Endorsed by Cancer Voices NSW
- the voice for people affected by cancer

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Radiotherapy is an important arm of cancer treatment that uses ionising radiation to destroy or damage cancer cells so they cannot multiply. Treatment may be used for curative or palliative intent for a broad range of cancer types. Internationally accepted benchmarks indicate that at least 50% of cancer patients will require radiotherapy at least once during the course of their illness. However, in NSW, only about 36% of cancer patients currently receive radiotherapy largely due to lack of capacity at existing facilities and workforce shortages. It is estimated that almost 51,000 cancer patients eligible for radiotherapy between 1996 and 2006 did not receive it. As estimated in this document, nearly 40,000 years of additional life were lost in NSW during this period because patients did not receive radiotherapy.

It is vital that all patients who require radiotherapy have access to this treatment in order to provide the maximum possible cure rates and best quality of life. Treatment should be delivered within recommended timeframes at a location within reasonable travelling distance from a patient’s home. Long-term systematic planning is needed to ensure that radiotherapy services keep pace with expected demand in the face of the growing cancer burden.

As the leading cancer charity in NSW, Cancer Council NSW has been approached by consumers and professionals who are concerned by the current low level of radiotherapy provision. Cancer Council has developed this position paper to highlight current issues in radiotherapy provision in NSW. This paper does not purport to be a comprehensive radiotherapy plan – that responsibility rests with the NSW Government. To assist the NSW Government in this task, this paper highlights current issues in the provision of radiotherapy services and provides best-possible estimates for infrastructure and workforce requirements. It contains recommendations for providing immediate relief in access to radiotherapy services, as well as actions needed for long-term improvements in radiotherapy services across the state, to improve survival and quality of life of cancer patients.

Summary of recommendations

Short-term actions to improve access to radiotherapy
i. Complete and publicly release NSW Health radiotherapy planning documents.
ii. Establish formal agreements with private radiotherapy centres to purchase radiotherapy treatment for patients who elect to be public outpatients.
iii. Provide funding to obtain immediate increase in capacity in radiotherapy services in specific areas.
iv. Establish an online, public waiting times database.
v. Reduce the financial burden on country patients travelling to access radiotherapy.

Solutions for long-term improvements in radiotherapy services
vi. Increase the number of linear accelerators in accordance with cancer incidence projections.
vii. Specify, build and support through professional networks a proportion of linear accelerators in non-metropolitan areas to overcome travel and social challenges for patients and their families.
viii. Plan for, invest in and deliver a workforce responsive to current and predictable future demand.
ix. Establish one over-arching body to be responsible for long-term radiotherapy planning, procurement and quality in NSW.
x. Radiotherapy responsibilities and contributions between the Federal and NSW Governments to be renegotiated as part of the Australian Health Care Agreements.
1. Introduction

As the leading cancer charity in NSW, Cancer Council NSW has been approached by patients, carers, consumers and professionals who are concerned about the low level of radiotherapy services in some parts of NSW. Cancer Council developed this position paper to highlight current issues in radiotherapy provision in NSW. This paper does not purport to be a comprehensive radiotherapy plan – that responsibility rests with the NSW Government. To assist the NSW Government in this task, this paper highlights current issues in the provision of radiotherapy services and provides best-possible estimates for infrastructure and workforce requirements. It contains recommendations for providing immediate relief in access to radiotherapy services, as well as actions needed for long-term improvements in radiotherapy services across the state, to improve survival and quality of life of cancer patients.

What is radiotherapy?

Radiotherapy* uses ionising radiation to destroy or damage cancer cells so they cannot multiply. The aim of radiotherapy is to deliver as high a dose of radiation as possible to the cancer whilst sparing surrounding normal tissues. Radiotherapy is used most commonly to treat lung, breast, rectal, prostate and head and neck cancers, often in combination with surgery and chemotherapy. For some cancers, including head and neck, cervical, brain and lung cancers, radiotherapy is recommended as the first definitive treatment. Radiotherapy may also be used as part of palliative care to control cancer growth or alleviate symptoms without necessarily providing a cure.

Radiotherapy may be delivered externally or internally. External radiotherapy typically uses a machine called a linear accelerator to focus a beam of ionising radiation (X-rays or electrons) at the cancer. An alternative external approach called superficial or orthovoltage therapy may be used to treat skin cancers or other superficial cancers. Internal radiotherapy (also known as brachytherapy) involves placing an implant containing radioactive material in or near the cancer. Implants can be used for varying durations and in some cases may be left in place permanently.

While radiotherapy requires greater upfront capital investment in comparison to other cancer treatments, this cost is discounted over the life of the equipment and facilities. Economic studies confirm that radiotherapy is a cost-effective cancer therapy.3,4

* Also called radiation therapy
“Health authorities accept that radiotherapy will be the indicated treatment for at least 50% of all cancer patients at least once during the course of their illness.”

Service requirements
Radiotherapy is a specialised cancer treatment that requires a team of highly qualified, specialist staff and large, complex equipment. Key members of this team are radiation oncologists, radiation therapists, medical physicists and specialist nurses, as well as information systems support and administrative staff. In Australia, radiotherapy is delivered mostly as an outpatient service, i.e., patients are not usually admitted to hospital as inpatients for radiotherapy treatment.

