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Commonwealth Department of Health and Family Services

Cancer Control

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Cancer control

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Executive summary

This report on cancer control is one of a series of biennial reports to Health Ministers on each of the five National Health Priority Areas (NHPA). It is part of a process that involves various levels of government and draws on expert advice from non-government sources, with the primary goal being to reduce the incidence of, mortality from, and impact of cancer on the Australian population.

Cancer has a major impact on the Australian community, in terms of morbidity, mortality and costs. On average, one in three men and one in four women are likely to develop cancer before the age of 75. The number of new cases of cancer has been steadily rising. Many of these new cases are due to population growth, the aging of the population and increased rates for the detection of some cancers. Mortality from cancer is decreasing, reflecting changes in patterns of exposure to risk factors, changes in treatment and early detection techniques and the use of medical services. The direct costs of cancer were estimated at $1.361 billion in 1993–94.

The NHPA process has identified specific cancers which represent issues of major concern in all States and Territories, and where significant gains can be achieved through prevention and control. The status of these cancers in 1997 and major issues for the future is summarised as follows.

Lung cancer

Current status

Lung cancer is the most common cause of cancer deaths among Australian males and the second most common cancer in Australia with approximately 7,300 new cases diagnosed each year, most of which go on to be fatal. Lung cancer rates in males exceed those in females by approximately three to one. Incidence and mortality rates are decreasing in males while those of females are increasing.

Prevention is the key to reducing the burden of lung cancer; smoking is by far its largest preventable cause. Actions to reduce lung cancer rates have focused on promoting cessation and decreased uptake of smoking, and on legislative changes to restrict tobacco sales and consumption.

Knowledge of lung cancer is rapidly expanding, with new techniques for early detection and improved treatment being evaluated.

Major issues

There is a wide range of strategies for tobacco control already in place at Commonwealth, State and Territory, local health authority and community level. However, community groups and health bodies want to further restrict tobacco sales and consumption.

Skin cancer

Current status

Non-melanocytic skin cancer is the most common cancer in Australia and Australia has the highest incidence rate in the world with between 250,000 and 300,000 new cases diagnosed each year. Non-melanocytic skin cancers even though more numerous are generally less life threatening than melanoma. Melanoma and non-melanocytic skin cancers show the greatest geographical variation in prevalence of any cancer across Australia, with Queensland having the highest rates. The estimated treatment costs for skin cancers are higher than the costs for any other cancer in Australia.

Primary prevention programs in Australia have been very successful in raising awareness of the dangers of exposure to sunlight and are generally effective in decreasing exposure to sunlight.

Opportunistic detection by general practitioners and targeting of specific high-risk population groups remain useful methods for early detection and diagnosis of skin cancer.

Major issues

Future preventive efforts may need to concentrate more on structural changes within the community, to decrease time in the sun and to increase protective shade structures and other physical means of protection. If an impact is to be made on future incidence rates of skin cancer in Australia, the nature and amount of sun exposure in children and adolescents need to be reduced.

Cancer of the cervix

Current status

Cancer of the cervix is the eighth most common cancer among Australian women, with approximately 1,000 new cases diagnosed each year. Both its incidence and mortality rates have been falling for many years, due mainly to the widespread use of Pap smear screening tests and the subsequent treatment of precancerous abnormalities. This is one of the few cancers where precancerous lesions are detectable and treatable. Hence, mortality from this cancer could be largely prevented with current screening and treatment methods.

Major issues

The development and implementation of effective and culturally appropriate strategies for screening groups with a higher incidence of cancer of the cervix would assist in increasing overall participation in the national screening program. The participation of Indigenous and older women is crucial if health gains from this screening program are to be optimised.

Increased quality assurance measures for laboratories and further encouragement for women and general practitioners to adhere to two-yearly screening would improve both the quality and cost-effectiveness of the national program.

Breast cancer

Current status

Breast cancer remains the most common cause of female cancer deaths in Australia, with nearly 9,800 new cases diagnosed and 2,600 deaths in 1994. In the ten years to 1994, breast cancer incidence rose by an average of 3 per cent. This rise in incidence results partly from improved and easier detection of breast cancers by the BreastScreen Australia program, although some proportion of the increase may be attributable to a real increase in disease rates. However, based on changes in incidence between 1994 and 1996, breast cancer incidence is expected to fall slightly by 1999.

Breast cancer cannot be prevented, so the major scope for reducing the impact of its mortality and morbidity is early detection through the national mammographic screening program, prompt diagnosis, and effective treatment based on the latest evidence.

Major issues

Issues in breast cancer control, such as rates of participation in the national BreastScreen program and the need for models of coordinated care, could be addressed by the establishment of a more integrated approach to the screening, diagnosis and management of the disease.

Colorectal cancer

Current status

Colorectal cancer is the second most common cancer affecting both males and females in Australia, with about 10,000 new cases diagnosed each year and 4,600 deaths. Incidence and mortality have remained stable over the past decade.

Currently there is no national screening program for colorectal cancer, because of uncertainties about which test to use, which groups to test and the likely degree of public acceptance. There is *ad hoc* screening of high-risk groups, such as those with a family history of colorectal cancer.

Major issues

There is great potential for control of colorectal cancer, through early diagnosis which allows for comparatively simple surgery, low morbidity and minimal community cost. Advanced disease demands the use of complex and costly treatment. The Australian Health Technology Advisory Committee (AHTAC) has undertaken a review of the benefits, risks and costs of national screening for colorectal cancer, and has recommended commencing pilot programs using faecal occult blood testing (FOBT) for the average risk population aged 50 years or more.

Prostate cancer

Current status

With nearly 13,000 new cases diagnosed each year, prostate cancer is the most common cancer, excluding non-melanocytic skin cancer, in Australian men. The reported incidence rose rapidly since the introduction of better detection methods in 1990. However, since 1994 incidence rates have declined, although not quite to their original level.

There is no evidence of any reduction in mortality associated with early detection in asymptomatic men. The current National Health and Medical Research Council (NHMRC) recommendation is that men without symptoms should not be screened for prostate cancer.

The optimum treatment for prostate cancer is subject to debate. The current trend is to adopt a watchful waiting approach in men aged over 75 years and with low grade tumours. Treatments such as radiotherapy or radical prostatectomy are being offered to younger men. This approach is seen by some as being a reasonable compromise until evidence from randomised controlled trials becomes available.

Major issues

Screening for prostate cancer should be discouraged unless evidence of benefit emerges which supports the development of a national screening program.

Ongoing audit is necessary as few Australian studies have reported outcomes of any form of treatment and there are often insufficient staging data to allow any comparison with international studies. Clarification of the role of various treatments in prostate cancer is severely restricted by the lack of reliable evidence-based information. Most importantly, there is a need for the development, testing and evaluation of appropriate information for men and their general practitioners.

Opportunities for improving cancer control

A focus on cancer types is useful in determining progress in cancer control, but other common factors should also be considered. Issues such as the identification and control of risk factors, the transfer of existing or new knowledge that is available through research into strategies against cancer, the kinds of data systems that are available, whether aspects of cancer services or treatment are different among particular population groups, and the role and rights of consumers, are all important in building a full picture of cancer control in the nation.

A comprehensive, rational approach at the national level can be promoted by discussing opportunities for improving cancer control within a systematic framework. This would consider the cancer types, the stages along the continuum of care and other categories of health system activity that are relevant to cancer. Such a framework would provide a blueprint for collaborative action under the NHPA process, which also draws in non-government expertise.

Opportunities for improving cancer control include:

- promoting comprehensive consumer participation in all aspects of cancer control;
- ensuring that preventive and screening strategies are accessible and effective, with a particular focus on special populations;
- promoting research which addresses important gaps in our knowledge of cancer prevention, early detection and treatment;
- improving the linkages between research and decision-making processes in cancer prevention and treatment;
- ensuring that treatment, rehabilitation, supportive care and palliation are accessible and effective;
- considering financial and other incentives for the promotion of evidence-based practice;
- improving and maximising the use of data as an essential tool in decision making;
- improving the integration of care across the health continuum; and
- encouraging the development of model centres of excellence in cancer care.

Cancer has a large impact on the Australian community. Some reduction of mortality and morbidity is possible, but there is still much work to be done to realise the full potential for cancer prevention control.

Introduction

Background

This report on cancer control is one of a series of biennial reports to Health Ministers on each of the five National Health Priority Areas (NHPA) — cardiovascular health, cancer control, injury prevention and control, mental health and diabetes mellitus.

While each report targets a discrete group of diseases or conditions and the recommended strategies for action are often specific in nature, the NHPA initiative recognises the role played by broader population health initiatives in realising improvements in the health status of Australians. Public health strategies and programs which target major risk factors such as smoking may benefit several priority areas, including cancer and cardiovascular health.

This report on cancer control is part of an encompassing NHPA process that involves various levels of government and draws on expert advice from non-government organisations, with the primary goal being to reduce the incidence of, mortality from, and impact of cancer on the Australian population.

The National Health Priority Areas initiative

Based on current international comparisons, the health of Australians is among the best in the world and should continue to improve with continued concerted efforts across the nation. The NHPA initiative emphasises collaborative action between Commonwealth and State and Territory Governments, the National Health and Medical Research Council (NHMRC), the Australian Institute of Health and Welfare (AIHW), non-government organisations, appropriate experts, clinicians and consumers. It recognises that specific strategies for reducing the burden of illness should be holistic, encompassing the continuum of care from prevention, through to treatment, and management and maintenance, all underpinned by evidence based on appropriate research.

By targeting specific areas which impose high social and financial costs on Australian society, collaborative action can achieve significant and cost-effective advances in improving the health status of Australians. The diseases and conditions targeted through the NHPA process were chosen because these are the areas where significant gains in the health of Australia's population can be achieved.

From National Health Goals and Targets to National Health Priority Areas

The World Health Organization (WHO) published the *Global Strategy for Health for All by the Year 2000* in 1981. In response to this charter, the *Health for All Australians* report was developed and represented Australia's 'first national attempt to compile goals and targets for improving health and reducing inequalities in health status among population groups' (Health Targets and Implementation Committee 1988). The 20 goals and 65 targets focused on population groups, major causes of sickness and death, and risk factors.

A revised set of targets was published in 1993 in the *Goals and Targets for Australia's Health in the Year 2000 and Beyond* report (Nutbeam et al 1993). Goals and targets were established in four main areas: reductions in mortality and morbidity, reductions in health risk factors, improvements in health literacy, and the creation of health-supportive environments. However, this framework was not implemented widely.

Introduction

The *Better Health Outcomes for Australians* report was released in 1994 and refined the National Health Goals and Targets program. The focus of goals and targets was shifted to four major areas for action — cardiovascular health, cancer control, injury prevention and control, and mental health. As a corollary to this, Australian Health Ministers also adopted a national health policy which committed the Commonwealth and State and Territory Governments to develop health goals and targets in the priority health areas and re-orient the process towards population health.

In 1995, it was recognised that there were a number of fundamental shortcomings of the National Health Goals and Targets process, principally, that there were too many indicators (over 140 across the four health priority areas), there was a lack of emphasis on treatment and ongoing management of the disease/condition, and there was no national reporting requirement. In implementing a goals and targets approach, emphasis was placed on health status measures and risk factor reduction. However, no nationally agreed strategies were developed to promote the change required to reach the targets set.

This led to the establishment of the current NHPA initiative. Health Ministers agreed at their July 1996 meeting that a national report on each priority area be prepared every two years, to give an overview of their impact on the health of Australians. These reports would include a statistical analysis of surveillance data and trends for a set of agreed national indicators. It was also agreed that diabetes mellitus become the fifth NHPA.

A consolidated report on progress in all the priority areas was presented to Health Ministers in August 1997, the *First Report on National Health Priority Areas 1996* (AIHW & DHFS 1997).

Development of the report

In developing this report, the National Health Priority Committee (NHPC) sought the assistance of both the National Cancer Control Initiative (NCCI), to provide expert advice on cancer control, and the Australian Institute of Health and Welfare (AIHW), to provide statistical analysis of cancer data.

The NCCI was established in February 1997 to develop a comprehensive national response to cancer, including the provision of independent, expert advice to the Commonwealth Health Minister on all issues relating to cancer control in Australia.

An important part of the NCCI's activities has been the development of a *Priority Issues Discussion Paper on Cancer*, produced in July 1997, which detailed current incidence, mortality and estimated costs associated with cancer in Australia. The paper also outlines the priority setting process which the NCCI undertook for the National Cancer Control Plan and Implementation Strategy, delivered to the Commonwealth in December 1997.

The NCCI sought input on various aspects of cancer control through its extensive network of experts working in the field. This input forms the NCCI's contribution to the NHPA report. In providing advice on cancer control to the NHPC, the NCCI reviewed current cancer research, current practice in prevention, treatment and management, and other activities in the field of cancer control. Through a wide consultation process, the NCCI has developed a holistic view of the imperatives in cancer control. This high level of cooperation reflects one of the great strengths of the health system in Australia.

Data development and statistical analysis, including determination of trends and differentials by the AIHW form the basis for reporting against the agreed set of cancer indicators.

Purpose and structure of the report

The *First Report on National Health Priority Areas 1996* provided baseline data and underlying trends in the five National Health Priority Areas. This report on cancer control builds on that report and outlines strategies for change across the continuum of care for cancer control. The data component of this report updates the indicators in the First Report and continues the monitoring of trends and differentials in cancer control.

This report focuses on specific cancers which represent issues of major concern in all States and Territories, and where significant gains can be achieved through prevention and disease management. These are:

- lung cancer;
- skin cancer (melanoma and non-melanocytic skin cancer);
- cancer of the cervix;
- breast cancer;
- colorectal cancer; and
- prostate cancer.

Chapter 1 includes an overview of cancer, including a profile of the disease, its known causes, the range of strategies used in cancer control and a comparison of the incidence and mortality rates of various cancers.

Chapter 2 focuses on the current status of each NHPA cancer, including its epidemiology, known risk factors, direct and indirect costs, and key activities in prevention, screening, early detection and treatment.

Chapter 3 considers major issues for consideration by Health Ministers, for each NHPA cancer specifically and for issues that apply to cancer control generally. There is also a discussion of planning, including incentives to achieve desired changes.

Throughout this report the gaps in information about each of the cancers are highlighted as are the barriers to interventions which might reduce their incidence, morbidity and/or their mortality.

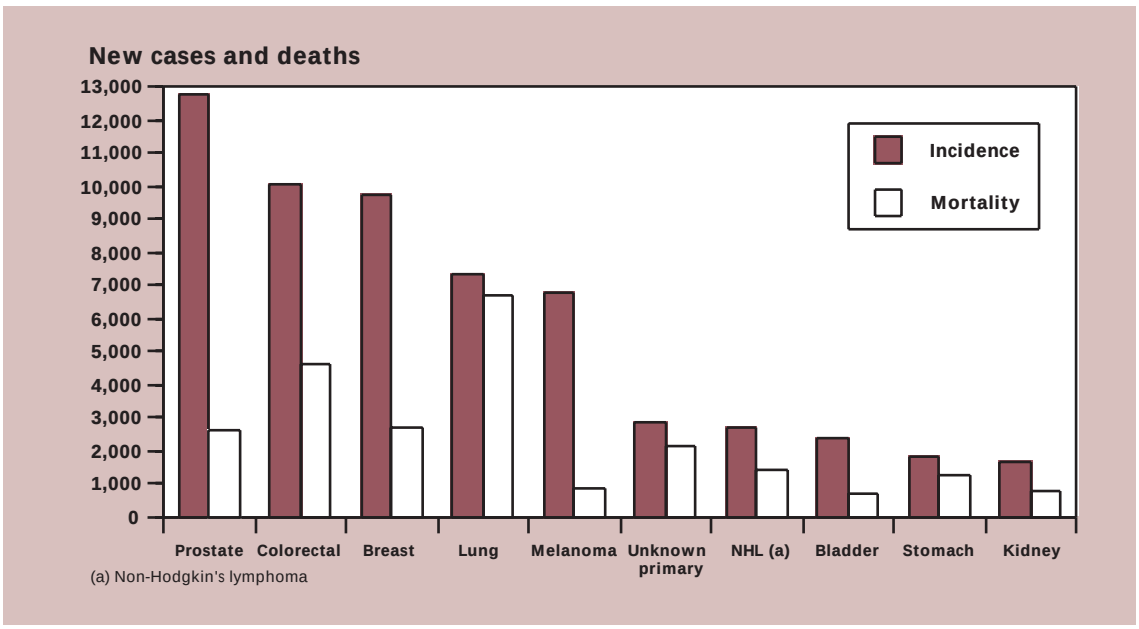
Chapter 1
Overview

1.1 Profile of cancer

Cancer is a diverse group of diseases characterised by the proliferation and spread of abnormal cells, which cannot be regulated by normal cellular mechanisms and grow in an uncontrolled manner. These cells can invade and destroy surrounding tissue and spread (metastasise) to distant parts of the body. Cancer can develop from most types of cells and each cancer has its own pattern of behaviour and metastasis. While some cancers share common causes or risk factors, it is believed that most cancers have a unique set of factors responsible for their initiation. The incidence of cancer continues to increase and, while the overall death rate has begun to fall, the death rate from many of the most common cancers is either stable or increasing.

The impact of cancer on the Australian community is significant. Figure 1.1 illustrates the incidence and mortality of leading cancers in Australia. On average, one in three men and one in four women are likely to develop cancer before the age of 75. The latest national incidence information indicates that there were 75,498 new cases of cancer diagnosed in Australia in 1994. This excludes non-melanocytic skin cancers (at least another 250,000–300,000 new cases). In 1996, there were 34,302 cancer deaths.

Figure 1.1 Leading cancers (excluding non-melanocytic skin cancer), Australia, 1994



Mortality rates for all cancers in both males and females were stable for the period 1921–35 (at 180 for males and 150 for females per 100,000), after which female mortality rates declined slowly to the current level of 139 per 100,000. All cancer mortality rates for males climbed to a high in 1985 (248 per 100,000), after which they have shown a slight decline to 231 per 100,000 (1996). These changes reflect variations in patterns of risk factors as well as improvements in treatment and early detection techniques.

Projections of cancer incidence rates suggest that Australia will have approximately 76,000 new cancer cases per annum diagnosed by 1999. The total annual number of cases of cancer has been steadily increasing since national incidence data were first collected in 1982. Many of these new cases are due to population growth and, importantly, to the aging of the population. Better diagnosis has also contributed to the recorded increased incidence. The risk of cancer increases with age, with 30 per cent of cases diagnosed in those aged 45–64 and 59 per cent of cases diagnosed in those over the age of 65.

In general, cancer develops over many years (up to 20 years). It is estimated that 30 per cent of cancers are a direct result of smoking, 30 per cent are due to dietary influences, 2 per cent are due to radiation exposure, 5–15 per cent to infectious agents and the remainder to other causes (Trichopoulos et al 1996). Some of the causes can be reduced through lifestyle changes, while others are inherited and are difficult to modify. The risk of death from certain cancers may be reduced through intensive monitoring of individuals, reducing additional risk factors and treating newly diagnosed cancers early in their development.

The keys to cancer control are prevention, screening and early detection and effective treatment. These have differing degrees of effectiveness depending on the cancer type.

Primary prevention

Environmental or lifestyle factors play an important role in the initation and development of cancer. Much of this exposure is potentially preventable. At least a third of cases can be prevented, if existing knowledge is used to encourage behavioural change (Parkin et al 1994; Potter et al 1997).

For cancers, where there are known modifiable risk factors, primary prevention is the main focus of cancer control. The risk factors most amenable to primary prevention measures are smoking, exposure to sunlight and, to some degree, diet. Proven preventive activities include measures such as smoking and tobacco control to reduce lung cancer, and 'sun smart' activities to reduce skin cancer. Diet is thought to be associated with the onset of certain cancers, including colorectal cancer, although the relationship is not fully understood. Little is known at this stage about risk factors for cancers of the breast and prostate, so there are limited opportunities for primary prevention at present.

Screening and early detection

Screening and early detection are based on the understanding that the earlier in their development most cancers are treated, the greater the likelihood of an acceptable outcome. Population-based screening can be used for breast cancer, where tumours can be detected early, and cancer of the cervix, where precancerous

changes can be detected. For some other cancers (eg melanoma), early detection through opportunistic screening by general practitioners or targeting high-risk groups may be more effective.

Treatment of cancer

Cancer treatment aims to cure the disease, prolong life and improve the quality of life. The main treatment modalities for cancer are surgery, radiotherapy, chemotherapy, hormone therapy or a combination of these. Rehabilitation and supportive care play an important role in maximising the effectiveness of these treatments.

It is increasingly recognised that the major modalities of cancer therapy can interact to improve cancer control (Selby et al 1996). Multimodal therapy is now used for the management of some primary tumours and to improve survival following apparently successful surgical excision but has a variable role in the management of advanced disease. A good example is oesophageal cancer. For this cancer, neo-adjuvant or pre-operative chemotherapy and radiotherapy shrink tumours and allow surgery to be used more effectively (Law & Wong 1997). The challenge for cancer control is to develop systems to allow effective and efficient multidisciplinary management.

As cure rates for cancer rise, the rehabilitation of cancer survivors will assume increasing importance. Significant issues include physical adaptation to the side effects of cancer treatment, psychological adjustment and social relocation. Costs and quality of prostheses, travel and accommodation for rural residents, cultural issues for people from non-English speaking and Indigenous backgrounds and access issues for reconstructive surgery and supportive services are central to effective rehabilitation.

Palliative care is the care of people whose disease is not responsive to curative treatment. Care is delivered by coordinated medical, nursing and allied health services which are provided, where possible, in the environment of the person's choice. Control of pain, of other symptoms and provision of psychological, social, emotional and spiritual support is paramount. Approximately 80–90% of people who use palliative care services have a diagnosis of cancer (Kasap and Associates, 1996).

Palliative care aims for the achievement of the best possible quality of life for patients and their families and friends. Many aspects of palliative care are also applicable earlier in the course of the illness in conjucntion with treatment aimed at cure.

Costs of cancer

In 1993–94, the estimated total direct health system costs of cancer in Australia were $1,361 million. These include costs for hospital inpatient and outpatient services, nursing homes, medical services, pharmaceuticals, allied health services, research, other institutional and administration but do not include the cost of ambulance services, community health services, or medical aids and appliances. Indirect costs such as those associated with lost productivity due to sickness and premature death, and intangible costs such as those due to pain, suffering, anxiety and bereavement, are not included.

