for people with heart failure has fallen from about nine to ten days in 1993–94 to seven to eight days in 2000–01. Females are hospitalised for slightly longer than males, and the older a person is the longer they are likely to stay in hospital—ten to eleven days on average for those aged 85 and over compared with an average of six days for 45–54 year olds.

Hospital deaths where heart failure or hypertensive heart disease was the principal diagnosis have also continued to decline—and more rapidly than the separation rates (Figure 3). In the period 1993–94 to 2000–01, hospital separation rates for heart failure fell on average by about 2% per year, whereas deaths in hospital fell by 4–5% per year reflecting a fall in the in-hospital case-fatality rate of about 2%. These falls suggest that in-hospital treatment for heart failure is improving, although the data do not take into account the severity of the condition among those being treated in acute care hospitals. Possible changes in admission policies over the period studied may also be influencing the trends.

Information about hospital readmissions cannot be determined using the National Hospital Morbidity Database because there is no individual identifier, although, as noted, a high readmission rate is characteristic of patients with heart failure and is most likely contributing to the high rates observed in the elderly population. Because of the ageing population, falls in hospital admission rates for heart failure in recent years (Figure 1) may be attributable to falls in first-ever admissions rather than falls in the readmission rate. This is also supported by the differing falls in hospitalisation rates reported earlier. However, there is insufficient detail in the data to draw a definitive conclusion about trends in readmissions.

Pharmaceutical use

National data are available on the use of prescription drugs in Australia from the Pharmaceutical Benefits Scheme and the Repatriation Pharmaceutical Benefits Scheme data collections. However, the main limitation of these collections is that they do not include information about the condition for which a drug is being prescribed and drugs used to treat heart failure can also be used for other conditions, such as high blood pressure. Further, the collections include only drugs subsidised through these schemes. In the past, these data sources were supplemented by a regular sample of pharmacy dispensing data collected by the Pharmacy Guild of Australia, but this collection ceased in 1998.

Analysis of GP encounters (AIHW: Senes & Britt 2001) showed on average, that heart failure patients were prescribed more medications than other patients of the same age. Several types of generic medications were prescribed, among them diuretics, digitalis and related drugs, potassium supplements, ACE inhibitors, nitrates and aspirin. The diuretic, frusemide, was prescribed for one in three newly diagnosed cases of heart failure.

Mortality

Heart failure and hypertensive heart disease accounted for 3,205 deaths in 2001 among people aged 45 years and over with nearly 90% of these deaths occurring in people aged 75 years and over. Between 1993 and 2001, mortality rates declined for both men and

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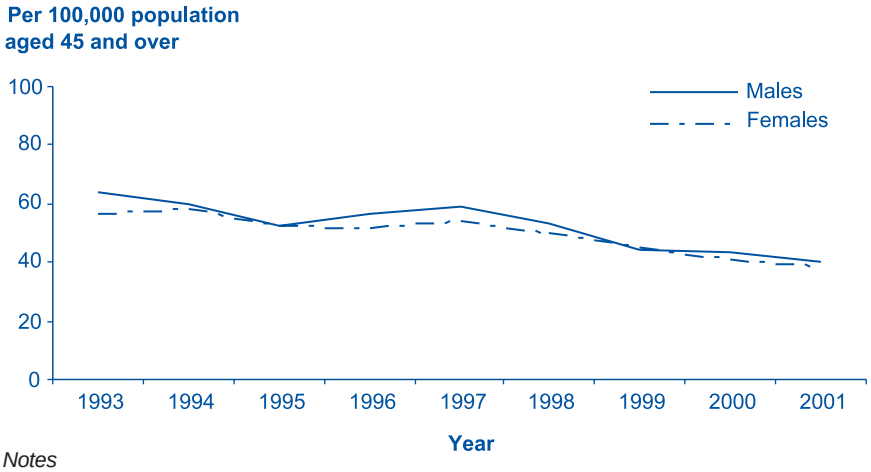
women aged 45 years and over (Figure 4). On average, the male death rate declined by 6% a year and the female death rate by 5%. Falls among the elderly (those aged 85 years and over) were slightly less than the average (5% and 4% among men and women, respectively). Interestingly, the decline in death rates was lowest among 55–64 year olds for both men and women, whereas this age group experienced the greatest fall in hospitalisation rates over a similar period of time.

