NORTH WEST RADIOTHERAPY CLINICAL EXPERT PANEL

Advice for provision of radiotherapy services to people with cancer from North West Tasmania

Prepared for the Tasmanian Government Minister for Health

by an Independent Clinical Expert Panel

June 2011

CONTENTS

EXECUTIVE SUMMARY AND PREFERRED OPTION

This document provides advice from an independent Clinical Expert Panel (CEP) appointed by Tasmanian Government Minister for Health about the safe and sustainable provision of radiotherapy services for people affected by cancer in North West Tasmania. The CEP comprised experts with national and international reputations in regional radiotherapy service development as well as a local consumer representative.

The CEP has considered current and projected demand for radiotherapy and associated services in North West Tasmania, the risks and benefits of different clinical models for provision of radiotherapy for patients in the region, barriers to delivering the recommended model and the conditions under which this model should be implemented.

The steps taken in developing this advice included:

- a review of best practice models to identify key principles for the planning and implementation of regional radiotherapy services
- interviews with stakeholders in Burnie, Launceston, Hobart and Melbourne to identify gaps, priority needs and potential models for a radiotherapy service in North West Tasmania
- meetings of the CEP to discuss the approach to developing the advice, consider the literature review and stakeholder consultation findings and gain consensus on the preferred model
- development and refinement of the final document.

KEY FINDINGS

- The caseload of cancer patients in North West Tasmania is sufficient to use the capacity of one linear accelerator (linac) and will continue to increase with time.
- The utilisation rate for radiotherapy in North West Tasmania of 42.5% is similar to that in other areas of Tasmania and other states and territories but is below the national guideline recommendation of 52%.
- Launceston has provided an excellent radiotherapy service for patients from North West Tasmania to date in terms of access and quality of care. However, the burden of travel for radiotherapy is a major issue for people with cancer from the North West.
- The cancer caseload in North West Tasmania and burden of travel for people from the North West support the need for radiotherapy to be made available locally.
- Radiotherapy is a complex treatment modality for cancer that must be managed safely with appropriate professional management and support within an organisational safety culture.
- A radiotherapy service in North West Tasmania should be linked to an established radiotherapy service. A stand-alone radiotherapy service entails unacceptable risks to the safe, sustainable delivery of services.
- Development of a radiotherapy service for the North West should be considered within the broader context of a multidisciplinary cancer service across the North/North West region.
- Other priority areas of need include: improvements in coordination of care and access to cancer services; improvements in a range of cancer services in the region, including medical oncology and malignant haematology, palliative care, allied health support services, general and specialist medical services; and improvements in the overall governance of cancer services within the region and networking across the state.

OPTIONS FOR PROVISION OF RADIOTHERAPY SERVICES FOR NORTH WEST TASMANIA

The CEP advice comprises immediate actions to reduce the current burden on patients and carers related to radiotherapy treatment and longer-term actions to be taken when funding for a local radiotherapy service becomes available.

Immediate actions

The CEP has identified actions that could be implemented without waiting for funds for a local radiotherapy service to become available. These immediate actions would reduce the burden on patients and carers associated with travelling from the North West region to Launceston for radiotherapy and include:

- implementing strategies to improve coordination of care for people with cancer who need to travel outside the North West region for treatment
- improving the quality of transport and accommodation options for people who need to travel outside the North West region for treatment
- increasing access to information about available transport, accommodation and other support services for people with cancer and their carers.

Actions to be taken when funding for radiotherapy in the North West is available

The CEP has concluded that it is appropriate to develop a local radiotherapy service in the North West of Tasmania when funds are available to support the infrastructure and workforce required to ensure safety, quality and sustainability. The preferred model is a radiotherapy service operating across two sites in the North and North West that:

- utilises established radiotherapy services at Launceston General Hospital
- adds a new single linac and staff at the North West Regional Hospital Burnie
- provides capacity for expansion to a second linac at Burnie in future if required.

To minimise the risks of safety and sustainability, the existing Launceston radiotherapy department and the proposed Burnie radiotherapy department should be run as a single administrative entity. This model is contingent on having a systematic and clear plan about how immediate and future priorities for broader issues of cancer service delivery in the region will be addressed. A number of the priorities identified in this review are designed to be addressed through the development of the North West Regional Cancer Centre.

The report outlines a range of issues to be considered for the proposed model, including:

- the risk profile, including societal risks, patient risks, economic risks, health service risks to be managed during planning and implementation
- the importance of clear contractual agreements between the North and North West sites
- the importance of an adequate and sustainable oncology workforce and resources to link services at both sites
- key staffing, equipment and linkages required, including linkages within and outside Tasmania
- the importance of a clear communication strategy to articulate the role and scope of services provided by a regional radiotherapy service to the North West community and the broader Tasmanian population.

1. BACKGROUND

KEY POINTS

- This report provides advice from an independent Clinical Expert Panel (CEP) to the Tasmanian Government Minister for Health about the safe and sustainable provision of radiotherapy services for people affected by cancer in North West Tasmania.
- CEP advice has been informed by a review of current best practice for planning and implementing radiotherapy services in regional areas, as well as broad consultation with stakeholders in Burnie, Launceston, Hobart and Melbourne.
- The report considers the current and projected demand for radiotherapy and associated services within the region, the risks and benefits of different clinical models for provision of radiotherapy services, barriers to delivering the recommended approach and the conditions under which the optimal model should be implemented.

1.1 HISTORY OF THE PROJECT

In 2010, Tasmania applied successfully for funding through the Commonwealth Government Health and Hospitals Fund (HHF) Regional Cancer Centres (RCC) initiative. A total budget of $48.5 million has been provided to fund the Tasmanian Cancer Care Project, which will comprise purpose-built cancer facilities (including ambulatory care and patient support facilities) in each Area Health Service (South, North and North West). Additional funds have been sought for clinical information technology systems and advanced videoconferencing facilities. The RCC funding is part of a long-term strategy by the Tasmanian Government to improve the distribution of cancer services across the state. In addition to RCC funding, a budget bid has been made for Cancer Care Coordinator positions in each Area Health Service as well as administrative support for multidisciplinary teams.

In North West Tasmania, RCC funding is designed to bring together cancer specialists, community-based palliative care and non-profit organisations such as Cancer Council Tasmania.

On 8 October 2010, a supplementary application was lodged with the Australian Government Minister for Health and Ageing on behalf of the Tasmanian Government to seek funding for expansion of the Tasmanian Cancer Centre to include radiotherapy in North West Tasmania. This application was made in response to a policy commitment given by the Australian Government to consider funding the construction of facilities and equipment to enable provision of radiotherapy services at the North West Regional Hospital.

North West Regional Cancer Centre funds will support:

- magnetic resonance imaging (MRI)
- 12 chemotherapy chairs
- consulting rooms
- outreach palliative care
- education facilities
- provision for future addition of two radiation oncology bunkers.

Single Machine Radiotherapy Unit Clinical Expert Panel

In 2010, the Tasmanian Government Minister for Health appointed a Clinical Expert Panel to provide independent advice about when radiotherapy services can safely and sustainably be provided in the North West. The Single Machine Radiotherapy Unit Clinical Expert Panel (CEP) is an independent panel of leading national experts from other jurisdictions with significant expertise in the planning and implementation of regional cancer services, including radiotherapy, in Australia and overseas. Interstate CEP experts were assisted by a local community representative, who is a cancer survivor. Details of CEP members are provided in Appendix II.

The CEP met face-to-face in Tasmania and in Melbourne at intervals throughout the membership term and corresponded via a designated intranet site established to support information sharing and discussion. The CEP was supported by staff from the Department of Health Tasmania as well as an independent healthcare communications consultant who assisted in the development of this report.

CEP members undertook a broad consultation process with stakeholders in Burnie, Launceston, Hobart and Melbourne to inform the development of their advice (see Appendix III for the list of consultations). The CEP also considered relevant reports and publications about provision of radiotherapy services in regional and rural areas, in particular single machine radiotherapy units (SMU). A summary of the key documents used to inform this report is provided in Appendix IV.

1.2 PURPOSE AND SCOPE OF REPORT

This report has been developed by the CEP to provide the Tasmanian Government with independent advice about the provision of safe and sustainable radiotherapy services for patients with cancer from the North West of Tasmania. The report considers current and projected demand for radiotherapy and associated services within the region, the risks and benefits of different clinical models for provision of radiotherapy services, barriers to delivering the recommended approach and the conditions under which the optimal model should be implemented.

Cancer services

Cancer services are provided by a wide range of health professionals for patients as they journey through a continuum that includes early detection, diagnosis, treatment, follow-up and survivorship or palliative and end-of-life care. Supportive care is essential in all aspects of cancer care.

General practitioners (GPs) are often the first point of contact for a patient with symptoms/signs of cancer. Diagnostic investigations may include medical imaging, surgery and/or pathology procedures. Following diagnosis, cancer treatment may include medical oncology, radiation oncology, biological therapy, surgical oncology and supportive care, or a combination of these options. On completion of treatment, ongoing follow-up care and rehabilitation is important to check for signs of recurrence and long-term side effects of treatment. For some patients, palliative and end-of-life care is required.

This report focuses on radiation oncology. However, it is important to note that radiation oncology is only one component of the cancer care pathway and should only be provided as part of a multidisciplinary approach that considers the individual needs of the patient and carers.

2. RADIOTHERAPY AND ITS ROLE IN CONTEMPORARY CANCER CARE

KEY POINTS

- Radiotherapy has a crucial role in contemporary cancer care and may be used alone as a curative treatment, to improve cure rates in combination with other treatments, or for symptom relief as part of palliative care.
- Radiotherapy should only be provided as part of a multidisciplinary approach to cancer care, alongside high-quality diagnostic, treatment and supportive care services.
- Planning and delivery of safe and effective radiotherapy is a complex process requiring highly specialised equipment and staffing.
- A course of radiotherapy may take up to 8 weeks to complete, with associated financial and social costs for patients over this time.
- The CEP advice focuses on external beam radiotherapy.

Information in this chapter has been adapted from *Options for radiation oncology services in the Northern Territory: a report commissioned by the Government of the Northern Territory of Australia (August 2004)*.[1]

2.1 WHAT IS RADIOTHERAPY?

Radiotherapy (or radiation therapy) involves the use of ionising radiation (from X-rays, γ-rays or particles) to kill cancer cells. Clinical radiotherapy schedules are designed to take advantage of the different responses to ionising radiation of normal cells and cancer cells. Generally, normal cells are able to repair damage caused by ionising radiation, whereas cancer cells are not as efficient at repairing damage.

Definitions

Radiation oncology: the study and discipline of treating cancer with radiation.

Fraction: The amount of radiation given in one session.

Field: A beam of radiation.

Radiotherapy has a crucial role in the treatment of many cancers, alongside surgery, chemotherapy and hormonal therapy. It may be:

- curative (e.g. early-stage lymphoma, and cancer of the larynx)
- an adjuvant therapy used following surgery and/or chemotherapy (e.g. following lumpectomy for breast cancer) to improve cure rates, or
- given as palliative treatment for symptom relief (e.g. pain due to bone metastases).

Radiotherapy can prolong survival, help to preserve organs affected by cancer, provide symptom relief, and improve quality of life for people affected by cancer.

Types of radiotherapy

Radiotherapy delivers radiation in one of two ways:

- as an **external beam** generated by a machine called a linear accelerator (linac) that produces beams of megavoltage X-rays and electrons used to target the tumour
- as **brachytherapy**, where a radioactive source is inserted directly into or onto tissue affected by a tumour; brachytherapy is a highly specialised technique that is confined to large

specialised cancer centres with expertise in radiation oncology and the relevant specialised field of surgery required to insert the radioactive source.

The CEP advice focuses on external beam radiotherapy.

What does radiotherapy involve?

Radiation is given as a series of doses or 'fractions' over days or weeks. The number of fractions, the amount of radiation given in each fraction and the time between fractions is designed to kill as many cancer cells as possible, while minimising damage to normal tissue.

Different cancer types vary in their level of sensitivity to radiation. Curative radiotherapy uses higher radiation doses that are close to the tolerance of normal tissues. Palliative radiotherapy typically uses low doses of radiation.

The length of a treatment course of radiotherapy varies with the intent of treatment and can be up to 8 weeks. A course of radiotherapy delivered with the aim of cure typically involves daily treatment for 5 days a week for up to 8 weeks. Delivery of radiation beams typically takes only a few minutes but each session can take 12 to 15 minutes. Prior to starting treatment, the patient has one or more planning appointments to determine the optimal dose, mode of delivery and exact specifications for their treatment course.

Who should receive radiotherapy?

The optimal radiotherapy utilisation rate (RTU) describes the optimal proportion of patients for whom radiotherapy is indicated. The RTU for the treatment of cancer was estimated by Delaney *et al*.[2] and is used as a benchmark for planning radiotherapy services in Australia and internationally.

Not all types of cancer are suitable for radiotherapy because of the different natural history of cancers, and differences in the normal tissues around the cancer. The overall distribution of different cancers therefore affects the overall RTU.

Calculating the RTU

Radiotherapy was considered indicated if it increased survival, controlled tumour growth, improved the patient's quality of life or reduced treatment toxicity and the patient was fit enough to receive treatment. Indications were taken from Australian and international cancer guidelines of treatment efficacy. The proportion of all cancer cases with each indication was estimated from the available epidemiological data.

From the guideline and epidemiological data Delaney *et al*. estimated that 52% of new cases of cancer in the Australian population have an indication for radiotherapy at least once during the course of their illness.

Minimising side effects

Side effects of radiotherapy depend on which part of the body is being treated, how much normal tissue is exposed to radiation, the amount of radiation given per week (dose accumulation) and the total dose of radiation over the entire treatment period.

