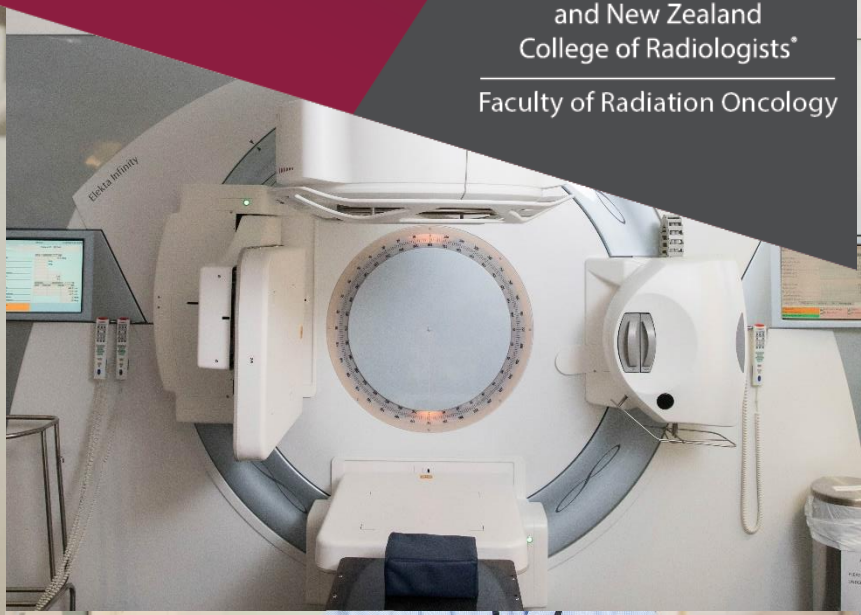
ESTABLISHING AND SUSTAINING REGIONAL AND RURAL RADIATION THERAPY CENTRES

The Royal Australian and New Zealand College of Radiologists®

Faculty of Radiation Oncology



A RADIATION ONCOLOGY ALLIANCE COMMENTARY

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Establishing and Sustaining Regional and Rural Radiation Therapy Centres

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PREFACE

Advocating for improved access to essential cancer services for regional and rural populations remains a priority for the Radiation Oncology Alliance. The current review of the document first published in 2016 takes into account new and emerging techniques and technologies, changing models of care and learnings from previous regional investments. It is hoped that the principles in this document will continue to guide establishment of radiation therapy services in regional areas.

Cancer outcomes are worse for patients in regional and rural areas.(1, 2) These patients face many challenges in accessing the care they need, for example, travelling and accommodation requirements for outpatient treatment.

A proposed regional radiation therapy centre must address current gaps in cancer services and meet a demonstrated need. It must consider the basic statistics that entail: regional population base, cancer case load, and number of cases suitable for radiation therapy per year (reflecting the number of radiation therapy machines required and informing the need for staff numbers).

The New Zealand Ministry of Health, Australian Institute of Health and Welfare (AIHW), Cancer Council Australia and state health departments are key organisations with published reports reflecting the cancer burden in the region being considered. A further useful resource is the Australian Cancer Atlas—https://atlas.cancer.org.au/app. It must be acknowledged that non-melanoma skin cancer is not notifiable and therefore not represented in this data but represents a significant workload in regional radiation therapy centres.

Beyond numerical estimations and a demonstrated regional health care need for the radiation therapy service, the regional facility must be one that:

- helps to develop those communities and regions in line with state and national strategic priorities aiming to build a health system for the future
- synergises with other infrastructure investments in the region (e.g., transport / roads / schooling)
- contributes to building health equity and quality of life for the region
- contributes to improving access and affordability of care for the region
- aligns and networks with the wider cancer control plans, and considers the impact (positive and negative) on any surrounding cancer network(s) currently providing care in that region
- can demonstrate how it will be part of integrated care teams in partnership with tertiary/quaternary centres for patients requiring highly complex management
- contributes to strengthening access to clinical trials and research for the community
- will be sustainable by a workforce-ready solution
- will link into local health networks to provide collaborative network building with systems to monitor, evaluate and report outcomes
- demonstrates systems to monitor, evaluate and manage performance.

With these elements considered, the Radiation Oncology Alliance welcomes the current governments' policy decisions made to establish regional radiation therapy centres to improve access and care in regional areas.

INTRODUCTION

Audience

The intended audience for this paper are the:

- **leadership team** involved in establishing and sustaining a regional radiation therapy centre
- **state and federal government bodies** looking to improve access to regional radiation therapy centres as committed at the 2019 election and into the future
- **consumer groups** who are critical partners in planning and sustaining radiation therapy centres.

These groups include project management, from planning stages to operational readiness, as well as the ongoing management of a radiation therapy centre in regional and rural areas. The management team usually involves a combination of established hospital staff (with variable experience in the establishment of radiation therapy centres and their integration into existing services), and experienced radiation therapy managerial staff employed to assist and collaborate in establishing such centres.

About radiation oncology

Radiation oncology is a medical discipline in which specialised oncologists use their knowledge of cell and cancer-biology, radiation technology, and radiation physics to treat cancer and some benign diseases with ionising radiation. Radiation therapy is used to treat practically all cancers, anywhere in the body. Radiation therapy is an effective treatment for cancer cure and palliation, and contributes a useful role in 40% of all cancer cures.(3) Radiation therapy also has a major impact on quality of life and improving cancer burden and symptomology in the non-curative setting. The safe and accurate delivery of this treatment requires the skills of a multi-disciplinary team of radiation oncologists (ROs), radiation oncology medical physicists (ROMPs), radiation therapists (RTs), radiation oncology nurses, engineers, allied health staff and administrative staff. Radiation therapy is delivered using various specifically chosen techniques to deliver a prescribed radiation dose to the target area or volume (such as a tumour) while ensuring that the radiation dose to the surrounding normal tissues is as low as possible.(4) More information about radiation therapy can be found on the Targeting Cancer website (http://www.targetingcancer.com.au/).

The term radiation therapy centre has been used to reflect the concept of department / practice / facility and other terms that may reflect the organisational set up and physical structure of a location where radiation therapy is delivered.

Newer technologies and techniques, such as stereotactic ablative body radiation therapy (SABR), using larger radiation doses per treatment and administered with precision and control, are proving to improve cancer control rates and outcomes for patients. They are becoming standard of care in many scenarios.(5-7)

The clinical, technical and physics expertise required for the safe delivery of all radiation therapy treatments is demanding and emphasises the need for a robust quality governance framework in large and small radiation therapy facilities.

The overall optimal radiation therapy utilisation rate for all cancer patients in Australia, based upon the best available evidence, is 48.3%.(8) This means that one in two people diagnosed with cancer would benefit from radiation therapy at some point in their cancer journey. Those patients who miss out on clinically appropriate radiation therapy treatment can be adversely affected. The consequences can include compromised health outcomes, inadequate symptom control, reduced quality of life, increased suffering, or premature death. Considering that radiation therapy costs approximately 9 cents in every dollar spent on cancer care, radiation therapy is a very cost effective treatment option.(9)

Evidence from an Australian case study indicates that the establishment of a radiation therapy centre in a regional area of need significantly improved the utilisation of radiation therapy. The study

illustrated that the establishment of a centre in regional New South Wales (NSW) increased radiation therapy utilisation from 29.3% to 33.4%.(10)

Utilisation in Australia between 2001 and 2009 remained at 38%.(11, 12) This is despite a significant investment in radiation therapy infrastructure, which has appeared merely to have kept pace with increases in the number of patients for whom there is an indication for radiation therapy.(13) Utilisation in New Zealand in 2018 is at a national intervention rate of 33%, with a range by District Health Board of 28-39%.(14)

Scope and aim

This document aims to provide clear guidance on expected minimum requirements for the establishment and continuing management of radiation therapy centres in regional and rural areas, and in outer metropolitan centres or community settings when not part of a larger teaching or training radiation therapy service.

The core operational, legislative and practice standard elements for safe and quality service delivery are the same, irrespective of location. Radiation therapy accidents associated with poor quality controls and governance can be lethal, are costly, and are psycho-socially challenging for the community, whether they occur in country towns or big cities.(15) On the other hand, quality service delivery has been shown to improve clinical outcomes.(16) Therefore, all radiation therapy centres need to be properly resourced, networked, planned, structured, and administered to achieve optimal outcomes.

The elements of a safe and quality radiation therapy centre are dictated by standards within the industry(17, 18), as well as national and state requirements. There are also specific challenges faced in regional and rural areas that need to be highlighted. This document represents the collective expertise and experience of staff who have worked both in large metropolitan centres and experienced the challenges of establishing and sustaining regional and rural radiation therapy centres.

The radiation oncology professionals involved in the development of this document include the Regional Issues Working Group of the Radiation Oncology Alliance (formerly the Radiation Oncology Tripartite Committee), comprising members of:

- Australasian College for Physical Scientists and Engineers in Medicine (ACPSEM);
- Australian Society of Medical Imaging and Radiation Therapy (ASMIRT);
- Cancer Nurses Society of Australia (CNSA); and
- The Royal Australian and New Zealand College of Radiologists (RANZCR) Faculty of Radiation Oncology.

In addition, this document has also undergone a period of external stakeholder consultation, with feedback incorporated as considered appropriate.

Limitations

Each radiation therapy centre has specific nuances unique to its set up. These may include, but are not limited to, geographical location, public / private enterprise, stand-alone or hub and spoke model and co-location with other services. This document does not provide a modular solution for all situations; however, it does mandate key principles to consider and apply to individual solutions.

This document does not deal with brachytherapy and paediatric radiation oncology which the authorship advocates should still be centralised to higher volume centres for those procedures.