Radiotherapy facilities must contain one or more linear accelerators, together with a range of supporting equipment (such as simulators and computed tomography (CT) scanners), to plan and deliver treatment. Given its unique geographic size and population distribution, Australia likely requires more linear accelerators per head of population than centralised populations such as Europe.4

Established radiotherapy benchmark treatment rate
There is a consensus about a global quantitative benchmark for radiotherapy treatment (Table 1). As can be seen, a benchmark radiotherapy treatment rate rests conservatively at 50%.4-7

Table 1. Benchmark for radiotherapy treatment

<table>
<thead>
<tr>
<th>Source</th>
<th>Year</th>
<th>Treatment benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW Health – Radiotherapy Strategic Plan for NSW4</td>
<td>1991</td>
<td>50%</td>
</tr>
<tr>
<td>NSW Health – Strategic Plan for Radiotherapy Services in NSW 1995-2000</td>
<td>1995</td>
<td>50%</td>
</tr>
<tr>
<td>The Royal Australian and New Zealand College of Radiologists, Australian Institute of Radiography, Australasian College of Physical Scientists and Engineers in Medicine – National Strategic Plan for Radiation Oncology (Australia)4</td>
<td>2001</td>
<td>50-55%</td>
</tr>
<tr>
<td>NSW Health – Planning for Radiotherapy Services in NSW to 2006</td>
<td>2003</td>
<td>50%</td>
</tr>
<tr>
<td>ESTRO-QUARTS (Europe)</td>
<td>2005</td>
<td>52.3%</td>
</tr>
<tr>
<td>Queensland Health – QLD Statewide Cancer Treatment Services Plan 2008-17</td>
<td>2008</td>
<td>52.3%</td>
</tr>
</tbody>
</table>
In other words, health authorities accept that radiotherapy will be the indicated treatment for at least 50% of all cancer patients at least once during the course of their illness.

The most recent and comprehensive attempt to estimate optimal treatment rates for radiotherapy was published in 2005. This study examined the incidence of each type of notifiable cancer in Australia, the evidence-based indication for radiotherapy, and the probability of radiotherapy being recommended in each case. This study concluded that the ‘ideal proportion of patients with cancer in whom external beam radiotherapy is indicated at least once during the course of their illness based on the best available evidence is 52.3%’.10

Waiting time benchmark for radiotherapy treatment

Waiting times for radiotherapy treatment are another important indicator of the performance of the NSW health system.11,12 Treatment delays are known to lead to adverse outcomes, with life-threatening consequences, especially for those patients with breast, head and neck cancers who are forced needlessly to wait for access.13,14

In 2003, NSW Health issued a Clinical Service Framework for Optimising Cancer Care in NSW, outlining a set of standards for cancer care. Under Standard 4 – Access to appropriate clinical services, there is a specific standard that “For radiotherapy, maximum acceptable time between decision to treat, and commencing treatment is 3 weeks.”16 The Radiation Oncology Indicators from the Australian Council on Healthcare Standards also state a maximum waiting time of 21 days for radiotherapy treatment.17

Countries such as New Zealand,15 Canada and the United Kingdom (UK) have made a commitment to public reporting of cancer waiting times and have established user-friendly, online waiting times databases. The webpage of the UK National Health System (NHS) shows the percentage compliance with radiotherapy treatment waiting time targets, presented by major hospitals and cancer sites, as does the New Zealand site. Collection and public reporting of these data, which are updated every month, enables the UK Government to monitor progress regularly against the NHS Cancer Plan.16

Canada has also implemented a public monitoring system, where ‘wait times’ are reported by province on the internet to facilitate greater transparency and accountability.17

Radiotherapy and survival

Radiotherapy treatment can increase survival of cancer. A seminal Australian study estimated the survival benefit of radiotherapy in a defined population. In this study, Barton (1995) calculated and published survival data on nearly 10,000 patients treated with radiotherapy at Westmead Hospital over a 13-year period. In brief, three scenarios (best, average and worst case) were used to examine the effect of radiotherapy on survival. Five-year survival rates were 40%, 35% and 17% depending on the assumptions made in the scenario.

Survival curves then estimated the average survival of patients in the cohort, all of whom had received radiotherapy.

To be certain of determining that proportion of survival directly attributable to radiotherapy, the authors also calculated the component of the worst-case survival rate directly attributable to radiotherapy, introducing the concept “Life Years Gained”. The five-year survival rates were adjusted by multiplying by the fraction of survival attributable to radiotherapy for each tumour site. By summing all adjusted survival rates that could be defensibly calculated (ie for 97% of patients in the cohort), the authors published a global estimate for this cohort of the survival gain attributable to treatment by radiotherapy, namely 20.6% of years of survival. If patients with skin cancer were excluded, the global estimate of the survival gain due to radiotherapy was 15.7% of the entire survival.

Quantifying the survival benefit attributable to radiotherapy treatment provides a means of calculating the impact of any shortfall in the provision of radiotherapy treatment. For the purposes of this report, the more conservative figure of 16% survival gain with radiotherapy has been used when estimating the effect on survival from the shortage of radiotherapy services later in this document.
“There are two major challenges of greatest concern to CCNSW: capital costs of establishing radiotherapy facilities and radiotherapy workforce shortages.”

Role of the Federal Government

Radiotherapy provision relies on involvement from Federal and State Governments, particularly funding of initial and replacement capital costs.

Commonwealth Department of Health and Ageing also administers the Radiation Oncology Health Program Grants (HPG). The HPG is designed to reimburse radiotherapy centres for the cost of replacing equipment such as linear accelerators when they are over 10 years old.

Cancer Australia is the national government agency body charged with providing national leadership in cancer control, including working closely with the Commonwealth Department of Health and Ageing on cancer policy and planning. Cancer Australia could play a key role in radiotherapy planning and monitoring under the auspices of the Council of Australian Governments (COAG).

Challenges in ensuring adequate radiotherapy services

Radiotherapy service deficiencies have been reported worldwide. There are two major challenges of greatest concern to CCNSW: capital costs of establishing radiotherapy facilities and radiotherapy workforce shortages.

Over the past 20 years, radiotherapy provision in Australia has been examined by over 50 inquiries and reports, each of which has highlighted the importance of radiotherapy in cancer treatment and the underfunding that exists in this area. The national Radiation Oncology Inquiry, chaired by Peter Baume in 2002, was seminal and made substantive recommendations. These included establishing an independent national body to oversee radiotherapy services, improving radiotherapy availability in non-metropolitan areas and ensuring a sustainable radiotherapy workforce alongside adequate funding.