Figure 4: Trends in death rates where heart failure or hypertensive heart disease was the underlying cause, by sex, 1993 to 2001



Notes

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2. Death rates have been age-standardised to the 1991 Australian population aged 45 years and over.

Source: National Mortality Database.

Also of note is the similarity in death rates between men and women—41 deaths per 100,000 for men and 38 deaths per 100,000 for women in 2001. This contrasts with the disparity between hospitalisation rates and in-hospital death rates, where male death rates are much higher than those for females (Figures 1 and 3). The notion that heart failure is widely under-diagnosed in women (Watson et al. 2000) may be contributing to the gender differences. It may also be that women are less likely to be readmitted to hospital because of their role as carers in the community, thus keeping female hospitalisation rates down.

Survival

Without adequate data on the incidence of heart failure in Australia, it is not possible to determine survival rates for the condition. In 1993, Ho et al. published international data based on a long-term follow-up study (beginning in 1948) of over 5,000 people in the Framingham Heart Study; they concluded that congestive heart failure was 'highly lethal', with a five-year survival rate of 25% in men and 38% in women. In 1997, Cowie et al. found that the prognosis for heart failure had still not improved, despite advances in therapy in the last four decades, although results from the use of drugs in clinical trials suggest that this situation may change. More recent analyses of the Framingham

Heart Study, by Levy et al. (2002) indicate that survival rates in the United States among both men and women are improving. Between 1950 and 1969, five-year survival was 30% for men and 43% for women; between 1990 and 1999, it increased to 41% for men and 55% for women.

These improvements are partially attributed to the increased use of ACE inhibitors and beta blockers. In Australia there were substantial increases in the prescription of ACE inhibitors throughout the 1990s, although the prescription of beta blockers remained relatively unchanged (AIHW 2001). Australian data on prescription drugs do not indicate reasons for prescription, but ACE inhibitors are often prescribed for people with high blood pressure or heart failure or both. A rise in their use may have contributed to improved survival among people suffering from heart failure in Australia, but there are insufficient data to confirm this.

Disease costs

National data on disease costs are available only for direct costs for the period 1993–94. Direct costs include hospital in-patient services, outpatient services, nursing homes, GP and specialist consultations, pathology tests, screening and diagnostic imaging services, allied health services and pharmaceuticals. They exclude community health services, public health programs, ambulance services, and medical aids and appliances. The direct health care costs for heart failure in 1993–94 were estimated to be $411 million or 10% of the total costs attributable to cardiovascular disease. This ranks heart failure fourth behind coronary heart disease (23%), high blood pressure (21%) and stroke (16%) (AIHW: Mathers & Penm 1999).

The AIHW is currently updating its estimates of disease costs.

Aboriginal and Torres Strait Islander peoples

This section compares heart failure hospitalisation and death rates for Indigenous Australians and non-Indigenous Australians. Note however, that the comparisons are based only on selected States and the Northern Territory since good quality data are not yet available for all jurisdictions.

From 1995–96 to 1997–98 and from 1998–99 to 2000–01, hospital admission rates for heart failure fell among both the male and female Indigenous and non-Indigenous populations investigated (Figure 5). Despite this however, hospitalisation rates were significantly higher among the Indigenous population in both three-year periods than among a similar population of non-Indigenous Australians—1,555 per 100,000 in the male Indigenous population compared with 743 per 100,000 in the male non-Indigenous population and 1,579 per 100,000 in the female Indigenous population compared with 541 per 100,000 in the female non-Indigenous population.

Between the two periods 1995–96 to 1997–98 and 1998–99 to 2000–01, death rates for heart failure remained fairly static among both the male and female Indigenous and non-Indigenous populations investigated (Figure 6). Although there were relatively few deaths attributable to heart failure in the Indigenous population, this population was nearly three times as likely to die from the condition between 1998–99 and 2000–01 (173.0 per 100,000 males and 160.3 per 100,000 females) compared with a similar non-Indigenous population (60.2 per 100,000 males and 65.6 per 100,000 females).

