Cardiovascular problems and risk behaviours among patients at general practice encounters in Australia 1998–00

GP Statistics and Classification Unit

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General Practice Statistics and Classification Unit 2000 [cited 22-12-2000]. SAND abstracts from the BEACH program. Sydney: AIHW/University of Sydney. Available from Internet: http:/www.fmrc.org.au/beach.htm.

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GENERAL PRACTICE SERIES
Number 9

BEACH

Bettering the Evaluation and Care of Health

Cardiovascular problems and risk behaviours among patients at general practice encounters in Australia 1998–00

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July 2002

A joint report by the University of Sydney and the Australian Institute of Health and Welfare
Canberra

AIHW cat. no. GEP 9

This is the ninth publication of the General Practice Series, from the General Practice Statistics and Classification Unit, a collaborating unit of the University of Sydney and the Australian Institute of Health and Welfare. A complete list of the Institute's publications is available from the Publications Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601, or via the Institute's web site at http://www.aihw.gov.au.

ISBN 1 74024 208 4

ISSN 1442 3022

Suggested citation

Henderson J, Pan Y, Britt H, Charles J, Miller GC, Knox S 2002. Cardiovascular problems and risk behaviours among patients at general practice encounters in Australia 1998–00. AIHW Cat. No. GEP 9. Canberra: Australian Institute of Health and Welfare (General Practice Series No. 9).

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Published by the Australian Institute of Health and Welfare

Printed by Panther Printnet

Foreword

This BEACH (Bettering the Evaluation and Care of Health) report represents a very significant addition to our understanding of general practice activity in Australia. The data come from the first 2 years of the BEACH program (April 1998 to March 2000) and provide large amounts of information about patients who visit their general practitioners with cardiovascular issues and about those general practitioners.

This is not a duplication of the prevalence studies published regularly by bodies such as the National Heart Foundation. It is complementary to such documents, however, and as such will be very useful in planning primary healthcare in the future.

Based on some 203,100 encounters, the data tell us, for example, that patients classed as 'cardiovascular' were significantly older than those who were 'non-cardiovascular', which is not surprising, but also that for all age groups there were relatively more cardiovascular encounters for females than for males, which is somewhat surprising. There were no significant differences in terms of ethnicity or Aboriginal/Torres Strait Islander status for patients attending cardiovascular encounters, which is a little concerning given the known high prevalence of cardiovascular disorders in Aboriginal and Torres Strait Islander peoples. Almost 60% of the patients with cardiovascular encounters were aged over 65 and most were long-standing patients at the practice. Cardiovascular encounters resulted in significantly more prescriptions and pathology tests than the overall average.

The report also contains useful information about ongoing risk factors and risk behaviours in terms of cardiovascular disease in the Australian community which will be of interest and value to general practitioners and to health planners. I hope that it might also provide some impetus for GPs to increase their 'prescribing' of interventions such as weight reduction and exercise.

Given the importance of cardiovascular disorders in the overall burden of morbidity and mortality in Australian society, it is very pleasing as a cardiologist to see information such as this being collected and published. I commend this report not just to all categories of healthcare providers but to the Australian public in general. It is a privilege to have been invited to write this foreword.

Terry Campbell

President, Cardiac Society of Australia and New Zealand.

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Background

Despite advances in treatments and the introduction of prevention strategies over the past 30 years, cardiovascular disease remains the single largest cause of premature death and death overall in Australia. As cardiovascular disease most commonly affects older persons, the progressive ageing of Australia's population is likely to result in an increasing future demand relating to these conditions on the healthcare system. Currently there are little published data available about cardiovascular problems in the general practice population.

Aims

This study aims to describe the cardiovascular problems managed in general practice, the patients with cardiovascular problems, general practitioners (GPs) who frequently manage cardiovascular problems, and the relative frequency of specific cardiovascular problems managed in general practice. It further aims to investigate health risk behaviours of patients with cardiovascular problems and the prevalence of cardiovascular problems in the general practice patient population. Finally, it aims to describe and compare changes in the management of cardiovascular problems over the 1990s using data from the 1990–91 Australian Morbidity and Treatment Survey (AMTS) and the 1998–00 BEACH program.

Methods

This is a secondary analysis of data from the BEACH (Bettering the Evaluation and Care of Health) program, a continuous national study of general practice activity in which a random sample of approximately 1,000 recognised GPs per year records details of 100 doctor–patient encounters of all types. The information is recorded on structured paper encounter forms. GP–patient encounters from the first 2 years of the BEACH program, April 1998 to March 2000, provided a sample of 203,100 encounters recorded by 2,031 GPs. Also analysed were data collected for subsets of the encounters relating to the prevalence of cardiovascular problems and self-reported health risk behaviours in the patient population.

Results

At least one cardiovascular problem was recorded by GPs at 31,161 (15.3%) of the 203,100 encounters (cardiovascular encounters).

Characteristics of GPs at cardiovascular encounters

Being male, aged more than 35 years, working full time, having graduated in Australia, conducting more than half their consultations in a language other than English, and working in smaller or rural practices were significant predictors of high cardiovascular encounter rates.

Characteristics of cardiovascular encounters

The characteristics of the cardiovascular encounters were compared with those of the non-cardiovascular encounters. Cardiovascular encounters were more likely to be claimable through Medicare, less likely to be claimable through workers compensation, more likely to be long surgery consultations and more likely to be home visits.

Patients at cardiovascular encounters were more likely to be male, and were significantly older than those at non-cardiovascular encounters. They were less likely to be new patients to the practice and more likely to hold a Commonwealth Government Health Care card or a Veterans' Affairs card.

At cardiovascular encounters there were significantly more patient reasons for encounter and more problems managed. The problems were less likely to be new to the patient than those at non-cardiovascular encounters.

Cardiovascular problems managed

Over half of the cardiovascular problems managed were labelled as hypertension of various types. Ischaemic heart disease was relatively common as was cardiovascular check-up, other vascular disease, heart failure and arrhythmia. Problems less frequently presented related to cerebrovascular disease and other circulatory disease.

Management of cardiovascular problems

For 61.9% of cardivascular problems, at least one medication was prescribed or advised at the encounter. At least one non-pharmacological treatment occurred for 16.5% of cardiovascular problems, the majority being advice or counselling. Almost 6% of cardiovascular problems were referred, mainly to a specialist, and 12% generated at least one investigation, the majority of these being for pathology.

Changes since 1990–91

Between 1990–91 and 1998–00 there was a decrease in the rate of cardiovascular encounters with patients in all age groups from 25 to 74 years. The rate of management of ischaemic heart disease and heart failure decreased but there was an increase in cardiovascular check-up, pointing to a decrease in mangement by GPs of serious disease and an emphasis on preventive measures. This change was also evident in management of cardiovascular problems, with a relative increase in medications such as antihypertensives, hypolipidaemics and anticoagulants. Medications that were new to the market during the 1990s accounted for a large proportion of the overall increase and contributed to the decrease in GP prescribing of some medications that were available in 1990–91.

Prevalence of cardiovascular problems

The prevalence of cardiovascular problems in general practice patient encounters was estimated to be 24.5%, at least one such problem bring recorded at 3,000 of the 12,247 encounters in the subsample. This prevalence rate is higher than the rate per 100 encounters because the latter does not include problems which are not managed on the day of the patient's visit to the GP. Over two-thirds of these patients had at least one of their cardiovascular problems managed at the encounter. At these 3,000 encounters, 72.5% of patients reported having only one cardiovascular problem and 22.2% reported the presence of two cardiovascular problems. The prevalence of hypertension among general practice patients was estimated to be 15% (95% CI: 13.8–16.1) and this was followed by ischaemic heart disease (IHD)/acute miocardial infarction (AMI) (4.1%),

heart failure (1.9%), arrhythmias (1.8%) and 'other vascular disease' (1.7%). At encounters where a current cardiovascular problem was recorded the prevalence of lipid disorder was estimated to be 11.5% (95% CI: 9.7–13.3). The prevalence of diabetes at these cardiovascular encounters was estimated at 11.6% (95% CI: 10.2–13.1).

Health risk behaviours of patients at cardiovascular encounters.

Patients at a sample of cardiovascular encounters ('cardiovascular patients') also provided information about their current smoking status. Another sample of 11,476 cardiovascular patients responded to questions about their alcohol consumption and their height and weight. One in ten patients reported being current smokers (8.2% of adult females and 13.2% of adult males). At-risk alcohol intake was reported by one in five of the subsample (27.1% of adult males and 15.7% of adult females). The rate of at-risk drinking in younger adults was 40.0%. Almost two-thirds of the sampled cardiovascular patients were either overweight (37.5%) or obese (25.2%). Both of the alcohol and overweight/obese risk factors were reported by 13.2% of the sample. However, younger males aged 18–44 years were far more likely to be overweight/obese and drink at-risk levels of alcohol (> 25%) than women and older male cardiovascular patients.

Conclusion

This secondary analysis of BEACH data has described the cardiovascular problems being managed by GPs, and the relative frequency of their management in the general practice population. The Supplementary Analysis of Nominated Data (SAND) substudies have provided an indication of the likely prevalence of various types of cardiovascular problems being encountered in this population. They have also allowed investigation of the extent to which people with known cardiovascular problems continue to partake in risk behaviours such as smoking, excessive alcohol consumption or remaining overweight. These are the first data of this type from such a large national sample of general practice patient encounters. Added to data from other sources, these and further measures currently being gathered in BEACH subsamples can be used in the future to assess Australia's progress in reducing cardiovascular problems and risk behaviours.

Acknowledgments

The General Practice Statistics and Classification Unit wish to thank the 2,031 general practitioners who participated in BEACH 1998–2000. This report would not have been possible without their valued cooperation and effort in providing the data.

We also thank the following organisations for their financial support and their contribution to the ongoing development of the BEACH program during the first 2 years of its activities from which this report is drawn:

- the (then) Commonwealth Department of Health and Aged Care
- Commonwealth Department of Veterans' Affairs
- National Occupational Health and Safety Commission
- AstraZeneca (Australia)
- Aventis Pharma Pty Ltd
- Roche Products Pty Ltd

and more recently

- Janssen-Cilag Pty Ltd
- Merck Sharp & Dohme (Australia) Pty Ltd.

We acknowledge the support of the Royal Australian College of General Practitioners, the Australian Medical Association, the Australian Divisions of General Practice and the Consumers Health Forum, and the contribution of their representatives to the BEACH Advisory Board.

We are grateful for the large contribution made to the collection and preparation of the BEACH data by other current BEACH research staff (particularly Lisa Valenti), the strong administrative support provided by Dulcie Bucksath and Gervaise Woods, and the valuable contribution of the general practitioner recruitment staff (particularly Errol Henderson) and data entry staff (particularly Rebecca Chapman). We recognise the earlier contribution of past members of the BEACH team.

The cooperation of Carolynn Fredericks and Gordon Calcino of the General Practice Branch of the Commonwealth Department of Health and Aged Care in regularly supplying general practitioner random samples and national Health Insurance Commission data is also appreciated. At the Institute, Jenny Hargreaves assisted with the editing of the report, Stan Bennett and Susana Senes assisted with editorial advice on the literature review, and Amanda Nobbs coordinated the printing and publication process.

Ethics approval for this study was obtained from the Human Ethics Committee of the University of Sydney and the Ethics Committee of the Australian Institute of Health and Welfare.

1 Background

Recent advances in prevention and treatment of heart, stroke and vascular diseases, and a lower prevalence of some of their associated risk factors, have been associated with increased life expectancy and improved quality of life for many Australians. Despite these advances, cardiovascular disease remains the largest cause of premature death and death overall in Australia and most other developed nations. It is also responsible for a greater proportion of health and economic burden than any other disease in Australia. The major factors contributing to this burden are the managements related to cardiovascular conditions, e.g. hospitalisation, diagnostic and surgical procedures, cardiovascular co-morbidity increasing length of stay for other conditions, general practice consultations and prescriptions associated with cardiovascular conditions[1-4].

As cardiovascular disease is generally acknowledged as a disease of the elderly, the number of Australians with these diseases is likely to increase dramatically over the next 20 to 30 years as the average age of the population increases. The burden associated with the increase in heart failure, stroke and heart attack is therefore also likely to increase. Reducing the impact of this burden falls, to a great extent, on general practitioners. Being consulted by approximately 80% of Australians annually[5], and being the main access point to the health system for most Australians, there is an increasing expectation for GPs to be more active in lifestyle counselling and continually up-to-date regarding medications, tests and techniques available for prescription or referral to manage these conditions.

Although some of the risk factors associated with cardiovascular disease are physiological or familial, many premature deaths and a significant amount of morbidity could be reduced by decreasing risk behaviours such as tobacco smoking, physical inactivity and poor diet. These activities are also important in preventing and managing type 2 diabetes, lipid disorders and hypertension, all conditions which are associated with eventual development of other cardiovascular disease. A number of people exhibit a clustering of these risk behaviours, despite already being managed for one or more cardiovascular conditions by their general practitioner.

This report differs from previous BEACH reports which have to date been based largely on encounter data, i.e. on information about the overall problems managed and treatments provided in general practice. This report does include an examination of some encounter data, but only that pertaining to the topic of interest—cardiovascular problems. It does not provide detailed information on the management of specific cardiovascular problems as this topic was covered in an earlier report[6].

The current study includes information about encounters with patients for whom a cardiovascular disease was managed, the characteristics of patients with cardiovascular problems and the GPs who managed these conditions. It also investigates self-reported risk behaviours of patients at subsamples of encounters involving management of cardiovascular problems and the prevalence of cardiovascular-related problems in patients at general practice. Changes in the management of cardiovascular problems over the 10-year period 1990–91 to 1998–00 are also examined.

1.1 Aims

This report:

- describes the characteristics of GPs who managed patients with cardiovascular problems and defines the group of GPs most likely to see cardiovascular problems more frequently
- describes the encounters with these patients and the types of cardiovascular problems managed
- describes the characteristics of patients who have cardiovascular problems managed at general practice encounters
- describes changes in the management of cardiovascular problems over the 10-year period 1990–91 to 1998–00
- estimates the prevalence of cardiovascular-related problems in general practice
- examines selected self-reported risk behaviours of the general practice patients for whom cardiovascular problems were managed.

1.2 A review of the literature—risk factors, risk behaviours and cardiovascular problems

This study looks at general practice encounters at which a cardiovascular problem was managed. It further focuses on the risk behaviours of patients who have been identified as having a cardiovascular problem. For this reason, the main objective of this literature review is to describe the risk factors and risk behaviours which cause cardiovacular disease initially, and which exacerbate cardiovascular problems once established. The risk behaviours reported in the substudy populations are smoking, alcohol consumption and being overweight; risk factors such as hypertension, diabetes and lipid disorders are also examined. These topics are therefore examined more through the literature. Other risk factors and risk behaviours not reported on in this study, but nevertheless important in the development of cardiovascular disease, have been covered to a lesser degree. The topics are also presented from a health system perspective as much as from that of general practice. Although GPs may be well placed to effect change in risk behaviours through counselling, the problems associated with risk behaviours are systemic—the same risks affect the population at large as they do general practice patients in particular.

Cardiovascular disease (CVD) incorporates all diseases pertaining to the heart and blood vessels including coronary heart disease, stroke, heart failure and peripheral vascular disease[7]. It kills more Australians annually than any other disease[3]. Associated illness, disability and ensuing healthcare costs, which exceed those of any other disease, categorise cardiovascular disease as a major health and economic burden for Australia[2] and have resulted in its inclusion as one of Australia's National Health Priority Areas.

The underlying cause of many forms of cardiovascular disease is atherosclerosis, a common type of arteriosclerosis in which deposits of plaque containing cholesterol, lipoid material and lipophages are formed within large and medium-sized arteries[8]. Atherosclerotic plaques basically develop in three stages—dysfunction of the vascular endothelium, development of a fatty streak and fibrous cap formation[9]. These plaques

reduce the capacity of vessels to supply blood. The most serious effects occur when vessels supplying blood to the heart muscle become clogged, leading to angina or a heart attack, or to the brain which can result in a stroke. Peripheral vascular disease results from damaged or blocked vessels supplying blood to the legs or other peripheral structures.

Cardiovascular disease accounted for 39% of all deaths in Australia in 2000[10]. With around 80 deaths each day from coronary heart disease, it is the highest single cause of death in Australians aged less than 70 years. The second greatest killer is stroke, which claimed almost 12,500 Australians in 2000, averaging 9.7% of all deaths in Australia per year [10]. Stroke is also the principal cause of long-term disability in adults[3,7]. Peripheral vascular disease accounted for 1.6% of deaths from all causes in 1998–99 as well as over 700 amputations and 13,612 hospitalisations with an average length of stay of 8.0 days [10,11].

In 1993–94 cardiovascular disease accounted for 12% of the total health system costs representing the largest proportion of health system costs in Australia[1,4,10]. Public and private hospital costs due to cardiovascular diseases during that period totalled $1.5 billion, with a further $700 million spent on drugs for their treatment and prevention[3]. Cardiovascular diseases account for approximately 8% of all hospital separations each year[7,10,11]. They also comprised 11.1% of all problems managed by general practitioners annually between 1998–99 and 2000–01[12-14]. For each of these periods, almost 15% of all prescriptions provided by GPs were for cardiovascular medications, antihypertensives being the drugs most frequently prescribed. Nationally, one-fifth of all medications prescribed in the community in 1997 were for cardiovascular drugs[3]. By 1998 this figure had risen to almost one-quarter of all prescriptions[4].

Although advances in treatment and the introduction of prevention strategies have contributed to a steady decline in cardiovascular diseases over the past 30 years, these diseases remain the single largest cause of premature death and death overall in Australia. As cardiovascular diseases most commonly affect older persons, the progressive ageing of Australia's population is likely to result in an increasing demand on the healthcare system in the future, as levels of drug treatment and other interventions, and their associated costs continue to rise[7].

Risk factors

Cardiovascular diseases share a number of risk factors, both physiological and behavioural. Some of these risk factors such as age, gender and family history cannot be influenced, but many risk factors are reducible or preventable. Cigarette smoking, excessive alcohol consumption, poor nutrition, physical inactivity, excess weight, hypertension, hyperlipidaemia, stress and diabetes[3,15] are all risk factors for heart disease. Atrial fibrillation is a further risk factor for stroke. Some population groups have a higher risk of cardiovascular disease than other groups and risk factors themselves can be influenced by other characteristics such as education, living conditions, economic resources, working conditions, social influences and access to health care[3].

Age and sex

Increasing age and being male are risk factors for cardiovascular disease. The prevalence of cardiovascular disease increases with age, particularly between the ages of 40 and 70 years. For example, in 1995 over 60% of people aged 75 and over had a cardiovascular condition compared with less than 9% of those aged 35 or under[3]. The risk for both sexes increases greatly with age, but at any age the risk for males exceeds that for females. A

report based on data from the Framingham Heart Study[16] found that at all ages men had a higher lifetime risk of developing coronary heart disease than women. Before age 40 the risk is low (1.2% in men, 0.2% in women). However, at age 40 the risk for men is about one in two (48.6%) and one in three for women (31.7%)[3,16]. Even at age 70, the risk for men is one in three, and for women it is one in four.

While the overall mortality rate from heart disease has declined in recent years, the decline has been greater for men than for women. Since 1984, more women than men (in absolute numbers) have died each year from heart disease, a fact accounted for by the greater number of women than men in the population, particularly among the elderly[17]. In many cases, age helps to level out the sex differences in risk for cardiovascular disease.

Sex and age differences have been observed in survival outcome following hospitalisation for myocardial infarction (MI)[18]. In patients under 50 years old, women had an almost threefold higher risk for death than men, although this odds ratio decreased with advancing age such that it was close to 1.00 by 70 years of age. Women often have a worse prognosis compared with men once heart disease has been confirmed[17], but men are still at far greater risk of developing heart disease initially. A recent study of Finnish men and women found that men were three times more likely to develop heart disease and five times more likely to die of heart disease than women[19]. Differences in major cardiovascular risk factors (smoking, cholesterol levels, body mass index and diabetes), particularly in the youngest participants, accounted for half of the sex difference in incidence and mortality. In general, risk factors carry a similar level of risk for both men and women. One exception is diabetes—not only is diabetes more strongly related to heart disease in women than in men, but also it removes their health advantage with respect to heart disease[17].

Family history

Several studies have concluded that family history of cardiovascular disease is in itself an independent risk factor, as well as having additive effects when combined with other risk factors[20,21]. Family history of stroke has been found to be an independent risk factor for all stroke types combined and for cerebral infarction, especially among individuals with a parental history of stroke[22-24]. Other studies have concluded that most early cardiovascular events occur in families with a positive family history of cardiovascular disease[25,26], that family history is the most important risk factor in prevention of coronary heart disease from youth[27] and that family history may be a favourable indicator of familial burden for coronary heart disease in situations where genetic or clinical information is unavailable[28].

A positive family history of coronary heart disease indicates a high risk for premature coronary heart disease independent of traditional and non-traditional risk factors[29,30]. Szamosi et al. (1999) examined children of parents with premature coronary heart disease (observed prior to 45 years of age) for body fat, blood pressure, blood cholesterol and blood sugar levels, and concluded that risk factors of atherosclerosis are detectable in children and adolescents of high-risk families[31]. Although genetic factors are certainly involved, the family environment can add to the risks, as many family members often share the same behavioural patterns of diet, alcohol consumption, smoking and level of physical activity[20,22,23]. Family history should feature prominently in targeting high-risk subjects for the prevention of cardiovascular disease[25,30,32].

Smoking

Smoking of tobacco products increases the risk of cardiovascular diseases as well as a range of cancers and other morbidity[3]. It is the risk factor associated with the greatest disease burden in Australia[33] with approximately 13% of deaths from cardiovascular disease attributed to its practice[1,34]. Smoking is regarded as the most important modifiable risk factor because it approximately doubles the risk of death from a heart attack and is entirely preventable[7,35,36]. Furthermore, cessation of smoking reduces the risk of heart, stroke and peripheral vascular disease within 2 to 5 years, to levels similar to those for people who have never smoked[7].

Cigarette smoking contributes to the development of coronary atherosclerosis by damaging the vascular endothelium. Nicotine alters the expression of a number of endothelial genes whose products help to regulate vascular tone, leading to endothelial cell dysfunction and the gradual onset of coronary atherosclerosis[37]. It increases arterial wall stiffness reducing blood vessel distensibility and compliance, and is associated with increased fibrinogen levels, increased platelet aggregation, increased hematocrit and decreased high-density lipoprotein (HDL) cholesterol levels[36]. Smoking has been found to acutely affect cerebral blood flow[38] and, when combined with other risk factors, considerably increases the risk of cardiovascular diseases even in the young. Smoking, even of short duration and moderate consumption, has been found to have a detrimental impact on lipid profiles of boys as young as 15 to 18 years[39]. The risk of myocardial infarction from smoking in women aged 16 to 44 years is considerable, heavy smokers with other risk factors being particularly at risk[40]. Stroke risk is greatly increased for teenage girls and young women who smoke in combination with the use of oral contraceptives[36,41-43].

In Australia, the number of people who smoke daily is gradually declining. In 1995, 24% of adults were daily smokers[44]. In 1998, 21.8% smoked daily, and by 2001 this percentage had reached 19.5%[45]. Similarly, the percentage of adults who have ceased smoking or have never smoked has gradually increased[45].

Because smoking has been identified as the single most important cause of premature death in developed countries and is rapidly becoming a major health concern in most developing countries, the World Health Organization (WHO) is increasing efforts to control what it describes as a 'global tobacco epidemic'[46]. Its aim through studies such as the MONICA Project, a multinational study set up to monitor the trends and determinants in cardiovascular disease, is to determine whether changing prevalence is resulting from initiation or cessation of smoking and which groups should be targeted for public health intervention strategies. Many of the countries in the study showed a reduction in the prevalence of smoking. However, population groups from some countries, particularly men in China and eastern and central Europe, and women in many populations, have an increasing prevalence, a factor attributed to powerful socioeconomic forces resulting from a global economy[46].

Two Australian communities participated in the MONICA Project (Perth and Newcastle). Over the 10-year period of the study there was a significant reduction in the prevalence of smoking[47], a decreasing trend reported in the number of daily smokers, an increase in the number of people who have never smoked, and an increase in the number of former smokers for both population groups[46]. These trends supported the findings of the 2001 National Drug Strategy Household Survey. The study concluded that reducing the prevalence of smoking should remain a high public health priority in all countries.

Alcohol

Consumption of alcohol has long been considered a risk factor for cardiovascular disease. Level of consumption and patterns of drinking produce different health outcomes, some negative and some positive. The negative effects of excessive long-term alcohol consumption are cardiac arrhythmias[36], haemorrhagic stroke[41], aortic stiffness[48], systemic hypertension[36,41,49], congestive cardiomyopathy, cerebral vascular incidents and reduced left ventricular ejection fraction[49]. Consuming sporadic large amounts or 'binge' drinking can result in embolic stroke or acute myocardial infarction[50]. The rapid change in both systolic and diastolic blood pressure during and after intoxication may increase the likelihood of strokes even in young drinkers[51].

During recent years, many observational studies have reported a demonstrated cardioprotective effect of consuming small to moderate amounts of alcohol regularly[49,50,52-56]. Consuming 10–20g per day (1–2 standard drinks) for women or 20–30g per day (2–3 standard drinks) for men is associated with a 30–50% morbidity and mortality risk reduction for cardiovascular disease[49,52,54,55,57,58]. The protective effects of alcohol consumption are attributed to an ethanol-induced increase in HDL cholesterol[49,53,54], to the antioxidant effects[52,54] particularly of red wine[49,56] and dark beer[49], and to platelet anti-aggregation agents[53,54,56]. Several studies have reported a J-shaped dose-response curve where those who consume 1–2 standard drinks of alcohol per day have a lower relative risk of developing cardiovascular diseases than non-drinkers, although the risk increases again after a level of more than 5 drinks per day is consumed[36,41,49,59]. National Health and Medical Research Council (NHMRC) guidelines suggest that two or fewer standard drinks per day for women and four or fewer per day for men are low risk levels for alcohol consumption[10].

For this reason, promotion of alcohol as a cardioprotective tool should be viewed with caution, particularly among population groups who have higher rates of diabetes and hypertension, or whose literacy skills make the 'beneficial limit' difficult to comprehend[60]. Low socioeconomic status and education level are often associated with groups who have experienced alcohol abuse as a problem either collectively or for addictive individuals[60,61]. Apart from the direct negative physical effects of excessive alcohol consumption, the increased injury and mortality from road accidents, violence, accidental falls, fires, drownings, suffocations and inhalations, suicides and self-inflicted injuries take a huge toll on the population, and categorise alcohol abuse as harmful even for those not alcohol-dependent[33,62]. Alcohol's protective benefits are specifically associated with cardiovascular disease. It remains detrimental where other causes of morbidity and mortality are concerned[62].

Diet and nutrition

Dietary patterns also provide potential risk factors for cardiovascular disease. The risk is attributed to a range of dietary components which, when combined over time, can either cause or adversely affect other physiological conditions. Diabetes, hypertension, excess body weight, blood cholesterol and antioxidant levels are all affected by dietary intake and are all involved with the disease processes of cardiovascular morbidity[3]. In Australia, diet-related diseases and their risk factors result more from over consumption and sedentary life styles than from under-nutrition[2]. This is resulting in a gradual rise in the number of overweight and obese Australians[10]. A proportion of some population groups, such as the Indigenous, still suffer from under-nutrition, although generally the population's mean nutrient intake meets the NHMRC's Recommended Dietary Intake (RDI) levels for most vitamins and minerals in all age groups[2,63]. There is certainly room

for improvement in this area, however, as 'on any day, over half of males aged 12–44 years and approximately a third of children aged 4–11 years do not eat fruit or fruit products, and more than 20% of children under 12 years do not eat any vegetables or vegetable products'[2]. For many Indigenous Australians, poor diet is often the result of nutritious food being unavailable in some of the more remote areas[64] but for other Australians it seems simply the result of poor choices. GPs may have more success in counselling individuals that good dietary habits from a young age help prevent cardiovascular (and many other) problems in the long term.

High dietary intake of saturated fatty acids (from cheese, butter, margarine, meat, milk and pastries), trans fatty acids (from some margarines, meat and meat products) and cholesterol (from eggs, meat, milk and poultry) increase blood cholesterol and contribute to an increased risk of coronary heart disease. Dietary intake of alcohol and salt should also be moderated. An increase in blood pressure is associated with high consumption of dietary salt[4].

A study by Hu at al. (2000) concluded that two main dietary patterns significantly predict the incidence of coronary heart disease, independent of other lifestyle variables. The study found strong evidence that a diet high in vegetables, fruit, legumes, whole grains, fish and poultry, and low in red meat, processed meat, high-fat dairy products and refined grains may reduce the risk of coronary heart disease[65]. Other studies agree that a diet high in fruits and vegetables[36,41,66], whole grains[67], and fish containing omega-3 fatty acids[68] may decrease the risk of stroke. Diets high in sodium and low in potassium can lead to hypertension, and those high in saturated fats cause obesity and hypercholesterolaemia, which also adversely affect blood pressure levels[41]. Excess intake of carbohydrates with a high glycaemic index such as potatoes and white bread have been associated with an increased risk of type 2 diabetes and coronary heart disease[65]. A study by Liu at al. (2000) concluded that a higher intake of whole grain foods was associated with a lower risk of ischaemic stroke among women, independent of other known CVD risk factors[67]. Dewailly at al. (2001) attribute the consumption of marine products rich in n-3 (omega 3) fatty acids, the traditional diet of the Inuit, to the low mortality rate from ischaemic heart disease in the Inuit population[69].

Folic acid, particularly in conjunction with vitamin B12[70], has recently been recogised as an effective therapy for reducing plasma homocysteine, which, in elevated concentrations is associated with cardiovascular disease[71-73]. Dietary sources of folate include meat (especially liver), yeast extract, fruits and vegetables, cereals and other grain products[74,75]. Consuming fibre contained in fruits, vegetables and especially cereals, also has a beneficial affect on cardiovascular health[76]. Fernandez (2001) cites several studies documenting that dietary fibre lowers the risk of coronary heart disease[77]. High fibre intake has been associated with reductions in serum cholesterol[77,78], with oat fibre in particular tending to lower plasma total and LDL cholesterol[76,79]. Giacco at al. (2000) also report benefits of a high fibre diet for type 1 diabetic patients, in particular, an improvement in glycaemic control and reduction of hypoglycaemic events[80].

Between 1960 and 1990 evidence gathered by the WHO suggested that the Mediterranean population were being positively influenced by some factor affecting their health[81]. Of particular interest were the lower death rates and longer life expectancy occurring in Greece, specifically Crete[82,83]. The traditional diets (pre-1960) of people in these regions, particularly in rural areas, consist of a high intake of fruits, wild edible greens and other vegetables, nuts, beans, seeds, cereals, olive oil and olives, fish, cheese, moderate amounts of red wine, and low amounts of milk and red meat[82,84,85]. This style of diet is low in saturated fat, moderately high in unsaturated fat, and high in fibre, flavonoids and other

antioxidants[81,86] and it is considered likely that these properties may be responsible for the cardioprotective effect observed[82,85,87]. Wasling (1999) suggests this effect may also be due to what is missing from the diet—'the animal fats, margarine, cakes, sweets, biscuits and manufactured foods that are characteristic of the British diet'[88]. The Lyon Diet Heart Study found that a Mediterranean-style diet reduced subsequent cardiovascular events in patients following an initial myocardial infarction[85,87,89]. Fuentes at al. (2001) found that the Mediterranean style diet improved endothelial function in hypercholesterolemic men[90]. However, subsequent studies suggest that the Mediterranean model may be losing favour in its traditional regions, becoming more restricted to older people and to rural areas because younger, urbanised people are departing from it[84,91].

Physical activity

Poor nutrition coupled with physical inactivity can often lead to excess weight or obesity, also a risk factor for cardiovascular disease. However, physical inactivity is recognised as an independent risk factor for coronary artery disease. The American Heart Association expounds the beneficial effects of physical activity—exercise training increases both maximum cardiac output and the ability of muscles to extract and use oxygen from blood; improves haemodynamic, hormonal, metabolic, neurological and respiratory function; helps control blood lipid abnormalities, diabetes and obesity by favourably altering lipid and carbohydrate metabolism; affects the distribution of adipose tissue; and assists in the prevention of osteoporosis and certain neoplastic diseases, notably colon cancer[92].

Apart from the health benefits of physical activity, being active greatly reduces the financial burden of healthcare costs. Physical inactivity accounts for 6% of the total burden of disease and injury among Australian males and 8% among females, and ranks second only to tobacco use in terms of the burden of disease in Australia. The direct healthcare cost attributable to physical inactivity is approximately $377 million annually, comprising an estimated $161 million for coronary heart disease, $101 million for stroke and $28 million for type 2 diabetes[4].

Studies by Hu at al. (2000, 2001) concluded that physical activity, including moderate-intensity exercise such as walking, is associated with substantial risk reduction of total and ischemic stroke[93] and cardiovascular events among diabetic women[94]. Wannamethee at al. (1999) recommend light or moderate physical activities such as walking, gardening, light swimming or cycling undertaken regularly to reduce mortality and heart attacks in older men with and without diagnosed cardiovascular disease[95]. Similar conclusions were drawn by Hakim at al. (1999) in the Honolulu Heart Program, which targeted physically capable elderly men. Their findings suggested that important health benefits, particularly a reduced risk of coronary heart disease, could be derived by encouraging the elderly to walk[96].

Wei at al. (1999, 2000) concluded that low cardiorespiratory fitness and physical inactivity[97] were strong and independent predictors of cardiovascular disease, comparable in importance with diabetes as a risk factor[98] and that physical activity is associated with decreased risk of developing diabetes[99,100]. They found that, generally, fit and active individuals were at much lower risk of morbidity, mortality and loss of function than sedentary and unfit persons[101]. Other studies have shown a relationship between mild-to-moderate physical activity levels and favourable lipid profiles in men[102], and that cardiorespiratory fitness achieved through physical activity attenuates many of the health risks associated with overweight or obesity[103]. Lee at al. (1998, 1999) supported these findings, reporting that lean, unfit men had a higher level of all-cause and cardiovascular mortality than men who were fit and obese[104,105]. Lakka at al. (2001) found

good cardiorespiratory fitness to be associated with slower progression of early atherosclerosis in middle-aged men[106].

Yet, although all these benefits continue to be substantiated by ongoing studies, Australians are spending less time each week walking or participating in other moderate or vigorous physical activity even though the majority believe that doing so would be beneficial to their health. The results of the National Physical Activity Survey in 1999 (a follow-up to the 1997 Survey) show that 88% of Australians aged 18–75 years believe they could be healthier by being more active, and 92% believe their health could be improved by spending 30 minutes each day on moderate physical activity[107]. However, the survey also reported that the average amount of time spent each week on all forms of physical activity has fallen in recent years. In particular, the level of vigorous activity had fallen from an average of 91 minutes per person each week in 1997 to 65 minutes per person in 1999, and that the proportion of Australians doing enough physical activity each week to provide a health benefit had also fallen.

Overweight and obesity

The decline in activity levels coincides with a continuing high level of overweight and obesity across the community, which the National Physical Activity Survey reports as 44%[107]. The AIHW (2001) reports similar findings for 1999–00, noting 60% of Australians aged 25 years and over were overweight with 20% of these being classified as obese[4]. In 1995, Australian men on average weighed 3.6 kg more than their counterparts in 1980. Women weighed on average 4.8 kg more[2]. In terms of total disease burden, overweight and obesity are responsible for approximately 4.3% in both males and females in Australia[4].

The estimate of overweight and obese Australians reported in the National Physical Activity Survey[107] is supported by BEACH data over the first 3 years of its collection. BEACH collects the self-reported height and weight of patients to estimate their body mass index (BMI) which is summarised in the program's annual reports. In 1998–99, BEACH showed 51.2% of adults over 18 years to be overweight (32.8%) or obese (18.4%)[14]. In 1999–2000, BEACH reported 52.5% to be overweight (33.1%) or obese (19.4%)[12]and in the 2000–2001 BEACH year, 54.3% were found to be overweight (34.1%) or obese (20.2%)[13]. All of the above studies used BMI as the classification for being overweight or obese, as proposed by the WHO as a simple measure of obesity[108]. BMI is calculated by dividing a person's weight (in kilograms) by their height squared (in m^2). A person is generally considered to be overweight if their BMI is ≥ 25, and a BMI of ≥ 30 is considered to be obese[4]. Because the calculation of a raised BMI does not distinguish between weight mass from fat, muscle or heavy bone structure, the WHO also regard waist circumference as a useful measure of increased risk due to overweight and obesity[108]. A waist circumference of 94 cm for men and 80 cm for women indicates increased risk, and circumferences exceeding 102 cm for men and 88 cm for women indicate substantially increased risk[4]. Waist-to-hip ratio (WHR) is another commonly used anthropometric measure to indicate obesity, the American Heart Association recommending a WHR > 0.80 as an indicator of obesity for women and > 1.0 for men[109].