Abbreviations

ACHS	Australian Council on Healthcare Standards
ACPSEM	Australasian College of Physical Scientists and Engineers in Medicine
AIHW	Australian Institute for Health and Welfare
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASMIRT	Australian Society of Medical Imaging and Radiation Therapy
COSA	Clinical Oncology Society of Australia
CPD	Continuing professional development
CNSA	Cancer Nurses Society of Australia
EBRT	External beam radiation therapy
EN	Emergency nurse
EPA	Environmental Protection Agency
FTE	Full time equivalent
GP	General practitioner
HARRP	High availability rapid recovery protection
IT	Information technology
IAEA	International Atomic Energy Agency
IMRT	Intensity modulated radiation therapy
MBA	Medical Board of Australia
MCNZ	Medical Council of New Zealand
MRI	Magnetic resonance imaging
NZIMRT	The New Zealand Institute of Medical Radiation Technologists
PACS	Picture archiving and communication system
RANZCR	The Royal Australian and New Zealand College of Radiologists
RO	Radiation oncologist
ROMP	Radiation oncology medical physicist
ROPS	Radiation Oncology Practice Standards
RN	Registered nurse
RT	Radiation therapist
RTAG	Radiation Therapy Advisory Group
SABR	Stereotactic ablative body radiotherapy
SBRT	Stereotactic body radiation therapy
SMU	Single machine unit
SOP	Standard operating procedures
SRS	Stereotactic radiosurgery
TAFE	Technical and further education
TEAP	ROMP Training and Education Assessment Program
VMAT	Volumetric modulated arc therapy

EXECUTIVE SUMMARY

The Expected Minimum Requirements

Each section describes elements of regional radiation therapy centre service provision. The following have been identified as **minimum requirements for the provision of safe and quality radiation therapy services** to be embedded into the centre's establishment and sustainability programs.

Recommendations within each section are not optional considerations.

Governance

1. An overarching Oncology Governance Committee must be established to be responsible for—and with the authority to have effect on—radiation oncology facilities, staff, procedures and clinical practice. The Governance Committee must deal with governance, risk, strategy and compliance issues, and report to the Chief Executive of the health care organisation responsible for the service. This committee should include senior administration from the Local Health Network or District Health Board and the Primary Health Care Network where appropriate.
2. A Consumer Advisory Council must be established and meet regularly and feed back to the Governance Committee.
3. A Safety and Quality Committee must be established with lines of reporting to the Governance Committee, and be responsible for continous quality improvement.
4. There must be a multi-disciplinary approach to governance. Clinical governance must revolve around the oncology multi-disciplinary meeting and team approach, with adequate administrative and clinical support to allow the oncology team to fulfil this function.
5. The centre should establish pathways for integrated cancer management through arrangements and referral basis with relevant specialities, links to other centres particularly for on-referral and discussion of complex cases, and access to in-patient care.

Human resources

1. The following roles must be included in the 'business as usual' model:
    a. radiation oncologists (ROs)
    b. radiation therapists (RTs)
    c. radiation oncology medical physicists (ROMPs)
    d. radiation oncology trained nurses
    e. engineering staff (trained in support and maintainence of radiation therapy machines)
    f. information technology staff (trained in supporting radiation therapy electronic medical record systems and infrastructure)
    g. appropriate allied health and administrative staff.
    h. research related trials coordinators and / or data managers
2. *Accessibility of staff*: it is recommended that the majority of the above staff are local residents of the community rather than fly-in/fly-out or drive-in/drive-out staff. Relevant clinical staff (including ROs and ROMPs) should be rostered and available at all times during operational hours. A centre should not be treating patients when clinical staff are inaccessible to physically review patients should the need arise.

a. Dependance on non-resident visiting ROs as the primary means of providing service is not recommended as this does not support sustainable or safe practice. It does not support the local workforce, continuity of patient care, department development, trust in the department and consistency of clinical pathways.

b. Dependance on short-term contracts for RTs for routine staffing does not provide continuity of patient care or allow for development of knowledge and skills in the department, and makes development of working relationships with local staff more difficult.

c. At least two of the ROMP staff should reside locally. This is essential for the safe and quality operation of the radiation therapy centre. Dependence solely on visiting ROMPs is not recommended.

d. In principle, situations of unforeseen workforce shortages, where a centre is at risk of not serving its intended purpose, require reliance on visiting / locum staff in a networked fashion and this is an important contingency for business continuity. However, this should not be the norm and should not be considered a long-term solution.

3. *Networked approach*: it is fundamental that regional centres adopt a networked approach and leverage this network for the benefit of their clinical, educational and research programs. Benefits of this include building resilience, clinical back-up, access to innovation, building of relationships and trust between colleagues, continuing professional development, and bi-directional transparency and insight. Networking is essential for peer review and to standardise quality assurance in all professional groups

4. *Experience*: strong consideration must be given to the experience that candidates can bring to a centre. It is recommended that a centre is not staffed primarily by inexperienced or junior staff. Senior staff must have greater than five years relevant (to the advertised position) experience in their craft group.

5. *Allied health*: Establishment of the centre must consider the appointment of allied personnel as an essential part of the cancer care continuum. Consideration should be given to resource sharing where appropriate with other elements of the health services available.

6. *Single linac centres*: Caution is urged with regard to single-linac centres. Planned or unplanned disruptions can mean patients are unable to access treatment for a period , creating disruption and increasing the risk of compromised treatments. The distance to an alternate radiation therapy centre for treatment, and the capacity of that centre to treat additional patients, is critical in these circumstances; bringing with it consideration of the impact on patients and their families.

Information technology infrastructure and data collection

1. Integrated IT solutions within and between elements of the health service for everyday operations, electronic medical record keeping, outcomes reporting and benchmarking, and the capability to capture quality large volume aggregated clinical data are essential. Ongoing analysis of data is required to ensure that the centre is meeting appropriate quality benchmarks. This must be established and incorporated into the operational budget as a continuing budget item. It is no longer acceptable for this to be an upfront capital expenditure item with no recurring funding, as has been the case historically. A robust, well-planned IT system will add timeliness, efficiency, safety, auditability and transparency to the centre's operations.

Research and innovation

1. Research and innovation must be part of the centre's plans within the first 2-5 years of operation.
2. Access to clinical trials is to be considered standard of care and not optional.
3. Staff education, training and research opportunities, and establishment of a trial coordinator role must be considered as a business as usual requirement and not only if and when all other core activity is provided for, as is often the case.

The balance between a networked "hub and spoke" approach and a stand-alone centre

Established regional radiation therapy centres illustrate that the local health 'eco-system' in which they operate carries unique nuances to consider in relation to their operations, staffing, governance, infrastructure, interaction and integration with the relevant health services. Some regional centres can be self-sufficient and provide core and ancilliary services. Others must rely on an networked integrated approach, acknowledging that when patients require highly complex care in a tertiary/quaternary service this is arranged in a smooth and linked fashion for the patient and their loved ones.

There are published examples of quality care provided by regional centres in a networked approach.(19, 20) These examples show that core and ancilliary services and elements of stand-alone or networked solutions have been developed and phased over time, with core services taking priority over ancilliary services in a staged fashion.

The principles in this document apply to all centres; however, there is no doubt that the ideal solution for each centre lies on a spectrum between a stand-alone and a networked and integrated approach. Both ends of the spectrum carry risk. For example, an extremely networked approach with a tertiary centre may not allow resilience to be built in over time, whereas an isolated stand-alone centre may not withstand the unforeseen human resourcing or equipment issues that can hamper its operations. A centre that is not self-sufficient and future-proofed for service continuity should acknowledge and appreciate this limitation and aim for greater formalised inter-connectivity and integration with other regional or metropolitan centres.

Certain functions are very amenable to shared service or networked approaches (e.g., treatment planning, research, education and IT functions) while others can only be achieved with on-the-ground services and staff (e.g., clinical care elements, care coordination). Certain tumour streams required integrated care for optimal outcomes (eg gyn oncology, neuro-oncology and head and neck oncology).

The authorship is keen to emphasis there is dynamic between these two strategies (stand-alone versus networked) that allow for optimal benefit to the community for safe quality care and access to care closer to home. There are guiding principles and case studies of different models and we advise that with project governance and oversight, stakeholder consultation, and quality improvement review cycles, each centre will need to consider its ideal "landing zone".

Summary of Recommendations

1. Considerations of Risk, Governance and Compliance

a) Establish and commit to robust and regular governance and review functions of the practice management group and key sub-groups (e.g., quality and safety committee). This function is essential especially in regional and rural radiation therapy centres that operate independently.
b) Establish processes, policies and protocols in the development phase, as this will prepare the centre well for effective and productive functionality.
c) Establish clear position roles and responsibilities in order to ensure comprehensive coverage of essential tasks.
d) Independent peer reviews should be undertaken periodically, as they are useful tools to review performance and risks.

2. Core Staff Requirements

a) Adhere to—and regularly audit the ability to adhere to—guidelines established by authoritative bodies for each professional group. Overall workforce requirements will become clear, according to activity and the unique nuances of the centre's geographic and epidemiological location. Shared roles and cross-skilled staff are key considerations for sustainable operations.
b) Robust scenario planning is required in the context of predictable situations of leave and staff turnover (e.g., winter months where sick leave is at its highest and temporary contracts / casual pool staff should be available at this time of the year).
c) Determine the number of full time equivalent (FTE) required for maintaining workflow and develop plans for dealing with periods of unexpected reduced FTE early. Such plans need to include waiting list policies, capacity reduction methods and the multi-skilling of staff.
d) Ensure staff roles / processes / responsibilities are established in standard operating procedures (SOP). Establish a culture of cross-skilling early, to allow roles and tasks to have reserve built into the operational process in the event of staff being unavailable. This allows for possible establishment of advanced practice roles. Cross-skilling and flexible work ethic is especially important in centres with smaller amounts of human capital, as roles that silo staff in a specific skill set with no cross-skilling / cross-tasking represent an important point of failure and a real risk.
e) Plan strategies early to encourage staff stability and improve staff retention. Attractive remuneration packages are a valuable tool in this context. Connect and establish staff feedback processes to identify gaps and problems before they become a major hurdle. Recruiting a full profile and correct skills set should be a long-term plan (over five years). Strategies to improve job satisfaction by focusing on educational / research opportunities, department supported social networking opportunities, performance-based appreciation, fixed period rotations, and intentional succession planning can be useful.
f) Plan a staff profile of variable experience and levels to distribute the skill sets, allowing for different attributes to be utilised in the centre's growth and provide a clear progression pathway for staff.
g) Mentoring and inter-centre links are useful ways to establish safety, and maintain quality, collegiality and a supportive environment. These should be a negotiated priority task at an early stage in establishing regional centres. In the current climate, this should include supporting radiation therapist (RT) and radiation therapy medical physicist (ROMP) student and registrar rotations, as well as utilising available funding for medical resident / registrar roles. The centre needs to be provided with the budget and information technology (IT) tools to enable this, for example, teleconferencing and/or videoconferencing facilities and face-to-face contact time.