Side-effects of radiotherapy can be minimised by meticulous planning and delivery following a step-wise approach that requires input from a number of specialist and allied health professionals (see Section 2.3).

Side effects of radiotherapy

Early reactions: result from damage to tissues with rapidly dividing cells (e.g. lining of the gastro-intestinal tract, skin). Most patients recover completely.

Late reactions: usually result from damage to tissues that cannot replace damaged cells. Typically occur at least 3 months after completion of treatment, and, while rare, are usually permanent or progressive.

Specialised radiotherapy techniques

Special external beam radiotherapy techniques include:

- **intensity-modulated radiotherapy (IMRT)**, in which the radiation beam is modified during treatment to allow the dose of radiation to be increased when the beam concentrates on tumour tissue, and decreased for adjacent normal tissue
- **stereotactic radiotherapy** in which multiple narrow high-energy beams intersect in the tissue requiring treatment; stereotactic radiotherapy may also be delivered as multiple γ-rays from cobalt isotopes fixed in a treatment device called a gamma knife.

These techniques are often specified (by inclusion or exclusion) in estimates of the costs of purchasing and running radiotherapy equipment. Given that the indications for these specialised radiotherapy techniques are rare, the techniques are usually confined to a small number of centres that can service a large population, ensuring cost effectiveness and availability of necessary expertise.

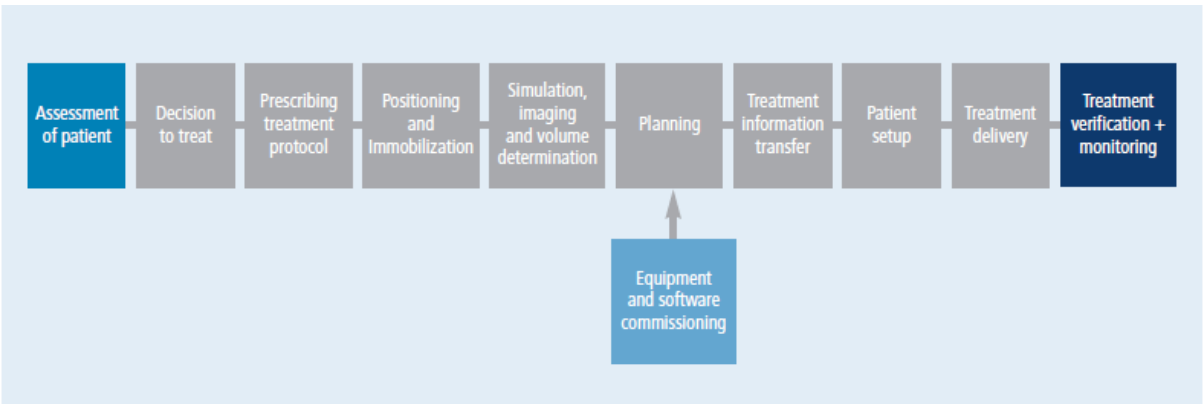
2.2 ROLE OF RADIOTHERAPY IN MULTIDISCIPLINARY CANCER CARE

Radiotherapy should only be provided as part of a multidisciplinary approach to cancer care. This requires adequate access not only to the specialist services required for radiotherapy itself (see Section 2.3) but the full range of diagnostic, treatment and supportive care services involved in the delivery of high-quality cancer care. This includes surgical and medical oncology, pathology, imaging, general and specialist medical and surgical services (including emergency services, palliative care and general practice), nursing, psychosocial support and allied health services. Careful, comprehensive planning of all of these services is critical if the value of an investment in radiation oncology is to be realised.

2.3 REQUIREMENTS FOR RADIOTHERAPY

Provision of a safe and effective radiation oncology service is complex, with a number of key steps required to manage the risks involved (Figure 1). It requires a substantial capital investment in radiotherapy equipment, a specially designed building, ongoing investment for equipment maintenance and replacement, expert teams of specialist doctors (radiation oncologists), radiation therapists and medical physicists, supported by nursing and allied health, good access to engineering support as well as specialised computer support and data management. Despite the complexity of resources required, based on available figures, radiotherapy appears to be a cost-effective investment.[3]

Figure 1: Radiotherapy risk profile



World Health Organization[4]

Equipment/facility requirements

Central to the delivery of external beam radiotherapy is the linac. This machine accelerates electrons onto a tungsten target, which generates X-rays within the megavoltage energy range. The X-rays are then aimed at the tumour. A linac can emit electrons alone, and the electrons can also be used therapeutically.

The X-rays produced in a linac have much higher energy, and penetrate tissue more deeply than X-rays from a diagnostic machine. With modern linacs, the dose of radiation can be concentrated at deeper sites by directing the X-ray beams, thus minimising skin side-effects. Multiple beams can be directed at the tumour and the beam can be shaped according to the tumour volume and to minimise damage to surrounding normal tissues.

Linacs are installed in concrete bunkers. A concrete-lined corridor typically separates the room containing the radiation-generating equipment from other rooms in a radiation oncology unit. Because of the cost of shielding, it is unusual for any occupied areas to be located above the bunker. Other rooms in a radiation oncology unit include waiting areas for patients, space for planning resources, such as computed tomography (CT) scanners and dosimetry computers, clinic rooms where patients are assessed, offices for staff and various workshops for maintaining and servicing equipment.

Radiotherapy staffing requirements

Three types of professionals are involved in the prescription and safe delivery of radiation treatment.

- The **radiation oncologist** is a specialist medical practitioner with expertise in:
  - assessing cancer patients, jointly with other members of a multidisciplinary cancer team
  - determining whether radiotherapy is the most appropriate treatment for a patient
  - explaining treatment options to patients, and helping them make treatment choices
  - planning courses of radiotherapy for individual patients, including prescription of doses
  - supervising the delivery of radiotherapy
  - managing complications of radiotherapy
  - providing support and ongoing advice to patients
  - surveillance and follow-up after completion of treatment
  - contributing to educational activities for patients and professionals.
- The **radiation therapist** is technically trained and skilled in the planning and delivery of radiotherapy in accordance with the prescribed dose and the pre-determined tumour volume, and undertakes roles including:
  - development of appropriate immobilisation devices
  - imaging to support planning and calculation of the optimal treatment plan
  - positioning of patients and delivery of treatment
  - checking equipment and the treatment plan for variations
  - routinely assessing the accuracy of beam delivery based on patient position and shape
  - providing education and support to patients during treatment
  - assessing the patient daily for changes, referring to relevant staff as required.

- The **medical physicist**:
  - helps to ensure that the prescribed dose of radiotherapy can be delivered within the tolerance of the available equipment
  - ensures that the dose prescribed is actually delivered by taking dose-verification measurements
  - calibrates the radiotherapy machinery
  - plays a major role in radiation safety.

There are acute shortages of medical physicists in Australia and in many other developed countries. Training programs have been or are being established to address these shortages. Australia also has a relative shortage of radiation oncologists.

Typical staffing configuration

Current European guidelines recommend staffing levels of one radiation oncologist per 200–250 cancer patients (depending on the complexity of cases) and one medical physicist per linac.[5] The Faculty of Radiation Oncology of the Royal Australian and New Zealand College of Radiology recommends that the maximum case load should be 200–250 new cases per radiation oncologist, which equates to about 1.5 radiation oncologists per linac.

The National Strategic Plan for Radiation Oncology (Australia) recommended in 2001 that each linac should be staffed with a minimum of eight radiation therapists and 1.7 medical physicists.[6] These parameters may need to be changed as technology evolves.

Linac capacity

Each linac can treat a limited number of cases each year. The Radiation Oncology Inquiry found that each linac treats an average of 414 courses (for all reasons) each year.[7]

2.4 QUALITY AND SAFETY PARAMETERS

Quality and safety parameters for a radiation oncology service relate to both facilities and personnel. The Radiation Oncology Inquiry identified the value of bringing together a critical mass of each profession involved in the planning and delivery of radiotherapy with sufficient patient numbers. Such critical mass helps to facilitate sub-specialisation within the profession, allows the development of a high level of expertise on the part of staff and can help to maintain a high standard of quality.[7] Other identified benefits include an increased likelihood of clinical trial participation, and economies of scale for training and quality control procedures. Fewer patients means that development of expertise is slowed and the maintenance of quality assurance can be more difficult.

Planning for a radiation oncology service also requires consideration of backup protocols in case of equipment breakdown to minimise treatment delays or the burden of additional travel for patients.

Key findings and recommendations

- Radiotherapy is a complex treatment modality for cancer that must be delivered safely with appropriate professional management and support within an organisational safety culture.
- A stand-alone radiotherapy service would entail unacceptable risks to the safe, sustainable delivery of services. A radiotherapy service in North West Tasmania must be linked to an established radiotherapy service.

3. REGIONAL CONTEXT

KEY POINTS

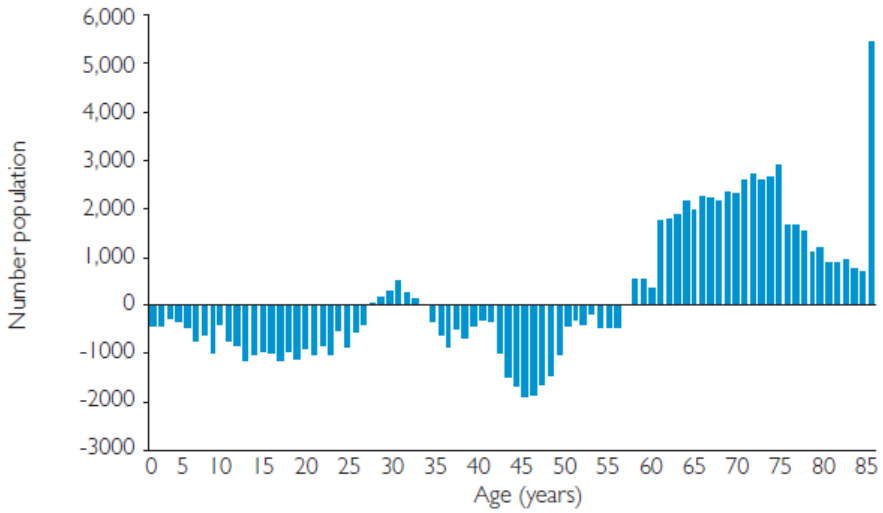
- Tasmania has a dispersed population of around 0.5 million.
- Approximately 22% of the population lives in the North West region of the state.
- While population growth in Tasmania is expected to be modest in the next 10 years, the population of Tasmania is ageing more rapidly than the populations of other states and territories. The North West has one of the fastest ageing populations in Tasmania.
- Burnie in North West Tasmania is situated 160km by road from Launceston and 330km from Hobart. While Melbourne is 370km away, the link between the North West and Melbourne can be easier than the link between the North West and Hobart.

3.1 ABOUT TASMANIA

Tasmania has a population of around 0.5 million.[8] This is a dispersed population. At the time of the 2006 census, 49.5% of the population lived in the South, 28.2% in the North and 22.3% in the North West. The major population centres in Tasmania are Hobart in the South, Launceston in the North and Burnie and Devonport in the North West.

Population growth over the planning period is expected to be modest over the next 10 years, with a 3.2% growth predicted between 2006 and 2021.[9] However, the Tasmanian population is ageing more rapidly than the populations of other states and territories. In 2006, Tasmania had the second highest proportion of people aged 65 years and above. The proportion of the Tasmanian population aged 70 years was 10.6% in 2006 and this is predicted to increase to 16.6% by 2021 (Figure 2).

Figure 2: Changes in the Tasmanian population by age group, 2006–2021[10]



In the 2006 census, 3.5% of the Tasmanian population identified as Indigenous.[11] Almost half of the Indigenous population is located in the South (47%), followed by the North West (32%) and the North (21%).[12]

Health in Tasmania

Nationally, Tasmania has the second highest:

- death rates for cancers overall
- death rate for circulatory diseases
- incidence of respiratory cancers
- rates for accidents and intentional self-harm.[12]

Many of the conditions significantly affecting the health and wellbeing of the Tasmanian community are preventable or their effects can be reduced by active prevention and early intervention strategies.[12]

With distance from Hobart, socio-economic determinants of poorer health outcomes (smoking, diet, education, teen pregnancy) increase.[13] Health outcomes tend to be poorer in people living in remote areas compared to those living in metropolitan areas.[9] Factors that may explain this difference include geographic isolation, quality of transport networks, and lack of access to health professionals and health services.[14] Typically, the most health-disadvantaged people have the least ready access to health services.

Health services in Tasmania

Tasmania's health system includes non-admitted community-based services and inpatient services in metropolitan and rural areas. Publicly funded services are complemented by private community- and hospital-based services.[9]

Three main tertiary hospitals operate in Tasmania: the Royal Hobart Hospital in the South; the Launceston General Hospital in the North; and the North West Regional Hospital Burnie in the North West.

3.2 ABOUT THE NORTH WEST REGION

The North West region of Tasmania (also known as Mersey-Lyell and the Cradle Coast) is made up of nine local government areas (LGAs) (Burnie, Central Coast, Circular Head, Devonport, Kentish, King Island, Latrobe, Waratah-Wynyard and West Coast) (Figure 3).

In 2009, the North West was home to 22% of the Tasmanian population (112,383 people).[8] This means that just under half of the population of the northern half of Tasmania reside in the North West in the LGAs of Latrobe, Devonport and the Central Coast. Between 15% and 21% of the population is over 65 years of age, making these among the fastest ageing regions in Tasmania.[9]

Figure 3: Map of Tasmania

Transportation links

Burnie is 50 km from Devonport, 160 km from the nearest radiotherapy service in Launceston, and 330 km from Hobart. The travel time to Launceston is approximately 3 hours from Smithton, 2 hours from Wynyard, 1.75 hours from Burnie, 1.25 hours from Ulverstone, and 1 hour from Devonport.