Excess body weight carries with it a higher risk of ill health because of the effects of increased body fat on conditions related to life expectancy, particularly cardiovascular conditions such as coronary heart disease, congestive heart failure, stroke and type 2 diabetes[4,33]. Hypertension and adverse lipid profiles associated with excess body weight also increase the risk of coronary heart disease[4,36,108]. In particular there is a strong association between intra-abdominal adiposity and the development of such diseases as

type 2 diabetes[108]. Although being overweight is an important risk factor, the central obesity fat patterning characterised by abdominal fat deposition seems to present a greater risk than the 'pear shape' patterning of hip and thigh fat deposition in the occurrence of stroke[36,41] and other atherosclerotic disease[110].

Results from both the Honolulu Heart Program and the Framingham study indicate that obesity is an independent risk factor for stroke, as reported at the American Heart Association prevention conference in 1997 [36,110], a claim supported by Goldstein at al. (2001)[36]. Fitzgerald and Jarrett (1992) reported from the Whitehall study data that BMI was a predictor for stroke in both smokers and non-smokers, and that a BMI above 24 in combination with smoking accounts for 60% of strokes in men up to 65 years of age[111]. Rexrode at al. (1997, 1998) concluded that waist–hip ratio and waist circumference are independently associated with risk of coronary heart disease[112], and that both obesity and weight gain in women are important risk factors for ischaemic and total stroke[113].

Yet despite increasing knowledge and education about obesity, nutrition, exercise, and the hazards associated with being overweight, the prevalence of obesity in many countries is at a level that is now considered pandemic[114,115]. The WHO has described this increasing prevalence as a major public health problem for developed countries and an increasing number of developing countries[116]. The health economic consequences to these countries has been estimated at 3–5% of their total health budget[117]. A study by Quesenberry at al. (1998) showed a direct association between BMI and annual rates of in-patient days, number and costs of outpatient visits, costs of outpatient pharmacy and radiology services, and total costs. Relative to a BMI of 20 to 24.9, mean annual costs were 25% greater for those with a BMI of 30 to 34.9 and 44% greater for those with a BMI ≥ 35. The authors attributed these elevated costs to the association between BMI and coronary heart disease, hypertension and diabetes[118].

Australia is at present second only to the United States as the most overweight nation in the world[119,120], with the United Kingdom a close third[120]. Such a large proportion of the US population is overweight that in 2000 the American Heart Association began stressing the importance for adults of trying to maintain their current weight rather than just urging the overweight to slim down[121]. In December 2001, the US surgeon-general warned that obesity could soon overtake smoking as the leading cause of preventable deaths in America with over 60% of Americans now considered overweight, and that the situation is so serious that it is countering progress made in fighting cancer and heart disease[122]. The International Obesity Task Force, extrapolating from existing data, has made a projection that by the year 2025 obesity levels could reach 45–50% in the United States, 30–40% in Australia, England and Mauritius, and over 20% in Brazil[120]. Studies previously referred to in this work suggest that in Australia, if the situation remains unchecked, this level is likely to be achieved, and probably sooner than the year indicated[4,12-14,107].

A trend of increased prevalence of obesity in children is also of concern. Childhood obesity increases the risk of adult obesity and of the associated cardiovascular disease risk factors of hypertension, diabetes and dyslipidaemia[123]. Again, the United States leads the rest of the world in the prevalence of overweight youth[119,120]. In the past 30 years the percentage of overweight children in the United States has doubled, from 15% to 32%[120]. But although American children have the 'gold medal for fatness'[119] Australian children are very close behind. Magarey at al. (2001) reported that the rate of overweight and obese children in Australia had doubled in the decade between 1985 and 1995 to a level where 19.5% of boys and 21.1% of girls between 7 and 15 years of age are overweight or obese[124]. What is more disturbing, Magarey at al. showed that the number of children

classified as obese in the overweight group has trebled in that decade[124]. Children of obese parents have more than double the risk of obesity in adulthood[4]. Although it may be conjecture to assume that overweight children remain overweight and eventually become overweight adults, it is likely that this may be the case for a substantial number when consideration is given to the effort required in changing the diet and lifestyle habits established in childhood.

There is, however, evidence that the risks to these children are not postponed until adulthood. Results from the Taipei Children Heart Study showed 70% of obese boys had one, and 25% had two or more, CVD risk factors other than obesity. Obese girls had a higher prevalence of CVD risk factor clustering and a significantly higher prevalence of high blood pressure than non-obese girls[123]. Similar findings were reported from the National Heart, Lung, and Blood Institute Growth and Health Study. Overweight was associated with increased risk factor levels and with increased clustering of risk factors in 9–10 year old girls, and greater central adiposity was associated with higher levels of risk factors and increased clustering[125]. Morrison at al. (1999) concluded from the Princeton School Study that the trend towards increased obesity in children could potentially reverse the recent decline in morbidity from cardiovascular disease[126].

Obesity is presenting serious consequences in terms of personal and economic costs, and the solution will require commitment and education. The desire among overweight individuals to reduce their weight is obvious from the amount they spend on diet programs[127] and weight loss gimmicks. Telephone surveys have reported that more than two-thirds of Americans are attempting to lose or maintain weight, but only 20% of those trying to reduce their weight were using the recommended combination of calorie/ kilojule reduction and 150 minutes of moderate physical activity per week[127,128].

Although reducing weight is beneficial to health generally, many studies have shown specific benefits. Clinically significant long-term reductions in blood pressure and reduced risk for hypertension can be achieved with even modest weight loss[129]. In Phase II of the Trials of Hypertension Prevention, Stevens at al. (2001) observed a linear association between weight reduction and reduction in blood pressure: for every kilogram of body weight lost, systolic and diastolic blood pressures were reduced by 1 mmHg and 1.4 mmHg, respectively. The more weight lost, the greater the reductions in blood pressure levels[127,129].

Given the difficulty in reducing weight once the problem has manifested, prevention strategies would seem to be most worthwhile, particularly when aimed at the young. Singapore's 'Fit and Trim' program, based on activities promoting healthy eating habits and increased physical activity, has started to reduce the prevalence of overweight and obesity in primary, secondary and junior college students since its introduction into schools. The International Obesity Task Force is hopeful that, despite cultural differences, such programs might be as successful if introduced in other nations' schools[120].

Hypertension

Hypertension refers to an increase in the forces exerted by blood onto the walls of the arteries, and for this reason, is often referred to as high blood pressure. The pressure of the blood on arterial walls depends on the energy of the heart action, the elasticity of the arterial walls and the volume and viscosity of the blood. The maximum pressure occurs near the end of the stroke output of the heart's left ventricle and is called maximum or systolic pressure. The minimum pressure occurs late in ventricular diastole and is called the minimum or diastolic pressure[8]. Blood pressure is usually expressed as systolic/ diastolic in mmHg, e.g. 120/80 mmHg, stated as '120 over 80'.

The WHO has recently released a classification for the clinical management of hypertension as systolic blood pressure (SBP) ≥ 140mmHg and/or diastolic blood pressure (DBP) ≥ 90 mmHg and/or receiving medication for high blood pressure. Previously, high blood pressure in Australia was defined as SBP ≥ 160 mmHg and/or DBP ≥ 95 mmHg and /or receiving medication for high blood pressure[4]. Many Australian studies have therefore quoted estimates of prevalence at the latter level. As we now use the WHO classification, the validity of comparisons across studies is affected where previous and future studies are based on different classifications for defining hypertension.

Hypertension is the most common cardiovascular disorder and is considered both as a disease category and as one of the major risk factors for stroke, coronary heart disease and heart failure[4,33,130]. As the level of blood pressure increases so does the corresponding risk level[7,33]. Although systolic blood pressure is a stronger predictor of death due to coronary heart disease, both systolic and diastolic blood pressures are predictors of heart, stroke and vascular diseases at all ages[7,131].

Prevalence of hypertension increases with age. The major risk factors are obesity, poor nutrition, excessive intake of sodium and alcohol, and lack of physical activity[130]. In 1999–00, approximately 31% of men and 26% of women in Australia aged 25 years and over had hypertension. For those aged 65–74 years, 70% of men and 67% of women had high blood pressure and/or were on treatment for hypertension[4]. Approximately 25% of Americans have hypertension[129] which is slightly higher than the international trend—the WHO estimates that hypertension currently affects about 20% of the adult population worldwide[130].

Hypertension has a major role in the pathogenesis of atherosclerosis[132], and is estimated to account for about 5.5% of the total burden of disease and injury among Australians[4,33] with most of this burden attributed to ischaemic heart disease and stroke. The burden of risk for men starts in the 15–24 age group, for women in the 25–34 age group, and rises steadily with age for both. The burden for men is higher across all age groups except those 70 and over, where it is much higher for women[33]. Since 1998, hypertension has accounted for approximately 6% of all problems managed by GPs in Australia[12-14]. There is evidence that this burden could be eased by adopting healthy lifestyle changes[133-136]. Oncken at al. (2001) found that cessation of smoking reduces systolic blood pressure[134]. Dickey and Janick (2001) reported a reduction in both systolic and diastolic blood pressure from weight reduction and reduced dietary sodium intake[133]. Moreau at al. (2001) reported that just 30 minutes per day of moderate-intensity physical activity is effective in lowering systolic blood pressure[134]. Non-pharmacological methods in combination with antihypertensive medications increase the success of achieving target levels for blood pressure reduction[137].

Many studies have examined the efficacy of treatments and medications for patients with hypertension, in consideration of the social and economic resources required to manage this predominantly 'elderly' disease in an ageing population. There is consensus that current treatments are effective and safe for long-term use and, when taken correctly, do reduce the development of severe hypertension, stroke, congestive heart failure, and other coronary heart disease[26,131,138,139]. However, control of hypertension remains poor in many countries, especially when the patient is elderly, where multidrug regimens are involved or where patients experience side effects from antihypertensive medications[129,140]. Since 1980 there has been a significant decline in the prevalence of hypertension in Australia. The rate of men aged 25–64 years with high blood pressure has

fallen from 45% in 1980 to 22% in 1999–00. The rate for women in that age group has fallen from 29% in 1980 to 16% in 1995 and has remained steady[2,4,33].

Promoting lifestyles which prevent the initial development of hypertension should still be the objective of healthcare providers in both developed and developing countries[129,133].

Hyperlipidaemia

Hyperlipidaemia is a general term for elevated concentrations of any or all of the lipids in the plasma, including triglycerides and cholesterol. Lipids are fats and fatlike substances which are stored in the body and serve as a source of fuel. They are an important constituent of cell structure and include fatty acids, neutral fats, waxes and steroids. Compound lipids comprise the glycolipids, lipoproteins and phospholipids[8]. The role of blood lipids such as cholesterol in the development of atherosclerosis and subsequent cardiovascular disease were established in the Framingham Heart Study in 1960 and high blood cholesterol is now considered a major modifiable risk factor for developing coronary artery disease[141,142].

Cholesterol is a lipid which the body needs to repair cell membranes, insulate nerves, manufacture vitamin D on the skin's surface and produce certain hormones such as oestrogen and testosterone. About two-thirds of the body's cholesterol is manufactured in the liver, production being stimulated by saturated fat. It is also obtained through diets which include animal fats found in meat, poultry, fish and dairy products[143,144]. Cholesterol is transported through the blood in lipoproteins categorised by their size[143]. Low-density lipoproteins (LDL) and high-density lipoproteins (HDL) both have an important role in maintaining health.

Low-density lipoprotein (LDL) transports about 75% of the blood's cholesterol to the body's cells and is normally harmless. It becomes problematic, however, when it penetrates the artery walls where it can interact through oxidation with oxygen-free radicals, particles which the body releases naturally but which increase when the body is exposed to environmental toxins such as cigarette smoke. These molecules are essential in fighting bacteria but, in excess, can become destructive because they are missing an electron and therefore tend to bind with any other molecule. If LDL collects on arterial walls, free radicals can attack and oxidise with it, modifying its form. The new oxidised LDL triggers an immune system response where white blood cells gather at the site forming a fatty plaque and causing inflammation. This process of plaque deposits building up on arterial walls which, over time, restrict the blood flow is known as atherosclerosis[143,145]. The reduced blood flow starves the heart of oxygen which can eventually cause angina, myocardial infarction or death[144].

The function of high-density lipoproteins (HDL) is to remove cholesterol from the arterial walls and return it to the liver which, apart from producing cholesterol, also removes it from the blood. It is removed by special proteins called LDL receptors which are normally present on the liver surface[143,145]. Because of their differing functions, LDL cholesterol has become known as 'bad' and HDL as 'good' cholesterol[144,145]. Total cholesterol level is therefore not a good reflector of cardiovascular disease risk because it consists of both LDL and HDL cholesterol which have opposing effects on cardiovascular risk[146]. The best risk assessment is obtained through separate measurements of these two levels[146-148]. The Framingham study demonstrated the total/HDL cholesterol ratio to be the most efficient lipid profile for predicting coronary disease[142]. Rizos and Mikhailidis (2001) concluded from evidence presented in the Veterans Affairs High Density Lipoprotein Cholesterol Intervention Trial (VA-HIT) and the Bezafibrate Infarction Prevention Trial (BIP) that levels of total, LDL and HDL cholesterol, and triglycerides, are all predictors of risk of

cerebrovascular events[149]. Wannamethee at al. (2000) found an association between higher levels of HDL cholesterol and a significant decrease in risk of non-fatal stroke[150].

For optimum health, high levels of HDL are promoted while LDL should be kept to a minimum[148]. As the body makes enough cholesterol to perform the functions for which it is required, any added cholesterol from dietary sources has the potential to create more LDL than the body can remove through normal processes. Dietary fatty acids directly influence the susceptibility of lipoproteins to oxidation which subsequently affects other triggers in the inflammatory process and formation of plaques[9]. Some people also have a reduced number of LDL receptors on the liver cell surfaces which impede their ability to dispose of LDL cholesterol from the blood. This can be a genetic predisposition that can make 'high cholesterol' a familial problem, and affected family members tend to develop atherosclerosis in early adulthood[145]. In most cases, however, raised LDL cholesterol levels are usually caused by diet[146], particularly the consumption of foods high in saturated fats.

High dietary intake of saturated fats impedes the liver's LDL receptor activity which thus raises the LDL cholesterol levels in the blood. Unsaturated fats, either polyunsaturated or mono-unsaturated, do not raise LDL cholesterol and may even lower it in some cases. Oils high in mono-unsaturated fats such as olive or canola oil contain antioxidants which can scavenge free radicals and protect against peroxidation[151], offering a protective effect against coronary heart disease[144,145]. However, excess calories from any source are stored as fat deposits so the body becoming overweight, and particularly obese, will also raise cholesterol levels.

Diet modification is the preferred initial choice for prevention and treatment of hypercholesterolaemia[152,153], but the best method of dietary intervention continues to be debated. Diets focusing on reducing total fat and cholesterol often result in reducing both LDL and HDL cholesterol, whereas those which focus on calorie reduction but not on saturated fat reduction have little effect on lowering LDL cholesterol levels[152]. However, raising the HDL cholesterol level may be just as, if not more important. Boden (2000)[154] reported that raising HDL while maintaining levels of LDL cholesterol was responsible for benefits which included significant reductions in death from coronary artery disease, non-fatal myocardial infarction (MI), stroke, transient ischaemic attack and carotid endarterectomy. From the VA-HIT study he concluded, 'for every 1% increase in HDL-C, there was a 3% reduction in death or MI, a therapeutic benefit that eclipses the benefit associated with LDL-C reduction'. The best approach appears be a diet which lowers LDL cholesterol and raises HDL cholesterol levels.

Although dietary therapy remains the first line of treatment for high cholesterol, drug therapy is available for those patients considered at risk for coronary heart disease[153]. There is an abundance of literature from many clinical trials which report evidence that lipid-modifying treatments have a positive effect on cardiovascular disease risk from hyperlipidaemia. Many secondary prevention studies report the benefits of lipid-lowering medications, particularly for patients with pre-existing coronary heart disease and diabetes (the Scandinavian Simvastatin Survival Study(4S)[155-157], the Cholesterol and Recurrent Events (CARE) Trial[158], the Long-Term Intervention with Pravastatin in Ischaemic Disease (LIPID) Study[159], the Veterans Affairs High-Density Lipoprotein Cholesterol Intervention Trial (VA-HIT)[160], the Helsinki Heart Study[161], the West of Scotland Coronary Prevention Study (WOSCOPS)[162,163], and the Air Force/Texas Coronary Atherosclerosis Prevention Study[164]). Results from many of these studies show a significant reduction (around 30%) in relative risk of major coronary events such as fatal and non-fatal myocardial infarction for patients with elevated lipids treated with lipid

modifying medications[148]. Statins, particularly, as demonstrated in many of these trials, reduce the risk of stroke[165] and transient ischaemic attacks in patients with coronary disease, and their efficacy extends to subgroups such as diabetics, women and the elderly[165,166]. The anti-inflammatory and antioxidant properties of statins reduce the incidence of ischaemic stroke by stabilising atherosclerotic plaques[167,168] and through antithrombotic actions[167,168].

The availability of lipid-lowering medications has reduced the severity and frequency of cardiovascular events for a large proportion of the population. However, given the health and economic costs associated with more than 6 million adult Australians (aged 25 years and over) having a cholesterol level higher than 5.5 mmol/L[4], promoting strategies for awareness and prevention should continue as a priority for healthcare planners.

Diabetes

Diabetes is a general term representing a collection of related metabolic disorders characterised by excessive urine excretion (polyuria) and high blood glucose levels (hyperglycaemia). It is caused by defective pancreatic islets which inhibit the secretion of the hormone insulin, inhibit the insulin action, or both[4,8]. Diabetes is associated with long-term dysfunction of organs such as the heart, eyes, kidneys, nerves and blood vessels. Peripheral vascular disease associated with diabetes often results in lower limb ulceration, gangrene and amputation in more severe cases[169].

There are three main types of diabetes. Type 1 or insulin-dependent diabetes mellitus (IDDM) is the result of auto-immune destruction of the pancreatic islets that produce insulin. Individuals with type 1 diabetes require insulin injections daily for survival[4]. The peak age of onset is 12 years, but onset can occur at any age[8]. Type 2, or non-insulin-dependent diabetes mellitus (NIDDM) is characterised by insulin resistance and/or abnormal insulin secretion[4]. Basal insulin secretion levels are maintained or reduced, but insulin release in response to glucose load is delayed or reduced. Defective glucose receptors on the beta cells of pancreatic islets may be involved. Obesity and physical inactivity are strongly associated with its onset, as is a genetic predisposition. The peak age of onset is generally 50–60 years. Type 2 diabetes accounts for about 85–90% of all diabetes[4]. Gestational diabetes is caused by carbohydrate intolerance and is first recognised during pregnancy[8]. Approximately 4–6% of women not previously diagnosed are affected, and have a greater risk of developing type 2 diabetes in later life[4].

Diabetes is both a risk factor for, and shares other common risk factors with, cardiovascular disease. In particular, type 2 and gestational diabetes are promoted by behavioural risk factors such as poor nutrition, excess weight and physical inactivity. The effects of abnormal blood lipid levels, smoking, central obesity and hypertension are all amplified by the presence of diabetes. Cardiovascular risk factors relatively specific to people with diabetes include longer duration of diabetes during adulthood, raised blood glucose concentrations and microalbuminuria[170]. People with diabetes and microalbuminuria have a higher risk of coronary morbidity and mortality than people with normal levels of urinary albumin and a similar duration of diabetes. Clinical proteinuria increases the risk of major cardiac events in type 1 and type 2 diabetes compared with individuals with the same type of diabetes having normal albumin excretion[170]. Abnormal lipoprotein metabolism advances the development of coronary artery disease in type 1 diabetes[171].

A clustering of risk factors, known as the metabolic syndrome, is more likely among diabetes sufferers[4]. Conversely, people with the metabolic syndrome are at increased risk of developing diabetes and cardiovascular disease[172]. There is no international definition

for the metabolic syndrome but the WHO suggests a working definition as having glucose intolerance, impaired glucose tolerance or diabetes mellitus and/or insulin resistance together with two or more of the following: impaired glucose regulation; central obesity, hypertriglyceridemia and high blood pressure[172]. Other definitions add low high-density lipoprotein to this list[173,174]. This clustering has been variously labelled as the 'metabolic syndrome', the 'insulin resistant syndrome'[172] or 'syndrome X'[172,175,176]. Each individual component of the cluster group carries a risk of CVD but in combination they become much more powerful[172]. Using 2000 census data, the 3rd National Health and Nutrition Examination Survey (ATPIII) determined that about 47 million US residents have the metabolic syndrome, with prevalence increasing with age from around 6.7% of 20–29 year olds to around 43% of those aged 60 or older[173].

Apart from being the seventh leading cause of death in Australia[169], diabetes is the most common cause of blindness in persons under 60 years of age, the most common cause of non-traumatic amputations, and the second most common reason for the commencement of renal dialysis[6]. The risk of heart disease and stroke is two to four times higher for diabetics than for people without diabetes[177]. In Australia in 1998, diabetes was the second most common additional cause of death where ischaemic heart disease was the underlying cause[1].

Along with obesity, diabetes is reaching epidemic proportions in the United States, Australia, New Zealand and other developed nations[178]. For males, most nations have experienced increases in the death rates from diabetes since the mid–1950s, with the most dramatic of these occurring in Denmark (164%), Italy (83%) and Spain (80%)[179].

The 1995 National Health Survey[44] reported 430,700 Australian people (2.4% of the population) diagnosed as diabetics and estimated that the number had doubled since the 1980s. Based on this assessment, the 1998 National Health Priority Areas report on diabetes mellitus predicted that the number diagnosed with diabetes would rise to 770,000 by the year 2000, would reach 950,000 by 2010 and would exceed 1 million within 15 to 20 years of the 1995 survey[169]. However, just 2 years after the 1998 report, the Australian Diabetes, Obesity and Lifestyle Study (AusDiab) found about 940,000 Australians aged over 25 (8.0% of males and 7.0% of females) were diagnosed with diabetes[177]. It would seem that the 'one million' mark will be exceeded much sooner than estimated, and may indeed have already been exceeded—both studies[44,177] reported that for each diagnosed diabetic there was another person with diabetes as yet undiagnosed. As in many other countries, Australia's Indigenous population has a much higher rate of diabetes than other Australians[169]. In the 30–54 age group, more than 20% of Indigenous Australians are estimated to have diabetes[179]. The annual incidence of type 1 diabetes in New South Wales children aged 0–14 years has increased on average by 3.2% each year since 1990[180].

The burden of this disease is also increasing at a similar rate. In 1993–94, the estimated health system cost attributed to diabetes was 2.2% of total health expenditure for that year[33]. By 1996 this had increased to 5%, a figure considered to be an underestimation as it was based on self-reported information[4]. The main contributors to this cost increase are the large number of hospitalisations either directly related to diabetes or where diabetes is a secondary diagnosis. The average length of stay in hospital for diabetes in 1998–99 was almost twice as long as for non-diabetic conditions, accounting for almost 1% of all occupied hospital beds on any given day[4]. Diabetes is the eighth most common problem managed by Australian doctors each year in general practice[4,12-14,181] and is managed at nearly 2% of all encounters[4,12-14]. A study by Overland at al. (2000) reported that over a 5-year period, diabetics accounted for 3.0% of the population but had used 5.5% of

general practitioner services, and a three-fold to four-fold increase in the use of specialist and consultant physician services compared with their non-diabetic counterparts[182]. Although the financial cost of 7,887 diabetes-related lower-limb amputations between 1995 and 1998 can be readily determined, the personal cost cannot[183].

Pharmacological managements are advancing and studies such as the Catopril Prevention Project (CAPP)[184] and the Heart Outcomes Prevention Evaluation (HOPE) study[185,186] report benefits of treatment with angiotensin-converting enzyme (ACE) inhibitors, specifically catopril and ramipril respectively, which include reduced risk of complications related to diabetes, and reduced new diagnoses of diabetes itself among those at high risk. It is reassuring to have access to these medications, but given the escalation in costs associated with the increase in diabetes incidence, promoting lifestyle changes might be a better initial approach to management. Studies in Sweden, China and Finland[187,188] have concluded that changes in diet and exercise habits can prevent or delay the onset of type 2 diabetes for high-risk subjects; however, lifestyle changes have to be sustained and willingness to do this ultimately rests with the individual.

Stress

Stress as a contributing factor in development of cardiovascular disease is somewhat controversial as it is not always clear whether 'stress' refers to physical, mental, emotional or psychological stress. Regardless of the type of stress involved, stress is predominantly a secondary rather than primary risk factor for cardiovascular disease[189].

The majority of medical literature refers to physical stress in relation to cardiovascular disease—the increased demands for energy and oxygen placed on the heart during physical stress are measurable and reproducible. The effects of physical stress on the cardiovascular system depend on the general fitness of the individual. Physical exercise which places a greater demand on the heart muscle to pump oxygenated blood around the body is very beneficial to the cardiovascular health of the individual. Indeed, the lack of physical activity caused by sedentary lifestyle is considered to be a major risk to cardiovascular health. However, if there is underlying heart disease from other causes, stress from physical effort can be dangerous. During physical exertion, the heart beats more rapidly to meet the body's increased demands. If coronary arteries are partially blocked by atherosclerotic plaques, they cannot supply the heart's extra requirement for oxygenated blood. This 'starving' of oxygen is called ischaemia and can cause angina pain or, in severe cases, the heart muscle to infarct[190]. Although physical stress can induce a heart attack in an individual with existing coronary heart disease, it does not cause heart disease in a normal, healthy person.

Other types of stress—mental, emotional, psychological—can be caused by a variety of factors and can be detrimental to long-term cardiovascular health. Individuals may perceive situations differently, but whatever the triggers, their physiological responses to mental effort, anger, fright, grief, anxiety and so on are similar. The sympathetic nervous system mediates the discharge and release of adrenal medullary hormones in response to these stressors, which results in increased blood pressure and cardiac output, increased blood flow to skeletal muscles, decreased flow to the viscera, and increased rate of glycolysis and blood glucose concentration[8]. Homocysteine levels, heart rate and blood pressure have been shown to increase in women exposed to mental and emotional stress-inducing tests[191]. Homocysteine is an amino acid strongly associated with cardiovascular disease because of its potential to damage cells lining arterial walls, contributing to the development of arterial plaques. Stoney (1999) concluded that the rise in homocysteine concentration may be sympathetically mediated and may therefore be an important factor

in the relationship between psychological stress and cardiovascular disease risk. Homocysteine level has also been associated with stroke risk in other works[192]. Sarabi and Lind[193] reported that endothelium-dependent vasodilation in young healthy people is also affected by mental stress. Carroll at al. (2001)[194] found that heightened blood pressure reactions to mental stress contributed to the development of high blood pressure on 10-year follow-up of participants in the Whitehall Study. Cordero et al[195] suggest that ischaemia can be initiated through a neurocardiac pathway and that stress can trigger the link between the brain and the heart involved in pathogenic processes such as coronary vasospasm, ischaemia and arrhythmias even in hearts lacking structural disease.

Although these works support a possible primary link between the physiological responses to stress and the long-term development of heart disease, there is considerable evidence that stress is detrimental to health where cardiovascular disease is already present. Various studies have concluded that mental stress impairs systolic function by inducing transient myocardial ischaemia[196]; combined increases in cardiac demand and concomitant reduced myocardial blood supply may contribute to myocardial ischaemia with mental stress[197]; excessive sympathetic reactivity to stress may be aetiologically important in stroke, especially ischaemic stroke[198]; psychological distress is a predictor of fatal ischaemic stroke[199]; cardiovascular reactivity to psychological challenge plays a role in the etiology of hypertension[200]; mental stress could contribute to Coronary Artery Disease (CAD) progression and acute coronary syndromes in patients with cardiovascular disease[201]; acute psychological stress may elicit a hypercoagulable state in elderly subjects with cardiovascular disease which could promote progression of atherosclerosis and acute coronary thrombosis[202]; and both chronic and acute psychological stress can be detrimental to the patient with CAD[203].

Chronic mental, emotional or psychological stress can therefore play a prominent role in the development of cardiovascular disease, and methods of reducing stress are widely promoted. Some individuals are more likely to be affected by stress-induced cardiovascular problems, particularly those of 'type A' behaviour pattern (competitive achievement orientation, sense of urgency in general life, easily aroused to anger/hostility)[204,205], those with 'job strain'[206,207], those in stressful marital relationships[208,209], sufferers of depression[206] or pessimistic/superstitious outlook[210], or those who have experienced war or natural disasters[206,211]. Pickering (2001) regards the common link for all these factors as a perceived loss of control over one's environment[206]. This perception may also apply to persons following an initial cardiovascular event and may affect their recovery. Cossette at al. (2001) concluded that post-myocardial infarction interventions that reduce psychological distress have the potential to improve long-term prognosis and psychological status for both men and women[212]. It seems that, regardless of its role in the aetiology of cardiovascular disease, stress is a major factor in the progression of established illness.

Atrial fibrillation

Atrial fibrillation (AF) is an arrhythmia in which very small areas of the atrial myocardium are in various uncoordinated stages of depolarisation and repolarisation. Multiple re-entry circuits within the atrial myocardium cause the atria to quiver continuously in a chaotic pattern instead of intermittently contracting[8]. This rapid activity within the atria removes normal sinus node control of the heart rhythm causing rapid and irregular atrial activity[213]. The result is a totally irregular, often rapid, ventricular rate[8].

AF is the most common arrhythmia encountered in clinical practice. It accounts for approximately one-third of all hospitalisations for cardiac rhythm disturbances[214] and its prevalence increases with age. About 2% of the general population are affected, increasing to 5% in people over 65 years and 10% of those over 75 years. Episodes may occur singularly, as a series of recurrent episodes (paroxysmal AF), or continuously (permanent or chronic AF)[215]. When an underlying cause can't be identified, the condition is called 'lone' AF, and this type affects about 10% of chronic AF sufferers[216]. However, AF may be a sign of underlying heart disease and is associated with an increased risk of systemic thromboembolism and stroke[215]. This increased risk occurs because the loss of effective atrial contraction alters the normal flow of blood, often resulting in stasis and triggering of the coagulation cascade. As a result, fibrin thrombi form within the atria and atrial appendages which can dislodge and travel through the systemic circulation to the brain causing ischemic stroke[217].

The incidence of AF is greater in men than in women, but advancing age levels this difference. Women with AF are more likely to have underlying valvular disease, whereas men are more likely to have underlying coronary artery disease[218]. The risk of stroke is substantially increased for both men and women with AF, particularly in the first year after diagnosis[219,220]. Stroke in persons with AF is generally more severe and induces higher mortality[220]. In Framingham Heart Study cohorts, AF was associated with a 50% to 90% mortality risk after adjustment for age and pre-existing cardiovascular conditions such as hypertension, myocardial infarction, congestive heart failure and smoking[220,221]. For people with AF, risk factors for stroke include history of congestive heart disease (relative risk (RR) 1.4), increasing age (RR 1.4), history of hypertension (RR 1.6), history of diabetes (RR 1.7), and prior stroke or transient ischaemic attack (RR 2.5)[222]. Prior myocardial infarction, rheumatic heart disease and poor left ventricular function are also factors associated with an increased risk of stroke in AF[216].

Socioeconomic influences

In 1992, the National Health Strategy cited a number of studies which offered evidence that low socioeconomic status is strongly associated with high mortality rates, poorer health status and higher levels of risk behaviours which increase exposure to a number of health problems including cardiovascular disease and some cancers[15].

People in lower socioeconomic groups are more likely to die from CVD than people in higher socioeconomic groups. In 1997, people aged 25–64 years living in the most disadvantaged group died from CVD at around twice the rate of those living in the least disadvantaged group[4]. The 1995 National Health Survey reported that 82% of women in the lowest socioeconomic group had a CVD risk factor (i.e. tobacco smoking, high blood pressure, overweight or obesity, physical inactivity) compared with 69% in the highest socioeconomic group. Almost 13% of women in the lowest group had three or more risk factors compared with 7% of women in the highest group[44]. Men in the lowest socioeconomic group were twice as likely to have three or more risk factors than men in the highest socioeconomic group (18% and 9% respectively) although there was no significant difference between the two male groups for one CVD risk factor. Men and women in the lowest socioeconomic group (37% and 40% respectively) were more likely to partake in no physical activity in their leisure time than those in the highest socioeconomic group (27% and 29%)[44]. Women in lower socioeconomic groups are more likely to be overweight (53%) or obese (24%) than women in the highest group (44% and 14% respectively) although there were no significant differences between overweight and obese men in these two groups. For type 2 diabetes, prevalence in the lowest socioeconomic group was almost 2.5 times higher, and deaths where diabetes was the

underlying cause of death were 44% higher than those in the highest socioeconomic group[44].

The 1998 National Drug Strategy Household Survey reported that 27% of individuals from the lowest socioeconomic background smoked daily compared with 18% of those from the highest socioeconomic background[223]. Higher levels of smoking were associated with being unemployed and with having a lower level of education. Those with no qualifications (26%) were more than twice as likely to smoke daily compared with those with tertiary qualifications (12%). Persons with less than 12 years of education were almost twice as likely to be physically inactive as those with a Higher School Certificate or equivalent, or with tertiary qualifications[4,44]. Results from a Finnish study support the higher incidence of smoking among the poorer educated, observing that the educational discrepancy already begins to emerge at the upper stage comprehensive level (12–15 years of age)[224]. Other studies have concluded that men with heightened cardiovascular responsiveness to stress who were born into poor families, had little education or had low incomes had the greatest atherosclerotic progression[225], that poorer socioeconomic circumstance, particularly with early-life adversity, was associated with greater stroke risk[226], and that chronic stress, hostility, depression, level of social support and socioeconomic status play a direct role in organic coronary artery disease pathology[227].

Population groups

Some population groups have higher prevalence of cardiovascular disease and risk factors than others. People born in Australia are more likely to die from CVD than Australian residents who were born overseas, but certain migrant groups have a higher prevalence of conditions such as diabetes than their Australian-born counterparts. Diabetes is very common among peoples from many Pacific Islands, Asian Indians, Chinese and other Asian groups, and people from southern Europe[4].

Various ethnic groups may have a physiological predisposition for some of the risk factors associated with CVD. US-based studies have shown hypertension to be more frequent and blood pressure levels to be higher in black participants than in their white counterparts[228]. The incidence of stroke in the US and UK black populations is approximately twice that of the white population after adjusting for age, sex and socioeconomic status[228,229]. The Northern Manhattan Stroke Study (NOMASS) demonstrated race–ethnic differences in stroke incidence whereby blacks had a 2.4-fold increased annual stroke incidence and Caribbean Hispanics a 2-fold increased annual stroke incidence compared with whites living in the same community[229]. Sacco at al. cite literature which has consistently shown race–ethnic disparity in the prevalence of cardiovascular risk factors. Blacks have the highest prevalence of hypertension regardless of geographic location and diabetes is more common among black populations, whereas coronary artery disease and atrial fibrillation are more common in whites[229,230]. Physiological causes are not always the explanation for high prevalence of some conditions—Polynesians have a high prevalence of type 2 diabetes, attributed more to their high level of obesity because studies have concluded that they are not intrinsically insulin-resistant as a group[231].

For some population groups, higher prevalence of CVD and CVD risk factors may be a reflection of a combination of physiological predisposition and socioeconomic circumstances. In the 1996 Australian Census, Aboriginal and Torres Strait Islander peoples were shown to be disadvantaged across a range of socioeconomic factors. They experienced lower incomes, higher rates of unemployment, poorer educational outcomes and lower rates of home ownership than other Australians, all of which can affect general

health and wellbeing[232]. Australia's Indigenous peoples also experience higher death rates from all causes than other Australians. Not only are they twice as likely to die from CVD than other Australians, but also they have substantially higher levels of chronic heart disease (CHD) and stroke than Indigenous populations in New Zealand or the United States[4].

Compared with other Australians, Aboriginal and Torres Strait Islander peoples have higher rates of hospitalisation for CHD and stroke (2–4 times) and greater length of stay for CVD conditions. They die from CVD at twice the rate of other Australians, the greatest disparity occurring among those aged 25–64 years, where death rates are seven and ten times those of other Australian men and women respectively. Indigenous peoples have one of the highest rates of rheumatic heart disease in the world, with hospitalisation rates in 1998–99 for this disease being 20–25 times higher than those for other Australians. They have one of the highest rates of prevalence for type 2 diabetes in the world. Overall prevalence for Indigenous Australians is 2–4 times higher than for other Australians, particularly for the 25–55 age group. In 1995, the self-reported prevalence for this age group was 7–8 times higher than for other Australians. In 1997 and 1998, Indigenous deaths where diabetes was the underlying cause occurred at almost three times the rate of other Australians[4].

Indigenous Australians also have higher levels of risk behaviour for CVD. They are more likely to report no physical activity in their leisure time, and those aged 18 years or over are almost twice as likely to smoke as other Australians[4]. Around 56% of Indigenous men and 46% of Indigenous women in 1998 were defined as current smokers compared with 29% of other Australian men and 24% of other Australian women[223]. Although there is little difference between overweight Indigenous men (62%) and other Australian men (63%) the levels of obesity within these groups differ, with Indigenous men at 25% and other Australian men at 18%[4,223]. For women, more Indigenous women were overweight (60%) or obese (28%) than other Australian women (49% and 18% respectively). Although Indigenous Australians are more likely to abstain from alcohol than other Australians (51% compared with 45%) those who do drink are more likely to consume harmful quantities (8% compared with 3%)[4].