3. Staff Considerations and Inter-Departmental Consequences

a) Consider the consequential effects on other health departments and services in the networks. Plan for the increase in demand these services will experience, to ensure holistic and cohesive care is available and to future-proof as service demand grows.
b) Dedicated allied health staff attached to the radiation therapy centre is a critical part of budgeting and resource planning and must be done ahead of time. Being reactive to these needs is a pitfall in service planning and will result in poor care pathways for patients.
c) Consider the impact and collaborately plan with the following departments when establishing regional radiation therapy centres: medical oncology, palliative care, emergency department, radiology, pathology, local primary care network, patient travel and accommodation services.

4. Information Technology, Infrastructure and Data Collection

a) Establish a line of communication between the industry provider and internal IT staff. Ensure the systems are maintained and troubleshooting is undertaken before the radiation therapy centre becomes operational and at regular intervals after the centre opens.
b) Have a dedicated senior systems administrator or "super-user" role, which should be a portfolio of a clinical or technical role already employed in the clinical setting, to lead the development of the electronic medical record system to reach its full capability.
c) IT infrastructure must be robust to allow incident review, audit and mandatory reporting functions to be met. A move to a paperless system, as much as possible for these functions, is recommended. Many software platforms now allow this to happen effectively.

d) Future-proof department IT systems by ensuring appropriate software and hardware is purchased with thoughts of the expected demand for access and processing power.
e) Departments must be set up to provide telehealth services.

5. Stakeholder Involvement and Essential Collaboration

a) Engage with consumer groups to provide tangible feedback before and after a radiation therapy centre's establishment. This will be crucial to good engagement from the community as the centre develops.
b) Map and engage stakeholders for the region (including the centre that used to service the community before, and/or the centre that will support the regional centre in a networked fashion), as their ongoing engagement is important to centre development.
c) Multi-disciplinary meetings and cancer care coordination are the cornerstones of modern-day cancer care. These need to be established early, and supported from an administrative point of view, to allow their ongoing sustainable functioning. These should not be a low priority endpoint for centres.
d) Establish integrated care pathways with tertiary/quaternary services for patients requiring highly complex care.

6. Research and Training (Postgraduate and Continuing Education)

a) Research must be an essential objective in establishing a radiation therapy centre—once clinical core objectives are achieved. The inclusion of a research program must be facilitated by a budgeted expansion plan in resources and staffing when appropriate.
b) Strong consideration should be given to applying for accreditation for training of registrars / trainees and linking with university undergraduate programs in all disciplines, depending on appropriate workforce requirements and radiation therapy centre size. This may not always be feasible in every regional and rural radiation therapy centre but underpins the principle of exposing trainee staff and undergraduates to regional health care.
c) Funding, incentives and application frameworks that allow staff to participate in continuing professional development (CPD) and get involved in their professional associations are essential. Such meetings typically occur in metropolitan centres, and the associated time and travel costs should be supported and considered in the business case and operational budget for the centre.

7. Design and Infrastructure:

a) Although each radiation therapy centre will have a unique set-up and footprint (dictated by factors such as jurisdictional requirements and space available), experienced staff should be involved in the design phase as early as possible—to visualise practical patient flow and work processes, and determine the required sizes for waiting rooms and administrative office spaces, thus ensuring maximal efficiency.
b) Designated reserved parking for patients is important to consider, as is consideration of cultural diversity appropriateness when designing spaces such as waiting rooms and family meeting areas.
c) Establishing a local patient accommodation facility with dedicated daily transport resources to the centre is ideal.

8. Regional Stereotactic Radiation Therapy Programs

a) When choosing to establish a stereotactic program, follow established guidelines and aim to do so with the support of an established centre delivering stereotactic radiation therapy.
b) Establish a robust plan for training, credentialing and ongoing supervision, both in-house and within the network.
c) Maintain ongoing support structures within the established network to ensure ongoing sustainability and improvement of the program over time.

9. The Zest Report – The Family Element

a) Include regional / rural origin as a selection criterion for training and staff positions.
b) Establish mentoring or coaching programs – to assist staff in transitioning to a non-metropolitan training post or practice.

c) Establish professional support networks or interest groups for staff to share information and seek advice.
d) Participate in links between hospitals, medical schools and healthcare networks to enhance regional training opportunities.
e) Develop promotional resources to challenge negative perceptions of non-metropolitan practice.
f) Engage with research and clinical trials groups to advocate for non-metropolitan-relevant clinical research.

BACKGROUND

This is the second version of this document, with the original version published in 2016.

The underutilisation of radiation therapy identified in the early 2000s across Australia and New Zealand led to significant government investment in radiation therapy infrastructure through the efforts of the Radiation Oncology Reform Implementation Committee in Australia.(21) This included recommendations on investment outside the major metropolitan areas. The 2019 Faculty of Radiation Oncology Facilities Survey, sent to 95 radiation therapy centres across Australia, identified 24 as regional and rural (defined as Modifed Monash Model areas MMM2-7) representing 25% of all centres, noting that there are no radiation therapy centres in MMM4-7 regions. Regional centres in Australia have an average of two linear accelerators (linacs) per centre, each treating on average 284.4 treatment courses/year. Although there has been an increase in regional centres since 2016 (n=19) to 24, this growth is proportional with the overall growth in centres across the country (total=74 in 2016; 95 in 2019).

One driver for establishing regional centres was the evidence that distance from the nearest radiation therapy centre resulted in less access—therefore poorer outcomes—disadvantaging people living in regionaland rural areas.(22, 23) This has been shown internationally as well.(24) The impact of distance and cultural boundaries for Indigenous Australians is also clearly evident.(25) The de-centralisation of radiation therapy services has helped improve access; however, has also resulted in challenges when establishing and sustaining regional and rural radiation therapy centres and their workforces. De-centralisation also needs to balance the appropriateness to treatment of all tumour streams, which will depend on the case complexity and the skills set available. Evidence also indicates that a regional centre can provide quality care when critical elements around skills and staffing, multi-disciplinary care, peer review and networked approaches are utilised.(20, 26) There are good examples of successful regional centres providing quality care and outcomes, to which those responsible for establishing and sustaining regional centres can look for guidance.

This document is a guide and commentary about the establishment and ongoing operation of new radiation therapy centres in geographically or operationally isolated circumstances. Although initially written for the Australian context, the principles of this document relate to radiation therapy centres within New Zealand as well. As part of the review of the document, stakeholders in both Australia and New Zealand were consulted.

The document provides insight into the challenges; however, it must be read with other crucial documents that are already established and provide a guide to understanding the legislative and regulatory framework around the establishment and operational requirements of radiation therapy centres, regardless of location.

These key documents include:

1. Radiation Oncology Practice Standards(17, 18)
2. Planning for the Best – Tripartite National Strategic Plan for Radiation Oncology 2012-2022(27)
3. New Zealand Cancer Action Plan 2019-2029(28)
4. Australasian Health Facilities Guidelines(29)
5. Improving access to radiotherapy for regional cancer patients – the National Radiotherapy Single Machine Unit Trial(30)
6. National Safety and Quality Health Service (NSQHS) Standards (2nd ed.)(31)
7. Jurisdictional Cancer Plans
8. Best Practice Guidelines And Workforce Requirements For Allied Health Workers In Cancer Oncology Guidelines(32)
9. Radiation Oncology Health Program Grants (ROHPG) Scheme (https://www1.health.gov.au/internet/main/publishing.nsf/Content/health-roi-hpg-overview-index.htm)

10. Practice guidelines for the care of patients undergoing radiation therapy (https://www.cnsa.org.au/documents/item/241)
11. Optimal cancer care pathways (https://www.cancer.org.au/health-professionals/optimal-cancer-care-pathways.html)
12. Optimal Care Pathway for Aboriginal and Torres Strait Islander People(33)
13. 2015 RANZCR published guidelines on the safe practice of SBRT(34).

This document provides the expected minimum requirements and a commentary on the unique factors in regional and rural radiation therapy centres, with work done under the auspices of the Radiation Oncology Alliance.

The collective experience of key stakeholder groups with a common voice of advocacy are described in order to ensure lessons and mistakes of the past are used to influence projects of the future.

The diversity of situations faced in regional and rural healthcare facilities and the mix of public centres, private centres, and public-private partnerships, which add complexity to this issue, are acknowledged.

The New Zealand context

All public services that provide radiation therapy within New Zealand are located within public hospitals in Auckland, Hamilton, Palmerston North, Wellington, Christchurch and Dunedin.

There is appetite to expand these services to include smaller, regional hospitals.

It is acknowledged that New Zealand is short of all professions related to the provision of radiation therapy: radiation oncologists, radiation therapists and physicists. And it is understood that it is not plausible for New Zealand to train enough radiation oncologists over the next decade to staff current services, never mind new services (particularly in regions where it is already difficult to recruit and retain staff).

Discourse coming from the Ministry of Health, Health Workforce, Cancer Control Agency and the Health and Disability review panel all suggests the following changes are likely:

- There will be a significant investment in technology to support telehealth
- One can predict that the District Health Boards (DHBs) will employ staff to cover all services/locations under their umbrellas. The smaller satellite services would then be staffed with a combination of full-time permanent staff (this is where scope expansion comes into play) at the site and staff that travel out from the main centre to help cover the service.