The North West region is closer to Melbourne than Hobart in terms of accessing services. The flight from Burnie or Devonport to Melbourne takes 1 hour and 10 minutes, with flights departing daily. There are four flights a week from Devonport to Hobart. There are no flights from Burnie to Hobart.

Key findings

- Tasmania has a dispersed population with almost one-quarter of people living in the North West region.
- Although population growth is modest, the ageing population is likely to lead to an increased demand for cancer and other health services.
- The North West's distance and relative isolation from Launceston and Hobart mean that residents feel isolated from the services that are available in the state's major centres.

4. CANCER IN TASMANIA AND THE NORTH WEST REGION

KEY POINTS

In 2007:[14]

- there were 3024 new cancer cases in Tasmania, and 591 new cancer cases in the North West region
- there were 1170 cancer-related deaths in Tasmania
- the most common cancer diagnosed in men was prostate cancer, followed by colorectal cancer and then lung cancer; the most common causes of cancer-related deaths were lung cancer, colorectal cancer and prostate cancer
- the most common cancer diagnosed in women was breast cancer, followed by colorectal cancer and then lung cancer; the most common causes of cancer-related deaths were lung cancer, colorectal cancer and breast cancer.

It is predicted that the incidence of cancer in the North West will nearly double to 1066 cases by 2021.[15]

4.1 CANCER EPIDEMIOLOGY IN TASMANIA

Notification of cancer is a statutory requirement in all Australian States and Territories. Analysis and reporting of population-based cancer data generally takes several years from the time of collection. Cancer incidence and mortality data reported in this report are based on the most current available data as reported by the Tasmanian Cancer Registry in 2010, and reflect cancer registrations for 2007 unless otherwise specified.[14]

Cancer incidence and mortality

Tasmania has the second highest incidence of cancer in Australia,[16] with 3024 new cases of cancer (excluding non-melanoma skin cancers) diagnosed in 2007. The risk of developing any cancer (other than non-melanoma skin cancers) by the age of 75 was 1 in 2 for Tasmanian men and 1 in 4 for Tasmanian women.[14] Tasmania also has the highest age-standardised incidence rate (ASR) for cancer of any Australian state or territory.[17] The overall ASR during 2007 was 432.3 per 100,000 for men and 271.2 per 100,000 for women.[14]

A note on age-standardised rates

Cancer incidence and mortality rates are adjusted for age to facilitate comparisons between populations that have different age structures, e.g. between youthful and ageing communities. The age-standardised incidence and mortality rates used in this report use the World Standard Population (1960).

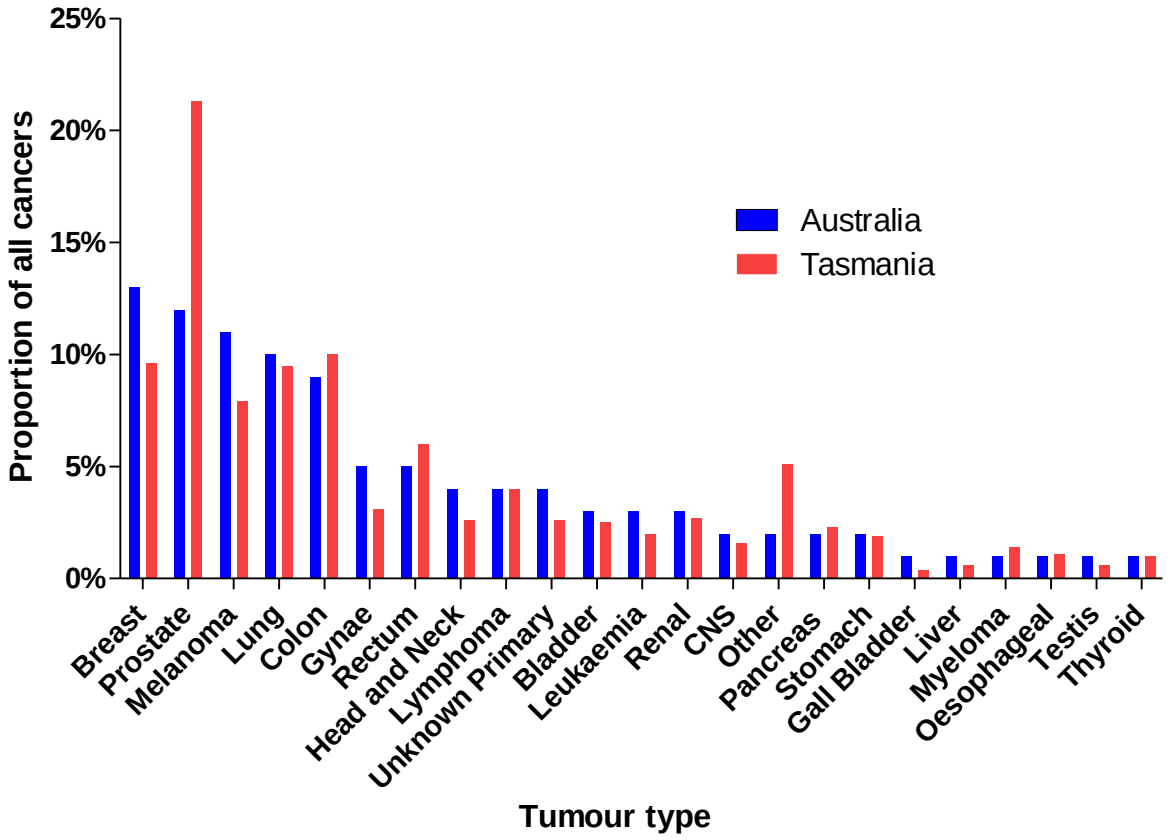
In 2007, there were 1170 cancer-related deaths of Tasmanian residents (627 in men and 543 in women), with an overall age-standardised mortality rate of 134.2 per 100,000 for men and 98.3 per 100,000 for women.[14]

The most commonly diagnosed cancers in 2007 were prostate, colorectal and lung cancer for men and breast, colorectal and lung cancer for women. The most common causes of cancer-related deaths were lung cancer, colorectal cancer and prostate cancer in men and lung, colorectal and breast cancer in women.[14] These cancers, and in particular breast, lung and prostate cancer, are among the cancers that most commonly utilise radiotherapy.[16]

Figure 4 shows the proportion of cancer cases by type for Tasmania compared with Australia. Tasmania has the second highest incidence of cancer in Australia.[18] As a proportion of all cancers,

prostate cancer is more common in Tasmania than the rest of Australia and many other cancers are slightly less common.

Figure 4: Cancer cases by tumour site for Australia and Tasmania[14]



The ASR for all cancers (excluding non-melanoma skin cancers) among Tasmanian residents increased by 52% for men and 28% for women between 1980 and 2007, and increased by 10% for men and decreased by 2% for women between 2006 and 2007.[14] The difference between men and women is likely to have been driven by the introduction of prostate-specific antigen (PSA) testing in the late 1980s, which was responsible for the detection of a large number of previously undiagnosed prostate cancers in the early 1990s. As prostate cancer accounts for 25–29% of all male cancers, this has affected the trend for all cancers for men.

Cancers that had a particularly high incidence in 2007 compared with 1980 were prostate cancer and malignant melanomas in men, and lung, malignant melanoma and colorectal cancers in women.[14] This increasing cancer incidence can be attributed to a number of factors, including the ageing of the population, lifestyle changes, screening and early diagnosis.

As is the case throughout Australia, the burden of cancer is likely to increase rapidly as the proportion of the population aged over 65 years increases in the coming years. This is particularly pertinent for Tasmanians, given that Tasmania has one of the fastest ageing populations in Australia.[19]

Regional variations across Tasmania

There appears to be little variation in the incidence of cancer across Tasmania's LGAs.[20] Age-standardised incidence rates for all cancers appear to be highest for men and women living in inner regional areas of Tasmania (529.9 per 100,000 population) and lowest for men and women living in remote and very remote areas (454.2 per 100,000 population). Cancer mortality in remote and very remote areas is not statistically significantly different from cancer mortality in more accessible areas for either men or women.[20]

A note on regional classifications

The Accessibility/Remoteness Index of Areas (ARIA) classification system is based on 1996 Census data.

The ARIA index classifies people into one of six Australian Standard Geographical Classification (ASGC) Remote Areas: major cities; inner regional areas; outer regional areas; remote areas; very remote areas; and migratory.

None of the localities in Tasmania has been classified as a major city, as none of Tasmania's centres has a population greater than 250,000.

Differences in cancer incidence do appear to exist across socio-economic groups and are likely to reflect differences in lifestyle, as well as behavioural and environmental risk factors. Tasmanians living in areas of relatively low socio-economic status have a significantly higher incidence of lung cancer and all smoking-related cancers combined than those in areas of higher socio-economic status.[20]

4.2 CANCER IN NORTH WEST TASMANIA

In 2007, there were 591 new cancer cases in the North West region.[14] This is predicted to increase by 17% to 769 cases by 2011, by 38% to 911 cases by 2016, and by 62% to 1066 cases by 2021 (Table 1).[15]

Table 1: Current and projected incidence of cancer patients in Tasmania and the North West region

Area Health Service	Projected 2011	Projected 2016	Projected 2021
South	1625	1964	2346
North West	769	911	1066
North	952	1139	1342
Total	3346	4014	4754

Australian Institute of Health and Welfare[15]
The North West region is referred to as Mersey–Lyell in the AIHW report.

The most commonly diagnosed cancers in the North West in 2007 were: prostate cancer (157 cases, 24%); colorectal cancer (118 cases, 18%); breast cancer (65 cases, 10%); and melanoma of the skin (63 cases, 10%).

A review of new cases of cancer diagnosed between 2002 and 2006 showed that, compared with other parts of Tasmania, the North West region had proportionally fewer breast, lung and prostate cancers but a slightly higher proportion of melanoma (Table 2).

Table 2: New cases of cancer; counts by type and health region, Tasmania, 2002–2006[21]

Cancer type	North	North West	South
Bladder	90	64	171
Breast	437	338	829
CNS	6	4	4
Colon	280	282	541
Gall Bladder	24	29	41
Leukaemia	76	63	202
Liver	26	25	62
Lung	432	314	676
Lymphomas	142	120	277
Melanoma	297	299	594
Oesophageal	51	44	85
Pancreas	87	61	131
Prostate	587	444	1,103
Rectum	177	153	322
Renal pelvis etc	8	6	13
Stomach	90	67	118
Testis	25	16	36
Thyroid	40	18	77
Head & Neck	100	62	160
Myeloma	47	31	85
Gynaecological	133	115	224
Unknown	149	93	228
Other	339	287	607
Total	**3643**	**2935**	**6586**

Demand for radiotherapy

Using the planning figures discussed above, the number of cases with an indication for radiotherapy in 2007 was 344. This is projected to rise to 558 by 2021 if all cases with an indication for radiotherapy receive treatment. If the current utilisation rate of 42.5% remains unchanged then demand for radiotherapy will be 292 cases in 2011 and 405 cases in 2021. About 25% of cases will need a second course of treatment at some stage. There are clearly sufficient cancer cases in the North West to use the entire capacity of one linac.

Table 3: Projected number of new cases with an indication for radiotherapy in North West Tasmania

	New cases of cancer in North West Tasmania	Current utilisation rate in North West Tasmania (42.5%)	Optimal utilisation rate (52%)
2007	658	250	344
2011 (projected)	769	292	402
2016 (projected)	911	346	476
2021 (projected)	1066	405	558

Key findings and recommendations

- The caseload of cancer patients in North West Tasmania is sufficient to use the capacity of one linear accelerator and will continue to increase with time.

5. CANCER SERVICES IN NORTH WEST TASMANIA

KEY POINTS

Priorities for cancer services to be addressed in North West Tasmania identified through stakeholder consultations (not presented in order of priority) were:

- reducing the burden on patients who have to travel for radiotherapy services (various options ranging from improving transport/accommodation options to local provision of radiotherapy)
- improving coordination of care and access to cancer services
- improving access to information about treatment and support services
- improving medical oncology and malignant haematology services in the region
- improving a range of other relevant services, including palliative care, access to physicians and general medical and support services
- improving overall governance of cancer services within the region and networking across the state.

5.1 CANCER SERVICES IN TASMANIA

Tasmania has a Cancer Clinical Network comprising clinicians and consumers. The Network does not hold funding but has a focus on clinical engagement, professional development support and oversight of relevant projects.

Tasmania has a Cancer Framework and Strategic Cancer Plan developed by DLA Phillips Fox, which has been based on a comprehensive state-wide consultation process.[17] This document is supported by stakeholders in Tasmania. Tasmania's Cancer Framework has three key elements: a service system designed in accordance with best evidence; a contemporary a model of care; and strong governance systems. The nine principles underpinning the Cancer Framework are outlined in Table 4.

In recent years there has been some investment in public health and health promotion activity focused around stopping smoking, increasing health motivation, and using patient experts as drivers for behavioural change.

Objectives of the Tasmanian Cancer Plan:

- improving cancer prevention
- detecting cancers earlier
- creating an integrated and sustainable system
- providing a contemporary model of care
- ensuring a well-governed system.