Cancer costs accounted for 4 per cent of the total direct costs of all diseases ($31,397 million) in 1993–94. These rank eighth in terms of direct costs, behind diseases of the digestive system (12 per cent), cardiovascular disease (12 per cent), musculoskeletal conditions (10 per cent), mental disorders (8 per cent), injury and poisoning (8 per cent), respiratory disease (8 per cent), and diseases of the nervous system and sense organs (7 per cent).

National Health Priority Areas cancers

The most common cancer in Australia in both males and females is the non-melanocytic skin cancer. There are no national data but surveys have shown that the rate of treated non-melanocytic skin cancer is approximately six times that of the next most common cancer (Marks et al 1993). The next most common cancers in males are cancers of the prostate, colon and rectum, lung, melanoma of the skin and bladder. Common cancers in females are those of the breast, colon and rectum, melanoma of the skin and lung. Figures 1.2 and 1.3 illustrate the most common cancers in Australia.

Excluding non-melanocytic skin cancer, NHPA cancers account for 63 per cent of all cancers and almost 50 per cent of the total direct costs of cancer in 1993–94. Non-melanocytic skin cancer was the biggest contributor to cancer costs in 1993–94 with a total direct cost of $190 million. The direct costs of colorectal cancer were $152 million, of lung cancer were $103 million, of prostate cancer were $95 million, of female breast cancer were $93 million, of melanoma were $17 million, and of cancer of the cervix were $10 million.

Colorectal cancer has the highest costs per new case ($15,182). Lung cancer ranks second with a cost of $14,075 per new case, followed by female breast cancer ($9,632), cancer of the cervix ($9,052), prostate cancer ($7,459), and melanoma ($2,557).

Due to their significant impact on the Australian community, lung cancer, skin cancer (both melanoma and non-melanocytic skin cancer), cancer of the cervix, breast cancer, colorectal cancer and prostate cancer are the focus of the NHPA on cancer control. There are good prospects for primary, secondary and tertiary preventive intervention. However, it should be noted that these are not the only cancer types which offer good prospects for reduction in morbidity and mortality.

The *First Report on National Health Priority Areas 1996* (AIHW & DHFS 1997) provide baseline data and underlying trends of the mortality and incidence of each NHPA cancer. This disease-specific focus is supplemented by the identification of three process indicators. The first two relate to cervical and breast cancer screening and the last to the establishment of hospital-based cancer registries. Table 1.1 lists the priority indicators which are reported in Chapter 2.

Figure 1.2 Leading cancers (excluding non-melanocytic skin cancer), males, Australia, 1994

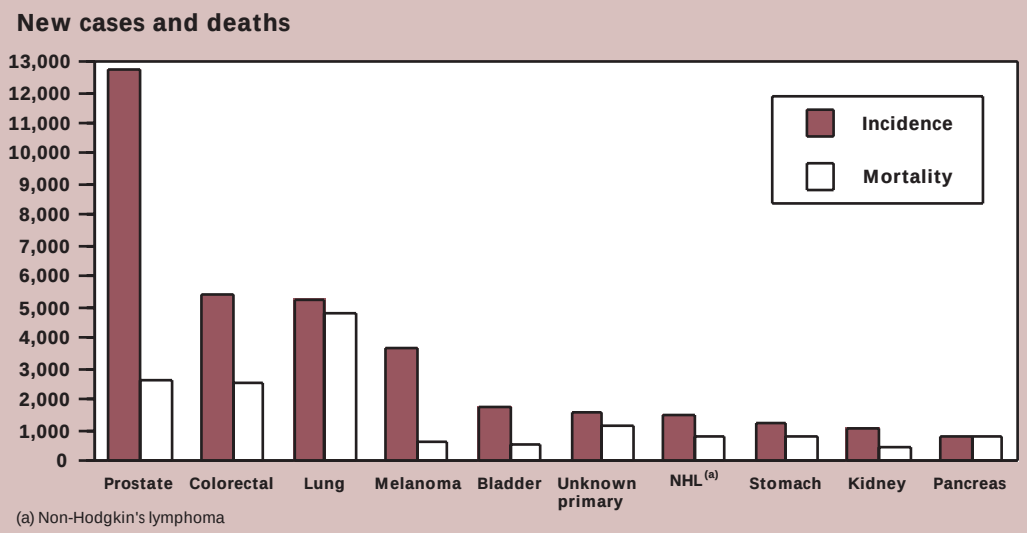


Figure 1.3 Leading cancers (excluding non-melanocytic skin cancer), females, Australia, 1994

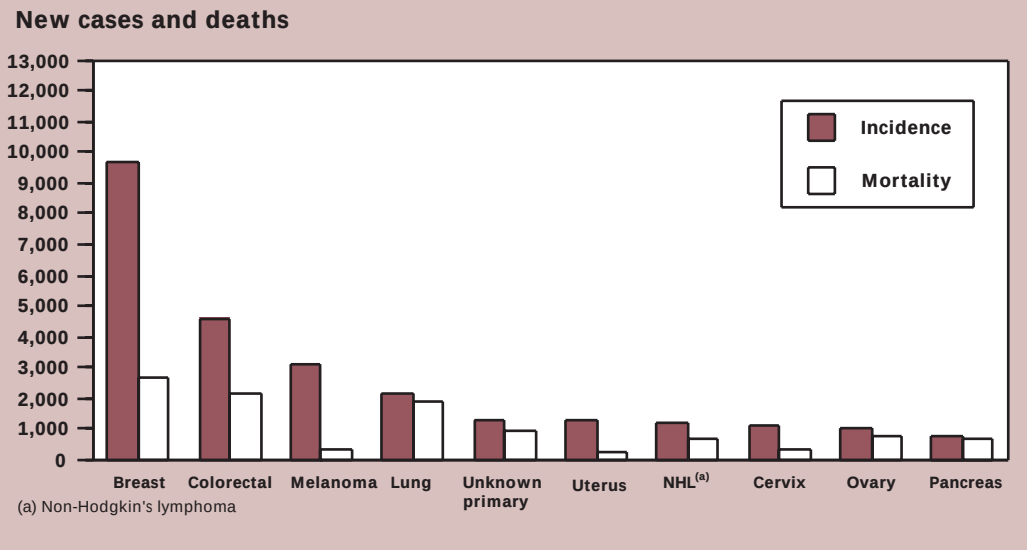


Table 1.1 Priority cancer indicators*

Reported in First Report on National Health Priority Areas 1996	Updated for current report
Incidence of lung cancer (1990 data)	1994
Death rate for lung cancer (1994 data)	1996
Incidence of melanoma of the skin (1990 data)	1994
Death rate for melanoma of the skin (1994 data)	1996
Incidence of (treated) non-melanocytic skin cancer (1990 data)	No further data available
Death rate for non-melanocytic skin cancer (1994 data)	1996
Incidence of cancer of the cervix (females aged 20-74) (1990 data)	1994
Death rate for cancer of the cervix (females aged 20-74) (1994 data)	1996
Incidence of breast cancer (females aged 50-74) (1990 data)	1994 (semi-national to 1996)
Death rate for breast cancer (females aged 50-74) (1994 data)	1996
Incidence of colorectal cancer (1990 data)	1994
Death rate for colorectal cancer (1994 data)	1996
Incidence of prostate cancer (1990 data)	1994 (semi-national to 1996)
Death rate for prostate cancer (1994 data)	1996
Proportion of females aged 50-69 screened for breast cancer (1994/95 data)	No further data available
Proportion of females aged 20-69 screened within specified intervals for cancer of the cervix (1992-94 data)	No further data available

* Priority indicators for which data were not available to report against are listed in Appendix 2.

The breast and cervical cancer screening indicators (Table 1.1) examine the proportion of women attending for screening within a defined target population. These are reported for 1994–95 for the breast cancer program and for 1992–94 for the cervical screening program. More recent data related to these screening programs has not been collected at a national level since the publication of the first NHPA report. To address this situation, the AIHW has been contracted by the Department of Health and Family Services to work with the State and Territory screening programs to collect these data and report on them in a standardised way, together with a range of other screening indicators. This process is currently underway and is expected to deliver its first results in 1998.

Chapter 2

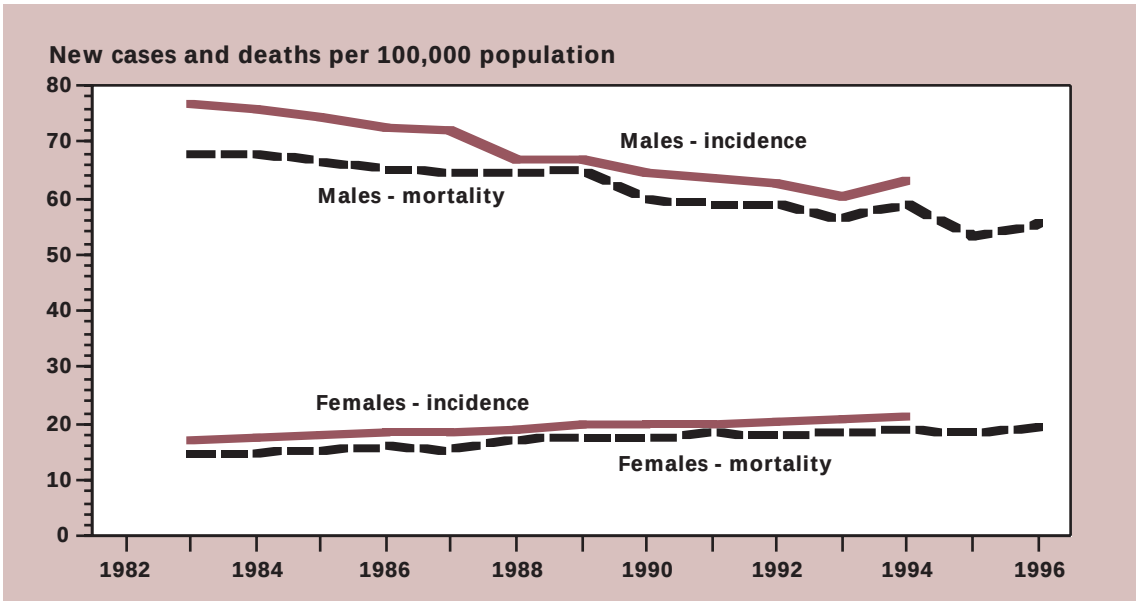
National Health Priority Areas cancer sites — current status

2.1 Lung cancer

Epidemiology

Cancer of the lung is the most common cause of cancer death among males and the fourth most common cancer in Australia. Lung cancer incidence and mortality rates in males exceed those in females by approximately three to one and increase with age.

Figure 2.1 Lung cancer — incidence and mortality trends



Since the early 1980s, there has been a steady decline in male lung cancer incidence by approximately 18 per cent, while female lung cancer increased by approximately 23 per cent (Figure 2.1). Projections of incidence data indicate that the rate of lung cancer in males will continue to fall to 58.6 per 100,000 (approximately 5,400 new cases) in 1999. Among females, the current rate of increase is projected to continue to a rate of 22.8 per 100,000 (approximately 2,600 new cases) in 1999. In 1994, there were 5,196 new cases diagnosed in males and 2,110 cases in females, accounting for 12.2 per cent of all new cancers in males and 6.4 per cent in females.

In 1996, lung cancer was the cause of 4,773 male deaths and 2,054 female deaths. Mortality from this cancer results in approximately 46,500 potential years of life lost before the age of 74 (Table 2.1), making it the most significant cancer in Australia based on this measure. Five-year survival rates are poor, at around 10 per cent for both males and females.

Table 2.1 Fast facts on lung cancer

Australia	Males	Females
New cases (1994)	5,196	2,110
Incidence rate (per 100,000)	63.1	21.1
Incidence trends (1990-94)	-0.6%pa	+1.2%pa
% all new cancers	12.2	6.4
Lifetime risk (0-74 years)	1 in 19	1 in 51
Deaths (1996)	4,773	2,054
Mortality rate (per 100,000)	55.4	19.4
Mortality trends (1990-96)	-1.3%pa	+2.0%pa
Potential years of life lost (0-74 years)	31,343	15,120
Lifetime risk (0-74 years)	1 in 22	1 in 59
Costs ($ '000) (1993-94)	71,146	31,685

Table 2.2 States and Territories — lung cancer

	1991–94 Incidence		1991–94 Mortality	
State/Territory	Males	Females	Males	Females
	New cases and deaths per 100,000 population			
NSW	63.7	21.2	56.5	18.2
VIC	63.7	21.8	58.0	19.8
QLD	63.5*	19.3*	56.8	16.9
WA	65.3	24.1	57.5	20.0
SA	64.8	20.8	55.9	17.1
TAS	68.7	22.9	59.3	20.9
ACT	51.2	22.8	46.9	18.0
NT	66.9	41.5	84.8	37.7

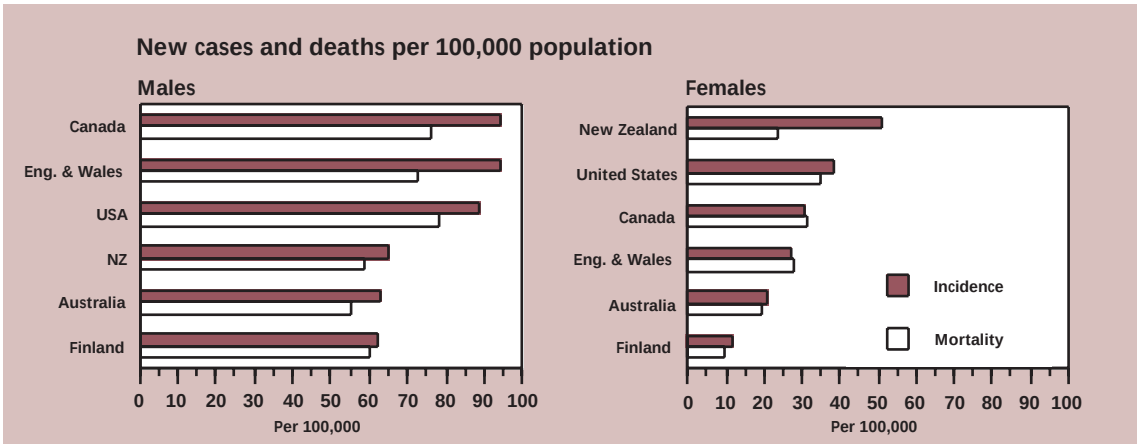
* Preliminary data.

There is limited variability in lung cancer incidence and mortality rates within Australia, except in the Australian Capital Territory where both the rates for males are much lower (Table 2.2). Incidence rates in the Northern Territory are higher for both males and females, but are subject to wide variability due to the relatively small size of the population.

National incidence and mortality data are not available for Indigenous Australians, however, data from the Northern Territory indicate that the incidence of lung cancer is higher in Indigenous Australians than non-Indigenous Australians.

In comparison with other major developed countries, Australia has lower lung cancer incidence and mortality rates for both males and females (Figure 2.2).

Figure 2.2 International comparisons — lung cancer



Note: Age-standardised rates for Australia (incidence–1994; mortality–1996) and other selected countries (incidence–1983–95; mortality–1993–94).

In Australia, males and females born in the UK, males born in Northern Europe and Malta and females born in New Zealand, Hungary, China, South Africa and the United States, appear to have significantly higher age-standardised mortality rates for lung cancer than the Australian born population (Giles et al 1995).

Risk factors

Smoking tobacco strongly increases the risk of lung cancer and accounts for approximately 85 per cent of new cases. This risk is associated with the cumulative exposure to tobacco smoke. Lung cancer risk rises with age. Risk factors also include exposure to other carcinogenic particulates.

Prevention

Prevention is the key to reducing the burden of lung cancer, as tobacco smoking is by far its largest preventable cause. The risk is associated with both the years of use and the amount smoked. There are no identified safe levels of tobacco consumption.

Rates of smoking in Australia

Smoking rates among adults have declined since the early 1980s. The most recent estimates suggest that there are 3.2 million adult smokers in Australia (28 per cent of males and 22 per cent of females) (DHFS 1995). The highest prevalence of smoking (31.2 per cent) is among those aged 18–34 years (ABS 1997).

Young people are a priority population for lung cancer prevention. Australian studies have demonstrated that by 14–16 years of age, 15 per cent of adolescents are smoking each day, and that in the last three years of secondary school, the prevalence of daily smoking increases from 15 per cent to 31 per cent (Stanton et al 1996). The earlier a smoker takes up the habit, and the longer their exposure to tobacco, the more likely it is that they will develop lung cancer or one of the other known smoking-caused diseases.

Smoking rates remain higher in less advantaged socio-economic groups. Adults classified as 'blue collar workers' have approximately twice the smoking prevalence rates of those classified as 'white collar workers' (Hill et al 1991). Of university graduates, 18 per cent of males and 14 per cent of females smoke, compared with 34 per cent of males and 25 per cent of females who attained an educational level of Year 9 or less (Hill et al 1991). The percentage of Indigenous persons who smoke is about twice the national average, being 56 per cent among males and 48 per cent among females (ABS & AIHW 1997). Smoking rates are also high among males born in Vietnam, Greece and the Middle East (AIHW, unpublished data).

Reducing tobacco caused harm

All Australian governments are committed to a comprehensive approach to reduce the harm caused by use of tobacco. This commitment is reflected in the National Health Policy on Tobacco, which was endorsed by the Ministerial Council on Drug Strategy in 1991. The National Health Policy recommends a multivariate approach to tobacco control incorporating advertising bans, education campaigns, restrictions on supply of tobacco products and enforcement of legislation (such as the NSW Sales to Minors Program) as essential strategies.

A recent example of a collaborative national effort to address the issue is the National Tobacco Campaign using the theme 'Every Cigarette is Doing You Damage'. The campaign, launched by the Commonwealth Minister for Health and Family Services in June 1997, is the first truly national anti-smoking campaign undertaken in Australia. The planning for the campaign involved extensive consultations with State and Territory Governments, *Quit* organisations across the country, the anti-smoking lobby and health professionals including the Australian Medical Association, the Royal Australasian College of General Practitioners, the National Heart Foundation and the Australian Cancer Society.

Quit campaigns in most States have helped to highlight the risks of smoking, as well as providing advice on cessation and promoting reduced uptake. Cessation is the most effective method of reducing the risk of lung cancer in smokers. Estimates suggest that 48 per cent of smokers in Victoria attempt to quit in any one year. Five per cent of smokers are able to quit for more than three months, 6 per cent for less than three months, and 37 per cent relapse (Silagy et al 1996).

The use of nicotine replacement therapy (NRT) significantly increases the chance of smokers abstaining long term. A meta-analysis of trials investigating the effects of NRT reveals a success rate of 18 per cent compared with 10 per cent in a control group (Silagy et al 1996). Behavioural modification and relapse prevention have also been shown to improve the likelihood of abstinence (Baillie et al 1994; Law & Tang 1995).

Risk of passive smoking

A recent report on passive smoking (NHMRC 1997) summarises the available evidence linking passive smoking with disease. Important associations are noted between passive smoking and several serious illnesses including asthma in children, lower respiratory infections, lung cancer, major coronary conditions and other diseases.

Measures to reduce tobacco smoking in public and work environments are likely to significantly reduce the risk to non-smokers. Strategies are also required to reduce the effect of passive smoking in the home environment.

Smoking prevention and cessation strategies

A major focus in smoking prevention has been on restricting the promotion of tobacco products, including bans on all but the most limited forms of tobacco advertising and a national system of strengthened health warnings on tobacco products.

The promotion of smoke-free policies which ban smoking in all workplaces and enclosed public places has had a significant impact. There is consistent evidence from studies in Australia, Europe and North America that the adoption of smoke-free policies in workplaces is followed by a net reduction in the number of cigarettes smoked daily among those who continue to smoke (Chapman et al, in press). Given adequate information and notice, compliance with smoke-free policies has been extremely high (Borland et al 1990; Wakefield et al 1996). Surveys show widespread support for extension of smoke-free policies, including in the hospitality industry (Schofield et al 1993; Jones et al, in press). While workplace smoking bans are becoming more common, small workplaces have the poorest rates of uptake of these policies (Wakefield et al 1996).

Screening and early detection

Reliable methods for early detection of lung cancer are yet to be developed. If such methods were developed, an effective screening and early detection program would be expected to have a major impact on lung cancer mortality in Australia because:

- currently, less than 30 per cent of patients are suitable for potentially curative treatment at presentation; and
- lung cancer rates are likely to remain at epidemic levels for at least the next 30 years. This is because the prevalence of smoking in Australian adults remains high, and because ex-smokers have an elevated risk of developing lung cancer, even if they have not smoked for many years (Lung Cancer Consultative Group 1997).

There is increasing evidence to support case detection strategies using serial chest X-rays and possibly sputum cytology in selected groups of high-risk smokers. These strategies are currently being advocated and practised by a number of Australian specialists (Lung Cancer Consultative Group 1997; McCaughan 1996).

Several new detection techniques are being developed for screening. Recent studies investigating the benefit of gene therapy and use of molecular markers for early diagnosis have shown promising results (Mao et al 1994; Sidransky 1995).

Treatment

Accurate staging of lung cancer is essential to determine optimal therapy. In particular the therapeutic modalities vary with the type of lung cancer. Lung cancer can be divided into two categories — non-small-cell lung cancer (NSCLC) and small-cell lung cancer (SCLC) and are treated differently. SCLC comprises 20 per cent of all lung cancer cases with the remaining 80 per cent of lung cancers, including adeno-carcinoma, squamous cell carcinoma and large-cell undifferentiated carcinoma, being classified as NSCLC (American Society of Clinical Oncology 1997).

Surgery has a proven survival advantage in early stage lung cancer, provided the tumour is completely resected (Lung Cancer Consultative Group 1997). Patients with peripheral tumours extending beyond the lung into adjacent structures also benefit from surgery. There is a limited role for surgical resection in highly selected patients with more advanced disease. Recent randomised data indicate a survival advantage in those patients given induction chemotherapy who subsequently undergo complete surgical resection of their tumour (Roth et al 1994). There is growing interest in the use of induction therapy (pre-operative chemotherapy alone or in conjunction with radiotherapy) in patients with advanced disease, followed by surgery or radiation therapy (Lung Cancer Consultative Group 1997; Flehinger et al 1993).

