Demand for Services and Trends

In this section

Cancer and Radiation Oncology Services in Australia

Summary of the Issue

Ongoing investment in cancer control is a national priority.

Cancer control is a national health priority area. Cancer is estimated to be the leading cause of the burden of disease in Australia in 2010, accounting for 19% of the total burden[1].

Cancer has a major impact on the Australian community. At current incidence rates, one in three men and one in four women in Australia will be diagnosed with cancer by the age of 75. By age 85, the risk increases to one in two for men and one in three for women[1].

A key challenge for action to control cancer is that the term encompasses a diverse group of several hundred diseases. All cancers are characterised by changes to some of the body's cells which become abnormal and begin to multiply out of control. These abnormal cells can form an invasive (i.e. malignant) tumour. If the spread of these tumours is not controlled, they usually result in death[2].

Cancer is potentially one of the most preventable and treatable of today's common causes of death. The effects of decisions made on cancer control strategies have long lead times. What is done currently will have its impact over the next 5-15 years; this timeframe is even longer for measures aimed at prevention rather than treatment.

The impacts of cancer are not evenly distributed – the poorest areas and patients suffer the most.

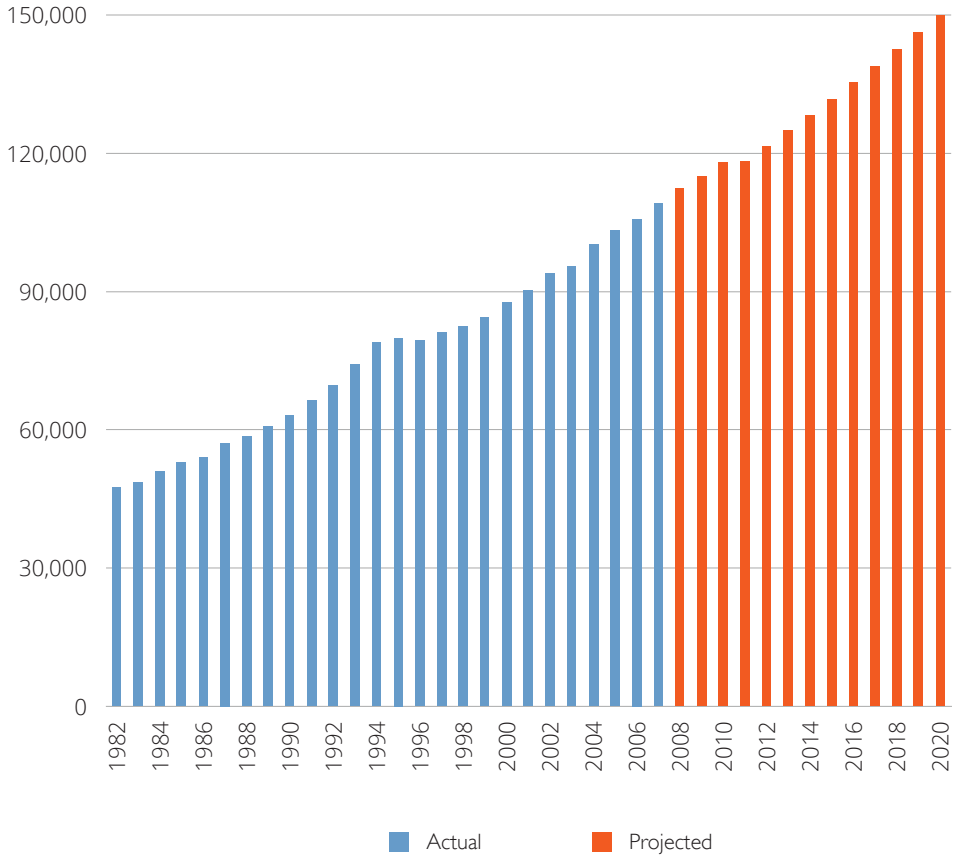
Research indicates that Australians living in lower socio-economic areas have higher mortality rates from cancers than those living in other areas[1]. Similarly, people living in remote and very remote areas of Australia have higher mortality rates from cancer than those living in more urbanised areas. Indigenous Australians have higher mortality rates than non-Indigenous Australians[1].