Table 4: Principles of the Tasmanian Cancer Framework[17]

Principle 1	**A multidisciplinary approach** Achieving optimal outcomes for all Tasmanians through a consistent multidisciplinary approach, implemented across the continuum of prevention and care and throughout the state
Principle 2	**Integrated, quality care that meets the needs of consumers** Developing systems to support the delivery of patient-centred, coordinated and integrated care in accordance with evidence-based practice
Principle 3	**Access, equity and diversity** Facilitating timely access to information and integrated high quality services by all Tasmanians, regardless of where they live or their social, physical or economic circumstances
Principle 4	**A skilled and supported workforce** Providing the career pathways, educational and organisational supports and cultures to attract and retain appropriate numbers of highly skilled cancer professionals
Principle 5	**Research and innovation** Fostering a culture that values innovation and promotes and supports research as a basis for the delivery of evidence-based care
Principle 6	**Data and information to support decision-making** Establishing, maintaining and supporting high quality data collection and monitoring systems that support clinical decision-making, clinical governance and continuous improvement
Principle 7	**An engaged and educated community** Enabling the community to engage meaningfully in cancer prevention and management, providing effective community education on the risk factors for cancer, promoting healthy behaviours and creating healthy environments to support behavioural change, early detection and participation in screening programs and supporting people who are living with cancer
Principle 8	**A planned, flexible and adaptable system** Ensuring that the service system remains responsive to the needs of the community and the forces impacting on it through ongoing planning and review
Principle 9	**Accountable and responsible stewardship and use of resources** Designing and managing the cancer service system so that it is sustainable across time and generations and complements the broader health service system

5.2 CURRENT CANCER SERVICES AND REFERRAL PATHWAYS IN NORTH WEST TASMANIA (NON-RADIOTHERAPY)

As with the rest of Tasmania, cancer care in the North West is delivered by a network of health and community services. The North West Area Health Service is responsible for the care provided in the North West Regional Hospital and surrounding district hospitals, multipurpose centres and services. The private sector also plays a significant role in acute and primary care, with some clinicians working across both sectors.

A summary of Tasmania's cancer treatment resources and cancer medical workforce is provided on the following page, followed by more detailed information about specific elements of cancer service delivery, including stakeholder feedback about issues and gaps. Consideration of this feedback should take account of the fact that cancer services in North West Tasmania are likely to be improved with the development of the North West Regional Cancer Centre.

Tasmania's cancer treatment resources include: [17]

- day oncology units in each of the three regions (South: 12 chairs, 2 beds; North: 12 chairs, 1 bed; North West: 9 chairs, 1 bed)
- public and private inpatient beds (including a 20-bed oncology/haematology ward in the South; in the North West, patients with cancer are cared for in general medical wards and surgical wards)
- two linacs in each of Hobart and Launceston, with a third linac installed and being commissioned in Launceston at the time of writing the report; high-dose brachytherapy is available in Launceston and a superficial X-ray unit and low-dose brachytherapy are available in Hobart
- range of imaging in the South (CT, magnetic resonance imaging (MRI) and positron emission tomography (PET)) and North (CT and MRI), with general imaging services (CT) available in the North West (MRI has been approved for installation in the North West but does not have a licence for Medicare rebate)
- comprehensive range of pathology services provided by the Launceston General Hospital and Royal Hobart Hospital, with private services also available; pathology services are contracted from the private sector in the North West
- most cancer surgery is performed across Tasmania; major neurosurgery and thoracic surgery are only performed at the Royal Hobart Hospital, and surgery for some tumours (e.g. sarcomas, paediatrics) is performed interstate
- specialist medical oncologists and haematologists practice in Hobart and Launceston and provide outreach consulting services to the North West; outreach services to the North West not provided in a private capacity; a medical oncology link with the Peter MacCallum Cancer Centre in Melbourne has recently been established
- a single statewide service is available for autologous bone marrow transplantation (BMT), including a nurse coordinator, and is led from Hobart, with arrangements for care with the Launceston General Hospital; allogeneic BMT is provided interstate
- designated public and private inpatient palliative care beds are available in the South and North; inpatient palliative care beds are also available in the North West, with a 'hospice without walls model' used across the state.

Tasmania's current cancer medical workforce includes:[16]

- **Medical oncology/haematology**: South: 5.0 FTE Medical oncologists including a BMT Director; 2.0 FTE Haematologists; North: 3 FTE Medical oncologists and 3 FTE Haematology/Haem-oncologists; North West: Joint NWAHS–Peter MacCallum Medical Oncologist 8 days/month from June 2011; visiting Clinical trials oncologist from RHH 1 day a month; visiting Medical oncologist from LGH 2 days a month; visiting Haematology-oncologist Launceston General Hospital 3.5 days a month
- **Radiation oncology**: South: 3.0 FTE Radiation oncologists (2 FTE combined public/ private practices; 1 FTE public-only staff specialist); North: 3 FTE Radiation oncologist (public/private combined practices); North West: Visiting Radiation oncologist from Launceston General Hospital for consulting services 2 days/month
- **Palliative care (not cancer specific):** South: 3 FTE; North: 2 FTE; North West: 1 vacant position; visiting Royal Hobart Hospital clinician to commence end of June 2011 for 6 months
- **Registrar training positions:** South: 1 advanced trainee in medical oncology; 2 advanced trainees in haematology; 1 accredited radiation oncology trainee; North: 1 accredited trainee

in radiation oncology; 1 accredited advanced trainee in medical oncology; North West: visiting Medical Oncologist Registrar from Royal Hobart Hospital 3 days a month with Visiting Medical Oncologist (ceased June 2011).

Surgical oncology

Surgical oncology services are provided at North West Regional Hospital and Mersey Community Hospital. However, many procedures are only available in the larger centres in Launceston and Hobart and a small number of specialties are provided in one centre alone.

Medical oncology and haematology

Medical oncology and haematology care is available in Launceston and Hobart, with more limited local services supplemented by outreach services in Burnie/Latrobe. Some chemotherapy is administered in small district hospitals. A variety of outreach cancer services are provided to the North West region. For example, haematologists and medical oncologists from both Hobart and Launceston visit the North West region on a regular basis to provide consulting services to people who live in those areas. Initiatives to improve sustainability in medical oncology include an ongoing relationship with Launceston General Hospital and new partnerships with Royal Hobart Hospital and Peter MacCallum Cancer Centre. The North West has a haematology service and transfusion service, but service expansion is needed.

The Tasmanian Cancer Framework identified that these services are not organised systematically and have tended to be unsustainable in the past because of their dependence on key individuals. Stakeholders consulted during the CEP review indicated that the current model results in fragmented and non-cohesive management of patient care. Arrangements for funding vary and have not been established systematically with the primary purpose of ensuring service sustainability and quality.

There is a state-wide bone marrow transplantation service led from Hobart that works collaboratively with Launceston-based clinicians to enable care to be provided closer to home when clinically appropriate.

Stakeholder feedback suggests that provision of medical oncology and haematology continues to be an issue in the North West.

Allied health and cancer nursing

Tasmania has several community-based nurse co-ordinators, including a breast care nurse and bowel cancer screening nurse employed within the community health subsector, and a breast care nurse employed with 4-years' funding support from the McGrath Foundation (reporting to both BreastScreen and the Royal Hobart Hospital continuing care management team). The Leukaemia Foundation also employs a community-based nurse coordinator.

The North West has two Breast and Stomal Nurses, but these are not full-time roles. A part-time Cancer Care Co-ordinator project position established in February 2010 to August 2011 is proving a valuable addition to the supportive services for patients in the North West. There is 1.0 FTE Cancer Care Co-ordinator in both of the North and South.

Issues with coordination of care and access by patients to information and support services were raised by stakeholders during the CEP review. The need for improved continuity and coordination of care for patients from the North West was also identified.

Palliative care

Tasmania's Palliative Care Service has three specialist community teams, based in Hobart, Launceston and Burnie, with outreach to rural areas. Stakeholder consultation indicated that palliative care in the North West is in a state of flux. Dedicated inpatient facilities for palliative care patients are available in Hobart and Launceston and there is an in-reach service into the state's teaching hospitals. The specialist palliative care health professionals in the Palliative Care Service work within a consultancy framework across the whole health sector to support primary health service providers in urban and rural areas to provide quality palliative care.

Tasmania's supportive and palliative care strategy is underpinned by the subacute care component of the Council of Australian Governments National Partnership Agreement on Hospital and Health Workforce Reform.

Concerns were raised by some stakeholders about the quality and safety of some local services, with palliative care flagged as one example.

General practice

Tasmania's Health Plan indicated that, while Tasmania is not disadvantaged in GP numbers, on average, the number of GPs in 22 of the 29 LGAs falls below the national average.[9] In 2006, there were 96 GPs working in the North West, with a FTE rate of 59.9 per 100,000 population.

Stakeholder feedback highlighted the fact that many of the doctors who work in the North West region of Tasmania were trained overseas and as a result many do not have established referral networks or an awareness of cancer referral pathways and strategies. The region also experiences a rapid turnover of GPs, and as a consequence a need exists for education regarding cancer services and optimal cancer care networks to ensure timely and appropriate referrals into cancer services from the primary care setting.

Non-government organisations

A number of non-government, community-based organisations make a key contribution to the care and wellbeing of Tasmanians with cancer and their carers. Usually working from a volunteer base, these organisations often make a substantial contribution through a range of roles. In the North West region, support for transport and/or accommodation and information and support for patients and carers by Cancer Council Tasmania is an important component of the cancer care system.

Stakeholder feedback highlighted the value placed by patients and carers on the transport provided by Cancer Council Tasmania for people travelling to Launceston for radiotherapy and other treatments.

Information and communications technology

There is a state-wide information and communications technology (ICT) plan for oncology services, which proposes the use of ARIA as the dedicated oncology system for radiation oncology and medical oncology applications at all sites. The ARIA system is currently in use state-wide for radiation oncology. The medical oncology module of ARIA has been made available state-wide but is seen by users as cumbersome. Launceston-based users have attempted to use the majority of the applications available in this module but use at other sites is limited to the scheduling function. Stakeholder advice indicates a need for the allocation of ICT resources to develop the system to meet the needs of the users in medical oncology.

5.3 RADIOTHERAPY SERVICE PROVISION FOR PEOPLE FROM NORTH WEST TASMANIA

Current radiotherapy services

The Royal Hobart Hospital and Launceston General Hospital both have two linacs. Money has been made available for a third linac. This has been allocated to Launceston General Hospital with a longer term view that it would increase critical mass and provide a substantial base for a training pipeline and outreach support for a future single machine unit in North West Regional Hospital. The third linac is due to be online in April 2011.

The North West region does not currently have a local radiotherapy service. Patients from the North West requiring radiotherapy typically have a return journey of over 300km to Launceston General Hospital for treatment. This involves either return day trips to and from appointments or overnight/weekly stays in Launceston for up to 8 weeks of treatment (depending on the intent of treatment).

A small number of patients requiring specialist radiotherapy services are referred to Melbourne. This includes patients requiring stereotactic radiotherapy and paediatric patients. Some patients elect to have treatment in Melbourne because of proximity to family or because of a perception that care will be better.

Financial costs for people who have to travel for radiotherapy include those related to travel, accommodation and loss of earnings. These costs were found to be considerable in the Victorian Single Machine Unit Trial (aggregate cost of $400,000+ per annum per site).[22]

Stakeholders indicated that the quality of the current radiotherapy service provided for patients from the North West region by Launceston General Hospital is good, but that the amount of travel required places a significant burden on patients and their carers. Every person consulted during the stakeholder consultation period highlighted the burden of travel for radiotherapy as the major issue for cancer patients from the North West. It was also noted that the current public–private structure and high number of VMOs also creates barriers to linkage of departments across sites and limits opportunities for sub-specialisation.

Transport and accommodation options for people requiring radiotherapy

A bus run by Cancer Council Tasmania (CCT) travels daily along the coast between Burnie and Launceston, picking up patients who are receiving radiotherapy at Launceston General Hospital. Currently, 10% of patients from the North West who attend the Holman Clinic in Launceston use the CCT bus. Accommodation in Launceston is available either through Spurr Wing or private options. Six units are currently being built at Launceston funded by the Commonwealth Government.

Patient Transport Assistance Scheme (PTAS)

The Patient Transport Assistance Scheme (PTAS) provides some level of Government funding for patients who have to travel more than 100 km for treatment, but patients are typically still out of pocket.

For many North West residents, a 6–8-week course of radiotherapy at Launceston General Hospital requires either travel at night or loss of employment for individuals and their carers who may be already in low-income brackets. Table 5 lists PTAS payments made since 2009. Not all patients claim using the PTAS system so the numbers provided do not necessarily reflect the total cost.

Table 5: PTAS payments from 2009 to 28 February 2011[23]

Journey	Claims	Trips	Expenditure
2009–2010 Financial year			
Travel from Burnie/Devonport to Launceston	247	4728	$244,831
Travel from other North West regions to Launceston	34	258	$42,207
Travel from the North West region to Melbourne	4	4	$8981
TOTAL	**285**	**4990**	**$296,019**
2010–2011 Financial year (until 28 Feb 2011)			
Travel from Burnie/Devonport to Launceston	197	3451	$208,858
Travel from other North West regions to Launceston	24	186	$46,839
Travel from the North West region to Melbourne	-	-	-
TOTAL	**221**	**3637**	**$255,697**

PTAS payments only apply to journeys over 100km so these costs do not reflect costs for people travelling shorter distances that can still represent a significant burden for patients and carers.

Not all patients claim PTAS so numbers do not reflect the total cost of travel.

Radiotherapy utilisation

Using the proportions of different tumour types in Tasmania, it is possible to estimate the proportion of cases in which radiotherapy would be indicated. For example 9.8% of all cancers in Tasmania are breast cancers and 83% of breast cancers have an indication for radiotherapy at least once. Therefore 7.9% (83% of 9.8%) of cancers in Tasmania are breast cancers with an indication for radiotherapy.

