The State of Cancer Control in Australia 1987-2007:
Changes in cancer incidence and mortality
Cancer Council NSW
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In this section, eight cancer types are outlined briefly as a way of contextualising the analysis and highlighting cancer types that are important in Australia – either because of their public health programs or because of large incidence or mortality percentage changes – to illustrate how policy, programs or other changes may have affected these measures. These have been selected based on a combined list of the top five cancer sites for males and females in incidence and mortality according to IARC GLOBOCAN 2008 working estimates, and cancer types of national importance in Australia.5

Firstly, trends in incidence and mortality for the cancer type are described – including data from the IARC GLOBOCAN project to illustrate global incidence and mortality working estimates for 2008 in individuals aged 74 years and under. Additionally, the most current survival data available for Australia from the AIHW are also provided.3 The AIHW survival data are presented to provide context rather than to facilitate a comparison between survival trends and our findings. However, the AIHW data were only available for all ages combined. The relative survival and five-year conditional relative survival data reported by the AIHW show the probability of surviving a given number of years, provided that an individual has already survived a specific amount of time after diagnosis.3

A brief overview of current prevention strategies, screening programs and treatment methods in use globally and in Australia are also provided. The results of our analysis for the specific cancer type are then presented and discussed.

References
7.7.1 Background
Prostate cancer is the most common cancer in males in Australia. The incidence of prostate cancer has risen globally, whereas mortality has seen a lower rate of change overall.² IARC GLOBOCAN 2008 working estimates reported the incidence for prostate cancer was 20.4/100,000 in males under 75 years of age.³ Developed countries have higher rates of prostate cancer, attributed to the prevalence of PSA testing, with Australia recording the highest incidence rates of 105/100,000 for all ages.³ Mortality rates are 3.6/100,000 in males under 75 years of age globally and 6.6/100,000 in Australia.³

Prostate cancer has no known carcinogen associated with its aetiology.³²¹ It does not present in the early stages with any specific symptoms. Symptoms of advanced stage prostate cancer (eg weak or interrupted flow; difficulty stopping or starting the flow; frequent urination and blood; pain or burning associated with urination) are also generally symptoms of benign enlargement of the prostate.³²³ Higher than usual levels of PSA will be present in the blood if the prostate is enlarged, diseased or infected, not only if cancer is present.³²² Although there is a strong association between PSA levels and prostate cancer, its specificity is only moderate.³²¹, ³²³ The Gleason score grades the prostate cancer tissue to determine the stage of the cancer. The clinical and histopathological staging, Gleason score and PSA levels are used independently and in combination to assess the stage of prostate cancer.

The incidence of prostate cancer in Australia increased dramatically in the early 1990s with the expansion of PSA testing. Incidence rates remain relatively high in Australia, again due to continued testing; however, mortality has changed to a lesser extent. Relative survival is relatively high, with a 92% probability of surviving for at least 5 years at diagnosis.³ The 5-year conditional relative survival was 93% at 1 year and 92% at 5 years after diagnosis.³ Five-year survival rates are higher for males in the highest SES group, and lower for males who are younger at diagnosis.³
7.7.1.1 Causes and risk factors

The only risk factors clearly associated with prostate cancer are advanced age and family history of the cancer. There is speculation regarding the impact of early-life exposures, such as sex hormones, on the likelihood of developing prostate cancer that has stimulated further research. Research linking food and nutrition to prostate cancer risk has found probable evidence of foods containing selenium or lycopene and selenium (administered through a supplement) having a protective effect. On the other hand, there is probable evidence that diets high in calcium increase risk of prostate cancer.

A review of studies analysing the association between BMI and prostate cancer showed a significant relationship between high BMI and increased risk of future prostate cancer mortality in the general population. Overall, an estimated 12% to 20% of prostate cancer deaths have been attributed to BMI in the overweight and obese ranges. Unlike cancer in other sites, it has been suggested that diabetes mellitus reduces the risk of prostate cancer, possibly explained by lifestyle changes recommended to diabetes sufferers, which include a diet low in calories and fat that also reduces the risk of prostate cancer.