Radiotherapy and chemotherapy are used principally for palliative treatment of lung cancer, although high-dose radiation therapy provides a survival advantage in patients with early stage disease who are unsuitable for surgery or after incomplete resection (Lung Cancer Consultative Group 1997).

Developments are likely to include:

- improving the detection rate of potentially resectable primary lung cancer;
- assessing the role of chemotherapy and radiation therapy, used concurrently or sequentially, as induction therapy before surgery in locally advanced NSCLC; and
- evaluating the use of molecular markers in early screening and prognosis prediction.

Non-small-cell lung cancer

Of patients with NSCLC, 60–70 per cent present with advanced disease and are therefore not suitable for curative treatment (Lung Cancer Consultative Group 1997). In these patients, effective palliation is the principal aim of therapy. Of those undergoing curative treatment, a cure is achieved in about 50 per cent of patients (Lung Cancer Consultative Group 1997).

Small-cell lung cancer

Management of advanced SCLC has traditionally been with chemotherapy. However, radiation may be used for specific metastatic sites that are symptomatic, such as bone or brain metastases. Early data has shown that prophylactic cranial irradiation following chemotherapy in SCLC may confer a survival advantage but this area remains controversial (Turrisi 1997).

Combined modality therapy, concurrent radiation and chemotherapy, is the current standard treatment for limited non-bulky disease and results in rapid response and moderate toxicity (Turrisi 1997). Sequential therapy of initial chemotherapy followed by consolidating radiation therapy is reserved for patients with bulky disease. Molecular abnormalities may precede the occurrence of malignancy and may have diagnostic and prognostic value in SCLC (Mills et al 1995).

Developments in treatment are likely to include:

- evaluation of the mechanisms of resistance to chemotherapy and radiation therapy and methods to overcome these;
- evaluation of genetic markers of prognosis in SCLC; and
- evaluation of new chemotherapeutic regimes and molecular therapy for use in SCLC.

Lung cancer — current status

- **Lung cancer remains the leading cause of death in Australian males. Lung cancer rates in males exceed those in females by approximately three to one. Incidence and mortality rates in men are decreasing while those in women are increasing. Survival rates are very poor.**
- **Prevention is the key to reducing the burden of lung cancer, as smoking is by far its largest preventable cause. Action to reduce lung cancer rates has focused on promoting cessation and decreasing uptake of smoking, and on legislative changes to restrict tobacco sales and consumption.**
- **Knowledge of lung cancer is rapidly expanding, with new techniques for early detection and improved therapy now being evaluated.**

2.2 Skin cancer

Epidemiology

Skin cancer is the most common cancer in Australia (Giles et al 1988). It can be divided into melanoma and non-melanocytic skin cancer, the latter being more numerous but less life threatening. Both types are common in Australia, and both have been identified as NHPA cancers.

Non-melanocytic skin cancers

There are no national incidence data but surveys have shown that the rate of treated non-melanocytic skin cancer is approximately six times that of the next most common cancer (Marks et al 1993). Provided non-melanocytic skin cancers are treated early, they can usually be cured. Despite this, mortality has been increasing since the late 1980s.

Table 2.3 Fast facts on non-melanocytic skin cancer

Australia	Males	Females
Incidence rate (per 100,00)* (1985)	944	714
Incidence rate (per 100,00)* (1995)	1,374	857
Deaths (1996)	252	117
Mortality rate (per 100,000)	3.1	1.0
Mortality trends (1990-96)	+0.5%pa	+10.1%pa
Potential years of life lost (0-74 years)	1,093	425
Lifetime risk (0-74 years)	1 in 655	1 in 1,974
Costs ($ '000) (1993-94)	111,503	75,489

* Treated non-melanocytic skin cancer.

Melanoma

Melanoma is the fourth most common cancer in males and the third most common cancer in females. In 1994, it accounted for 8.7 per cent of all new cancers in males and 9.4 per cent in females. Since the early 1980s, there has been a 66 per cent increase in male melanoma incidence and a 26 per cent increase in female melanoma incidence, with 3,695 and 3,081 new cases diagnosed in males and females respectively in 1994 alone.

Projections of incidence data indicate that the rate of melanoma in males will continue to rise to 49.1 per 100,000 (4,700 new cases) in 1999. The incidence rate in females is also likely to continue increasing, to a projected rate of 35.9 per 100,000 (3,800 new cases) in 1999. Five-year survival rates are good at around 90 per cent and higher at early stages of detection.

Between the 1950s and the 1990s, melanoma mortality increased five-fold in males and two-fold in females. In 1996, there were 586 male deaths and 326 female deaths from melanoma. However recently, melanoma mortality rates for both sexes have been relatively stable (Figure 2.3). Melanoma deaths result in approximately 11,000 potential years of life lost before the age of 75.

Figure 2.3 Melanoma — incidence and mortality trends

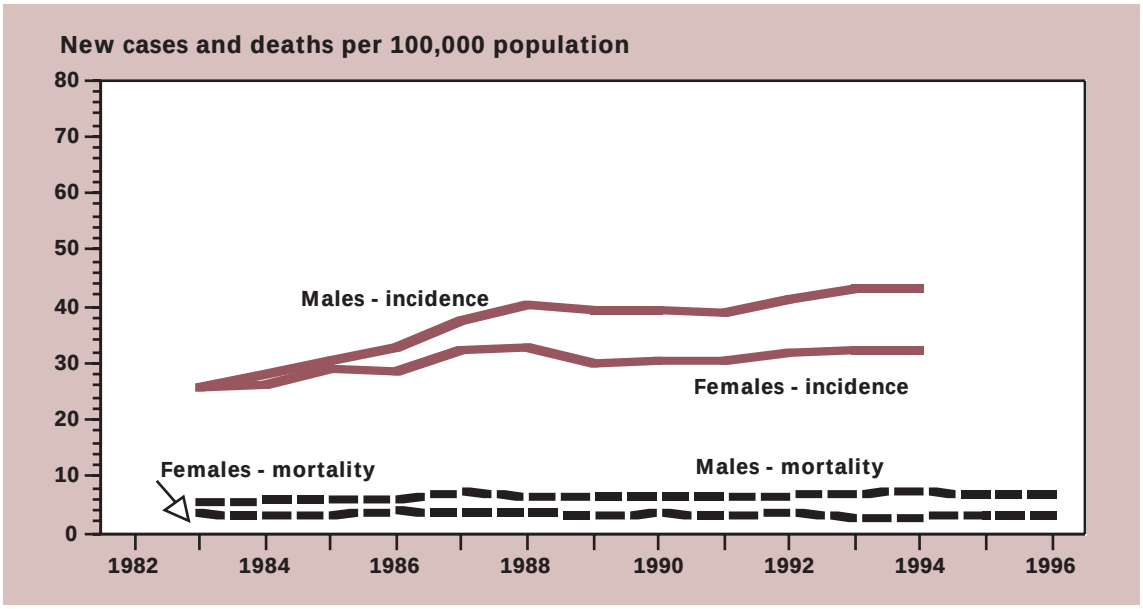


Table 2.4 Fast facts on melanoma

Australia	Males	Females
New cases (1994)	3,695	3,081
Incidence rate (per 100,000)	42.9	32.4
Incidence trends (1990-94)	+2.2%pa	+1.7%pa
% all new cancers	8.7	9.4
Lifetime risk (0-74 years)	1 in 28	1 in 37
Deaths (1996)	586	326
Mortality rate (per 100,000)	6.7	3.0
Mortality trends (1990-96)	+0.3%pa	+2.2%pa
Potential years of life lost (0-74 years)	7,070	3,940
Lifetime risk (0-74 years)	1 in 207	1 in 440
Costs ($ '000) (1993-94)	9,331	7,999

Table 2.5 States and Territories — melanoma

State/Territory	1991-94 Incidence		1991-94 Mortality	
	Males	Females	Males	Females
	New cases and deaths per 100,000 population			
NSW	44.3	31.4	7.9	3.2
VIC	30.2	25.7	5.7	2.9
QLD	54.9*	40.3*	8.2	3.3
WA	47.0	34.9	6.6	3.2
SA	38.1	32.9	4.6	2.8
TAS	32.3	26.9	4.3	2.7
ACT	35.0	25.0	6.7	3.3
NT	25.3	16.4	8.6	2.2

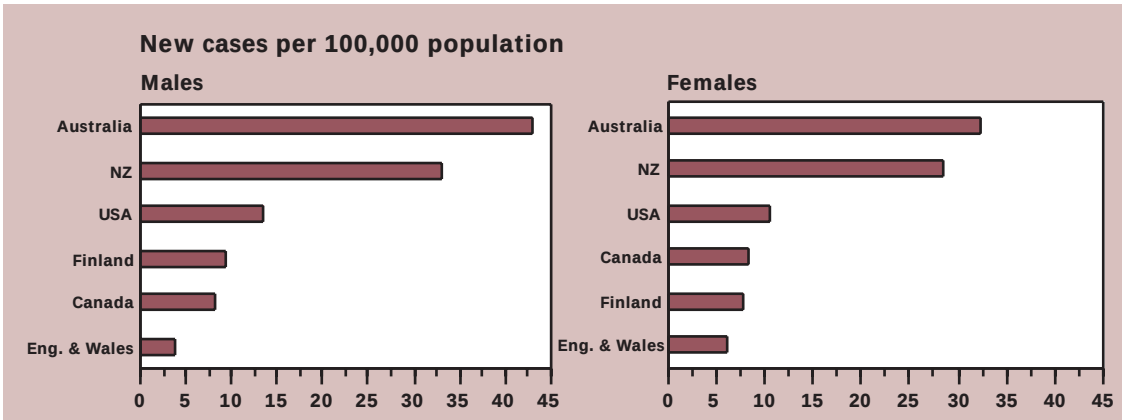
* Preliminary data.

Melanoma incidence shows the greatest geographical variation across Australia of any cancer (Table 2.5). This variation in incidence is directly related to the intensity of and exposure to ultraviolet (UV) radiation. Queensland has the highest rate of incidence among all jurisdictions (latest available incidence data 1990). However, in Tasmania and Victoria, the proportions of thicker melanomas, which are later stage and have poorer prognosis, are relatively high.

Limited information has become available on melanoma incidence among Indigenous Australians. Until recently, there has only been a few cancer registries which collected information identifying Indigenous Australians. However, international studies indicate that populations with a higher concentration of melanin in the skin have lower rates of skin cancer and it is expected that this pattern would also apply to Indigenous Australians. Australian-born populations have significantly higher mortality rates from melanoma than most migrant groups, except males born in New Zealand and females born in Malaysia, who have similar rates (Giles et al 1995).

There is a 300-fold variation in melanoma incidence rates internationally (Figure 2.5). These incidence differentials suggest that variations in UV exposure patterns contribute significantly to patterns of melanoma (Parkin et al 1997).

Figure 2.4 International comparisons — melanoma



Risk factors

Melanoma and non-melanocytic skin cancer are associated with UV radiation exposure. The incidence of skin cancer is higher in people with fair, sun-sensitive skin, those with pigmented naevi or moles on their skin, and those whose pattern of sun exposure has been intermittent, as indicated by high recreational exposure, or involved frequent sunburns. Epidemiological evidence suggests that over-exposure to sunlight in the first two decades of life is an important risk factor for the development of skin cancer later in life (Elwood 1992; Swerdlow et al 1986; Tucker et al 1993; Masri et al 1990; English & Armstrong 1988).

Specific genetic lesions have been identified in people with a family history of melanoma, but it is not yet possible to identify specific genetic markers in people with melanoma or skin cancer who do not have a family history of the disease (Aitken et al 1994; Easton et al 1991).

Prevention

Prevention programs in Australia have been based on behavioural research indicating that knowledge, beliefs and attitudes about melanoma, sunlight exposure and suntans are critical in determining behaviour (Hill et al 1993). Their primary focus is to reduce overall sun exposure and prevent sunburn, particularly among young people, principally through physical methods of protection (eg shade cloth and awnings). Such protection involves avoidance of exposure to direct sunlight (particularly within two hours each side of solar noon), use of sun-protective clothing, development of community facilities designed to increase shaded areas, and use of effective sun screening agents. The recent decision by the Australian Standards Association to allow the marketing of SPF 30 sunscreens may be beneficial to some Australians at high risk of skin cancer.

Programs such as ‘Slip, Slop, Slap’, ‘Sunsmart’ and ‘Me No Fry’ to protect against sunlight and supported by the Australian Cancer Society through Skin Cancer Awareness Week have been very successful. Research indicates that, at least for those parts of the country where data are available, awareness to protect against sunlight is high (Hill et al 1993; Baade et al 1996).

Screening and early detection

Early detection of skin cancer can significantly reduce associated morbidity and mortality. However, the Australian Cancer Society does not recommend mass population screening, on the basis of costs and a lack of reliable data on the efficacy of any screening tests.

The presentation of potential skin cancers is most likely to occur in the general practice setting. Screening in Australia is done on an *ad hoc* basis, targeting specific groups within the community and encouraging general practitioner screening of their patients, particularly those with high susceptibility.

Early detection, particularly of melanoma, has achieved a high level of success in Australia. In 1995, almost 4 per cent of Australians had a skin lesion excised. The ratio of benign pigmented lesions to invasive melanomas removed was between 16:1 and 28:1 (Burton et al 1993; Del Mar et al 1994). More than 80 per cent of those with melanoma are cured (Jelfs et al 1994; Jelfs et al 1996; Giles et al 1996). Nonetheless, approximately 900 people die of melanoma each year most of who are likely to have been diagnosed at a more advanced stage of the disease (Hersey et al 1991).

A wide variety of early diagnosis programs are already available in Australia. Many of these are part of prevention programs, but some specific early detection programs are conducted through the State and Territory cancer councils and individual organisations such as the Melanoma Foundation of the University of Sydney, the Australian College of Dermatologists and the Skin and Cancer Foundations in each State and Territory. 'Spot the Difference', 'Freckles, Moles, Sores and Sunspots' and 'The Mole Patrol' are current national programs. A *60 Minutes* television program in November 1987 entitled 'Goodbye Sunshine' resulted in the diagnosis of about 750 additional early melanomas in the six months following televising (McCarthy & Shaw 1990).

Each of the State and Territory cancer councils conducts specific programs targeting susceptible groups in the community, occasional programs on early diagnosis for general practitioners and the maintenance of early detection units ('battle stations' at beaches during the summer and video-based campaigns including interactive educational programs at appropriate community centres).

There is very little economic evidence about screening for melanoma. An Australian study has examined the potential cost-effectiveness of opportunistic melanoma screening by general practitioners (Girgis et al 1996). The costs vary from $6,853 per life year for men, if screening is undertaken five-yearly, to $12,137 if screening is two-yearly. The comparative estimates for women were $11,102 and $20,877 respectively.

Similar exploratory cost-effectiveness analysis has been undertaken of a national primary prevention program, along the lines of the Victorian SunSmart campaign (Carter et al, in press). The incremental cost-effectiveness, using a 'current practice' comparator, was $2,714 per life year (ignoring the cost offsets and using a conservative estimate of benefit).

A randomised controlled trial of a community based screening program for malignant melanoma is currently being undertaken in Queensland.

Treatment

The treatment of melanoma and non-melanocytic skin cancer has not changed significantly in the last few years. Surgery remains the mainstay of therapy for all common skin cancers, but a variety of other techniques are used to deal with early basal, and some early squamous, skin cancers. These early stages of cancer are treated by cryosurgery, diathermy curettage, laser ablation and in some cases cytotoxic creams. In recent years, an interest has developed in the treatment of basal cell carcinomas by interferon injection (Cornell et al 1990). Laser surgery is also rarely used because the laser energy oblates the tumour entirely, leaving no tissue for examination by the pathologist (Cornell et al 1990). The use of radiotherapy is also largely restricted to the management of skin cancers not treatable by the other modalities. Comprehensive guidelines have been published by the Australasian Cancer Network (ACN) for the treatment of cutaneous melanoma (Australasian Cancer Network 1997).

In the treatment of melanoma, the most important change has been a move towards less radical excisions of primary tumours. The ACN guidelines recommend a range of excision margins, based on the results of two randomised controlled trials (Balch et al 1993; Veronesi & Cascinelli 1991; Karakousis et al 1996). The ACN guidelines also cover all the following aspects of the management of melanoma:

- For the management of enlarged lymph nodes, needle biopsy is recommended in preference to open biopsy of the lymph node because of the risk of tumour cell spillage (Balch etal 1992). Radical node dissection is generally accepted as the treatment of choice for lymph nodes involved with melanoma.
- Several centres around the world are engaged in a clinical trial of a new technique for the management of melanomas deeper than 1 mm (Morton et al 1992; Thompson et al 1995). The technique is known as selective lymphadenectomy or sentinel node biopsy and involves selective identification of positive lymph nodes for node dissection. The treatment is regarded as experimental and is not recommended for general use before the completion of the international controlled trial.
- Adjuvant therapy for deep melanoma or melanoma involving lymph nodes is also the subject of a number of controlled clinical trials around the world (Houghton & Balch 1992; Parkinson et al 1992). These trials are based on either chemotherapy or immunotherapy protocols, but to date the outcomes do not justify routine use of these modalities.
- The management of disseminated melanoma remains a problem. Current protocols with a variety of agents have not demonstrated long-term benefit. Most people with disseminated melanoma are now placed on experimental immunotherapeutic or chemotherapeutic protocols.

The most likely change to the management of melanoma in the immediate future is the possible adoption of the sentinel node biopsy technique as standard procedure for the management of intermediate thickness and deeper melanoma. In the USA,

many centres are now using the selective lymph node technique as a staging procedure to determine patients who should have interferon added to their treatment regimen. Interferon is regarded as appropriate for patients with melanomas deeper than 4 mm or those who have proven metastases to the lymph nodes (Nathanson 1996). The adjuvant interferon therapy has the potential to become an established mode of treatement in the near future. However this procedure is not generally accepted as appropriate for Australian patients with melanoma because of the high levels of toxicity.

Skin cancer — current status

- **Skin cancer is the most common cancer in Australia and Australia has the highest incidence rate in the world. The estimated early detection and treatment costs for skin cancers are higher than the costs for any other cancer in Australia.**
- **Primary prevention programs in Australia have been successful in raising awareness of the dangers of exposure to sunlight and have been generally effective in encouraging people to take preventive actions.**
- **Opportunistic screening by general practitioners and targeting of specific high-risk population groups remain useful methods for early detection and diagnosis of skin cancer.**

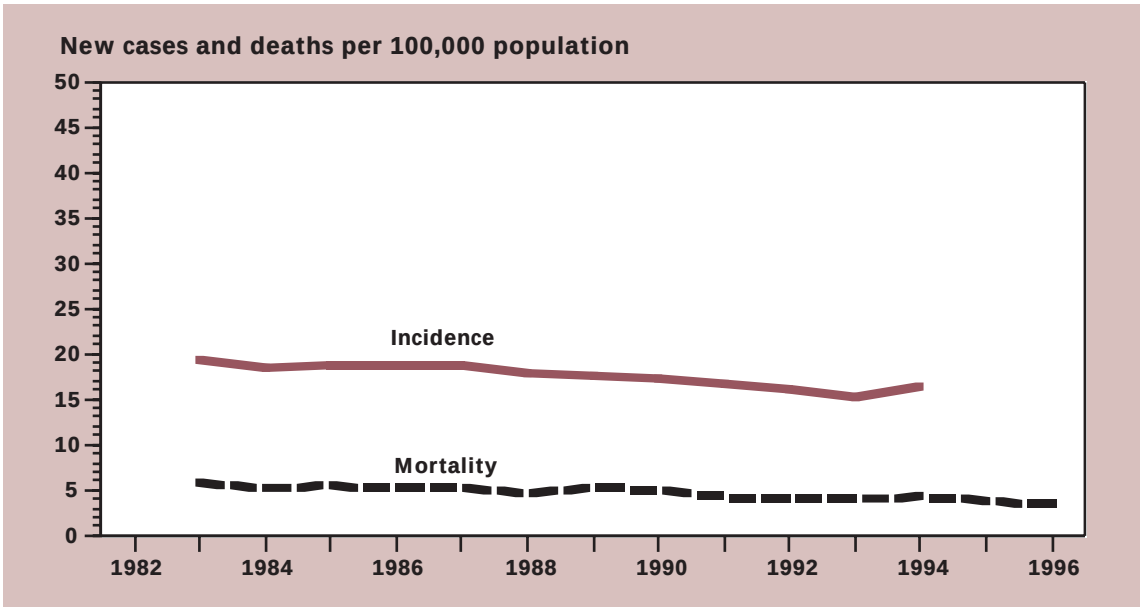
2.3 Cancer of the cervix

Epidemiology

Cancer of the cervix is the eighth most common cancer in Australian females. Cancer of the cervix rarely affects women before the age of 30. In 1994, there were 1,121 new cases diagnosed and cancer of the cervix accounted for 3.4 per cent of all new cancers in females. Projections of incidence data indicate that the rate of cancer of the cervix will continue to fall to 10.4 per 100,000 (approximately 1,100 new cases) by 1999 (Figure 2.5).

Mortality from cancer of the cervix has been declining since this cancer was able to be identified separately from other genital cancers in 1942. In 1996, 302 women died from the disease (Table 2.6), accounting for 2.4 per cent of all cancer deaths among females. Mortality from cancer of the cervix resulted in approximately 4,300 potential years of life lost before the age of 74. This decline reflects the introduction and widespread use of the Papanicolaou (Pap) smear screening test, and the subsequent treatment of precancerous abnormalities. Five-year survival rates are around 72 per cent.

Figure 2.5 Cervical cancer — incidence and mortality trends (20–74 year old females)



There is limited variability in cancer of the cervix incidence rates between Australian States and Territories, the exceptions being South Australia (9.2 per 100,000) and the Northern Territory (16.6 per 100,000) with the lowest and highest rates of age-standardised incidence respectively (Table 2.7). However, rates for the Northern Territory are subject to wide variability due to the relatively small size of the population.

National incidence and mortalty data are not available for Indigenous Australians. Incidence data from the Northern Territory indicate that the rate of cancer of the cervix is higher among Indigenous than non-Indigenous females (d'Espaignet et al 1996). Mortality data indicate that Indigenous females are eight times more likely to die from cervical cancer than non-Indigenous females (Anderson et al 1996).