In response to the inquiry, the Australian Health Ministers Advisory Council established a Radiation Oncology Jurisdictional Implementation Group (ROJIG), which has since been replaced by the Radiation Oncology Reform Implementation Committee (RORIC).

To date, the recommendations of the Baume Inquiry remain to be implemented.

Cancer Council action

Cancer Council NSW has had long-standing concerns about poor patient access to radiotherapy and the associated impact on outcomes for cancer patients. Cancer Council has worked closely with key stakeholders, particularly the professional and peak consumer groups such as Cancer Voices NSW. As early as 2001, Cancer Council published the paper Improving radiotherapy for Cancer in NSW, after convening a nationwide summit on the issue.

Over the years, Cancer Council has made a range of recommendations to Government regarding the need for increased funding for radiotherapy services, comprehensive and timely planning for new radiotherapy services, and publication of waiting times data. Cancer Council has also filled gaps in educational and training services that would normally be the responsibility of government.

In March 2009, Cancer Council held a Radiotherapy Call-in, to provide a mechanism for patients and carers to share their perspectives and experiences of radiotherapy treatment. The information collected through the Call-in will help develop a much stronger qualitative understanding of the types of problems cancer patients are experiencing in accessing radiotherapy. A companion report to this Roadmap is currently in production, describing the main themes raised by patients and carers during the Call-in.
Radiotherapy service planning in NSW

Radiotherapy is an important treatment for cancer that requires substantial physical infrastructure and a particular mix of professional staff. The complexity of providing, managing and planning for radiotherapy services highlights the critical need for deliberate, comprehensive and long-term planning to ensure sufficient radiotherapy services for future need.

According to the NSW Cancer Plan 2004-2006, NSW Health has direct responsibility for planning and funding of radiotherapy services in NSW, including responsibility for the Radiotherapy Strategic Plan, the Radiotherapy Management Information System and the planning of capital projects. The Cancer Institute NSW has been ascribed a supporting role, providing policy advice and funding new academic posts in radiation sciences, and jointly convening the Radiotherapy Joint Working Party with NSW Health.22

NSW Health is responsible for the planning of radiotherapy services, including the development and publication of a plan every few years. Three planning periods are considered here.

2. In 2003, NSW Health published Planning for Radiotherapy Services in NSW to 2006.7 In this document, NSW Health adopted a 50% target for radiotherapy treatment, and proposed an expansion of up to an additional seven linear accelerators for NSW.
3. Since 2006, there has been no published plan for radiotherapy services. In 2004, NSW Health and the Cancer Institute NSW jointly convened the Joint Radiotherapy Advisory Committee (JRAC) to provide input to the fourth radiotherapy services plan for NSW, covering the period 2007–2011. As of May 2009, neither working documents nor a consultation draft have been released, despite being in the third year of the planning period these are meant to cover.
identified opportunities to improve services and patient throughput by 10–25% in the Sydney South West Area Health Service. However, the business improvement plans themselves have not been published.

Current distribution of radiotherapy facilities in NSW

NSW currently has 42 linear accelerators at 18 sites; 30 of these are in metropolitan Sydney and the remainder in rural NSW. Of these 42 linear accelerators, 33 are funded through the public health system (Appendix 2). There are some parts of the State where the only radiotherapy centre is a private facility (Central Coast and the South West NSW), and other parts of the State with no radiotherapy treatment centre (New England, South Coast and Greater West). New facilities are currently planned for Orange (as a public/private partnership) and for Lismore.

There is always a long lead time between a decision to establish and fund a new radiotherapy treatment centre and when patients can actually receive treatment. For example, radiotherapy departments at Coffs Harbour and Port Macquarie announced in 2002 did not begin to treat patients until 2007. It is unlikely that radiotherapy units planned for Lismore (announced 2004) and Orange (proposed in 2001) will be operational and, therefore, able to treat patients, before 2011.

The distribution of radiotherapy services means that some residents live in areas of the State with no radiotherapy service within easy reach. For these people, there are specific burdens associated with access to treatment. To some extent, this is reflected in the variation in radiotherapy utilisation rates observed between Area Health Services (Table 2). Geographical distance creates its own burdens for patients needing to travel for treatment. These burdens include the cost and logistics associated with travel and accommodation, arranging care for any dependents remaining at home, and the coordination of appointments.

The Transport for Health/Isolated Patients Travel Accommodation and Assistance Scheme (IPTAAS) is a subsidy program that assists people in NSW travelling more than 100km each way to attend an appointment with their nearest medical specialist. IPTAAS is usually used by people travelling by private car or in some instances by rail or air. A Federal inquiry into the operation of patient-assisted travel schemes such as IPTAAS found that these schemes do not adequately compensate patients and do not overcome distance as a barrier to medical treatment. Although there have been some welcome changes to transport schemes in recent years, many problems still exist, including high upfront costs and low reimbursement rates.

In view of the population distribution in remote and rural NSW, patient accommodation centres need to be planned and established in larger regional centres to accommodate patient inflow from surrounding areas. Affordable patient accommodation needs to be incorporated into the planning of any new or enhanced radiotherapy treatment centres.

Private radiotherapy facilities

In some parts of NSW, the only radiotherapy treatment centre may be a private facility. In those areas where a private centre is the only option, local residents are faced with a choice of travelling further afield to attend a public centre, or using the closer centre and incurring costs charged by the private provider.

Fees charged by private providers exceed the amount covered by Medicare. Cancer patients who use private radiotherapy treatment centres with or without private health insurance must pay the difference known as the ‘gap fee’. As radiotherapy is delivered as an outpatient service and is not covered by private health insurance, Cancer Council NSW continues to receive reports from patients who have incurred personal costs of thousands of dollars in gap fees for radiotherapy treatment and consultant fees.