The scientific evidence points to the significant growth in cancer incidence and makes meaningful planning to meet this challenge essential.

The Australian population has been increasing and is expected to exceed 25 million by 2020. The population is ageing as a result of sustained low fertility and increasing life expectancy[3]. In the next few decades, population ageing is projected to create significant fiscal pressures and to have major implications for health, labour force participation, housing and demand for skilled labour. Slower economic growth associated with ageing, increased demand for age-related payments and services, expected technological advancements in health and demand for higher quality health services will add to these pressures[4].

Australia has some of the best internationally recognised high quality data on cancer incidence through the work of the Australasian Association of Cancer Registries (AACR) and the Australian Institute of Health and Welfare (AIHW). This data provides essential baseline information and allows for projections of cancer incidence. These projections are a mathematical extrapolation of past trends and are illustrative of the future changes that might reasonably be expected to occur[5].

Trend in number of new cases
(All cancers combined, projected to 2020)



Sources: Projected incidence[5]; historical incidence[6].

The age related increase in cancer incidence across Australia is significant. The number of cases of cancer diagnosed in Australia will rise over the next decade for both males and females, and is expected to reach about 150,000 in 2020[5] — an increase of almost 40% from 2007.

Radiation Oncology as Part of the Solution

A strong radiation oncology sector is the bulwark of an effective cancer control strategy.

Radiotherapy's contribution to the fight against cancer is significant. The impact of radiotherapy in cancer survival has been estimated at 40%, compared to 49% of patients being cured by surgery and 11% of patients for systemic treatments[7]. A key advantage of radiation oncology is that it is an effective and non-invasive anti-cancer treatment without any associated mortality risk.

In radiation oncology highly precise doses of radiation are used to kill cancer cells while minimising damage to the surrounding healthy tissue. Advances in radiotherapy techniques use the latest research in biology and physics and combine these with cutting-edge technology to deliver successful treatments.

Radiotherapy can be used to treat almost all cancers, anywhere in the body. It can be used alone or in conjunction with other treatments like surgery or chemotherapy. Radiotherapy has a major positive impact on local cancer control and is a highly effective therapy for the control of cancer symptoms such as pain. Radiation therapy allows organ conservation, may be a curative option for patients with inoperable disease, and may allow a curative approach for patients who have significant co-morbidity that precludes surgery.

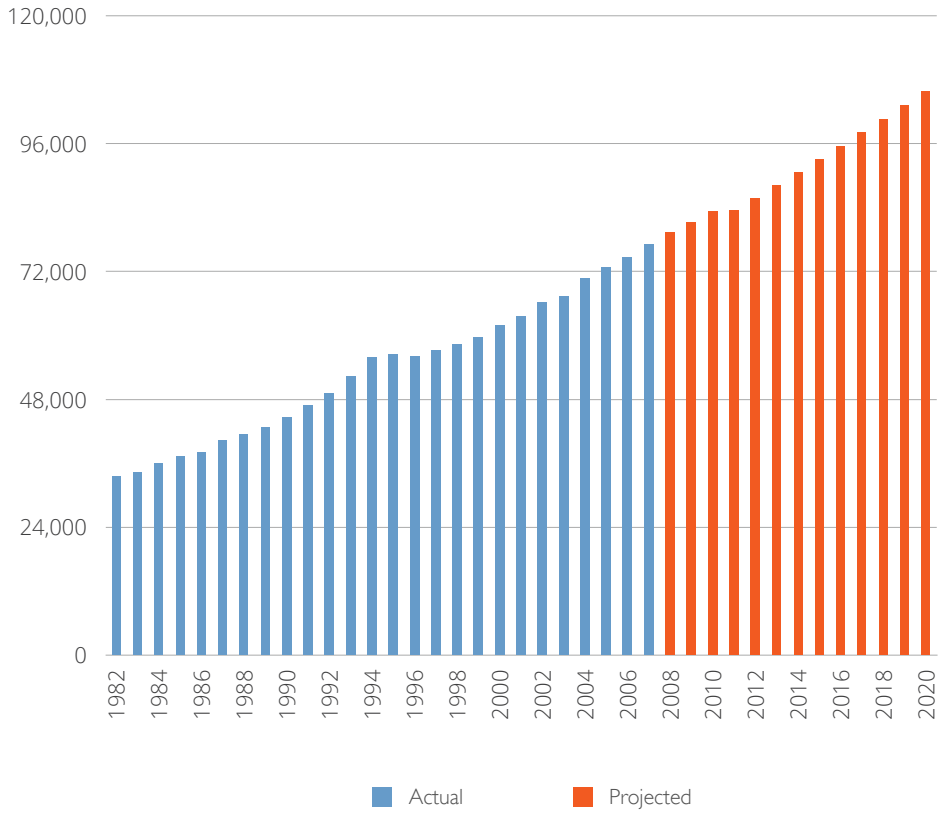
Radiotherapy can be accurately conceptualised as a biological intervention with profound effects at the cellular and molecular level, modulated through cellular signalling pathways and the immunological axis[8]. The majority of indications for external beam radiotherapy are to improve survival. In most of those indications radiotherapy is the treatment of choice and usually cannot be replaced by other treatments.