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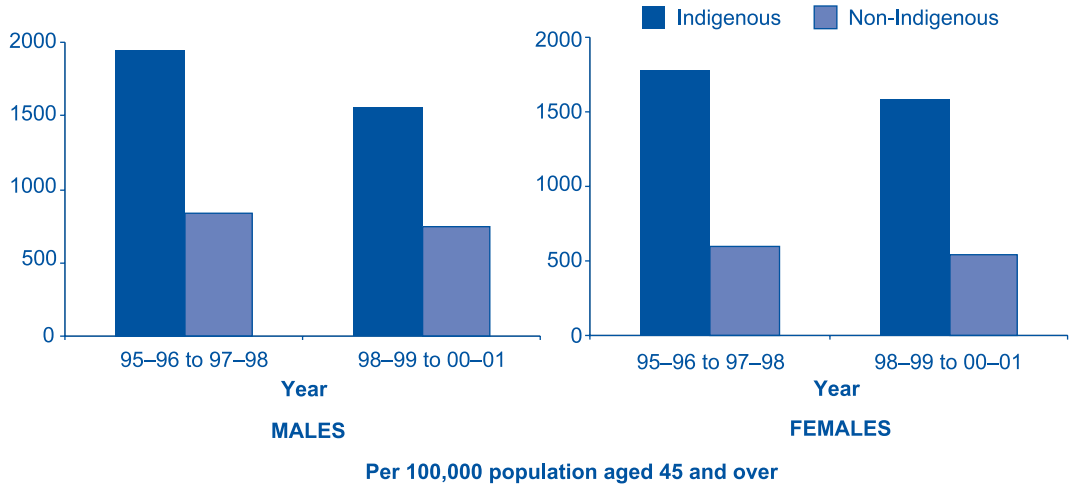
Figure 5: Hospitalisation rates among Indigenous and non-Indigenous males and females where heart failure or hypertensive heart disease was the principal diagnosis, 1995–96 to 1997–98 and 1998–99 to 2000–01



Notes

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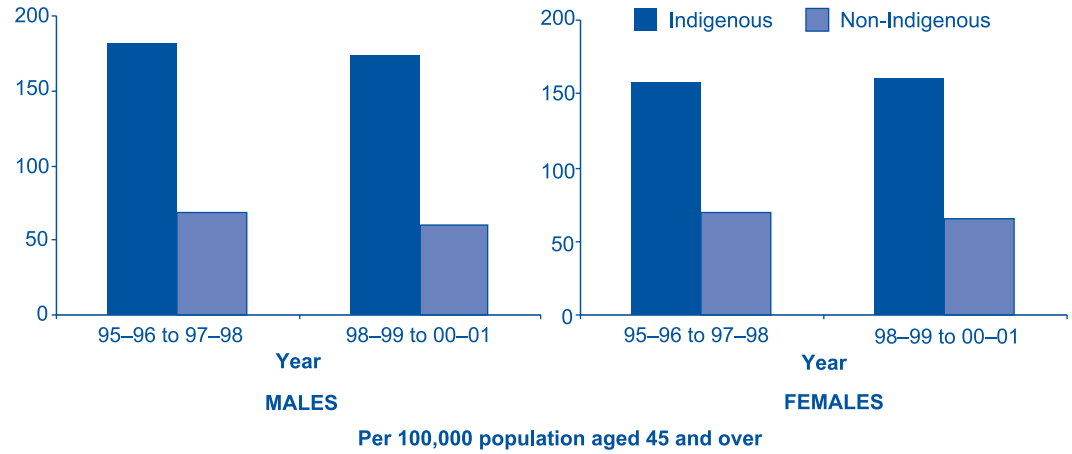
2. Hospitalisation rates have been age-standardised to the 1991 Australian population aged 45 years and over.
3. Data are for South Australia and the Northern Territory only.

Source: National Hospital Morbidity Database.

Figure 6: Death rates among Indigenous and non-Indigenous males and females where heart failure or hypertensive heart disease was the underlying cause, 1995–96 to 1997–98 and 1998–99 to 2000–01



Notes

1. Heart failure refers to ICD-9 code 428 and ICD-10 code I50; hypertensive heart disease refers to ICD-9 codes 402 and 404 and ICD-10 codes I11 and I13.
2. Death rates have been age-standardised to the 1991 Australian population aged 45 years and over.
3. Data are for South Australia, Western Australia, Northern Territory and Queensland only.

Source: National Mortality Database.