Patients who are unable or unwilling to pay the gap fee incurred by using the local private facility are forced to either travel to a public centre further away, thus incurring different types of costs and burdens, or opt for a less optimal form of cancer treatment.
The distribution of radiotherapy services means that some residents live in areas of the State with no radiotherapy service within easy reach.”

The situation highlights a structural anomaly in the funding of treatment of life-threatening diseases. Other cancer treatments – surgery and chemotherapy – are fully covered by Medicare should patients elect to be treated as ‘public patients’ for hospital-based care. Under these circumstances, patients do not incur a gap fee. Patients with private health insurance who require surgery or chemotherapy are also covered by policies in their private health insurance plans. The absence of coverage for radiotherapy, or any structured financing arrangements, means that cancer patients for whom radiotherapy is a beneficial treatment option are confronted by different financial burdens from others, particularly if they live in a part of NSW where the only radiotherapy centre is private.

Radiotherapy workforce in NSW

A radiotherapy treatment centre requires not only significant physical infrastructure, but also a specific mix of professional staffing – radiation oncologists, radiation therapists and medical physicists – to be able to provide treatment.

In 2003, a European survey of radiotherapy services (the ESTRO QUARTS project) used data from 41 countries across Europe to develop radiotherapy workforce recommendations. The authors recommended staffing levels of one radiation oncologist per 200–250 cancer patients (depending on complexity of cases) and one medical physicist per linear accelerator.30 Guidelines for staffing levels for radiation therapists were more difficult to establish, given the influence of local factors and the complexity of treatments.

NSW cancer incidence projections for 2007 estimated 37,494 new cases of cancer.31 This would have resulted in 19,497 patients requiring radiotherapy. Comparing these figures with ESTRO QUARTS recommendations, it is also possible to calculate that NSW should have had between 78 and 97.5 FTE radiation oncologists at work in 2007. In 2007, there were an estimated 70.5 FTE radiation oncologist positions in NSW, with a 4.3% vacancy rate.1 For the same period, the vacancy rate for qualified medical physicists was 1.5%.1 Hence, NSW and the ACT required an additional 10 radiation oncologists to meet demand in 2007.32 Given the lead time required for individuals to qualify as radiation oncologists, it is essential that action be taken as soon as possible to address this shortfall in specialists, as demand will continue to increase in the future.

In the 2003 document Planning for Radiotherapy Services in NSW to 2006,7 NSW Health made a commitment to working with the Federal Government to increase graduating numbers in the professions of radiation therapy and medical physics at the University of Sydney and the University of Newcastle. There has also been an expansion of vocational training places (also known as Professional Development Year or PDY) for radiation therapists over the past two years, funded in part by the Cancer Institute NSW.22 It is important to note that radiation therapy graduates must complete a professional development year of fully supervised practice after completing university to be eligible to be licensed in NSW. These initiatives are important and valued, yet the positions created will not immediately deliver necessary new capacity.

The gap in radiotherapy service delivery in NSW

Although the NSW Government, through NSW Health and the Cancer Institute, has publicly adopted a benchmark of 50% of cancer patients to receive radiotherapy, data from NSW Health reveal that, over the 10 years from 1996 to 2006, only 36% of newly diagnosed cancer patients in NSW received radiotherapy (Appendix 1).1 This is considerably lower than any agreed benchmark, and lower than the levels achieved in other jurisdictions.

Studies of patterns of care for patients with specific cancers also demonstrate sub-optimal treatment rates. For example, a recent study found that 40% of eligible colorectal cancer patients in NSW did not receive preoperative radiotherapy in accordance with clinical guidelines.33 Data on selected sites (Table 3) from NSW in 2006 show that radiotherapy utilisation for head and neck and breast cancers is close to optimum benchmarks10 but utilisation for lung, rectal and prostate cancers is about half of the optimum benchmarks.
The impact of the radiotherapy treatment gap on cancer patients

Despite the establishment of several new facilities in NSW over the last decade, radiotherapy service supply has not kept pace with increasing demand. Calculations using data from the NSW RMIS reports suggest that almost 51,000 eligible cancer patients in NSW did not receive radiotherapy between 1996 and 2006 (Table 4). Using estimates of survival benefits from radiotherapy developed by Barton et al\(^3\), it is possible to calculate the number of life years lost to cancer patients as a result of not receiving radiotherapy.

Barton et al\(^3\) calculated average survival of all radiotherapy patients to be 4.75 years. The survival benefit attributable to radiotherapy treatment was approximately 16\% of this period or 0.76 years. Between 1996 and 2006, it is estimated that almost 51,000 cancer patients eligible for radiotherapy did not receive it. This means nearly 40,000 years of life lost to cancer patients overall during that period.

### Table 3. Proportion of cases for selected tumour sites treated by RT, NSW 2006

<table>
<thead>
<tr>
<th>2006</th>
<th>Radical</th>
<th>Palliative</th>
<th>Total</th>
<th>New cases of cancer, NSW</th>
<th>%RTU**</th>
<th>Corrected RTU*</th>
<th>Benchmark(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>2509</td>
<td>270</td>
<td>2779</td>
<td>4173</td>
<td>67%</td>
<td>74%</td>
<td>83%</td>
</tr>
<tr>
<td>Head &amp; Neck</td>
<td>602</td>
<td>62</td>
<td>664</td>
<td>951</td>
<td>70%</td>
<td>77%</td>
<td>78%</td>
</tr>
<tr>
<td>Lung</td>
<td>378</td>
<td>737</td>
<td>1115</td>
<td>3137</td>
<td>36%</td>
<td>39%</td>
<td>76%</td>
</tr>
<tr>
<td>Prostate</td>
<td>1574</td>
<td>226</td>
<td>1800</td>
<td>6158</td>
<td>29%</td>
<td>32%</td>
<td>60%</td>
</tr>
<tr>
<td>Rectum</td>
<td>376</td>
<td>85</td>
<td>461</td>
<td>1688</td>
<td>27%</td>
<td>30%</td>
<td>61%</td>
</tr>
</tbody>
</table>

\(^a\) no data from Westmead – includes estimated RTU from Westmead

\(^*\) RTU = radiotherapy utilisation

\(^\text{**}\) RTU = radiotherapy utilisation
“Between 1996 and 2006... nearly 40,000 years of life were lost to cancer patients during that period.”