The First Nations People and Closing the Gap initiative

The Radiation Oncology Alliance acknowledges the health challenges of our Aboriginal and/or Torres Strait Islander peoples and the Closing the Gap government policies and strategies in place. Many Aboriginal and/or Torres Strait Islander people live in regional, rural and remote Australia and access to care and culturally appropriate care is a significant challenge. In the cancer care spectrum, Aboriginal and/or Torres Strait Islanders people tend to attend less for screening, present with more advanced cancers and have poorer outcomes than non-Indigenous peoples. This has led to the development of the Optimal Care Pathway for Aboriginal and Torres Strait Islander People with cancer by Cancer Australia.(33)

Although this document details elements of establishing and operating a regional radiation therapy centre, consideration of care for Aborginal and/or Torres Straight Islander peoples and their involvement as key stakeholders is important. The Radiation Oncology Alliance acknowledges and emphasises this dimension of cancer care with respect to the elders past, present and emerging, on the lands of where these centres will be established.

1. CONSIDERATIONS OF RISK, GOVERNANCE AND COMPLIANCE

1.1 Commentary

1.1.1 Governance

An overarching Oncology Governance Committee must be established to be responsible for—and with the authority to have effect on—radiation oncology facilities, staff, procedures and clinical practice. The Governance Committee must deal with governance, risk, strategy and compliance issues, and report to the Chief Executive of the health care organisation responsible for the service. The aim is to meet the requirements of the national standards(31) and Radiation Oncology Practice Standards (ROPS)(17, 18) through this mechanism. Additional staffing resources must be considered to support this aim.

The overarching Oncology Governance Committee should facilitate vertical integration of the radiation therapy centre and strong links to the medical oncology, surgical oncology and palliative care governance structure to ensure that development is in line with, and in collaboration with, other departments. It should also ensure that there is appropriate and rapid access to inpatient care where required. Regional centres should have the ability to treat patients requiring emergency radiation therapy. The risk of independent departmental governance with little cross-talk or higher-level oversight is a fragmented service development strategy and/or divergence of progress / priorities. This will prove detrimental in the long run and impact on service delivery and the quality of patient care. Typical examples that occur include lack of consideration of out-of-hours services for the department, timely management of oncological emergencies such as spinal cord compression, or allied departments required to work out-of-hours.

1.1.2 Integrated clinical links

Regional radiation therapy centres should establish clinical links with other proximate regional centres and tertiary centres to optimise patient care. A good example of clinical linkage is the need to plan for multi-centre, multi-disciplinary meetings in a networked approach for the more sub-specialised tumour treatment sites (e.g., gynae-oncology or head and neck cancer). Planning and resource allocation should be based around the patient population and a networked approach. Integrated care referral pathways for more complex cases and uncommon tumour types must be established where evidence exists of poorer outcomes for low-volume treatments. In such situations, it is appropriate to refer patients to higher-volume tertiary/quaternary centres where subspecialised services are available routinely.

Commissioning agencies must plan for availability of sufficient capacity to provide highly reliable, safe, high-quality facilities in the case of plausible disruption scenarios. New radiation therapy centres should be constructed with a plan for at least two bunkers and two machines. Where one machine is proposed initially, this should only be done with an agreed, enforcable and funded contingency plan for care of patients requiring radiation treatment in case of breakdown, servicing, or other service-disruption events. Whilst single-machine units have been established in Australia, the notable successes have been in strictly regulated partnerships between large metro services and the single-machine unit and provision for rapid expansion in machine numbers and bunkers.(35)

1.1.3 Private-public partnerships

A note on private-public partnerships is important here. Private-public partnerships carry merit in sharing the skills burden, operational burden and cost burden. The commercial or operational drivers in partnership agreements may vary between the contracted organisation and the governing organisation, but so long as this is recognised in an appropriate funding

and regulatory framework, the partnership should be able to provide quality care to patients. It must share an aligned responsiblity, culture, vision and accountability.

1.1.4 Local service links

From a governance point of view, regional radiation therapy centres are more often aligned with the local service in which they operate. It is not recommended that radiation therapy centres are established as independently governed centres that sit outside the local health network's governance processes. Oversight and collaboration is important and enforcable regulatory or contractural arrangements should be established so that health care organisations responsible for providing these radiation oncology services can be held accountable for the safety and the quality of service provided.

1.1.5 Consumers

A Consumer Advisory Council must be established to provide periodic review and feedback on centre operations, patient experience and ways to improve the centre in line with momentum and credentialling standards. This is a national best practice expectation.

1.1.6 Planning

Scenario planning and business continuity planning are key governance considerations. Machine breakdown planning is one important scenario to be considered. Actions to be taken in the event of breakdown need to be proactive and well-considered, and may involve back-up with nearby radiation therapy centres that are within reasonable travel distance.

Consideration of patients' willingness to travel must be included in any contingency plan. The ability to transfer treatment data between centres requires integration of radiation oncology electronic medical record systems, treatment planning systems, and linac specifications. Such shared systems lend themselves to economies of scale, as well as shared skills that allow staff within and between centres to deal with unexpected challenges. Strategically mirroring the setup of the collaborative centre has significant practical importance.

Intentional machine downtime for planned maintenance is another scenario, especially for a single machine unit (SMU). This could be tackled by short periods of downtime in any one day / week to allow essential treatments to be delivered. Further insight into considerations of SMUs are noted in the Queensland Cancer Care Statewide Health Service Strategy(36) the Victorian SMU report(35), and the North West Tasmania report(37).

Other considerations are that in the event of linac failure, the time it can take for a vendor to reach a regional or rural radiation therapy centre to conduct repairs can be excessive. The impact on patient care during downtime and the impact on the ability to conduct preventative versus reactive maintenance in-hours lends to the argument that a two-linac centre is a safer approach. Having such redundancy allows for beam matching, further increasing the ease of patient transferability in times of high demand, breakdowns and on servicing days. Additionally, the extra staff / FTE required to staff the second bunker can be utilised effectively in other roles (e.g., in research, education, or quality assurance) during times of low activity. A useful trouble-shooting strategy is to also keep minimum spare parts locally or regionally in the event they are required.

It should be noted that, irrespective of whether a SMU or two-linac centre is established, a Memorandum of Understanding with another facility should be developed to cover patient acceptance in times of catastrophic failure—when there is an inability to accept emergency patients—or for highly complex / unique patient cases that cannot be managed by the regional centre. Such planning should be done early and, if possible, equipment and beam matching with the chosen centre should occur. Communication with the community about such arrangements is crucial to manage public expectation when such situations arise.

Prior to a radiation therapy centre becoming operational, a lead-in time to establish protocols and procedures is essential. It is difficult to achieve such core operational elements once a centre opens, as the ability to dedicate time to this task becomes scant once other clinical and stakeholder demands take over. Connecting with and using established protocols from existing centres that are appropriate for individual setup is prudent, and help in alignment of

the centre within its network. Processes should be set up in a multi-disciplinary fashion and with transparency to ensure cohesion of services and compliance. Using the ROPS self-assessment tool(17) on a regular basis will provide an indication on how the centre is tracking and ensure all parties continue working towards a common goal.

Developing a five-year plan for the department with agreed milestones will provide guidance and objectivity for decision making that is required around the development and expansion of the service.

It is vital that organisational structures are implemented and agreed upon early in the development of a radiation therapy centre. This ensures clear reporting lines, job delineation and clear progression pathways. Figure 1 illustrates a suggested model for RT staffing for a stand-alone centre. In a networked approach, the FTE requirements will likely be reduced and shared roles and role extension can be expected. Early in establishing the radiation therapy centre, roles tend to be more versatile, fluid and cross-skilled and cross-covering. However, as centre operations progress, mature and grow, it is important to review, re-define and streamline roles where appropriate to create those experienced and specialised skills sets. This needs to be balanced with maintaining cross-skilling to cover roles when staff are away.

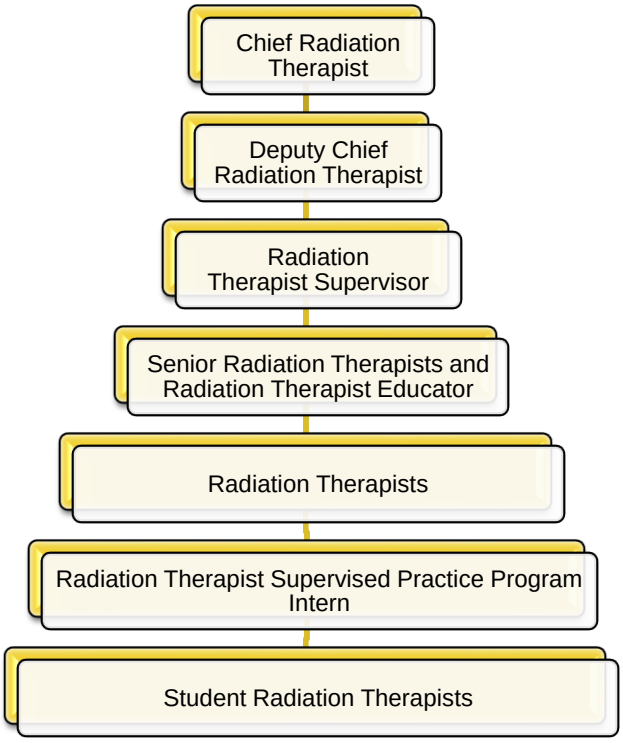

Figure 1: Sample RT organisational structure

Within the hospital setting, clinical governance is crucial as the local hospital structure and processes may not be appropriate for radiation therapy centres. For example, having a centre-wide Incident Information Management System and Quality Improvement Group will be productive and effective at an operational level.

It is recommended that an independent peer review occurs (RO, ROMP, RT, and nurses) at predefined timeframes to assess compliance with best practice and to assist in quality improvement and innovation. Peer review is also a useful tool to drive recommendations for expansion (e.g., of staff) and development (e.g., new equipment) at a local executive level, particularly in fiscally challenging times.

Multi-disciplinary sub-specialist interest groups, either tumour- or technology-specific, should be established when looking to develop new techniques and technologies. By establishing links with centres that have implemented these it is possible to harness their knowledge, skill and experience. Administrative support for such groups is beneficial.