Looking at the rates between different age groups, the 1999–01 hospitalisation rates for heart failure are higher among middle-aged Indigenous males than among older Indigenous males—1,937 hospitalisations per 100,000 among 55–64 year olds and 1,354 per 100,000 among males aged 75 years and over. Death rates between different age groups in the same period are higher among 55–64 year old males (47 deaths per 100,000) than among 65–74 year old males (34 per 100,000) but rise dramatically among males aged 75 years and over (433 per 100,000). This apparent anomaly is not evident in the female Indigenous population. It is also not evident among the male and female non-Indigenous population, in which rates rise sharply from 55 years and over. So although heart failure is generally considered a condition of the elderly, this may not be the case for Indigenous males where the indications are that its prevalence is also high among middle-aged males.

Whilst the disparities in hospitalisation and death rates for heart failure among the Indigenous and non-Indigenous populations are considerable, the rates are likely to be underestimates for the Indigenous population because identification of Indigenous status in hospital data collections and on death certificates is in need of improvement.

International comparisons

Internationally, the picture for heart failure is a similar one—uncertainty about incidence and prevalence, but falling hospital and mortality rates, with numbers of hospitalisations peaking in the early to mid-1990s and falling more recently. There is also widespread agreement, both nationally and internationally, that identification and coding of the condition on hospital records and death certificates might be artificially influencing these trends. Similarly, differences in diagnostic criteria make comparisons difficult.

International analyses of long-term trends in the incidence of heart failure are rare. One recent study, by Levy et al. (2002), using data from the Framingham Heart Study, suggests that between 1950 and 1999 the incidence of heart failure in the United States fell by 30–40% among women but remained relatively unchanged for men. Interestingly, the disparity between the sexes is because heart failure related to high blood pressure is more common among women, whereas men who develop heart failure are more likely to have had a prior heart attack. Improved control of high blood pressure has therefore led to a fall in the prevalence of heart failure in women, whereas more men are surviving a heart attack and are thus more likely to develop heart failure. Despite these favourable trends, rapid increases in the prevalence of obesity and diabetes among both men and women coupled with an ageing population, are likely to cause a rise in the incidence of heart failure in the future (Redfield 2002). An international analysis of the epidemiology of heart failure, by Cowie et al. (1997), found that incidence rates in the general population ranged from one to five cases per 1,000 population per year to as many as 40 cases per 1,000 among people aged 75 years or more.

International estimates of the prevalence of heart failure are more common. The most recent data for the United Kingdom (Davies et al. 2001) indicate that the prevalence of heart failure is about 3% in people aged 45 years or more, with two-thirds of these cases confirmed using a combination of echocardiography and clinical examination and the remainder with suspected heart failure. This compares with an estimated prevalence in

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Australia of 4% among people aged 45 years or more. According to the National Health and Nutrition Examination Surveys, heart failure in the United States affects an estimated 2% of people aged 40 to 59 years, 5% aged 60 to 69 years, and 10% aged 70 or more. In addition, prevalence is at least 25% greater among the 'black' population than among the 'white' population (NHLBI 1996).

During the 1980s, the number of hospital admissions for heart failure in the United States and the United Kingdom was increasing, whilst the average length of stay was decreasing. As in Australia however, some countries are reporting recent falls in hospitalisation rates. In England between 1990–91 and 1999–00, the age-standardised hospital admission rates for heart failure fell by 8% for men aged 45 years and over and 5% for women of a similar age (Gnani et al. 2002) and a recent study in Scotland found that rates of admission rose to a peak in 1993 and then fell (Stewart et al. 2001).

In their international comparison of heart failure rates Cowie et al. (1997), reported that the hospital case fatality rate had fallen in the United States, the Netherlands and Scotland. Age-standardised mortality rates had also fallen in the United States and Canada, although the accuracy of death certificates and changes in coding practices may be artificially affecting trends in these countries. Similar trends in death rates have occurred in Australia, where as noted, diagnosis and coding of the cause of death also remain problematic.

Possible trends in future incidence

Although the incidence and prevalence of heart failure in Australia are largely unknown, the recent trends for hospital admissions and mortality suggest that neither of these indicators is increasing. The question that remains then is: What is likely to happen to the incidence of heart failure in Australia? In accordance with international trends, several factors are likely to be influential. There are also some factors that could artificially distort the measurement of these trends.