Most of the literature referred to above underscores the importance of prevention as a key factor in the management of cardiovascular disease internationally. Promotion at all levels—from government to practitioners to classrooms to homes—is vital if the gains made in cardiovascular health are to be maintained or improved in the future. In acknowledgement of the substantial opportunity for GPs to observe and influence the risk behaviours of their patients, the Joint Advisory Group on General Practice and Population Health has developed the 'SNAP' initiative for general practice which aims to 'reduce the health and socioeconomic impact of Smoking, poor Nutrition, harmful and hazardous Alcohol use and Physical inactivity on patients and the community through a systematice approach to behavioural interventions in primary care'[233]. Education about risk behaviours and individual responsibility should be promoted from the earliest age, and general practice is an excellent avenue for both introducing information and positively reinforcing it over the duration of the GP–patient relationship.

2 Methods

This study is a secondary analysis of data from the BEACH (Bettering the Evaluation and Care of Health) program, a continuous study of general practice activity. The data period investigated is from April 1998 to March 2000 inclusive. The BEACH methods are summarised below in Section 2.1, which also includes a more detailed description of the methods applied in the analyses of cardiovascular problem contacts and cardiovascular problem prevalence in this report.

2.1 The BEACH program

The methods adopted in the BEACH program have been described in detail elsewhere [12,14,234]. In summary, each of the recognised GPs in a random sample of approximately 1,000 per year records details about 100 doctor–patient encounters of all types. The information is recorded on structured paper encounter forms. The sample of GPs is a rolling sample, approximately 20 GPs participating each week, 50 weeks a year.

Sampling methods

The source population includes all GPs who claimed a minimum of 375 general practice A1 Medicare items (items 1–51, 601, 602) in the most recently available 3-month HIC data period. This equates with 1,500 Medicare claims a year and ensures inclusion of the majority of part-time GPs while excluding those who are not in private practice but claim for a few consultations a year. The General Practice Branch of the Commonwealth Department of Health and Ageing (DHA) draws a sample on a regular basis.

Recruitment methods

The randomly selected GPs are approached initially by letter, then by telephone follow-up. GPs who agree to participate are set an agreed recording date approximately 3 to 4 weeks ahead. A research pack is sent to each participant about 10 days before their planned recording date. A telephone reminder is made to each participating GP in the first days of the agreed recording period. Non-returns are followed up by regular telephone calls.

Each participating GP earns points towards their quality assurance (QA) requirements under the Royal Australian College of General Practitioners (RACGP)'s Quality Assurance program. As part of this QA process, each GP receives an analysis of his or her results compared with those of nine other unidentified practitioners who recorded at approximately the same time. Comparisons with the national average and with targets relating to the National Health Priority Areas are also provided.

BEACH includes three interrelated data collections: encounter data, GP characteristics, and patient health status. Examples of the forms used to collect the encounter data and the data on patient health status are included as Appendix 1 (1998–99 data year) and Appendix 2 (1999–00 data year). Copies of the GP characteristics questionnaires are included as Appendix 3 (1998–99 data year) and Appendix 4 (1999–00 data year).

Encounter data include date of consultation, type of consultation (direct, indirect), Medicare/Veterans' Affairs item number (where applicable), specified other payment source (tick boxes).

Information about **the patient** includes date of birth, sex, postcode of residence. Tick boxes are provided for healthcare card holder, Veterans' Affairs card holder, non-English-speaking background, an Aboriginal person (self-identification) and Torres Strait Islander (self-identification). Space is provided for up to three patient reasons for encounter (RFEs).

The **content of the encounter** is described in terms of the problems managed and the management techniques applied to each of these problems. Data elements include up to four diagnoses/problems. Tick boxes are provided to denote the status of each problem as new to the patient (if applicable) and if it was thought to be work-related.

Management data for each problem include medications prescribed, over-the-counter medications advised and other medications supplied by the GP. Details for each **medication** comprise brand name, form (where required), strength, regimen, status (if new medication for this problem for this patient) and number of repeats. **Non-pharmacological management** of each problem includes counselling and procedures, new referrals, and pathology and imaging ordered.

GP characteristics include age and sex, years in general practice, number of GP sessions worked per week, number of full-time and part-time GPs working in the practice (to generate a measure of practice size), consultations in languages other than English, postcode of major practice address, country of graduation, postgraduate general practice training and FRACGP status, after-hours care arrangements and use of computers in the practice.

Supplementary analysis of nominated data (SAND): A section on the bottom of each recording form investigates aspects of patient health or healthcare delivery in general practice not covered by the consultation-based information (see Appendix 1). The year-long data collection period is divided into 10 blocks, each of 5 weeks. Each block is designed to include data from 100 GPs. Each GP's recording pack of 100 forms is made up of 40 forms which contain questions about patient wellbeing, height and weight (for calculation of BMI) and alcohol intake, 40 that have a single question about the patient's smoking status together with questions on other subjects nominated for that block, and 20 forms with other nominated questions. Different questions are asked of the patient in each block and these vary throughout the year. Data from such substudies are used in this report to investigate the prevalence of cardiovascular disease among patients at general practice encounters (Chapter 8) and selected health risk behaviours of patients at encounters involving the management of cardiovascular problems (Chapter 9).

In Chapter 9, comparisons are made of the management of cardiovascular problems in general practice between 1990–91 and 1998–00. The earlier data are drawn from the Australian Morbidity and Treatment Survey (AMTS)[235]. A copy of the recording form used in the AMTS is provided as Appendix 5 of this report.

The BEACH relational database

The BEACH relational database is described diagrammatically in Figure 2.1. Note that all variables can be directly related to GP and patient characteristics and to the encounter. Reasons for encounter (RFEs) have only an indirect relationship with problems managed. All types of management are directly related to the problem being treated.

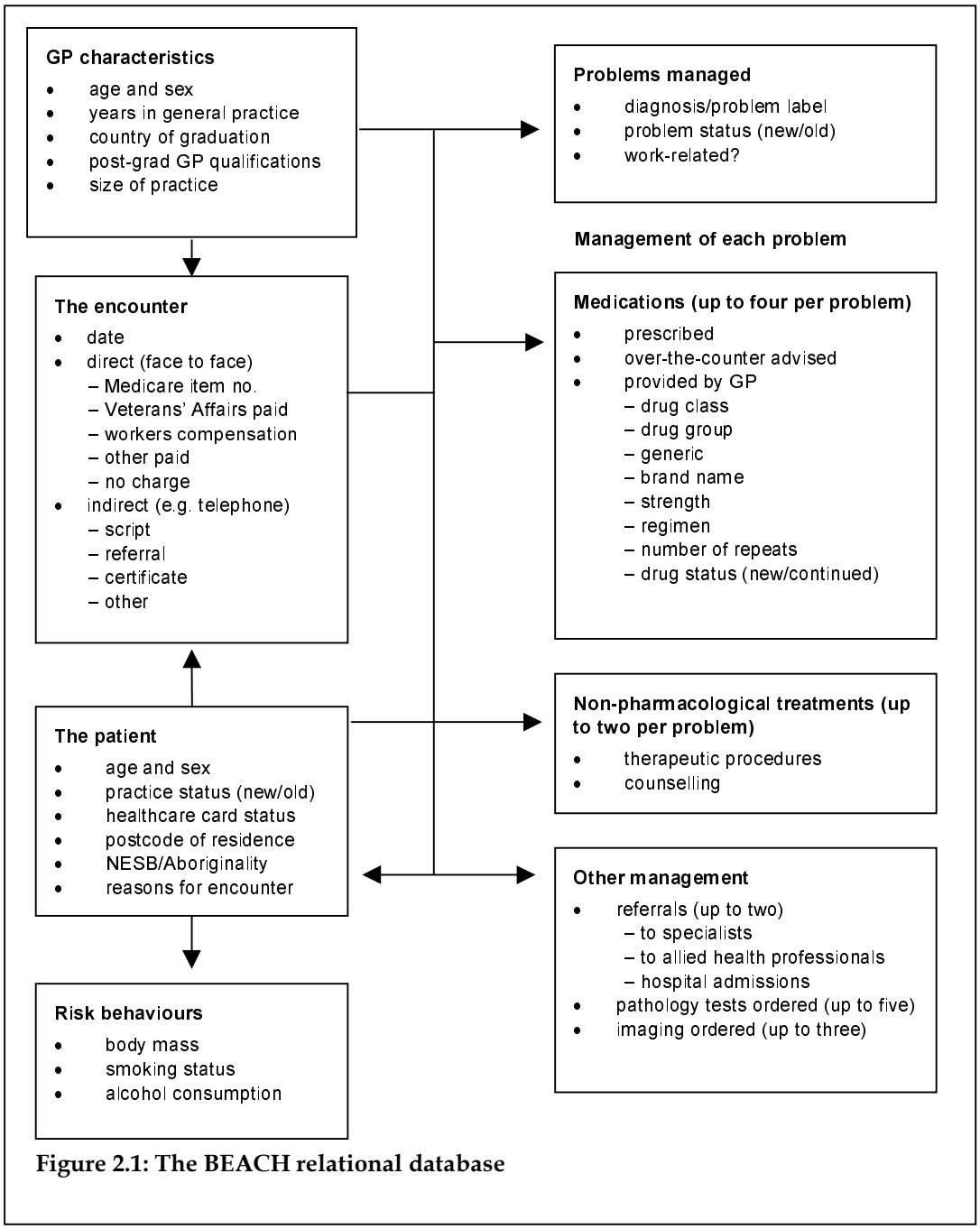


Figure 2.1: The BEACH relational database

Classification of data

The patient reasons for encounter, problems managed, therapeutic procedures, other non-pharmacological treatments, referrals, pathology and imaging orders are coded usingICPC-2 PLUS[236]. This is an extended vocabulary of terms classified according to the International Classification of Primary Care (Version 2) (ICPC–2), a product of the World Organization of Family Doctors (WONCA)[237]. The ICPC is regarded as the international standard for data classification in primary care. The structure and derivatives of ICPC-2 have been described elsewhere[12,237].

Grouping codes for cardiovascular problems

In this report, some grouping of ICPC-2 codes and/or ICPC-2 PLUS codes has been made to overcome differences in the level of specificity recorded by GPs in ascribing problem labels. For example, GPs often do not specify whether the hypertension they are managing is with or without complications. Hypertension unspecified is (by ICPC-2 rules) classified to 'simple hypertension'. To avoid under- or over-estimation of the relative rates of management of 'simple hypertension' versus 'hypertension with complications', these rubrics are grouped under the general heading 'hypertension'. These grouped codes are marked with an asterisk and are defined in terms of ICPC-2 rubrics in Appendix 6.

In Chapter 8, which investigates the prevalence of multiple cardiovascular problems, broader groups have been created to facilitate analysis. Use of individual rubrics or the smaller groups used in problem management analyses would render the number of possible combinations unmanageable. These broader groups of cardiovascular problems are also defined in Appendix 6.

Classification of pharmaceuticals

In Chapter 7 comparisons are made between the pharmaocological management of cardiovascular problems in 1990–91 and 1998–00. Pharmaceuticals prescribed are coded and classified according to an in-house classification called the Coding Atlas for Pharmaceutical Substances (CAPS). This is a hierarchical structure that facilitates analysis of data at a variety of levels, e.g. drug class, drug group, generic composition and brand name. CAPS is mapped to the Anatomical Therapeutic Chemical classification (ATC)[238] which is used in Australia for classifying drugs at the generic level.

Statistical methods

The analysis of the BEACH database is conducted with SAS version 6.12[239] and the encounter is the primary unit of analysis. Proportions (%) are used only when describing the distribution of an event that can arise only once at a consultation (e.g. age, sex or item numbers) or to describe the distribution of events within a class of events (e.g. problem *A* as a percentage of total problems).

Rates per 100 encounters are used when an event can occur more than once at the consultation (e.g. patient reasons for encounter, problems managed or medications). Rates per 100 problems are also sometimes used when a management event can occur more than once per problem managed. In general, the number of observations *(n)*, rate per 100 encounters and the 95% confidence intervals are presented.

The BEACH study is essentially a random sample of GPs, each providing data about a cluster of encounters. Cluster sampling study designs in general practice research violate the simple random sample (SRS) assumption because the probability of an encounter being included is a function of the probability of the GP being selected[240].

There is also a secondary probability function of particular encounters being included in the GP's cluster (associated with the characteristics of the GP or the type and place of the practice) and this increases the likelihood of sampling bias. Also there will be inherent relationships between encounters from the same cluster and this creates a potential statistical bias. The probability of gaining a representative sample of encounters is therefore reduced by the potential sampling and statistical bias, decreasing the accuracy of national estimates.

When a study design other than SRS is used, analytical techniques that consider the study design should be employed. In reporting BEACH results, the standard error calculations used in the 95% confidence intervals accommodate both the single-stage clustered study design and sample weighting according to Kish's description of the formulae[241]. SAS 6.12 is limited in its capacity to calculate the standard error for the current study design, so additional programming is required to incorporate the formulae. In annual analyses of results, post-stratification weighting is applied to the raw data before each year's analysis to account for underrepresentation of GPs in any particular group such as age, sex or activity level[12].

Post-stratification weighting (described earlier) is based on annual data sets and would therefore have been applied differently for the two data sets (i.e. the collection periods, April 1998 to March 1999 and April 1999 to March 2000) depending on which groups were underrepresented in each year's sample of participants. Therefore, unweighted data are used. This means that there is a slight underrepresentation of young GPs aged less than 35 years in the 2-year data set and this may mean the results are not totally representative of GP–patient encounters nationally.

Due to rounding, individual frequencies do not always sum exactly to the reported total. Where the relative frequency of an event is sufficient to provide statistical estimates of accuracy, the 95% confidence interval is provided. The rate is an estimate and its confidence limits suggest a 95% certainty that the true result lies between the reported upper and lower limits.

In the comparison of BEACH results and an earlier study (Chapter 7), statistical methods for the measurement of differences were applied incorporating the single-stage cluster sampling design used in both studies. Statistical difference was determined on the basis of non-overlapping confidence intervals (95% CI) where specific comparisons were made between two estimates. Chi-square tests at the 5% level were used to measure differences between the characteristics of GP participants in both studies.

3 The total data set

This study is based on data collected between 1 April 1998 and 31 March 2000. The final participating sample consisted of 2,031 practitioners who provided details pertaining to 203,100 encounters. These GPs represented 38.6% of those who were contacted and available, and 35.0% of those with whom contact was attempted. A comparison of characteristics of participating GPs with those of the total GP population found no significant differences between the groups with the exception of age group. Participants were significantly older and GPs aged less than 35 years were underrepresented.

3.1 GP characteristics

Of the 2,031 participants, 69.8% were male and 58.3% were 45 years of age or older. Three-quarters of the participants (75.7%) had been in general practice for more than 10 years and 13.9% could be regarded as practising part time, working fewer than six sessions per week. Almost one-fifth of participants were in solo practice (18.1%) and the majority (75.1%) had graduated in Australia. One in ten respondents (10.7%) conducted more than half of their consultations in a language other than English (Table 3.1).

Table 3.1: Characteristics of participating GPs

GP characteristic	Number[a]	Per cent of GPs[a] (*n* = 2,031)
Sex		
Male	1,418	69.8
Female	613	30.2
Age (missing = 8)		
< 35 years	150	7.4
35–44 years	694	34.3
45–54 years	653	32.3
55+ years	526	26.0
Years in general practice (missing = 20)		
< 5 years	157	7.8
6–10 years	333	16.6
11–19 years	659	32.8
20+ years	862	42.9
Sessions per week (missing = 18)		
< 6 per week	280	13.9
6–10 per week	1,356	67.4
> 10 per week	377	18.7

(continued)

Table 3.1 (continued): Characteristics of participating GPs

GP characteristic	Number[(a)]	Per cent of GPs[(a)] (*n* = 2,031)
Size of practice (missing = 19)		
Solo	354	17.6
2–4 GPs	816	40.6
5–10 GPs	714	35.5
11+ GPs	128	6.4
Place of graduation (missing = 4)		
Australia	1,517	74.8
UK	177	8.7
Other	333	16.4
More than 50% of consultations in languages other than English (missing = 12)	216	10.7

(a) Missing data removed.

3.2 The patients

Female patients accounted for a greater proportion of GP consultations (58.9 per 100 encounters) than male patients (41.1) (Table 3.2).

Table 3.2: Characteristics of the patients at encounters

Patient variable	Number[(a)]	Per cent of encounters (*n* = 203,100)[(a)]	95% LCL	95% UCL
Sex (missing = 2,709)				
Males	82,283	41.1	40.5	41.6
Female	118,108	58.9	58.4	59.5
Age group (missing = 1,752)				
< 1 year	4,604	2.3	2.2	2.4
1–4 years	10,144	5.0	4.9	5.2
5–14 years	13,891	6.9	6.7	7.1
15–24 years	20,137	10.0	9.7	10.3
25–44 years	52,644	26.2	25.7	26.6
45–64 years	49,469	24.6	24.2	24.9
65–74 years	24,807	12.3	12.0	12.7
75+ years	25,652	12.7	12.3	13.2
New patient to practice	17,705	8.8	8.3	9.2
Healthcare card holder	80,473	39.6	38.8	40.5
Veterans' Affairs card holder	6,769	3.3	3.1	3.5
Non-English-speaking background	20,567	10.3	9.1	11.5
Aboriginal and/or Torres Strait Islander	2,067	1.0	0.4	1.7

(a) Missing data removed.

Note: LCL—lower confidence limit, UCL—upper confidence limit.

Approximately one in seven encounters were with children aged less than 15 years (14.2%), one in ten were with young adults (10.0%), and approximately one in four with patients in each of the following age groups, 25–44 years (26.2%), 45–64 years (24.6%), and 65 years and older (25.0%).

The patient was new to the practice at 8.8% of encounters and patients who held a healthcare card accounted for 39.6% of all encounters. At 10.3% of encounters the patient was from a non-English-speaking background, and at 1.0% patients indicated they were an Aboriginal person and/or Torres Strait Islander (Table 3.2).

3.3 The encounters

The distribution of encounter types shows the varied nature of general practice (Table 3.3).

Table 3.3: Type of encounter

Variable	Number	Rate per 100 encounters[(a)] (*n* = 203,100)	95% LCL	95% UCL
General practitioners	2,031	. .	. .	. .
Direct consultations	186,317	96.2	96.0	96.5
No charge	1,420	0.7	0.5	1.0
Medicare-claimable	175,865	90.8	90.3	91.4
Short surgery consultations	2,390	1.2	0.9	1.6
Standard surgery consultations	144,133	74.5	73.7	75.2
Long surgery consultations	16,686	8.6	8.2	9.1
Prolonged surgery consultations	1,663	0.9	0.0	1.8
Home visits	3,687	1.9	1.4	2.4
Hospital	972	0.5	0.0	1.7
Nursing home	1,852	1.0	0.4	1.5
Other items	4,482	2.3	1.9	2.7
Workers compensation claimable	3,672	1.9	1.7	2.1
Other paid (hospital, State, etc.)	5,360	2.8	1.3	4.2
Indirect consultations	7,281	3.8	3.4	4.1
Script	3,888	2.0	1.7	2.3
Referral	984	0.5	0.3	0.7
Certificate	243	0.1	0.0	0.3
Other	2,378	1.2	1.0	1.5
Total encounters	**203,100**	. .	. .	. .

(a) Missing data for 9,502 encounters removed. Per cent base (*n*) = 193,598.

Note: LCL—lower confidence limit, UCL—upper confidence limit.

Direct consultations (where the patient was seen by the GP) represented 96.2% of all encounters. By far the majority of these were claimable on Medicare. Standard surgery consultations were most common, accounting for 74.5% of all recorded patient contacts. Workers compensation claims represented 1.9% of all recorded encounters. Indirect consultations (patient not seen) represented 3.8% of encounters (Table 3.3).

3.4 The content of the encounters

At the 203,100 recorded encounters there was an average of 148.6 patient reasons for encounter described per 100 encounters. Of the 148.6 problems managed per 100 encounters, 49.2% were considered to be problems new to the patient. Problems regarded by the GP as likely to be work-related (irrespective of whether the encounter was covered by workers compensation) occurred at a rate of 3.6 per 100 encounters (Table 3.4).

Medications were prescribed, advised or supplied at a rate of 108.8 per 100 encounters. Non-pharmacological treatments were recorded less often than medications, with clinical non-procedural treatments (e.g. counselling, advice or psychotherapy) being recorded at a higher rate (34.2% per 100 encounters) than procedural treatments such as excisions and physical therapies (12.4 per 100 encounters).

Table 3.4: The content of the encounters

Variable	Number	Rate per 100 encounters	95% LCL	95% UCL	Rate per 100 problems	95% LCL	95% UCL
General practitioners	2,031	. .	. .	. .	. .	. .	. .
Encounters	203,100	. .	. .	. .	. .	. .	. .
Reasons for encounter	301,793	148.6	147.6	149.6	. .	. .	. .
Problems managed	301,759	148.6	147.4	149.8	. .	. .	. .
New problems	99,883	49.2	48.2	50.1	33.1	32.4	33.8
Old problems	168,555	83.0	81.3	84.7	55.9	54.9	56.8
Work-related	7,371	3.6	3.4	3.8	2.4	2.3	2.6
Medications	221,006	108.8	107.3	110.3	73.2	72.4	74.1
Prescribed	188,352	92.7	91.2	94.3	62.4	61.5	63.4
Advised OTC	17,879	8.8	8.4	9.2	5.9	5.6	6.2
GP supplied	14,775	7.3	6.6	7.9	4.9	4.5	5.3
Other treatments	94,616	46.6	45.3	47.8	31.4	30.6	32.1
Clinical treatments	69,461	34.2	33.1	35.3	23.0	22.3	23.7
Procedural treatments	25,155	12.4	12.0	12.8	8.3	8.1	8.6
Referrals	24,259	12.0	11.6	12.3	8.0	7.8	8.2
Emergency department	150	0.1	0.0	0.3	0.1	0.0	0.2
Hospital	1,592	0.8	0.6	1.0	0.5	0.4	0.6
Specialist	15,906	7.8	7.6	8.1	5.3	5.1	5.4
Allied health services	6,611	3.3	3.1	3.4	2.2	2.1	2.3
Pathology tests ordered	55,563	27.4	26.5	28.2	18.4	17.9	18.9
Imaging test ordered	15,560	7.7	7.4	7.9	5.2	5.0	5.3

Note: LCL—lower confidence limit, UCL—upper confidence limit, OTC—over-the-counter.

Approximately 12 referrals were made per 100 encounters. Orders for a pathology test (or batch of tests, e.g. Full Blood Count (FBC), HIV) were recorded more frequently (27.4 per 100 encounters) than were referrals. Orders for imaging (e.g. X-rays, scans) occurred at a rate of 7.7 per 100 encounters (Table 3.4).

Management actions

The GPs recorded at least one management action at 83.2% of encounters and for 74.7% of problems (Table 3.5). At least one medication was given at more than two-thirds (67.5%) of encounters and for 56.9% of problems managed.

At least one non-pharmacological treatment was given at 36.4% of encounters and for 28.1% of problems, a clinical treatment being approximately three times more likely than a procedure. A referral was made at 11.1% of encounters, for 7.8% of problems. At least one test or investigation was ordered at 19.4% of encounters and for 14.6% of problems. These were most commonly pathology orders, which were reported at 14.3% of encounters (for 10.7% of problems). Imaging orders were placed less frequently at 6.8% of encounters and for 4.7% of problems.

Table 3.5 Encounters and problems in which treatments occurred

Variable	Number of encounters	Rate per 100 encounters (*n* =203,100)[(a)]	95% LCL	95% UCL	Number of problems	Rate per 100 problems (*n* =301,759)[(a)]	95% LCL	95% UCL
At least one treatment type	169,006	83.2	82.8	83.6	225,362	74.7	74.2	75.1
At least one medication	137,024	67.5	66.9	68.0	171,772	56.9	56.3	57.5
At least 1 prescription	119,966	59.1	58.4	59.7	149,246	49.5	48.8	50.1
At least 1 OTC advised	15,859	7.8	7.5	8.2	16,213	5.4	5.1	5.6
At least 1 GP supplied	11,145	5.5	5.0	5.9	11,696	3.9	3.5	4.2
At least one non-pharmacological treatment	73,999	36.4	35.7	37.2	84,772	28.1	27.5	28.7
At least 1 clinical treatment	55,546	27.4	26.6	28.1	63,327	21.0	20.4	21.6
At least 1 therapeutic procedure	22,992	11.3	11.0	11.7	23,773	7.9	7.6	8.1
At least 1 referral	22,593	11.1	10.9	11.4	23,576	7.8	7.6	8.0
At least 1 referral to specialist	15,142	7.5	7.3	7.7	15,713	5.2	5.1	5.3
At least 1 referral to allied health	6,358	3.1	3.0	3.3	6,478	2.2	2.1	2.2
At least 1 referral to hospital	1,568	0.8	0.6	0.9	1,591	0.5	0.4	0.6
At least 1 referral to ED	149	0.1	0.0	0.3	150	0.1	0.0	0.2
At least 1 investigation	39,490	19.4	19.0	19.8	44,058	14.6	14.3	14.9
At least 1 pathology order	29,122	14.3	14.0	14.7	32,382	10.7	10.5	11.0
At least 1 imaging order/other test	13,719	6.8	6.5	7.0	14,210	4.7	4.6	4.9

(a) Figures will not total 100.0% as multiple events may occur in one encounter or in the management of one problem at encounter.

Note: LCL—lower confidence limit, UCL—upper confidence limit, ED—emergency department. OTC—over-the-counter.

3.5 The problems

There were 301,759 problems managed at the 203,100 patient encounters, at an average rate of 148.6 problems per 100 encounters. In 64.4% of encounters, one problem was managed, and three or more problems were managed at 10.7% of encounters.

Problems managed by ICPC-2 chapter

Table 3.6 presents (in decreasing order of frequency) the frequency and distribution of problems managed by ICPC-2 chapter (see Appendix 6). In the ICPC classification system, cardiovascular problems are assigned to the 'circulatory' label. Each ICPC-2 chapter and problem managed is expressed as a percentage of all problems managed and as a rate per 100 encounters with 95% confidence intervals.

Table 3.6: Distribution of problems managed by ICPC chapter

Problem label	Number	Per cent of total problems (*n* = 301,759)	Rate per 100 encounters (*n* = 203,100)	95% LCL	95% UCL
Respiratory	46,920	15.6	23.1	22.7	23.5
Musculoskeletal	34,961	11.6	17.2	16.8	17.6
Skin	34,270	11.4	16.9	16.6	17.2
Circulatory	33,770	11.2	16.6	16.2	17.1
General & unspecified	28,806	9.6	14.2	13.9	14.5
Psychological	22,763	7.5	11.2	10.8	11.6
Digestive	20,731	6.9	10.2	10.0	10.4
Endocrine & metabolic	18,411	6.1	9.1	8.8	9.3
Female genital system	14,638	4.9	7.2	6.9	7.5
Ear	9,186	3.0	4.5	4.4	4.6
Pregnancy & family planning	8,886	2.9	4.4	4.1	4.6
Neurological	8,172	2.7	4.0	3.9	4.1
Urology	6,164	2.0	3.0	2.9	3.1
Eye	5,715	1.9	2.8	2.7	2.9
Blood	3,578	1.2	1.8	1.6	1.9
Male genital system	2,819	0.9	1.4	1.3	1.5
Social	1,969	0.7	1.0	0.8	1.2
Total	**301,759**	**100.0**	**148.6**	**147.4**	**149.8**

Note: LCL—lower confidence limit, UCL—upper confidence limit.

Almost half of the problems managed in general practice (49.8%) related to four major body systems with circulatory problems ranking fourth at a rate of 16.6 per 100 encounters. Respiratory problems were the most frequently managed (23.1 per 100 encounters, followed by problems associated with musculoskeletal and skin systems, at 17.2 and 16.9 per 100 encounters respectively. Psychological problems were also common, as were problems related to the digestive and endocrine and metabolic systems. Problems least frequently managed related to the blood and blood-forming organs and the male genital system, or were of a social nature. Almost 10% of problems managed were not simply related to a single body system and were classified in the general and unspecified chapter.

4 GPs and cardiovascular encounter rates

This chapter describes the relationship between GP characteristics and the number of cardiovascular problems managed. It further investigates GP and practice characteristics as possible predictors of high rates of management of cardiovascular problems. This may provide researchers with an indication of the types of GPs who manage cardiovascular problems more frequently. This would allow them to select particular GP groups for interventions and so provide the most cost-effective approach to attempted behaviour change.

4.1 Distribution of GPs by cardiovascular encounter rate

Of the 2,031 GPs who participated in BEACH during 1998–00, there were only nine GPs who did not manage at least one cardiovascular problem.

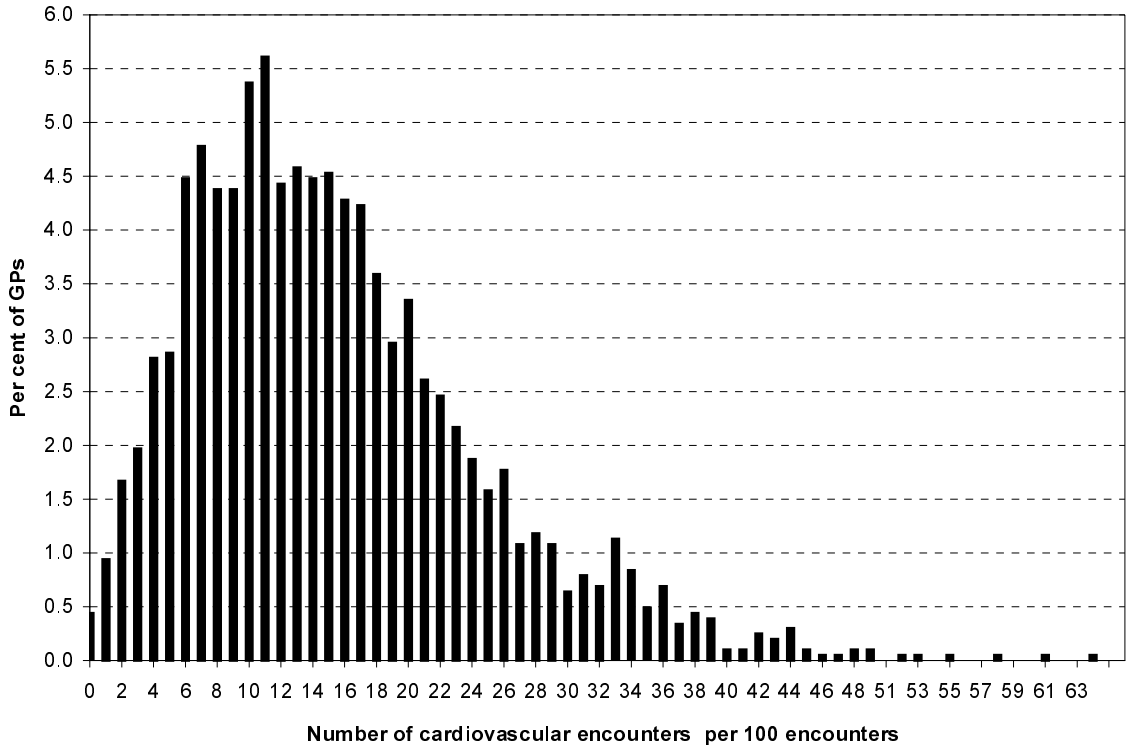


Figure 4.1: Distribution of GPs by cardiovascular encounter rate

The rate of cardiovascular encounters per GP varied widely, ranging from 0 to 64 per 100 encounters (Figure 4.1). The median cardiovascular encounter rate was 14 and the mean

15.3 with a standard deviation of 9.2. The cardiovascular encounter rates for the majority (70.1%) of GPs therefore fell between 6.1 and 24.5 per 100 encounters. The most common rate of cardiovascular encounters was 11 of the 100 recorded (5.6% of GPs).

4.2 Cardiovascular encounter rates by GP characteristics

The relative encounter rates for particular groups of GPs are presented in Table 4.1.

Male GPs had a significantly higher rate of encounters with at least one cardiovascular problem (16.1 per 100 total encounters, 95% CI: 15.6–16.6) than did female practitioners (13.6 per 100 encounters, 95% CI: 12.9–14.2).

There was a trend of increasing cardiovascular encounter rates as GP age increased. GPs aged 55 or more had a significantly higher cardiovascular encounter rate (18.2 per 100 encounters, 95% CI: 17.3–19.1) than those aged 45–54 years (15.8 per 100, 95% CI: 15.1–16.5), those aged 35–44 years (13.7 per 100, 95% CI: 13.1–14.3), and those aged less than 35 years (10.6 per 100, 95% CI: 9.6–11.6).

There was no significant association between GP place of graduation and cardiovascular encounter rate. GPs who worked 6–10 sessions per week had a significantly higher cardiovascular encounter rate (15.8 per 100 encounters, 95% CI: 15.3–16.3) than practitioners who worked fewer than 6 sessions per week (13.5 per 100, 95% CI: 12.4–14.6) or those working 11 or more sessions per week (15.1 per 100, 95% CI: 14.2–16.0).

There was a significant trend of increasing cardiovascular encounter rates with decreased size of practice, solo practitioners having higher rate of cardiovascular encounters (18.0 per 100, 95% CI: 16.9–19.0) than those in practices of 2–4 GPs (16.1 per 100, 95% CI: 15.5–16.8), those in practices of 5–10 GPs (14.0 per 100, 95% CI: 13.4–14.5) or those in large group practices of 11 or more GPs (10.7 per 100, 95% CI: 9.5–11.9).

The State/Territory-specific cardiovascular encounter rates ranged from 8.5 per 100 encounters in the Northern Territory to 16.8 per 100 in New South Wales. The New South Wales rate was significantly higher than that of the Northern Territory, the Australian Capital Territory (10.8 per 100, 95% CI: 8.8–12.8), Queensland (13.2 per 100, 95% CI: 12.5–14.0), South Australia (14.8 per 100, 95% CI: 13.6–16.0), and Western Australia (13.6 per 100, 95% CI: 12.5–14.8).

Using categories of the Rural, Remote and Metropolitan Area classification (RRMA)[242], the GPs were grouped according to the rurality of their major practice location. GPs from small rural (including remote) areas had a significantly higher cardiovascular encounter rate (16.9 per 100 encounters, 95% CI: 16.1–17.7) than those from metropolitan areas (15.0 per 100, 95% CI: 14.5–15.5). The cardiovascular encounter rate for large rural areas (15.0 per 100 encounters, 95% CI: 13.6–16.3) was not significantly lower than that of small rural areas; however, the smaller sample size from the large rural areas generated wide confidence intervals which may affect the accuracy of this comparison.

The cardiovascular encounter rate for GPs who conducted more than half of their consultations in a language other than English (17.2 per 100 encounters, 95% CI: 15.9–18.6) was significantly higher than that of their counterparts (15.1 per 100, 95% CI: 14.7–15.5).

GPs who did not hold Fellowship of the Royal Australian College of General Practitioners (FRACGP) had a significantly higher cardiovascular encounter rate (16.0 per 100

encounters, 95% CI: 15.5–16.5) than those who were Fellows of the RACGP (13.8 per 100, 95% CI: 13.1–14.5).

Table 4.1: Cardiovascular encounter rates by selected GP characteristics

GP characteristic	Number of encounters	Number of cardiovascular encounters	Per cent of total cardiovascular encounters (n = 31,161)[a]	Cardiovascular encounter rate per 100 encounters[a]	95% LCL	95% UCL
Sex						
Male	141,800	22,850	73.3	16.1	15.6	16.6
Female	61,300	8,311	26.7	13.6	12.9	14.2
Age (missing = 8)						
< 35 years	15,000	1,593	5.1	10.6	9.6	11.6
35–44 years	69,400	9,503	30.5	13.7	13.1	14.3
45–54 years	65,300	10,335	33.2	15.8	15.1	16.5
55+ years	52,600	9,595	30.8	18.2	17.3	19.1
Place of graduation (missing = 4)						
Australia	151,700	23,375	75.0	15.4	14.9	15.9
UK	17,700	2,672	8.6	15.1	13.8	16.3
Other	33,300	5,067	16.3	15.2	14.2	16.2
Sessions per week (missing = 18)						
< 6 per week	28,000	3,775	12.1	13.5	12.4	14.6
6–10 per week	135,600	21,404	68.7	15.8	15.3	16.3
11+ per week	37,700	5,696	18.3	15.1	14.2	16.0
Size of practice (missing=1,900)						
Solo	35,400	6,365	20.4	18.0	16.9	19.0
2–4 GPs	81,600	13,155	42.2	16.1	15.5	16.8
5–10 GPs	71,400	9,958	32.0	14.0	13.4	14.5
11+ GPs	12,800	1,372	4.4	10.7	9.5	11.9
State						
New South Wales	75,400	12,655	40.6	16.8	16.1	17.5
Victoria	44,700	7,268	23.3	16.3	15.4	17.1
Queensland	39,600	5,235	16.8	13.2	12.5	14.0
South Australia	17,000	2,509	8.1	14.8	13.6	16.0
Western Australia	16,500	2,250	7.2	13.6	12.5	14.8
Tasmania	4,700	733	2.4	15.6	13.4	17.8
Australian Capital Territory	3,000	324	1.0	10.8	8.8	12.8
Northern Territory	2,200	187	0.6	8.5	6.3	10.7

(continued)

Table 4.1 (continued): Cardiovascular encounter rates by selected GP characteristics

GP characteristic	Number of encounters	Number of cardiovascular encounters	Per cent of total cardiovascular encounters (*n* = 31,161)[a]	Cardiovascular encounter rate per 100 encounters[a]	95% LCL	95% UCL
RRMA category[b]						
Metropolitan	150,500	22,561	72.4	15.0	14.5	15.5
Large rural	15,000	2,248	7.2	15.0	13.6	16.3
Small rural	37,600	6,352	20.4	16.9	16.1	17.7
More than 50% of consultations in languages other than English (missing = 12)						
Yes	21,600	3,724	12.0	17.2	15.9	18.6
No	180,300	27,225	87.4	15.1	14.7	15.5
Hold FRACGP (missing = 29)						
Yes	58,800	8,127	26.1	13.8	13.1	14.5
No	141,400	22,606	72.6	16.0	15.5	16.5
Total	**203,100**	**31,161**	**100.0**	**15.3**	**14.9**	**15.7**

(a) Missing data removed.