To prepare Australia for the increasing cancer incidence, expansion of radiation oncology services should be enacted in a planned and sustainable way.

In the past, the importance of and the ongoing need for radiation oncology were significantly underestimated. From 2002 onwards, governments across Australia implemented commendable initiatives to increase radiation oncology infrastructure. However, significant pre-existing infrastructure deficiencies combined with increasing demand for services, leave Australia with inadequate radiation oncology sector capacity to meet current and future need.

A robust benchmark for planning radiotherapy services on a population basis was set in Australia. The optimal radiotherapy utilization rate was calculated using an evidence-based technique and the target of 52.3% of all patients with notifiable cancer in Australia was estimated[9].

Number of patients requiring radiotherapy
(including new cases, re-treatment cases, non-malignant and non- reportable disease)



Sources: projected cancer incidence[5]; historical cancer incidence[6]; re-treatment cases, non-malignant and non-reportable disease[10]. Calculated on the basis of combining 52.3% of new cancer cases, 25% load for retreatment cases and 10% load for non-notifiable and non-malignant disease.

The known demand for radiotherapy treatments, combined with the complex nature of radiation oncology service provision makes prospective planning logical and essential.

Workforce has historically been a rate-limiting step in radiation oncology. Specific emphasis is urgently needed to match workforce strategies to service expansion plans to ensure that investment in workforce is used effectively and to grow the facilities infrastructure sustainably.

Access to radiation oncology services remains a significant problem for many Australian patients.

Having the optimal radiotherapy utilisation rate as a target allows comparison with actual rates to identify areas where improvements in the evidence-based use of radiotherapy can be made. It provides valuable data for radiotherapy service planning.

38% of patients with cancer will receive RT at some stage in their illness, i.e. the current average radiotherapy utilisation rate is about 38% [11], [12]. When patients miss out on radiation oncology, the patient outcomes suffer. Radiotherapy has a positive impact on local cancer control and control of cancer symptoms such as pain.

Access to radiation oncology services and remedying the current under-utilisation of radiotherapy treatments is an important priority for cancers control.

- At present, at least 14.2% of new cancer patients in Australia do not receive radiotherapy treatment mandated by evidence-based practice;
- This equates to at least around 18,000 cancer patients not receiving potentially beneficial radiotherapy treatment in 2012;
- In 2022, if the current under-utilisation rate is maintained, this would equate to around 24,000 cancer patients will miss out on radiotherapy[13].

Patients who miss out on clinically appropriate radiotherapy treatments can be significantly affected.

The consequences for patients who are not able to access radiation oncology when clinically beneficial include:

- Compromised health outcomes;
- Premature death;
- Inadequate pain and symptom control and
- Reduced quality of life and increased suffering.

Furthermore, patients can still face long waiting times for radiotherapy treatment, even some patients who require urgent treatment.