Factors that might cause a rise in incidence

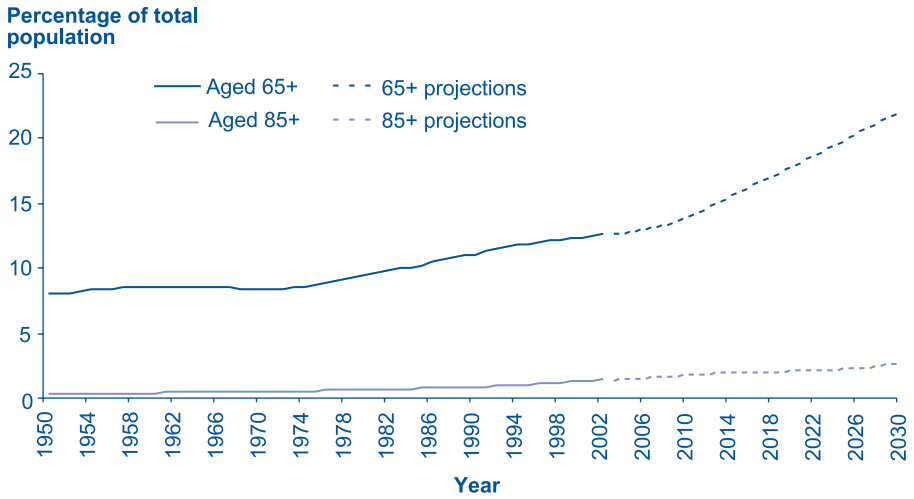
The ageing population

The population aged 65 and over is expected to rise dramatically during the next 30 years, from 1.3 million in 2002 to 2.2 million in 2030 (or 22% of the population). The increase in the number of people aged 85 or more represents a doubling, from 140,000 to 270,000 (or nearly 3% of the population) over the 30 years (Figure 7). Since the elderly are most susceptible to heart failure, the projected increase in this population will undoubtedly cause an increase in the number of new cases of the condition. However the effect on future incidence rates after adjusting for changes in the age structure of the population remains uncertain. These rates can't be assessed because of the lack of data on age-specific heart failure incidence in Australia.

Improved survival after acute coronary events

Between 1993–94 and 1999–00, the case fatality rate for acute coronary events such as heart attack fell by 12–16% (AIHW: Mathur 2002). The improvement has been attributed particularly to the prompt administration of thrombolytic therapy and rapid

Figure 7: Population projections to 2030: ages 65 and over and 85 and over



Source: ABS 1998.

increases in the use of revascularisation procedures such as coronary angioplasty and stents, but also other medical treatments for acute coronary events. Since previous heart attack is a common cause of heart failure among men, the increasing number of survivors may raise the incidence of heart failure by increasing the incidence among older men.

Increased incidence of diabetes and obesity

As in other developed countries, Australia is experiencing an increase in the prevalence of obesity and diabetes (Dunstan et al. 2001). As both are associated with an increased risk of heart failure, an increase in their prevalence will tend to increase the incidence of heart failure, particularly when combined with an ageing population and improved survival after acute coronary events.

Factors that might cause a fall in incidence

Decreased incidence of heart attacks

The recent report by Mathur (AIHW 2002) shows that during the 1990s the incidence of heart attack, a significant risk factor for heart failure, fell by 20%. The fall is partly attributed to large increases in the use of cholesterol lowering drugs, drugs used to prevent blood clotting and some blood pressure lowering drugs. There were also declines in the prevalence of tobacco smoking and high blood pressure during the period. If the incidence of heart attack continues to decline it may stem any tendency for an increase in the incidence of heart failure in coming years. However increases in the prevalence of obesity and physical inactivity during the 1990s (AIHW 2002a) may affect this downward trend because these factors increase the risk of heart attack.

Heart failure…what of the future?

Continuing improvements in the management of blood pressure

The incidence of heart failure may also be stemmed by the decline in the prevalence of high blood pressure (Table 1). There is evidence of this trend continuing because of the increased use of drugs to manage hypertension (AIHW: Mathur 2002).