Table 6 shows the proportion of cases for each tumour site, the proportion of that tumour type with an indication for radiotherapy and the proportion of *all cases* with an indication for radiotherapy.

By summing the proportions of each cancer with an indication for radiotherapy, it appears that 53% of all cases of cancer in Tasmania have an indication for radiotherapy at least once. The optimal radiotherapy utilisation rate for North West Tasmania is 52.5%, which is slightly higher than the estimate for Australia but slightly lower than for other regions of Tasmania.

Table 6: Proportion of cancer cases in Tasmania with an indication for radiotherapy

Tumour type (1)	Proportion of all cancers in Tasmania (%) (2)	Optimal radiotherapy utilisation rate by tumour type (%) (3)	Proportion of all cancer cases with an indication for radiotherapy in Tasmania (%) (4)
Bladder	2.5	58	1.5
Breast	9.6	83	7.9
Central nervous system	1.6	92	1.5
Colon	10.0	14	1.4
Gall bladder	0.4	13	0.1
Gynaecological	3.1	35	1.1
Head & neck	2.6	78	2.0
Leukaemia	2.0	4	0.1
Liver	0.6	0	0.0
Lung	9.5	76	7.2
Lymphoma	4.0	65	2.6
Melanoma	7.9	23	1.8
Myeloma	1.4	38	0.5
Oesophageal	1.1	80	0.9
Other	5.1	50	2.6
Pancreas	2.3	57	1.3
Prostate	21.3	60	12.8
Rectum	6.0	61	3.7
Renal	2.7	27	0.7
Stomach	1.9	68	1.3
Testis	0.6	49	0.3
Thyroid	1.0	10	0.1
Unknown primary	2.6	61	1.6
Total	**100.0**		**53.0**

Column (4) = Column (2) x Column (3)

Current radiotherapy service utilisation from North West Tasmania

It is estimated that 42.5% of the North West region's new cancer patients access radiotherapy.[24] This figure is similar to that in other jurisdictions but is short of the national benchmark of 52%.

In 2010, 377 patients from the North West region started a new course of radiotherapy. The majority of patients (83%) came from the coastal towns of Smithton, Wynyard, Somerset, Burnie, Ulverstone, Devonport and Latrobe. Between January 2010 and December 2010, 42% of the patients treated on radiotherapy linacs in Launceston were from the North West region.

Of the North West patients who accessed radiotherapy in Launceston, 55% received curative radiotherapy and 45% palliative radiotherapy. Twenty-nine per cent of these patients had received previous radiotherapy treatment.

Forecast need for radiotherapy in North West Tasmania

Currently, the number of patients being treated with radiotherapy from the North West region is sufficient to sustain one machine. Based on 2007 incidence data, it is predicted that there will be a 38% increase in the number of cancer cases in the North West region by 2016, and a 62% increase by 2021.[15] Depending on radiation therapy utilisation rates, this would mean that the North West region requires the capacity of 1.1 to 1.8 linacs to meet demand. Given that it is not possible to have a fraction of a machine, this would mean that by 2021 the region would require a two-machine radiotherapy unit.

Drivers for a local radiotherapy service in North West Tasmania

Stakeholder feedback has identified the following drivers for establishing a local radiotherapy service in the North West.

- There is sufficient caseload for a single machine unit radiotherapy service.
- The key driver is the burden of travel for the large number of patients from the North West region who have to travel for daily treatment over extended periods of time.
- Patients must choose between an average daily trip of over 300km, living away from home for extended periods or forgoing radiotherapy altogether.
- Anecdotal evidence suggests that a small minority of patients choose not to have radiotherapy because of the distance.
- Radiotherapy is the only ‘day-to-day’ health service not available in Burnie.
- There has been a long-standing desire in the North West community for radiotherapy services to be provided as close to home as possible.

Key findings and recommendations

- Utilisation of radiotherapy in North West Tasmania is similar to that in other areas of Tasmania and other states/territories but is below guideline recommendations.
- Launceston has provided an excellent radiotherapy service for patients from the North West region to date in terms of access and quality of care. However, the burden of travel for radiotherapy is a major issue for people with cancer in this region.
- The cancer caseload in North West Tasmania *and* burden of travel for people from the North West support the need for radiotherapy to be made available locally.
- Development of a radiotherapy service for the North West should be considered within the broader context of a multidisciplinary cancer service across the North/North West region.
- Other priority areas of need include improvements in coordination of care and access to cancer services, improvements in a range of cancer services in the region, including medical oncology and malignant haematology, palliative care and allied health support services, general and specialist medical services and improvements in the overall governance of cancer services within the region and networking across the state.

6. OPTIONS FOR RADIOTHERAPY PROVISION IN NORTH WEST TASMANIA

KEY POINTS

- The challenge for health planners is how to provide equitable access to radiotherapy services in areas where radiotherapy utilisation rates are less than optimal while maintaining service viability and quality.
- A stand-alone radiation oncology service distant to major population centres is not appropriate owing to staffing issues, insufficient demand, and insufficient support and expertise locally to manage such a specialist service.
- A linked model in which equal responsibility for patient outcomes is assigned to both the metropolitan cancer centre and the networked regional service partner is preferable.
- It may not be possible for all cancer patients to be treated at a regional radiotherapy unit; patients needing complex treatment may still need to be referred to specialist hospitals. Community education will be essential to raise community understanding of what a single machine unit radiotherapy service in a regional area can and cannot provide.

6.1 OPTIONS FOR REGIONAL RADIOTHERAPY SERVICES: EXPERIENCE FROM OTHER STATES

The question of how to provide radiotherapy services safely and effectively in regional areas is not unique to Tasmania. The shift to decentralising radiation oncology services reflects considerations around equity of access and recognition that radiotherapy utilisation rates in regional areas are often significantly lower than metropolitan populations and that travel and long stays away from home place a large burden on patients and their carers. This lower utilisation may be associated with the poorer cancer survival outcomes seen in some regional settings.

It is not appropriate to develop isolated radiation oncology services in areas distant to major population centres for reasons that include:

- an inability to attract sufficient numbers of specialist staff
- insufficient caseload to justify a stand-alone service
- insufficient support or expertise at the local hospital to manage and operate such a specialist service.

As a result, there is strong support for models of care that link smaller centres to larger centres of specialist expertise, with timely referral arrangements, ensuring that the quality of care is not compromised for people living in regional, rural and remote areas.[25] The challenge for health planners is how to provide equitable access to radiotherapy while maintaining service viability and quality, particularly in the context of workforce shortages.[25]

In 2002, the Commonwealth and Victorian State Government funded the National Radiotherapy Single Machine Unit Trial (SMU Trial). This 5-year project established that safe and cost effective radiation oncology services are feasible in regional areas, assuming that certain conditions are met. The major requirement was that the service was linked and supported by a larger radiotherapy service.[25] The SMU trial found that single machine radiotherapy services in regional areas linked with and supported by larger radiotherapy services can be successfully established. This linkage arrangement with one or more larger metropolitan radiation oncology services was designed to overcome or reduce potential problems with maintaining an appropriate quality of service, supporting service continuity and viability and ensuring future proofing. One regional service took 5 years to recruit its full staff complement and as a result extra resourcing and support was required from the partner centre.

6.2 PRINCIPLES FOR ESTABLISHING A SAFE AND SUSTAINABLE REGIONAL RADIOTHERAPY SERVICE

The review of published literature about regional radiotherapy services (see Appendix V) and consensus discussion by the CEP has been used to develop the following key principles for establishing a safe and sustainable regional radiotherapy service.

Demand and capacity

- **Demand**: It must be possible to demonstrate sufficient local need to justify costs. At minimum, a radiotherapy service must have a demonstrated demand of 400 new courses per year (typically this would comprise about 330 new cases and 70 retreatment cases) for reasons of economy and efficiency and to ensure economies of scale.[7]
- **Capacity**: Any radiotherapy service should have a two bunker capacity (even if only one linac is installed initially) as a minimum with linacs matched across networked sites. For a regional networked service, work processes should be designed to accommodate cross-site working, facilitate operational efficiencies and ensure training opportunities across sites.
- **Broader health service support**: Other health service units (surgical and medical oncology, other general and specialist surgical and medical services, general and specialist nursing services, diagnostic services, allied health services, and psycho-social support services) should be enhanced as a consequence of the increasing caseload and complexity of cases that would be treated locally rather than being managed elsewhere. This enhancement should be planned in parallel with the planning of the new radiation oncology unit.[1]

Linkage

- **Network support**: The unit should be developed in conjunction and retain a strong operational link with a major established radiation oncology service.[1] Linkage into a network arrangement with a service provider of sufficient size to support an outreach facility is essential. A linked model in which equal responsibility for patient outcomes is assigned to both the metropolitan cancer centre and the networked regional service partner is preferable.[26]
- **Outreach**: The department to which the unit is linked must have a demonstrated capacity to sustain professional and service-related linkages over long distances and have experience in providing outreach services and sustaining collegial relationships by telemedicine and video-conference.

Operating principles

- **Governance**: Service level agreements should be in place between the networked centres to define service provision and standards, agreed responsibilities and costs, and income streams. It is essential that the approaches to linkage are documented, including having memoranda of understanding in place to satisfy the needs of both partner sites as well as machine ownership agreements and service level agreements identifying specifics around ownership of records, data access, withdrawal agreements.
- **Compliance with accredited standards**: Access is required to a broader body of medical physics expertise for the resolution of difficult or unusual physics problems, and to allow cross-checking for quality assurance.
- **Contingency plans**: Detailed and feasible contingency plans for machine breakdown and patient transfer should be provided.

Sustainability and work practice

- **Workforce**: A regional radiotherapy service must be able to ensure adequate staffing levels to support service capacity, which requires innovative approaches and incentives for recruitment and retention of staff. This includes staff willing to live full-time in the vicinity. The partnering department should be well established and situated within a multidisciplinary oncology service. It must have the capacity to support all of the professions represented in the smaller service, including a fully qualified workforce capable of covering staff absences. Remote access solutions may be possible for some clinical tasks such as radiotherapy dose planning and for some quality assurance.
- **Funding:** Both network partners should be funded adequately to support travel and inter-centre links, e.g. efficient IT linkages with system redundancy and communications technology to support videoconferencing and planning. Consideration also needs to be given as to how a reduction in available funding for the larger service could impact on the smaller service. This could be addressed by having one department functioning over two sites.
- **Administrative and technical support:** Adequate resources must be available locally to support administrative, staffing and technical requirements.

Provision of best practice care

- **Multidisciplinary care**: The support of local medical oncology services, patient medical services, allied health, and palliative care services is essential, as is access to cancer imaging and relevant reference pathology services.
- **Working within capability:** It may not be possible for all cancer patients to be treated at a regional radiotherapy unit. Complex treatments that require specialised equipment, such as stereotactic radiosurgery for brain lesions, and radiotherapy treatment for the majority of paediatric patients may need to be undertaken at specialist hospitals.[27]
- **Protocols and guidelines**: Detailed protocols should be utilised to ensure standards of care, including definition of disease types and stages to be treated. These should cover imaging, planning and treatment protocols, safety and monitoring of standards, and access for patients who require special techniques.[1]
- **Patient accommodation and transport**: Some patients will still need to travel and stay overnight even when radiotherapy is provided at a regional site. On-site patient accommodation and patient transport options will be required for patients and carers who have to travel for treatment.

6.3 OPTIMAL CONFIGURATION OF A REGIONAL RADIOTHERAPY SERVICE

Staff

A regional radiotherapy service will generally require the following staff:

- **health professionals**: radiation oncologists (specialist and registrar); radiation therapists; medical physicists; and nursing staff including cancer nurse co-coordinators
- **technical staff**: technicians; biomedical engineer; appliance fabricator; instrument maker and electronics technician
- **administrative staff**: Clinical Director; Unit Manager; secretaries and medical typists, general administration and reception staff; Cancer Registry staff; QA officer; clinical trials data manager; IT support staff; other data management staff
- **support staff:** cleaning, catering, portering, security etc

- additional staff may be attached to the unit on a full-time basis or may attend on a part-time or ad hoc basis, and are likely to include: pharmacist; therapists (physiotherapy, occupational therapy, speech pathology); dietitians; social workers; pastoral care staff; clinical psychologists; and palliative care staff.

In 2003, a survey of radiotherapy services in 41 European countries recommended staffing levels of one radiation oncologist per 200–250 cancer patients (depending on the complexity of cases) and one medical physicist per linac.[5] The Faculty of Radiation Oncology of the Royal Australian and New Zealand College of Radiology recommends that the maximum load for a radiation oncologist should be 250 new consultations per year (about 80% of consultations result in treatment), which equates to about 1.5 radiation oncologists per linac.

The National Strategic Plan for Radiation Oncology (Australia) recommended in 2001 that each linac should be staffed by a minimum of eight radiation therapists and 1.7 medical physicists.[6] This may need to be reviewed as technology evolves.

Based on 2007 incidence data, it is predicted that there will be a 38% increase in the number of cancer cases in the North West region by 2016, and a 62% increase by 2021.[15] Depending on radiation utilisation rates (the current radiation utilisation rate of 42.5% falls short of the recommended rate of 52.5%), it is predicted that the North West region will be able to sustain a 2-machine radiotherapy unit by 2021. It is therefore likely that by 2021 such a unit would require three radiation oncologists (or four with administrative duties and travel), four medical physicists and at least 16 radiation therapists.

Facilities

A radiation oncology unit provides for the assessment, planning and treatment of patients and associated administrative and support functions, such as managing and organising staff, equipment and work processes. A typical configuration is provided below.