Table 4. Years of life lost for NSW residents due to lack of radiotherapy

<table>
<thead>
<tr>
<th>Year</th>
<th>Total new cancers per year in NSW</th>
<th>Number of cancer patients who require RT as per benchmark treatment rate (50% until 2004, then 52.3%)*</th>
<th>Total NSW residents treated with RT</th>
<th>Number NOT treated with RT</th>
<th>Years of life lost due to lack of RT***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>=E x 50%</td>
<td></td>
<td>=G - D</td>
<td>= H x 0.76 years survival attributable to RT</td>
</tr>
<tr>
<td></td>
<td>Cancer Registry data</td>
<td>Calculated from RMIS data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>26,714</td>
<td>13,357</td>
<td>9,691</td>
<td>3,666</td>
<td>2,786</td>
</tr>
<tr>
<td>1997</td>
<td>27,690</td>
<td>13,845</td>
<td>9,888</td>
<td>3,957</td>
<td>3,007</td>
</tr>
<tr>
<td>1998</td>
<td>27,941</td>
<td>13,971</td>
<td>9,923</td>
<td>4,048</td>
<td>3,076</td>
</tr>
<tr>
<td>1999</td>
<td>28,398</td>
<td>14,199</td>
<td>10,448</td>
<td>3,751</td>
<td>2,851</td>
</tr>
<tr>
<td>2000</td>
<td>29,344</td>
<td>14,672</td>
<td>10,340</td>
<td>4,332</td>
<td>3,292</td>
</tr>
<tr>
<td>2001</td>
<td>30,380</td>
<td>15,190</td>
<td>10,664</td>
<td>4,526</td>
<td>3,440</td>
</tr>
<tr>
<td>2002</td>
<td>30,448</td>
<td>15,224</td>
<td>11,223</td>
<td>4,001</td>
<td>3,041</td>
</tr>
<tr>
<td>2003</td>
<td>32,478</td>
<td>16,239</td>
<td>11,461</td>
<td>4,778</td>
<td>3,631</td>
</tr>
<tr>
<td>2004</td>
<td>34,092</td>
<td>17,830*</td>
<td>11,584</td>
<td>6,246</td>
<td>4,747</td>
</tr>
<tr>
<td>2005</td>
<td>34,227</td>
<td>17,900*</td>
<td>12,395</td>
<td>5,505</td>
<td>4,184</td>
</tr>
<tr>
<td>2006**</td>
<td>35,159</td>
<td>18,388*</td>
<td>12,403</td>
<td>5,985</td>
<td>4,549</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>50,795</td>
<td>38,604</td>
</tr>
</tbody>
</table>

* Benchmark treatment rate updated to 52.3% in 2004, as per Delaney et al, 2005
**Most recent year of data available at time of publication
***Based on 16% of 4.75-year survival rate attributable to radiotherapy – from Barton et al, 1995
Radiotherapy facilities

Adequate linear accelerator capacity is central to ensuring that patients have optimal and equitable access to radiotherapy. At the end of 2008, there were 42 operational linear accelerators in NSW. Future needs for linear accelerators can be estimated as follows:

• Projected number of new notifiable cancers. According to NSW Chief Health Officer estimates, there will be 43,450 new cases of cancer in NSW in 2012, 47,650 new cases in 2015, and 50,690 in 2017.34

• Treatment benchmark rate for radiotherapy. Continued acceptance of the international benchmark of 52.3% of patients with notifiable cancer, approximately 25% of whom will require re-treatment.10

• Recommended throughput rate. ROJIG35 and NSW Health7 recommend a throughput rate of 331 new patients treated with radiotherapy per linear accelerator per year.*

Using these inputs, NSW will require 69 linear accelerators by 2012, at least 76 linear accelerators by 2015, and 81 linear accelerators by 2017. These projections represent the minimum number of linear accelerators required to treat notifiable cancers in NSW. The increase in notifiable cancers underscores the critical need for a significant and rapid increase in investment in radiotherapy services.

Additional linear accelerators will be needed to compensate for the following factors:

• Provision for machine down time. Each linear accelerator has a working life of 10 years and replacement of outdated machines can take up to six months. Down time may be due to replacement, unplanned repairs or less than optimal throughput due to advanced machine age.

• Provision for reduced patient flow across state borders. Once radiotherapy facilities are completed at Lismore, it is assumed patients from this area of NSW will no longer travel to Queensland for treatment.

• Allowance for treatment of non-notifiable and non-cancerous conditions. The above calculations only include cancers that are notifiable to the NSW Cancer Registry. Other non-notifiable conditions treated by megavoltage radiotherapy include non-malignant diseases such as pituitary tumours or non-melanoma skin cancers, as well as conditions that require radiotherapy to prevent bone ossification after hip replacement surgery. A CCORE report reviewed data from the Alfred Hospital in Melbourne and the Royal Brisbane and Brisbane Mater Hospitals and calculated that 11% of cases treated by linear accelerators are non-notifiable conditions.36

• Variation in referral patterns. Cancer Council NSW understands that linear accelerator capacity should exceed demand by 10% in order to meet variation in referral patterns.37

These projections highlight the need for urgent action to address current shortfalls in radiotherapy provision and to build additional capacity to cope with future demand.