(b) Rural, Remote and Metropolitan Area classification: Metropolitan—RRMA groups 1 & 2; Large rural— RRMA groups 3 & 6; Small rural—RRMA groups 4, 5 & 7 [243].

Note: Shading indicates statistically significant differences between groups. UCL—upper confidence limit, LCL—lower confidence limit.

4.3 Characteristics of GPs with high, medium and low cardiovascular encounter rates

In this section, the characteristics of GPs are compared on the basis of their cardiovascular encounter rate. The participating GPs were divided into three groups according to their cardiovascular encounter rate. The low cardiovascular encounter rate group was defined as those GPs whose cardiovascular encounter rate was less than 6 per 100 encounters (the mean minus one standard deviation). The group with a medium cardiovascular encounter rate consisted of those GPs whose cardiovascular encounter rate was within the range of the mean (9.1 per 100 encounters) plus or minus one standard deviation (i.e. 6–24 per 100 encounters). The high cardiovascular encounter rate group was defined as those GPs whose cardiovascular encounter rate was above this range. The characteristics of the GPs falling into each of these cardiovascular encounter rate groups are compared in Table 4.2.

Table 4.2: Characteristics of GPs in the high, medium and low cardiovascular encounter groups

GP variable		GPs with low cardiovascular encounter rate (*n* = 217)				GPs with medium cardiovascular encounter rate (*n* = 1,514)				GPs with high cardiovascular encounter rate (*n* = 300)			
		Number	Per cent	95% LCL	95% UCL	Number	Per cent	95% LCL	95% UCL	Number	Per cent	95% LCL	95% UCL
Sex	Male	142	65.4	59.1	71.8	1,031	68.1	65.7	70.4	245	81.7	77.3	86.1
	Female	75	34.6	28.2	40.9	483	31.9	29.6	34.3	55	18.3	13.9	22.7
Age	< 35	37	17.1	12.1	22.2	109	7.2	5.9	8.5	4	1.3	0.0	2.6
	35–44	70	32.4	26.1	38.7	565	37.5	35.0	39.9	59	19.7	15.2	24.3
	45–54	61	28.2	22.2	34.3	492	32.6	30.3	35.0	100	33.4	28.1	38.8
	55+	48	22.2	16.6	27.8	342	22.7	20.6	24.8	136	45.5	39.8	51.2
Place of graduation													
	Australia	156	72.2	66.2	78.2	1,139	75.4	73.2	77.6	222	74.0	69.0	79.0
	UK	19	8.8	5.0	12.6	132	8.7	7.3	10.2	26	8.7	5.5	11.9
	Other	41	19.0	13.7	24.3	240	15.9	14.0	17.7	52	17.3	13.0	21.6
Years in general practice													
	< 2	2	0.9	0.0	2.2	12	0.8	0.3	1.2	1	0.3	0.0	1.0
	2–5	37	17.3	12.2	22.4	102	5.8	5.5	8.1	3	1.0	0.0	2.2
	6–10	49	22.9	17.2	28.6	251	16.7	14.8	18.6	33	11.2	7.6	14.8
	11–19	57	26.6	20.7	32.6	538	35.8	33.4	38.2	64	21.7	17.0	26.4
	20+	69	32.2	25.9	38.6	599	39.9	37.4	42.4	194	65.8	60.3	71.2
Sessions per week													
	< 6	41	19.0	13.7	24.3	208	13.9	12.1	15.6	31	10.4	6.9	13.9
	6–10	131	60.6	54.1	67.2	1016	67.7	65.4	70.1	209	70.4	65.1	75.6
	11+	44	20.4	15.0	25.8	276	18.4	16.4	20.4	57	19.2	14.7	23.7
Size of practice													
	Solo	31	14.4	9.6	19.1	233	15.5	13.7	17.4	90	30.3	25.0	35.6
	2–4	67	31.0	24.8	37.2	618	41.2	38.7	43.7	131	44.1	38.4	49.8
	5–10	88	40.7	34.1	47.3	557	37.2	34.7	39.6	69	23.2	18.4	28.1
	11+	30	13.9	9.2	18.5	91	6.1	4.9	7.3	7	2.4	0.6	4.1
Rurality	Metropolitan	190	87.6	83.1	92.0	1091	72.1	69.8	74.3	224	74.7	69.7	79.6
	Large rural	11	5.1	2.1	8.0	122	8.1	6.7	9.4	17	5.7	3.0	8.3
	Small rural	16	7.4	3.9	10.9	301	19.9	17.9	21.9	59	19.7	15.1	24.2
> 50% non-English consultation													
	Yes	16	7.4	3.9	11.0	152	10.1	8.6	11.6	48	16.2	12.0	20.4
	No	199	92.6	89.0	96.1	1,355	89.9	88.4	91.4	249	83.8	79.6	88.0
FRACGP	Yes	77	36.2	29.6	42.7	448	30.0	27.7	32.3	63	21.4	16.7	26.1
	No	136	63.8	57.3	70.4	1,046	70.0	67.7	72.3	232	78.6	73.9	83.3
Total		**217**	**100.0**	. .	. .	**1514**	**100.0**	. .	. .	**300**	**100.0**	. .	. .

Note: Shading indicates statistically significant differences between the groups. UCL—upper confidence limit, LCL—lower confidence limit.

When compared with the GPs in the medium and low cardiovascular encounter rate groups, GPs in the high cardiovascular encounter rate group were more likely to

- be male
- be aged 55+ years
- have been in practice for more than 10 years
- be a solo practitioner or in a practice of 2–4 GPs
- be in rural locations
- conduct more than 50% of their consultations in a language other than English

and were less likely to:

- be Fellows of the RACGP
- be in practices with more than 5 GPs
- be aged less than 44 years
- practise in metropolitan practices.

4.4 GP characteristics by cardiovascular encounter rate: analysis of variance

The factors that affected the GPs' cardiovascular encounter rate were identified using analysis of variance and linear regression. Of the 2,031 GPs, 1,876 had data recorded for all variables of interest. The analysis of variance was restricted to these 1,876 GPs.

Univariate analysis

The proportion of variance in cardiovascular encounter rates explained by each variable alone was determined using simple linear regression. Results are shown in Table 4.3.

Table 4.3: Univariate analysis of GP characteristics and cardiovascular encounter rates

Variable	Regression coefficient	Effect size (standard beta)	Per cent of variance explained	F-value	P-value
GP characteristics	. .	. .	**9.01**	**13.67**	**0.0001**
GP sex	2.549	0.128	1.64	32.36	0.0001
GP age	. .	. .	5.77	39.64	0.0001
Annual A1 Medicare claims	-0.000	-0.026	0.07	1.35	0.245
Place of graduation	. .	. .	0.01	0.13	0.875
Years in practice	. .	. .	6.31	43.62	0.0001
Sessions per week	. .	. .	0.82	8.05	0.0003
More than 50% of consultations in languages other than English	2.048	0.069	0.48	9.40	0.0022
Hold FRACGP	-2.196	-0.109	1.20	23.60	0.0001
Practice characteristics	. .	. .	**4.69**	**19.12**	**0.0001**
Size of practice	. .	. .	4.18	28.22	0.0001
Location of practice	. .	. .	0.69	6.77	0.0012

Note: F-value = the test statistic, P-value = the significance level.

Variables that were significant univariate predictors of cardiovascular encounter rates when fitted alone were sex, age, years in practice, sessions worked per week, more than 50% of consultations in languages other than English, Fellowship of the Royal Australian College of General Practitioners (FRACGP), practice location, and size of practice.

Multivariate analysis

Multiple linear regression was used to determine which of the possible explanatory variables were useful in predicting the cardiovascular encounter rate. When all variables of interest were entered, the model explained 11.5% of the variance in cardiovascular encounter rates. The full additive model explained a significant amount of the variance in cardiovascular encounter rates ($F(19, 1927) = 13.13$, $p = 0.0001$).

The model was reduced using backward elimination with predictor variables fitted in 'families' in the following order: 'GP characteristics', 'practice characteristics'. Families were reduced in order, the variables most directly related to cardiovascular encounter rates (GP characteristics) being reduced first, after adjusting for practice characteristics.

If a family was significant (global alpha = 0.1) when fitted last, it was reduced further by fitting each individual variable last. Significant variables (alpha = 0.05) or those that improved the fit of the model were kept. The reduced family was then fitted first and the next family fitted last. The final reduced model is summarised in Table 4.4.

The results of this multivariate analysis suggest that the indicators for higher cardiovascular rates are:

- male GPs (versus female)
- GPs aged 35–44 years or older (versus those aged less than 35 years)
- GPs working 6–10 sessions per week (versus those working part time)
- GPs who graduated in Australia (versus those who graduated in the UK or other countries)
- GPs who conducted more than half of their consultations in a language other than English (versus those with fewer than 50% of these consultations)
- Practices with 10 or fewer GPs (versus practices with 11 or more GPs)
- GPs from small rural practices (versus those from urban practices).

Together, the independent predictors explained 10.6% of the variance in cardiovascular encounter rates ($F(14, 1946) = 16.32$, $p = 0.0001$). Age of GP was the strongest independent predictor of cardiovascular encounter rates, which uniquely explained 3.7% of the variance. It was followed by the size of practice, which accounted for 2.0% of the variance uniquely.

The univariate analysis did not find an association between place of graduation and cardiovascular encounters. However, the effect of place of graduation was being masked by GP age, which has a significant positive association with cardiovascular encounters. GPs who graduated overseas were, on average, older than Australian graduates. The multivariate analysis revealed that for GPs of the same age group, Australian graduates had a higher rate of cardiovascular encounters than overseas graduates.

Table 4.4: Final model of independent predictors of GP cardiovascular encounter rates

Predictor (explanatory variable)		Regression coefficient[a]	Effect size (standard Beta)[b]	T-value (F-partial)	P-value[c]	Per cent of unique variance[d]
Sex						
Versus Female	Male	1.17	0.06	2.52	0.0119	1.64
Age		. .	. .	(26.81)	0.0001	3.72
Versus < 35	35-44	2.98	0.15	3.74	0.0002	. .
	45–54	4.63	0.24	5.67	0.0001	. .
	55+	6.92	0.33	7.99	0.0001	. .
Place of graduation		. .	. .	(5.23)	0.0054	0.48
Versus Other	Australia	1.47	0.07	2.65	0.0082	. .
	UK	-0.14	-0.00	-0.16	0.8699	. .
Sessions per week		. .	. .	(9.39)	0.0001	0.87
Versus < 6	6–10	1.72	0.09	2.83	0.0047	. .
	11+	-0.25	-0.01	-0.33	0.7406	. .
> 50% non-English consultations						
Versus No	Yes	1.48	0.05	2.30	0.0214	0.35
Size of practice		. .	. .	(14.43)	0.0001	2.00
Versus 11+	Solo	5.73	0.24	6.00	0.0001	. .
	2–4	4.15	0.24	4.83	0.0001	. .
	5–10	2.83	0.15	3.29	0.0010	. .
Location of practice		. .	. .	(4.38)	0.0127	0.41
Versus metropolitan	Large rural	0.14	0.00	0.18	0.8570	. .
	Small rural	1.53	0.07	2.95	0.0033	. .

(a) Unit change in cardiovascular encounter rate for every unit change in the predictor variable. Units are original measurement units. Negative values represent a reduction in cardiovascular encounter rates with an increasing rate of the predictor.

(b) The standardised effect of the variable on cardiovascular encounter rates. Measured as standard deviation change in cardiovascular encounter rate for every standard deviation change in the predictor.

(c) Significance when all other variables in the model are held constant.

(d) The percentage of variance in cardiovascular encounter rates attributable uniquely to the variable, after taking into account the variance explained by all other variables in the model.

4.5 Conclusion

This analysis has demonstrated the characteristics of GPs who see more cardiovascular problems. These results could be considered in the selection of GPs for educational interventions in the area of cardiovascular disease management.

5 Comparison of cardiovascular and non-cardiovascular encounters and patients

5.1 Type of encounter

The characteristics of the 31,161 cardiovascular encounters are compared with those of the 171,939 non-cardiovascular encounters in Table 5.1. There were four statistically significant differences between them.

Table 5.1: Distribution of services for cardiovascular and non-cardiovascular encounters

	Cardiovascular encounters (*n* = 31,161)				Non-cardiovascular encounters (*n* = 171,939)			
Encounter type	Number	Rate per 100 encounters	95% LCL	95% UCL	Number	Rate per 100 encounters	95% LCL	95% UCL
General practitioners	2,022	. .	. .	. .	2,031	. .	. .	. .
Direct consultations	28,835	96.9	96.6	97.2	157,482	96.1	95.9	96.4
No charge	97	0.3	0.0	2.8	1,323	0.8	0.5	1.1
Medicare claimable	27,949	93.9	93.3	94.5	147,916	90.3	89.7	90.9
Short surgery	172	0.6	0.0	2.2	2,218	1.4	1.0	1.7
Standard surgery	21,837	73.4	72.4	74.4	122,296	74.6	73.9	75.4
Long surgery	3,510	11.8	10.9	12.7	13,176	8.0	7.6	8.5
Prolonged surgery	221	0.7	0.0	3.3	1,442	0.9	0.0	2.0
Home visits	1,158	3.9	2.7	5.1	2,529	1.5	1.0	2.1
Hospital	261	0.9	0.0	4.6	711	0.4	0.0	1.7
Nursing home	435	1.5	0.0	3.3	1,417	0.9	0.2	1.5
Other items	355	1.2	0.0	3.1	4,127	2.5	2.0	3.0
Workers compensation	92	0.3	0.0	1.5	3,580	2.2	1.9	2.4
Other paid (hospital, State etc.)	697	2.3	0.0	8.4	4,663	2.9	1.3	4.4
Indirect consultations	919	3.1	2.2	4.0	6,362	3.9	3.5	4.3
Script	624	2.1	1.1	3.1	3,264	2.0	1.7	2.3
Referral	78	0.3	0.0	1.7	906	0.6	0.4	0.7
Certificate	11	0.0	0.0	2.8	232	0.1	0.0	0.3
Other	238	0.8	0.0	1.8	2,140	1.3	1.0	1.6
Missing	1,407	. .	. .	. .	8,095	. .	. .	. .

Note: Shading indicates statistically significant differences between the groups, LCL–lower confidence limit, UCL–upper confidence limit.

- Cardiovascular encounters were more likely to be claimable through Medicare (93.9%) than were non-cardiovascular encounters (90.3%) and less likely to be claimable through workers compensation (0.3% compared with 2.2%).
- Cardiovascular encounters were more likely to be charged as long surgery consultations (11.8%) than were non-cardiovascular encounters (8.0%) and more likely to be home visits (3.9% compared with 1.5%).

5.2 The content of the encounters

Table 5.2 (p. 45) provides a comparison of the overall content of cardiovascular encounters and non-cardiovascular encounters. At cardiovascular encounters:

- there were significantly more patient reasons for encounter recorded (181.3 per 100 encounters) than at non-cardiovascular encounters (142.7)
- the problems managed were significantly less likely to be designated as new problems to the patient (17.4%) than those at non-cardiovascular encounters (37.5%)
- significantly more problems were managed and the difference was considerable (211.3 compared with 137.2 per 100 encounters). Figure 5.1 gives a graphic view of the distribution of problems across cardiovascular and non-cardiovascular encounters.

One problem was managed at 70% of non-cardiovascular encounters and only 6.9% involved three or four problems. In contrast, only 28.5% of cardiovascular encounters involved the management of a single problem, and over 30% involved three or four problems.

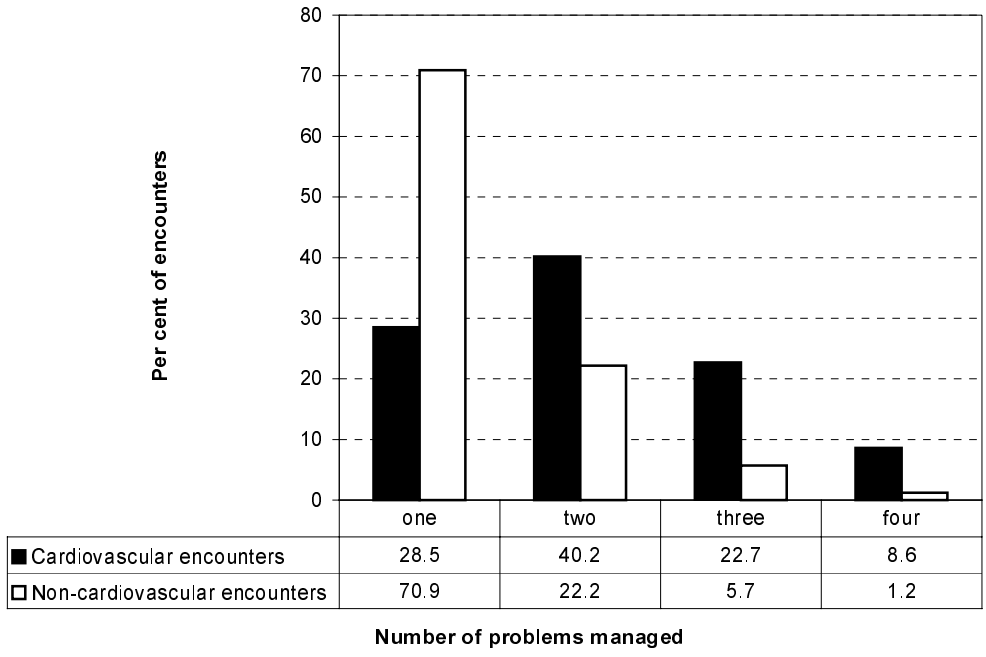


Figure 5.1: Comparison of number of problems managed at cardiovascular and non-cardiovascular encounters

Medications

Significantly more medications were prescribed, advised or supplied at cardiovascular encounters (170.8 per 100 encounters compared with 97.6 per 100 non-cardiovascular encounters), but this large difference in medication rates reduced when considered in terms of the number of problems managed at the encounters (80.8 medications per 100 problems managed at cardiovascular encounters compared with 71.1 per 100 at non-cardiovascular encounters) (Table 5.2).

The manner in which medications were provided to patients differed markedly at cardiovascular encounters and non-cardiovascular encounters. The higher overall medication rate at cardiovascular encounters was due wholly to the significantly higher prescribing rate (75.3 per 100 problems managed compared with 58.8). In contrast, the rates at which GPs advised over-the-counter medications and supplied medications directly to the patient were significantly lower at cardiovascular encounters (2.0 and 3.6 per 100 problems managed respectively) than at non-cardiovascular encounters (7.0 and 5.3 receptively).

Other non-pharmacological management

The overall rate of non-pharmacological treatments recorded per 100 encounters was significantly higher at cardiovascular encounters (49.4) than at non-cardiovascular encounters (46.1). Non-pharmacological managements are divided into two groups: clinical treatments (such as advice and counselling) and procedures.

The overall difference in non-pharmacological management rates was reflected in the rate of recording of clinical treatments, the rate being 39.7 per 100 encounters at cardiovascular encounters and 33.2 per 100 encounters at non-cardiovascular encounters. However, procedures were less frequently recorded at cardiovascular encounters (9.7 per 100 encounters) than at non-cardiovascular encounters (12.9).

When the greater number of problems managed at cardiovascular encounters was considered, the clinical treatment rates were significantly lower at cardiovascular encounters (18.8 per 100 problems) than at non-cardiovascular encounters (24.2). The procedural rate remained lower at cardiovascular encounters (4.6 per 100 problems managed) than at non-cardiovascular encounters (9.4).

Referrals

Referrals were more frequently recorded at cardiovascular encounters (14.0 per 100 encounters) than at non-cardiovascular encounters (11.6). However, this was entirely due to the high number of problems managed at cardiovascular encounters. When referrals were considered in terms of the numbers of problem, a reversal occurred, referral rates being higher at non-cardiovascular encounters (8.4 per 100 problems) than at cardiovascular encounters (6.6).

Referrals to medical specialists reflected this pattern, with higher rates per 100 encounters at cardiovascular encounters (9.3 per 100 encounters compared with 7.6) but lower rates per 100 problems managed (4.4 compared with 5.5). Although there was no significant difference in rates of referral to allied health services per 100 encounters, referrals for such services were lower in terms of the number of problems managed at cardiovascular encounters (1.7 per 100) than at cardiovascular encounters (2.3).

There were no significant differences between the two groups in rates of hospital admissions or referrals to emergency services.

Pathology ordering

Orders for pathology tests were made at a far higher rate at cardiovascular encounters (38.7 test orders per 100 encounters) than at non-cardiovascular encounters (25.3), but this difference again reflected the complexity of these cardiovascular encounters. When considered in terms of the numbers of problems managed, the pathology-ordering rate was almost identical at cardiovascular and non-cardiovascular encounters (18.3 compared with 18.5 per 100 problems respectively).

Imaging ordering

Orders for imaging tests were significantly less common at cardiovascular encounters than at non-cardiovascular encounters, both in terms of the number ordered per 100 encounters (6.3 compared with 7.9) and per 100 problems (3.0 versus 5.8).

Table 5.2: Morbidity and management at cardiovascular and non-cardiovascular encounters

	Cardiovascular encounters							Non-cardiovascular encounters						
Data element	Number	Rate per 100 encounters (*n* = 31,161)	95% LCL	95% UCL	Rate per 100 problems (*n* = 65,843)	95% LCL	95% UCL	Number	Rate per 100 encounters (*n* = 171,939)	95% LCL	95% UCL	Rate per 100 problems (n = 235,916)	95% LCL	95% UCL
Reasons for encounter	56,503	181.3	179.4	183.2	. .	. .	. .	245,290	142.7	141.7	143.6	. .	. .	. .
Problems managed	65,843	211.3	209.1	213.5	. .	. .	. .	235,916	137.2	136.3	138.2	. .	. .	. .
New problems	11,427	36.7	35.5	37.9	17.4	16.8	17.9	88,456	51.5	50.5	52.4	37.5	36.8	38.2
Work-related	352	1.1	0.3	2.0	0.5	0.2	0.9	7,019	4.1	3.8	4.3	3.0	2.8	3.2
Medications	53,227	170.8	166.9	174.7	80.8	79.2	82.5	167,779	97.6	96.4	98.8	71.1	70.3	71.9
Prescribed	49,550	159.0	155.0	163.0	75.3	73.5	77.0	138,802	80.7	79.5	81.9	58.8	58.0	59.7
Advised over-the-counter	1,284	4.1	3.5	4.8	2.0	1.7	2.2	16,595	9.7	9.2	10.1	7.0	6.7	7.4
GP supplied	2,393	7.7	5.2	10.2	3.6	2.5	4.7	12,382	7.2	6.6	7.8	5.3	4.8	5.7
Other treatments	15,396	49.4	47.5	51.3	23.4	22.5	24.2	79,220	46.1	43.0	49.1	64.7	61.6	67.8
Clinical	12,369	39.7	38.1	41.3	18.8	18.0	19.6	57,092	33.2	32.2	34.2	24.2	23.5	24.9
Procedural	3,027	9.7	9.3	10.1	4.6	4.3	4.9	22,128	12.9	12.5	13.3	9.4	9.1	9.7
Referrals	4,365	14.0	13.4	14.7	6.6	6.3	6.9	19,894	11.6	11.3	11.9	8.4	8.2	8.6
Emergency department	27	0.1	0.0	2.8	0.0	0.0	1.3	123	0.1	0.0	0.3	0.1	0.0	0.2
Hospital	328	1.1	0.0	2.1	0.5	0.0	1.0	1,264	0.7	0.6	0.9	0.5	0.4	0.7
Specialist	2,881	9.3	8.7	9.8	4.4	4.1	4.6	13,025	7.6	7.4	7.8	5.5	5.4	5.7
Allied health services	1,129	3.6	3.1	4.2	1.7	1.5	1.9	5,482	3.2	3.0	3.3	2.3	2.2	2.4
Pathology	12,045	38.7	36.9	40.4	18.3	17.5	19.1	43,518	25.3	24.5	26.1	18.5	17.9	19.0
Imaging	1,954	6.3	5.7	6.9	3.0	2.7	3.2	13,606	7.9	7.6	8.2	5.8	5.6	6.0

Note: Shading indicates statistically significant differences between patients at cardiovascular and non-cardiovascular encounters, UCL–upper confidence limit, LCL–lower confidence limit.

Patient sex and age group

Patients at cardiovascular encounters were more likely to be male (42.8%) than those at non-cardiovascular encounters (40.8%). Also, a greater proportion of encounters with male patients (16.0%) involved the management of at least one cardiovascular problem than those with female patients (14.9%) (calculated from Table 5.3).

Patients at cardiovascular encounters were also significantly older than patients at non-cardiovascular encounters, almost 60% of them aged 65 years and over. In contrast, almost 60% of patients at non-cardiovascular encounters were aged less than 45 years. Figure 5.2 provides a graphic representation of the age distribution of the patients at cardiovascular encounters. Females predominated in all age groups. However, when the relative rate of cardiovascular encounters was considered in terms of the total number of encounters for each age–sex group it was apparent that the relative frequency of cardiovascular encounters was higher for males than it was for females in all except the youngest age group (Figures 5.3) where there was little difference between the sexes.

Table 5.3: Characteristics of patients at cardiovascular and non-cardiovascular encounters

	Cardiovascular encounters (*n* = 31,161)				Non-cardiovascular encounters (*n* = 171,939)			
Patient variable	Number	Rate per 100 encounters[(a)]	95% LCL	95% UCL	Number	Rate per 100 encounters[(a)]	95% LCL	95% UCL
Sex Male	13,152	42.8	42.0	43.5	69,131	40.8	40.2	41.3
Female	17,615	57.3	56.5	58.0	100,493	59.2	58.7	59.8
Missing	(394)	. .	. .	. .	(2,315)	. .	. .	. .
Age < 25 years	474	1.5	0.9	2.2	48,302	28.3	27.8	28.9
25–44 years	2,703	8.7	8.2	9.2	49,941	29.3	28.8	29.8
45–64 years	10,031	32.5	31.7	33.2	39,438	23.1	22.8	23.5
65–74 years	8,392	27.2	26.6	27.7	16,415	9.6	9.3	9.9
75+ years	9,307	30.1	29.2	31.0	16,345	9.6	9.2	10.0
Missing	(254)	. .	. .	. .	(1,498)	. .	. .	. .
New to practice	1,162	3.8	2.9	4.6	16,543	9.7	9.2	10.2
Healthcare card holder	17,197	55.2	54.1	56.2	63,276	36.8	35.9	37.7
Veterans' Affairs card holder	2,271	7.3	6.7	7.9	4,498	2.6	2.4	2.8
Non-English-speaking background	3,542	11.5	9.2	13.9	17,025	10.0	8.8	11.3
Aboriginal and/or Torres Strait Islander	232	0.7	*	3.9	1,835	1.1	0.4	1.7

(a) Missing data removed.

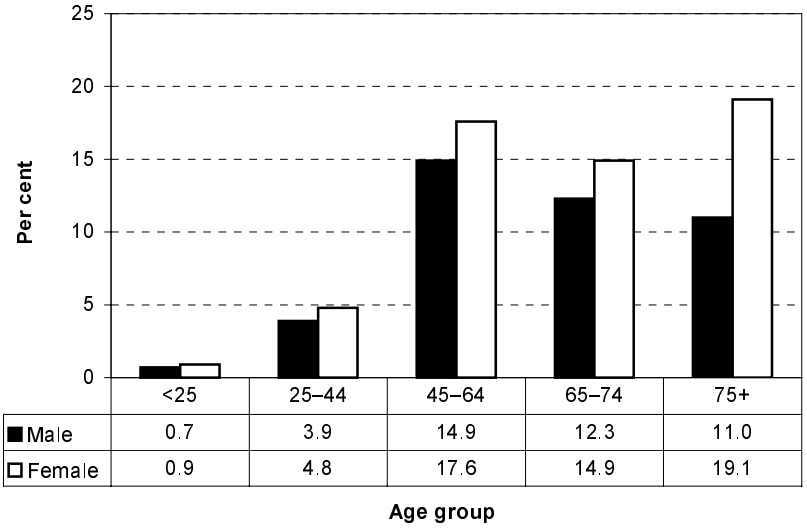
* Less than 0.05 per 100 encounters.

Note: Shading indicates statistically significant differences between patients at cardiovascular and non-cardiovascular encounters. UCL–upper confidence limit, LCL–lower confidence limit.

Other patient characteristics

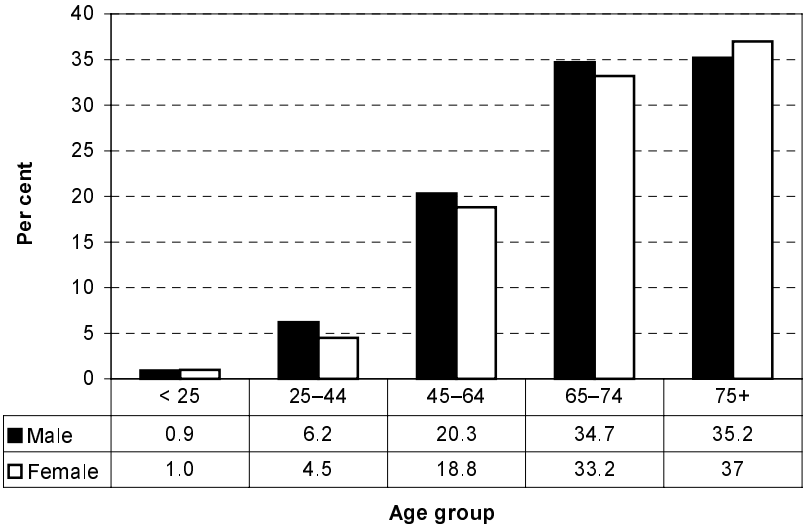
The patients at cardiovascular encounters were far less likely to be new patients to the practice (3.8%) than those at non-cardiovascular encounters (9.7%), reflecting the chronic

nature of cardiovascular disease. They were significantly more likely to hold a healthcare card or a Veterans' Affairs card. In total 62.5% of cardiovascular encounters were with patients who held a card of some sort whereas only 39.4% of the patients at non-cardiovascular encounters held a card. There were no significant differences between patients attending cardiovascular encounters and those attending non-cardiovascular encounters in terms of ethnicity (as measured by non-English-speaking background status) or their Aboriginality or Torres Strait Islander status (Table 5.3).



	<25	25–44	45–64	65–74	75+
Male	0.7	3.9	14.9	12.3	11.0
Female	0.9	4.8	17.6	14.9	19.1

Figure 5.2: Age–sex distribution of patients at cardiovascular encounters



	< 25	25–44	45–64	65–74	75+
Male	0.9	6.2	20.3	34.7	35.2
Female	1.0	4.5	18.8	33.2	37

Figure 5.3: Age-sex-specific rates of cardiovascular encounters

6 Cardiovascular problems managed

A problem managed is a formal statement of the provider's understanding of a health problem presented by the patient, family or community. It can be described in terms of a disease, symptom or complaint, social problem or ill-defined condition managed at the encounter. As GPs were instructed to record each problem to the most specific level possible from the information available, the problem managed may at times be limited to the level of presenting symptoms.

At each patient encounter, up to four problems could be recorded by the GP, a minimum of one problem being compulsory. The status of each problem to the patient—new (first presentation to a medical practitioner) or old (follow-up of previous problem)—was also indicated. The range of problems managed at the encounter often crosses multiple systems and may include undiagnosed symptoms, psychosocial problems or chronic disease. The order in which the problems were recorded by the GP is not significant and each problem is considered of equivalent importance.

Problems were classified according to the International Classification of Primary Care (Version 2) (ICPC-2) (see Chapter 2, Methods).

In this chapter the focus is on encounters where at least one problem from the ICPC-2 circulatory chapter was managed. These encounters are referred to as 'cardiovascular encounters'. Results are reported as percentages of total cardiovascular problems, percentages of total problems at cardiovascular encounters and problem rates per 100 cardiovascular encounters.

Where groups of problems are reported (e.g. other vascular disease) it must be remembered that more than one type of problem (e.g. palpitations and oedema) could have been managed at a single encounter. In considering these results the reader must be mindful that although a rate per 100 encounters for a single ungrouped problem (e.g. heart failure, 6.0 per 100 cardiovascular encounters) can be regarded as equivalent to 'heart failure is managed at 6.0%', such a statement cannot be made for grouped concepts.

6.1 Relative rate of cardiovascular problems and encounters

At least one cardiovascular problem was recorded by the GP at 31,161 (15.3%) of the 203,100 encounters. A total of 33,770 specific cardiovascular problems were recorded at a rate of 16.6 per 100 encounters and accounted for 11.2% of all problems managed. Extrapolated to the total number of GP–patient encounters across Australia, this suggests there were approximately 34 million cardiovascular problems managed by GPs over the 2-year period (17 million per year). At encounters where a cardiovascular problem was recorded, the average number of cardiovascular problems recorded was 1.08 or 108 per 100 cardiovascular encounters (Table 6.1).

Table 6.1: Summary of cardiovascular problems at encounter

	Number	Rate per 100 encounters (*n* = 203,100)	Per cent of total problems (*n* = 301,759)
Number of encounters with at least one cardiovascular problem	31,161	15.3	. .
Total number of cardiovascular problems	33,770	16.6	11.2
Cardiovascular problems/100 cardiovascular problem encounters	. .	108.4	. .

Table 6.2 shows the distribution of cardiovascular problems across all encounters and within cardiovascular encounters. It shows that no cardiovascular problems were recorded at 171,939 (84.7%) consultations and one cardiovascular problem was recorded at 28,707 encounters (14.1%). Two or more cardiovascular problems were recorded at only 1.2% of total encounters.

At the 31,161 encounters at which at least one cardiovascular problem was managed, only one such problem was managed at 92.1%, two at 7.4% of these encounters and three or four at less than 1%.

Table 6.2: Distribution of cardiovascular problems across encounters

Number of cardiovascular problems at encounter	Number of encounters	Per cent of total encounters (*n* = 203,100)	95% LCL	95% UCL	Per cent of cardiovascular encounters (*n* = 203,100)	95% LCL	95% UCL
None	171,939	84.7	84.3	85.1	. .	. .	. .
One	28,707	14.1	13.8	14.5	92.1	91.7	92.5
Two	2,306	1.1	1.0	1.3	7.4	6.9	7.9
Three	141	0.1	*	0.3	0.5	0.0	1.2
Four	7	*	*	0.7	*	0.0	2.7

* Less than 0.05.

Note: LCL—lower confidence limit, UCL—upper confidence limit.

6.3 Nature of cardiovascular morbidity

Most frequently managed cardiovascular problems

The 20 most commonly recorded individual cardiovascular problems are listed in descending order of frequency in Table 6.3. They are reported in terms of their overall frequency in the total data set as a rate per 100 encounters, and the proportion of total GP workload made up by these problems, as a percentage of total problems. This provides a view of cardiovascular problems relative to the total sample.

Hypertension, ischaemic heart disease and cardiac check-up were the three most frequently managed cardiovascular problems, combining to account for 7.7% of total problems managed. The 20 most frequently managed cardiovascular problems accounted for 11.2% of the total problems managed.