- **Entry and reception area***:* this is likely to also serve as the central administrative area and needs to accommodate the needs of staff, patients and families. Ideally this should include patient resources/education facilities, including computers for patient education and for completing quality of life data for clinical trials, a children's play area, facilities for volunteers and transport staff, changing rooms and toilets.
- **Clinical suite***:* rooms for multidisciplinary clinical review of patients, consulting rooms, nurses' area for dressings and a nurses' station.
- **Bed bay**: for accommodation of bed-bound inpatients attending for treatment.
- **Treatment planning***:* dedicated CT, patient changing rooms and toilets, computer planning room, offices for radiation therapists.
- **Radiation treatment***:* bunkers, mazes, control areas, changing rooms and toilets, examination and consultation rooms. Linacs require rooms (bunkers) that provide radiation protection using concrete walls, floors and ceiling to a specified thickness. These concrete bunkers are usually located directly on the ground owing to the weight of the structure. A concrete-lined corridor (maze) separates the room containing the radiation-generating equipment from other rooms in the radiation oncology unit.
- **Appliance fabrication***:* fitting/mark-up room, separate dirty/noisy room, workstations and storage areas.
- **Medical physics and biomedical engineering***:* physics laboratory, storage for medical physics equipment, electronic and biomedical engineering workshop, mould- and shield-making room.

- **Clinical trials and research***:* facilities should be available to accommodate involvement in clinical trials, research and training of students.
- **Staff offices and staff amenities***:* staff room, library, meeting rooms, offices for consultants, unit manager, chief radiation therapist, physicist and others.
- **Proximity to other services:** ideally the radiotherapy facility should be adjacent to chemotherapy delivery suites because a proportion of patients will have both chemotherapy and radiotherapy on the same day.
- **Access to inpatient care:** the facility should have access to inpatient beds to manage complications of cancer and its treatment.

6.4 BENEFITS AND RISKS OF A NETWORKED REGIONAL RADIOTHERAPY SERVICE

Benefits

A networked regional radiotherapy service can provide benefits both to the community and to the regional and partnering health services. Regional **patients** are likely to benefit in many ways, the most important being improved local access to a broad range of tumour-site-specific expertise in radiation oncology. A regional radiotherapy service will reduce the burden for those who have previously had to travel to access radiotherapy services. Many patients, their carers and families are likely to experience an improvement in their quality of life if the need for travel and overnight accommodation while accessing treatment is removed. Networking of regional radiation services may also lead to an improvement in the coordination of the patient's care.

Regional **health professionals** can benefit in a number of ways from a networked regional radiotherapy service. Linkage to a large partner centre allows for provision of outreach advice and treatment protocols from specialist health professionals. This advice is likely to be of benefit in the management of complex cases. Likewise, having access to a broad body of physics expertise for the resolution of difficult physics problems and for quality assurance purposes will bring benefit to both health professionals and patients.

Local health professionals are also likely to welcome the greater opportunities for professional development and peer support that an association with a larger partner centre will bring. There are also the benefits that can be brought by the enhanced opportunities for participating in clinical research. The greater range of working environments for health professionals is likely to encourage greater mobility of staff and to provide additional career development opportunities.

Benefits for the **regional health services** include having a local source of expertise in cancer management to advocate for and to enhance local service delivery. Benefits to a **larger partnering centre** include increased critical mass and associated benefits, such as increased opportunities for sub-specialisation, better service provision to local patients, and fewer resources required to deliver services to regional patients.

Risks

There are risks associated with establishing a regional radiotherapy service. It is possible that other health services (e.g. speech pathology, dietitians, psychosocial support) in the region will not be able to provide the expertise and capacity to support the management of radiation oncology patients. There is also the risk that other cancer services (especially medical oncology, haematology and palliative care) will not be able to cope with the increased demand for local services. Compounding this increase in demand can be the difficulty that regional services can experience in recruiting and retaining professional staff. If such issues exist, it may prove difficult to provide a continuous service without interruption due to technical factors and staffing issues. There is also no guarantee that

patients will be referred to the regional unit, and if patients continue to be referred elsewhere, this may lead to under-utilisation and a higher unit cost for service delivery.

Risks for the **larger partnering centre** include a reduction in utilisation of the larger site's radiation facilities, although this may also be a viewed as a benefit if it frees up capacity to treat other patients. There may also be an issue of critical mass for more complex cases and maintaining expertise. The cost of a networked model is generally higher than that of a decentralised approach, as more staff are required to manage services across two sites. Networked services do, however, bring some financial benefits to the community as a whole, as fewer out-of-pocket expenses are borne by the patient.

6.5 FINDINGS RELATED TO A REGIONAL RADIOTHERAPY SERVICE FOR NORTH WEST TASMANIA

Immediate needs

While stakeholders acknowledged the burden of travel for patients from the North West region, there was a general sense from the consultations that **a future radiation oncology service in Burnie would not be appropriate unless broader issues of workforce, governance and supporting infrastructure for cancer services are addressed**.

Regardless of the chosen approach, an **improvement in coordination and continuity of care** was flagged as essential. It was noted that funding is being sought for increased numbers of cancer care coordinators and support for multidisciplinary teams. Other immediate priorities flagged by the majority of stakeholders included:

- provision of **improved transport and accommodation services** for patients travelling for cancer treatment (it was noted that there are plans in place to improve the hostel accommodation at Launceston General Hospital)
- **improved access to information** for patients about available support services.

Medium-to-long-term needs

Provision of a local radiation oncology service in the North West was seen as a medium- to long-term goal by the majority of stakeholders with a proviso that **this should only be introduced when it is safe to do so and when sustainability can be assured**. Even if the decision to establish a radiotherapy centre in the North West was made immediately, it would take at least 2 years before the patients could be treated because of the time taken to design, build, install and commission equipment. There was a consensus view that **Burnie was the optimal location for a local service**. Only one stakeholder suggested that radiotherapy should be centralised in Launceston for the whole state and that a local service would never be viable.

Identified benefits of a local service included:

- reducing the burden of travel for patients
- availability of adequate numbers of patients to warrant a service
- potential for a local service to impact positively on other services (such as increased availability of clinical trials, trainees etc)
- opportunity to link with a larger centre around 2–3 hours away.

Identified negative aspects of a local service included:

- cost of establishing a new service
- need to consider how patients will be treated if the machine breaks down
- whether provision of a local service is in proportion with the broader level of service provision in the region.

6.6 PREFERRED MODEL FOR A LOCAL RADIOTHERAPY SERVICE FOR THE NORTH WEST

Based on the Principles, stakeholder findings and assessment of benefits and risks of different models, the CEP identified and assessed a number of options for provision of radiotherapy in the North West. These are summarised in Figure 5 with the preferred model highlighted.

The preferred model for provision of a local radiation oncology service in the North West was a **service linked to an established service**.

A standalone service based at Burnie was the least favoured option, with feedback indicating that most people would prefer no local service than a standalone service, due to concerns about safety, quality and workforce sustainability. Indeed, nowhere in Australia is an isolated single machine department accepted. Support for a standalone service was greater among some administrative stakeholders than clinical stakeholders. Identified benefits of a linked service included retaining critical mass for the larger centre, providing training opportunities for staff and increasing the likelihood of recruiting appropriately trained staff to the region.

The majority of stakeholders indicated a preference for a **service linked to Launceston**. Melbourne was the second choice for linkage, with Hobart the least preferred option due to its distance from Burnie. It was recognised that if the service was linked to a Melbourne site, this may have to be contracted on a 'quasi private' basis. The additional complication of air transport to Melbourne in the event of a local machine breakdown was identified as a major limitation.

Stakeholders would also support a private radiation oncology service as long as the service is linked with a larger centre and patients do not incur out-of-pocket expenses for their treatment.

Impact of a local radiotherapy service in the North West

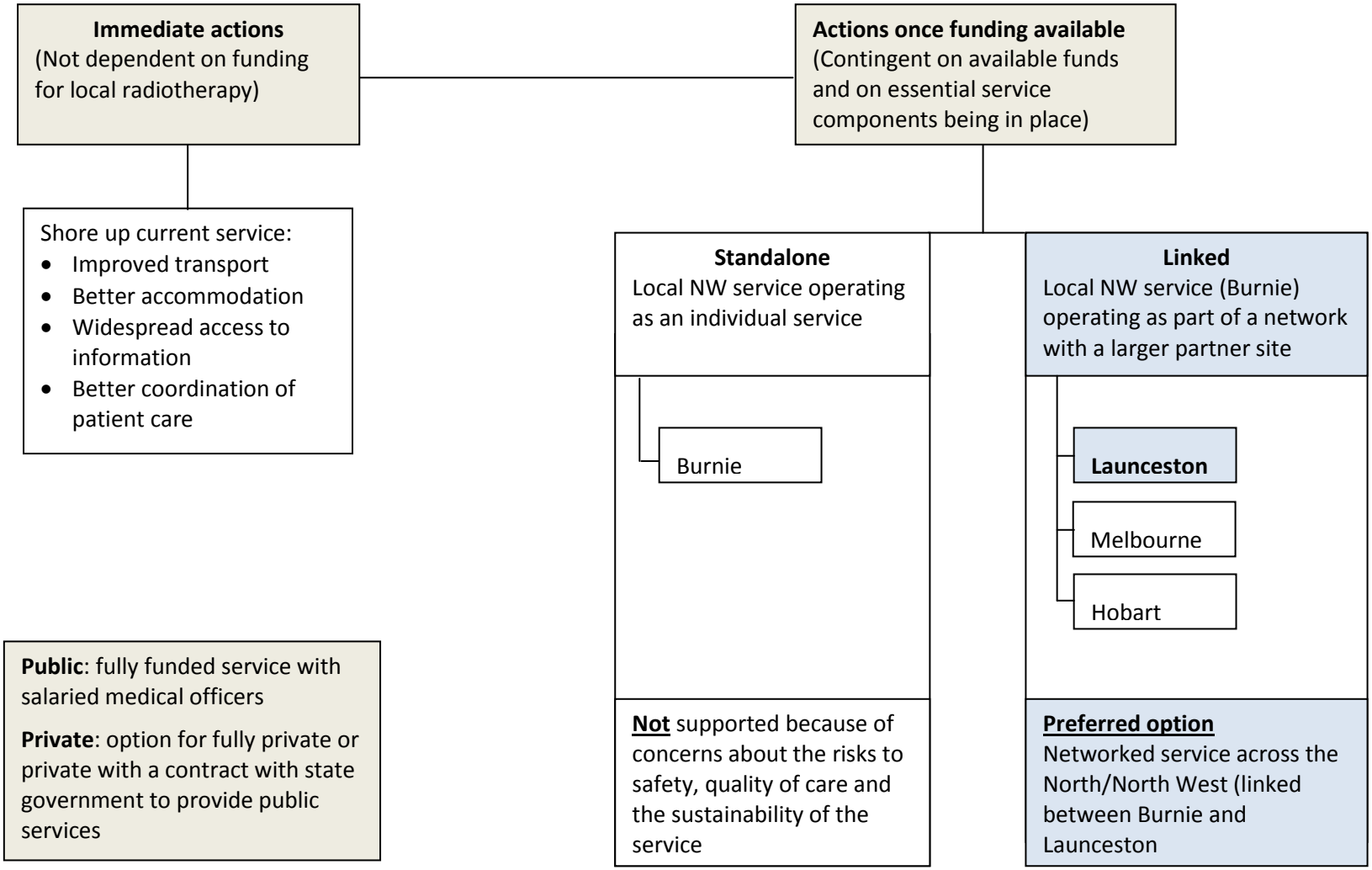
When considering the impact of a local radiation oncology service in the North West, stakeholders recognised that:

- provision of a North West radiotherapy service would still require transport and accommodation to be provided for people living further west
- not all patients requiring radiotherapy could be treated locally with specialist services still requiring referral to specialist centres of expertise (e.g. for paediatrics, brachytherapy and some neuro-oncology)
- some patients would still choose to go elsewhere for treatment
- community education will be essential to raise community understanding of what a single machine unit radiotherapy service in a regional area can and cannot provide
- provision of local radiotherapy would also be likely to affect other services, including chemotherapy (with an increased demand for concurrent chemotherapy), local acute services, allied health support, diagnostic services, and NGO services
- it was important to have a communication strategy to keep relevant stakeholders and the community informed of progress.

Key findings and recommendations

- There is strong support in Australia and overseas for models of care that link smaller centres to larger centres with specialist expertise in radiation oncology services.
- The 2002 National Radiotherapy Single Machine Unit Trial concluded that safe and cost effective radiation oncology services are feasible in regional areas assuming certain conditions are met.
- The CEP concluded that the preferred model for provision of a local radiation oncology service in the North West was a service linked to an established service.
- The majority of stakeholders indicated a preference for a service linked to Launceston. Melbourne was the second choice for linkage, with Hobart the least preferred option due to its distance from Burnie
- A standalone service based at Burnie was the least favoured option, with feedback indicating that most people would prefer no local service than a standalone service, due to concerns about safety, quality and workforce sustainability.

Figure 5: Options for a local public radiotherapy service in North West Tasmania*



* Options for private providers exist but involve additional level of complexity.

7. PREFERRED OPTION FOR PROVISION OF RADIOTHERAPY FOR NORTH WEST TASMANIA

The CEP advice comprises immediate actions to reduce the current burden on patients and carers caused by travelling for radiotherapy treatment and a longer term plan to develop a local radiotherapy service in the North West of Tasmania when funds are available to support a safe, quality and sustainable service.

Immediate actions

Implement immediate actions to reduce the burden on patients and carers associated with travelling from the North West region to Launceston for radiotherapy:

- improve the quality of transport and accommodation options
- improve financial support through PTAS
- increase access to information about available transport, accommodation and other support services
- implement strategies to improve coordination of care for people travelling outside the region for treatment.