*NSW Health and ROJIG calculated the throughput rate of cancer patients per linear accelerator per year by recommending 19 attendances per course, 4.1 attendances per hour, 8 operating hours per day, 240 working days per annum, and a 25% re-treatment rate. This results in a recommended throughput rate of 414 courses per year – 331 new patients and 83 patients re-treated.
4. Action required to improve access to radiotherapy services in NSW

Cancer Council NSW calls on the NSW Government to ensure optimal and equitable access to radiotherapy services for cancer patients in NSW by committing to the following actions – some that will provide immediate relief to those facing barriers in accessing radiotherapy, and some that address long-term development of radiotherapy services in NSW. Investment in radiotherapy infrastructure and the specialist radiotherapy workforce is essential to overcome the current crisis in radiotherapy service provision and ensure that all patients requiring radiotherapy in NSW have access to affordable, timely treatment, regardless of where they live.

Short-term actions to improve access to radiotherapy

i. Complete and publicly release NSW Health radiotherapy planning documents.

It is unacceptable that there is no current radiotherapy plan. It is also unacceptable that there are no planning or consultation documents or procedures to allow comment by professionals and consumer groups – necessary for open and transparent government planning process in accordance with principles outlined in the NSW Government State Plan. A comprehensive plan for radiotherapy services should include strategies that cover the increased need for radiotherapy services to meet projected cancer-incidence increase. Strategies must address physical infrastructure and workforce development needs, identify optimal locations for new radiotherapy treatment centres, and canvass arrangements for professional networking, referral and patient support needs. The planning for any new or enhanced radiotherapy treatment centres must also include provision for affordable patient accommodation.

If accepted, action on this recommendation would outline, for the public, the intended actions to be taken by the Government to build the capacity of radiotherapy services for the future. This will relieve the current level of uncertainty experienced by health professionals and consumer groups concerned with poor access to radiotherapy.

ii. Establish formal agreements with private radiotherapy centres to purchase radiotherapy treatment for patients who elect to be public outpatients.

NSW Health should establish a funding mechanism to enable the fee-for-service purchase of radiotherapy treatment from private centres so that patients are not required to pay the ‘gap fee’. A Government purchase arrangement will enable local cancer patients to access treatment without incurring financial hardship.

Purchasing radiotherapy treatment from private providers will have the added benefit of alleviating waiting times at public radiotherapy centres, as patients will be shared across both sorts of services.

If accepted, action on this recommendation would immediately improve access to treatment for cancer patients living in areas where the only radiotherapy centre is private, while also relieving pressure on public centres.
iii. Provide funding to obtain immediate increase in capacity in radiotherapy services in the following areas:

- funding to optimise staffing levels and work practices at St George Cancer Care Centre, so that all three linear accelerators can be used at full capacity; and to reduce waiting times for patients
- ensuring the timely finalisation of new services for Orange and Lismore
- accelerating the increase in capacity at Port Macquarie and Coffs Harbour by providing a second linear accelerator at each site
- investing in increased radiotherapy services for the Central Coast.

If accepted, action on this recommendation would provide NSW with increased radiotherapy services within a relatively short period of time, by building on existing infrastructure or plans.

iv. Establish an online, public waiting times database

The pressure on waiting times varies from facility to facility, with some radiotherapy treatment centres having shorter waiting times than others. Waiting times can also vary within centres from month to month, depending on factors such as staffing and the state of machines. Unlike other health services such as surgery, there is currently no provision for public access to waiting times for radiotherapy treatment. Cancer Council NSW has joined with cancer representative groups, such as Cancer Voices NSW, to call for a publicly available online waiting times database, as is the case in other jurisdictions such as the UK, New Zealand and Canada. Providing public access to waiting times data for radiotherapy, by each facility, has great potential to provide a short-term solution to access problems, by enabling referring doctors and patients to make decisions about where to go for treatment, and by redistributing demand from those centres that have very long waiting times to those with shorter waiting times. Public reporting of waiting times for cancer treatment is also important for improving government accountability and for monitoring overall improvements in waiting time across the State.

If accepted, action on this recommendation would facilitate immediate redistribution of demand and referrals from centres with long waiting times to those with more capacity.
v. Reduce the financial burden on country patients travelling to access radiotherapy.

Change the Transport for Health/Isolated Patients Travel Accommodation and Assistance Scheme (IPTAAS) by:

– eliminating the $20 administration fee for low-income clients and ensuring that people undergoing block or repeated treatments such as radiotherapy only pay the administration fee once per treatment cycle

– increase the petrol allowance to 21c per kilometre

– increase the rates for accommodation

– reforming the payment process so that travel and accommodation expenses can be paid in advance. If accepted, action on this recommendation would provide immediate relief for cancer patients experiencing the financial hardships incurred as a result of not having a radiotherapy centre within reasonable travelling distance from home.

Solutions for long-term improvements in radiotherapy services

vi. Increase the number of linear accelerators in accordance with cancer incidence projections.

Cancer Council NSW affirms the irrefutable need for an increase in the number of linear accelerators in NSW from the current 42 to 69 by 2012 (an additional 27 linear accelerators), with a view to reaching the required target of 76 linear accelerators by 2015.

Cancer Council NSW understands that, as at March 2009, NSW Government funding has been allocated for four new machines (at Lismore, Orange, Royal Prince Alfred Hospital and Liverpool Hospital). An additional eight linear accelerators have been proposed by the private sector (potential sites include the Norwest Business Park, Castle Hill; Macquarie University Hospital; Kogarah and Newcastle). Even with these eight additional linear accelerators provided through the private sector, the NSW Government will still need to fund a further 15 linear accelerators by 2012.

It is beyond the scope of this document to specify definitive locations for new or expanded radiotherapy services – this is properly the purview of a Government-developed NSW Radiotherapy Strategic Plan. However, in developing a new Radiotherapy Strategic Plan, Cancer Council recommends that the following locations (not in any particular order) should be considered for new or expanded radiotherapy services.