Table 6.3: Most frequently managed cardiovascular problems

Individual cardiovascular problems managed	Number	Rate per 100 encounters (*n* = 203,100)	95% LCL	95% UCL	Per cent of total problems (*n* = 301,759)	95% LCL	95% UCL
Hypertension*	17,226	8.5	8.2	8.8	5.7	5.5	5.9
Ischaemic heart disease*	3,099	1.5	1.4	1.7	1.0	0.9	1.1
Cardiac check-up*	2,814	1.4	1.2	1.6	0.9	0.8	1.1
Heart failure	1,859	0.9	0.8	1.0	0.6	0.5	0.7
Atrial fibrillation/flutter	1,232	0.6	0.5	0.7	0.4	0.3	0.5
Haemorrhoids	616	0.3	0.2	0.4	0.2	0.1	0.3
Cardiovascular disease, other	610	0.3	0.2	0.4	0.2	0.1	0.3
Phlebitis and thrombophlebitis	534	0.3	0.1	0.4	0.2	0.1	0.3
Atherosclerosis/peripheral vascular disease	519	0.3	0.1	0.4	0.2	0.1	0.3
Elevated blood pressure	509	0.3	0 0	0.6	0.2	0 0	0.4
Heart disease, other	491	0.2	0.1	0.4	0.2	0.1	0.2
Stroke/cerebrovascular accident	367	0.2	0.0	0.4	0.1	0.0	0.2
Postural hypotension (low blood pressure)	335	0.2	0.0	0.3	0.1	0.0	0.2
Transient cerebral ischaemia	329	0.2	0.0	0.3	0.1	0.0	0.2
Swollen ankles/oedema	298	0.1	0.0	0.3	0.1	0.0	0.2
Other preventive procedure—cardiovascular	276	0.1	0 0	0.3	0.1	0 0	0.2
Cardiac arrhythmia NOS	276	0.1	0 0	0.3	0.1	0 0	0.2
Palpitations/awareness of heart	270	0.1	0.0	0.3	0.1	0.0	0.2
Cardiovascular symptom/complaint, other	215	0.1	0 0	0.3	0.1	0 0	0.2
Heart valve disease NOS	206	0.1	0 0	0.3	0.1	0 0	0.2
Subtotal	*32,081*	*94.9*	. .	. .	. .	. .	. .
Total cardiovascular problems managed	**33,770**	**16.6**	**16.2**	**17.1**	**11.2**	**10.9**	**11.5**

* Includes multiple ICPC-2 or ICPC-2 PLUS codes (see Appendix 6).

Note: LCL—lower confidence limit, UCL—upper confidence limit, NOS—not otherwise specified.

Problems managed in cardiovascular groups

Examination of problems managed in cardiovascular groups provides a way of viewing the types of cardiovascular problems, grouped by aetiology, function and site, dealt with at cardiovascular consultations. In Table 6.4, each problem group is expressed as a percentage of all cardiovascular problems managed, a percentage of all problems managed at cardiovascular encounters and as a rate per 100 cardiovascular encounters with 95% confidence intervals.

Overall, half of the cardiovascular problems managed in general practice were labelled as hypertension of various types (55.3 per 100 cardiovascular encounters). Ischaemic heart disease/acute myocardial infarction was relatively common (10.4) as was cardiovascular check-up (9.0), other vascular disease (6.3), heart failure (5.5) and arrhythmia (4.9). Problems less frequently presented related to cerebrovascular disease and other circulatory disease. Ill defined conditions grouped as other heart diseases, circulatory symptoms/complaints other, and other ill-defined circulatory problems made up 8.1% of cardiovascular problems (Table 6.4).

Table 6.4: Distribution of cardiovascular problems using cardiovascular groups

Cardiovascular group	Number[(a)]	Per cent of all cardiovascular problems (*n* = 33,770)	Per cent of all problems at cardiovascular encounters (*n* = 65,843)	Rate per 100 cardiovascular encounters (*n* = 31,161)	95% LCL	95% UCL
Hypertension*	17,226	51.0	26.2	55.3	54.3	56.3
Ischaemic heart disease/acute myocardial infarction*	3,253	9.6	4.9	10.4	9.9	11.0
Cardiovascular check-up*	2,814	8.3	4.3	9.0	7.8	10.3
Other vascular disease*	1,954	5.8	3.0	6.3	5.9	6.7
Heart failure	1,859	5.5	2.8	6.0	5.4	6.6
Arrhythmias*	1,658	4.9	2.5	5.3	4.9	5.8
Other ill defined circulatory problems*	969	2.9	1.5	3.1	2.5	3.7
Circulatory symptoms/complaints other*	942	2.8	1.4	3.0	2.5	3.5
Other heart diseases*	797	2.4	1.2	2.6	2.1	3.1
Cerebrovascular disease*	752	2.2	1.1	2.4	1.8	3.0
Other circulatory disease*	702	2.1	1.1	2.3	1.5	3.0
Elevated blood pressure	509	1.5	0.8	1.6	0.0	3.4
Postural hypotension	335	1.0	0.5	1.1	0.3	1.9
Total	**33,770**	**100.0**	**51.3**	**108.4**	**107.9**	**108.8**

(a) This column will not add to 33,770 cardiovascular problems because cardiovascular problems within same cardiovascular group may present at one cardiovascular encounter.

* Includes multiple ICPC-2 or ICPC-2 PLUS codes (see Appendix 6).

Most common new cardiovascular problems

The 19 most common new cardiovascular problems managed (which include problems managed at a rate of 0.2 per 100 cardiovascular encounters or greater) are listed in Table 6.5. The overall rate of new cardiovascular problems was 10.4 per 100 cardiovascular problems managed and 11.2 per 100 cardiovascular encounters. Overall this means that new cardiovascular problems were managed at a rate of only 1.7 per 100 total encounters. Extrapolated to an estimated 100 million GP–patient encounters in any one year, this would suggest there are approximately 200,000 new cases of cardiovascular problems seen in general practice each year.

The order of the most common new problems was different from that of the most common problems overall, although hypertension was the most common in both.

New presentations of hypertension constituted almost a quarter of all new cardiovascular problems managed. However, new hypertension presentations were only managed at a rate of 4.9 per 100 total hypertension problems, the lowest relative rate among the top 19 cardiovascular new problems. On the other hand, acute myocardial infarction, while the least common on the list, had a relatively high rate of new presentations, accounting for almost a third of its total problem management. Chronic problems such as atrial fibrillation/flutter, ischaemic heart disease and heart failure had low relative rates of new problems, and other problems such as phlebitis, postural hypotension, oedema and transient cerebral ischaemia presented as new problems relatively frequently.

Table 6.5: Most frequently managed new cardiovascular problems

New cardiovascular problems managed	Number	Per cent of total new cardiovascular problems (*n* = 3,502)	Rate per 100 cardiovascular encounters (*n* = 31,161)	95% LCL	95% UCL	Per cent of cardio-vascular problems
Hypertension*	845	24.1	2.7	2.1	3.3	4.9
Haemorrhoids	312	8.9	1.0	0.3	1.7	50.6
Ischaemic heart disease*	245	7.0	0.8	0.1	1.5	7.9
Cardiovascular disease, other	198	5.7	0.6	0.0	1.5	32.5
Cardiac check-up*	192	5.5	0.6	0.0	1.7	6.8
Phlebitis and thrombophlebitis	171	4.9	0.5	0.0	1.4	32.0
Heart failure	163	4.7	0.5	0.0	1.8	8.8
Postural hypotension (low BP)	143	4.1	0.5	0.0	1.5	42.7
Swollen ankles/oedema	124	3.5	0.4	0.0	1.4	41.6
Transient cerebral ischaemia	110	3.1	0.4	0.0	1.4	33.4
Palpitations/awareness of heart	107	3.1	0.3	0.0	1.4	39.6
Atherosclerosis/peripheral vascular disease	105	3.0	0.3	0.0	1.6	20.2
Cardiac arrhythmia NOS	90	2.6	0.3	0.0	1.6	32.6
Atrial fibrillation/flutter	82	2.3	0.3	0.0	1.5	6.7
Elevated blood pressure	71	2.0	0.2	0.0	1.9	13.9
Stroke/cerebrovascular accident	59	1.7	0.2	0.0	1.6	16.1
Cardiovascular symptom/complaint, other	56	1.6	0.2	0.0	1.7	26.0
Varicose veins of leg	51	1.5	0.2	0.0	1.7	28.7
Acute myocardial infarction	50	1.4	0.2	0.0	1.8	32.5
Subtotal	*3,174*	*90.6*	*10.2*	. .	. .	. .
Total new cardiovascular problems managed	**3,502**	**100.0**	**11.2**	**10.7**	**11.8**	**10.4**

* Includes multiple ICPC-2 or ICPC-2 PLUS codes (see Appendix 6).

Note: LCL—lower confidence limit, UCL—upper confidence limit, NOS—not otherwise specified.

6.4 Overview of management of cardiovascular problems

The structure of the BEACH survey form allowed GPs to record several aspects of patient management for each problem at the encounter. Linked to each problem managed, pharmaceutical management was recorded in detail. Counselling, procedures, other treatments, referrals and hospital admissions were recorded briefly in the GP's own words. Provision was made on the form for pathology and imaging orders to be related to multiple problems.

Table 6.6 shows the number of cardiovascular problems where at least one type of management was recorded by the GP. At least one treatment was provided for 71.9% of the 33,770 cardiovascular problems managed. Medication was the most common, at 61.9%, with non-pharmacological treatments provided less often at 16.5%. At least one referral was given for 5.8% of cardiovascular problems, and investigations, mostly pathology, were ordered for 12.0% of those problems. A more detailed investigation of

management of specific cardiovascular problems in general practice can be found in an earlier publication[6].

Table 6.6: Overview of management of cardiovascular problems

Type of treatment	Number of cardiovascular problems	Per cent of cardiovascular problems (n = 33,770)[(a)]	95% LCL	95% UCL
At least one treatment type	24,272	71.9	70.9	72.8
At least one medication	20,910	61.9	60.8	63.0
At least one prescription	19,912	59.0	57.8	60.1
At least one OTC advised	319	0.9	0.3	1.6
At least one GP supplied	857	2.5	0.7	4.3
At least one non-pharmacological treatment	5,558	16.5	15.7	17.3
At least one clinical treatment	4,841	14.3	13.5	15.1
At least one therapeutic procedure	814	2.4	1.9	3.0
At least one referral	1,949	5.8	5.4	6.2
At least one referral to a specialist	1,245	3.7	3.2	4.1
At least one referral to allied health	537	1.6	1.0	2.2
At least one referral to hospital	229	0.7	0.0	1.6
At least one referral to emergency dept	20	0.1	0.0	2.9
At least one investigation	4,049	12.0	11.5	12.5
At least one pathology order	3,532	10.5	10.0	11.0
At least one imaging/other test order	758	2.2	1.7	2.8

(a) Figures will not total 100.0% as multiple events may occur in one encounter or in the management of one problem.

Note: LCL—lower confidence limit, UCL—upper confidence limit, OTC—over-the-counter.

7 Changes since 1991

This chapter compares data on cardiovascular problems managed in general practice from BEACH 1998–00 with those from the Australian Morbidity and Treatment Survey 1990–91 (AMTS), an earlier national survey of general practice[235]. The purpose is to ascertain whether changes have occurred in the management of cardiovascular problems by GPs from 1990–91 to 1998–00.

The AMTS, a 1-year paper-based survey of doctor–patient encounters, was the culmination of a number of studies undertaken by a group of researchers from the University of Sydney exploring and testing the methodology of research into general practice. These same methods have formed the basis of BEACH 1998–00.

In the AMTS, a random, stratified (by State) sample of 495 GPs recorded all consultations that took place in the surgery or in the patient's home for two periods of 1 week, 6 months apart. The total data set contained 113,467 encounters, which were analysed in terms of type of consultation, patient reasons for encounter, problems managed and their treatments, tests, referrals and follow-up. A total of 167,002 problems were managed and 112,377 medications were prescribed or provided.

In contrast to BEACH, the AMTS included only direct encounters (i.e. those at which the patient was seen in the surgery or at home). To ensure comparability, only the direct encounters were extracted from the BEACH data set and these 183,494 consultations formed the basis of the comparisons of cardiovascular problems and their management.

Both the 1990–91 AMTS and BEACH 1998–00 relied on GPs actively recording details about consecutive consultations on paper encounter forms. The morbidity and treatment section of the BEACH survey remained essentially comparable with the 1990–91 AMTS as did the systems used to classify the problems, management and medications data.

The core of the GP profile questionnaire, which gathered demographic data on the GP participants, has remained the same since the AMTS, thus enabling comparison of the characteristics of participants in the two studies.

7.1 Changes in characteristics of participating GPs and the patients

The GP profile questionnaire was completed by 95.5% of the AMTS GPs and 100% of BEACH participants. Results in Table 7.1 show statistically significant differences in all characteristics that were measured in both the studies.

The rise in the proportion of female GPs, from 19.6% in 1990–91 to 30.1% in 1998–00, reflects the trend in the total GP population of Australia where 19.6% were female in 1991 and 29.2% in 1999 (data provided by Department of Health and Aged Care).

GPs in BEACH were significantly older than those who participated in the AMTS. GPs under the age of 35 years made up a greater proportion of those taking part in the AMTS (14.2%) than in BEACH (7.4%). The AMTS figure corresponds to that of the total population of GPs at the time in which 12.9% were under 35 years. The underrepresentation of young GPs in the BEACH sample has been discussed in detail elsewhere[13]. It is likely to be related to one of the incentives offered to GPs to take part in

BEACH. In 1998–00, doctors were offered quality assurance (QA) points, which were not required by Registrars or young GPs who had recently completed training. This offer of QA rewards is likely to have resulted in fewer young GPs agreeing to participate in BEACH. In the 1990–91 study, no such incentive was offered.

The proportion of GPs in solo practice also changed between the two studies, decreasing from 25.8% in 1990–91 to 17.6% in 1998–00, as did the percentage of GPs who graduated in Australia (from 80.0% to 74.8%). Only 1.5% of GPs conducted more than 50% of consultations in a language other than English in 1991 compared with 10.7% in 1998–00.

Table 7.1: Comparison of the characteristics of participating GPs—AMTS and BEACH

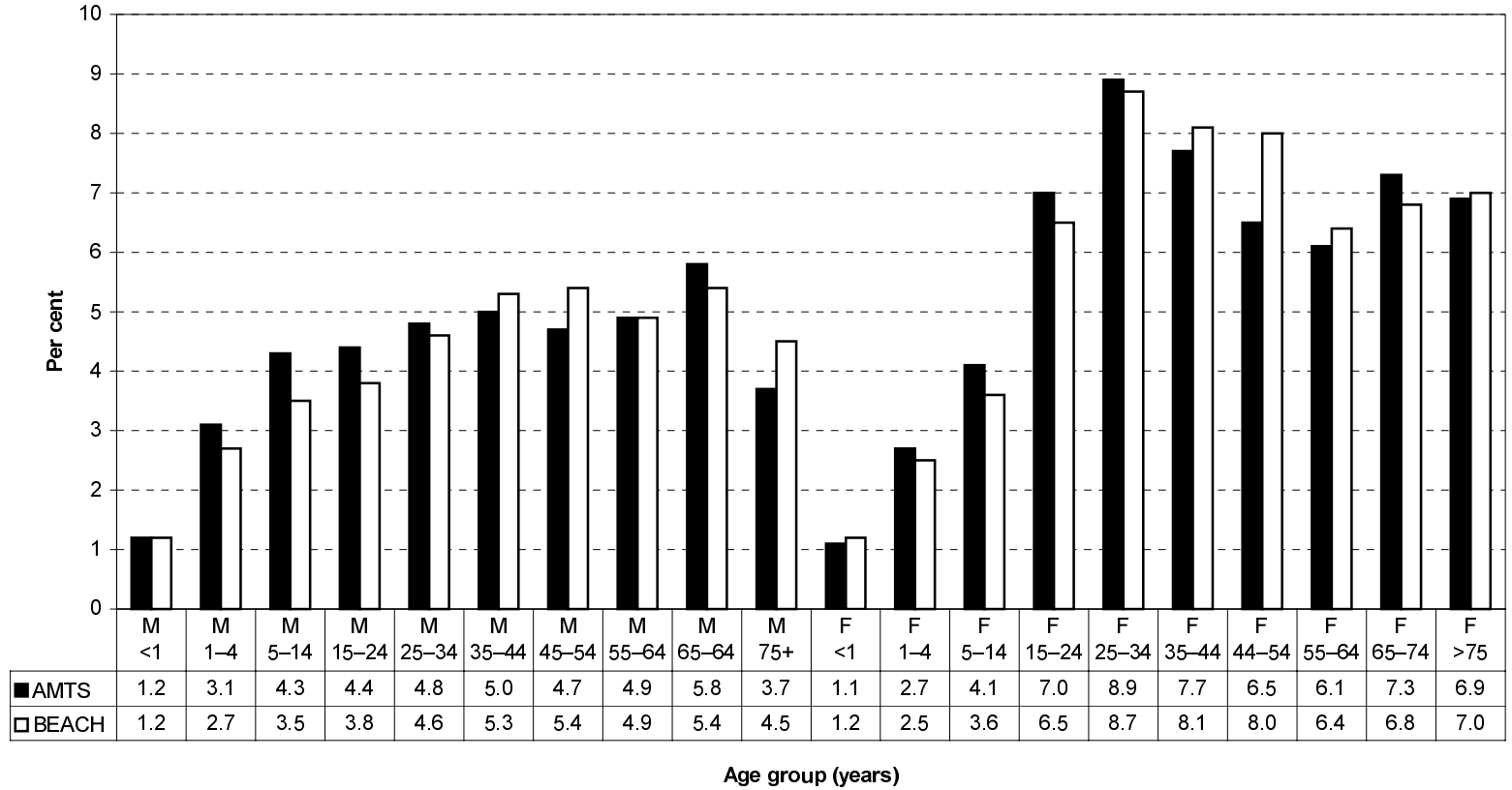
	AMTS 1990–91		BEACH 1998–00[a]	
GP characteristic	Number[b]	Per cent of GPs[b] (*n* = 495)	Number[b]	Per cent of GPs[b] (*n* = 2,030)
Sex (χ^2 = 21.9, p < 0.001)				
Male	398	80.4	1,418	69.9
Female	97	19.6	612	30.1
Age (χ^2 = 30.7, p < 0.001)				
< 35 years	67	14.2	149	7.4
35–54 years	321	67.9	1,347	66.6
55+ years	85	18.0	526	26.0
Years in general practice (χ^2 = 11.8, p = 0.003)				
< 5 years	54	11.4	157	7.8
6–10 years	96	20.3	332	16.5
> 10 years	323	68.3	1,521	75.7
Size of practice (χ^2 = 16.8, p < 0.001)				
Solo	122	25.8	354	17.6
> 1 GP	350	74.2	1,657	82.4
Graduated in Australia (χ^2 = 11.0, p = 0.004)				
Australia	373	80.0	1,516	74.8
UK	45	9.7	177	8.7
Other	48	10.3	333	16.4
> 50% consultations non-English (χ^2 = 40.0, p < 0.001)	7	1.5	216	10.7

(a) BEACH data reduced to direct surgery and home encounters only.

(b) Missing data removed.

The patients

There was no significant difference in the sex distribution of patients at encounters in the two studies. However, a significantly higher percentage of both male and female patients were aged between 5 and 24 years in the AMTS compared with BEACH while a significantly smaller proportion of patients were in the 45–54 age group (4.7% of males and 6.5% of females in the AMTS compared with 5.4% of males and 8.0% of females in BEACH). The patient age and sex distribution is presented graphically in Figure 7.1.



	M <1	M 1–4	M 5–14	M 15–24	M 25–34	M 35–44	M 45–54	M 55–64	M 65–64	M 75+	F <1	F 1–4	F 5–14	F 15–24	F 25–34	F 35–44	F 44–54	F 55–64	F 65–74	F >75
■AMTS	1.2	3.1	4.3	4.4	4.8	5.0	4.7	4.9	5.8	3.7	1.1	2.7	4.1	7.0	8.9	7.7	6.5	6.1	7.3	6.9
□BEACH	1.2	2.7	3.5	3.8	4.6	5.3	5.4	4.9	5.4	4.5	1.2	2.5	3.6	6.5	8.7	8.1	8.0	6.4	6.8	7.0

Figure 7.1: Age and sex distribution of AMTS and BEACH patients

7.2 Comparison of cardiovascular encounter rates

There was no statistically significant difference between the rates of cardiovascular problems managed per 100 encounters in the two studies but cardiovascular problems formed a significantly higher percentage of all problems managed in the AMTS than in BEACH (Table 7.2).

In the AMTS there were 18,344 encounters (16.2%) at which at least one cardiovascular problem was managed, with a total number of 20,241 cardiovascular problems managed during the study. There was a total cardiovascular rate of 17.8 problems per 100 encounters. Cardiovascular problems accounted for 12.1% of all problems managed in the AMTS.

The number of cardiovascular encounters in the 2-year BEACH sample was 28,139 and a total of 30,494 cardiovascular problems were managed. Cardiovascular problems as a percentage of total problems was significantly higher in the AMTS (12.1% CI: 11.6–12.7) than in the later study (11.1% CI: 10.8–11.4).

Table 7.2: Summary comparison of cardiovascular problems—AMTS and BEACH

	AMTS 1990–91			BEACH[(a)] 1998–00		
	Number	Rate per 100 encounters (*n* = 113,467)	Per cent of problems (*n* = 167,002)	Number	Rate per 100 encounters (*n* = 183,494)	Per cent of problems (*n* = 275,040)
At least one cardiovascular problem	18,344	16.2	. .	28,139	15.3	. .
Total cardiovascular problems	20,241	17.8	12.1	30,494	16.6	11.1
Cardiovascular problems/100 cardiovascular encounters	20,241	110.3	. .	30,494	108.4	. .

(a) BEACH sample reduced to direct surgery and home encounters only.

Characteristics of the patients at cardiovascular encounters

There were no significant differences in the sex-specific rates of patients at encounters involving a cardiovascular problem between the AMTS and BEACH. Male cardiovascular encounters occurred at a rate of 16.4 per 100 total encounters in the AMTS and 16.0 per 100 in BEACH. For females the rate was 16.0 per 100 in the AMTS and a slightly lower 14.9 in BEACH (results not presented).

Age-specific rates, however, did show significant differences between the two studies. The rate of cardiovascular encounters for patients in all age groups between 25 years and 74 years of age was significantly higher in the AMTS compared with BEACH (Figure 7.2).

In terms of age–sex-specific rates, there were significantly higher rates of cardiovascular encounters with male patients in all age groups from 25 to 64 years in the AMTS than in BEACH. Encounters with females 55–64 years old occurred at a rate of 28.2 in the AMTS and 25.4 per 100 encounters in BEACH, and the rate of female patient encounters in the 65–74 age group was significantly higher in 1990–91 than in 1998–00 (37.4 compared with 34.2.) (results not presented).

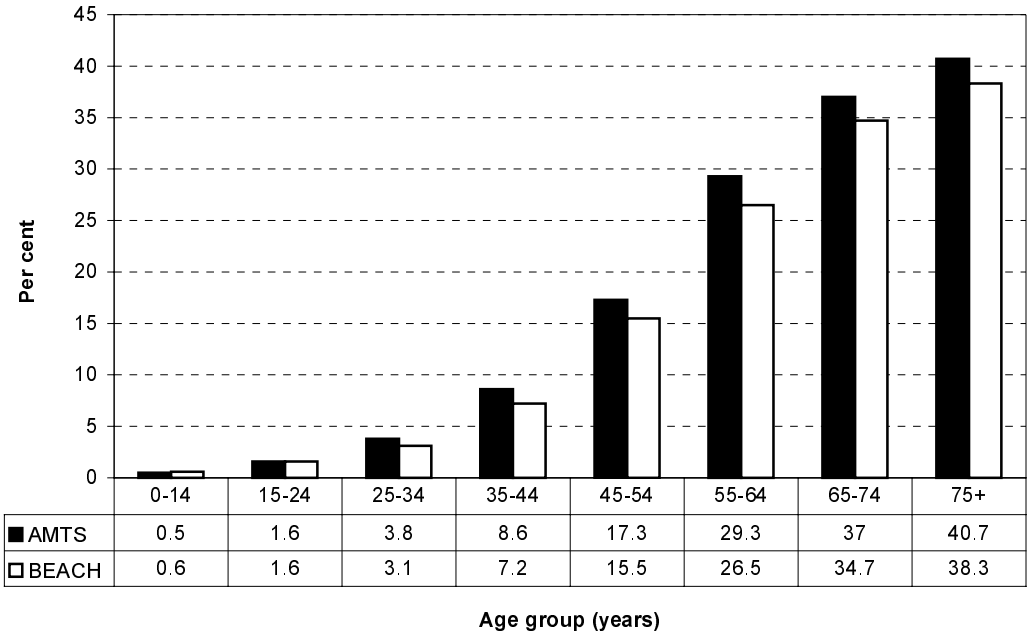


Figure 7.2: Age-specific rates of cardiovascular encounters in the AMTS and BEACH

7.3 Most common cardiovascular problems managed

The 20 most frequently managed cardiovascular problems are compared in Table 7.3. The problems are listed in order of decreasing frequency as they appeared in the AMTS data.

Hypertension remained the most commonly managed cardiovascular problem, with no significant difference in its relative rate per 100 encounters or percentage of total problems. The relative management rate of ischaemic heart disease decreased significantly from 2.0 per 100 encounters in the AMTS to 1.5 in BEACH, with an associated significant decrease in percentage of total problems (1.4% compared with 1.0%). Heart failure also showed a significant decrease between the two studies, with a management rate of 1.6 per 100 encounters (1.1% of total problems) in the earlier study, compared with 0.8 per 100 encounters (0.5% of total problems) in 1998–00.

Cardiac check-up was recorded at a significantly lower rate in the AMTS than in BEACH, rising from 0.8 per 100 encounters (0.5% of problems) to 1.4 (1.0%). The rate of atrial fibrillation/flutter also rose significantly from 0.3 to 0.6 per 100 encounters.

Table 7.3: Comparison of the most common cardiovascular problems managed—AMTS and BEACH

Individual cardiovascular problems managed	AMTS 1990–91							BEACH[(a)] 1998–00						
	Number	Rate per 100 encounters (*n* = 113,467)	95% LCL	95% UCL	Per cent of total problems (*n* = 167,002)	95% LCL	95% UCL	Number	Rate per 100 encounters (*n* = 183,494)	95% LCL	95% UCL	Per cent of total problems (*n* = 275,040)	95% LCL	95% UCL
Hypertension*	10,412	9.2	8.7	9.7	6.2	5.9	6.5	15,983	8.7	8.4	9.0	5.8	5.6	6.0
Ischaemic heart disease* **	2,303	2.0	1.8	2.2	1.4	1.3	1.5	2,751	1.5	1.4	1.6	1.0	0.9	1.1
Heart failure	1,790	1.6	1.4	1.8	1.1	1.0	1.2	1,490	0.8	0.7	0.9	0.5	0.5	0.6
Cardiac check-up*	897	0.8	0.6	0.9	0.5	0.4	0.6	2,648	1.4	1.2	1.7	1.0	0.8	1.1
Atherosclerosis/peripheral vascular disease	473	0.4	0.3	0.5	0.3	0.2	0.3	456	0.2	0.1	0.4	0.2	0.1	0.3
Haemorrhoids	454	0.4	0.3	0.5	0.3	0.2	0.3	570	0.3	0.2	0.4	0.2	0.1	0.3
Atrial fibrillation/flutter	381	0.3	0.2	0.4	0.2	0.2	0.3	1,062	0.6	0.5	0.7	0.4	0.3	0.5
Heart disease, other	370	0.3	0.2	0.4	0.2	0.2	0.3	394	0.2	0.1	0.4	0.1	0.1	0.2
Stroke/cerebrovascular accident	367	0.3	0.2	0.4	0.2	0.2	0.3	237	0.1	. .	0.3	0.1	0.0	0.2
Transient cerebral ischaemia	307	0.3	0.2	0.4	0.2	0.1	0.2	275	0.1	0.0	0.3	0.1	0.0	0.2
Subtotal (n, %)	*17,744*	*87.7*	. .	. .	. .	. .	. .	*25,866*	*84.8*	. .	. .	. .	. .	. .
Total cardiovascular problem managed	**20,241**	**17.8**	**16.9**	**18.7**	**12.1**	**11.6**	**12.7**	**30,494**	**16.6**	**16.2**	**17.1**	**11.1**	**10.8**	**11.4**

(a) BEACH sample reduced to direct encounters only.

* Includes multiple ICPC-2 or ICPC-2 PLUS codes (see Appendix 6).

Note: Shading indicates statistically significant difference between AMTS and BEACH. LCL—lower confidence limit, UCL—upper confidence limit.

7.4 Comparison of management of cardiovascular problems

In the AMTS and BEACH, GPs recorded several aspects of patient management. In both studies, pharmaceutical management was linked to a patient problem, as were other treatments such as counselling and procedures. In BEACH, referrals and hospital admissions were similarly related to a single problem, and orders for pathology and imaging could be related to multiple problems. In the AMTS, however, the recording form did not allow for the linking of referrals and tests ordered to the problem managed. This comparative analysis uses the reduced BEACH sample and therefore the BEACH figures differ from those examined at the end of Chapter 6.

The management elements common to both studies are compared in Table 7.4. For 65.7% (95% CI: 63.9–67.5) of cardiovascular problems in the AMTS at least one treatment was recorded. The corresponding figure in BEACH was 71.8% (95% CI: 70.8–72.8), significantly higher than in the AMTS.

The most common management activity in both studies was the prescribing of medication, but the prescription rate did not differ between the two studies. Problems for which at least one non-pharmacological treatment was given were significantly more frequent in BEACH. In particular, clinical treatments such as counselling and advice were significantly more likely in the later study. Therapeutic procedures did not show a significant rise but this may be due to the small sample size involved.

Table 7.4: Comparison of management of cardiovascular problems—AMTS and BEACH

	AMTS 1990–91				BEACH 1998–00[a]			
Type of treatment	Number of cardiovascular problems	Per cent of cardiovascular problems (*n* = 20,241)	95% LCL	95% UCL	Number of cardiovascular problems	Per cent of cardiovascular problems (*n* = 30,494)	95% LCL	95% UCL
At least one treatment type	13,302	65.7	63.9	67.5	21,898	71.8	70.8	72.8
At least one prescription	11,475	56.7	54.8	58.6	17,919	58.8	57.6	59.9
At least one non-pharmacological treatment	2,292	11.3	10.4	12.2	5,069	16.6	15.8	17.5
At least one clinical treatment	1,978	9.8	8.9	10.7	4,442	14.6	13.7	15.4
At least one therapeutic procedure	380	1.9	1.5	2.3	713	2.3	1.8	2.9

(a) BEACH sample reduced to direct surgery and home encounters only.

Note: LCL—lower confidence limit, UCL—upper confidence limit. Shading indicates statistically significant difference.

7.5 Comparison of medications prescribed for cardiovascular problems

In the AMTS, only medications prescribed or provided from the GP's own supply were recorded. This comparison, therefore, does not include the advised over-the-counter medications recorded by BEACH participants.

Medications were classified using a hierarchical coding system developed and used over the past 15 years by the General Practice Statistics and Classification Unit. It is known as CAPS (Coding Atlas for Pharmaceutical Substances) and allows analysis at levels from major drug group through generic substance down to individual branded products (see Chapter 2, Methods). For the purposes of this comparison, medications were analysed by subgroup and generic type.

There were 16,604 prescriptions given for cardiovascular problems in the AMTS, at a rate of 82.0 per 100 cardiovascular problems. In BEACH, 27,382 prescriptions for cardiovascular problems were written at the significantly higher rate of 89.8 per 100 cardiovascular problems managed.

A comparison of the most common medications prescribed for cardiovascular problems by subgroup and individual generic is shown in Table 7.5 listed in the AMTS order of frequency within subgroup. In BEACH 1998–00, antihypertensives were prescribed at a rate almost double that of the AMTS, at 43.3 per 100 cardiovascular problems compared with 23.5. Within the antihypertensive group, a marked shift in prescribing was apparent. There was a significant increase in the rate of other 'antihypertensives' from 15.3 per 100 cardiovascular problems in the AMTS to 23.2 in BEACH. However, with the exception of the rate of indapamide which rose significantly, most of the 'other antihypertensives' that appear in both studies were prescribed at a significantly lower rate in 1998–00 compared with 1990–91. It is clear that medications that were new to the market during the 1990s accounted for a large proportion of the overall increase in 'other antihypertensives' and to the decrease in use of those that were available in 1990–91. The same pattern is evident with ACE inhibitors. Of the two medications available in both studies, the rate of enalapril maleate has not changed and captopril has significantly decreased in BEACH. The sharp increase in ACE inhibitors is entirely due to the prescribing of medications that were not available in 1990–91.

There were significantly more diuretics prescribed in 1990–91, with a rate of 15.4 per 100 cardiovascular problems managed compared with 8.6 in the later study. There was also a significant decrease in prescribing of beta-blockers from 13.6 per 100 problems in the AMTS to 9.9 per 100 in BEACH. Provision of anti-angina medications decreased from 11.0 to 7.7 per 100 cardiovascular problem, and cardiac glycosides fell from a rate of 4.6 to 2.8 per 100.

There was a significant rise in prescribing of prophylactic aspirin for cardiovascular problems from 2.2 per 100 in the AMTS to 3.7 in BEACH and a similar significant rise in warfarin prescribing. A significant decrease in the prescribing of non-cardiovascular medications such as minerals and tonics between the two studies was notable.

There was a rise in hypolipidaemics that were linked to cardiovascular problems although significance could not be measured due to low numbers in the AMTS. Most medications from the hypolipidaemic group were prescribed for lipid disorder, a condition classified as metabolic, not cardiovascular. This study reports only on cardiovascular problems, so drugs associated with metabolic disorders are not included. However, because of the association between lipid disorder and cardiovascular problems, it is of interest to note the rise in use of hypolipidaemics.

There were four generic lipid-lowering medications prescribed at a rate of 0.5 per 100 total problems in 1990–91 and they accounted for only 0.5% of all medication. By 1998–00 there were 10 different lipid-lowering agents which together were being prescribed at a rate of 1.4 per 100 problems. Their proportion of total medications had risen to 1.9% (results not shown in tabular form).

Table 7.5: Comparison of the distribution of medications prescribed for cardiovascular problems—AMTS and BEACH

		AMTS 1990–91					BEACH[(a)] 1998–00				
Subgroup	Generic medication	Number	Per cent of total medications for cardiovascular problems	Rate per 100 cardiovascular problems	95% LCL	95% UCL	Number	Per cent of total medications for cardiovascular problems	Rate per 100 cardiovascular problems	95% LCL	95% UCL
Antihypertensives all		**4,747**	**28.6**	**23.5**	**22.2**	**24.7**	**13,219**	**48.3**	**43.3**	**42.2**	**44.5**
Antihypertensives other		**3,100**	**18.7**	**15.3**	**14.4**	**16.3**	**7,081**	**25.9**	**23.2**	**22.4**	**24.0**
	Verapamil hydrochloride	926	5.6	4.6	4.1	5.1	877	3.2	2.9	2.4	3.4
	Prazosin hydrochloride	674	4.1	3.3	2.9	3.8	388	1.4	1.3	0.7	1.9
	Felodipine	544	3.3	2.7	2.1	3.2	1009	3.7	3.3	2.8	3.8
	Methyldopa	465	2.8	2.3	1.8	2.8	183	0.7	0.6	0.0	1.4
	Indapamide	351	2.1	1.7	1.1	2.3	1101	4.0	3.6	3.1	4.1
	Amlodipine	. .	. .	. .	. .	. .	1429	5.2	4.7	4.1	5.2
	Irbesartan	. .	. .	. .	. .	. .	1194	4.4	3.9	3.3	4.6
	Diltiazem antihypertensive	. .	. .	. .	. .	. .	557	2.0	1.8	1.3	2.4
ACE inhibitors		**1,647**	**9.9**	**8.1**	**7.5**	**8.8**	**6,138**	**22.4**	**20.1**	**19.5**	**20.8**
	Enalapril maleate	833	5.0	4.1	3.7	4.6	1280	4.7	4.2	3.7	4.7
	Captopril	814	4.9	4.0	3.4	4.6	564	2.1	1.8	1.2	2.5
	Perindopril	. .	. .	. .	. .	. .	1196	4.4	3.9	3.4	4.5
	Lisinopril	. .	. .	. .	. .	. .	850	3.1	2.8	2.2	3.4
	Quinapril	. .	. .	. .	. .	. .	637	2.3	2.1	1.4	2.8
	Ramipril	. .	. .	. .	. .	. .	636	2.3	2.1	1.5	2.7
	Trandolapril	. .	. .	. .	. .	. .	524	1.9	1.7	1.0	2.5
	Fosinopril	. .	. .	. .	. .	. .	442	1.6	1.4	0.7	2.2

(a) BEACH sample reduced to direct encounters only

Note: LCL—lower confidence limit, UCL—upper confidence limit, ACE—acetylcholine esterase inhibitor. Shading indicates statistically significant difference.