Table 2.6 Fast facts on cancer of the cervix

Australia	Females 20-74 years*	Females all ages
New cases (1994)	989	1,121
Incidence rate (per 100,000)	16.5	12.0
Incidence trends (1990-94)	-1.3%pa	-0.8%pa
% all new cancers	4.2	3.4
Lifetime risk (0-74 years)	1 in 101	1 in 101
Deaths (1996)	217	302
Mortality rate (per 100,000)	3.4	2.9
Mortality trends (1990-96)	-5.8%pa	-4.4%pa
Potential years of life lost (0-74 years)	4,288	4,288
Lifetime risk (0-74 years)	1 in 415	1 in 415
Costs ($ '000) (1993-94)	8,822	10,148

* Lifetime risk (20–74 years); Potential years of life lost (20–74 years); Costs (25–74 years).

Table 2.7 States and Territories — cancer of the cervix

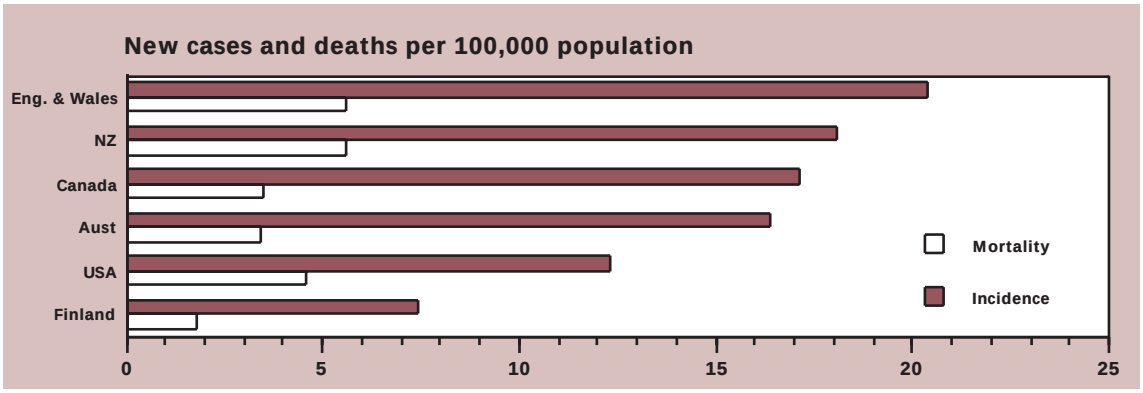
	1991-94 Incidence		1991-96 Mortality	
State/Territory	20-74 years	All ages	20-74 years	All ages
	New cases and deaths per 100,000 population			
NSW	16.0	11.6	4.1	3.3
VIC	15.7	11.3	4.0	3.3
QLD	16.3*	11.8*	3.8	3.3
WA	17.2	12.4	4.5	3.7
SA	12.9	9.2	2.8	2.4
TAS	15.4	11.8	6.2	4.8
ACT	14.4	10.3	3.3	3.2
NT	20.8	16.6	14.5	12.3

* Preliminary data.

In Australia, females born in Fiji and Vietnam have a higher incidence of cancer of the cervix than the Australian-born female population (MacCredie et al 1993). Females born in the Pacific Islands, Scotland and Germany have significantly higher age-standardised mortality rates than do Australian-born females (Giles et al 1995).

Incidence of cancer of the cervix internationally varies by a factor of approximately 30. Among women aged 20–74 years, Australia has a moderate rate of incidence (16.5 per 100,000) and mortality (3.4 per 100,000) when compared internationally (Figure 2.6). The incidence rate in England and Wales is around 21 per 100,000, while in Finland it is 7.5 per 100,000. Cancer of the cervix is a leading cause of death in non-industrialised countries.

Figure 2.6 International comparisons — cancer of the cervix (20–74 year old females)



Note: Age-standardised rates for Australia (incidence—1994; mortality—1996) and other selected countries (incidence—1983–95; mortality—1993–94), age group 20–74 years.

Risk factors

Cancer of the cervix is related to infection with the human papilloma virus (HPV), particularly genotypes 16 and 18 and to a lesser extent 31 and 33. Many women are infected with one or more HPV genotypes but less than 2 per cent develop cancer of the cervix. The latency period between HPV infection and cancer detection varies widely, with estimates ranging between 5 and 25 years.

Other risk factors for precancerous and cancerous lesions of the cervix are multifactorial. The major risk factors are age, sexual behaviour (young age at first intercourse and the number of sexual partners), smoking, socio-economic status and race.

Prevention

Our current knowledge of the risk factors for cancer of the cervix, other than age and sexual behaviour, does not allow the identification of high-risk groups that require screening. In the absence of this information, cervical cancer screening must be carried out on a population basis. Opportunistic screening using the Pap smear test to detect precancerous abnormalities of the cervix has been carried out since the mid-1960s. In 1991, Australia adopted a national cervical screening program to further increase participation rates and improve the quality of all steps in the screening pathway.

Within this program, recruitment strategies have to take account of groups whose participation rates may be low, for example older, Indigenous and non-English speaking females.

A prophylactic vaccine for HPV infection aimed at young adults before the onset of sexual activity is one possible approach to primary prevention, but major issues need to be addressed before the necessary clinical trials can proceed. These include: identification of relevant genotypes; evidence that vaccination against HPV infection is effective; and ethical considerations.

Screening and early detection

The current policy in Australia is for women who have ever had sexual intercourse to have two-yearly smears, from the age of around 20 years until 70 years. Females who have negative smears, and no signs and symptoms of abnormality, are advised to have a repeat smear in two years. Women whose Pap smears are reported as showing evidence of cervical intra-epithelial neoplasia are advised to have a colposcopy, a biopsy and treatment if the neoplasia is confirmed.

For the cervical screening program, the participation rate varies across age groups. For the period 1992–94, 55 per cent of the women aged 20–29, 69 per cent of those aged 30–39, 70 per cent of those aged 40–49, 63 per cent of those aged 50–59, and 39 per cent of those aged 60–69 participated in the screening program. Participation rates have improved over the last decade, especially among older women, although women over 60 remain an underscreened group.

Participation rates do not appear to be as high among women from non-English speaking backgrounds or among Indigenous females. Most States and Territories have strategies in place or under development to increase participation in cervical screening, targeting groups with lower participation rates. A reduction from Australia's current annual age-standardised incidence rate for cancer of the cervix of 11 per 100,000 to 3 per 100,000 women is achievable through the full implementation of an evidence-based cervical screening program (Ward 1997).

Efficient and effective analysis and communication of Pap test results are central to early diagnosis of cancer of the cervix. Adequate management and follow-up of abnormalities are critical for an effective screening program (AIHW 1991). A first step in this process must be adequate communication of the result to women so as to facilitate further assessment, but also to minimise the psychological impact of the result in the interim between notification and diagnosis (Austoker et al 1997).

All States and Territories (except Queensland) have Cervical Cytology Registries to encourage regular attendance by women, to provide a safety net so that women with abnormal Pap smears are not overlooked, and to assist pathology laboratories with both the day-to-day reporting of Pap smears and the provision of essential information for quality assurance. A cervical cytology register in Queensland is planned to begin operation in 1998.

There have been several Australian studies of the cost-effectiveness of cervical screening. The most appropriate age to begin screening seems to be the most contentious economic issue. Current Australian policy of including the 18–24 year age group costs approximately $17 million per life saved in this age group. The high cost has led several countries to raise the age of first screening to 30 or 35 years. A national evaluation has estimated that a three-year interval, combined with a screened age group of 25–69, would improve average cost-effectiveness of cervical screening from $30,700 to $23,700 per life year (AIHW 1991). A recent review of the policy (Harris and Scott 1995) confirmed that 'age of screening is a critical variable in cost-effectiveness of the program'.

There is limited evidence on the optimal distribution of resources along the screening pathway. However, given that the majority of deaths from cancer of the cervix occur in women who have never been screened, or who have been under-screened, there is potential benefit from focussing on effective recruitment to the screening program.

Treatment

Precancerous lesions

If a high-grade precancerous abnormality is proven on biopsy, treatment will depend on whether the whole of the abnormality can be seen ('in range') or whether the abnormality is 'out of range' and extends into the canal of the cervix. The diagnosis and relevant pathological parameters for cancer of the cervix need to be confirmed by a pathologist.

Treatments for in-range abnormalities include laser ablation, cervical diathermy and loop excision of the transformation zone. An out-of-range abnormality is usually treated with cone biopsy.

Early stage cancer of the cervix

Very early stage (Ia) carcinoma of the cervix can be treated with a cone biopsy or hysterectomy. Slightly more advanced squamous carcinomas (Stages Ib, IIa) are treated with either radical hysterectomy or radical radiotherapy, with both treatments showing equivalent cure rates (Landoni et al 1997). Patients treated primarily with radical radiotherapy for early-stage squamous cell carcinoma of the cervix have not demonstrated any survival benefit from the addition of routine hysterectomy following radiotherapy (Landoni et al 1997).

The optimal treatment for cervical adenocarcinoma has been controversial, but a recent randomised trial supports previous non-randomised studies that suggest a significant survival advantage for radical surgery over radiotherapy (Landoni et al 1997).

Advanced disease

The primary treatment for advanced cancer of the cervix is radiotherapy, combining external beam and brachytherapy. The use of combined chemotherapy and radiotherapy is under investigation, but as yet has shown no clear benefit. There is no proven benefit from neo-adjuvant chemotherapy before radiation therapy or from adjuvant chemotherapy following radical surgery.

Patients presenting with recurrent pelvic disease after primary surgery should be treated with radical radiation therapy. Cure rates of approximately 20–40 per cent can be expected (NIH Consensus Statement 1997; Thomson 1992).

Chemotherapy may be used for recurrent disease not suitable for treatment with either surgery or radiotherapy (Curtin & Shapiro 1997; Trope & Kristensen 1997). Cisplatin appears to be the most active single agent and survival duration does not appear to be improved with multi-agent chemotherapy (Vermorken 1993).

Future developments in treatment are likely to include a clarification of the roles of minimally invasive surgery in the treatment of early-stage cancer of the cervix. Preradiotherapy staging of advanced tumours, HPV vaccines in the treatment of established cancers, and chemotherapy as an alternative to radiotherapy and surgery are likely to be other treatment modalites.

Cancer of the cervix — current status

- **Cancer of the cervix is the eighth most common cancer among Australian women. Its incidence and mortality have been falling for many years. This has been mainly due to the widespread use of the Pap smear screening test and the subsequent treatment of precancerous abnormalities.**
- **Cancer of the cervix is one of the few cancers where precancerous lesions are detectable and treatable. Hence, this cancer could be almost totally prevented with current screening methods.**
- **A major window of opportunity for reducing the impact of cancer of the cervix remains the detection of precancerous changes through the National Cervical Screening Program. Most cases of cancer of the cervix could be prevented if all women at risk were screened every two years.**

2.4 Breast cancer

Epidemiology

Breast cancer is the most common cancer and cause of cancer deaths among females in Australia with nearly 9,700 new cases diagnosed each year and 2,600 deaths. In 1994, breast cancer accounted for 29.5 per cent of all new cancers in females and 18.6 per cent of all cancer deaths in females. This cancer mostly affects women after the age of 40.

Between 1983 and 1989, there was a steady increase in breast cancer incidence (Figure 2.7). Between 1990 and 1994, the increase was more rapid, at an average of 6 per cent per year. Semi-national incidence data for 1995 and 1996 from New South Wales, Victoria, South Australia, Western Australia and Tasmania indicate a peak in 1995 and a slight fall in 1996. Taking into account these semi-national data, the average annual increase in the incidence rate is moderated to approximately 4 per cent. This upward trend may have been in part a result of the BreastScreen Australia program, but there has also been a real increase in disease rates as well. Projections of incidence data indicate that the rate of breast cancer will decrease slightly to 98.6 per 100,000 by 1999.

In contrast, mortality rates for breast cancer have remained relatively stable since 1983 (Figure 2.7). In 1996, there were 2,623 breast cancer deaths among females, resulting in approximately 31,000 potential years of life lost before the age of 74 years (Table 2.8). Five-year survival rates are approximately 75 per cent. Based in these measures, breast cancer is the most significant cancer in Australian females.

Figure 2.7 Breast cancer — incidence and mortality trends (50–74 year old females)

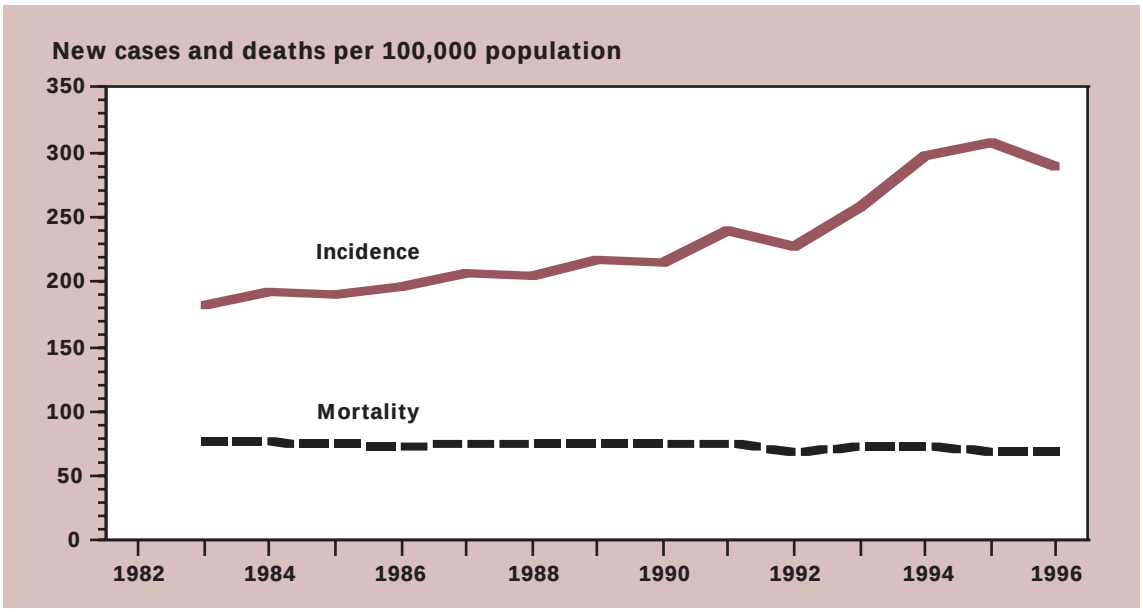


Table 2.8 Fast facts on breast cancer

Australia	Females 50-74 years*	Females all ages
New cases (1994)	5,553	9,694
Incidence rate (per 100,000)	297.1	100.9
Incidence trends (1990-94)	+8.3%pa	+5.7%pa
% all new cancers	32.3	29.5
Lifetime risk (0-74 years)	1 in 14	1 in 11
Deaths (1996)	1,340	2,623
Mortality rate (per 100,000)	69.0	25.0
Mortality trends (1990-96)	-1.3%pa	-1.0%pa
Potential years of life lost (0-74 years)	15,830	30,765
Lifetime risk (0-74 years)	1 in 57	1 in 48
Costs ($ '000) (1993-94)	39,851	93,434

* Lifetime risk (50–74 years); Potential years of life lost (50–74 years); Costs (50–74 years).

Table 2.9 States and Territories — breast cancer

	1991–94 Incidence		1991–96 Mortality	
State /Territory	50–74 years	All ages	50–74 years	All ages
	New cases and deaths per 100,000 population			
NSW	256.3	91.9	68.9	25.0
VIC	256.3	91.9	77.5	28.0
QLD	257.4*	92.8*	65.2	24.3
WA	256.6	93.1	68.4	25.1
SA	264.0	91.0	76.5	26.6
TAS	251.0	90.2	63.3	23.7
ACT	250.9	88.6	98.1	33.0
NT	159.2	61.7	66.2	18.3

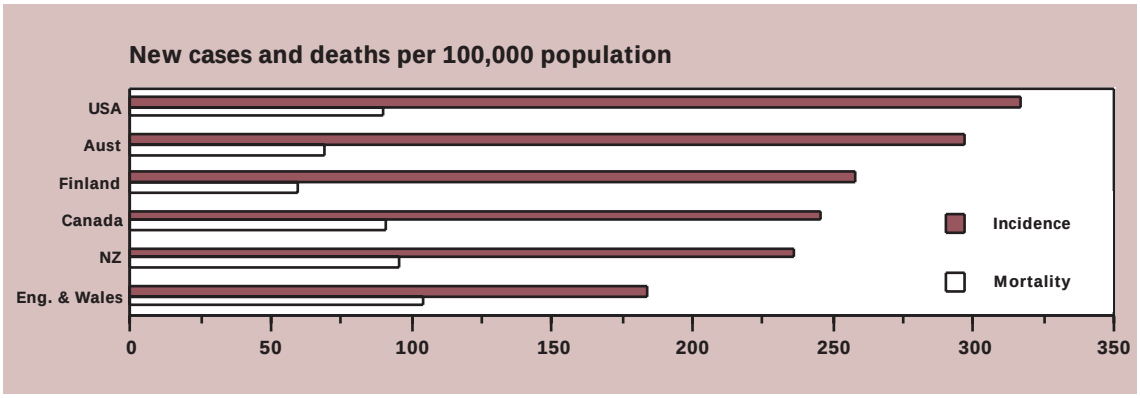
* Preliminary data.

There is limited variability in breast cancer incidence between Australian States and Territories (Table 2.9). Incidence rates for the Northern Territory are lower, but are subject to wide variability due to the relatively small size of the population. National incidence and mortality data are not available for Indigenous females. Data from Western Australia indicate that the incidence of breast cancer may be lower in Indigenous females than in non-Indigenous females. However, this data should be interpreted with caution as there is evidence of under-reporting of Indigenous status on cancer registries.

In Australia, females born in the United Kingdom, the Netherlands and the United States appear to have significantly higher age-standardised mortality rates than Australian-born females (Giles et al 1995).

There is a seven-fold variation in breast cancer incidence internationally (Giles et al 1995). Australia ranks above average for incidence and average for mortality among women aged 50–74 years (Figure 2.8). The United States and Australia have incidence rates of around 300 per 100,000. Finland, Canada and New Zealand have rates around 250 per 100,000 and England and Wales rates of about 180 per 100,000.

Figure 2.8 International comparisons — breast cancer



Note: Age-standardised rates for Australia (incidence—1994; mortaliy—1996) and other selected countries (incidence—1983–95; mortality—1993–94), age group 50–74 years.

Risk factors

Known risk factors account for only a third of all breast cancers. Age is the best indicator of risk, with women over the age of 50 accounting for over 74 per cent of all new cases. Significant family history of breast cancer (first degree relative with breast cancer occurring before 50 years of age and/or more than one relative on the same side of the family affected) and previous history of certain benign breast diseases (Bruzzi et al 1997) are significant indicators of risk.

Other factors which may play a role in increasing risk of breast cancer include:

- larger body size;
- reproductive factors including late age at first birth, nulliparity, early menarche and late age at menopause;
- long-term use of exogenous oestrogens in hormone replacement therapy; and
- exposure of breast tissue to ionising radiation (especially before 20 years of age) (Kricker & Jelfs 1996).

Family history of breast cancer has been linked to specific gene mutations, including BRCA1 and BRCA2, in about 5 per cent of cases.

Prevention

The known risk factors for breast cancer are not readily modifiable, nor do they appear to be implicated in up to 70 per cent of cancer incidence, so there are few opportunities for primary prevention of the disease.

The main scope for reducing mortality from breast cancer is through early detection, particularly through an organised mammographic screening program.

Screening and early detection

The early detection of breast cancer has a significant impact on survival. The five-year survival of women whose breast cancer is diagnosed while it is still localised in the breast is 90 per cent, compared with 18 per cent among women who have metastases at diagnosis (Taylor et al 1994).

Mammography improves overall mortality as well as five-year survival. Randomised trials of population-based mammographic screening have found a 30 per cent decrease in mortality from breast cancer among women aged 50–69 years (Fletcher et al 1993). These results are considered to be achievable by well-organised and high quality breast screening programs (Fletcher et al 1993).

BreastScreen Australia was established as a national mammographic screening program in mid-1991. It offers free two-yearly mammographic screening, actively targeting women aged 50–69 years, but women aged 40–49 years and those over 70 years of age are also able to participate if they choose. The NHPA program monitors mortality in women for a further five-years (up to age 74), to measure the benefits of the screening program. In July 1997, there were 36 screening and assessment services with 102 fixed and 23 mobile screening units. Quality assurance is addressed through National Accreditation Requirements and a National Quality Management Committee. Stringent quality assurance standards aim to ensure that screening detects as many small cancers as possible, while minimising the costs to individuals and to the community.

The screening indicator reported against in the *First Report on National Health Priority Areas* (AIHW & DHFS 1997) examines the proportion of women attending screening within a defined target population. For the national breast cancer screening program, the 1994–95 data indicate that 44 per cent of women in the 50–69 years age group attended screening (AIHW & DHFS 1997). BreastScreen Australia estimates a current participation rate of 54 per cent of women aged 50–69 years (BreastScreen Australia, preliminary unpublished data).

There have been several Australian studies of the cost-effectiveness of screening for breast cancer, which have estimated the cost per life year at about $20,000 for all women over 40 years and $45,000–$49,000 for women aged 40–49 years (Carter et al, in press; Irwig et al 1997). The cost-effectiveness of screening women aged 40–49 years is considered to be marginal. According to one study (Carter 1997), incidence-to-mortality ratios and higher cost structures related to quality and geography combine to make Australia's cost-effectiveness ratio for screening women aged 50–69 years(A$17,031) three times higher than that in the Netherlands (A$5,685) or the UK (A$4,827).

Early diagnosis of symptomatic disease

It is estimated that no more than 30 per cent of all breast cancers and 45 per cent of breast cancers among women aged 50–69 years will be detected by mammographic screening, even when the national program is fully expanded (Kricker, in press). The prompt diagnosis of symptomatic disease therefore remains important in reducing mortality from breast cancer.

There are currently no national data about the proportion of breast cancers diagnosed at an early and treatable stage; however, data from New South Wales suggest that there are considerable opportunities for improving early detection, with over half of all breast cancers being greater than 20 mm at diagnosis (Kricker et al 1995; Kricker et al, in press).