There are important differences between radiotherapy techniques, which are used to deliver specific health advantages in particular clinical circumstances. Patient access to radiation oncology services is key, so is patient access to the appropriate radiotherapy techniques.

Radiation oncology is distinguished from other areas of healthcare by several important characteristics.

Radiation oncology relies on a team of experts. This team management approach starts at the level of integration between radiation oncology, surgery, palliative care and medical oncology and extends to the core radiotherapy team, including Radiation Oncologists, Radiation Oncology Medical Physicists and Radiation Therapists. The radiation oncology team also includes engineers, cancer nurses and other allied health practitioners. Radiation oncology practice is strongly underpinned by a detailed knowledge of the biological effects and physics of radiation, the application of sophisticated imaging and treatment technologies, and extensive understanding of the diverse clinical behaviours, pathology and management of cancer.

Radiation oncology requires custom-built facilities and specialised equipment. Establishing a radiation oncology facility requires an up-front investment for the building of radiation-proof bunkers and the purchase of the necessary equipment (such as a linear accelerator and a CT scanner). Radiation oncology is a specialty dealing with rapidly changing technological advances largely directed at improving the accuracy and effectiveness of radiotherapy outcomes, including better control and cure of tumours, as well as reduction of side effects. Increasing use of high quality imaging to direct radiotherapy, newer types of radiation (such as heavy ions) and modern treatment techniques, such as Intensity Modulated Radiotherapy (IMRT), are changing the standard treatment methods. Radiation oncology facilities must include appropriate technological and information technology infrastructure to ensure quality service provision.

Radiation oncology is largely an out-patient service, but it cannot be delivered remotely. Research in radiobiology substantiates the benefits of fractionated radiotherapy for many patients. This is one of the main reasons why radiotherapy is usually delivered to patients in daily doses repeated over a number of weeks – it gives normal cells time to recover between treatments and allows a higher dose of radiation to be given to the cancer while the harm to normal tissue is minimized. This delivery method means that the patients have to be close to a radiotherapy facility for several weeks for their treatment.

Policy approaches to ensure that the national demand for radiation oncology services is met should be:

- Prospectively planned and coordinated nationally to effectively use resources and provide access for all patients;
- Differentiated to distinguish the different radiotherapy techniques and tumour streams, providing targeted approaches;
- Integrated across service providers, jurisdictions and medical disciplines to address silos in the system;
- Innovative to take advantage of technological and organisational developments internationally and between disciplines;
- Focused on quality across all domains including patient access, health outcomes, data, service provision and survivorship and
- Patient centred with consumer involvement at all levels of decision-making.

Action at the policy, service and professional levels aimed at meeting the rising incidence of cancer must be an ongoing effort. The needs of Australian patients are quantifiable and the contribution of radiation oncology to cancer care is well defined and evidence-based. There is a strong and urgent need to refocus the action agenda on closing the current radiotherapy service gaps, as well as identifying and acting on future needs.

Short-term fiscal considerations can hamper effective policy approaches in health care. The well-established cost effectiveness of radiation oncology is a strong incentive for policy action.

Radiation oncology is not only an effective but also a cost-effective cancer treatment: the cost per year of life gained from radiotherapy treatment in Australian dollars (1993 dollars) was reported to be A$7,186[14]. The addition of radiation therapy to breast conserving surgery has been shown to improve quality of adjusted life years (QALYs) at a cost of $28, 000/QALY[15] and the use of short-term, pre-operative radiation therapy for operable rectal cancer has been shown to increase QALYs by 39% at a cost of $25,100/QALY[16]. These costs are less than the threshold of $50,000/QALY commonly cited for cost-effective care[15].

Radiotherapy can be cheaper than other treatment modalities; the curative treatment of non-small cell lung cancer in Canada in 1995 was shown to be cheaper using radiation therapy (C$12,474) than with surgery[17].

Radiation therapy can be delivered to most patients as an outpatient service with resulting cost savings and improvements in patient convenience.

Active engagement of the professions and consumers is necessary for effective implementation of all initiatives and policies.