A link between increased risk of prostate cancer and tobacco consumption has not been conclusively proven. However, a recent study showed a higher risk for prostate cancer mortality in current smokers at diagnosis, and a moderate, but statistically insignificant, increase in risk for former smokers who quit 10 years before diagnosis, compared to never smokers. A pooled analysis of various cohort studies has shown a moderate increase in prostate cancer incidence and mortality with elevated levels of tobacco consumption. Conversely, a large European cohort study, the European Prospective Investigation into Cancer and Nutrition (EPIC) study, found that current smokers had a reduced risk of prostate cancer incidence in low-grade cases of the disease. However, heavy smokers or long-term smokers have an increased risk of prostate cancer-related mortality.

International analyses have identified an inverse association between ultraviolet radiation and prostate cancer incidence. Studies have varied in their strength of association between sun exposure and vitamin D with prostate cancer incidence but results indicate that less exposure to solar radiation leads to a higher incidence of prostate cancer. This is an area of active research. A positive association has been found between exposure to cadmium and cadmium compounds and risk of prostate cancer.

7.7.1.2 International prevention/screening/treatment programs

Currently, finasteride and dutasteride are two chemoprevention drugs available which can reduce the amount of male hormones in the body to prevent prostate cancer. Their use decreases the incidence of low-grade cancers and increases the diagnosis of high-grade cancers. Both drugs have been found to lower the risk of cancer by 25%, but are also associated with side effects such as reduced libido and erectile dysfunction. Existing evidence surrounding primary chemoprevention for prostate cancer is inconclusive, but shows some promising results requiring confirmation. PSA testing and digital rectal examination (DRE) are used to screen for prostate cancer. DRE is not considered to be as effective a method of screening as PSA testing, but generally recommendations suggest that the two tests are used in combination. Screening for prostate cancer using PSA testing has been subject to much debate, with doubt cast on the benefits being greater than the harm caused. PSA testing often detects cancer that may have otherwise gone unnoticed and not caused any harm or shortened survival. There has not been sufficient evidence from randomised controlled trials to support any population-based screening programs. Professional associations commonly recommend the use of PSA testing if the individual can potentially benefit and are well informed as to the uncertainty involved. For PSA testing to be recommended on a population basis, there need to be more specific trials to identify the thresholds for
‘positive’ and ‘negative’ results, to limit overdiagnosis and unnecessary follow-up. This has resulted in larger studies, notably the European Randomized Study of Screening for Prostate Cancer and Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial, to track the long-term effect of screening on prostate cancer trends, including a revised method for determining the level of overdiagnosis.

Treatment of prostate cancer can result in side effects that impact on quality of life, such as sexual dysfunction, incontinence and other adverse reactions that can cause longer-term harm. In an analysis of incidence trends in the USA, it was estimated that over a million males had been diagnosed and treated for prostate cancer as a result of PSA testing. This increase was most notable in males younger than 50 years of age, and it is claimed that a large proportion of these males do not benefit from early detection. Current findings do not present screening programs in a positive and cost-effective light. It has been shown that over a 13-year period, there is no benefit gained from organised annual screening over opportunistic screening as part of usual care. As a result, recommendations suggest that males with a life expectancy of 10–15 years or less be informed of the limited usefulness of screening. Additionally, PSA testing is prostate-specific rather than prostate cancer-specific. The identification of alternative prostate cancer–specific biomarkers is urgently required.

Active surveillance replaced watchful waiting as the preferred ‘passive’ treatment method as part of standard care. Watchful waiting defers treatment until a symptomatic, metastatic stage has been reached. Active surveillance follows the disease progression more closely with repeated and systematic monitoring of PSA tests and biopsies. These methods of closer monitoring before treatment have been proposed as a solution to overdiagnosis and overtreatment. The results of existing trials of this method suggest similar mortality rates to that of the ‘overtreated’ population. The Prostate Cancer Research International: Active Surveillance Study, a worldwide observational prospective study, has thus far found that active surveillance is a viable option for monitoring patients without compromising their long-term health. Further trials are required with clear guidelines on patient selection and psychological counselling for patients managed by active surveillance and specific surveillance methods.