• Concord Hospital
• Bankstown Hospital
• Blacktown Hospital
• Macarthur Cancer Therapy Centre (expansion of existing facilities)
• Nepean Hospital (expansion of existing facilities)
• Westmead Hospital (expansion of existing facilities)
• Dubbo Hospital
• Tamworth Hospital

Expansion of radiotherapy facilities and workforce will need to be sustained beyond 2012 to maintain radiotherapy services at an acceptable level, given the projected increases in cancer incidence.

If accepted, action on this recommendation will substantially enhance the total capacity for radiotherapy services in NSW, increase patient access, and enable radiotherapy utilisation rates to move closer to the benchmark of at least 50% of cancer patients.
vii. Specify, build and support through professional networks a proportion of linear accelerators in non-metropolitan areas to overcome travel and social challenges for patients and their families.

In NSW, radiotherapy is typically provided at metropolitan or large regional hospitals. A move away from this centralised model of radiotherapy delivery towards a satellite or outreach model is occurring in Sweden, Norway, Canada and the UK. This service delineation also enables larger metropolitan centres to focus on specialised or more technically difficult forms of radiotherapy.

Any future NSW Radiotherapy Strategic Plan needs to address the issue of optimal models for providing radiotherapy treatment to patients from regional and remote areas. Establishing smaller single machine unit centres in regional areas may improve access for cancer patients by providing treatment within reasonable travelling distance, and reduce some of the current difficulties faced by country patients. Data from Victoria show that smaller single-machine unit radiotherapy facilities can provide safe, effective radiotherapy on par with that of the larger centres. However, there are risks associated with single machine units, including the challenges of clinical support, ease of referrals for complex or less common treatments, research, the inability to specialise, staff back-up arrangements, and the heavy impact in the event of a problem with the machine.

Cancer Council NSW recommends that the preferred model is for all centres, whether metropolitan or non-metropolitan, to have at least two linear accelerators. Single machine units should only be established where there are close geographic and service ties to another radiotherapy facility, and should have formal arrangements for specialist outreach services from a major centre to facilitate staff support and training. Formal relationships should be established as service agreements between the linked units as well as with the major centres providing the outreach services.

If accepted, action on this recommendation will enable the establishment of new radiotherapy centres that are not only strategically positioned across NSW, but also professionally linked and supported.

viii. Plan for, invest in and deliver a workforce responsive to current and predictable future demand.

As the NSW Health radiotherapy service planning document for 2007-2011 has not been released, the adequacy of future planning for the radiotherapy workforce cannot be assessed. Cancer Council NSW recommends that NSW Health develops and distributes a coordinated recruitment and retention plan for the radiotherapy workforce that adds net workforce capacity and also targets areas with specific shortages. The NSW Government may have to consider a program of continued funding of training places at universities as well as overseas recruitment to meet immediate need.

If accepted, action on this recommendation will ensure that the establishment of new physical infrastructure for radiotherapy services is matched with the availability of the required mix of workforce to staff new and expanded services.
ix. Establish one over-arching body to be responsible for long-term radiotherapy planning, procurement and quality in NSW.

Management of radiotherapy services in NSW involves multiple levels of bureaucracy involving NSW Health, Area Health Services and individual hospitals, together with approval from the Commonwealth Department of Health and Ageing. In addition, the Cancer Institute NSW is responsible for the state-wide Cancer Plan. Cancer Council NSW calls for the creation of a new independent state authority to oversee radiotherapy planning, procurement, workforce issues, quality assurance, maintenance of machines, benchmarking, data collection and public reporting. Membership of this body must include an independent chair and representation from radiation oncology professional bodies and the peak consumer group, Cancer Voices NSW. Formation of such a body would centralise the decision-making process and alleviate current delays in construction of new facilities. It would also provide a mechanism for ensuring the safe and efficient delivery of radiotherapy in line with best practice guidelines and using a patient-centred approach that follows the quality of care criteria required for continued funding. Cancer Council NSW recommends that this entity is established immediately, with funding tied to specific radiotherapy needs and service benchmarks.

If accepted, action on this recommendation will provide a more streamlined and coherent planning process for radiotherapy services, with subsequent improvements in efficiency and effectiveness.

Within this body, there should be a sub-committee specifically to accelerate the design and ‘catch-up’ procurement of new facilities. This sub-committee should be immediately established to design and establish new radiotherapy facilities, including the procurement of equipment across the state. Managing the development of a radiotherapy service from the initial proposal to treating the first patient is a complex process. Formal consultation with facilities in which new departments have recently been completed would provide valuable lessons and experience.

If accepted, action on this recommendation would enable the centralisation of expertise and experience in procurement and planning for new facilities, ensuring consistency across the State and improving efficiency in processes.

x. Radiotherapy responsibilities and contributions between the Federal and NSW Governments to be renegotiated as part of the Australian Health Care Agreements.

The Federal Government has the opportunity to play a greater role in ensuring the long-term infrastructure for health care across the country, and investment in radiotherapy services clearly requires a level of capital investment in infrastructure appropriate for Federal support.

If accepted, action on this recommendation has the potential to increase the total pool of funds available for radiotherapy services in NSW.

“Lack of capital equipment and workforce shortages remain as major barriers to improving treatment rates.”
Recognised benchmarks suggest that at least 50% of all cancer patients will require treatment with radiotherapy at least once during the course of their illness.\textsuperscript{4-7,10} However, only 36% of cancer patients in NSW received radiotherapy between 1996 and 2006.

It is estimated that almost 51,000 cancer patients eligible for radiotherapy between 1996 and 2006 did not receive it. As estimated in this document, nearly 40,000 years of additional life were lost in NSW during this period because patients did not receive radiotherapy.