1.2 Recommendations

a) Establish and commit to robust and regular governance and review functions of the practice management group and key sub-groups (e.g. quality and safety committee). This function is essential in regional and rural radiation therapy centres that operate independently.

b) Establish processes, policies and protocols in the development phase, as this will prepare the centre well for effective and productive functionality.

c) Establish clear position roles and responsibilities in order to ensure comprehensive coverage of essential tasks.

d) Independent peer reviews should be undertaken periodically, as they are useful tools to review performance and risks.

2. CORE STAFF REQUIREMENTS

2.1 Commentary

The greatest radiation therapy centre assets are staff.

The core workforce in a regional two-linac centre is generally found to be lean, with limited reserve capacity. The specific skill sets required are not readily found in the community health workforce in regional areas. Skilled staff are generally sourced from outside the region, nationally, and internationally. Having adequate staffing levels has many benefits, including (but not limited to): short waiting times, quality and safety of care, staff retention, and the ability to take on other core department functions, such as teaching, supervision, audits, research, and leadership roles in the oncology services for the region.

Regional centres that lack flexibility and reserve in the workforce may be prone to constraints on the staff that provide challenges to cover for sick leave, conference leave, and other extended leave situations. Solutions to this must be determined prior to the commencement of operations. Creative solutions to this problem may be found in shared staffing, cross-skilling, duplication of certain roles to allow back-up, utilising locum coverage, establishing staff rotations from other centres where possible, and spread of staff experience. If adequate staffing cannot be anticipated under plausible realistic real-life scenarios from resources in these centres, then before these centres become operational, there must be agreed, enforceable and funded contingency plans to provide this support from other linked radiation therapy centres. These contingency plans should not be considered as long-term solutions to staffing.

Spread of staff experience is a crucial element in operating a safe and progressive centre that provides high-quality care. Senior staff need to establish the leadership culture; however, a diversity of staff experience often provides an energy and keenness to learn and contribute to a new centre's growth. The balance of spread and depth of staffing often provides the best mix for a small workforce to grow a supportive work culture. Staffing level guides from the respective professional bodies have been documented for the various craft groups.(38, 39)

The authorship is not aware of evidence regarding staff turnover in regional centres as compared with metropolitan centres. However, in regional centres when staff losses occur, they are felt to a greater extent than in metropolitan areas; particularly in cases where roles and processes have been established by departing key personnel. Stability of the workforce is crucial to a safe and efficient working environment. Strategies to encourage stability are often directed at remuneration and non-cash remuneration solutions. The impact of strategies that focus on education / research opportunities, leadership opportunities, or supporting team activities (either within or outside the workplace) should not be underestimated. These have been shown to be significantly important in the integration of staff and family within the centre and the wider community.(40)

Mentoring is one way to improve the support of staff—having the ability to seek second opinions and operating a safe service. The concept of mentoring / network creation with another radiation therapy centre is important and has been identified as a useful tool. Although general healthcare literature advocates for this(41, 42), there is less radiation therapy specific literature. Though it may be difficult to establish and sustain those links, technological developments have significantly assisted in this initiative through effective audio-visual telecommunication means.

Specific attention should be given to the administrative staffing requirements. The administrative team provides the process function of treatment scheduling, outpatient clinics scheduling, medical records, letters, billings, and sometimes administration support for research. The administration team is the front-face of a radiation therapy centre. Adequate administrative staffing is essential to provide operating proficiency and contribute to patient safety. However, they may often not have their own advocacy and usually are a small portion of the department workforce, and it is important that these FTE requirements are not underestimated. Other staff groups such as RTs and nurses

may find that they are diverted from their core roles to undertake administrative tasks if there is not sufficient FTE in the administration team.

Radiation oncology nursing is a specific oncology nursing sub-speciality, which is often dictated by hospital staffing rules and outside the scope of this document. It should be noted specific on-site training at an existing radiation therapy centre is essential to expedite and facilitate the sub-speciality skills nurses need to acquire to work in a new radiation therapy centre.

It must be recognised by funding and commissioning agencies that the relative cost for staffing of regional centres might be higher than equivalent metropolitan centres, as a consequence of the addional support and encouragement for local staff detailed here. These costs must be built into planning modelling. Notwithstanding these costs, the savings to the community and patients of enabling treatment close to home, without the associated travel and accommodation cost must be recognised, especially when the emotional costs of travel and living away from home and family are considered.In principle, centres should make formalised arrangements for after hours coverage of clinical service provision, which is generally a mix of local clinical staff and networked staff at the nearest centre, to ensure after hours emergencies can be adequately managed in a timely manner.Section 9 refers to the Zest Report, which highlights many of the key social and family factors that need to be considered in improving staff recruitment and retention across all craft groups, and should be read in parallel to this section.

A note on innovation and productivity

Although published workforce models are described below, it is acknowledged that these have been influenced by productivity and efficiency gains in the modern era of radiation therapy technology and processes. These include but are not limited to:

- Innovations that encourage resource sharing, such as a networked approach, and reducing treatment delivery times have impacted on FTE.
- Efficiencies resulting from technology developments. Initially, techniques such as intensity modulated radiation therapy (IMRT) and volumetric modulated arc therapy (VMAT) were labour intensive necessitating a greater FTE investment.
- New techniques and technologies, such as stereotactic body radiation therapy programs, are proving more labour and time intensive now as the next generation of important radiation therapy treatments.
- Investment and innovation in artificial intelligence, machine learning, and automation have resulted in a greater need for skilled FTE in these areas.

One benefit of realising efficiency gains is that centres have created the ability to reduce time spent on monotonous or repetitive tasks and re-deploy staff to opportunities around technique development, patient care, research and clinical trials, which is often hard to do otherwise.

The ultimate impact of these influences has not been quantified or published yet.

2.1.1 RO-specific commentary

Regional RO FTE cannot be determined simply by a patient activity to doctor ratio. The RO requirements are more profoundly influenced by geographical and network remoteness, intended patient case mix, contingency options (locum services, nearby hospital on call), presence of visiting ROs, wider network connectedness and local network support. Consideration must be given for more than 1.0 FTE at commencement of the centre operations and ongoing functioning. We recommend that the majority of this FTE resides locally and is an experienced RO with more than five years' post-FRANZCR consultant experience. In the current climate of RO shortages in regional and rural areas, strategies to support resident staff by visiting ROs—in parallel to maximising the likelihood of recruitment and retention of resident ROs—will need to be in place.

From a business as usual perspective, the centre should have one RO on site, or within close proximity, every day during the working week. Dependence completely on visiting ROs as the primary means of providing the service is strongly not recommended, as this does not

support the continuum of safe patient care, a sustainable medical workforce, progressive department development or consistent referral pathways. In situations of extreme shut down the ability of visiting ROs to attend their clinical responsibilities is hampered eg bush fire or public health emergencies, which can significantly affect patient care and care outcomes.

Although some responsibilities can be delegated to department RTs, allied health or nursing staff, the RO must be reasonably accessible to intervene when required. It is not reasonable to expect that general practitioners (GPs) or other specialists within the district will have the necessary knowledge and skill to advise on radiation oncology matters. Dependence on visiting ROs as the only support for a resident RO is not recommended. Resident ROs also cannot be assumed to provide clinical cover for patients being treated by the visiting ROs without agreed clinical cover arrangements, documented clinical handover and participation in departmental peer review. These staffing considerations will influence the ability of the service to remain safe, sustainable and likely future-proof it. It will also allow ROs time to provide key attention to clinical and organisational leadership, staff and registrar training, the research program, community awareness and education programs, and time off when required. It will favour a decreased rate of RO staff turnover.

ROs have a responsibility for clinical leadership and must be supported in order to perform their duties effectively. Although there is no easy ‘one size fits all’, this consideration is absolutely paramount and needs to be addressed early in the progress of centre operation. Challenges in staffing directly affect department moral and culture—reversing this is difficult after it has set in.

2.1.2 ROMP-specific commentary

A two-linac stand-alone regional radiation therapy centre should operate with a minimum of two locally residing physicists.

A two-linac networked regional radiation therapy centre with additional access to off-site physicist support, should not operate without two locally residing physicists unless a risk assessment clearly specifying the clinical activities that should not proceed without a registered ROMP on site, has been completed.

Recent data on recommended ROMP staffing numbers for external beam radiation therapy (EBRT) centres is not available. However, the prevailing recommended level of 1.7-2.3 FTE per linac(38) remains a relevant benchmark (range) dependent on the complexity of treatments delivered, geographic location (of a centre) and management arrangements in place. These factors may be:

1. Public vs private centre management
2. Networked vs stand-alone regional centres
3. Patient numbers
4. The range and complexity of treatment offered
5. Academic / research affiliations
6. Provision of supervision for medical physicist registrars.

ROMP staffing requirements for a stand-alone regional centre are greater than for a networked centre as the local physicists must cover all physics activities associated with the care provided at that centre and include local cover for leave.

Additionally, the observation of the operation of regional centres to date and considering the increasing probability that a regional centre will be privately owned, yields further guidance.

Advances in technology and the impact of digital communications on workflow (such as increasingly centralised treatment planning) move staffing requirements to the lower range. However, and equally, the increasing delivery of stereotactic treatments in regional centres, moves physics support requirements back toward the higher ratios and create definitive and

measurable periodic peaks in workload when new more complex treatments (e.g., stereotactic) are being introduced.

Functions included in the higher range of the ratio include definable quality assurance and optimisation activities relevant to common and sophisticated treatments, capacity to supervise and train registrars, as well as a built-in capacity for research and development.

All centres must place a high priority on research and innovation across the sector as a whole, including in regional areas, as this benefits the patients and community as well as improving the capabilities of the centre. The sector has been inadvertently and increasingly reliant on innovation and research from larger public and public/private centres, as privatization has increased, and requiring a commitment to research and innovation in all new regional centres will help restore balance and support localized continuous improvement in service delivery. ACPSEM is committed to continuing to increase regional capacity for vocational training and education.