Almost 20 per cent of women are estimated to experience a breast symptom in a two-year period, resulting in up to 350,000 consultations in general practice every year (Barratt & Vainio 1997). In 1997, the NHMRC National Breast Cancer Centre released evidence-based guidelines to assist general practitioners in investigating breast symptoms, entitled *Report on the Evidence Relevant to Guidelines for the Diagnosis of Symptomatic Women* (Irwig 1997).

Pathology reporting

Except under BreastScreen Australia, reporting of breast pathology in Australia is inconsistent. The Australasian Cancer Network has developed recommendations about reporting (Australasian Cancer Network Working Party 1997), but currently not all breast cancer is reported according to these recommendations (Kricker et al, in press).

Treatment

Several different aspects of the management of breast cancer have been shown to improve survival and/or wellbeing. For early breast cancer, these are summarised in the NHMRC *Clinical Practice Guidelines: the Management of Early Breast Cancer* (NHMRC 1995). The following recommendations are based on level I or II evidence (for definitions of levels of evidence see Appendix 2):

- Appropriate counselling has the potential to improve quality of life.
- The survival of patients with breast and other cancers is better if they are treated by a specialist who also treats a number of other similar patients, and who has access to the full range of treatment options in a multidisciplinary setting.
- There is no difference in the rate of survival or distant metastasis between women having mastectomy and those having breast-conserving surgery where appropriate.
- Not all women with nodal disease on axillary sampling develop metastases. Survival rates are not decreased by delaying radiotherapy to the axilla, although local control is less likely.

- Radiotherapy after lumpectomy significantly reduces the risk of local recurrence. The omission of radiotherapy, even in carefully selected patients, leads to an increased risk of local recurrence. Overall, the routine addition of radiotherapy to surgery causes no significant change in mortality in the first 10 years, but an excess late mortality from cardiac causes may result. However, the excess in cardiac deaths is more than offset by a reduction in breast cancer deaths as revealed by some recent trials.
- Tamoxifen, multi-agent chemotherapy and ovarian ablation all reduce annual risk of recurrence and death after treatment for women under the age of 50 years with node-positive as well as node-negative breast cancers. Optimal dose intensity is important to favourable outcomes in adjuvant chemotherapy.
- Women with oestrogen-receptor negative tumours have a poorer prognosis than those with oestrogen-receptor positive tumours.
- Intensive follow-up confers no survival benefit over a minimalist schedule.

Best-practice guidelines on the management of advanced breast cancer and of ductal carcinoma *in situ* are currently being developed by the NHMRC National Breast Cancer Centre. Detailed examinations of the evidence about specific issues such as post-mastectomy radiotherapy, the use of high-dose chemotherapy and autologous bone marrow transplantation are also being conducted. The development of an evidence-based approach is being assisted by the Cochrane Collaboration Review Group in Breast Cancer.

Current practice

Relatively little is known about current practice in the management of breast cancer in Australia. There have been three state-based surveys of management practices so far (Byrne et al 1993; Hill et al 1990a; Hill et al 1995); however, these were undertaken several years ago, were based in single States and did not assess all relevant aspects of care. The NHMRC National Breast Cancer Centre has commissioned a national survey of the management of breast cancer to generate national data about current practice in 1998.

The NHMRC *Clinical Practice Guidelines: the Management of Early Breast Cancer* were released in October 1995 and surveys of clinicians suggest that these guidelines are now part of routine practice (Carrick et al, in press).

Breast cancer — current status

- **Breast cancer remains the most common cause of female cancer deaths in Australia, with over 2,500 women dying each year from the disease. Breast cancer incidence is currently rising at about 4 per cent per year.**
- **The major scope for reducing the impact of breast cancer is early detection through the national mammographic screening program (BeastScreen Australia), prompt diagnosis, and effective treatment based on the latest evidence.**

2.5 Colorectal cancer

Epidemiology

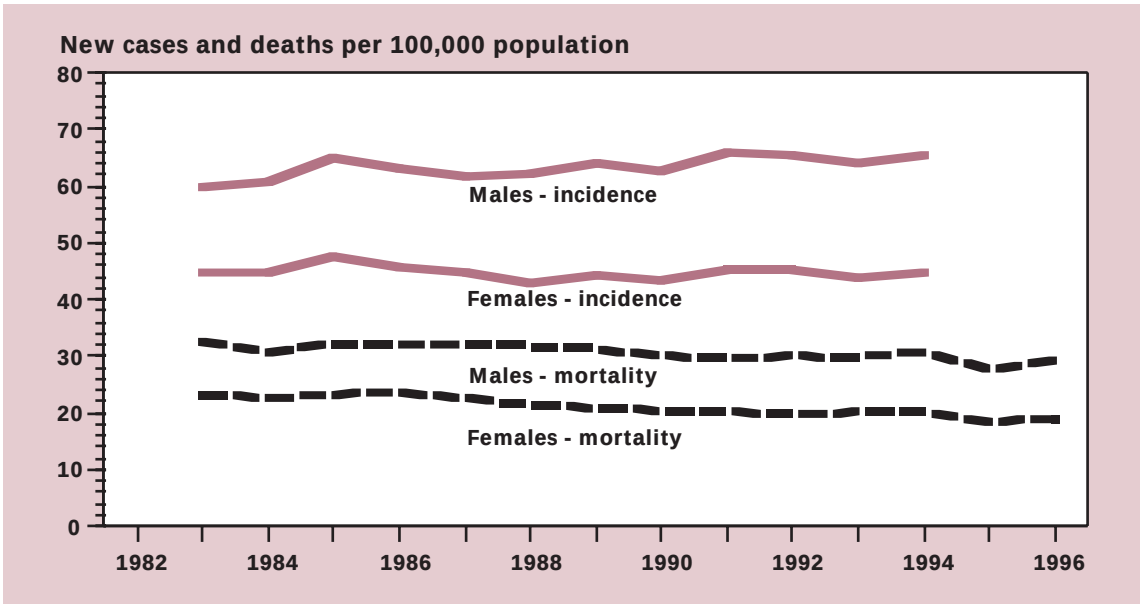
Colorectal cancer (or bowel cancer) is the second most common cancer affecting both men and women in Australia and the second most common cause of cancer deaths. Five-year survival rates are moderate at around 55 per cent although early detection results in better survival.

Since the early 1980s, both incidence and mortality rates for colorectal cancer have been relatively stable (Figure 2.9). In 1994, there were 5,433 new cases of colorectal cancer diagnosed in males and 4,583 new cases diagnosed in females (Table 2.10), accounting for 12.7 and 13.9 per cent of all new cancers in males and females, respectively. About one in 20 Australians is likely to develop colorectal cancer during his/her lifetime, with the risk increasing after the age of 40 and rising sharply and progressively from the age of 50 years.

Projections indicate that Australia's incidence rate of colorectal cancer in males will continue to rise slowly to 67.4 per 100,000 (approximately 6,300 new cases) in 1999. Incidence rates for females are projected to increase slowly to a rate of 45.8 per 100,000 (approximately 5,300 new cases) in 1999.

In 1996, 2,506 males and 2,112 females died from colorectal cancer with premature mortality resulting in approximately 31,000 potential years of life lost before the age of 75 (Table 2.10). Based on mortality measures alone, it is one of the most significant cancers in Australia.

Figure 2.9 Colorectal cancer — incidence and mortality trends



There is limited variability between Australian States and Territories in colorectal cancer incidence rates (Table 2.11). Incidence rates for the Northern Territory are lower, but are subject to wide variability due to the relatively small size of the population.

Table 2.10 Fast facts on colorectal cancer

Australia	Males	Females
New cases (1994)	5,433	4,583
Incidence rate (per 100,000)	65.6	44.9
Incidence trends (1990-94)	+1.1%pa	+0.9%pa
% all new cancers	12.7	13.9
Lifetime risk (0-74 years)	1 in 18	1 in 27
Deaths (1996)	2,506	2,112
Mortality rate (per 100,000)	29.2	18.9
Mortality trends (1990-96)	-0.4%pa	-1.3%pa
Potential years of life lost (0-74 years)	17,888	13,118
Lifetime risk (0-74 years)	1 in 43	1 in 71
Costs ($ '000) (1993-94)	81,950	70,108

Table 2.11 States and Territories — colorectal cancer

	1991-94 Incidence		1991-94 Mortality	
State/Territory	Males	Females	Males	Females
	New cases and deaths per 100,000 population			
NSW	66.5	44.5	28.4	18.1
VIC	68.1	49.0	31.7	21.6
QLD	65.7*	45.4*	28.4	18.6
WA	63.6	45.1	27.8	20.0
SA	66.0	46.9	29.2	19.2
TAS	68.3	48.3	33.4	22.6
ACT	67.8	48.2	34.3	21.8
NT	48.0	35.3	24.2	21.8

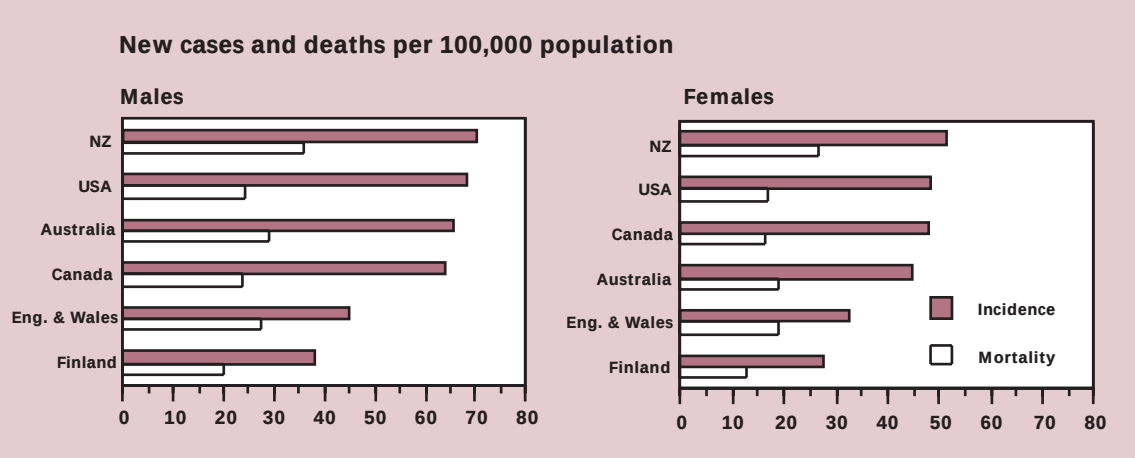
* Preliminary data.

National incidence and mortality data are not available for Indigenous Australians. Data from Western Australia and the Northern Territory indicate that incidence rates in Indigenous males are substantially lower than in non-Indigenous males, while rates in females are approximately the same or slightly lower. However, these data should be interpreted with caution as there is evidence of under-reporting of Indigenous status on cancer registries.

Australian-born persons have significantly higher rates of colorectal cancer than many of the major migrant groups in Australia (Giles et al 1995).

Internationally, colorectal cancer incidence varies by a factor of 20 in men and 15 in women. Australia's incidence and mortality rates rank high. Most of the developed countries have incidence rates of around 65 per 100,000 for males, although England, Wales and Finland had rates around 40 per 100,000 recently. A similar pattern occurs for females, although the rates are lower (Figure 2.10).

Figure 2.10 International comparisons — colorectal cancer



Note: Rates are age-standardised for Australia (incidence—1994; mortality—1996) and other selected countries (incidence—1983–95; mortality—1993–94).

Risk factors

Colorectal cancer is known to be associated with a diet high in fat and low in fruit and vegetables, reduced physical activity, increased alcohol consumption, previous history of polyps in the bowel, and in particular a family history of familial adenomatous polyposis (FAP) or colorectal cancer (Schottenfeld & Winawer 1996).

Prevention

There is evidence that consumption of vegetables are protective against colorectal cancer (Kune et al 1997). However, trials have failed to confirm that using carotenoids and other anti-oxidants present in vegetables can prevent the disease (Potter 1996; Potter et al 1997; MacLennan et al 1995). Poorly soluble cereal fibres such as wheat bran may also be protective. Dietary prevention strategies advocate consumption of a broad range of vegetables and unrefined cereals (Potter et al 1997).

Several studies are exploring the possible protective effects of resistant starch, aspirin and other non-steroidal anti-inflammatory drugs, selenium and phytochemicals, and possible harmful effects of browning of meat during grilling and frying (Potter et al 1997; Thun 1996; Gerhardsson et al 1991). For some of these (eg non-steroidal anti-inflammatory drugs), the effect appears especially strong (IARC 1997).

Screening and early detection

In most cases of colorectal cancer, a treatable benign precursor lesion, the adenomatous polyp, is easily recognisable. The process of change from adenomatous polyp to malignancy is usually slow, and even after a cancer has developed the metastatic spread is usually limited until the cancer is relatively large. This contrasts with cancers such as melanoma and breast cancer, where cancers can metastasise unpredictably even in early stages of development, and excision of early lesions does not guarantee eradication of the cancer.

Despite the obvious benefits of early detection, there has been no systematic screening program in Australia because of considerable debate here and overseas about which age and risk groups to target, which test or combinations of tests are the most effective, and questions about public acceptance of and compliance with testing strategies.

Screening of high and average risk groups currently operates in an *ad hoc* manner (AHTAC 1997). High-risk groups for colorectal cancer can be easily identified, usually from having a characteristic family history. Organised programs are in place to screen for inherited conditions such as FAP and hereditary non-polyposis colon cancer. There is also some State-based screening of various employee groups in the community.

Screening tests

Major international trials have reported a reduction in mortality following screening through the faecal occult blood test (FOBT). Up to 33 per cent reduction in mortality following annual testing (Mandel et al 1993) and a 15–18 per cent reduction following biennial testing (Kronborg et al 1996; Hardcastle et al 1996) have been reported.

However, the FOBT is known to lack sensitivity and specificity. Its sensitivity for large adenomatous polyps is about 11 per cent, and for larger polyps or early cancer, about 29 per cent (Ahlquist et al 1989). The false-positives rate may reach up to 10 per cent. Newer methods, including human haemoglobin immuno assay, should improve the test.

Follow up of positive occult bloods are usually done with colonoscopy or double-contrast barium enema (DCBE). The sensitivity of the two techniques is similar (Kewenter et al 1995), but colonoscopy is usually the preferred method. The problems with colonoscopy however are its high cost, complication rate and the inability to view the caecum in some cases.

Other possible screening tests are:

- Clinical examination and digital rectal examination (DRE), which is recommended as part of preventive health checks for the over-55 age group but is considered inadequate as a screening tool for colorectal cancer.
- Sigmoidoscopy, which has been reported in recent case-control studies to lead to reduction of 60–70 per cent mortality from cancer within reach of the sigmoidoscope, even if performed as infrequently as every five to ten years (Ahlquist et al 1989). Major clinical trials of sigmoidoscopy based screening are testing these findings (Atkin et al 1993; Gohagan et al 1994). A strong case can be made for implementing sigmoidoscopic screening as part of general health checks, but patient and practitioner compliance are uncertain (AHTAC 1997).
- Colonoscopy, which is the most effective tool for visualising and treating polyps, but is costly and carries a small chance of morbidity. Some advocate a single colonoscopy at age 55 to detect and remove polyps as the most effective way of ensuring a polyp-free colon, but there is no firm evidence of mortality reduction following this type of program.

Colorectal cancer is considered to show the greatest opportunities for mortality reduction of any cancer if a properly constructed screening program is introduced. A screening program based on FOBT in particular has the potential to be the most effective. The Australian Health Technology Advisory Committee (AHTAC) has undertaken a review of this issue and recommended commencing pilot FOBT programs for the average risk population aged 50 years or more (AHTAC 1997). Several feasibility projects on various aspects of screening have also been undertaken at State level.

Costs of screening

Economic literature on colorectal cancer screening reveals a wide range of cost-effectiveness estimates. Salkeld et al (1996) and Wagner et al (1996) have estimated, based on comprehensive studies, the screening costs as $25,700 and $18,826 per life year respectively.

Significant issues for the cost-effectiveness of colorectal cancer screening are the rate of diagnostic work-up, the cost of colonoscopy, and test sensitivity for cancer and significant adenomas (Irwig et al 1994; Salkeld et al 1996). The cost of the FOBT, the stage distribution of screen-detected cancers, and the cost of cancer treatment have minor impact on cost-effectiveness. The 95 per cent confidence interval for the Salkeld study, for example, was $13,539–$72,360, reflecting high variability of the estimates.

Treatment

The management of colorectal cancer is straightforward and well accepted. Surgical excision results in the cure of early stage colorectal cancer, although lymph node involvement at the time of surgery confers a poor prognosis with a five-year survival of about 30 per cent. Several clinical trials have shown an improvement in mortality rates using adjuvant chemotherapy in lymph node positive patients (IMPACT Investigators 1995).

Patients with distal metastases at the time of initial treatment rarely survive more than two years, and require treatment for palliation and reduction of tumour bulk. Chemotherapy, radiotherapy and a variety of interventional methods, including cryotherapy for liver secondaries, can all palliate the patient with advanced disease and modify the disease course.

There are some areas of controversy in relation to rectal cancer, where the place of adjuvant radiotherapy compared with total mesorectal excision is under trial, as is the utility of adjuvant chemotherapy. For colonic cancer, endoscopic resection is under trial.

Colorectal cancer — current status

- **Colorectal cancer is both common and costly. Each year there are about 10,000 cases diagnosed and about 4,500 deaths from the disease.**
- **Currently there is no national screening program for colorectal cancer. However, AHTAC has recommended commencing pilot programs for average risk Australians aged more than 50 years. There is *ad hoc* screening of high-risk groups such as those with a family history of colorectal cancer, and some State-based screening of average-risk groups.**
- **There is great potential for control of colorectal cancer through early diagnosis and a comparatively simple surgery, low morbidity and minimal community cost. Advanced disease cannot be cured and demands the use of complex and costly treatment. Prevention, screening and early detection programs need to develop alongside improved therapeutic interventions.**

2.6 Prostate cancer

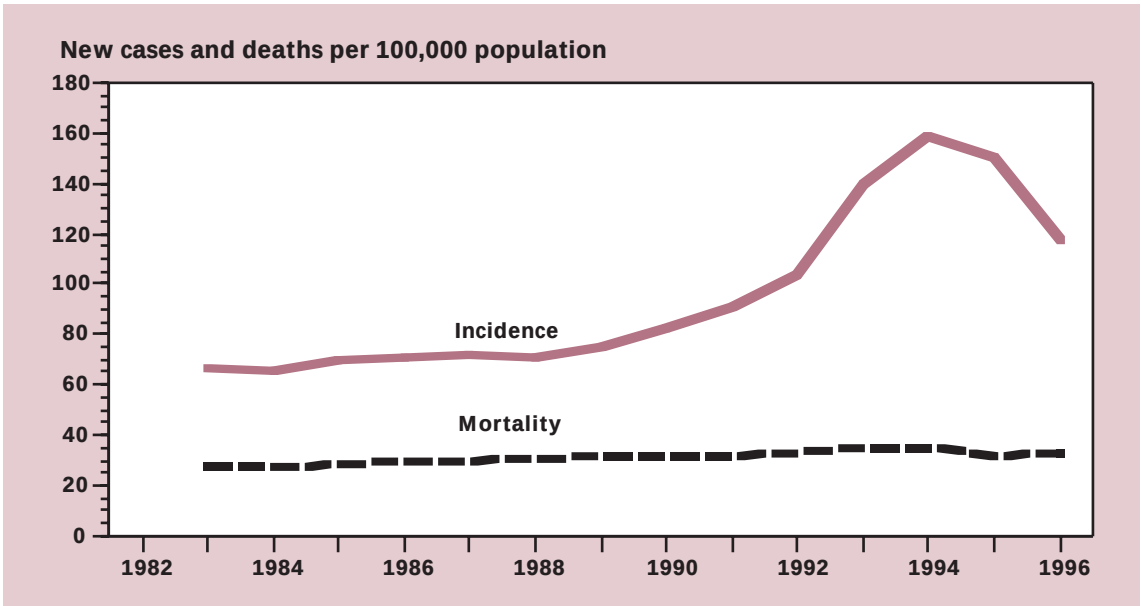
Epidemiology

Excluding non-melanocytic skin cancer, prostate cancer is now the most common cancer in Australian males, usually affecting men after the age of 55 years. Its reported incidence has risen rapidly since 1990, when prostate-specific antigen (PSA) testing, combined with ultrasonography and other investigations, was introduced widely. This testing indicates the presence of tumours in the prostate that would previously have remained undiagnosed in many cases. The introduction of this test had the effect of more than doubling the incidence rate between 1985 and 1994 (Figure 2.11).

There were 12,787 new cases diagnosed in 1994 (158.7 new cases per 100,000) accounting for 30 per cent of all new cancers in males (Table 2.12). However, semi-national data from four States for 1995 (150.5 per 100,000 males) and 1996 (117.1 per 100,000 males) indicate a sharp decline in reported incidence rates from the peak in 1994, reflecting a recent trend towards less widespread use of PSA testing.

Projections of incidence are problematic given the rapid changes in the rate over the past few years. If the current rate of PSA testing is maintained, it is estimated that by 1999 the incidence rate of prostate cancer will have reduced to 107.0 per 100,000 males (approximately 10,000 new cases) from the 1994 rate of 158.7 new cases per 100,000 males. Mortality rates, which reached a peak in 1993, are projected to fall at a relatively slow pace in comparison with incidence.

Figure 2.11 Prostate cancer — incidence and mortality trends



In 1996, there were 2,660 deaths from prostate cancer. Mortality from this cancer results in approximately 6,400 years of potential life lost before the age of 75 years. Five-year survival rates are around 66 per cent.