(continued)

Table 7.5 (continued): Comparison of the distribution of medications prescribed for cardiovascular problems—AMTS and BEACH

		AMTS 1990–91					BEACH[(a)] 1998–00				
Subgroup	Generic medication	Number	Per cent of total medications for cardiovascular problems	Rate per 100 cardiovascular problems	95% LCL	95% UCL	Number	Per cent of total medications for cardiovascular problems	Rate per 100 cardiovascular problems	95% LCL	95% UCL
Diuretics		**3,119**	**18.8**	**15.4**	**14.3**	**16.5**	**2,609**	**9.5**	**8.6**	**8.0**	**9.1**
	Frusemide (Furosemide)	1,232	7.4	6.1	5.5	6.7	1397	5.1	4.6	4.1	5.1
	Thiazide + Amiloride	547	3.3	2.7	2.2	3.2	337	1.2	1.1	0.4	1.8
	Chlorothiazide	312	1.9	1.5	1.0	2.1	313	1.1	1.0	0.2	1.8
	Trianterene/Hydrochlorothiazide	287	1.7	1.4	0.7	2.1	165	0.6	0.5	0.0	1.4
	Amiloride	178	1.1	0.9	0.1	1.6	61	0.2	0.2	0.0	1.4
	Bendroflumethiazide	137	0.8	0.7	0.0	1.8	102	0.4	0.3	0.0	1.6
	Methyclothiazide	82	0.5	0.4	0.0	1.4	8	0.0	0.0	0.0	3.4
	Chlorthalidone	81	0.5	0.4	0.0	0.9	39	0.1	0.1	0.0	1.7
	Cyclopenthiazide	75	0.5	0.4	0.0	1.3	1	0.0	0.0	. .	. .
Beta-blockers		**2,757**	**16.6**	**13.6**	**12.8**	**14.5**	**3,005**	**11.0**	**9.9**	**9.3**	**10.4**
	Atenolol	1,157	7.0	5.7	5.2	6.3	1,733	6.3	5.7	5.2	6.2
	Metoprolol	880	5.3	4.3	3.8	4.9	853	3.1	2.8	2.2	3.4
	Propranolol hydrochloride	372	2.2	1.8	1.3	2.3	231	0.8	0.8	0.0	1.5
	Pindolol	218	1.3	1.1	0.6	1.5	86	0.3	0.3	0.0	1.3
Antiangina agents		**2,234**	**13.5**	**11.0**	**10.2**	**11.9**	**2,359**	**8.6**	**7.7**	**7.2**	**8.3**
	GTN (glyceryl trinitrate)	783	4.7	3.9	3.4	4.3	731	2.7	2.4	1.9	2.9
	Nifedipine	706	4.3	3.5	3.0	4.0	676	2.5	2.2	1.6	2.8
	Isosorbide nitrate	494	3.0	2.4	2.0	2.9	698	2.5	2.3	1.8	2.8
	Diltiazem anti-angina	229	1.4	1.1	0.7	1.6	167	0.6	0.5	0.0	1.3

(a) BEACH sample reduced to direct encounters only

Note: LCL—lower confidence limit, UCL—upper confidence limit, ACE—acetylcholine esterase inhibitor. Shading indicates statistically significant difference.

(continued)

Table 7.5 (continued): Comparison of the distribution of medications prescribed for cardiovascular problems—AMTS and BEACH

		AMTS 1990–91					BEACH[(a)] 1998–00				
Subgroup	Generic medication	Number	Per cent of total medications for cardiovascular problems	Rate per 100 cardiovascular problems	95% LCL	95% UCL	Number	Per cent of total medications for cardiovascular problems	Rate per 100 cardiovascular problems	95% LCL	95% UCL
Non-cardiovascular drugs		**1,897**	**11.4**	**9.4**	**8.7**	**10.0**	**2,180**	**8.0**	**7.2**	**6.6**	**7.7**
Cardiac glycosides		**923**	**5.6**	**4.6**	**4.1**	**5.0**	**861**	**3.1**	**2.8**	**2.3**	**3.4**
	Digoxin	921	5.5	4.6	4.1	5.0	860	3.1	2.8	2.3	3.3
Miscellaneous cardiovascular medications NOS		45	0.3	0.2	0.0	1.0	64	0.2	0.2	0.0	2.5
	Aspirin	453	2.7	2.2	1.8	2.7	1,120	4.1	3.7	3.0	4.3
	Warfarin sodium	232	1.4	1.1	0.8	1.5	1,030	3.8	3.4	2.9	3.9
Antiarryhmic		**138**	**0.8**	**0.7**	**0.3**	**1.1**	**388**	**1.4**	**1.3**	**0.6**	**1.9**
Hypolipidaemics		**12**	**0.1**	**0.1**	**0.0**	**1.7**	**526**	**1.9**	**1.7**	**1.0**	**2.4**
	Simvastatin	9	0.1	0.0	0.0	1.8	266	1.0	0.9	0.0	1.8
	Atorvastatin	. .	. .	. .	. .	. .	132	0.5	0.4	0.0	1.4
Total medications for cardiovascular problems		**16,604**	**100.0**	**82.0**	**78.4**	**85.7**	**27,382**	**100.0**	**89.8**	**87.5**	**92.1**

(a) BEACH sample reduced to direct encounters only

Note: LCL—lower confidence limit, UCL—upper confidence limi, ACE—acetylcholine esterase inhibitor. Shading indicates statistically significant difference.

7.6 Conclusion

The AMTS provided a monitoring method that was used as a basis for the ongoing BEACH study. Detailed information from BEACH on the doctor–patient encounter can be measured in terms of various research questions, a major one being the assessment of changes that have taken place over time.

This chapter has summarised the changes that have taken place in cardiovascular problems and their management in general practice between 1990–91 and 1998–00. It was interesting to find that the rate of cardiovascular encounters for patients in all age groups between 25 and 74 years of age was significantly lower in BEACH than in the AMTS. The significant decrease in ischaemic heart disease and heart failure and the rise in cardiac check-up were also noteworthy.

An increase in the rates of recorded management occurred during the 1990s. GPs in the later study were much more likely to conduct cardiovascular check-up and use clinical treatments such as counselling and advice than they were 10 years earlier, but the medication prescribing rate remained steady. The decline in relative management rates of cardiovascular problems in general practice is likely to be a consequence of these new management patterns combined with the comprehensive changes in medication prescribing patterns, which incorporated the newly available medications of the 1990s. It is probable that the considerable rise in preventive medicine, in particular antihypertensives, anticoagulants and medications for the associated problem of lipid disorder, has been a factor in the fall in management rates of serious heart diseases. The significant decrease in prescribing rates of anti-angina medications and cardiac glycosides also points to this conclusion. The rise in warfarin prescribing indicates the increased importance of post-operative cardiac care in general practice.

8 Prevalence of cardiovascular problems among patients at encounters in general practice

This report has to date concentrated on the encounters at which a cardiovascular problem was managed by the GP and the patients attending those encounters. Although encounter data provides a picture of the workload associated with the selected problems and a view of the management of these problems, such data cannot be used to estimate prevalence of disease in the patients encountered. The prevalence of cardiovascular disease among patients encountered by the GPs was investigated in a subsample study through the Supplementary Analysis of Nominated Data (SAND) (See Chapter 2, Methods).

Between September 1998 and October 1999, three SAND blocks were used to investigate morbidity not managed at the encounter. GPs and/or patients were asked to report any chronic illnesses or other health problems that require continuing management or surveillance that had not already been listed as being managed at the encounter. If there were more than four, GPs were instructed to select the four most important. Each of 310 GPs were asked to complete these details for a subset of the patients encountered during the recording period. Over the three SAND blocks the 310 participating GPs provided this information for 12,247 patients.

All the problems listed by the GPs in the SAND (morbidity not managed at encounter) section were added to those problems recorded in the main section of the form (as having been managed at the encounter). This provided a picture of total morbidity for each patient. Thus a minium of one problem could have been recorded as managed at the encounter (with none not managed) and a maximum of eight conditions could be recorded per patient—four problems managed and four conditions not managed on that occasion.

8.1 Is the subsample representative?

Characteristics of GPs, patients and encounters

There were no statistically significant differences between this SAND subsample and the total 2 year sample (described earlier in this report) in terms of:

- GP characteristics (including age, sex, rurality, size of practice, years in general practice, country of graduation)
- patient characteristics (including age, sex, healthcare card status, Indigenous status, status to the practice)
- encounter characteristics (direct and indirect, consultation type etc.) (results not presented).

Number of problems managed

It was hypothesised that asking the GP to record a list of all morbidity not managed at the encounter may serve as a reminder to them of other patient morbidity and in turn stimulate an increase in the number of problems that were managed at the encounter. To test this hypothesis, the number of problems managed during the encounters involving the co-morbidity SAND questions were compared with the number managed in the total sample for the 2 years of BEACH data. As shown in Table 8.1, there was no significant difference in the distribution of number of problems managed at the subsample of encounters and the total sample, 64% including the management of only one problem, about 25% including two problems and about 10% involving more than two problems. The hypothesis was rejected.

Table 8.1: Comparison of the number of problems managed at the subsample of encounters and at all encounters

Number of problems managed	SAND subsample (*n* = 12,247)				BEACH 1998–00 (*n* = 203,100)			
	Number of encounters	Per cent of total encounters	95% LCL	95% UCL	Number of encounters	Per cent of total encounters	95% LCI	95% UCI
One	7,840	64.0	62.2	65.8	130,809	64.4	63.7	65.1
Two	3,153	25.7	24.5	27.0	50,697	25.0	24.6	25.4
Three	999	8.2	7.4	8.9	16,820	8.3	8.0	8.6
Four	255	2.1	1.3	2.9	4,774	2.4	2.1	2.6

Note: LCL—lower confidence limit, UCL—upper confidence limit.

8.2 Current morbidity among patients encountered in general practice

When the problems listed in the main section of the form (encounter data) were added to the problems listed in the SAND co-morbidity section for each patient, 40.8% of patients were found to have only one problem. A further 26.6% had two problems and 16.7% had three. Only 2.6% of patients had six or more problems recorded (Table 8.2).

Table 8.2: Number of problems recorded per patient

Number of problems recorded	Number of patients	Per cent of total patients (*n* = 12,247)	95% LCL	95% UCL
One	5,000	40.8	38.7	43.0
Two	3,260	26.6	25.6	27.7
Three	2,050	16.7	15.8	17.7
Four	1,049	8.6	7.8	9.4
Five	566	4.6	3.8	5.5
Six or more	322	2.6	1.5	3.8

Note: LCL—lower confidence limit, UCL—upper confidence limit.

Distribution of morbidity across ICPC chapter and proportion managed at encounter

Overall, there were 26,750 problems listed as current morbidities (either managed at the encounter or not) for the SAND subsample of 12,247 patients, an average of 2.18 problems per patient. Over two-thirds (67.9%) of these 26,750 problems had been managed at the encounter. Problems classified in the circulatory chapter of ICPC-2 were the most frequently recorded, accounting for 15.0% of all recorded morbidity, recorded at a rate of 32.7 per 100 patients. Just over half of these problems had been managed at the encounter (Table 8.3).

This was a relatively low proportion when compared with many of the other morbidity groups. For example, respiratory problems were second on the list of most commonly recorded problems, accounting for 13.3% of total morbidity, being recorded at a rate of 29.0 per 100 patients. However, a far greater majority of problems associated with the respiratory system had been managed at the encounter (78.7%).

Table 8.3: Distribution of problems by ICPC chapter and proportion managed at the encounter

Problem label	Number of recorded problems	Per cent of total problems (*n* = 26,750)	Rate per 100 patients (*n* = 12,247)	95% LCL	95% UCL	Per cent managed at encounter
Circulatory	4,007	15.0	32.7	30.4	35.0	51.6
Respiratory	3,546	13.3	29.0	27.6	30.3	78.7
Musculoskeletal	3,033	11.3	24.8	23.2	26.3	67.7
Psychological	2,425	9.1	19.8	17.9	21.7	55.5
Skin	2,354	8.8	19.2	18.2	20.2	88.0
Endocrine & metabolic	2,262	8.5	18.5	17.1	19.8	44.4
General & unspecified	1,919	7.2	15.7	14.6	16.7	88.3
Digestive	1,917	7.2	15.7	14.5	16.8	62.8
Female genital system	1,258	4.7	10.3	9.0	11.6	78.3
Neurological	760	2.8	6.2	5.6	6.8	60.5
Ear	684	2.6	5.6	5.1	6.1	86.0
Pregnancy & family planning	683	2.6	5.6	4.7	6.5	91.8
Eye	519	1.9	4.2	3.7	4.8	70.3
Urology	512	1.9	4.2	3.7	4.7	68.6
Blood	359	1.3	2.9	2.4	3.4	69.1
Male genital system	267	1.0	2.2	1.6	2.8	62.5
Social	245	0.9	2.0	0.0	4.0	57.1
Total	**26,750**	**100.0**	**218.4**	**211.6**	**225.3**	**67.9**

Note: LCL—lower confidence limit, UCL—upper confidence limit.

8.3 The prevalence of cardiovascular problems among patients encountered in general practice

For simplicity, the problems relating to the circulatory chapter of ICPC-2 will be referred to as cardiovascular problems rather than cardiovascular disease, because, some problems are not yet diagnosed and are described in terms of symptoms and complaints rather than a disease.

The prevalence of cardiovascular problems in general practice patients was estimated to be 24.5%, at least one such problem being reported for 3,000 of the 12,247 patients in the subsample (Table 8.4). Of these 3,000 patients, two-thirds (62.9%) had at least one of their cardiovascular problems managed at the encounter (results not presented).

Almost three-quarters (72.5%) of these 3,000 patients, reported the presence of only one cardiovascular problem and a further 22.2% the presence of two cardiovascular problems. However, a few patients (n = 21, less than 1% of the cardiovascular patients) had four or five cardiovascular problems recorded (Table 8.4). The prevalence of a single cardiovascular problem in general practice patients was estimated to be 17.8%; the prevalence of two cardiovascular problems was 5.4%.

Table 8.4: Number of cardiovascular problems per patient

Number cardiovascular problems in patient	Number of patients	Per cent of total patients (*n* = 12,247)	95% LCL	95% UCL	Per cent of cardiovascular patients (*n* = 3,000)	95% LCL	95% UCL
At least one cardiovascular problem	3,000	24.5	23.6	26.0	100.0	. .	. .
One	2,175	17.8	16.7	18.9	72.5	70.4	74.6
Two	666	5.4	4.7	6.2	22.2	20.2	24.2
Three	138	1.1	0.5	1.7	4.6	2.8	6.4
Four	19	0.2	0.0	0.9	0.6	0.0	3.2
Five	2	0.0	0.0	2.3	0.1	0.0	6.7

Note: Cardiovascular patients—patients for whom at least one cardiovascular problem was recorded; LCL—lower confidence limit, UCL—upper confidence limit.

Characteristics of patients with cardiovascular problems

The characteristics of the patients with at least one cardiovascular problem were compared with those of patients without a cardiovascular problem. Table 8.5 shows that there was no significant difference in the sex distribution of cardiovascular patients when compared with the other patients in the subsample who had no cardiovascular problem. However, the age distribution of the two groups differed markedly. As one might expect, patients with a cardiovascular problem were significantly older than their non-cardiovascular problem counterparts, almost 90% of cardiovascular patients being aged over 44 years. In contrast, two-thirds of non-cardiovascular patients were aged less than 45 years. The age distributions of the two groups are compared graphically in Figure 8.1.

Patients with a cardiovascular problem were far less likely to be new patients to the practice (3.5%) than patients without a cardiovascular problem (11.0%). They were significantly more likely to hold a healthcare card (57.5% compared with 35.1% of

patients without a cardiovascular problem) and more likely to hold a Veterans' Affairs card (8.3% compared with 1.6%). These differences are not surprising in light of the age distribution of these patients when compared with non-cardiovascular problem patients. There was no significant difference between patients with or without a cardiovascular problem in the proportion who were from a non-English-speaking background, or who identified as Indigenous persons (Table 8.5).

Table 8.5: Characteristics of patients with a cardiovascular problem and those without a cardiovascular problem

	Cardiovascular patients (*n* = 3,000)				Non-cardiovascular patients (*n* = 9,247)				Total sub-sample (*n* = 12,247)
Patient variable	Number	Per cent of patients[(a)]	95% LCL	95% UCL	Number	Per cent of patients[(a)]	95% LCL	95% UCL	Prevalence of cardiovascular problems in group
Sex Male	1,248	42.3	39.9	44.6	3,658	40.1	38.3	42.0	25.4
Female	1,706	57.8	55.4	60.1	5,455	59.9	58.0	61.7	23.8
Missing	(46)	. .	. .	. .	(134)	. .	. .	. .	. .
Age < 25 years	60	2.0	0.0	4.7	3,092	33.8	32.1	35.4	1.9
25–44 years	269	9.1	7.1	11.0	3,015	32.9	31.4	34.5	8.2
45–64 years	918	31.0	28.7	33.2	1,917	20.9	19.7	22.2	32.4
65–74 years	777	26.2	24.4	28.0	588	6.4	5.6	7.3	56.9
75+ years	942	31.8	28.9	34.6	540	5.9	4.9	6.9	63.6
Missing	(4)	. .	. .	. .	(95)	. .	. .	. .	
New to practice	103	3.5	0.9	6.1	1,007	11.0	9.7	12.3	9.3
Healthcare card holder	1,726	57.5	54.6	60.4	3,249	35.1	32.7	37.6	34.7
Veterans' Affairs card holder	249	8.3	6.6	10.0	148	1.6	0.8	2.4	62.7
Non-English-speaking background	268	9.0	3.9	14.1	849	9.3	5.1	13.4	24.0
Aboriginal/Torres Strait Islander	35	1.2	0.0	7.7	93	1.0	0.0	3.3	27.1

(a) Missing data removed.

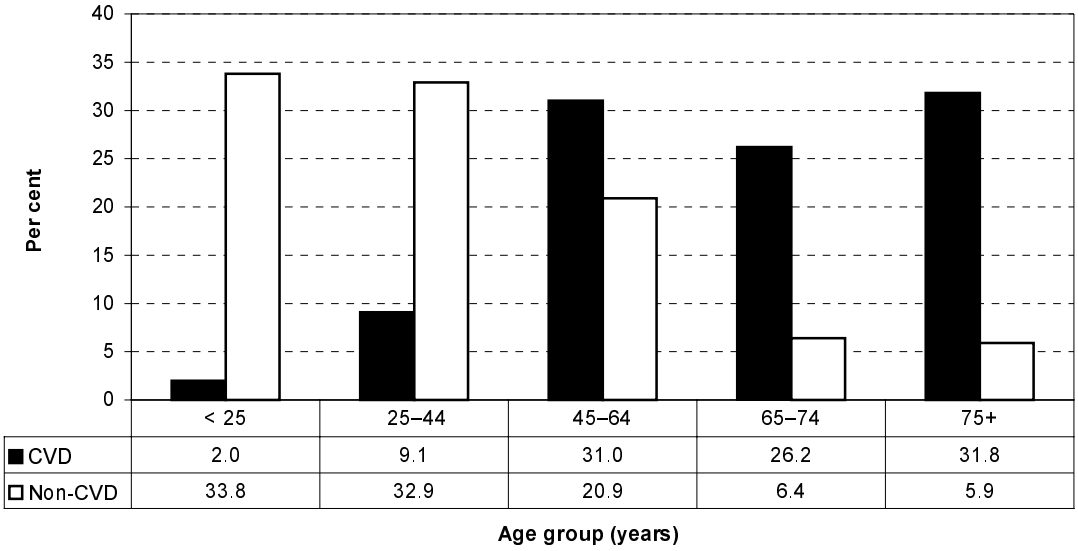
Note: Cardiovascular patients—patients for whom at least one cardiovascular problem was recorded; non-cardiovascular patients—patients for whom no cardiovascular problems were recorded. LCL—lower confidence limit, UCL—upper confidence limit. Shading indicates statistically significant difference.

In the far right-hand column of Table 8.5, prevalence estimates of cardiovascular problems are provided for each patient group. The prevalence of at least one cardiovascular problem was similar for male and female patients. However, there was a direct relationship between prevalence and age. Only 1.9% of young people aged less than 25 years had a cardiovascular problem and this increased steadily to 63.6% of patients aged 75 years or more. This relationship is graphically presented in Figure 8.2.

Prevalence was far higher for certain groups of patients including those who hold a healthcare card (34.7% having at least one cardiovascular problem) and those holding a Veterans' Affairs card (62.7%), and these rates are likely to be reflecting the age distribution of patients with a cardiovascular problem.

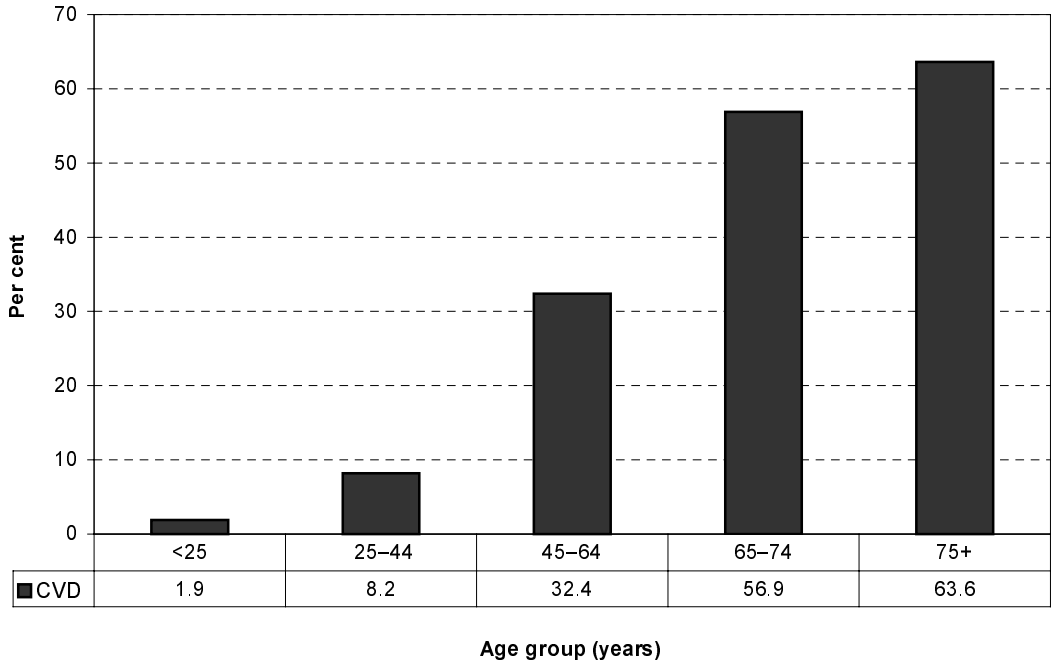
The overall prevalence of at least one cardiovascular problem was earlier shown to be 24.5% (Table 8.4). However, this prevalence was directly age-related, less than 2% of

patients aged less than 25 years having a cardiovascular problem and almost two-thirds (63.6%) of those aged 75 years or more having at least one cardiovascular problem (Figure 8.2).



	< 25	25–44	45–64	65–74	75+
CVD	2.0	9.1	31.0	26.2	31.8
Non-CVD	33.8	32.9	20.9	6.4	5.9

Figure 8.1: Age distribution of patients with at least one cardiovascular problem and of those without a cardiovascular problem



	<25	25–44	45–64	65–74	75+
CVD	1.9	8.2	32.4	56.9	63.6

Figure 8.2: Age-specific prevalence of at least one cardiovascular problem

Most prevalent cardiovascular problems in patient encounters in general practice

Hypertension was the most common cardiovascular problem recorded, at a rate of 16.5 per 100 patients. This was followed by ischaemic heart disease (4.1 per 100). The third most commonly reported problem was heart failure (1.9 per 100 patients) followed by cardiovascular check-up (1.5) and atrial fibrillation/flutter (1.2) (Table 8.6).

At first it was thought that patients for whom cardiovascular check-up or another cardiovascular process code were recorded should perhaps be removed from the sample since it was assumed that patients having a 'check-up' had been found to be free of cardiovascular problems at that point, and that patients for whom a process (e.g. pathology test order) was undertaken in the management of a cardiovascular problem had no demonstrated disease. However, further investigation demonstrated this was not the case. One in five of the patients having a 'cardiovascular check-up' had at least one other cardiovascular problem recorded as current. Further, 25% of these 186 patients had received a prescription for medication as a result of the check-up, usually an ACE inhibitor or antihypertensive. It is possible that, for patients for whom medication is controlling hypertension, the GPs are hesitant to record hypertension as a problem under management since the patient is no longer hypertensive. As the individual disease prevalence is not affected by any other specific disease prevalence, it was decided to leave these patients in the analysis. It must also be remembered that the 80% of these 186 patients who had no other cardiovascular problems recorded may well have hypertension. If this is the case, this estimate of the prevalence of hypertension would be underestimated by about 1.2%. Further, of the 72 patients for whom a process of care was recorded rather than a problem label, some were recorded as the care of a high-risk cardiovascular patient (such as people who had a coronary artery bypass, heart valve replacement etc.). It was decided to include these patients even though we were unsure of the exact cardiovascular label applicable.

Table 8.6: The ten most common individual cardiovascular problems

Individual cardiovascular problems	Number	Rate per 100 patient population (*n* = 12,247)	95% LCL	95% UCL
Hypertension*	2,023	16.5	15.2	17.8
Ischaemic heart disease*	497	4.1	3.3	4.8
Heart failure	237	1.9	1.1	2.8
Cardiac check-up*	186	1.5	0.3	2.7
Atrial fibrillation/flutter	148	1.2	0.5	1.9
Atherosclerosis/peripheral vascular disease	118	1.0	0.1	1.8
Cardiovascular disease, other	93	0.8	0.2	1.3
Stroke/cerebrovascular accident	76	0.6	**	1.5
Heart disease, other	75	0.6	**	1.4
Elevated blood pressure	74	0.6	**	2.3
Sub-total	*3,527*	*88.0*	. .	. .
Total cardiovascular problems	**4,007**	**100.0**	. .	. .

* Includes multiple ICPC-2 codes (see Appendix 6). ** Less than 0.05.

Note: LCL—lower confidence limit, UCL—upper confidence limit.

The most common individual cardiovascular problems recorded for these patients are presented in Table 8.6 with their rate of occurrence per 100 patients and the 95% confidence limits. These ten cardiovascular problems accounted for 88.0% of all cardiovascular problems recorded for the sample of 12,247 patients.

8.4 A grouped analysis of prevalence of cardiovascular problems in patients encountered in general practice

In this section we investigate the prevalence of cardiovascular problems, their inter-relationship in the group of patients with at least one cardiovascular problem, and the relationship of cardiovascular problems with diabetes and lipid disorders. In ICPC-2 diabetes and lipid disorders are classified in the endocrine/nutritional/metabolic chapter, so they have not as yet arisen in this report.

In order to simplify these analyses, the circulatory chapter of ICPC-2 was divided into 12 groups. The ICPC-2 codes and rubrics included in each group are listed in Appendix 6. But in summary the groups are as follows:

- *Arrhythmias:* including atrial fibrillation/flutter; tachycardia and other unspecified arrhythmias
- *Cerebrovascular disease:* including transient cerebral ischaemia, stroke/ cerebrovascular accident and other cerebrovascular disease
- *Hypertension:* including both complicated and uncomplicated hypertension
- *Ischaemic heart disease/acute myocardial infarction (IHD/AMI):* including ischaemic heart disease with or without angina, and acute myocardial infarction
- *Other vascular disease:* atherosclerosis/peripheral vascular disease, pulmonary embolism, phlebitis and thrombophlebitis, varicose veins and haemorrhoids
- *Circulatory symptoms and complaints:* including heart pain, pressure and tightness, palpitations, irregular heartbeat, oedema, fear of heart disease and limited function of the cardiovascular system.
- *Other heart disease:* including arterial murmurs, pulmonary heart disease and other heart disease
- *Other cardiovascular disease:* including infections of the circulatory system, rheumatic heart disease; neoplasms, congenital anomalies and cardiovascular disease not classified elsewhere
- *Elevated blood pressure:* only those, without a diagnosis of hypertension
- *Postural hypotension.*

An individual patient has been counted only once in each of these 12 groups, even if they were reported as having more than one problem type within the group. However, an individual patient could be counted multiple times if their cardiovascular morbidity fell into two or more of these groups.

Results

Almost two-thirds of the patients with at least one cardiovascular problem had hypertension and 16.7% had IHD/AMI. Heart failure was reported for 7.9% of these patients with a cardiovascular problem, and arrhythmias for 7.4%.

The prevalence of hypertension among general practice patients was estimated to be 15.0% (95% CI: 13.8–16.1) and this was followed by IHD/AMI (4.1%), heart failure (1.9%), arrhythmias (1.8%) and 'other vascular disease' (1.7%). (Table 8.7).

In the far right-hand column of this table these prevalence estimates have been extrapolated to the total population of general practice attenders. Approximately 82% of the population visit a GP in any one year[5]. This equates to about 15.6 million people. Extrapolation of the results of the current study suggest that between 3.6 and 4.05 million people who attend general practice have at least one (recognised) cardiovascular problem, that 2.3 million general practice patients have (diagnosed) hypertension and a further 78,000 have recognised elevated blood pressure without a diagnosis of hypertension. (Note that the diagnosis of hypertension requires repeated high blood pressure readings over time.)

The estimated number of general practice patients with diagnosed ischaemic heart disease/acute myocardial infarction is 640,000 and those with heart failure 296,000. Patients with arrhythmias are likely to number 280,000 and those with vascular disease 265,000. Estimates for the less commonly recorded cardiovascular problems are provided in Table 8.7, but due to small sample sizes the wide confidence intervals provide very broadband estimates.

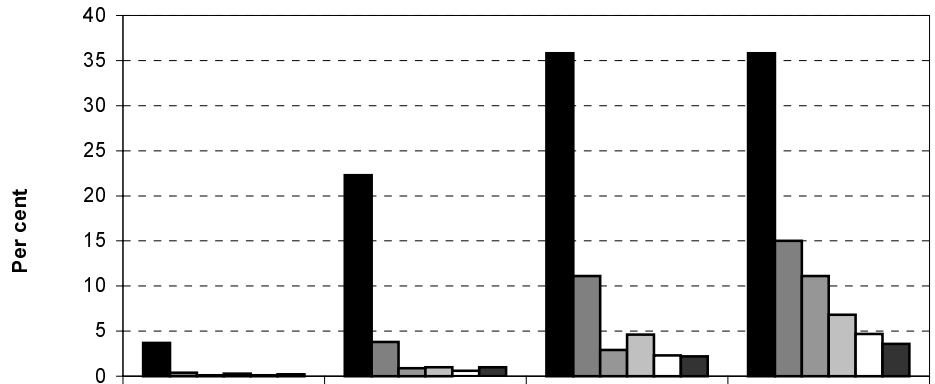
Table 8.7: Prevalence of cardiovascular problems in the general practice patient population

Cardiovascular group	Number of patients with at least one cardiovascular problem	Estimated prevalence (and 95% CI) in patients with a cardiovascular problem (*n* = 3,000)	Estimated prevalence (and 95% CI) in the general practice patient population (*n* = 12,247)	Extrapolated estimate of number of general practice patients in Australia (95% CIs)
Hypertension*	1,834	61.1 (58.7–63.6)	15.0 (13.8–16.1)	2,340,000 (2,153,000–2,500,000)
IHD/AMI*	501	16.7 (14.5–18.9)	4.1 (3.3–4.8)	640,000 (514,000–750,000)
Heart failure*	236	7.9 (5.6–10.1)	1.9 (1.1–2.8)	296,000 (172,000–437,000)
Arrhythmias*	208	7.4 (5.6–9.2)	1.8 (1.2–2.4)	280,000 (187,000–374,000)
Other vascular disease	222	6.9 (5.3–8.6)	1.7 (1.1–2.3)	265,000 (172,000–359,000)
Other heart diseases*	132	4.4 (2.8–6.0)	1.1 (0.6–1.6)	172,000 (93,000–250,000)
Cerebrovascular disease	123	4.1 (2.0–6.2)	1.0 (0.3–1.7)	156,000 (47,000–265,000)
Other cardiovascular disease *	109	3.6 (1.9–5.4)	0.9 (0.4–1.4)	140,000 (62,000–218,000)
Elevated blood pressure	53	2.4 (0.2–4.6)	0.5 (0.0–1.3)	78,000 (** –203,000)
Postural hypotension	30	2.3 (0.2–4.4)	0.2 (0.0–1.8)	31,000 (**–280,000)
Total	**3,000**	**24.5 (23.0–26.0)**	**100.0**	**3,800,000 (3,600,000–4,056,000)**

* Includes multiple ICPC-2 or ICPC-2 PLUS codes (see Appendix 6). ** Extrapolation not valid. CI—confidence interval.

Age-specific prevalence of the more common cardiovascular problems is presented in Figure 8.3. The prevalence of hypertension in the general practice patient population was shown in Table 8.7 to be 15.0%. However, this was directly related to patient age. Only 3.7% of younger adults had diagnosed hypertension, but prevalence leapt to 22.3% in those aged 45–64 years and to more than one in three (35.8%) in both older age groups.

Similar trends were apparent for IHD/AMI, the prevalence of which ranged from 0.4% in younger adults, to 15.0% of those aged 75 years or more, there being almost a threefold increase in prevalence from the 45–64 age group to the 65–74 age group. The jump in prevalence of heart failure occurred at an older age in this population. Although prevalence remained relatively low in the 65–74 age group, it increased almost threefold in the oldest age group. Steady increases in prevalence with age were demonstrated by each of the other more common cardiovascular problem groups (Figure 8.3).



	18–44	45–64	65–74	75+
Hypertension*	3.7	22.3	35.8	35.8
IHD/AMI*	0.4	3.8	11.1	15.0
Heart failure*	0.1	0.9	2.9	11.1
Arrhythmias*	0.3	1.0	4.6	6.8
Cerebrovascular disease*	0.1	0.6	2.3	4.7
Other heart disease*	0.2	1.0	2.2	3.6

Figure 8.3: Age-specific prevalence of cardiovascular problems in patients at general practice encounters

* Includes multiple ICPC-2 (see Appendix 6).

Note: IHD/AMI—ischaemic heart disease and acute myocardial infarction.

8.5 Interrelationships of cardiovascular problems

Using the twelve cardiovascular groups previously described, Table 8.8 provides a picture of the interrelationship of these problems in the patients with at least one cardiovascular problem.

Of the 3,000 patients with at least one cardiovascular problem, 2,319 (72.2%) had only one of these disease types. Elevated blood pressure (without a diagnosis of hypertension) was the cardiovascular problem most likely to occur without other cardiovascular problems. Nine out of ten of the patients with elevated blood pressure had no other cardiovascular co-morbidity.

Over three-quarters (76.3%) of patients with diagnosed hypertension did not have another cardiovascular problem. The most common cardiovascular co-morbidity with hypertension was ischaemic heart disease/acute myocardial infarction. Almost one in 10 (9.2%) of the patients with hypertension also had ischaemic heart disease/acute myocardial infarction and 33.7% of the 501 patients with ischaemic heart disease/acute myocardial infarction had hypertension.

Of the 236 patients with heart failure, one-third (35.2%) had no other cardiovascular problem recorded, whereas 29.2% also suffered hypertension and 13.1% had arrhythmias. Half the patients with 'other vascular disease' had no other cardiovascular problem but 27.0% had diagnosed hypertension and 16.2% had ischaemic heart disease/acute myocardial infarction. The remaining interrelationships between the groups are shown in Table 8.8.

Table 8.8: Multiplicity of cardiovascular problems in the cardiovascular patient group

Cardiovascular problem group	Hypertension*	IHD/AMI*	Heart failure*	Other vascular disease*	Arrhythmias*	Other heart diseases*	Cerebrovascular disease*	Other cardiovascular disease*	Circulatory symptoms & complaints*	Elevated blood pressure	Postural hypotension	Cardiovascular process of care*	Number of patients with at least one of specified problem
Hypertension*	1,400	169	69	60	59	31	59	36	11	0	0	34	1,834
Row per cent	76.3	9.2	3.8	3.3	3.2	1.7	3.2	2.0	0.6	. .	. .	1.9	
IHD/AMI*	*169*	217	50	38	35	14	12	12	6	2	2	21	501
Row per cent	33.7	43.3	10.0	7.6	7.0	2.8	2.4	2.4	1.2	0.4	0.4	4.2	
Heart failure*	*69*	*50*	83	12	31	11	12	4	3	0	3	10	
Row per cent	29.2	21.2	35.2	5.1	13.1	4.7	5.1	1.7	1.3	. .	1.3	4.2	236
Other vascular disease*	*60*	*36*	*12*	110	10	4	4	8	4	2	3	9	
Row per cent	27.0	16.2	5.4	49.5	4.5	1.8	1.8	3.6	1.8	0.9	1.4	4.1	222
Arrhythmias*	*59*	*35*	*31*	*10*	80	17	5	3	3	1	2	13	
Row per cent	28.4	16.8	14.9	4.8	38.5	8.2	2.4	1.4	1.4	0.5	1.0	6.3	208
Other heart diseases*	*31*	*14*	*11*	*4*	*17*	63	1	3	1	0	0	*2*	
Row per cent	23.5	10.6	*8.3*	3.0	12.9	47.7	0.7	2.3	0.7	. .	. .	1.5	132
Cerebrovascular disease*	*59*	*12*	*12*	*4*	*5*	*1*	45	2	0	0	0	*0.*	
Row per cent	48.0	9.8	9.8	*3.3*	4.1	*0.8*	36.6	1.6	. .	. .	. .	. .	123
Other cardiovascular disease*	*36*	*12*	*4*	*8*	*3*	*3*	*2*	53	1	1	0	*3*	
Row per cent	33.0	11.0	3.7	*7.3*	2.8	2.8	*1.8*	48.6	0.9	0.9	. .	2.8	109
Circulatory symptoms/complaint*	*11*	*6*	*3*	*4*	*3*	*1*	*0*	*1*	43	0	1	*4*	
Row per cent	15.9	8.7	*4.3*	5.8	4.3	1.4	. .	1.4	62.3	. .	1.4	5.8	69
Elevated blood pressure	*0*	*2*	*0*	*2*	*1*	*0*	*0*	*1*	*0*	53	0	*0*	
Row per cent	. .	3.4	. .	3.4	1.7	. .	. .	1.7	. .	91.4	. .	. .	58
Postural hypotension	*0*	*2*	*3*	*3*	*2*	*0*	*0*	*0*	*1*	*0*	21	*0*	
Row per cent	. .	6.7	10.0	10.0	6.7	. .	. .	. .	*3.3*	. .	70.0	. .	30
Cardiovascular process of care*	*34*	*21*	*10*	*9*	*13*	2	2	6	4	*0*	*0*	151	
Row per cent	*13.1*	*8.1*	*3.9*	*3.5*	*5.0*	0.8	0.8	2.3	2.2	. .	. .	58.5	258

* Includes multiple ICPC-2 or ICPC-2 PLUS codes (see Appendix 6).