A unique opportunity available to a regional centre that employs local resident permanent physics staff is that with judicious recruitment and based on the skills and attributes of modern medical physicists, centres will also likely be able to rely on this workforce for backup information and communications technology and first line engineering support, as well as capacity to chair local clinical governance and other stakeholder committees.

The ACPSEM can provide assistance in workforce modelling and an updated ROMP workforce modelling tool is expected to be available by the end of 2020.

All ROMPs within the regional centre should be on the ACPSEM register of Qualified Medical Physics Specialists or working under the supervision of a registered ROMP. Often regional centres are staffed by experienced ROMPs from overseas who will not necessarily be on the register. Support needs be provided to these individuals to obtain registration with the ACPSEM, but the selection process should ensure they can operate safely and competently as an independent physicist. Risk assessments should be updated to quantify the impact of unqualified staff on the operations of the centre.

A networked approach to support the ROMP Training and Education Assessment Program (TEAP) is necessary to enable placement of registrars in regional centres. Where the regional centre cannot provide all aspects of the required training, arrangements will need to be put in place to enable the registrar to attend other centres in the network as required to achieve the necessary competencies.

2.1.3 RT-specific commentary

The ASMIRT staffing model[1](39) includes two scenarios relevant to this document: one for a rural satellite centre and one for a stand-alone two-linac centre. The calculation of the recommended FTE is based on linac operating hours. Thus, for a stand-alone two-linac centre working for 18 operating hours daily (i.e., two linacs operating at nine hours per day), the recommended RT FTE is 23.8 for effective and efficient simulation, planning and treatment delivery. Any reduction in FTE makes it difficult to run and sustain a workforce, with leave arrangements and unplanned personal leave having a major impact. Plans for continuing work flow and throughput should be developed in the event of periods of unexpected reduced FTE. Any reduction in FTE is likely to impact on the number of treatment hours available and have a subsequent impact on wait times for patients.

Staffing must be carefully considered with respect to safety and quality. A suitable mix of senior and junior RT staff in all sections of the department will aid in ensuring that appropriate clinical decision making occurs, with oversight and guidance available from more experienced staff. This facilitates the support of staff development and the appropriate provision of care.

Consistency and quality of care requires continuity of radiation therapy staff delivering the radiation therapy treatment. This continuity allows RTs and patients to build rapport during

[1] The ASMIRT staffing model is being updated during 2020.

treatment. When patients are familiar with the staff, they are more likely to let staff know when there is a change in their health or wellbeing; and staff are more likely to pick up when the patient's condition has changed. Continuity of staffing is also required to ensure consistency in simulation, planning and quality assurance.

Short-term RT placements are not a safe and sustainable option for an ongoing staffing model. Fixed-term contracts not only provide sustainable workforce but are also useful in times of workload increases and staff absences.

A suitable and sustainable FTE structure also facilitates the ability of staff to access CPD opportunities. These may require additional travel time as well as transportation and financial support compared with RTs in metropolitan centres. Radiation therapy centres that are part of a hub and spoke or multi-site group may be able to achieve economies of scale benefits with FTE through sharing RT roles such as research, quality assurance, education and system administration across the sites.

2.1.4 Nurse-specific commentary

Nurses in regional centres tend to work a full scope and advanced scope of practice at times. Their roles tend to carry greater responsibility from a clinical perspective given that the reliance of the RO on the registered nurse (RN) and enrolled nurse (EN) are greater. Nursing practise should be accordance with the standards of the profession, relevent evidence-based speciality guidelines and broader health system (including the NMBA standards, codes and guidelines, the Australian Commission on Safety and Quality in Health Care and Standards for aged care). The nurse's role is also patient dependent as the needs of regional / rural patients can be unique. This requires a strong networked approach with community services.

2.2 Recommendations

a) Adhere to—and regularly audit the ability to adhere to—guidelines established by authoritative bodies for each professional group. Overall workforce requirements will become clear, according to activity and the unique nuances of the centre's geographic and epidemiological location. Shared roles and cross-skilled staff are key considerations for sustainable operations.

b) Robust scenario planning is required in the context of predictable situations of leave and staff turnover (e.g., winter months where sick leave is at its highest and temporary contracts / casual pool staff should be available at this time of the year).

c) Determine the number of full time equivalent (FTE) required for maintaining workflow and develop plans for dealing with periods of unexpected reduced FTE early. Such plans need to include waiting list policies, capacity reduction methods and the multi-skilling of staff.

d) Ensure staff roles / processes / responsibilities are established in standard operating procedures (SOP). Establish a culture of cross-skilling early, to allow roles and tasks to have reserve built into the operational process in the event of staff being unavailable. This allows for possible establishment of advanced practice roles. Cross-skilling and flexible work ethic is especially important in centres with smaller amounts of human capital, as roles that silo staff in a specific skill set with no cross-skilling / cross-tasking represent an important point of failure and a real risk.

e) Plan strategies early to encourage staff stability and improve staff retention. Attractive remuneration packages are a valuable tool in this context. Connect and establish staff feedback processes to identify gaps and problems before they become a major hurdle. Recruiting a full profile and correct skills set should be a long-term plan (over five years). Strategies to improve job satisfaction by focusing on educational / research opportunities, department supported social networking opportunities, performance-based appreciation, fixed period rotations, and intentional succession planning can be useful.

f) Plan a staff profile of variable experience and levels to distribute the skill sets, allowing for different attributes to be utilised in the centre's growth and provide a clear progression pathway for staff.

g) Mentoring and inter-centre links are useful ways to establish safety, and maintain quality, collegiality and a supportive environment. These should be a negotiated priority task at an early stage in establishing regional centres. In the current climate, this should include supporting radiation therapist (RT) and radiation therapy medical physicist (ROMP) student and registrar rotations, as well as utilising available funding for medical resident / registrar roles. The centre needs to be provided with the budget and information technology (IT) tools to enable this, for example, teleconferencing and/or videoconferencing facilities and face-to-face contact time.

3. STAFF CONSIDERATIONS AND INTER-DEPARTMENTAL CONSEQUENCES

3.1 Commentary

The establishment of radiation therapy services will lead to the provision of care locally and therefore a consequential increase in activity levels having to be provided by allied health services and departments. Patients requiring these services would otherwise be managed in the service they travel to prior to the establishment of a local centre.

Allied health staffing is often overlooked and not adequately considered in budget / resource planning. It has a significant impact on local / regional budgets and activity. When services are absent or reduced in regional or rural radiation therapy centres due to limited allied health resources, it is even more crucial to maintain this human resource asset.

Whether a centre is built within an established facility or a stand-alone centre, certain services will experience an increase in workload as a result of establishing a radiation therapy centre (e.g., dietetics, speech pathology, lymphoedema therapy, physiotherapy, psychology, social work, dental services, clinical radiology, and pathology). Specific emphasis should be placed on the inclusion of dedicated dietetics, speech pathology, care coordination and social work FTE to the radiation therapy centre. These roles are critical to provide adequate oncology-specific patient care and should be accessible and affordable for the patient. In certain areas, such as head and neck cancer, they represent crucial aspects of care. Shared roles are often a realistic solution. However, protecting the staff time dedicated to the radiation therapy centre is important to prevent gradual pull to other areas of service that occur over time. It is important to collaborate with all hospital departments in preparation for provision of radiation therapy services.

An ongoing activity review to plan and future-proof the demand requirements is strongly recommended. Existing guidelines provide an overview of the need, depending on the case mix and responsibility of care to be undertaken at the treatment centre.(32) The final demand will be an interaction of cancer treatments offered (e.g., radiation therapy versus chemo-radiotherapy treatments), case mix of cancer types, estimated case levels and collaborations with tertiary centres, to name a few.

The local emergency department, local general practices, and even the medical / surgical wards of the hospital will see increased activity as a result of the radiation therapy centre being established. The impact is even greater if medical oncology is established in parallel. Liaising with these groups to create awareness, pathways of communication and processes, as well as providing GPs, emergency department, and ward staff with training and education is important in ensuring smooth operation of the service. The converse can also be observed, which is that the local radiation therapy centre takes on more responsibility, and other health professionals will see less involvement in direct care for patients returning from distant centres with toxicity and care needs.

The presence of a radiation therapy centre means symptoms can be more effectively palliated, thus fewer presentations to emergency departments / primary care occur. Experience indicates that social work and cancer coordinators still remain essential to provide the logistical support patients need when having to travel to the regional centre from surrounding areas.

Increased regional centre activity over time can have impacts on palliative care, medical oncology / surgical oncology, and inpatient services. Considerations towards these aspects are important to decide how much, if at all, to invest in these areas of specialised care, for example, a dedicated oncology ward or hospice. Again no clear guide exists; however, regular review to future-proof expansion is a prudent approach.

A strong nurse-led networked approach between the radiation oncology nursing team and the inpatient team for safe transfer of care and inpatient radiation therapy is essential in this space.

3.2 Recommendations

a) Consider the consequential effects on other health departments and services in the networks. Plan for the increase in demand these services will experience, to ensure holistic and cohesive care is available and to future-proof as service demand grows.

b) Dedicated allied health staff attached to the radiation therapy centre is a critical part of budgeting and resource planning and must be done ahead of time. Being reactive to these needs is a pitfall in service planning and will result in poor care pathways for patients.

c) Consider the impact and collaborately plan with the following departments when establishing regional radiation therapy centres: medical oncology, palliative care, emergency department, radiology, pathology, local primary care network, patient travel and accommodation services.

4. INFORMATION TECHNOLOGY, INFRASTRUCTURE AND DATA COLLECTION

4.1 Commentary

Robust and comprehensive commercial radiation oncology electronic medical records systems exist[2,3]. These information techology systems are critical for radiation oncology management. No treatment for cancer patients can be provided if these IT systems fail. **The systems are mission critical, and furthermore, loss or corruption of electronic files will mean loss of historical patient data with very material legal, ethical, clinical-management, and safety implications.**

Such systems can be highly integrated to allow administrative, treatment delivery, and medical records requirements, as well as providing billing, research, audit functions and remote access capabilities. Especially important at this time are systems that allow outcomes data to be collected, such as toxicity, patient reported outcomes and cancer control outcomes, and ones that can integrate with cancer registries. Vital to this process is the appointment of data managers, and eventually trial managers, who will provide assistance in the maintenance of these databases that will grow exponentially. Integration with modern picture archiving and communication systems (PACS) is crucial for transfer of large data image files. Secure remote access is becoming an essential element, which is often required for on-call and support staff to assist with problems. These systems allow for effective minimum data set collection requirements that are mandatory at a state or national level, for example, waiting times collection data (e.g., refer to: https://meteor.aihw.gov.au/content/index.phtml/itemId/686202).