Table 2.12 Fast facts on prostate cancer

Australia	Males
New cases (1994)	12,787
Incidence rate (per 100,000)	158.7
Incidence trends (1990-94)	+17.9%pa
% all new cancers	30.0
Lifetime risk (0-74 years)	1 in 8
Deaths (1996)	2,660
Mortality rate (per 100,000)	33.1
Mortality trends (1990-96)	+0.6%pa
Potential years of life lost (0-74 years)	6,425
Lifetime risk (0-74 years)	1 in 66
Costs ($ '000) (1993-94)	95,372

Table 2.13 States and Territories — prostate cancer

State/Territory	1991–94 Incidence	1991–96 Mortality
	New cases and deaths per 100,000 population	
NSW	126.4	32.2
VIC	112.8	33.8
QLD	128.2*	34.1
WA	137.9	32.2
SA	129.1	33.8
TAS	140.9	38.1
ACT	124.8	41.4
NT	59.1	27.8

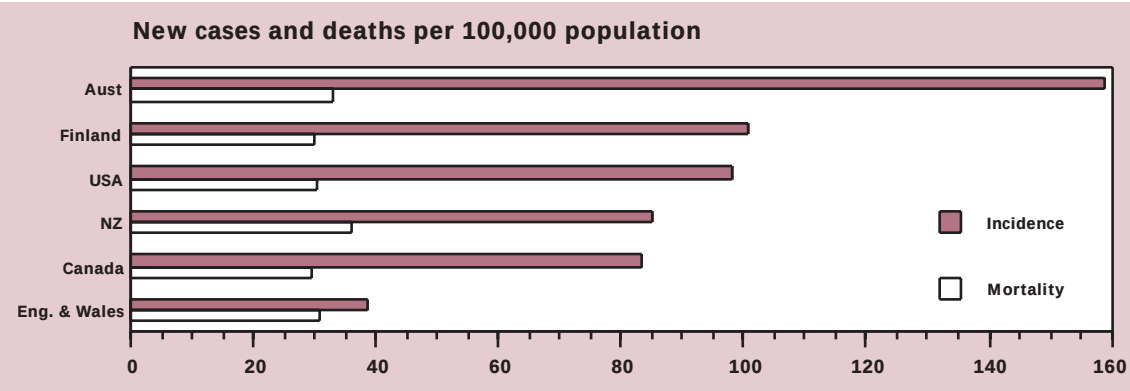
* Preliminary data.

There is limited variability between Australian States and Territories in prostate cancer incidence rates, apart from a slightly lower rate in Victoria (Table 2.13). Incidence rates for the Northern Territory are lower, but are subject to wide variability due to the relatively small size of the population.

National incidence and mortality data are not available for Indigenous males. Cancer registry data from Western Australia and the Northern Territory indicate that incidence rates may be six times lower in Indigenous males than non-Indigenous males. However, these data should be interpreted with caution as there is evidence of under-reporting of Indigenous status on cancer registries.

Australian-born males have prostate cancer mortality rates significantly higher than most migrant groups (Giles et al 1995).

Figure 2.12 International comparisons — prostate cancer



Note: Age-standardised rates for Australia (incidence—1994; mortality—1996) and other selected countries (incidence—1983–95; mortality—1993–94)

International prostate cancer incidence rates vary by a factor of 70 (Giles et al 1995). These incidence differentials suggest variation in PSA testing, rather than variation in prostate cancer rates. Of the countries compared in Figure 2.12, Australia has the highest incidence rate. However, the data for the USA, Canada and England and Wales are for the period 1983–87 and do not show increased incidence rates observed following the introduction of PSA testing.

Risk factors

Knowledge about risk factors for prostate cancer is poor. Currently the strongest known association is with age. Other possible risk factors include diet, body mass, physical activity, genetic factors and vasectomy, although there is no conclusive evidence.

Prevention and screening

There are currently no epidemiological data to define risk groups for targeted prevention or screening activities for prostate cancer.

The early detection and subsequent treatment of prostate cancer is a complex challenge that has received considerable attention over the past two decades, both in Australia and overseas. Evidence of any mortality reduction following early detection is equivocal; the role of population screening of asymptomatic men is therefore uncertain. The outcomes from current clinical studies are unlikely to become available for the next five to seven years.

There are two major randomised trials of prostate cancer screening underway (Gohagan et al 1995; Schroder & Bangma 1997). A major problem confronting these studies is the high level of PSA testing already present in recruits to the trial, requiring a large increase in sample size to show statistically significant changes in outcome. There are also likely to be significant differences between centres in the methods of recruitment, the number of screening modalities offered and the delineation of positive and negative tests.

There is continuing debate about screening for prostate cancer with DRE and PSA. There are no substantive data to support either view, and no assurance that the two major trials will be able to provide definitive evidence. Also, there is uncertainty about how PSA can be most effectively used in the detection of prostate cancer. Even proponents of mass screening do not recommend testing in men over 75 years of age, but studies of Australian practice show that significant numbers of men in this age group are being tested (Ward et al 1997; Pinnock et al, in press). Regardless of how the test is used, better information needs to be available to both men and general practitioners.

This point was highlighted in a recent AHTAC review of the issue (AHTAC 1996). AHTAC concludes that men without symptoms should not be screened for prostate cancer, and that 'men being offered or requesting the PSA test must be fully informed of the limitations of the available tests and the possible further diagnostic and treatment choices which they may face should they proceed with the test'. While there is uncertainty about the benefits of screening for prostate cancer, sufficient resources are needed to ensure that men are given the information they need. Last year, Antioch et al (1997) have updated the AHTAC review and supported its position.

Costs of *de-facto* prostate screening

Medicare statistics have been used to quantify patterns and trends in the use of the PSA test in Australia in the period 1992–96 (Bruce Armstrong, personal communication). Medicare statistics do not permit differentiation of PSA from prostate acid phosphatase tests, however the contribution of the latter is thought to be small. During 1992–1996, more than two million PSA and prostate acid phosphatase tests were reimbursed through Medicare in Australia, with more than one million Australian men tested (61 per cent of these had just one test, 10 per cent had more than three tests). Almost half of men aged 60–69 years had one or more PSA test.

The number and rate of PSA tests peaked in all age groups and all States and Territories (except the Australian Capital Territory) in 1995, and the age-standardised rate of men having one or more PSA test increased by 150 per cent from 1,829 per 100,000 men in 1992 to 4,571 per 100,000 in 1996. More than $10 million was spent on PSA and prostate acid phosphatase tests in 1996 through Medicare alone.

Economic evidence on cost-effectiveness of screening is sparse and is reliant on intermediate outcome measures and overseas data. The AHTAC review found that costs generated by adverse events associated with the diagnostic work-up, the therapeutic intervention or long-term surveillance may be significant.

The economic case for prostate cancer screening has not yet been well presented. Based on the public health significance of prostate cancer, it seems reasonable to support the recommendations of Antioch et al (1997) that Australian researchers should link in with the two large randomised controlled trials of prostate cancer interventions being undertaken in the USA and Europe and consider more carefully targeted screening strategies. The clinical usefulness, epidemiology and cost-effectiveness of prostate cancer screening may not be known for at least 10–15 years (Auvinen et al 1996).

Treatment

Controversy also exists as to the most effective treatment for prostate cancer.

Diagnosis and staging of prostate cancer

The driving force in the diagnosis of prostate cancer is the PSA level. An arbitrary cut-off point is used to decide which men should undergo biopsy. To increase accuracy, lower thresholds should be chosen to determine the need for biopsy, but this will result in a very significant rise in the rate of unnecessary biopsy and in the anxiety levels of men who have had a PSA test.

Management of prostate cancer is complicated by the fact that it is extremely difficult to adequately stage the disease and assess its biological activity before treatment begins. Approximately 60 per cent of men newly diagnosed with prostate cancer are believed to have organ-confined disease (Parker et al 1996), but pathological analysis following surgery reveals organ-confined disease in less than 50 per cent of cases.

To improve staging accuracy, nomograms have been developed that predict the probability of a patient having organ-confined disease. The use of these nomograms, when counselling men before radical prostatectomy, has increased the proportion of men with organ-confined disease opting for surgery from 33 per cent to 55 per cent (Partin et al 1997).

Treatment modalities

The three most frequently applied management strategies are watchful waiting, radiotherapy and radical prostatectomy. Watchful waiting is considered feasible for prostate cancer because of the generally slow progression of the disease and because of the side effects of radiotherapy and surgery. A wide range of outcomes for each of these treatment modalities may be expected. Some of the most favourable results are reported below, but the paucity of evidence from randomised trials compounds the difficulties that confront patient, urologist and oncologist alike, when deciding treatment.

Watchful waiting — A meta-analysis of watchful waiting has found 10-year disease-specific survival to be around 87 per cent. Eighty-one per cent of early stage (grade one) patients but only 26 per cent of later stage (grade three) patients were metastases-free at 10 years (Chodak et al 1994).

Radical radiotherapy — The metastases-free survival has been reported to be 90 per cent for grade one tumours, 65 per cent for grade two tumours, and 25 per cent for grade three tumours, eight years after diagnosis and treatment (Hanks 1991).

Radical prostatectomy — The five-year metastases-free survival has been reported to be 94 per cent for grade one tumours, 90 per cent for grade two tumours, and 73 per cent for grade three tumours, following this procedure (Gerber et al 1996).

All of these studies have attracted criticism for poor trial design. Currently, at least four randomised trials are underway in Europe and the USA to optimise treatment modalities. Recruitment is not easy for these trials, a point highlighted by the UK Medical Research Council (PRO6) trial. This study, launched in 1994, aims to

compare watchful waiting with radiotherapy and radical surgery, but by the end of 1995 was able to recruit only 21 men (MRC Working Party on Prostate Cancer 1994).

Nonetheless, a recent 10-year, population-based, retrospective study of approximately 60,000 men suggests that there is some definite benefit in moderately and poorly differentiated tumours, from treatment as opposed to non-treatment (Lu-Yao & Yao 1997).

Prostate cancer — current status

- **Prostate cancer is the most common cancer in Australian men and second only to lung cancer as a cause of cancer death among them. The incidence of the disease doubled between 1985 and 1994, when prostate-specific antigen (PSA) and other tests were introduced widely in Australia. Semi-national data up to 1996 however indicate a sharp decline in incidence since the 1994 peak.**
- **There is no evidence of any reduction in mortality following early detection of cancer in asymptomatic men. Current national policy is that men without symptoms should not be screened for prostate cancer.**
- **The optimum treatment for prostate cancer is subject to debate. The current trend is to adopt a watchful waiting approach in men aged over 75 years, particularly with low PSAs and low-grade tumours. Treatments such as radiotherapy or radical prostatectomy are being offered to younger men. This approach is seen by some as being a reasonable compromise until new evidence from randomised controlled trials becomes available.**

2.7 Other cancers

The priority cancers currently targeted offer good prospects for primary, secondary and tertiary preventive interventions, but the list is not exclusive and these are not the only cancer types which offer the best prospects for reduction in morbidity and mortality. Other cancer types may be considered in future NHPA processes.

Head and neck cancers are a major cause of morbidity and mortality, especially in males. Aetiologically, they are strongly associated with smoking and alcohol consumption, both amenable to behavioural change. The outcome of treatment of head and neck cancer is demonstrably superior when undertaken by expert multidisciplinary teams, providing a simple strategy for improvement of results.

Nasopharyngeal cancer has a strong genetic predisposition in South-East Asian people and a reasonable case could be made for screening Cantonese and Vietnamese ethnic groups, especially those with a family history of the disease. Cancers of the paranasal sinuses are associated with wood workers, and this disease could be largely prevented by protection against inhalation of wood dust.

Hepatocellular carcinoma is strongly linked to infections with hepatitis B and C, both of which are preventable diseases. It is also associated with alcoholic cirrhosis, which is again is equally amenable to prevention.

Oesophageal cancer is causally linked to smoking, and therefore partially preventable. New therapy protocols involving chemoradiation offer reduced morbidity and mortality compared with oesophagectomy.

Bladder cancer is another smoking-related cancer. Bladder conservation protocols using chemoradiotherapy show promise.

A significant proportion of anal cancers are due to HPV infection, which is sexually transmitted. The disease is largely preventable by safe-sex practices. Treatment of anal cancer has been revolutionised by chemoradiotherapy protocols which have largely eliminated the need for abdominoperineal resection.

Among gynaecological cancers, ovarian cancer is the largest cause of mortality. Recent discovery of predisposition genes offers the possibility of detecting those at highest risk for close monitoring by transvaginal ultrasound or Ca 125 serum marker levels.

Chapter 3

Opportunities for cancer control in Australia

3.1 A framework for change

Cancer control encompasses a broad range of activity and effort. National effort through the NHPA process, and the National Health Goals and Targets process before it, have concentrated on cancer types and have determined particular indicators for those cancer types to measure progress in the control of cancer.

While a focus on cancer types is centrally important in determining progress, it provides only a portion of the whole picture. Other factors are important in building a holistic picture of cancer control in the nation. These include the role and rights of consumers, the transfer of existing or new knowledge available through research into strategies against cancer, the kinds of data systems that are available and whether aspects of cancer services or treatment are the same for all population groups.

In addition, there are a number of stages along the continuum of cancer control that need to be considered. These are research, prevention, screening and early detection, treatment and palliation. As discussed in Chapter 2, screening and early detection practices are possible or useful in some cases, such as for cancers of the breast or cervix, but not as useful for prostate cancer and largely unavailable for lung cancer, although research into better early detection techniques is continuing. Many treatment strategies or breakthroughs are applicable to more than one kind of cancer, and multimodal and multidisciplinary approaches to treatment and care are proving beneficial to patients across the whole spectrum of disease.

It would be useful to build a systematic framework for promoting a comprehensive, rational approach to cancer control at the national level. This framework should take into account the cancer types, the stages along the continuum of care, and other categories of health system activity that are relevant to cancer control. Taking this approach should make it easier to identify gaps or particular problem points in the system that, if addressed successfully, could lead to overall improvements. In addition, the framework would allow each endeavour to have a rightful place so that individual or State/Territory activities that contribute to national cancer control could be identified within it. The framework would provide a blueprint for collaborative action under the NHPA process, which also draws on non-government expertise.

A process to develop cancer control priorities in Australia was undertaken by the NCCI as part of its contribution to this report. This process involved a wide range of stakeholders, to focus on issues as they apply across cancer types as well as within cancers with a practical focus on actions. Through the wide consultation process undertaken, the NCCI was able to develop a broad overview of opportunities to improve cancer control.

This chapter addresses these opportunities within the suggested framework of cancer control, dealing first with the particular cancer types, and any specific stages along the continuum of care that can be identified as requiring attention. Secondly, the opportunities for improvements in the areas that are relevant across the spectrum of cancer control are examined. Section 3.6 identifies opportunities for utilising the Australian research effort in the most effective manner. Finally, Section 3.7 looks at scope within the health system to promote evidence-based best practice.

3.2 Specific issues for priority cancers

Lung cancer

Prevention

The intersectoral collaboration on smoking policy is a major reason for the success of preventive efforts to reduce lung cancer. There is a wide range of preventive strategies already in place at Commonwealth, State and Territory, local health authority and community level. Over the past 10 years, there have been legislative changes about packaging and advertising at a national level, State-based promotion of smoke-free workplaces, and many anti-smoking activities by government, non-government and community organisations.

There have been calls from community groups and health bodies suggesting additional changes to further restrict tobacco sales and consumption:

- promoting the widespread uptake of smoke-free policies which ban smoking in all workplaces and enclosed public places;
- a change in the method of calculating excise duty to cents per cigarette, which should reduce smoking prevalence by preserving the effect of price increases (Scollo 1996);
- development of a new regulatory framework dedicated to covering the range of nicotine products formulated to deliver nicotine for therapeutic reasons or recreational use (Borland 1997);
- introduction of generic packaging, to reduce the influence of brand consciousness in the media and among consumers;
- cessation of all forms of advertising and promotion, with an extension of present tobacco control legislation to prohibit point-of-sale advertising, including the display of packets to the general public; and
- more effective measures to persuade adolescents not to take up smoking, such as legislative changes to reduce promotion and increase price, as well as compulsory education in primary and high schools and population-wide smoke-free policies.

Skin cancer

Primary prevention

Epidemiological evidence demonstrates that overexposure to sunlight in the first two decades of life is an important risk factor for the development of skin cancer. If an impact is to be made on future incidence rates of skin cancer in Australia, the nature and amount of sun exposure in children and adolescents needs to be reduced.

While systematic efforts have contributed to an increased awareness of the dangers of sun exposure and decreased levels of sun exposure (Hill et al 1993), many people still have not adopted sun protection behaviours. Environments without sufficient shade place great demands on individuals to be sun safe. The fashionable appeal of non-sun-safe items can inhibit use of SunSmart alternatives, such as the use of baseball caps by adolescents (Centre for Behavioural Research in Cancer, unpublished). These remain major obstacles to improved protection and might be foci for concerted activity in the future.

Future efforts may concentrate more on structural change within the community to decrease available time in the sun, increase protective shade structures and other physical means of protection and encourage those at risk to use the highest SPF sun screen. Behavioural research is obviously a critical part of the development, delivery and measurement of new programs.

Screening and early detection

In 1995, almost 4 per cent of Australians had a skin lesion excised with the Medicare costs for this general practice procedure alone (pathology and consultation costs excluded) at almost $50 million (Burton 1996). Melanoma incidence and mortality trends indicate that this amount is more than what may be required to control the disease (Burton 1996). Besides a reduction in the ratio of benign to malignant lesions removed by general practitioners has the potential to generate considerable cost savings for the health system.

A number of studies have found that simple interventions by general practitioners can improve their accuracy in detecting malignant pigmented lesions, thereby reducing the ratio of benign to malignant pigmented lesions excised (Del Mar & Green 1995). It is however important that this strategy does not result in a significant increase in missed malignant lesions, nor result in delay in diagnosis of melanomas while they are thin (<1mm in thickness).

Cancer of the cervix

Screening

Potential future directions and issues for cervical screening in Australia include the following.

Need to adequately test populations at risk — It thought that most cases of cervical cancer could be prevented if all women at risk were to be screened every two years. This risk group comprises women who are sexually active and who have an intact cervix. Where there is sufficient evidence of the effectiveness and acceptability of a specific recruitment strategy, it should be implemented. Where evidence is insufficient, responsive research to generate timely and sound evidence is required (Ward 1997).

Incorporation of automated and semi-automated devices into routine laboratory practice — Semi-automated slide preparation techniques and computer-assisted rescreening have been designed to assist cytotechnologists in evaluating Pap smear slides, which would minimise the number of sampling procedures and false negative laboratory results. While the former involves producing more representative samples which are easier to interpret, either conventionally or with the aid of a computer, the latter uses computer technology to assist rescreening of the conventional Pap smear.

These devices have been introduced in Australia over the past two years. AHTAC is undertaking a review of the effectiveness and cost-effectiveness of these devices and examining their likely usefulness in the national screening program.

Use of HPV typing to identify high-risk groups of women — HPV typing is now available in Australia, and could theoretically be used to identify two possible high-risk groups: women with low-grade abnormalities who require further investigation; and older women infected with high-risk HPV genotypes. Relevant research for both of these approaches is needed before they can become widely adopted.

Restriction of government funding to those laboratories that meet defined performance standards — Laboratory inspections from 1 January 1999 will assess the laboratory's performance against a set of nominated performance standards. This should increase the confidence of both women and health workers in the quality of Pap smears.

Better adherence to the two-year screening interval — Currently, there is no restriction on Pap smear screening. Although women and general practitioners are encouraged to adhere to two-yearly screening, women can seek testing at any time. Major cost reductions could be achieved if women and medical practitioners were encouraged to adhere to the two-year policy.

Despite the high age-standardised incidence rates for Indigenous women and immigrant women from specfic countries, the screening rates for these groups are low. Research into effective and culturally appropriate recruitment strategies is currently being undertaken.

Breast cancer

Within Australia, many opportunities for reducing mortality and morbidity from breast cancer are missed. Also, service delivery is more complex, less effective and costlier than is optimal. Improving breast cancer control will require a more coordinated approach to offering all aspects of screening, diagnosis and management in a cost effective manner.

Some of the major issues which need to be addressed in improving breast cancer control include the following:

Mammographic screening

Although Australia has a fully expanded, high quality mammographic screening program, a number of issues need to be addressed:

- Strategies to review the national accreditation requirements and to facilitate the implementation of strategies to ensure that all aspects of the screening and assessment process that meet these requirements are put in place.
- At least 70 per cent of women in the target age range (50–69 years) should participate in the program to justify the expenditure on the program. Currently, participation is about 54 per cent (BreastScreen Australia, unpublished data). Re-attendance rates seem to be higher, with rescreening rates of between 68 per cent and 83 per cent (BreastScreen Australia, unpublished data). Based on current recruitment and rescreening rates it has been estimated that by the Year 2000 the participation rate may have increased to 64 per cent (Kricker, in press), but this is still short of the target. It appears there is a high level of community awareness of BreastScreen Australia and the role of mammographic screening (Barratt et al 1997). However more evidence-based and cost-effective approaches will be required to increase participation in the program. This may require the further development and implementation of targeted strategies to increase participation by Indigenous women and women from non-English speaking backgrounds.
- Indicators of the quality, participation and impact of the program must be developed so that governments and the community can be assured of an excellent program aimed at reducing mortality from the disease. Currently, key national data on participation and quality are collected, but there is little collation of this data. The comparability of State/Territory data is also problematic.
- The costs of the program should be reviewed to ensure that they come into line with appropriate benchmarks overseas. Cost structures within Australia should be investigated through the existing data sets, to determine where the Australian program is costing more, and to what degree this is amenable to change. However for reasons of quality and geography, among others, it is not always possible to match the costs of overseas programs.

Diagnosis

The establishment of a system that reduces unnecessary investigations and provides accurate and timely diagnosis of breast cancer is necessary. Currently, most women with breast symptoms present first to their general practitioner who may investigate the symptoms and/or refer to a surgeon. The National Breast Cancer Centre (NBCC) has developed and disseminated guidelines to general practitioners to assist this process.

Spreading the message — There is a considerable lack of understanding among women about the importance of prompt investigation of breast symptoms. Fifty per cent of women in the National Breast Health Survey, who were found to have a breast symptom in the past two years, had not visited their doctor within one month of observing the symptom. One out of four women had not had the symptom examined at all (Barratt et al 1997). There is a need for community information programs and further research to explore the reasons why some women do not present until the cancer is fairly advanced.

Training health professionals — Practitioners need to receive adequate training in clinical breast examination at medical schools. There is a need for agreed evidence-based guidelines about both breast self-examination and clinical breast examination. Improved training opportunities for undergraduate medical students, general practitioners and other health professionals are needed. These will require innovative approaches to medical education to overcome the current lack of opportunity to perform breast examination on either asymptomatic or symptomatic women.