Experiences across multiple sectors, including health care and community development, demonstrate that successful implementation of policies and initiatives are reliant upon active engagement of key stakeholders.

The radiation oncology sector must build on its successes to-date in fostering collaboration between the professions, planners, funders and consumers to create ongoing conditions and forums for collective planning and decision-making.

Australia must act now to maintain existing gains in the provision of quality radiation oncology services and to meet current and future demand among cancer patients.

To guide action, the Tripartite National Strategic Plan for Radiation Oncology (Australia) 2012-2022 articulates important strategic directions and a series of recommendations to improve, expand and safeguard the provision of quality radiation oncology services across Australia.

To assist stakeholders in understanding the radiation oncology sector and its challenges, the Plan details key elements of providing a quality radiation oncology service across Australia, including:

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Trends Having an Impact on the Radiation Oncology Sector

Trends Across the Oncology Sector

Cancer care is a dynamic and evolving field, which encompasses the medical disciplines of surgery, radiation oncology, medical oncology and palliative care. Optimal provision of cancer treatments further relies on a diverse team of allied health professionals. One consequence of the interrelated and complex nature of cancer care provision is that trends within the broader oncology sector have impact on the delivery of quality radiation oncology services.

Increasing incidence of cancer and improved survival prospects for patients are key developments.

Approximately 60% of people diagnosed with cancer will survive more than five years after diagnosis[1] and this number will continue growing in absolute terms in line with the increases in cancer incidence[2]. One of the consequences of increased survival is a proportionate growth in the number of radiotherapy re-treatments required in instances when the cancer recurs. In the longer-term, improved patient outcomes also mean that an ever-growing number of cancer patients live long enough to develop second primary cancers that also require treatment.

Collaborative approaches to cancer care will continue to grow and strengthen.

Multi-disciplinary care is an important component of national and jurisdictional cancer care frameworks. Multidisciplinary teams (MDT) are an essential element of quality patient care delivery and the emphasis on multidisciplinary care is expected to continue and grow. Multi-disciplinary management of patients often results in increased referrals for radiotherapy treatments as it increases knowledge amongst other clinicians about the benefits of radiotherapy.

Consumer expectations and involvement in cancer control at all levels will increase.

The awareness of cancer and of the available treatment options among cancer patients, carers and their families has been steadily increasing. In addition to the stronger emphasis on information provision by health care professionals, consumers can now access a vast array of information (of variable quality) via the Internet. The role of the healthcare provider will increasingly be one of a partner, who explains and demystifies the vast quantities of information, as well as providing advice on the possible treatment alternatives. Patients will be increasingly knowledgeable about new radiotherapy techniques and technologies and will likely demand a greater number of treatment options and alternatives, including the integration of supportive and complementary therapies.

Investment in the development of systemic and targeted therapies will continue.

Ongoing translational research is investigating the use of new systemic therapies and targeted therapies that are specifically designed for specific tumour genotypes. Increasing use of tumour genetic testing is expected, allowing the design of treatment regimens that will be most effective for tumour subtypes. This may result in increasing indications for radiotherapy in some cancers and decreasing indications in others.

Continuing improvements in techniques and technologies are increasing the precision and accuracy of radiotherapy, allowing treatments that minimise the impact on healthy tissue and reduce treatment related morbidity. These advances are mediated through increased complexity of treatments and consequently are relatively more resource-intensive in the short term, but lead to long term savings. The following trends are expected to endure across the radiation oncology sector.

The rate of evolution in radiotherapy techniques and improvements in the delivery technologies will accelerate.

Recent radiotherapy innovations have led to increases in the precision of treatments, which allows improved outcomes and reduced treatment-related side effects. Notable developments to date are in the areas of intensity modulated radiotherapy (IMRT), stereotactic body radiation therapy (SBRT), 4D imaging, particle therapy and nanotechnology. Advances in imaging technology are further enhancing the targeting of radiotherapy treatments. An important development is the introduction of adaptive treatments that can be adjusted as tumour and patient characteristics change throughout the course of radiotherapy. Adaptive treatments improve patient outcomes (for example, the reduction of radiotherapy related side effects for bladder cancer) but can often require significant investment of time by the radiation oncology team[3], [4].