One challenge is that these systems are oncology specific and never easily integrate with established hospital (new or legacy) systems. Information that interrelates with other hospital services is difficult, such as comparing how radiation therapy patient activity correlates with emergency department presentations and increased in-patient activity.

A second challenge is that the radiation oncology electronic medical records systems are generally new to the local service and therefore lack of experienced staff who understand and can deal with system issues can be a challenge. IT support is crucial to the safe and timely operation of radiation therapy centres that operate electronically in almost every aspect. This is often provided, to some extent, as an after sales service contract by industry providers. A radiation therapy centre with an on-site qualified IT leader to assist in solving issues between providers and the hospital / stand-alone IT infrastructure is a much stronger and safer one. This cannot be overstated.

Due to the specialised nature of radiation oncology electronic medical record systems, a dedicated senior systems administrator or “super-user” role (ideally with clinical experience) should be part of the staffing profile. This position should be seated and managed within the radiation therapy centre and the function of this person is Radiation Oncology Information Systems support. If the Senior Systems Analyst does not have clinical experience, providing dedicated training with vendors and locally within the centre is important. This ensures they understand the clinical impact of their administration decisions and reports, and will give long-term benefits to the development of the centre. If the Senior Systems Analyst has a pure IT background having an additional Clinical Administrator, such as a senior-level RT, is imperative to give the correct mix of technology and clinical expertise when developing and maintaining the electronic medical record.

A third challenge pertains to the governance function. Regional and rural radiation therapy centres, whilst having tertiary centre links, often operate on their own from an operational point of view. These

[2] MOSAIQ® (Elekta) - https://www.elekta.com/software-solutions/care-management/mosaiq-radiation-oncology
[3] ARIA® (Varian) - https://www.varian.com/oncology/products/software/information-systems/aria-ois-radiation-oncology

centres therefore need their own governance, incident review, and audit functions to ensure safe treatment and timely review of incidents. Effective technical infrastructure again is crucial to enabling this; allowing adequate record keeping and electronic and automated interrogation of records when required. It would be incorrect to assume all elements of a radiation therapy centre operate as per hospital-based operations, as there are many unique technical, governance and quality control functions and challenges unique to a radiation therapy centre.

IT infrastructure development and maintenance has become such a specialised field that it requires dedicated staff to fulfil this role.

IT infrastructure may be housed locally or may be situated remotely—for example, a shared primary database situated at a geographically separate location. In either case, IT infrastructure must be easily accessible for management, particularly in times of failure and upgrade. Redundancy is vitally important in a rural setting, along with regular backup. The use of a commercial rapid recovery back-up system is recommended, such as virtualised server systems. Having a power back-up system in place that is tested and verified is an essential risk management process—for example, a generator and uninterrupted power supply system. For a shared location, access and data security need careful consideration, especially if there is potential for multiple departments / sites to access the same patient.

One important aim of establishing the centre's infrastructure is a paperless environment. Interfacing with the local health network may prevent this; however, minimising paper requirements is fruitful and supported by current industry software solutions. Considerations when establishing a paperless department workflow include reporting and auditing needs. Being paperless will require more terminals and monitors to work at, and more licencing to cope with the electronic workflows. This may require high-end specification hardware to cope with the increase in information flow and storage. Consider the planning and accessibility requirements of the radiation therapy electronic medical record and planning system to future-proof the ability to cope with future growth / technological advancements in the department. Having an abundance of licences combined with the use of software platforms for improved accessiblility, as well as fast processing capability through the use of graphics processing units to cope with modern algorithms are examples of requirements for start-up and should be reviewed with respect to future-proofing for expansion.

4.1.1 Telehealth

Telehealth strategies to facilitate patient care and care closer to home have been in use in Australia for many years. It is an important and appropriate clinical care tool for selected oncology care circumstances.(43) Centres should be planned to operate with the correct resources pertaining to appropriate rooms, audio-visual set-ups, compatible software facilities, support staff, internet quality, IT security and record-keeping requirements. Jurisdictional standards should be adhered to, alongside other published guidelines.(44, 45)

4.2 Recommendations

a) Establish a line of communication between the industry provider and internal IT staff. Ensure the systems are maintained and troubleshooting is undertaken before the radiation therapy centre becomes operational and at regular intervals after the centre opens.

b) Have a dedicated senior systems administrator or "super-user" role, which should be a portfolio of a clinical or technical role already employed in the clinical setting, to lead the development of the electronic medical record system to reach its full capability.

c) IT infrastructure must be robust to allow incident review, audit and mandatory reporting functions to be met. A move to a paperless system, as much as possible for these functions, is recommended. Many software platforms now allow this to happen effectively.

d) Future-proof department IT systems by ensuring appropriate software and hardware is purchased with thoughts of the expected demand for access and processing power.

e) Departments must be set up to provide telehealth services.

5. STAKEHOLDER INVOLVEMENT AND ESSENTIAL COLLABORATION

5.1 Commentary

The health system in which regional radiation therapy centres operate can be different to that of metropolitan centres. Variability in ancilliary resourcing, skills sets, availability of different health services and the differing roles of public and private hospital and health services and the primary health care system tend to be unique to regions. For example, regional or rural general practice generally has a more involved role in care provision after hours or for palliative care. Similarly, private allied health practitioners can carry greater responsibility in supportive care aspects. In establishing and growing radiation therapy services, those nuances and the unique demographic requirements need to be considered.

The needs of culturally diverse groups (including Aboriginal and Torres Strait Islander people in Australia, and Māori and Pasifika in New Zealand) need to be considered. The Aboriginal and Torres Strait Islander populations vary by geographic location from <1 per cent in Victoria to 30 per cent in the Northern Territory.(46) Similarly, the Māori population varies by geography, with 86 per cent living in the North Island (23.8 per cent in the Auckland region) and 14 per cent in the South Island.(47) In developing and sustaining a regional or rural radiation therapy centre, it is crucial to involve all stakeholders to understand what the final service will look like. Some of these collaborations are essential to provide core clinical services.

Common important stakeholders, who are invaluable in ongoing feedback and service development considerations, include:

- Aboriginal medical services, Māori health services, and First Nations People advisory groups
- consumer groups (essential for accreditation requirements as well)
- primary care sector (e.g., GPs) and other local health care providers
- hospital departments and local specialists (particularly medical imaging)
- sub-specialised pathology (e.g., molecular testing / onsite cytology), radiology services (e.g., image guided biopsy, emergency magnetic resonance imaging (MRI) availability, molecular imaging) and clinical genetic services
- the tertiary centre to which the centre relies on and collaborates with
- industry vendors
- professional and industry bodies/groups (e.g., Clinical Oncology Society of Australia (COSA), Cancer Australia, Radiation Therapy Advisory Group (RTAG))
- Cancer Council and the established tumour site specific support groups (e.g., breast / prostate support groups)
- established national supportive care providers (e.g., McGrath Foundation, Prostate Cancer Foundation, Adolescent / Young adults' groups)
- patient and accommodation services for the region
- local media groups (which have an important role in coverage, awareness and advocacy).

The centre that used to service the region in question prior to establishment of the regional or rural radiation therapy centre, needs to be consulted and involved in planning the local service. Stakeholders of that centre also need to be consultated (e.g., medical oncology / surgical onology).

Firstly, that centre will likely remain the subsequent or tertiary referral centre and be most likely to provide clinical back-up. Typical examples of this may include gynaecology oncology or head and neck cancer care, as well as after-hours access to emergency imaging and treatment options. Secondly, that centre will have a wealth of experience in the requirements for the region and could provide staff during the establishment phase and as routine off-site remote and in-person back-up. Thirdly, that centre could be helpful in protocol and process development, providing a wealth of regional appropriate experience. This involvement does not preclude the regional centre from establishing other networks and contacts to best provide services.

Multi-disciplinary meetings are essential to effective and efficient cancer care planning for patients. These meetings provide a point of contact for all specialists / allied health professionals, and treatment planning for a patient's specific situation. Essential to this function is the role of the cancer care coordinator, to assist patients in navigating the complex care requirements, as well as providing clinical and non-clinical information / support.(48) Cancer care coordination tend to be fulfilled by experienced senior staff (generally nurses, but also administrative staff) and, depending on workload, a radiation therapy centre may need several FTE of care coordinators. The McGrath Foundation and Prostate Cancer Foundation are not-for-profit organisations that fund such staff for patients, specifically those with breast and prostate cancer, and should be approached.

An initiative that has been welcomed by the community is an effort to connect with local education facilities in the area (schools, TAFEs and universities), attendance at local career exhibitions and invitations for departmental tours. This has the dual advantage of increasing awareness of cancer care and education, awareness of local treatment facilities and facilitating the conversation of a career in the field of radiation oncology within the community.

The purpose of early stakeholder engagement is to envision a radiation therapy centre that is comprehensive and holistic in meeting the needs of the community. Complete and comprehensive resourcing is not always possible from the outset, and this should not negate the start-up of a centre. Early advocacy is important as in many cases services build up according to realistic short- and long-term business plans. Engaging with local media is a powerful tool to help manage community expectation of a new service, to inform them of new developments as the department grows, and to empower local patients by informing them they can now have treatment at this local centre rather than follow the old established referral patterns to metropolitan centres. Not engaging stakeholders early may result in more difficulties in progressing initiatives when needed. Therefore, early and involved collaboration is a key principle in centre establishment, development and sustainability. This should not be underestimated.