Existing guidelines — The NBCC guidelines (Irwig 1997) to assist general practitioners in investigating breast symptoms and ACN recommendations about the reporting of breast pathology (Australasian Cancer Network Working Party 1997) should be implemented and evaluated. The need for guidelines and/or quality assurance programs in breast cytology and in imaging techniques should be explored in conjunction with the relevant professional colleges.

Women at increased risk

The women who have ductal carcinoma *in situ*, lobular carcinoma *in situ*, atypical hyperplasia, a previous personal history of breast cancer or a significant family history of breast cancer are all at increased risk of developing breast cancer. It may be possible to make a major impact on the disease at the population level by increasing the identification of these women and providing appropriate surveillance and management should breast cancer develop.

Management

Reductions in mortality and morbidity from breast cancer can also be achieved by ensuring that all women receive management that accords with the best evidence about effectiveness. Effective management includes both the clinical treatment and supportive aspects of care.

High quality cost-effective management will require the following:

- Strategies to ensure that research findings flow rapidly into clinical practice. Experience to date suggests that this is best achieved through a process of systematic review such as that provided by the Cochrane Collaboration and through the development and implementation of evidence-based guidelines.
- The development of more coordinated models of care. For example, the cost-effectiveness of breast centres that provide a seamless transition from diagnosis or screening into treatment should be explored. Similarly, approaches to multi–disciplinary care should be trialed. This work will need to begin by developing a shared definition of multidisciplinary care and strategies that address the particular needs of the rural sector such as teleconferencing, regional clinics, and training. Multidisciplinary care requires agreed local protocols and audit, and the opportunity for multidisciplinary case conferencing about management. Specific strategies for providing supportive care must also be included.

- Emerging strategies for managing breast cancer are likely to be based on a better understanding of the development of the disease. The ways in which gene mutations lead to the development of breast cancer may help to identify early intervention strategies.

Many of these issues could be addressed by establishing a more integrated approach to the screening, diagnosis and management of the disease. This will require national coordination and collaboration between the key players which will include the Commonwealth, State and Territory health departments, BreastScreen Australia, the National Breast Cancer Centre, the professional colleges, treatment centres and consumer groups.

Colorectal cancer

Screening

As discussed in Chapter 2 (Section 2.5), there is evidence that screening using FOBT can help reduce mortality from colorectal cancer, but there is limited information on the feasibility or acceptability of this type of screening in Australia. Likely issues for a future screening program include ensuring that the participation rates for initial and follow-up screening are high and that screening is acceptable to the target group, to others in the community and to the health care providers involved.

An AHTAC review has considered the benefits, risks and costs of a national screening program for colorectal cancer (AHTAC 1997), and recommends commencing pilot programs using FOBT for the average risk population aged 50 years or more.

Treatment

There are several areas of controversy in relation to colorectal cancer treatment. The major impetus for the development and implementation of evidence-based management guidelines is to achieve a uniform acceptance of evidence about the newer developments in colorectal cancer treatment.

Prostate cancer

Screening

There is continuing uncertainty over the benefits of population screening for prostate cancer. The current recommendations of AHTAC (1996) are:

- men without symptoms should not be screened for prostate cancer using PSA tests as there is insufficient evidence for the benefit of the test;
- PSA should continue to be used in the monitoring of men known to have prostate cancer and in patients selected for active treatment of benign prostatic hyperplasia; and
- that all men requesting or being offered a PSA test must be fully informed of the limitations of the test and the possible further diagnostic and treatment choices which they could face.

It has been argued that limited PSA testing would lead to fewer potentially harmful consequences for men (including those from follow-up investigations, surgery and radiotherapy) with long-term benefits and substantial cost savings to the community. It would appear reasonable to discourage the inappropriate use of

PSA testing to screen well men for prostate cancer, unless evidence of benefit emerges which warrants development of a national screening program.

Staging and treatment

Recent increases in the detection of prostate cancer have highlighted uncertainty in both methods of treating early stage disease and treatment of metastatic disease, particularly in terms of quality of life and cost-effectiveness. A diversity of treatment practices reflect this uncertainty.

Ongoing audit is necessary as few Australian studies have reported outcomes of any form of treatment and there is often insufficient staging data to allow any comparison with international studies. Our ability to clarify the role of various treatments in prostate cancer is severely restricted by the lack of reliable evidence-based information. While the numbers required for screening studies in Australia would be high, outcome studies are certainly within the scope of the Australian experience.

3.3 Evidence-based practice in cancer control

In addition to cancer type specific issues described in the previous section, there are several issues that are common to all cancer types. For example early detection and accurate diagnosis are crucial to the effective treatment of most cancers. There are many similarities in the management of different cancers and other issues of general concern. The increasing complexity of cancer treatments, together with the necessity for treatment to be based on evidence of best practice, has led to widespread advocacy for clinical practice guidelines and to a belief that existing processes for multidisciplinary consultation should be extended. Other priority areas are palliative care, psychosocial care and the need to increase consumer involvement in all stages of cancer control.

Role of general practitioners in prevention and early detection

Most general practice prevention is described as opportunistic, despite the fact that 82 per cent of people visit their general practitioners at least annually (ABS 1992). In some practices, patients are contacted for specific preventive and screening procedures, but this is not common, because of the limited use of nurses in general practice and because individuals are not linked to particular general practitioners.

Opportunistic preventive activities can increase screening rates but it is difficult for Australian general practitioners to provide optimal preventive care (Ward et al 1991; Dickinson et al 1988; Dickinson et al 1989; Heywood et al 1994). But there are a number of barriers to cancer prevention in general practice. The beliefs of general practitioners and patients, paucity of resources, and the structure of primary medical care services form a complex set of factors which interact and limit the provision of preventive services in this setting.

Strategies that can overcome these barriers include:

- mass media campaigns;
- distribution of pamphlets in general practice waiting rooms;
- the adoption of practical, patient-centred general practitioner guidelines;

- audit of medical records with feedback;
- visits from practice facilitators to help set up a preventive care system;
- the use of inexpensive, reliable, fast and easy to use information systems about patients' individual risks and cost-effective management alternatives; and
- general practitioner input into planning and developing appropriate roles for general practitioners as part of all public health cancer programs.

Claims about remuneration issues for general practitioners which impede preventive care have been raised in the health sector over many years. Commonwealth funding through the General Practice Strategy has been designed to help overcome these problems, and the current review of the strategy may identify other opportunities in this area.

Clinical best practice

Evidence-based best-practice guidelines attempt to define and encourage best practice so that the most efficient and effective approaches to cancer prevention and treatment can be used and consistency in practice enhanced. As reviewing and interpreting available evidence to make decisions about what constitutes best practice is a considerable and complex task, it has been argued that a systematic and rigorous process with multidisciplinary input should be followed.

Progress has been made towards such a systematic approach in Australia. In 1995, the NHMRC published *Guidelines for the Development and Implementation of Clinical Practice Guidelines* (NHMRC 1995). This provides broad guidance on priority setting, review of evidence, development of guidelines, and dissemination, implementation, monitoring and evaluation of completed guidelines. Within the field of cancer control, a number of evidence-based guidelines have been developed, including *Guidelines for the Detection and Management of Early Breast Cancer* (NHMRC 1996). Guidelines for advanced breast cancer, ductal carcinoma *in situ*, colorectal cancer, and cutaneous melanoma are also being developed.

Currently, the major issues facing guideline development and implementation are:

- establishing priorities for the development of guidelines;
- establishing evidence-based strategies for dissemination and implementation of guidelines; and
- evaluating the cost-effectiveness of the guideline approach to promotion of evidence-based best practice in the health system.

Multidisciplinary care

Multidisciplinary care is commonly understood to mean care based on formal consultation between medical specialists — generally surgeons, radiotherapists, medical oncologists and pathologists. But the term is increasingly being used to describe care based on broader consultation that may involve specialists in diagnostic imaging, pharmacy, nursing, social and psychosocial work, and palliative and other support services.

The phase of a particular illness and the goals of any intervention define the skills required of a particular team, rather than the medical or other qualifications of the individual professionals involved in such teams.

The distinction between phases of an illness are seldom clear cut. Overlap and continuity of special skills are needed. With several health professionals involved in multidisciplinary care at any one time, it is essential that one individual is identifiable as the overall manager and decision maker, working closely with the patient and the patient's general practitioner.

The extent of advocacy for multidisciplinary care reflects a widespread belief that benefit for the patient will ensue in many cancers when there is a process that ensures individual patients are treated by specialists from several disciplines. Evidence to support this approach is however inconsistent (Selby et al 1996). Nevertheless, multidisciplinary teams are increasingly being established in relation to both adult and childhood malignancy and are seen as 'state of the art'. Further investigation is needed to identify the cancers and stages of illness in which patients are likely to benefit from multidisciplinary care.

Palliation

Palliative care services provide physical, emotional, psychological and spiritual support for patients and their families facing a life-threatening illness. In Australia, approximately 80–90 per cent of people who use palliative care services have a diagnosis of cancer (Kasap & Associates 1996). The Australian Association of Hospice and Palliative Care (AAHPC) estimates that of 19,000 individuals who died receiving palliative care services in 1995/96, 17,100 would have died of cancer (AAHPC unpublished data).

In Australia, palliative care has emerged as a specialised field in the health care system, with significant growth in the number and type of palliative care services available. Currently, however, there is considerable variation in the range and quality of these services. Palliative care services are not able to meet current demand and not all Australians requiring palliative care have been able to access a consistent range of high quality and appropriate services.

The Palliative Care Program Review Steering Committee comprising representatives from the Commonwealth and State and Territory Governments, the Consumers' Health Forum, the Australian Catholic Healthcare Association and the AAHPC is currently developing a draft national policy framework for palliative care until 2003. The Committee is examining ways to improve access to high quality palliative care; continuity of care for all terminally ill people; enhanced options for treatment at home, hospital or hospice; and making palliative care an integral part of the health care system.

Psychosocial care

It appears that cancer patients are largely satisfied with the quality of technical care they receive, but less satisfied with other aspects of their care, including communication and supportive services (Wiggers et al 1990; Girgis & Foot 1995). There is a lack of information about whether interventions in these fields can make a difference for patients.

Consumer groups argue that many of their concerns relate to the manner in which reductions in morbidity and mortality in the cancer control field are apparantly achieved. Undue emphasis placed on the disease may result in social, emotional and practical needs not being considered. Research tends to support this argument, revealing high levels of physical and psychosocial problems experienced by cancer patients (Newell et al, in press; Perkins et al, in press). The provision of information about tests, treatment and prognosis is also an issue.

There is a growing awareness that patients should be treated as active participants in their health care. While the NHMRC recommends that cancer patients should be encouraged to participate in decision making about their treatment (NHMRC 1995), there is contradictory evidence about the level of involvement patients actually desire (Degner & Sloan 1992; Johnson et al 1996). Additional research, suggesting that patients do better when involved in the decision-making process at their desired level, highlights the need for doctors and patients to communicate effectively in this area (Miller & Mangan 1983).

Research shows that patients' needs for information about their disease, its treatment and their prognosis are not being currently met (Rainbird et al, in press). Patients have indicated that they do not know enough about the possibility of the cancer spreading, dealing with fear of potential pain and suffering, coping with anxieties relating to having treatment, and keeping up with work commitments. Doctors tend to underestimate the amount of information their patients desire and they overestimate the amount of time spent providing that information (Waitzkin 1984). Given the central role that information has in allowing individuals to be active participants in decision making, and in satisfying medicolegal requirements, such findings are of concern and indicate the need for effective action.

Promising data on the survival benefits of psychosocial interventions with cancer patients (Spiegel et al 1981; Spiegel et al 1989; Fawzy et al 1990a; Fawzy et al 1990b) are currently being investigated in randomised trials in Australia (Kissane et al 1996). Critical components for quality improvement in clinical care include feedback of patient-generated data on routine clinical performance and improved training of clinicians. A review of over 200 studies of training programs that target communication and interaction skills confirmed the positive impact of training (Kern et al 1989).

Supportive care

Concerns have been raised by consumers about the apparent lack of recognition of the need for supportive care in cancer control. The NHMRC guidelines about the clinical management of early breast cancer emphasise the need for cancer specialists to provide appropriate and adequate counselling and support. This includes being offered adequate counselling, access to support groups and desired practical assistance. Such psychosocial support has been found to have beneficial effects on the patient's quality of life, emotional adjustment, social functioning, knowledge levels, coping skills and even their disease and treatment related symptoms (NHMRC 1995; Burke & Kissane 1996; Meyer & Mark 1995; Devine & Westlake 1995).

Development of a consumer network

The NCCI priority setting process has reinforced the need to establish a national consumer forum. Such a forum would aim to foster a national network of consumers and facilitate their active participation in cancer control. Consumers would be concerned with prevention, treatment and palliation of cancer and they would develop, implement and monitor the application of a national policy on the inclusion of consumer representatives in organisations involved in cancer control.

A consumer charter could be developed that embodies principles including consumer involvement in decision making; the right to an informed choice; care which takes account of physical, social, emotional and practical concerns; and equity of access to information and resources. This charter could be incorporated into accreditation and quality assurance programs of appropriate services and would be promoted through cancer networks, professional colleges, hospitals, research bodies and incorporated into funding guidelines for services. Such a charter could ensure comprehensive consumer participation in all aspects of cancer control.

3.4 Special populations

The underlying principles of health care delivery in Australia include the provision of quality health care to all Australians. However, special populations such as Indigenous peoples, people from non-English speaking backgrounds, socio-economically disadvantaged groups and people living in rural and remote areas all require special consideration.

Indigenous peoples

Cancer is the fourth most frequent cause of death for Indigenous males and the second most frequent cause for Indigenous females, accounting respectively for 10 per cent and 13 per cent of deaths in 1992–94 (Anderson et al 1996). Overall, mortality from neoplasms is higher among Indigenous males than females.

Indigenous mortality by type of cancer reveals a slightly different pattern than that obtained in the non-Indigenous population (Bhatia & Anderson 1995). Indigenous women have a high relative risk of cancer of the cervix; in 1992–94, it was estimated to be 8.3 times higher than that for non-Indigenous women (Anderson et al 1996). In comparison, the relative risk for prostate cancer among Indigenous males was found to be one-fifth of that noted for non-Indigenous males. Although the overall numbers are small, the relative risks for deaths from liver cancer and lung cancer are high among Indigenous Australians.

The death rate for cancer in the Indigenous population fluctuated widely between 1985 and 1994, especially for Indigenous males, so no consistent trend was observed. Mortality from specific cancer sites all decreased between 1989–91 and 1992–94, but only breast cancer mortality decreased significantly.

The greater preventable cancer mortality among Indigenous people may be attributable to a lack of access to effective and culturally appropriate prevention

and treatment programs, particularly those that focus on smoking, alcohol consumption and screening for cancer of the cervix. However, limited information has become available on the extent to which Indigenous Australians receive appropriate preventive care. Existing data suggest that up to 40 per cent of Indigenous peoples who smoke do not receive 'quit smoking' advice from a health care provider (Perkins 1995). Strategies for improving the delivery of such care by existing health care providers need to be developed.

Socio-economically disadvantaged people

Overall cancer mortality rates are up to 93 per cent higher among socio-economically disadvantaged groups in Australia than those in higher socio-economic groups (Mathers 1994). The principal contributor to this differential is a 152 per cent greater mortality due to lung cancer. Higher mortality rates among disadvantaged groups also apply for cancers of the mouth, pharynx, oesophagus, stomach, rectum, liver, larynx and cervix (Smith et al 1996).

The prevalence of smoking is significantly greater among socio-economically disadvantaged individuals, with males 43 per cent more likely to smoke and females 54 per cent more likely to smoke (Mathers 1994). Such differentials appear to be widening as a result of a more marked reduction in smoking rates among those who are socio-economically advantaged (MacFarlane & Jamrozik 1993). Women who are socio-economically disadvantaged are 18 per cent less likely than those in higher socio-economic groups to report having cervical cancer screening at the recommended interval (Mathers 1994).

Diet, smoking, occupational exposures and utilisation of health care services all play a part in creating these differentials. However, existing cancer risk reduction programs focus on reducing cancer risks in the community as a whole, rather than special groups, thereby failing to focus on specific social and economic factors that predispose disadvantaged individuals to such risks. Additional research is required to establish programs that have a greater capacity to reduce the prevalence of such risks among socio-economically disadvantaged people.

People from non-English speaking backgrounds

For some cancers, incidence rates are higher among migrants than among the Australian-born population. Migrants from northern Europe have greater incidence rates of lung, bladder and stomach cancers, whereas those from Fiji and Vietnam have a greater incidence of cancer of the cervix (MacCredie et al 1993). The differentials in incidence and mortality parallel differentials in risk behaviours and use of preventive services (Mathers 1994).

For many migrants to Australia, many factors may foster exposure to cancer risks and influence the pattern of health service utilisation. In order to address these issues, cancer control initiatives directed at developing culturally appropriate models of preventive health care delivery are required.

Rural and remote populations

In contrast to the patterns noted for injury mortality and morbidity, no large differentials in cancer mortality exist between Australians who live in rural and remote areas and those living in metropolitan areas, with the possible exceptions of breast cancer and melanoma. In 1991–95, death rates for all neoplasms were similar across all seven of the Rural, Remote and Metropolitan Area (RRMA) categories (see Appendix 2) (Titulaer et al 1997). Mathers (1994) found lower breast cancer mortality in non-metropolitan areas. Titulaer et al (1997) reported slightly lower rates of melanoma deaths in the remote zone.

Some differences have been reported between RRMA categories with respect to self-reported actions taken to reduce cancer risks. Respondents to the 1995 National Health Surveys from remote areas reported the use of sun protection more often than those living in other areas (Titulaer et al 1997). Mathers (1994) reported that females residing in non-metropolitan areas were more likely to smoke, and males in these areas were more likely to consume alcohol at 'at-risk' levels. In terms of health care utilisation, Australians in non-metropolitan locations were less likely to consult a doctor, but more likely to visit hospitals as outpatients. Women in non-metropolitan areas were less likely to have regular mammographic screening, but more likely to have regular cervical screening.

Available data do not provide a clear understanding of the need for, and access to, cancer control services in rural and remote areas. Particular issues that are of concern involve:

- accessibility of specialist cancer diagnostic and treatment services;
- accessibility of cancer-oriented support services; and
- strategies for providing cancer control programs in rural areas that are directed at reducing the risk of melanoma, lung cancer, breast cancer, cervical cancer and cancers associated with high levels of alcohol consumption.

3.5 Familial cancers

Most cancer occurs as a result of an interaction between genes and the environment. Advances in genetic technology have allowed a detailed understanding of the importance of genetic changes in the evolution of cancer. Some of these advances can be directly applied to cancer screening and prevention now, while further research is needed to refine current understanding and apply the advances to cancer diagnosis and treatment.

Family history is a risk factor for many common cancers, including breast, colorectal, prostate and melanoma. Approximately 20 per cent of cancer patients have a family history of cancer which may be due to genetic factors, common environmental factors or due to chance. An additional 5–10 per cent of all cancers are due to inheritance of genetic susceptibility that increases the lifetime risk of cancer. Individuals within these families who have inherited the specific mutation have a high (80–100 per cent) risk of developing cancer. In addition, gene carriers (heterozygotes) develop cancer some 10–20 years before the average age at which the cancer occurs in the general population. Thus, familial cancers may be associated with more potential years of life lost and cost to the community than other cancers. The ACN has

submitted comprehensive guidelines on the management of familial cancer in Australia to the NHMRC for endorsement. These guidelines cover all aspects of familial cancer considered in this section.

The identification of cancer predisposition genes involved in the inherited susceptibility to the common cancers has resulted in an improved understanding of cancer risk based on family history. Further, the ability to test for mutations in these genes offers the prospect of accurate identification of those individuals at a significantly increased risk of cancer. In those individuals, targeted cancer prevention and early detection measures should result in a reduction of morbidity and mortality from cancer. The genes involved in the inherited susceptibility to cancer have also been implicated in the more common, non-familial forms of these cancers. Knowledge of the normal function of these genes and their role in carcinogenesis will be applicable to all cancers.

Significant progress has been made in the identification of genes involved in the susceptibility to cancers. Some 10 per cent of all colorectal cancer (and up to 20 per cent of early onset colorectal cancer) may be due to mutations in genes involved in DNA repair. Similarly, 5 per cent of all breast cancer (and up to 15 per cent of early onset breast cancer) is due to mutations in genes such as BRCA1 and BRCA2. Melanoma and prostate cancer are other common forms of cancer in which inherited susceptibility plays an important role.

It is estimated that about 1,000 new cases of cancer a year in Australia are due to deleterious genes which are passed down from generation to generation within families. They result in some 300 deaths each year. The number is similar to the number of deaths from cancer of the cervix, for the prevention of which large resources are made available. By establishing an individual's genetic risk early, a significant proportion of the familial cancer deaths could be prevented now, and morbidity associated with other cancers significantly reduced (Järvinen et al 1995; Lynch & Lynch 1995; Lynch & Smyrk 1996).

Increasing awareness of family history as a risk factor has created a demand for access to specialised cancer genetic services. Through expert genetic counselling, individuals at high risk for the cancer are given accurate information about the probability of their developing the disease and the options available for prevention/early detection. In some cases, genetic testing may be used to clearly identify those individuals in a family who are at increased risk to develop the disease. Others in the family identified not to carry the mutation could avoid unnecessary and expensive cancer screening and may be relieved of their anxiety.

For example, individuals who inherit FAP genes are at greatly increased risk of developing colorectal cancer. A test for mutations in the gene involved in FAP is now available. Family members found to carry a mutation can be offered careful surveillance until the time when surgical removal of the bowel is indicated. Such predictive testing requires extensive genetic counselling with preparation for a positive or negative test result. Thus, although FAP accounts for less than 1 per cent of the 10,000 new cases of colorectal cancer diagnosed in Australia each year, the medical, social and financial impact of this cancer is high.

In Victoria, the Colorectal Cancer Genetics Program is underway, as a major pilot study for comprehensive and organised cancer genetics services.

3.6 Research and data collection

While there may be debate about the adequacy and distribution of funding and the content of policy, Australian Governments and the community have shown strong commitment to cancer research through policy, funding and support for institutional infrastructure. This covers the full spectrum of cancer control, from the basic biology of cancer genetics and molecular epidemiology, to clinical trials and psychosocial/ behavioural research. However, Australian health systems are going through major changes and a continuing stable commitment to cancer research is needed.