Radiation oncology is increasingly personalised.

Radiotherapy is by its nature a personalised treatment: every patient's plan is unique and tailored to their particular clinical circumstances and anatomy. It is anticipated that the introduction of tumour marker testing and molecular and biological imaging techniques will enable the already personalised radiotherapy treatments to be even more targeted. With the introduction of tumour marker testing, radiotherapy treatments and doses can be tailored to the specific tumour biology of each patient, for example, radiotherapy dose modification based on Positron Emission Tomography (PET) findings in prostate cancer[5] and radiotherapy volume modifications based on PET findings in head and neck cancer[6]. Molecular and biological imaging will allow improved patient selection for treatment (for example, select patients suitable for surgery in lung cancer, melanoma and oesophageal cancer)[7] and will reduce futile treatment in instances where cancer has already spread [8 - 10].

Models of care are evolving.

Service delivery and models of care are changing, with the focus shifting from the delivery of isolated treatments towards a multidisciplinary, coordinated approach to cancer care. This multidisciplinary patient management involves radiation, surgical and medical oncology as well as allied health services. The team considers relevant treatment options and agrees on treatment planning and supportive care for individual patients. Increasingly, radiation oncology centres are developing expertise in specific techniques and the treatment of specific malignancies. As a result, provision of radiation oncology services will increasingly rely on networks for collaboration and referral of patients to specific centres. Referrals to these specialist facilities will increase for certain diagnoses and complex treatments.

The use of technology to enable better communication and information transfer will intensify.

Radiation oncology uses some of the most advanced information technology infrastructure in the healthcare system to support its data and imaging needs. The need to use tele- medicine in patient management across Australia will increase dramatically as the number of cancer centres, particularly in regional areas, increases. With a mobile patient population, increasing numbers will present following initial treatment to a different radiotherapy centre and require re-treatment with radiotherapy or develop a second malignancy (requiring treatment with radiotherapy). Technological solutions to expedite the transfer the relevant imaging and previous radiotherapy treatment details to the treating radiotherapy centre will be important. This technology is already in use in Australia, although our use is significantly below that of other countries such as Canada. The utilization of telemedicine in radiation oncology is well below that of other medical specialists in Australia; however it is expected to intensify due to the changes in service provision and models of care.

The inflexible nature of funding arrangements for radiation oncology will increasingly be a rate-limiting step for services.

Radiation oncology professionals raised significant concerns during the stakeholder consultation about the current funding levels being inadequate to meet service needs and that the funding structures do not appropriately support the complexity of current treatments and are likely to be even more restrictive as new treatments emerge. This is anticipated to remain a challenge in the future.

Consumer awareness of radiotherapy and new techniques will continue to expand.

Consumer awareness of radiation oncology has historically been low. Increased access to information via the Internet is changing this. The current lack of a centralised patient information resource for radiation oncology means that sometimes the information accessed by consumers is inappropriate or not relevant in their clinical circumstances. In some instances, the information may relate to treatment techniques that are not available in Australia (such as proton therapy or heavy ion therapy). It is anticipated that awareness of radiotherapy treatments will continue to increase in the coming years as a result of the increasing availability of information via the Internet and the increased awareness through multidisciplinary care teams.

Interpreting Future Impacts of the Trends

Radiotherapy service planning should consider the changing demographics of the Australian population as well as increasing cancer incidence and prevalence of individual types of cancer. The impact of investment in cancer prevention and early detection will become more apparent in the coming years. The adoption of new radiotherapy treatment techniques and technologies into service delivery will be continuous and require investment in human and financial resources, but these treatment advances will improve overall patient outcomes. Personalised medicine will strain the health sector including radiation oncology as increased resources and planning time are required for this approach. However the improved quality of survivorship will result in long term economic gains. The management of radiotherapy waiting times will remain an issue. Further investment in telemedicine will reduce the need for face-to-face follow-up attendances and lead to innovative practices.

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