Note: IHD/AMI—ischaemic heart disease and acute myocardial infarction.

8.6 Prevalence of lipid disorder and diabetes in patients with cardiovascular disease

In patients with a current cardiovascular problem the prevalence of lipid disorder was estimated to be 11.5% (95% CI: 9.7–13.3). The prevalence of diabetes in these patients with a cardiovascular problem was estimated at 11.6% (95% CI: 10.2–13.1).

In terms of the total GP patient sample, the prevalence of cardiovascular problem(s) + lipid disorder was estimated as 2.8% (95% CI: 2.2–3.4) and that of cardiovascular problem(s) + diabetes at 2.9% (95% CI: 2.4–3.3). The triple combination of cardiovascular problem(s) +diabetes + lipid disorder was rare, being recorded for only 52 patients, representing only 1.7% of the cardiovascular patients and 0.4% of the total GP patient sample. The majority (n = 35) of the cardiovascular patients with both diabetes and lipid disorder had hypertension.

Table 8.10 shows the prevalence of lipid disorder and diabetes in relation to each of the more common cardiovascular problem groups. The number of patients with lipid disorder and/or diabetes was highest for hypertension. However, this is due to the overall prevalence of hypertension in the group, rather than a higher prevalence of these diseases in patients with hypertension. In fact, both these diagnoses were more prevalent in patients who had ischaemic heart disease/acute myocardial infarction than in those with hypertension.

Table 8.9: Prevalence of lipid disorders and diabetes in patients with at least one cardiovascular problems

Disease combination	Number	Per cent of cardiovascular patients (n = 3,000)	95% LCL	95% UCL	Prevalence in GP patients (n = 12,247)	95% LCL	95% UCL
At least one cardiovascular problem + lipid disorder	345	11.5	9.7	13.3	2.8	2.2	3.4
Hypertension + lipid disorder	241	8.0	6.3	9.8	2.0	1.4	2.5
At least one cardiovascular problem + diabetes	349	11.6	10.2	13.1	2.9	2.4	3.3
Hypertension + diabetes	235	7.8	6.3	9.3	1.9	1.4	2.4
At least one cardiovascular problem + diabetes + lipid disorders	52	1.7	0.0	4.9	0.4	0.0	1.4
Hypertension + diabetes + lipid disorder	35	1.2	0.0	4.2	0.3	0.0	1.1

Note: Cardiovascular patients—patients for whom at least one cardiovascular problem was recorded. LCL—lower confidence limit, UCL—upper confidence limit.

Table 8.10: Prevalence of lipid disorder and diabetes in patients with specific cardiovascular problems

Cardiovascular problem type	Lipid disorder		Diabetes		Number of patients with at least one of specified cardiovascular problem
	Number	Prevalence	Number	Prevalence	
Hypertension*	241	13.1	235	12.8	1,834
IHD/AMI*	86	17.0	82	16.4	501
Heart failure*	10	4.2	36	15.2	236
Other vascular disease*	12	5.4	25	11.3	222
Arrhythmias*	20	9.6	23	11.1	208
Other heart diseases*	10	7.6	16	12.1	132
Cerebrovascular disease*	9	7.3	12	9.8	123
Other cardiovascular disease*	7	6.4	8	7.3	109
Other circulatory problems*	8	11.1	7	9.7	72
Elevated blood pressure	9	15.5	5	8.6	58
Postural hypotension	1	3.3	4	13.3	30
Total: at least 1 cardiovascular problem	**345**	**11.5**	**349**	**11.6**	**3,000**

* Includes multiple ICPC-2 or ICPC-2 PLUS codes (see Appendix 6).

Note: IHD/AMI—ischaemic heart disease and acute myocardial infarction.

8.7 Discussion

Methodological issues

The estimates of prevalence of cardiovascular disease among general practice patients included in this chapter are the first available for general practice. However, they are likely to be overestimates. The chance of a patient being 'selected' in the subsample study is directly related to their number of GP attendances over the year. That is, a young healthy male who sees the GP only once in the year has a lesser chance of being included in the subsample than an older patient with multiple chronic diseases who may have visited 18 times in that year. It must also be remembered that these estimates are confined to the patient population of general practitioners, rather that to the population at large. Although over 80% of the Australian population visit a GP in any one year, the remaining 15–20% are likely to be well, or to not have a diagnosed cardiovascular condition.

Future substudies of this type will include a question about the number of GP attendances during the previous 12 months. These data in combination with HIC data on average age–sex-specific rates of GP attendance will allow some adjustment for this selection bias and so provide more reliable estimates at that time.

Comparison with other data sources

The AIHW estimates that in 1999–00 almost 3 million Australians over the age of 25 had high blood pressure[4]. In the current study we need to add the number with hypertension to the number with elevated blood pressure to gain a comparable figure. This provides an estimate of 2.2 million to 2.75 million, a figure not very different from the AIHW estimate.

The AIHW also estimates that in 1999–00 31% of men and 26% of women had high blood pressure and that in people aged 65–74 the prevalence was 79% for men and 67% for women. Prevalence estimates in Table 8.5 of this report suggest a prevalence of any cardiovascular problem of 25.4 for males (all ages) and 23.8% of females, considerably less that the estimate of hypertension alone by the AIHW. In the 65–74 age group, the prevalence of all cardiovascular problems was estimated as 56.9%, again considerably less than that estimated for this age group in the total population. This may reflect the fact that patients attending general practice are usually ambulatory and are only rarely in hospital when under the GP's care. If hospitalised patients were included in the AIHW estimates, then the prevalence rate would be expected to be higher than that of general practice attended. In fact, the GP data here reported agree far more with that of the Australian Bureau of Statistics, from the 1995 National Health Survey, which estimated the prevalence of hypertension (through self-report) to be 14.4%[44].

The AIHW estimates from current available data that around 40,000 people have a stroke each year, and the 1995 National Health Survey estimated that 116,500 (0.6% of the population) had at some times in their lives had a stroke[4]. The current study suggests an estimated 0.6% of the patient population have a diagnosis of stroke (Table 8.6) and this extrapolates to about 94,000 general practice patients nationally. Again this estimate would exclude the majority of hospitalised patients.

The are no national data available for the prevalence of the other cardiovascular problems here reported.

9 Health risk behaviours in patients at cardiovascular encounters

General practice is commonly identified as a significant intervention point for health care and health promotion. As about 80% of the population visit a GP in any one year[5], GPs have contact with a very large proportion of the community in an environment where consideration of aspects of the patient's health is the purpose of the contact.

In the SAND sections on the bottom of each of the BEACH forms (see Chapter 2, Methods) patients could be asked a range of different questions depending on the SAND recording block into which they fell. Some were asked questions about their alcohol intake and their self-reported height and weight. Others were asked about their current smoking status (together with a range of other questions). Of these subsamples of patients, some also had a cardiovascular problem managed during their encounter.

In the 2-year period 1998–00, 12,279 patients at cardiovascular encounters were asked and responded to the question about smoking and 11,476 responded to the questions about alcohol consumption and height and weight. This chapter investigates the extent to which patients for whom a cardiovascular problem is being managed in general practice continue to carry risk factors known to be detrimental to their cardiovascular health.

9.1 Smoking

A review of the literature pertaining to the relationship between smoking and cardiovascular disease is provided in Chapter 1, Background.

The National Drug Strategy Household Survey estimated that 22% of the population aged 14 years and over are regular smokers, comprising 25% of men and 20% of women[244].

In the total BEACH data set, the estimates of daily smokers have been quite consistent over the 3 years 1998–01 at about 19% of adult (18+ years) patients attending a GP. Male patients are more likely to smoke daily (22.6%) than females (17.1%) and the prevalence of smoking in this population decreases with age. In 2001, 27.3% of the surveyed patients reported they were past smokers[13].

The extent to which people with known cardiovascular problems continue to smoke, irrespective of extensive public education programs regarding the association of smoking and cardiovascular disease, has not been investigated elsewhere.

Method

The GPs were instructed to ask the patients (18+ years):

- What best describes your smoking status? Smoke daily; Occasional smoker; Previous smoker; Never smoked

Results

The smoking status of 12,279 adult patients aged 18 years and over at cardiovascular encounters was ascertained from encounters with 1,936 GPs. Overall, 10.3% (95% CI: 9.0–11.7) of these patients reported being daily smokers. A further 2.6% (95% CI: 1.1–4.1) reported occasional smoking and 35.1% (95% CI: 34.2–13.2) were previous smokers (results not presented).

Age and sex were specified for 12,137 of the 12,279 respondents. Over half (52.0%, 95% CI: 51.0–53.0) of these patients at cardiovascular encounters (two-thirds of the female patients and about one-third of the male) had never smoked. A greater proportion of male cardiovascular patients (13.2%) than female (8.2%) were daily smokers (Figure 9.1).

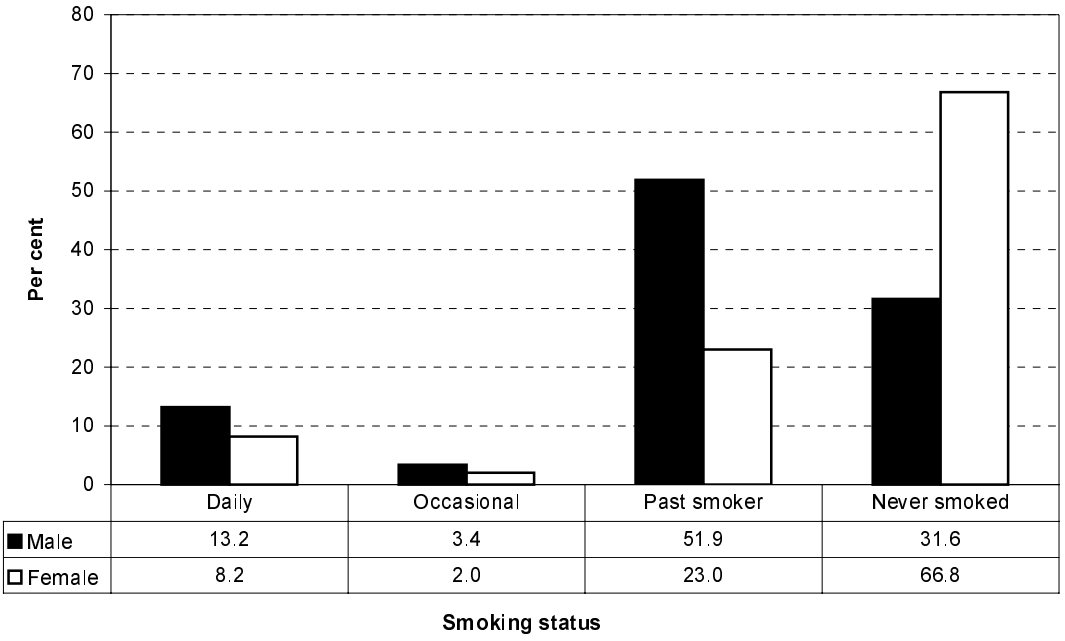


Figure 9.1 : Current smoking status of adult patients at cardiovascular encounters by patient sex (males *n* = 5,049; females *n* = 7,088)

Age–sex-specific smoking rates

Daily smoking was most common in younger adults of both sexes, one in four men (23.7%) and one in five women (19.3%) aged between 18 and 44 years reporting that they smoked daily. The proportion of patients who were smokers decreased with age. Only 6.1% of male and 3.6% of female cardiovascular patients aged 75 years and over were daily smokers (Figure 9.2). However, 61.1% of males and 23.6% of females aged 65 years or more were previous smokers (results not shown).

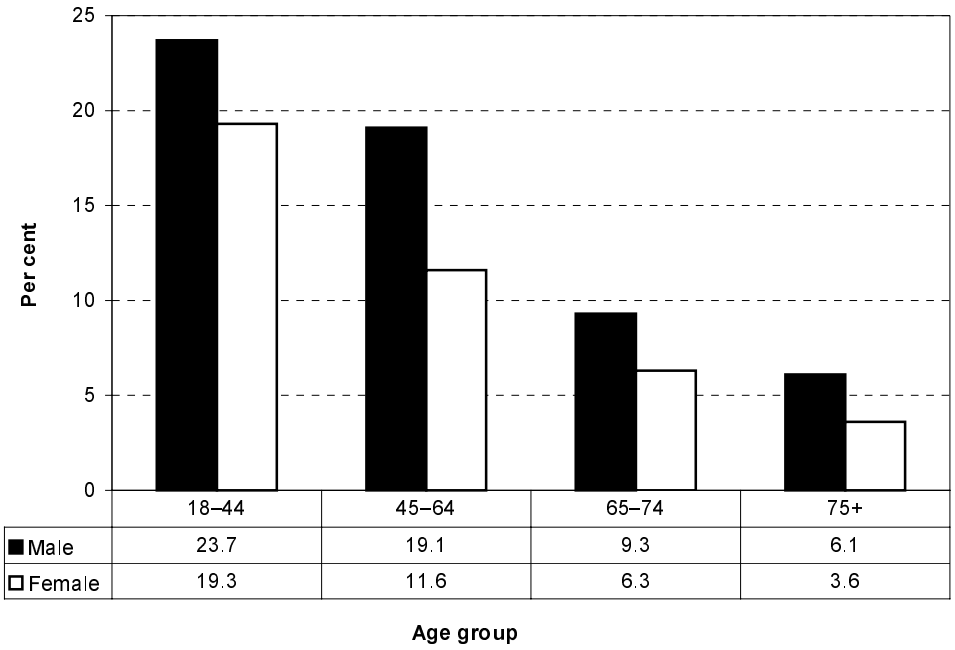


Figure 9.2: Age–sex-specific rates of daily smoking in adult patients at cardiovascular encounters

Discussion

These results indicate that adult patients managed for cardiovascular problems are about half as likely to be current smokers than average for the total GP patient population and this applies to both sexes. The proportion of this population that reported being previous smokers was slightly higher (35.1%) than average (27.1%)[13]. This is likely to reflect the older age group of patients involved in cardiovascular encounters, for the past smoking rate in older patients (65 years and over) paralleled that of the total population for this age group.

The age–sex-specific smoking rates demonstrate some interesting trends. Although the proportion of both males and females in the 18–44 age group who are current smokers is considerably less than the total population (23.7% cardiovascular male patients compared with 36.7% total patient population, 19.3% female cardiovascular patients compared with 24.3% total patient population), the levels are of concern. Clearly, the presence of a cardiovascular problem that is currently under management by a GP is having only marginal effect on the smoking behaviour of these people.

9.2 Alcohol consumption

The literature relating to the relationship of at-risk alcohol consumption and cardiovascular disease was reviewed in Chapter 1. In summary, although alcohol use in moderation may be beneficial to cardiovascular health, hazardous consumption is an important modifiable cause of cardiovascular disease as well as other premature death and disability in Australia[7]. The 1998 National Drug Strategy Household Survey estimated that 7–16% of adult males and between 4–10% of adult females were drinking

at hazardous or harmful levels[244]. The latter figures are somewhat lower than the estimates from the 1995 ABS National Health Survey, of 15% for males and 13% for females[33].

The 3 years of data available from the BEACH program for patients attending GPs suggest a consistent rate of 24% of adults reporting at-risk alcohol consumption levels[13].

Method

To measure alcohol consumption, BEACH uses three items from the WHO Alcohol Use Disorders Identification Test (AUDIT)[245], with slightly modified wording and scoring for an Australian setting[246]. Together these three questions assess at-risk alcohol use. The scores for each question range from 0 to 4. A score of 5+ for males or 4+ for females suggests that the person's drinking level is placing them at risk.

GPs were instructed to ask the patient (18+ years):

- How often do you have a drink containing alcohol?
  Never
  Monthly or less
  Once a week
  2–4 times a week
  5+ times a week
- How many standard drinks do you have on a typical day when you are drinking? _____
- How often do you have 6 or more standard drinks on one occasion?
  Never
  Monthly or less
  Once a week
  2–4 times a week
  5+ times a week

A standard drinks chart was provided to each GP to help the patient identify the number of standard drinks consumed.

Results

Responses to these questions were recorded at 11,476 cardiovascular patient encounters (18+ years) from 1,928 GPs. Age and sex were available for the total subsample.

Overall, 20.7% (95% CI: 19.0–22.3) of these patients reported drinking at-risk levels of alcohol. A significantly greater proportion of males reported at-risk drinking levels (27.1%, 95% CI: 24.0–30.2) than female patients (15.7%, 95% CI: 13.3–18.1). Responsible drinkers accounted for almost half (47.0%) the male respondents and for over one-third (35.2%) of female respondents. Almost half the women patients reported that they did not drink at all compared with one-quarter of the male patients (Figure 9.3).

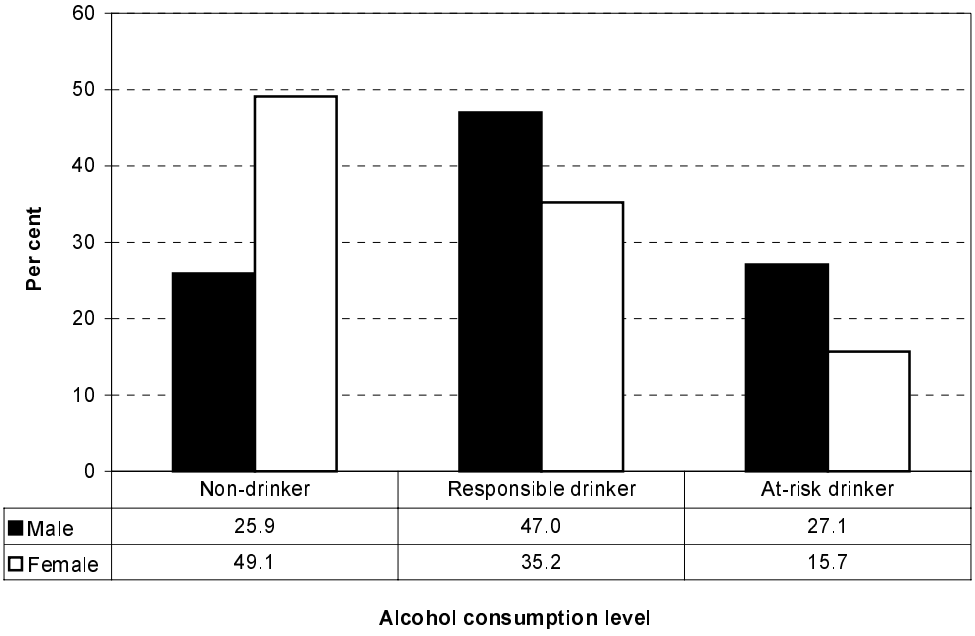


Figure 9.3: Alcohol consumption level in adult patients at cardiovascular encounters by patient sex (males *n* = 4,980; females *n* = 6,496)

Age–sex-specific rates

Of those males aged 18–44 years for whom a cardiovascular problem was managed 40.0% reported at-risk levels of alcohol consumption. Although this proportion decreased with age of the patient, it remained relatively high at one in three for those aged 45–64 years, dropped to one in four (24.9%) in those aged 65–74 years and then to one in seven (15.4%) for patients of 75 years of more. The same trend was demonstrated for women at cardiovascular encounters, but the proportion of at-risk drinkers was far less than for their male counterparts, particularly in those aged 18–64 years (Figure 9.4).

Discussion

The overall prevalence of at-risk drinking in this cardiovascular patient population (20.7%) was a little lower than the overall rate for the total GP patient population (24.1%). However this difference was mainly due to a lower at-risk alcohol prevalence in women of 25–44 years, the remaining rates being very similar to the average for the GP patient population[13].

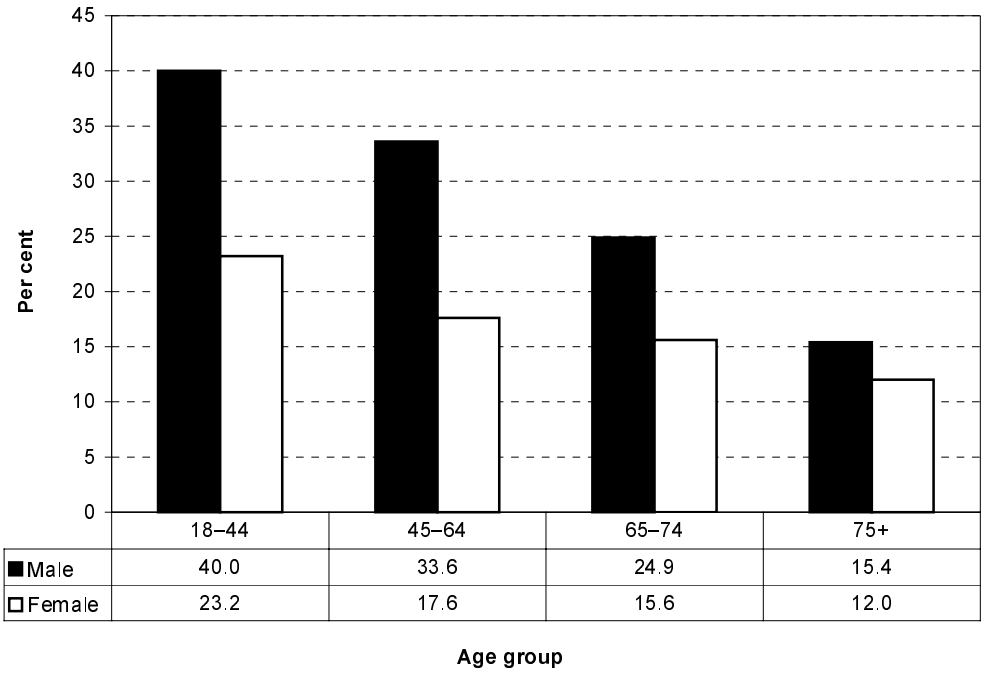


Figure 9.4: Age–sex-specific rates of at-risk alcohol consumption in adult patients at cardiovascular encounters

9.3 Body mass index

Background

Australia is at present second only to the United States as the most overweight nation in the world[119,120], with the United Kingdom a close third[120]. A review of the available literature on obesity and overweight and the relationship between weight and cardiovascular disease is provided in Chapter 1. A brief summary is provided below.

The estimate of overweight and obese Australians reported in the National Physical Activity Survey[107] is supported by BEACH data over the first 3 years of its collection. BEACH collects the self-reported height and weight of patients to estimate their BMI which is summarised in the study's annual reports. In 1998–99, BEACH showed 51.2% of adults over 18 years to be overweight (32.8%) or obese (18.4%) [14]. In 1999–00, BEACH reported 52.5% to be overweight (33.1%) or obese (19.4%) [12] and in the 2000–01 BEACH year, 54.3% were found to be overweight (34.1%) or obese (20.2%) [13]. The AIHW reports similar proportions for 1999–00, claiming 60% of Australians aged 25 years and over were overweight with 20% of these being classified as obese[4]. In 1995, Australian men on average weighed 3.6 kg more than their counterparts in 1980. Women weighed on average 4.8 kg more[2]. In terms of total disease burden, overweight and obesity are responsible for approximately 4.3% in both males and females in Australia[4].

All of the above studies used body mass index (BMI) as the classification for being overweight or obese, as proposed by the World Health Organization (WHO) as a simple measure of obesity[108].

Method

The GPs were instructed to ask the patients (or their carer in the case of children):

- What is your height in centimetres?
- What is your weight in kilograms?

Metric conversion tables (feet and inches to centimetres; stones and pounds to kilograms) were provided to the GP.

The BMI for an individual is calculated by dividing weight (kilograms) by height (metres) squared. A person with a BMI of less than 20 is considered underweight, 20–24 is normal, 25–29 overweight and more than 30 is considered to be obese[4].

Results

BMI was calculated for 11,534 patients aged 18 years and over at cardiovascular encounters with 1,939 GPs. Overall, less than one-third (31.9%, 95% CI: 31.0–32.9) of patients at cardiovascular encounters were in the normal weight range. In total almost two-thirds were classified as overweight or obese. One-quarter (25.2%, 95% CI: 24.2–26.1) were considered obese, and a further 37.5% (95% CI: 36.6–38.4) were classed as overweight. Approximately one-quarter of both male and female patients were classed as obese, but males were far more likely to be overweight (43.5% compared with 32.9%) than were their female counterparts (Figure 9.5).

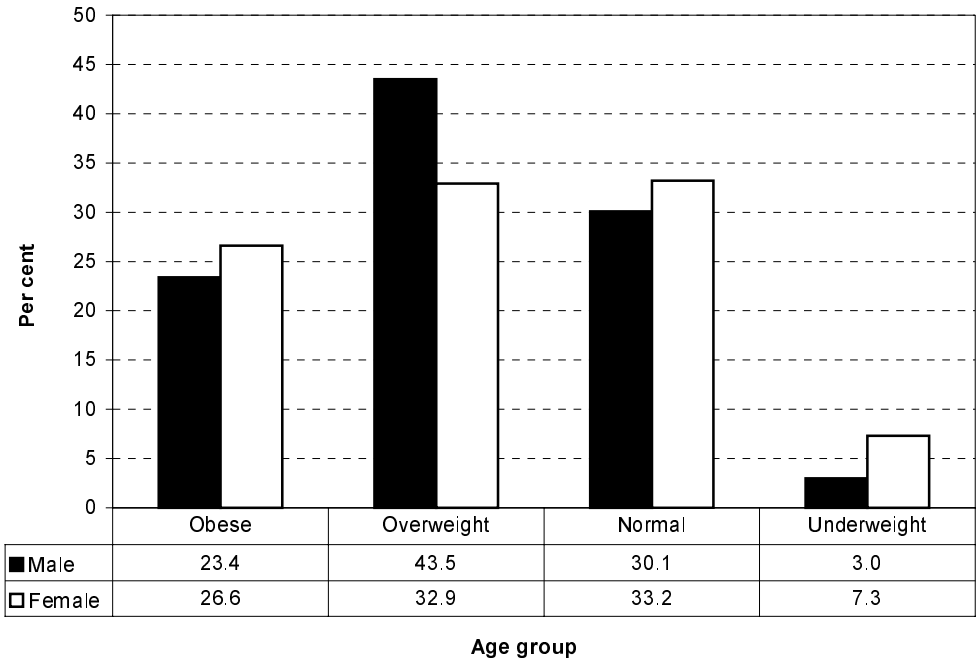


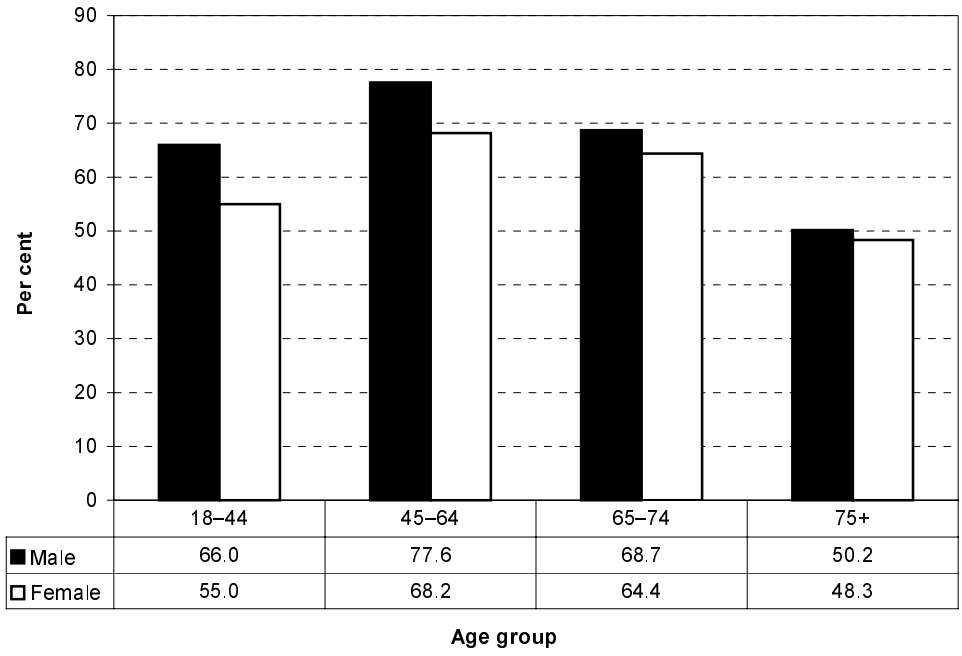
Figure 9.5: Body mass index in adult patients at cardiovascular encounters by patient sex (males *n* = 5,055; females *n* = 6,479)

Age–sex-specific rates

Males were more likely to be overweight or obese (66.9%, 95% CI: 63.3–70.5) than were females (59.5%, 95% CI: 56.3–62.7). More than three-quarters (77.6%, 95% CI: 73.1–82.0) of the middle-aged male patients (aged 45–64 years) were considered overweight or obese. Two-thirds (66.0, 95% CI: 60.5–71.6) of the younger males (18–44 years) and of those aged 65–74 years (68.7%, 95% CI: 63.7–73.6) were found to be overweight or obese. The rates for women at cardiovascular encounters were only slightly lower, ranging from 68.2% (95% CI: 64.1–72.2) in middle-aged women (45–64 years) down to 48.3 (95% CI: 43.6–53.1) in those who were 75 years or over (Figure 9.6).

Discussion

These rates of overweight and obesity are somewhat higher than those of the total adult patient population in BEACH in which the overall overweight/obesity rate is estimated to be about 52% (compared with 63% in this sample of cardiovascular patients). This difference applied in all age groups except in patients aged 75 years and over, in whom prevalence of weight problems was similar to the total population[13].



	18–44	45–64	65–74	75+
Male	66.0	77.6	68.7	50.2
Female	55.0	68.2	64.4	48.3

Figure 9.6: Age–sex-specific rates of overweight or obesity in adult patients at cardiovascular encounters

9.4 Alcohol consumption and body mass index

Since the questions on height and weight and those on alcohol consumption were asked of the same patients, it is possible to investigate the proportion of patients at cardiovascular encounters who were at risk in terms of both of these variables.

There were 11,198 patients for whom responses to both the BMI questions and the alcohol consumption questions were recorded. Half of these (49.6%, 95%CI: 48.5–50.6) were overweight or obese but did not report at-risk levels of alcohol consumption. Those patients who were drinking at-risk levels of alcohol but were not overweight or obese represented 7.7% of the sample (95% CI: 6.7–8.8). Patients who were both overweight or obese and who consumed at-risk levels of alcohol accounted for 13.2% (95% CI: 12.2–14.2) of the sample. Only 29.5% (95% CI: 28.5–30.5) had neither of these risk factor (Figure 9.7).

Age–sex-specific rates

The age–sex-specific rates of these combined risk behaviours are presented in Figure 9.8. One in five males at cardiovascular encounters (19.6%, 95% CI: 17.7–21.6) reported having both health risk behaviours, a significantly greater proportion than in the female sample in which 8.2% reported both (95% CI: 6.1–10.2). The prevalence of these combined risk behaviours was highest in the youngest age group for both sexes (25.5% of males and 10.7% of females), and it remained near these levels for both sexes in the middle ages. However, the proportion of patients with both risk behaviours decreased at 65 years and reduced to less than 10% in the elderly.

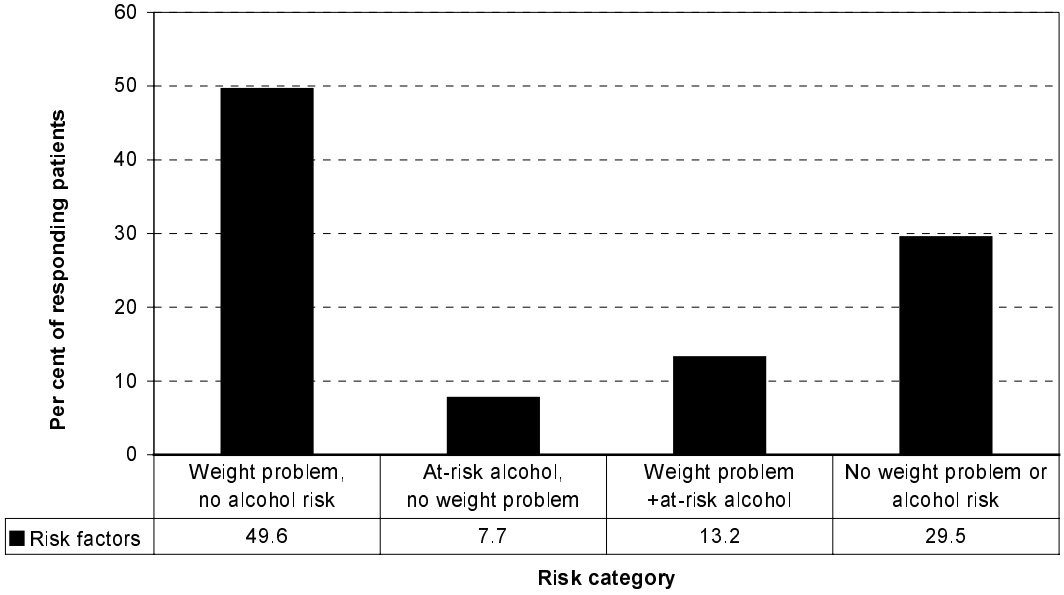


Figure 9.7: Prevalence of weight problem plus alcohol risk factors in patients at cardiovascular encounters (*n* = 11,198)

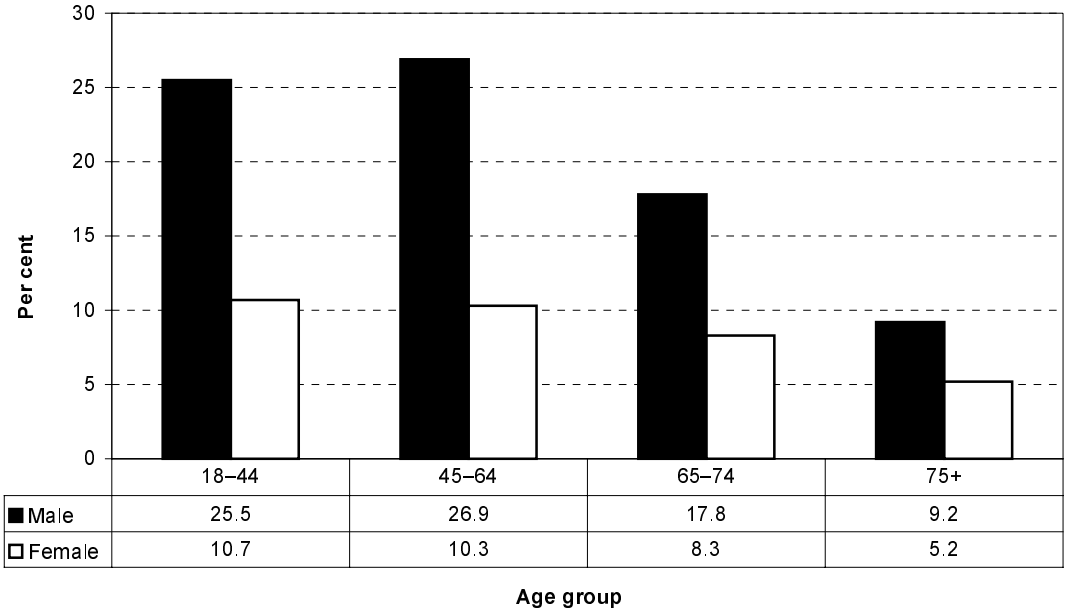


Figure 9.8: Age–sex-specific rates of at-risk alcohol consumption and overweight or obesity in adult patients at cardiovascular encounters

9.5 Overview of these results

The literature review provided in Chapter 1 highlighted the relationship between each of these measured risk behaviours and cardiovascular disease. Figure 9.9 summarises the major findings reported above. The estimates provided of risk behaviours of patients for whom a cardiovascular problem was managed by the GP at the encounter suggest that excess weight is by far the most common of the three measured risk behaviours for these patients. Although the most recent data for the total GP-attending population suggest an overall overweight/obesity prevalence of 54%[13], it might have been expected that patients attending for the management of a cardiovascular problem would watch their weight more carefully in response to education about the relationship between weight and cardiovascular disease. This was not the case, the prevalence of overweight problems (62.7%) being similar to that of the total GP patient population. Further, the prevalence in younger adults reflected that of the total population.