Currently, approximately 12 per cent of government funding allocated through the NHMRC goes to cancer research.

Table 3.1 NHMRC funding for research in NHPAs: actual expenditure and percentage of total expenditure

Year	Total	Injury		Mental health		Cardiovascular		Cancer		Diabetes		Indigenous health	
	$m	$m	%	$m	%	$ m	%	$m	%	$m	%	$m	%
1994	121.24	2.10	1.7	15.19	12.5	23.34	19.3	15.50	12.8	2.97	2.4	N/A	
1995	131.15	2.00	1.5	17.89	13.6	24.86	19.0	13.74	10.5	3.06	2.3	N/A	
1996	145.20	2.37	1.5	20.69	14.3	26.73	18.4	16.13	11.1	3.07	2.1	2.51	1.7
1997	150.75	2.35	1.6	22.95	15.2	29.70	19.7	17.57	11.7	3.61	2.4	2.52	1.7

Note: 1. These figures are based on NHMRC and RADGAC funding and also include pro-rata expenditure estimates of relevant research done in NHMRC funded research institutes where appropriate.
2. Indigenous health is a designated priority population within the National Health and Priority Areas process.
3. Data not available for Indigenous health research funding in 1994 and 1995.

Source: NHMRC.

Types of research

In discussing research, it is helpful to distinguish between basic, strategic and applied research.

Basic research is directed towards advancing the frontiers of knowledge. For example, the basic curiosity driven research done in the 1950s on the structure of nuclear DNA, which won a Nobel Prize for James Watson and Francis Crick in 1962, laid the foundation for research into the genetic basis of disease.

Strategic research is also directed at advancing the frontiers of knowledge, but towards a particular health problem. The findings of such research will contribute knowledge and understanding of a health problem, with the potential for further development and evaluation leading to reducing the impact of the problem. Such research is usually investigator initiated. The importance of investigator-initiated strategic research is illustrated by the insights that are emerging from mechanistic studies that seem likely to lead to the next generation of progress in cancer prevention. Some examples are:

- inhibitors of specific cycloxgenase pathways have recently given justification for studies of colorectal cancer prevention;

- identification of HPV as the major carcinogen responsible for cancer of the uterine cervix and of *Helicobacter pylori* as a cause of gastric cancer (derived from observations made in Australia) opens the door to studies of vaccines and preventive antimicrobial interventions;
- linkage of hepatitis B and C viruses with hepatocellular carcinoma opens another avenue for prevention;
- recent insights from strategic research into nicotine addiction are leading to pharmacologic strategies for the enhancement of behavioural approaches to tobacco control, with possible implications for reducing lung cancer; and
- Australian research on factors governing white blood cell activity is revolutionising the control of cancer by chemotherapy.

Applied research is undertaken with the specific aim of achieving some predetermined objective, such as the development and evaluation of a vaccine or new diagnostic tool. It may lead to specific development activities to produce a commercial product or new treatment protocol. For example, applied research includes development of a *Helicobacter* treatment regimen, gene therapy for genetically caused diseases, and other cancer treatments.

The importance of a diverse, but strong, basic and strategic research capacity should not be underestimated. It is critical to the development of solutions to the world's health problems as the directions from which a solution may come cannot easily be forecast. While it is important to identify the strategic areas in which research should be undertaken, it would be inappropriate to be too prescriptive and stifle novel approaches.

Transfer of research information

The development of evidence-based practice and policy advice for cancer control depends upon improvements in the linkages between research and decision-making processes in cancer prevention and care. This applies at individual, population and policy levels. Traditional mechanisms for disseminating research results often fail to engage practitioners and policy makers. For research to contribute most effectively to cancer control, mechanisms for promoting research transfer must be enhanced.

Some suggested priorities for cancer research

There are some important gaps in our knowledge of cancer prevention, early detection and treatment which need to be further researched.

- ***Research on human behaviour*** – Human behaviour and its resistance to change are acknowledged as the greatest barriers to the control of cancer. There have been gains in raising awareness of the dangers of behaviours such as smoking and unprotected sun exposure, but behaviour change is difficult to achieve. A better understanding of methods of behaviour modification is also needed for promoting the uptake of research-based knowledge into health care practice by health care professionals. Effective research transfer depends upon a readiness of health care professionals to change their practices and adopt new treatments.

- ***Research on methods of preventing cancers for which potentially preventable causes are known*** – For some types of cancer, potentially preventable causes have been identified, but it is not known how to implement prevention. For example, large proportions of cases of cancer of the cervix and stomach are due to infections but no effective strategies exist to prevent them.
- ***Research on effective methods of early detection and treatment*** – Irrespective of the potential for primary prevention, effective early detection and treatment will contribute to the control of some cancers. These include, for example, cancers of the breast and cervix.
- ***Research on genetics of cancer*** – There is now a good understanding of the genetic basis of cancer. Advancements in genetic technology are creating new opportunities for understanding the causes of cancer, the detection and management of cancer risk, the early detection of cancer, and cancer treatment. Continuing support of both basic and strategic research in cancer genetics is a clear priority for the future of cancer control. Moreover, failure to invest wisely in Australian research on cancer genetics now is likely to lead to a future need to import expensive genetic technology.
- ***Research on screening techniques*** – Screening for cancer generally is a key area requiring focused research expertise. Large investments are already being made in cancer screening, either formally (eg for cancers of the breast and cervix) or informally (eg for cancers of the skin and prostate). It is doubtful whether all of these investments are yielding adequate returns. There are many unanswered questions about the performance of particular screening techniques, the efficacy and effectiveness of both prospective and established screening programs, and the efficiency and cost-effectiveness in practice of most of the established programs.

Participation in clinical trials

Evidence from randomised, controlled clinical trials is considered to be the standard for the evaluation of therapeutic effectiveness and provides the highest level of evidence on which to base individual patient recommendations (Sackett et al 1996). Major advances in the prevention, early detection and treatment of cancer have occurred through the use of randomised, controlled trials. Many clinical trials demonstrate only modest advances, but even these may translate into considerable community benefits.

Large numbers of patients are needed to accurately demonstrate such improvements. But no more than 3 per cent of patients with common cancers such as breast or colon cancer, and less than 1 per cent of cancer patients overall, receive treatment as part of a clinical trial (Fisher 1991). Participation among people from minority groups and non-English speaking backgrounds is even lower. Continuing low accrual rates significantly prolong the time taken to complete a trial, delaying potentially important results and threatening the viability of clinical trials.

Participation in clinical trials may offer benefits to individual patients. Patients invited to participate in a clinical trial should receive either the current best standard therapy or a therapy thought to be at least equally effective. There is some evidence that patients treated in clinical trials have better outcomes than patients receiving treatment outside trials (Davis et al 1985). This may be explained, in part, by the selection of patients with better-than-average prognoses for inclusion in clinical trials, but it may also reflect differences in the care received in a clinical trial. There is also evidence that doctors who participate in clinical trials incorporate the results of randomised trials more rapidly into routine clinical practice than doctors who do not (Ketley & Woods 1993).

Factors influencing patients' participation

Community understanding of randomised trials is generally poor, especially the need for randomisation. Younger people, women, those who have higher levels of education or are from higher socio-economic backgrounds and people expressing a desire to make their own decisions about treatment are all less likely to participate in clinical trials (Llewellyn Thomas et al 1995). Greater community awareness of the need for clinical trials and the manner and safeguards with which they are conducted is needed.

Factors influencing doctors' participation

Doctors may be uncomfortable inviting patients to participate in randomised trials. For example, Taylor et al (1984) have found that concerns regarding the doctor-patient relationship, difficulty in obtaining informed consent and a dislike of open discussions about uncertainty were the most commonly cited reasons for not entering patients into a randomised trial of partial versus total mastectomy.

A survey of Australian cancer specialists' attitudes to randomised trials in breast cancer have found that resource issues and concerns about the current trials (uninteresting research questions or inappropriate choice of standard therapy) are the cited reasons for not participating (Ellis 1997). There is a limited pool of central funding available for clinical research and hospitals provide little infrastructure for clinical research. Factors such as the availability of data management, availability of time, past experience with clinical trials and a feeling that the extra effort involved in trial participation is not justified are also cited as reasons for not participating.

Clinical trials should directly address key outcomes such as improvements in patients' quality of life or survival, rather than addressing indirect surrogate end-points such as tumour response. There are a number of important questions in cancer control about the relative merits of different treatment approaches. Many doctors express discomfort randomising patients on to trials with very different treatment options (eg radiotherapy versus surgery), or with large differences in the expected toxicity of treatment (eg high-dose versus standard-dose chemotherapy).

Data collection

Reliable data provided to clinicians, policy makers and consumers are required for the successful planning and evaluation of cancer control activities and for quality assurance and improvement. The capacity to collect standardised national data sets and incorporate them in a feedback loop to help guide clinical and public health practice is important for the systematic and informed progression of a national cancer control program in Australia.

Some gaps and issues for national cancer control data are outlined in Appendix 2.

3.7 Setting priorities and future directions

Cancer control in Australia encompasses a broad range of activity and effort. A consideration of specific cancer types, the stages along the continuum of care and other categories of health system activity that are relevant to cancer control have identified the complex nature of this activity, as well as gaps and problem points in the system. This discussion suggests a number of areas where there are opportunities to improve cancer control in Australia.

It is important for those involved in cancer control to recognise the role and rights of consumers in all its aspects. People who have cancer, together with their families and carers, must be involved as far as practicable in all phases of treatment, both curative and palliative, as well as having their social and psychosocial needs addressed.

Preventive and screening programs must be accessible as well as effective and should attempt to reach all population groups. This may involve further research, development and implementation of recruitment and targeting strategies specific to priority populations with higher rates of various cancer types.

All individual, environmental and social preventive strategies should be tested to determine their cost-effectiveness in achieving the desired outcomes. Current and any proposed screening programs should be developed in a way which ensures cost-effectiveness and sustainability, as well as acceptability by target groups and the whole community.

General practitioners have a central role to play in cancer control. Financial incentives to promote best practice among general practitioners have already been trialed through the General Practice Strategy. This strategy is currently under review and there is much interest in how the revised strategy might impact on the further promotion of best practice among general practitioners.

In the treatment of individual cancers, best practice is determined by the strength of evidence for the treatment modality or combination of modalities which leads to the best outcome for patients.

Within Australia's complex health system, there are many opportunities for incentives to promote the adoption of evidence-based best practice. The Commonwealth Government has scope to provide financial incentives to promote best practice and discourage inappropriate practice, either through dedicated programs such as the General Practice Strategy, or through national health financing systems such as the Medicare Benefits Schedule and the Pharmaceutical Benefits Schedule. In addition, schemes to promote coordinated care may suggest ways to improve care and achieve better cost-effectiveness. The States and Territories also have a range of opportunities to provide financial incentives to promote best practice, especially through the public hospital system.

Professional organisations such as the Colleges can provide a range of strategies aimed at promoting best practice among peers. Many already do so by participating or driving the development of best-practice guidelines, and providing a range of other services, courses and education packages to promote best quality care among their members.

It is important to promote research which addresses important gaps in our knowledge of cancer prevention, early detection and treatment, and continue fostering a strong and diverse system of basic and applied research. The development of evidence-based practice and policy advice for cancer control depends upon improvements in the linkages between research and decision-making processes in cancer prevention and care.

Improving and maximising the use of data as an essential tool in decision making is also an important component of promoting evidence-based best practice in cancer control, across the whole spectrum of endeavour from prevention through treatment to palliation. Data should be collected in a timely fashion on a systematic basis and in accordance with nationally agreed data definitions. Data can be collected and used to assess the efficacy of preventive and screening programs, as well as for assessing clinical practice and outcomes.

The development of model centres of excellence in cancer care should be encouraged. These centres should involve all relevant providers and could be constructed by consolidating existing structures or by instituting new structures which ensure that people with cancer receive treatment, rehabilitation and palliation in the most effective way possible. Where it is not possible for all modalities of care to be geographically co-located, coordinated care could be sustained by ensuring that each provider of cancer care is affiliated to recognised centres of excellence in cancer care. These affiliations can also be encouraged between centres and/or practitioners in rural and remote areas and city-based centres.

In all cases, educational and training programs must be developed to ensure that the concept of an evidence basis for preventive, screening and therapeutic measures and the use of a systematic clinical database for the continuing evaluation of the evidence base is accepted as an integral part of the undergraduate and postgraduate medical curricula.

Appendix 1
Quality of evidence ratings

These ratings have been adapted from the *Guide to Clinical Preventive Services: An Assessment of the Effectiveness of 169 Interventions* (United States Preventive Services Task Force 1989).

I	Evidence obtained from a systematic review of all relevant randomised controlled trials.
II	Evidence obtained from at least one properly designed randomised controlled trial.
III-1	Evidence obtained from well-designed controlled trials without randomisation.
III-2	Evidence obtained from well-designed cohort or case-control analytic studies preferably from more than one centre or research group.
III-3	Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.
IV	Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Source: NHMRC Quality of Care and Health Outcomes Committee (1995) *Guidelines for the Development and Implementation of Clinical Practice Guidelines*. AGPS, Canberra.

Appendix 2

Data and statistical issues

Data issues concerning specific cancers have been discussed in relevant sections of the report. However, there are several issues involved in the NHPA monitoring that are common to one or more of the priority areas. These include not only the demographic and statistical techniques used for determining trends, but also those that pertain to age standardisation and establishment of baselines. Comparability of data sources, data availability and use of common terminology are other relevant issues. This appendix provides information to assist in the interpretation of data and statistical techniques used in the report.

Sources of national data

Major databases accessed for preparing this report were:

National Cancer Statistics Clearing House database

The registration of cancer cases is required by law in each of the States and Territories, where the data are collected by cancer registries. The registries collect clinical and demographic information about people with newly diagnosed cancer. This information is obtained from hospitals, pathologists, radiation oncologists, cancer treatment centres and nursing homes. Information related to deaths is collected by the Registrars of Births, Deaths and Marriages.

By combining information from these sources, the State and Territory cancer registries produce statistics of cancer incidence and mortality. A national collection of cancer data is maintained by the National Cancer Statistics Clearing House at the AIHW.

National mortality database

Registration of deaths in Australia is the responsibility of the State and Territory Registrars of Births, Deaths and Marriages. Information on the cause of death is supplied by the medical practitioner certifying the death or by a coroner. Other information about the deceased is supplied by a relative or other person acquainted with the deceased, or by an official institution where the death occurred. Registration of death is a legal requirement in Australia and compliance is virtually complete.

Information on deaths is provided by the Registrars to the Australian Bureau of Statistics (ABS) for coding of information and compilation into national statistics. AIHW maintains these data without personal identifiers in a national database which currently includes data to 1996.

Data deficiencies

For a general discussion of gaps and deficiencies in Australian health statistics, see *Australia's Health 1998* (AIHW 1998).

Mortality data remain the most comprehensively collected national data pertaining to health. However, problems relating to coding of all conditions listed on death certificates and poor identification of priority populations (eg Indigenous peoples) remain. Proposed changes to death registration, and the introduction of automatic multiple cause of death coding, will allow study of all conditions on death certificates.

Cancer incidence data are currently available to 1994 for all States and Territories, except Queensland for which data are available to 1990. However, incidence rates at the national level include pro-rated estimates for Queensland to 1994.

No new data on the incidence of treated non-melanocytic skin cancer have been published since the release of the *First Report on NHPA*, which included incidence rates for 1985 and 1990.

International data have been included in this report and are for the following countries and time periods.

	Years	
Country	**Incidence**	**Mortality**
Canada	1983- 87	1993
Finland	1995	1993
New Zealand	1993	1993
United Kingdom & Wales	1983- 87	1993
United States of America	1983- 87	1993

Sources: Mortality — World Health Organization 1996.
Incidence — Canada, UK & Wales, and USA from Parkin et al 1992; Finland from Finnish Cancer Registry 1997; and New Zealand from New Zealand Ministry of Health 1997.

Incidence and death rates for these countries were age-standardised to the total estimated resident population of Australia as at 30 June 1991 (see below). Despite this, care should be taken in interpreting international differences in incidence because data for Canada, the United Kingdom and Wales, and the United States are old. Therefore, recent changes in incidence trends such as that observed in the past few years for prostate cancer are not shown for these countries. This is because current incidence data at the level required for age standardisation were not readily available for countries other than New Zealand and Finland.

International data on melanoma deaths have not been included, as these data were not readily available.

Priority indicators reported against in the *First Report on National Health Priority Areas 1996* (AIHW & DHFS 1997) and updated for this report are listed in Chapter 1. For a number of other priority indicators, there is incomplete information. These are:

- Five-year survival for melanoma of the skin
- Five-year survival rate for cancer of the cervix
- Five-year survival rate for breast cancer
- Five-year survival rate for colorectal cancer
- Five-year survival rate for prostate cancer
- Patient satisfaction for treatment for cancer of the cervix
- Patient satisfaction for treatment for breast cancer
- Patient satisfaction for treatment for prostate cancer
- Improved access to quality support services for all cancer patients, their families and carers
- Establishment of hospital-based cancer registries

Data developments

In 1998, the AIHW in conjunction with State and Territory cancer registries will begin the process of standardising data items collected by cancer registries. For data items already included in the National Health Data Dictionary (NHDD), the process will involve ensuring that cancer registries are using definitions consistent with those in the dictionary. For data items not included in the NHDD, the process will involve developing standard definitions under the guidelines set by the National Health Data Committee. This development work will concentrate on a limited number of key items and occur in a way that maximises the value of existing databases, some of which have operated for decades. It is intended that this process will improve the collection of data items such as country of birth and Indigenous status by drawing attention to their current inadequacies and by implementing corrective action. The end result of this process will be a data set that is nationally consistent internally and with other health and demographic data collections.

Targets for cancer indicators, when originally decided in 1992, were only set for a few of the cancer-specific indicators. This was due to either a lack of appropriate information, some rapidly changing cancer incidence patterns, the likelihood of changing patterns due to the impact of screening or the recognition that the cancer is not amenable to significant change in the near future given current detection and treatment practices. As we move towards the date of original target, Year 2000, this situation poses a challenge to the NHPA program when it next considers a target setting process for the future. This challenge should be assisted though by an improving health information system which is able to deliver more timely information on the cancer priority indicators and some recent changes in screening practices and a stabilisation of cancer incidence rates in some cancers.

Appendix 2

Statistical methods

State and Territory data

Unlike the national data, the data presented for each State and Territory are averaged annual rates over four years for incidence and over six years for mortality. By presenting data in this manner, natural statistical variation due to small numbers of cases within each State and Territory are averaged across the period, providing a more stable representation of the annual rates. To take account of the latest data available, mortality data were averaged for the years 1991–96, while cancer incidence data were for the years 1991–94.

Age standardisation

To control for any effects of differing age structures, direct age standardisation was applied to death rates and incidence rates for both Australian and international data. The standard population used in age standardisation was the total estimated resident population of Australia at 30 June 1991 (Table A2.1).

Table A2.1 Age composition of the Australian population by sex, 30 June 1991

Age group	Males	Females	Total
0-4	652,302	619,401	1,271,703
5-9	652,418	619,790	1,272,208
10-14	638,311	603,308	1,241,619
15-19	698,773	665,301	1,364,074
20-24	707,124	689,640	1,396,764
25-29	702,728	696,935	1,399,663
30-34	713,784	711,951	1,425,735
35-39	664,228	664,159	1,328,387
40-44	655,138	639,133	1,294,271
45-49	526,498	502,647	1,029,145
50-54	433,762	413,172	846,934
55-59	367,302	358,648	725,950
60-64	366,779	370,089	736,868
65-69	320,142	351,248	671,390
70-74	228,494	282,261	510,755
75-79	158,993	225,502	384,495
80-84	84,413	145,415	229,828
85 and over	44,220	110,027	154,247
Total	**8,615,409**	**8,668,627**	**17,284,036**

Source: Australian Bureau of Statistics.

The usual convention of using age-specific rates for five-year age groups, as shown in Table A2.1, was followed using the following formula:

$$SR = \Sigma \{R_i \times P_i\} / \Sigma P_i$$

where SR = the age-standardised rate

R_i = the age-specific rate for age group *i*, and

P_i = the standard population in age group *i*.

It should be noted that age-standardised rates estimated using this standard population may differ from those obtained using another standard population (eg the World Standard Population).

Rural, remote and metropolitan areas classification

To compare the death rate ratio for cancer among people living in rural and remote areas of Australia and the general population, the deaths data were cross-categorised using the Rural, Remote and Metropolitan Areas (RRMA) classification. The classification has been developed by the Commonwealth Departments of Primary Industries and Energy and Human Services and Health, based primarily on population numbers and an index of remoteness. The RRMA categories show a natural hierarchy, providing a model for incremental health disadvantage with rurality and remoteness as risk factors. Based on population density, the following three zones and seven area categories are recognised.

Zone	Category
Metropolitan zone	Capital cities
	Other metropolitan centres (urban centres population ≥ 100,000
Rural zone (index of remoteness<10.5)	Large rural centres (urban centres population 25,000-99,000)
	Small rural centres (urban centres population 10,000-24,999)
	Other rural areas (urban centres population <10,000)
Remote zone (index of remoteness>10.5)	Remote centres (urban centres population ≥ 5,000)
	Other remote areas (urban centres population <5,000)

Acronyms and abbreviations

AAHPC	Australian Association of Hospice and Palliative Care
ABS	Australian Bureau of Statistics
AHMAC	Australian Health Ministers' Advisory Council
AHTAC	Australian Health Technology Advisory Committee
AIHW	Australian Institute of Health and Welfare
DCBE	double-contrast barium enema
DHFS	Commonwealth Department of Health and Family Services
DHSH	Commonwealth Department of Human Services and Health
DRE	digital rectal examination
FAP	familial adenomatous polyposis
FOBT	faecal occult blood test
HPV	human papilloma virus
NCCI	National Cancer Control Initiative
NHDD	National Health Data Dictionary
NHMRC	National Health and Medical Research Council
NHPA	National Health Priority Areas
NHPC	National Health Priority Committee
NRT	nicotine replacement therapy
NSCLC	non-small-cell lung cancer
Pap	Papanicolaou test
PSA	prostate-specific antigen
RRMA	Rural, Remote and Metropolitan Areas
SCLC	small-cell lung cancer
UV	ultraviolet
WHO	World Health Organization

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