Factors that might distort incidence

It is uncertain what effect improved diagnosis of heart failure might have on future incidence since several conflicting factors are at play. Improvements in diagnosis or the use of broader criteria to identify the condition, particularly among the elderly who frequently have accompanying health conditions, may increase measured incidence. Conversely, exclusion of some conditions previously attributed to heart failure or changes in the criteria used, might, through improved diagnosis, result in a fall in measured incidence.

Abbreviations

ABS	Australian Bureau of Statistics
ACE	angiotensin converting enzyme
AIHW	Australian Institute of Health and Welfare
AMI	acute myocardial infarction
AusDiab	The Australian Diabetes, Obesity and Lifestyle Study
BMI	body mass index
CASE	Cardiac Awareness Survey and Evaluation Study
CSANZ	Cardiac Society Australia New Zealand
ICD-9	International Classification of Diseases, 9th revision
ICD-10	International Classification of Diseases, 10th revision
NHF	National Heart Foundation
NICS	National Institute of Clinical Studies

Glossary

ACE inhibitor	A drug used to expand arteries by inhibiting the effect of an enzyme that helps to constrict them. This enables the blood to flow more easily, so the heart works more efficiently.
Beta blocker	A drug that slows the heart rate and reduces blood pressure by blocking the effects of parts of the nervous system.
Body mass index	The most commonly used method of assessing whether a person is normal weight (BMI 18.5 to less than 25), underweight (BMI less than 18.5), overweight (BMI 25 to less than 30) or obese (BMI 30 or over). It is calculated by dividing a person's weight (in kilograms) by their height (in metres).

Cardiomyopathy	A range of disorders in which the heart muscle as a whole is weakened or damaged. There may be multiple causes, including viral infections.
Diuretic	A drug that increases the loss of water and salt from the body, thereby reducing blood volume and the heart's workload.
Echocardiography	A recording of sound waves bounced off the heart, producing images of the heart in action.
Left ventricular failure	Heart failure may affect the left, right, or both sides of the heart. If the left half of the heart fails (left ventricular failure), fluid will build up in the lungs due to congestion of the veins in the lungs.
Rheumatic heart disease	Disease from damaged heart valves caused by a childhood attack of rheumatic fever.

Data sources

1999–2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab)

This study was conducted by the International Diabetes Institute and partially funded by the Commonwealth Department of Health and Aged Care. It is the most comprehensive study to date of the prevalence and impact of diabetes. The survey collected information on self-reported and measured diabetes and cardiovascular risk factors, features of the metabolic syndrome, health knowledge, attitudes, and health service use and practices. The information was collected from approximately 10,000 adults aged 25 years or more throughout Australia (excluding the Australian Capital Territory).

National Hospital Morbidity Database

This database is held at the Australian Institute of Health and Welfare and contains demographic, diagnostic, procedural and duration of stay information on episodes of care for patients admitted to hospital. The data items are supplied to the Institute by the state and territory health authorities. The database provides information on the number of hospitalisations for a particular condition or procedure. It is not possible to count patients individually.

National Mortality Database

This database is held at the Australian Institute of Health and Welfare and contains information on the cause of death as supplied by the medical practitioner certifying the death or by a coroner. Registration of deaths is the responsibility of the state and territory Registrars of Births, Deaths and Marriages. Registrars provide the information to the Australian Bureau of Statistics for coding of cause of death and compilation into aggregate statistics.

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Acknowledgments

Data analysis was undertaken by George Phillips.

Valuable comments were received by members of the National Cardiovascular Monitoring System Advisory Committee, members of the Heart, Stroke and Vascular Health Strategies Group and Colleen Krestensen and Krissa O'Neil from the Commonwealth Department of Health and Ageing. Advice on the NICS congestive heart failure program was provided by Sue Phillips.

This bulletin was funded by the Commonwealth Department of Health and Ageing.

This publication is part of the Australian Institute of Health and Welfare's Bulletin series. A complete list of the Institute's publications is available from the Media and Publishing Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601, or via the Institute's web site (http://www.aihw.gov.au).

AIHW Cat. No. AUS 34

ISSN 1446-9820

ISBN 1 74024 280 7

Suggested citation

AIHW: Field B 2003. Heart failure...what of the future? Bulletin no. 6. AIHW Cat. No. AUS 34. Canberra: AIHW.

Australian Institute of Health and Welfare

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Published by the Australian Institute of Health and Welfare

Printed by Union Offset Printers