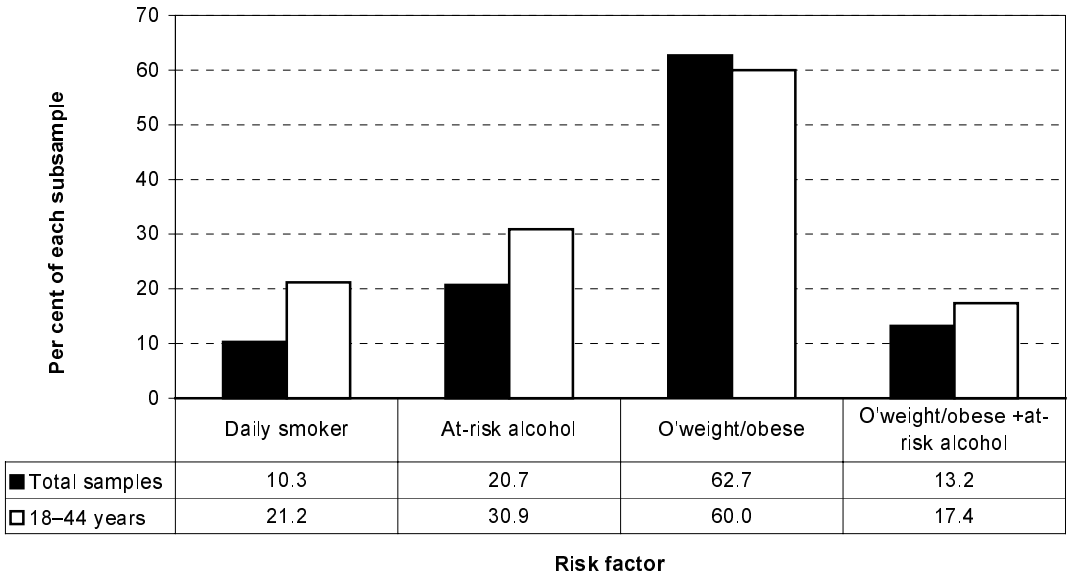


Figure 9.9: Prevalence of risk factors for the total subsample and for the subsample of cardiovascular patients aged 18–44 years

Whereas the prevalence of daily smoking among patients at cardiovascular encounters (10.3%) was only half that estimated for the total GP attending population[13] the prevalence in patients 18–44 years remained high at 21.4%.

The prevalence of at-risk alcohol consumption of 20.7% was considerably less than for the overall patient population (about 34%),[13] but again, younger adults were more prone to this risk behaviour, with 30% drinking at-risk levels of alcohol.

The patients at cardiovascular encounters who were both overweight/obese and reported at-risk alcohol consumption accounted for only 13% of the subsample asked these questions, but 17% of the younger adults (and 25.5% of younger male cardiovascular patients) had both risk behaviours.

It has not been possible with the current data set to estimate the proportion of patients at cardiovascular encounters who have all three risk behaviours because the sample of patients asked about their smoking habits differed from the sample asked about alcohol intake and height and weight. In future years, such analyses will be possible because from BEACH year 3 onwards all three risk behaviours were assessed for the same subsample.

However, these data suggest there is ample opportunity for GPs to intervene with this group of patients, particularly in the provision of education regarding the risks of being overweight (all ages) and, for younger male adults in particular, the risks to their cardiovascular health of high alcohol consumption and smoking.

10 Conclusion

This study has presented an overview of the GPs who participated in the BEACH program between April 1998 and March 2000, and of the subset of these GPs who managed cardiovascular problems as part of their general practice activity during that period. The cardiovascular problems managed by these GPs and the patients for whom they were managed have also been described, as have the types of management undertaken for these cardiovascular problems. Changes in types of cardiovascular problems, the management of these problems, the GPs who manage them and the patients for whom they are managed have also been presented for the decade since 1990–91. The prevalence of cardiovascular problems and the risk behaviours of people with recognised cardiovascular problems have also been examined in subsamples of the patients at general practice encounters involved in this study.

The prevalence of cardiovascular problems in the general practice population is such that 99.6% of this GP sample (2,022 of 2,031 GPs) managed at least one cardiovascular problem per 100 patient encounters. On average, the GPs managed 16.6 cardiovascular problems per 100 encounters. An examination of the characteristics of GPs who had higher cardiovascular encounter rates was undertaken to determine whether there were particular GP groups who might become the focus of cost-effective interventions to promote patient behavioural change. In the analysis of variance, the factors that were significantly associated with management of cardiovascular problems were identified. These were GP age, sex, activity level, years in practice, place of graduation, proportion of consultations in languages other than English, and Fellowship of the RACGP. Multivariate analysis used multiple linear regression to identify the best independent predictors of high cardiovascular encounter rate. Being male, aged 35 years or more, working full time, having graduated in Australia, conducting more than half their consultations in a language other than English, and working in smaller or rural practices were significant predictors of high cardiovascular encounter rates. The most cost-effective interventions in terms of education about cardiovascular problem management or patient education could therefore be specifically aimed at these types of GPs, although the amount of variation explained was small, probably reflecting the wide variety of other influences on encounter patterns not investigated in this study.

Although the patients at cardiovascular encounters in all age groups were more likely to be female, a greater proportion of encounters with males involved the management of at least one cardiovascular problem. The patients at cardiovascular encounters were significantly older, more likely to hold a Veterans' Affairs or Commonwealth Government healthcare card and less likely to be a new patient to the practice than those at non-cardiovascular encounters. As atherosclerosis is generally considered to be a disease associated with the ageing process (promoted over time by risk behaviours in many individuals), it is not surprising that the majority of patients presenting with cardiovascular problems are clustered in the age groups of 45 years and over. Almost 60% of the patients at cardiovascular encounters were aged 65 years or over, which, being the retirement/pension age for many Australians, would also explain the high number of healthcare card holders in this group. Patient age may also provide some explanation for those at cardiovascular encounters being less likely to be new patients to the practice. A relationship of trust between patient and GP is created over a period of time and older persons may be more likely to seek ongoing care from the practice in which they have developed confidence. As age advances, it may be less practical for the less mobile to

change practices, which may further explain their continuing to seek care from the same practice. The results suggest considerable continuity of care being provided to these patients in general practice.

There were significantly more patient reasons for encounter recorded and two-and-a-half times the number of problems managed at cardiovascular encounters than at non-cardiovascular encounters. The problems managed at cardiovascular encounters were also significantly less likely to be designated as new problems to the patient. This higher proportion of continuing problems reflects the chronic nature of many cardiovascular conditions, and many of the co-morbidities that tend to affect the older population.

Just over half the cardiovascular problems managed were labelled as hypertension of various types. This is not surprising given that hypertension can be diagnosed and managed as a problem individually or can occur as a symptom of other diseases. Ischaemic heart disease, cardiovascular check-up, other vascular disease, heart failure and arrhythmia were other common problems listed. Over 70% of the cardiovascular problems were managed with at least one type of treatment, the vast majority of which were prescribed medications. Antihypertensives accounted for nearly half of these, which is to be expected given the frequency of hypertension discussed above. GPs also provided non-pharmacological treatments to over 16% of patients with cardiovascular problems, mostly advice or counselling. It is reasonable to assume that this counselling involved discussions about the patients' lifestyles and suggestions to change risk behaviours where these existed. In 5.6% of cases, patients were referred to another healthcare provider, the greater proportion of these being a specialist. Pathology orders constituted the majority of investigations.

Comparing data from the Australian Morbidity and Treatment Survey 1990–91 (AMTS)[235] provided an interesting view of how things have changed over the decade. The characteristics of the GP population itself have changed. There are now fewer solo GPs, reflecting the general trend towards group practice which has escalated in general practice through the late 1990s. The percentage of GPs who conduct more than 50% of their consultations in a language other than English has significantly changed since 1991 [247]. This increase possibly reflects influences of both the multicultural patient population and the number of bilingual doctors who have either immigrated or are the second generation of immigrant families who have graduated and are now practising in Australia. Although there may be significantly more encounters conducted in languages other than English, the more recent BEACH data showed that patients from a non-English-speaking background were no more likely to either have a cardiovascular problem or be managed for cardiovascular problems more often.

The age distribution of patients at encounters changed to some degree over the decade, and the age-specific rates for cardiovascular encounters showed a decrease in all adult age groups. Between the two studies there were no significant changes in overall rates of management of cardiovascular problems, with hypertension still ranking number one for both. However, cardiovascular problems formed a significantly higher proportion of all problems managed in the AMTS than in BEACH. Also apparent was a reduction in the frequency of management of more severe cardiovascular problems such as ischaemic heart disease and heart failure in the later study. The greatest changes occurred in the methods of management for cardiovascular problems. The occurrence of cardiovascular check-up, the number of problems with at least one medication prescribed, and the number of problems with at least one non-pharmacological treatment were significantly higher in BEACH, as were clinical treatments such as counselling and advice. This emphasis on preventive treatment was mirrored in the medications, with significant

increases in both prescribing frequency and type between the two studies. Medications new to the market were responsible for a shift away from several medication types used frequently in the earlier study. The quadrupling of prescriptions for hypolipidaemics over the decade also reflects the changes in management for this cardiovascular risk factor. Evidence provided in these two studies suggests that GP management trends have helped improve the incidence of serious cardiovascular disease over the past decade.

For the first time we have prevalence data provided in the subsample of patients at BEACH encounters. These data show that 24.5% of the 12,247 patients encountered in the subsample currently had at least one cardiovascular problem (either managed or not managed at the recorded encounter). The prevalence of most of these conditions was associated with age and, as previously described, with healthcare card status and being previously seen at the practice. Hypertension was the most prevalent individual cardiovascular problem. These data have provided a point from which estimates can be extrapolated for prevalence of hypertension, ischaemic heart disease, heart failure, arrhythmias and so on in the population of Australian general practice encounters. Added to data from other sources such as the AIHW and the ABS, these and further measures currently being gathered in BEACH subsamples can be used in the future to assess progress in reducing cardiovascular problems and risk behaviours. As previously mentioned, the chance of being 'selected' in the subsample study is directly related to the patient's number of GP attendances over the year. This selection bias will have resulted in overestimates of rates for cardiovascular problems in this study. It probably will also have underestimated the prevalence of risk behaviours such as smoking and alcohol consumption in the younger, less frequent general practice encounter attendees. However, the age-specific rates for both these groups should be reliable. Future substudies of this type which include questions on the number of GP visits per year, in conjunction with HIC data on average age–sex–specific rates of GP attendance, will allow some of the methodological issues referred to in Section 8 of this report to be solved.

The SAND sub-tudies have also allowed the investigation of the extent to which people with known cardiovascular problems continue to partake in risk behaviours such as smoking, excessive alcohol consumption or remaining overweight. Almost one-quarter of males and over 20% of females aged 18–44 years being managed for a cardiovascular problem continue to smoke. Again, in this age group, almost 40% of these males and 23% of these females continue to drink alcohol at at-risk levels. Almost two-thirds of patients with a cardiovascular problem currently under GP management remain overweight, approximately one-quarter of those overweight being classified as obese. Over 17% of younger patients with a cardiovascular problem being managed had both risk factors of overweight and at-risk alcohol consumption. Although these proportions decrease with patient age, these are the 'formative' years for cardiovascular problems, and clearly more effort should be made by patients to avoid these behaviours, particularly when cardiovascular problems have been already identified as they have for this subsample.

In future years it will be possible to analyse all three risk behaviours simultaneously as the BEACH encounter form now allows recording of BMI, smoking behaviour and alcohol consumption level for the same patient. In the meantime, GPs should be encouraged to identify at-risk patients and offer appropriate counselling. Because the majority of Australians consult a GP at least once in any given year, GPs are uniquely placed to promote lifestyle changes and long-term disease prevention [248]. GPs are considered by the public to be a reliable, credible source of information [248] and can effectively provide preventive care that reaches the majority of the population. Some population groups in particular may benefit from interventions delivered by their GP. This study has shown that conducting more than half of their consultations in a language

other than English is a significant predictor of high cardiovascular encounter rate among GPs. GPs from a similar language or cultural background are potentially very effective in providing needs assessment and delivering educational material aimed at reducing risk behaviours[249].

However, building a trusting rapport with a patient may help the GP who understands the culture and speaks the same language to deliver a message in a format understandable to the patient, but this does not guarantee that the message will be delivered or that the physician's advice will be followed. The recent literature describes many incidences of successful interventions where GPs have provided educational tools such as nutritional knowledge questionnaires[250], step-counters and self-monitoring forms[251] for patients at risk of heart disease, with resulting improvements in weight, blood pressure[252] and physical activity levels of patients[253]. The GP–patient consultation provides an excellent opportunity for delivery of interventions, but despite the successes noted above there remain some significant barriers to achieving cardiovascular health improvement or risk reduction via this method.

Ideally, all GPs would advise all patients to adopt healthy lifestyles and so prevent the development of risk factors or decrease the severity of problems already established. In the real world, there are issues with GP confidence, attitude and time limitations that interfere with this delivery, evidence of which also exists in recent literature. Doctors' low self-efficacy has also been cited as a significant barrier to the delivery of effective advice[252]. Girgis at al. (2001) found that substantial proportions of the GP population (as well as surgeons and specialty physicians) reported a lack of competence in, and a high level of support for formal training in, prevention and other interactional skills. Quality of interactional skills can have a substantial effect on outcomes such as patient recall of advice on medication and behaviour modification[254]. The attitude of GPs to perception of risk and delivery of counselling is also less than ideal. Evidence by Heywood at al. (1996) suggests that GPs may counsel only the patients they identify as having a risk factor, and that they are regularly less than accurate in recognising these risk factors in their patients[255]. Lewi at al. (2002) found in a study of smoking advice in general practice that almost 50% of GPs reported asking patients about their smoking history only when it was relevant to their current medical complaint[256]. Heywood at al. (1996) reported that counselling for risk behaviour was associated with longer consultations and older GPs. This study has also found an association between longer consultation, older GPs and cardiovascular encounter rate.

Barriers to physician counselling for risk behaviour also include time constraints and lack of reimbursement[257]. Lengthening consultations to incorporate preventive care and health education without remuneration is probably not considered economically viable in the rapidly 'corporatising' health system. Another real barrier for GPs in delivering effective lifestyle counselling is perceived patient disinterest. GPs often feel that they are wasting their time trying to convince some patients to change their habits. Apart from the 'just give me the script, doc' patients who prefer pharmacological treatment, there are others who lack motivation, family or social support, or who feel too pressured by family or work commitments to fit a 'change of lifestyle' into their busy lives[248]. The evidence presented in this study supports this perception, given the numbers of patient with a cardiovascular condition already under management who continue with one or more risk behaviours.

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Glossary

A1 Medicare items: Medicare item numbers 1, 2, 3, 4, 13, 19, 20, 23, 24, 25, 33, 35, 36, 37, 38, 40, 43, 44, 47, 48, 50, 51, 601, 602, 720, 722, 724, 726, 728, 730, 734, 738, 740, 742, 744, 746, 749, 757, 759, 762, 765, 768, 771, 773, 775, 778, 779, 801, 803, 805, 807, 809, 811, 813, 815.

Aboriginal: The patient identifies himself or herself as an Aboriginal person.

Activity level: The number of general practice A1 Medicare items claimed during the previous 3 months by a participating general practitioner.

Allied and other health professionals: Those who provide clinical and other specialised services in the management of patients, including physiotherapists, occupational therapists, dietitians, dentists and pharmacists.

Cardiovascular problem: Any problem classified in the circulatory chapter (Chapter K) of the International Classification of Primary Care (Version 2) (ICPC-2).

Chapters (ICPC-2): The main divisions within ICPC-2. There are 17 chapters primarily representing the body systems.

Complaint: A symptom or disorder expressed by the patient when seeking care.

Consultation: See *Encounter*

Diagnosis/problem: A statement of the provider's understanding of a health problem presented by a patient, family or community. GPs are instructed to record at the most specific level possible from the information available at the time. It may be limited to the level of symptoms.

- *New problem:* The first presentation of a problem, including the first presentation of a recurrence of a previously resolved problem but excluding the presentation of a problem first assessed by another provider.
- *Old problem:* A previously assessed problem that requires ongoing care. Includes follow-up for a problem or an initial presentation of a problem previously assessed by another provider.

Encounter (enc): Any professional interchange between a patient and a GP.

- *Indirect:* Encounter where there is no face-to-face meeting between the patient and the GP but a service is provided (e.g. prescription, referral).
- *Direct:* Encounter where there is a face-to-face meeting of the patient and the GP.

Direct encounters can be further divided into:

Medicare-claimable

- A1 items of service—MBS item numbers as previously listed—see *A1 Medicare items*
  - *surgery consultations:* encounters identified by any one of MBS item numbers 3, 23, 36, 44
  - *home visits:* encounters identified by any one of MBS item numbers 4, 24, 37, 47
  - *hospital encounters:* encounters identified by any one of MBS item numbers 19, 33, 40, 50
  - *nursing home visits:* encounters identified by any one of MBS item numbers 20, 35, 43, 51
  - *other institutional visits:* encounters identified by any one of MBS item numbers 13, 25, 38, 40
  - *other MBS encounters:* encounters identified by an MBS item number that does not identify place of encounter
- *Workers compensation:* encounters paid by workers compensation insurance
- *Other paid:* encounters paid from another source (e.g. State).

General practitioner (GP): 'A medical practitioner who provides primary comprehensive and continuing care to patients and their families within the community' (Royal Australian College of General Practitioners).

Grouper: Multiple ICPC-2 or ICPC-2 PLUS codes which are grouped together for purposes of analysis.

Medication: Medication which is prescribed, advised for over-the-counter purchase or provided by the GP at the encounter.

Medication status:

- N*ew:* the medication prescribed/advised/provided at the encounter is being used for the management of the problem for the first time.
- C*ontinuation:* the medication prescribed/advised/provided at the encounter is a continuation or repeat of previous therapy for this problem.
- O*ld:* see *Continuation* (above).

Morbidity: Any departure, subjective or objective, from a state of physiological wellbeing. In this sense, sickness, illness and morbid conditions are synonymous.

Patient status: the status of the patient to the practice

- *New patient*: the patient has not been seen before in the practice.
- *Old patient:* the patient has attended the practice before.

Problem managed: See *Diagnosis/problem.*

Provider: A person to whom a patient has access when contacting the healthcare system.

Reasons for encounter (RFEs): The subjective reasons given by the patient for seeing or contacting the general practitioner. These can be expressed in terms of symptoms, diagnoses or the need for a service.

Recognised GP: A medical practitioner who is:

- vocationally recognised under Section 3F of the Health Insurance Act, ***or***
- a holder of the Fellowship of the Royal Australian College of General Practitioners who participates in, and meets the requirements for, quality assurance and continuing medical education as defined in the RACGP Quality Assurance and Continuing Medical Education Program, ***or***
- undertaking an approved placement in general practice as part of a training program for general practice leading to the award of the Fellowship of the Royal Australian College of General Practitioners or undertaking an approved placement in general practice as part of some other training program recognised by the RACGP as being of equivalent standard. (Medicare Benefits Schedule book, 1 November 1998).

Referral: The process by which the responsibility for part or all of the care of a patient is temporarily transferred to another healthcare provider. Only new referrals to specialists, allied health professionals, and for hospital and nursing home admissions arising at a recorded encounter are included. Continuation referrals are not included. Multiple referrals can be recorded at any one encounter.

Rubric: The title of an individual code in ICPC-2 PLUS.

Statins: HMG CoA reductase inhibitors.

Torres Strait Islander: The patient identifies himself or herself as a Torres Strait Islander.

Work-related problem: Irrespective of the source of payment for the consultation, it is likely in the GP's view that the problem has resulted from work-related activity or workplace exposures or that a pre-existing condition has been significantly exacerbated by work activity or workplace exposure.

Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
AHP	Allied health professional
AMA	Australian Medical Association
AMI	Acute myocardial infarction
AMTS	Australian Morbidity and Treatment Survey 1990–91
ATC	Anatomical Therapeutic Chemical (classification)
AUDIT	Alcohol Use Disorders Identification Test
BEACH	Bettering the Evaluation and Care of Health
BMI	Body mass index
BP	Blood pressure
CAPS	Coding Atlas for Pharmaceutical Substances
CI	Confidence interval (in this report 95% CI is used)
CNS	Central nervous system
COAD	Chronic obstructive airways disease
CVA	Cerebrovascular accident
CVD	Cardiovascular disease
CVS	Cardiovascular system
DoHA	Commonwealth Department of Health and Ageing
DHAC	Commonwealth Department of Health and Aged Care
DHHCS	Commonwealth Department of Health, Housing and Community Services
DHSH	Department of Human Services and Health
Enc	Encounter
FMRC	Family Medicine Research Centre, The University of Sydney
GP	General practitioner
GPSCU	General Practice Statistics and Classification Unit, University of Sydney, a collaborating unit of the Australian Institute of Health and Welfare
HIC	Health Insurance Commission
ICPC	International Classification of Primary Care
ICPC-2	International Classification of Primary Care (Version 2)
ICPC-2 PLUS	An extended vocabulary of terms classified according to ICPC–2
IHD	Ischaemic heart disease
LCL	Lower confidence limit
MBS	Medicare Benefits Schedule

NEC	Not elsewhere classified
NESB	The patient reports coming from a non-English-speaking background, i.e. a language other than English is spoken at home.
NHMRC	National Health and Medical Research Council
NOS	Not otherwise specified
NSAID	Non-steroidal anti-inflammatory medications
OA	Osteoarthritis
OTCs	Medications advised for over-the-counter purchase
PVD	Peripheral vascular disease
QA	Quality assurance (in this case the Quality Assurance Program of the Royal Australian College of General Practitioners)
RACGP	Royal Australian College of General Practitioners
RFEs	Reasons for encounter (see Glossary)
RRMA	Rural, remote and metropolitan area classification
SAND	Supplementary analysis of nominated data
SAS	Statistical Analysis System
UCL	Upper confidence limit
VA	Veterans' Affairs
WHO	World Health Organization
WONCA	World Organization of Family Doctors

Appendix 1: Example of a recording form from 1998–99 BEACH data year

BEACH (Bettering the Evaluation And Care of Health) -Morbidity and Treatment Survey -National National

DOCID:

Date of encounter	Date of Birth	Sex	Patient status	Patient Postcode
___/___/___	___/___/___	M ☐ F ☐	New ☐ Old ☐	

NESB?	Aboriginal?	Torres Strait Islander?
Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐

Encounter Number:

Patient Reasons for Encounter (up to three)	HCC Status	Veterans Affairs
1.	Yes ☐	Gold card ☐
2.	No ☐	White card ☐
3.		

PATIENT SEEN
Item no. ____
W/C paid ☐
Other paid ☐
No charge ☐

PATIENT NOT SEEN
Script..... ☐
Referral..... ☐
Certificate..... ☐
Other..... ☐

1. Diagnosis/problem — Work Related ☐ — **Problem status** New ☐ Old ☐

Medications for this problem: (up to four)

	Strength	Regimen	No. Rpts	? OTC	GP Supply	Drug status New	Drug status Cont.
1.							
2.							
3.							
4.							

Procedures, other treatment, counselling

New referrals, admissions

2. Diagnosis/problem — Work Related ☐ — **Problem status** New ☐ Old ☐

Medications for this problem: (up to four)

	Strength	Regimen	No. Rpts	? OTC	GP Supply	Drug status New	Drug status Cont.
1.							
2.							
3.							
4.							

Procedures, other treatment, counselling

New referrals, admissions

3. Diagnosis/problem — Work Related ☐ — **Problem status** New ☐ Old ☐

Medications for this problem: (up to four)

	Strength	Regimen	No. Rpts	? OTC	GP Supply	Drug status New	Drug status Cont.
1.							
2.							
3.							
4.							

Procedures, other treatment, counselling

New referrals, admissions

4. Diagnosis/problem — Work Related ☐ — **Problem status** New ☐ Old ☐

Medications for this problem: (up to four)

	Strength	Regimen	No. Rpts	? OTC	GP Supply	Drug status New	Drug status Cont.
1.							
2.							
3.							
4.							

Procedures, other treatment, counselling

New referrals, admissions

Pathology	for problem(s)
1	1 2 3 4
2	1 2 3 4
3	1 2 3 4
4	1 2 3 4
5	1 2 3 4

Test/Body Site for problem(s)	
Plain X-ray	1 2 3 4
.....	
US/CT/Contrast	1 2 3 4
.....	
Other Imaging	1 2 3 4
.....	

To the patient:
In general would you say your health is:
Excellent..... ☐
Very good... ☐
Good..... ☐
Fair..... ☐
Poor..... ☐

Patient's
Height: ____ cm
Weight: ____ kg

To the patient if 18+:
How often do you have a drink containing alcohol?
Never ☐
Monthly ☐
Once a week ☐
2-4 times a week ☐
5+ times a week ☐

How many standard drinks do you have on a typical day when you are drinking? ____

How often do you have 6 or more standard drinks on one occasion?
Never..... ☐
Monthly or less..... ☐
Once a week..... ☐
2-4 times a week... ☐
5+ times a week.... ☐

BO1A

Appendix 2: Example of a recording form from 1999–00 BEACH data year

BEACH (Bettering the Evaluation And Care of Health) - Morbidity and Treatment Survey - National

DOCID

Encounter Number

Date of encounter	Date of Birth	Sex	Patient Postcode
___/___/___	___/___/___	M ☐ F ☐	

Patient Reasons for Encounter
1.
2.
3.

New patient	☐
Health Care Card holder	☐
NESB	☐
Aboriginal	☐
Torres Strait Islander	☐
Veterans Affairs Card	
White card	☐
Gold card	☐

PATIENT SEEN
Item No
MBS/Vet.Affairs
VA paid ☐
Workers comp paid ☐
State/Other paid ☐
No charge/Unpaid ☐

PATIENT NOT SEEN
Script ☐
Referral ☐
Certificate ☐
Other ☐

1. Diagnosis/problem — **New problem** ☐ **Work related** ☐

Medications/vaccines for this problem	Strength	Regimen	No. of Rpts	? OTC	GP Supply	New Drug
1.						
2.						
3.						
4.						

Procedures, other treatment, counselling this consult
1.
2.

New referrals, admissions
1.
2.

2. Diagnosis/problem — **New problem** ☐ **Work related** ☐

Medications/vaccines for this problem	Strength	Regimen	No. of Rpts	? OTC	GP Supply	New Drug
1.						
2.						
3.						
4.						

Procedures, other treatment, counselling this consult
1.
2.

New referrals, admissions
1.
2.

3. Diagnosis/problem — **New problem** ☐ **Work related** ☐

Medications/vaccines for this problem	Strength	Regimen	No. of Rpts	? OTC	GP Supply	New Drug
1.						
2.						
3.						
4.						

Procedures, other treatment, counselling this consult
1.
2.

New referrals, admissions
1.
2.

4. Diagnosis/problem — **New problem** ☐ **Work related** ☐

Medications/vaccines for this problem	Strength	Regimen	No. of Rpts	? OTC	GP Supply	New Drug
1.						
2.						
3.						
4.						

Procedures, other treatment, counselling this consult
1.
2.

New referrals, admissions
1.
2.

Pathology **For problem(s)**
1 ..... 1 2 3 4
2 ..... 1 2 3 4
3 ..... 1 2 3 4
4 ..... 1 2 3 4
5 ..... 1 2 3 4

Imaging & other tests (+Body site)
Problem(s)
1 ..... 1 2 3 4
2 ..... 1 2 3 4
3 ..... 1 2 3 4

To the patient:
In general would you say your health is:
Excellent ☐
Very good ☐
Good ☐
Fair ☐
Poor ☐

Patient's
Height: ____ cm
Weight: ____

To the patient if 18+:
How often do you have a drink containing alcohol?
Never ☐
Monthly or less ☐
Once a week ☐
2-4 times a week ☐
5+ times a week ☐

How many standard drinks do you have on a typical day when you are drinking?
____

How often do you have 6 or more standard drinks on one occasion?
Never ☐
Monthly or less ☐
Once a week ☐
2-4 times a week ☐
5+ times a week ☐

BA

Appendix 3: GP characteristics questionnaire, 1998–99 BEACH data year

The University of Sydney
at Westmead Hospital

General Practice Statistics and Classification Unit
Family Medicine Research Centre
Department of General Practice

a collaborating unit of the
Australian Institute of Health and Welfare
AIHW

Please fill in boxes or circle answers where appropriate

1. Doctor Identification Number: [ ][ ][ ][ ]

2. Sex: Male / Female 3. Age [ ]

4. How many years have you spent in general practice? [ ]

5. Number of general practice sessions you usually work per week? [ ]

6. How many **full-time** (>5 sessions per week) general practitioners work with you at this practice? (Practice= shared medical records) [ ]

7. How many **part-time** (<6 sessions per week) general practitioners work with you at this practice? (Practice= shared medical records) [ ]

8. Do you conduct more than **50%** of consultations in a language other than English? Yes / No

9. What is the postcode of your major practice address? [ ][ ][ ][ ]

10. Country of graduation: Aust NZ Asia UK Other: _____

11. General Practice training status (CSCT or RACGP training programme)?	Presently training	Completed training	Not applicable

12. Do you hold FRACGP? Yes / No

13. Are you a member of any of the following organisations?	AMA	RACGP	RDAA

14. How do you routinely instruct pharmacists on the substitution of generic drugs?	No substitute allowed	Substitute allowed

15. Special interests: *(up to three)*

1. Acupuncture	7. Dermatology	13. Paediatrics
2. Anaesthetics	8. Diabetes	14. Preventive medicine
3. Asthma	9. Geriatrics/aged care	15. Psychiatry
4. Cardiology	10. Nutrition	16. Sports medicine
5. Computers	11. Obstetrics/antenatal	17. Surgery
6. Counselling	12. Occup./indust.med.	18. Women's Health

Other _____

Appendix 4: GP characteristics questionnaire, 1999–00 BEACH data year

The University of Sydney
at Westmead Hospital

General Practice Statistics and Classification Unit
Family Medicine Research Centre
Department of General Practice

a collaborating unit of the
Australian Institute of Health and Welfare

AIHW

Please fill in boxes or circle answers where appropriate

Doctor Identification Number [ ][ ][ ][ ]

1. Sex: ..... **Male / Female**

2. Age ..... [ ]

3. How many years have you spent in general practice? ..... [ ]

4. Number of general practice sessions you usually work per week? ..... [ ]

5. How many **full-time** (>5 sessions per week) general practitioners work with you at this practice? (Practice= shared medical records) ..... [ ]

6. How many **part-time** (<6 sessions per week) general practitioners work with you at this practice? (Practice = shared medical records) ..... [ ]

7. Do you conduct more than **50%** of consultations in a language other than English? ..... **Yes / No**

8. What is the postcode of your major practice address? ..... [ ][ ][ ][ ]

9. Country of graduation: ..... **Aust** **NZ** **Asia** **UK** **Other:(specify)** .....

10. General Practice training status ..... (CSCT or RACGP training programme)? **Presently training** **Completed training** **Not Applicable**

11. Do you hold FRACGP? ..... **Yes / No**

12. Are you a member of any of the following organisations? **AMA** **RACGP** **RDAA**

13. How do you routinely instruct pharmacists on the substitution of generic drugs? **No substitute allowed** **Substitute allowed**

14. To what extent are computers used at your major practice address? *(Circle as many as apply)*
Not at all **Billing** **Prescribing** **Medical Records** **Internet / Email** **Other Admin**

15. Is this practice accredited ? ..... **Yes / No**

16. What are the normal after-hours arrangements for your practice?
Practice does its own **Co-operative with oth. practices** **Deputising service** **Referral to other service (eg A&E)** **Other** **None**

17. Do you have your own ***on-site*** NATA accredited pathology lab? ..... **Yes / No**

18. Which external pathology provider does your practice normally use?
Name of provider.....
Provider's Postcode [ ][ ][ ][ ]

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Appendix 5: The recording form used in the Australian Morbidity and Treatment Survey 1990–91

PROVIDER NUMBER: 697 (9-11)

ENCOUNTER NUMBER: № 080 (12-14)

TYPE OF ENCOUNTER
MEDICARE ITEM NUMBER (15-18)

DATE OF ENCOUNTER (19-24)
Day Month Year

OFFICE USE ONLY
Block cols 1-8 front sheet
12-14, 15-18, 19-24

THE PATIENT

SEX: (circle) M F

AGE: (years) <1yr = 00 >99yr = 99

Patient NEW to practice..... 1
Seen before in practice..... 2

REASONS FOR ENCOUNTER (up to 3)
1
2
3

THE PROBLEMS AND THEIR MANAGEMENT

1. DIAGNOSIS/problem:
*
STATUS this problem (circle) NEW OLD
TREATMENT/SCRIPTS for this problem: (up to 4)

2. DIAGNOSIS/problem
*
STATUS this problem (circle) NEW OLD
TREATMENT/SCRIPTS for this problem: (up to 4)

3. DIAGNOSIS/problem:
*
STATUS this problem (circle) NEW OLD
TREATMENT/SCRIPTS for this problem: (up to 4)

4. DIAGNOSIS/problem
*
STATUS this problem (circle) NEW OLD
TREATMENT/SCRIPTS for this problem: (up to 4)

REFERRAL, TESTS, INVESTIGATIONS ordered/undertaken:

PATHOLOGY:	X - RAY	OTHER
Blood..... 1	Plain..... 1	E.C.G..... 1
Urine..... 2	Contrast/special..... 2	Spirometry..... 2
Culture..... 3	Ultrasound..... 3	Multiphasis screening.....3
Papsmear..... 4	Other 4	Other..... 4
Other tissue..... 5		
Other.....6		

ADMISSIONS
Hospital Emergency - public..... 1
- private..... 2
Elective - public..... 3
- private..... 4
Nursing home..... 5
Other..... 6

NEW REFERRALS TO SPECIALISTS & HEALTH PROFESSIONALS
1.
2.

FOLLOW - UP: Has this patient been asked to return within the next three months for any of these problems? YES..... 1 NO..... 2

OFFICE USE ONLY
25
26 - 27
28
29 - 37
38 - 57
58 - 77
78 - 97
98 - 117
118 119 120 121 122 123
124 125 126 127
128 129 130 131
132
133-134
135-136
137

Appendix 6: Problem code groups from ICPC-2 used in this report

Group	ICPC codes	ICPC-2 rubric
Arrhythmias	K78	Atrial fibrillation/flutter
	K79	Paroxysmal tachycardia
	K80	Cardiac arrhythmias NOS
Cardiovascular check-ups	K30	Cardiovascular check-up—complete
	K31	Cardiovascular check-up—partial
Cerebrovascular disease	K89	Transient cerebral ischaemia
	K90	Stroke/cerebrovascular accident
	K91	Cerebrovascular disease
Diabetes—all	T89	Diabetes; insulin-dependent
	T90	Diabetes; non-insulin-dependent
	W85	Gestational diabetes
Hypertension (non-gestational)	K86	Uncomplicated hypertension
	K87	Hypertension with involvement of target organs
Ischaemic heart disease	K74	Ischaemic heart disease without angina
	K76	Ischaemic heart disease with angina
Ischaemic heart disease/acute myocardial infarction (IHD/AMI)	K74	Ischaemic heart disease without angina
	K75	Acute myocardial infarction
	K76	Ischaemic heart disease with angina
Other vascular disease	K92	Atherosclerosis/peripheral vascular disease
	K93	Pulmonary embolism
	K94	Phlebitis and thrombophlebitis
	K95	Varicose veins of leg
	K96	Haemorrhoids
Cardiovascular process of care	K30–K31	Check-ups of the circulatory system, partial or full
	K32–K49 inclusive	Problems labelled as diagnostic, screening and preventive procedures of the cardiovascular system
	K50–K59 inclusive	Problems labelled as medication, treatment or procedures of the cardiovascular system
	K60–69 inclusive	Problems labelled in terms of test results, administrative action, referrals etc., associated with the cardiovascular system

(continued)

Appendix 6 (continued): Problem code groups from ICPC-2 used in this report

Group	ICPC codes	ICPC-2 rubric
Circulatory symptoms and complaints	K01	Heart pain
	K02	Pressure/tightness of heart
	K03	Cardiovascular pain NOS
	K04	Palpitations/awareness of heart
	K05	Irregular heartbeat, other
	K06	Prominent veins
	K07	Swollen ankles/oedema
	K22	Risk factors for cardiovascular disease
	K24	Fear of heart disease
	K25	Fear of hypertension
	K27	Fear of cardiovascular disease, other
	K28	Limited function/disability cardiovascular
	K29	Cardiovascular symptom/complaint, other
Other heart disease	K81	Heart/arterial murmur NOS
	K82	Pulmonary heart disease
	K83	Heart valve disease
	K84	Heart disease, other
Other cardiovascular disease	K70	Infection of circulatory system
	K71	Rheumatic heart disease
	K72	Neoplasm, cardiovascular
	K73	Congenital anomaly, cardiovascular
	K99	Cardiovascular disease, other