Actions to be taken when funding for radiotherapy is available

The CEP has concluded that it is appropriate to develop a local radiotherapy service in the North West of Tasmania when funds are available to support the infrastructure and workforce required to provide a safe, quality and sustainable service.

The preferred model is a single radiotherapy service across two sites in the North and North West that:

- utilises established linacs at Launceston General Hospital
- adds a new single linac at the North West Regional Hospital Burnie
- provides capacity for expansion to a second linac in future if required.

To minimise the risks of safety and sustainability the existing Launceston department and the proposed Burnie department should be run as a single administrative entity.

This model is contingent upon having a systematic and clear plan about how immediate and future priorities for broader issues of cancer service delivery in the region will be addressed. A number of the priorities will be addressed through the North West Regional Cancer Centre. The report outlines a range of issues to be considered, including:

- the risk profile of the proposed model (including societal risks, patient risks, economic risks, health service risks) to be managed during planning and implementation
- the importance of clear contractual agreements between sites
- the importance of adequate resourcing of both the smaller and larger site
- the key staffing, equipment and linkages required if a radiotherapy service is developed in the North West
- the importance of a clear communication strategy to articulate the role and scope of services provided by a regional radiotherapy service.

APPENDIX I: LIST OF ACRONYMS AND ABBREVIATIONS

Abbreviation/acronym	Explanation
ARIA	Accessibility/Remoteness Index of Areas
ASR	Age-standardised incidence rate
CEP	Clinical Expert Panel
CT	Computed tomography
FTE	Full time equivalent
HHF	Health and Hospitals Fund
ICT	Information and communications technology
IGRT	Image guided radiotherapy
IMRT	Intensity modulated radiotherapy
LGH	Launceston General Hospital
Linac	Linear accelerator
MCH	Melbourne Childrens' Hospital
MRI	Magnetic resonance imaging
NWRH	North West Regional Hospital
PET	Positron emission tomography
PTAS	Patient Transport Assistance Scheme
RCC	Regional Cancer Centre
RHH	Royal Hobart Hospital
SMU	Single machine unit
YTD	Year to date

APPENDIX II: MEMBERSHIP OF THE SINGLE MACHINE RADIOTHERAPY UNIT CLINICAL EXPERT PANEL

Professor Michael Barton OAM (Chair)
Professor of Radiation Oncology, South Western Sydney Clinical School, University New South Wales

Michael Barton OAM is Professor of Radiation Oncology at University of NSW, Research Director of the Collaboration for Cancer Outcomes Research and Evaluation (CCORE) and the Research Director of the Ingham Institute at Liverpool Hospital. His major interest is in cancer health services research. He has published over 100 papers in peer-reviewed journals and has written 38 reports on cancer services in Australia and overseas.

He has been involved in State, national and international strategic planning projects for cancer services. These include chairing the Victorian Cancer Services Framework Report, the Papua New Guinea Cancer Services Report, the review of cancer services in New South Wales in 2004, the feasibility study of radiotherapy in the Northern Territory and a review of cancer services in Western Australia. He was the inaugural Chair of the NSW Neuro-oncology Group and he currently chairs the National Brain Tumour Guidelines Committee of the Australian Cancer Network. He was the inaugural Secretary of the Faculty of Radiation Oncology of the Royal Australian and New Zealand College of Radiologists.

The benchmarks for radiotherapy service delivery that CCORE developed have now been adopted throughout Australia, Europe and Great Britain. Recently a similar benchmark has been developed to benchmark and plan chemotherapy services.

Professor Barton was awarded the Medal in the Order of Australia in June 2007 for his service to medicine, particularly radiation oncology, through a range of clinical, research, education and professional development roles.

Ms Rhonda Coleman
Director, WA Cancer and Palliative Care Network

Rhonda trained as a radiation therapist and worked in Sydney, Brisbane, Ottawa and Vancouver Island in Canada before coming to Perth 8 years ago as Head of Radiation Therapy. She is the Director for the WA Cancer and Palliative Care Network and represents WA Health on national committees related to Radiation Oncology. At the same time she is the Project Director for Cancer Redevelopment responsible for the building of the first Comprehensive Cancer Centre in WA. This involves leading the process redesign required to make hub and spoke specialist led multidisciplinary care implementable.

Rhonda's extensive experience in Australia and Canada as a cancer clinical services leader specialising in developing and implementing models of cancer care has enabled her consult in Australia and overseas related to cancer facilities and services. She has been involved to varying degrees in the development of six Comprehensive Cancer Centres and five cancer units in Australia, Indonesia and Canada. Rhonda works with architects and clinicians to ensure that the facilities provide an opportunity for multidisciplinary care to happen and encourage the efficient use of new technology and new procedures.

As an educator, department manager and now leading a statewide clinical network Rhonda has fostered a learning environment with academic pursuits and clinical research integrated into the day to day operations of each department she had led. This has resulted in recruitment incentives as the best staff want to work in a progressive environment.

Rhonda has presented at state, national and international conferences. She is an avid reader and continues to learn as she attends events and reads journals for the following organisations of which she is a current member.

- Australian Institute of Radiography (AIR)
- Australian College of Health Service Managers (ACHSM)
- International Society for Quality in Health Care (ISQua)
- Trans Tasman Radiation Oncology Group (TROG)
- Canadian Association Medical Radiation Technologists (CAMRT)
- International Society Radiographers & Radiological Technologists (ISRRT)

Her personal drive is to make things better for those who need treatment for cancer. Rhonda focuses on improving services for the current and future generations driven by consumer identified priorities.

Professor Gillian Duchesne
Director, Radiation Oncology & Cancer Imaging, Peter MacCallum Cancer Centre, Melbourne

Gillian has been the Director of Radiation Oncology at the Peter MacCallum Cancer Centre for over eight years during which time she has overseen the expansion of Radiation Oncology service provision by Peter Mac in Victoria from two to five satellite networked services including the first single machine service in Bendigo. She has also served in a number of extracurricular professional roles, including membership of the Royal Australian and New Zealand College of Radiologists Council and the Radiation Oncology Faculty Board; she has been the Chair of the Tri-Partite Committee representing the three professions of Radiation Oncology, Radiation Therapy and Radiation Oncology Medical Physicists since 2005, and was a member of the Ministerial Taskforce for Cancer, Victoria, 2003–2006. She has also fulfilled numerous academic and professional roles including for example the Scientific Chair of the Trans Tasman Radiation Oncology Cancer Research Group, member of the Australian Synchrotron Medical Beam Line Clinical Advisory Panel, and various MSAC supporting committees. She is active in clinical research and professional training.

Mr Royce Fairbrother
Community representative

Royce was the inspiration behind the birth of Fairbrother Pty Ltd. He left Devonport High School at the age of 15 to commence an apprenticeship as a Joiner with a small Devonport company. After completing 7 years in the Joinery trade he worked as a carpenter for a further 3 years before commencing business in partnership with his wife Thea.

Initially Royce was responsible for all estimating and project management while at the same time working on site. As the Company grew he undertook the various roles necessary to facilitate that growth and over the past 37 years has provided the leadership and vision that has enabled the Company to become an industry leader in Tasmania.

Royce has extensive experience in Project Management and Development. He possesses advanced people management and motivational skills, and has been at the forefront of the development of Fairbrother's Project Management, Quality Assurance, Health & Safety and Leadership Development systems and programs. He has no formal education but claims to have graduated from the 'University of Hard Knocks' with honours. Royce has spent many hours studying the requirements for successful business management, is an avid reader and is often sought to speak on the subject. Royce says, "The most valuable lesson my Mother and Father taught me was the need to work hard for what you want. The most valuable lesson that life has taught me is the need to be honest with yourself and the people you deal with." Fairbrother has been built on these principles.

After leading the company as Managing Director for 30 years, in 2003 Royce embraced a new challenge as company Chairman. As Fairbrother has grown and expanded, in this role Royce is now responsible for providing leadership, strategic direction and vision for the entire Fairbrother Group of companies, which includes Fairbrother Construction & Joinery, Fairbrother Developments, Fairbrother Facilities Maintenance & Management, Tasmania's leading mechanical services and refrigeration company Degree C, and Fairbrother's regional Victorian based construction arm Morey & Hurford.

In 2008, Royce received National recognition for his long-standing commitment to Australian apprentices when he became the inaugural winner of the Minister's Award for Commitment to Australian Apprentices.

Royce has provided support and career opportunities for hundreds of apprentices and continues to advocate tirelessly for their key role in the industry and our nation's futures.

Outside the office Royce is an avid sports person with a strong personal focus on health and wellbeing.

Having represented Australia four times at the Triathlon World Championships, Royce has also ridden a number of the mountain passes that feature in the Tour de France and can be regularly found cycling through Tasmania's picturesque countryside. As Chairman of the Premier's Physical Activity Council, he is a leading advocate for healthy lifestyles with a particular focus on workplace health and wellbeing programs.

He is also a strong supporter of the National Heart Foundation and the Cancer Council Tasmania.

Royce also has a strong and vocal passion for his community and the youth of Tasmania. Seeing a need to address issues such as suicide prevention, depression and mental illness in the Tasmanian construction industry and in particular amongst apprentices, Royce worked tirelessly to bring the OzHelp Foundation to Tasmania. OzHelp, of which Royce is now Tasmanian Chairman, addresses these critical issues via a range of training programs and support services. Royce's passion for his home region is evident in his work as a Director on the Cradle Coast Authority Board, and he is working to improve the schools system as Chair of the Tasmanian North West Schools Improvement Board. Together with wife Thea, Royce is further giving back to his home State via the Fairbrother Foundation, a not for profit organisation the couple have established to provide charitable assistance and support to targeted worthy causes and recipients.

Royce was also the 2006 Gold Medal Award Winner as the Tasmanian Director of the Year awarded by the Tasmanian Division of the Australian Institute of Company Directors. The award is presented to a person acknowledged as having contributed service to the community in a number of spheres – including business, charitable works and employment creation. It's awarded to a person who upholds high ethical standards in their personal and public life. The award is made in recognition of outstanding effort as a company director and citizen of Tasmania.

Ms Philippa Hartney

Manager, Loddon Mallee Integrated Cancer Service, Bendigo Health

Philippa is currently the Strategic Manager for the Loddon Mallee Integrated Cancer Service in Victoria. She is a registered nurse with a Certificate of Management (Nursing), Master of Health Sciences and Diploma of Teaching (Nursing). She is currently a PhD candidate at the School of Public Health, Flinders University. Philippa is a committee member of the Victorian Integrated Cancer Service Network Group, the Victorian Statewide Supportive Care Project Steering Committee, the Loddon Mallee Cancer Care Coordination Committee and is on the BioGrid Australia Board of Management. Her previous positions have included Program Manager for Bendigo Regional

BreastScreen, State Coordinator of the rural mobile screening service for BreastScreen Victoria, Program Manager for Loddon Mallee Breast Services Enhancement Project and accreditation surveyor for BreastScreen Australia.

Ms Josephine Smylie

Manager, Radiation Therapy, Gippsland Cancer Care Centre, William Buckland Radiotherapy Centre, Latrobe Regional Hospital

Jo has been involved in health care services for over 40 years in the specialty of Radiation Oncology. Her career has included both clinical and senior management positions at three major Australian public hospitals. Her management experience in Radiation Oncology includes:

- Chief Radiation Therapist/ Business Manager, Royal Adelaide Hospital
- Chief Radiation Therapist/ Budget Manager, William Buckland Radiotherapy Centre, the Alfred
- Director Radiation Therapy Services, Peter MacCallum Cancer Institute
- Radiation Therapy Manager, William Buckland Radiotherapy Gippsland, Latrobe Regional Hospital.

Her experience spans all aspects of operational service management and various levels of policy and decision-making in health care management. Her appointments at Peter MacCallum Cancer Institute and the Alfred involved development of satellite services, including the start-up of two single machine unit sites at Bendigo and Latrobe Regional Hospital respectively. Currently she is the operational manager for a single machine unit site in Gippsland and is intimately aware of the issues concerning the development of regional services.

Additionally she has made substantial contributions to national and state reviews/committees concerning the development of radiation oncology services, cancer services, cancer research, funding models, quality assurance modelling and equipment evaluation. Her level of contribution has varied from executive appointments, committee representation and the provision of expert opinion to the Department of Health and Ageing enquiry into Radiation Oncology which resulted in the publication of the Baume report in 2002.

She has been engaged as a private consultant by hospital administrations to review and to comment on the development, structure and staffing of Radiation Oncology services, including a review of cancer services in Papua New Guinea.

She has a long standing professional relationship with the Australian Institute of Radiography (AIR) culminating in an appointment to the Board of Directors (2000 to 2006) and serving as the President in 2003/04.

She brings a set of broad-based skills at the organisational, economic, strategic planning and service development levels. Her career has been dedicated to quality patient care delivered by a professional multidisciplinary team.

Dr Stephen Vaughan
Director, Grampians Integrated Cancer Services (GICS)

Stephen Vaughan conducts a part-time practice as a Locum Consultant Physician in Haematology / Medical Oncology in various public and private clinics throughout Victoria, New South Wales and Tasmania. He has also worked as a consultant to the Health Insurance Commission on high-cost drugs and for the Department of Health & Human Services on Pathology accreditation.

Stephen was Chairman of Geelong Water Authority (Barwon Water) for eight years and a Board Director of the Peter MacCallum Cancer Institute for six years.

He is Chairman of Cell Therapies Pty Ltd, a biotechnology company manufacturing cancer vaccines and was a Board Director of City West Water, a water supply company that services the CBD and West Melbourne from 2005 to 2008.