Current evidence suggests that following watchful waiting or active surveillance could benefit survival. Treatment for prostate cancer varies depending on age, stage and grade of the cancer. The number of males receiving curative treatment increased substantially from the early 1990s to 2011 in Victoria. Other medical conditions may also influence the treatment course chosen. Early-stage cancer can be addressed using surgery, external beam radiation or radioactive seed implants. Hormonal therapy, chemotherapy and/or radiation are required for more advanced cancers. Radiation oncology is now using more advanced techniques associated with conformal radiotherapy and intensity-modulated radiation therapy, as well as the introduction of tomotherapy, which are varying the treatment options for prostate cancer patients.

7.7.2 Incidence and mortality rates in Australia 1987–2007

Our analysis shows that prostate cancer incidence has risen dramatically, by 276%, from expected numbers (Table 7–13). Mortality has declined by 27% (Table 7–13). Both are statistically significant changes (Table 7–14). The age-standardised mortality rates for prostate cancer also showed a decline in cancer deaths following a peak in the early 1990s (Figure 7–13). Figure 7–14 shows the change in incidence rates, illustrating the rise in the number of incident cases over the same period of time.
The increased in incidence can be attributed to PSA testing and the high-profile nature of prostate cancer in the media. As a result of the uncertainty surrounding the effectiveness of screening, prostate cancer initiatives have not been fully integrated into the Australian political agenda beyond the current reimbursement through the MBS and the recent allocation of funds to further prostate cancer research.\(^{102,344,348}\) Despite this, prostate cancer receives considerable publicity from initiatives such as Movember and the Prostate Cancer Foundation of Australia, raising concerns relating to the advocacy for annual screening tests without adequate information on the associated benefits and harm provided consistently.\(^{354}\) In recent years, Movember has broadened its focus to incorporate male mental health and testicular cancer as well as prostate cancer in its key messages.\(^{355}\)

Quality-of-life studies of prostate cancer patients often separate males according to the treatment they received. Treatment methods can result in specific side effects, such as declined sexual function, that affect physical and psychological elements of a patient’s quality of life.\(^{356,357}\) A review of quality-of-life studies and the association with physical activity showed that exercise is an important part of survivorship and should be a regular and encouraged element of usual care.\(^{356}\) An Australian study comparing the longer-term quality of life of patients with localised prostate cancer found that there was little difference between groups based on the type of treatment they received.\(^{359}\) The most common negative effect of treatment in males with localised prostate cancer was sexual dysfunction, with poor urinary function also present but less common.\(^{357}\) Those having undergone external beam radiotherapy reported poor bowel function as a result.\(^{357}\) It has been shown that patients with advanced prostate cancer have differing issues to those with localised cancer, and these differences are often only apparent in the results of longitudinal studies.\(^{356}\) Further research could be conducted in comparing different treatment types and identifying which types can maximise quality of life.

### Table 7-13
Prostate cancer deaths and incident cases in Australia 1987–2007

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deaths(^{a})</td>
</tr>
<tr>
<td>Observed in 2007 (O)(^{a})</td>
<td>799</td>
</tr>
<tr>
<td>Expected in 2007 (E)(^{a})</td>
<td>1,094</td>
</tr>
<tr>
<td>Difference (O-E)</td>
<td>-295</td>
</tr>
<tr>
<td>Change in (O-E)/E (%)</td>
<td>-27</td>
</tr>
</tbody>
</table>

\(^{a}\)An average of the observed rates for 2006 to 2008 was applied to the 2007 population to calculate the observed number of deaths and incident cases for 2007.

### Table 7-14
Prostate cancer average annual percentage change (AAPC)

<table>
<thead>
<tr>
<th></th>
<th>Mortality</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AAPC</td>
<td>Confidence Interval (95%)</td>
</tr>
<tr>
<td>Male</td>
<td>-1.5</td>
<td>-2.1, -1.0</td>
</tr>
<tr>
<td>Female</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Persons</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Figure 7-13
Prostate cancer age-standardised cancer mortality rates in Australia 1987–2007, 0–74 years

### Figure 7-14
Prostate cancer: age-standardised cancer incidence rates in Australia 1987–2007, 0–74 years
7.7 Prostate cancer (C61)

References


322 Medical Services Advisory Committee. Prostate specific antigen (PSA) near patient testing for diagnosis and management of prostate cancer. Canberra: Commonwealth of Australia 2005 (MSAC Application 1068).