Lack of capital equipment and workforce shortages remain as major barriers to improving treatment rates. Urgent action is needed to improve capacity in both equipment and workforce in order to attain the nationally recognised benchmark treatment rate and improve patient survival. Cancer Council estimates that a minimum of 69 linear accelerators will be required by 2012, 76 by 2015, and 81 by 2017, to meet the increasing incidence of cancer in NSW. This means that the NSW Government needs to establish an additional 33 linear accelerators by 2015, either with public funding or a combination of public and private funding.

Cancer Council calls for urgent action to improve access to radiotherapy services in NSW, through a combination of immediate measures to provide short-term improvements, as well as measures that will lead to improved capacity in radiotherapy services for the long term.

Effective increases in the capacity of radiotherapy services in NSW require careful strategic planning that addresses physical infrastructure and workforce capacity, a considered role for the private sector, and arrangements to reduce financial hardship, particularly for country patients.

Cancer patients in NSW should not have to face the uncertainty associated with long waiting times for treatment, or the additional psychological, emotional and financial burdens associated with access to treatment. There are clear benchmarks for access to radiotherapy – in terms of proportion of cancer patients, and in terms of waiting times for treatment – which are not in question. It simply remains for planning for the long-term development of a robust radiotherapy services system for NSW, to keep pace with projected demand, and for immediate actions to improve access for those people currently needing radiotherapy.

5. Conclusion
References


Australasian College of Physical Scientists and Engineers in Medicine; 2001.


18. **Australian Government Cancer Australia.**
   Cancer Australia - Overview. 2009 [cited 10.2.09];


29. **Wallace N.** Cancer patients face choice of travel or pay. Sydney Morning Herald, 1 Apr, 2008;4.


32. **Cancer Council WA.** Collaboration for Cancer Outcomes Research and Evaluation. Western Australia: Cancer Council WA; 2008.


### NSW residents who received radiotherapy treatment (1996–2006)

(NSW residents are mostly treated in NSW but some received radiotherapy in other states)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total number of people treated with RT in NSW (includes NSW residents and international and interstate)</th>
<th>Overseas and interstate people treated in NSW</th>
<th>NSW residents treated interstate (NSW residents treated in Vic, Qld, SA)</th>
<th>Total NSW residents treated with RT</th>
<th>Total new cancers per year in NSW</th>
<th>Percent NSW residents treated with RT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
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<td>969</td>
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<td>263</td>
<td>1,250</td>
<td>11,223</td>
<td>30,448</td>
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<td>1,215</td>
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<td>494</td>
<td>857</td>
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<td>Total</td>
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<tr>
<td>Average</td>
<td></td>
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**Formula**

\[
F = \frac{A - B + C}{E} \times 100
\]

**Source**


### Linear accelerators in NSW as at end 2008

<table>
<thead>
<tr>
<th>Site</th>
<th>Funding</th>
<th>Existing linear accelerators 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metropolitan sites</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liverpool Cancer Therapy Centre</td>
<td>Public</td>
<td>3</td>
</tr>
<tr>
<td>Macarthur Cancer Therapy Centre, Campbelltown</td>
<td>Public</td>
<td>2</td>
</tr>
<tr>
<td>Nepean Cancer Care Centre</td>
<td>Public</td>
<td>2</td>
</tr>
<tr>
<td>Prince of Wales Hospital</td>
<td>Public</td>
<td>3</td>
</tr>
<tr>
<td>Royal North Shore Hospital</td>
<td>Public</td>
<td>3</td>
</tr>
<tr>
<td>Royal Prince Alfred Hospital</td>
<td>Public</td>
<td>4</td>
</tr>
<tr>
<td>St George Cancer Care Centre</td>
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<td>3</td>
</tr>
<tr>
<td>St Vincent’s Hospital</td>
<td>Public</td>
<td>1</td>
</tr>
<tr>
<td>Westmead Hospital</td>
<td>Public</td>
<td>4</td>
</tr>
<tr>
<td>St Vincent’s Private Hospital Clinic</td>
<td>Private</td>
<td>1</td>
</tr>
<tr>
<td>Sydney Adventist Hospital, Wahroonga</td>
<td>Private</td>
<td>2</td>
</tr>
<tr>
<td>Sydney Radiation Oncology Centre, Sydney Mater Misericordiae Hospital</td>
<td>Private</td>
<td>2</td>
</tr>
<tr>
<td><strong>Regional sites</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illawarra Cancer Care Centre, Wollongong Hospital</td>
<td>Public</td>
<td>2</td>
</tr>
<tr>
<td>Newcastle Mater Misericordiae Hospital</td>
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<td>4</td>
</tr>
<tr>
<td>North Coast Cancer Institute – Coffs Harbour</td>
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</tr>
<tr>
<td>North Coast Cancer Institute – Port Macquarie</td>
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<td>1</td>
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<tr>
<td>Central Coast Radiation Oncology Centre, Gosford</td>
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</tr>
<tr>
<td>Riverina Cancer Care Centre, Wagga Wagga</td>
<td>Private</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>42</td>
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*Public* means funded by the government
### Required linear accelerators in NSW 2006–2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected cancer incidence</th>
<th>Minimum linear accelerators required</th>
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<tbody>
<tr>
<td>2008</td>
<td>38,561</td>
<td>62</td>
</tr>
<tr>
<td>2009</td>
<td>39,699</td>
<td>64</td>
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<td>2010</td>
<td>40,835</td>
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<tr>
<td>2011</td>
<td>41,974</td>
<td>67</td>
</tr>
<tr>
<td>2012</td>
<td>43,173</td>
<td>69</td>
</tr>
<tr>
<td>2015</td>
<td>46,750</td>
<td>76</td>
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</table>
“Cancer Council calls for urgent action to improve access to radiotherapy services in NSW, through a combination of immediate measures to provide short-term improvements, as well as measures that will lead to improved capacity in radiotherapy services for the long term.”