Currently he is a part-time Director of the Grampians Integrated Cancer Service (GICS), which is part of the Victorian Government's "Fighting Cancer" initiative. www.health.vic.gov.au/cancer/index.htm

He also works as an expert witness in the areas of cancer, blood diseases and transfusion medicine.

Professional qualifications include a Bachelor of Medicine, Bachelor of Surgery from the University of Melbourne, Fellowship of the Royal Australian College of Physicians (FRACP), Fellowship of the Royal College of Pathologists Australia (FRCPA), Member of the Royal Australian College of Medical Administrators (MRACMA) and Fellow of the Australian Institute of Company Directors (FAICD).

Current associations include the Haemophilia Society, Thalassaemia Society, Haematology Society of Australia, Clinical Oncology Society of Australia (COSA), Member of Medical Oncology Group of Australia (MOGA).

APPENDIX III: STAKEHOLDERS CONSULTED

Group	Representative(s)
Local specialist oncology health professionals	Anne Wilks (oncology nurse, Mersey) Pauline Denton (oncology nurse, NWRH)
Local nursing/allied health professionals	Sharon Murcott (Cancer Care Nurse, NWRH)
North West Regional Health	Mr James Roberts-Thomson (Surgeon, Mersey) Denise Parry (General Manager, NWRH) Anne Cabalzar (Director, Quality, Mersey) Dr Trevor Leese (Surgeon, NWRH) Suzette Seaton (Manager Pharmacy, NWAHS)
North West Regional Health and Rural clinical school	Prof Michael Buist (Director Medicine, NWRH) Bert Shugg (Director, Paediatrics, NWRH)
Consumers of oncology services	Via Cancer Council Tasmania/Cancer Voices Tasmania – Rosalie Stevens organising group (1 x driver and 4 x patients – transport2treatment)
General practitioners	Keith MacArthur (GP NW Liaison Officer)
Other specialist oncology health professionals (Hobart)	**Holman Clinic RHH** Rosie Harrup Barbara Shields Bronwyn Hilder Michael Young John Ward John Daubenton
Other specialist oncology health professionals (Launceston)	**Holman Clinic LGH** Helen Tubb Dr Stan Gauden Dr Mike Beamish Dr David Woods Dr Mark Bell Grant Smith John Bertram John Kirwan Dr Kim Rooney
Other specialist oncology health professionals (Melbourne)	Professor Chris Hamilton (Austin Hospital) A/Professor Jeremy Millar (Alfred Hospital) Dr Michael Guiney (Radiation Oncology Victoria) Professor Gillian Duschene (Peter MacCallum Cancer Centre)

APPENDIX IV: SUMMARY OF LITERATURE REVIEW

CAPACITY AND UTILISATION

Numbers

- A single linac site is likely to have capacity to treat 400 patients per year.[22]
- The National SMU Radiotherapy Trial reported lower than benchmark activity levels (400-450 courses per linac per annum) of the SMUs after 2 years in operation. This was due to staffing shortages and the 'bedding-in' time required for the new linacs. Referral patterns and appropriate staffing of the services are unlikely to have been optimised at the SMUs in the first year of operations.
- The SMUs improved radiotherapy utilisation in regional areas, however all areas of Victoria were still found to be below utilisation rates recommended by Baume and the optimal rates for the Australian population calculated by Delaney.[25]

What services can/cannot be delivered

- To minimise any risk of poorer outcomes for regional patients, SMUs should initially focus on the treatment of sentinel cancers using common protocols. More complex treatment should be considered where there is available expertise and capacity, and demand for these treatments to be undertaken.[25]
- A major role for linked units is likely to be in the treatment of fit adults with common solid tumours and a low risk of acute side-effects.[28]
- The following tumour groups are potentially suitable for treatment in a SMU:
    - metastatic disease (with the provisos QA standards being particularly important)
    - breast cancer (post mastectomy and post conservation surgery)
    - prostate cancer (radical external beam local therapy)
    - lung cancer (local palliation, radical external beam therapy)
    - bladder cancer (radical external beam therapy)
    - lymphoma (palliative treatment)
    - gynaecological tumours (pelvic external beam therapy)
    - colorectal cancer (pre-operative pelvic therapy, post-operative pelvic therapy)
    - oesophageal cancer (palliative external beam therapy)
    - skin cancer.[28]

Potential for growth

- The speed of growth of a SMU reflects the capacity for new radiation oncology services to capture unmet demand and provide a local focus for regional cancer referrals. SMU sites in the SMU Trial all experienced significant growth after an initial settling in period. The speed of growth in SMU sites was faster than predicted by examining population demographics and growth.[22]
- A key constraint to growth noted at one site in the SMU Trial was a limitation in medical oncology, resulting in a number of patients bypassing the local service to receive their

chemotherapy/radiotherapy care in Melbourne. Conversely, available treatment complexity at another site increased upon a new specialist surgeon commencing in the region, in part attracted by the access to local radiation oncology services for his patients.[22]

- The centres will only meet their potential if the other part of the equation – patient travel and accommodation assistance – is markedly improved.[26]
- Technological advances in treatment are improving the success rate of radiation therapy and expanding number of cancer cases for which radiation therapy can be beneficial.[29]

DESIGN AND PLANNING

General design considerations

- A regional radiation oncology service should, as a minimum, be patient-focused, multidisciplinary and pro-active in developing relationships with local and sub-regional health service providers.[22]
- Peter MacCallum experience: design trends to improve patient experience. Good design needs to take account of comfort, peace and a caring non-clinical atmosphere (for patients and staff), as well as safety and functionality. This includes providing spaces and support for carers while the patient is having treatment.[30]
- The environment should foster hope, and make people feel like they're in a community setting, not a hospital.[30]
- Patient/carer accommodation should be provided as part of the development of regional radiotherapy services, with capacity to meet estimated demand increases.[25]
- The specific model of care for a particular regional radiation oncology service will differ depending on the available local health resources and facilities that patients and clinicians can access, local patient preferences, historical referral pathways, the expertise of and support available for regional radiation oncology staff.[22]
- In NSW, in accordance with the RT Strategic Plan to 2016, all cancer centres are being built with a minimum physical infrastructure for two bunkers, providing capacity for two linacs over time as needed. All bunkers are designed to accommodate high energy / high dose rate machines and IMRT.[29]
- Site capacity for and timing of expansion from one to two bunkers/linacs should be considered as part of the initial planning and design stages. This serves to future proof services for growth into the medium term, as well as reducing disruption from machine replacement at the end of a machine's useful life.[22]
- The access route for installation or replacement of equipment needs to be planned and consideration given to width of doors, corridors, ceiling height and weight of machine.[29]
- Consider accommodation needs for fly-in fly-out staff, as well as patients.[30]

Integration with other services

- Ideally, radiation oncology treatment centres should be built within a cancer centre precinct.[30]
- To ensure quality and workforce issues can be adequately addressed, SMUs should be established and operated by a larger partner service.[25] Benefits include access to a broad range of tumour-site specialist expertise in radiation oncology. Specialists can provide outreach advice and treatment protocols, and can take over the care of complex cases. Access is

provided to a broader body of physics expertise for the resolution of difficult or unusual physics problems, and in cross-checking for quality assurance.[1]

- There is strong support for networked models of care. The establishment of SMU services in a networked arrangement (sometimes called a 'hub and spoke' arrangement in past literature) overcomes or reduces potential problems with maintaining an appropriate quality of service and supporting service continuity and viability. The SMU trial involved different 'hub' sizes and 'spoke' construction and operations, and found that different models can be used to address local needs and to integrate with existing infrastructure.[22]
- Networked arrangements should be put in place to facilitate referral of patients to the larger partner when waiting lists increase at the smaller site.[25]
- The distance between network partners may limit the ability of SMUs to be effectively operated, serviced and maintained with integration from a hub centre. Within Victoria, no smaller partner was more than 2.5 hours by road from the larger partner, enabling travel within a single day between sites, and facilitating back-up from metropolitan areas as required.[25]
- A number of local factors are likely to affect the success of an SMU. These include the availability of services and activities such as medical oncology, emergency support, physics and engineering and continuing medical education for medical and nonmedical staff. The absence of these services/opportunities could potentially degrade a remote unit's operations.[25]
- In the SMU Trial, all the hospitals/towns in which SMUs were located already provided significant cancer services (chemotherapy/surgery), and had access to a broad range of other hospital services (24 hour emergency, on-call anesthetists, ICU).[25]
- Medical, surgical, nursing, allied-health, psychosocial support and diagnostic service staff are likely to face an increased workload as a result of the establishment of a new radiation-oncology service.[1]
- Radiation oncologists also tend to sub-specialise so that even 'non-complex' work may require support from or referral to another site to ensure the patient is treated adequately.[22]

Future proofing

- SMU services should be established with (at least) two bunkers to allow for service expansion over time, or capacity to ensure that expansion can occur.[1,25]
- The design of a radiation-oncology unit should allow for expansion over time, as the caseload increases. For example, the unit should be situated in an area where an additional adjacent bunker could be built if needed. This is an essential part of long-term planning.[1]

RESOURCES AND REQUIREMENTS

Infrastructure

- Ideally, equipment within the larger partner site should be compatible with at least some of the equipment at the smaller site.[1] Having matched linacs at both sites means staff are familiar with the equipment, and that plans created for a linac in the larger unit will be valid for smaller units, which is useful if patients have to be transferred in the event of breakdown.[28]
- Age of equipment has an inverse relationship to radiotherapy efficiency. Older equipment is more likely to be out of operation for longer periods due to repairs and maintenance, while brand new equipment may take time to 'optimise'.[25]

- All megavoltage accelerators require planned 'down time' for quality assurance and maintenance. Unplanned 'down time' is approximately 1% per year; if a major breakdown were to occur, patient outcomes could be adversely affected,[31] and respected guidelines for radiotherapy units with linacs recommend that there should be ready access to a minimum of two fully-staffed machines[28] or access to a second linac in the case of a SMU.[1]
- For the ideal staffing mix to function effectively and for the centre to meet current and future needs, a range of services and infrastructure would need to be in place, including: efficient referral pathways (e.g. to ensure patients with complex cancers requiring highly specialised care are promptly referred to, and monitored through, larger centres); and strengthened links with primary care in the region and with tertiary care in large centres.[26]
- Efficient data-sharing capacity must be built into the networking of centres, to improve referral pathways and ensure capacity to manage single electronic health identifier (as government e-health agenda progresses).[26]
- Facilities such as telemedicine must be available to support outer remote services and to allow linkage to metropolitan centres.[26,30]

Staff

- It is important to recruit key staff at the earliest possible time to ensure their expert involvement in establishing the service.[22]
- Consideration should be given to appropriate skill mix and level of seniority and expertise required, particularly given that staff may be operating without immediate peer support.[29]
- A valuable selection criterion for radiation oncologists would be a willingness to assist with the general oncology workload, and to undertake the management of uncomplicated medical-oncology patients.[1]
- Medical physicists are in demand throughout Australia and overseas, and some Victorian services experienced difficulty in filling new or replacement positions.[32] Recruitment of appropriately qualified radiation oncology medical physicists (ROMPs) has also been a challenge in the commissioning of the second linac at Coffs Harbour, NSW. This problem reflects the high vacancy rates for ROMPs Australia wide and internationally.[22]
- Work environments alone do not encourage retention. Staff retention can be improved through access to mentoring, inclusion in multi-disciplinary care, opportunities for teaching and research, as well as linkages with tertiary centres.[25,29]
- In the SMU trial, staff reported being happy to be working in smaller, team-oriented and less bureaucratic environments than the hubs.[25]

Costs

- The SMU Trial reported that capital items constituted greater than 85% of total equipment costs: linacs, multi-leaf collimators (MLCs), CT scanners / simulators, simulation systems, treatment planning systems (for dosimetry), verification systems; staffing costs accounted for approximately 60% of recurrent costs for SMUs.[25]
- Linacs become outdated after 10 years (although Commonwealth HPG will pay for a replacement after this period of time). Radiotherapy is subject to rapid development of new technologies, many of which have significant capital cost implications.[32]
- When assessing the costs and benefits of a new regional service, consideration should be given to the reduction in financial burden on rural and regional patients and their carers. Financial

costs to these people include those related to travel, accommodation, and loss of earnings. These costs were found to be considerable in the SMU Trial ($400,000+ per annum per site).[22]

- Referral patterns and appropriate staffing are unlikely to be optimised in the first year of operation. There is a certain amount of downtime in the first year of establishing new equipment. Cost efficiencies are related to caseload mix of sentinel or more complex cancers. Three to five years is therefore a reasonable period for a new SMU service to become operationally viable.
- There is a need to consider the impact on surgery and medical oncology providers as the establishment of radiation oncology services has been shown to increase the volume of all cancer care in that region. Costs may include theatre time, extra facilities and workforce, chemotherapy chairs, beds, ward space and time, and workforce.

Quality assurance

- The outcomes of the quality evaluation support the networked as successful in providing for a radiotherapy service at the SMUs that met, or in some cases exceeded, the quality of the larger site.[22]
- The connotation that 'hub and spoke' reflects an inferior distant service should be avoided; shared ownership of the service and responsibility for its outcomes, irrespective of locations, were the keys, and these needed to be embedded into the system.[26]
- To ensure quality and workforce issues can be adequately addressed, protocols applying at the larger partner site should be utilised at the smaller site, and an oversighting committee with membership of from both sites should regularly meet to discuss performance and activity at the SMU.[25]
- Quality service delivery is dependent on a range of factors, many of which are specific to the locality, and its proximity and relationships with other service providers.[22]

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