5.2 Recommendations

a) Engage with consumer groups to provide tangible feedback before and after a radiation therapy centre's establishment. This will be crucial to good engagement from the community as the centre develops.

b) Map and engage stakeholders for the region (including the centre that used to service the community before, and/or the centre that will support the regional centre in a networked fashion), as their ongoing engagement is important to centre development.

c) Multi-disciplinary meetings and cancer care coordination are the cornerstones of modern-day cancer care. These need to be established early, and supported from an administrative point of view, to allow their ongoing sustainable functioning. These should not be a low priority endpoint for centres.

d) Establish integrated care pathways with tertiary/quaternary services for patients requiring highly complex care.

6. RESEARCH AND TRAINING (POSTGRADUATE AND CONTINUING EDUCATION)

6.1 Commentary

6.1.1 Research

Clinical research should not be considered an optional provision for a regional radiation therapy centre, but rather an essential part of the service. The consideration of resources to establish a research program during project planning is strongly advised. It should be emphasised that a research team be established in the first 12 months of operation, with the purpose of looking at research projects in terms of appropriateness, reflecting the diversity / complexity of the radiation therapy centre. Part of this is the establishement of the trials coordinator role and data manager role that is essentially to being able to develop and run a research program. Research, whether in the form of in-house projects or taking part in multi-centre studies, is crucial for staff satisfaction, professional education, and progression, as well as for patient opportunity and access to clinical studies. With tele-trials evolving as the next step in research, access to clinical trials for those in regional Australia and New Zealand is expected to improve. Involvement in clinical trials enables regional centres the opportunity to credential and benchmark planning and treatment activities as well.

6.1.2 Training programs

It is recommended to forge links with undergraduate training programs and postgraduate training colleges to support trainees. This will allow all craft group professionals and their trainees to gain early exposure to regional practice. As most of the undergraduate and postgraduate training is metropolitan based, this does affect the ability to attract, recruit and retain staff. RANZCR has made a concerted effort to understand this issue in particular.(40) ASMIRT administers scholarships for regional and rural student placements that are available to students in universities with a Medical Radiation Sciences degree. Such opportunities for training will enable regional and rural Australia to train a workforce that understands the needs of the regions. There is increasing evidence that indicates training an interested workforce regionally will increase retention and return to regional practices.(49) The ACPSEM has commenced a new “Regionalising Training” review for completion in mid-2021, in response to the Australian Government’s regional policies, with the specific intent of increasing capacity to train in regional areas.

6.1.3 Continuing education

Staff from regional and rural areas report increased time (and cost) to travel to meetings for CPD and education, and involvement in their service to professional bodies, such as committees and boards, much of which is based in metropolitan centres. This must be considered in the business case and operational budget for the centre. This also relates to staff being supported to contribute to professional service of organisations like RANZCR, ACPSEM, ASMIRT, CNSA and the New Zealand Institute of Medical Radiation Technologists (NZIMRT). These organisations need regional centre staff to provide representation and adocacy for regional issues in Australia and New Zealand. Appropriately incentivised CPD allowances and travel time considerations are required to reflect these challenges. Funding and application frameworks to attend conferences, workshops and seminars should be established and confirmed with the management to ensure their ongoing support.

Establishment of an education, training and research program should occur early in the development of a radiation therapy centre. Internally, this can be done through regular in-service programs, chart round meetings, as well as via local district education opportunities

and mandatory training programs. Opportunities to conduct projects and be involved in clinical trials is invaluable in engaging and retaining staff. Dedicated time should be given to such activities to promote the centre, and support internal development and research. Although core operational activity provision is always the priority, education, training and research opportunities must be considered business as usual requirements and not optional extras. The benefit of this strategy will be for the nourishment of the centre's staff and growth of the health care expertise and resilience in the region.

To be registered in Australia or New Zealand, the Medical Board of Australia (MBA) and the Medical Council of New Zealand (MCNZ) require ROs to undertake CPD. Participation in the RANZCR CPD program is mandatory for all RANZCR members, to help ensure compliance with the MBA and MCNZ requirements.

RTs, either in a dedicated educator role or with a specific responsibility within their substantive role, are required to provide, facilitate and maintain CPD activities. They are also expected to provide the resources to support student RTs, Supervised Practice Program RTs, new graduates and new staff. Dedicated research or development RT roles are another way to provide support to activities such as internal development and research. They are required to provided education, training and support for staff as new techniques and technologies become available. Again, FTE dedicated to allow such activities is essential to the continual growth and development of RTs in regional and rural radiation therapy centres.

All ROMPs within the regional centre should be on the ACPSEM register of Qualified Medical Physics Specialists or working under the supervision of a registered ROMP. Often regional centres are staffed by experienced ROMPs from overseas who will not necessarily be on the register. Support needs be provided to these individuals to obtain registration with the ACPSEM alongside other registered ROMPs who work to meet the ACPSEM's continuing professional development requirements and subsequently remain registered.

The nursing craft group must have access to a framework that allows for mentoring, collaborative learning between centres, and support acquisition of relevant postgraduate qualifications for nursing. This is relevant for all craft groups; however, given the increased clinical input nurses have in supporting the ROs clinically, this is a more substantive consideration in sustaining a quality and stable nursing workforce regionally. Alongside that, establishing key colleagial tertiary centre nursing connections is important to maintain skill level, competency, currency, and professional development. Nurses must be provided the means to do this.

Heads of Departments should be supported in executive training opportunities to continually develop their skills (e.g., interpersonal skills, performance management, communication strategies), as well as health systems literacy around the business and costs of health care, safety and quality principles.

6.2 Recommendations

a) Research must be an essential objective in establishing a radiation therapy centre—once clinical core objectives are achieved. The inclusion of a research program must be facilitated by a budgeted expansion plan in resources and staffing when appropriate.

b) Strong consideration should be given to applying for accreditation for training of registrars / trainees and linking with university undergraduate programs in all disciplines, depending on appropriate workforce requirements and radiation therapy centre size. This may not always be feasible in every regional and rural radiation therapy centre but underpins the principle of exposing trainee staff and undergraduates to regional health care.

c) Funding, incentives and application frameworks that allow staff to participate in continuing professional development (CPD) and get involved in their professional associations are essential. Such meetings typically occur in metropolitan centres, and the associated time and travel costs should be supported and considered in the business case and operational budget for the centre.

7. DESIGN AND INFRASTRUCTURE

7.1 Commentary

The core design and infrastructure requirements from the point of view of building specifications, health and safety requirements, and radiation safety requirements are prescriptive. Details can be found from various sources such as ARPANSA(50) EPA(51) and IAEA(52); however, jurisdictional requirements need to be considered.

Depending on the level of service to be provided, cohesion with medical oncology, the hospital wards and the wider hospital system needs to be considered. Each radiation therapy centre will have a unique set-up and foot print. It is imperative that experienced staff be involved as early as possible in the design phase of treatment, and that relevant stakeholders be consulted to visualise how patient and work processes would flow, to allow maximal efficiency and full use of the space available. Additional advantages of this include enabling future-proofing of the centre for development and prioritising the (often) limited space available. Space becomes a premium over the years. Considering the size of waiting rooms, practical patient flow, and the need for office administrative space is important.

Externally, parking is a consideration and the designation of reserved parking for patients is important, yet often overlooked. Many centres have provided innovative and culturally appropriate solutions for the diversity of cultural mix in their regions. This may relate to the physicality of the waiting areas, family meeting rooms, décor / aesthetics / welcome messaging, and with particular respect to the Indigenous people of the region (e.g., Darwin Hospital, Rockhampton Hospital).

Establishment of a local patient accommodation facility and dedicated daily transport sources to the department are ideal; however, if not possible then the establishment of a network of local accommodation providers and existing community transport options will assist to meet this need.

7.2 Recommendations

a) Although each radiation therapy centre will have a unique set-up and footprint (dictated by factors such as jurisdictional requirements and space available), experienced staff should be involved in the design phase as early as possible—to visualise practical patient flow and work processes, and determine the required sizes for waiting rooms and administrative office spaces, thus ensuring maximal efficiency.

b) Designated reserved parking for patients is important to consider, as is consideration of cultural diversity appropriateness when designing spaces such as waiting rooms and family meeting areas.

c) Establishing a local patient accommodation facility with dedicated daily transport resources to the centre is ideal.

8. REGIONAL STEREOTACTIC RADIATION THERAPY PROGRAMS

8.1 Commentary

Stereotactic radiation therapy refers to the use of very precise geometric targeting in order to deliver high ablative doses of EBRT to either intracranial (stereotactic radiosurgery – SRS) or to extracranial (stereotactic body radiotherapy – SBRT) locations. The term stereotactic ablative radiation therapy (SABR) can be used as an alternative. Specialised planning, quality assurance and delivery techniques are required for stereotactic procedures, and thus delivery has traditionally been in the domain of larger volume metropolitan and academic centres. In 2015, RANZCR published guidelines on the safe practice of SBRT(34) to ensure best practice in establishing programs in Australia and New Zealand. This commentary should be read in context with that document and serve as additional support for regional centres.As stereotactic techniques become standard of care in certain clinical scenarios, such as early stage medically inoperable lung cancer(53), there is a possibility that regional patients will miss out on these treatment options as they may choose not to travel or be unable to travel to other centres to receive this treatment. Regional centres should review their patient caseload to ensure they have sufficient numbers to establish and maintain expertise in stereotactic treatments. It may be that the caseload reflects the need for only one or two treatment sites (e.g., lung cancer or bony metastases) and it is logical to tackle these sites on an as needs basis first. Additionally, in regional centres such skills are typically maintained by a small core group of staff (perhaps one or two within each discipline). Therefore, unexpected unavailability of even one staff member can put the program at risk.

SABR treatment programs are already in operation in regional centres. The authorship advocates for a number of considerations when developing a SABR program:

- Develop a SABR program in the post-establishment phase of the regional centre as a second phase of the centre's development and innovation. Consider the tumour sites to be treated in a phased development program, depending on the needs of the community.
- In setting up the program, consider standardising to technical and clinical protocols already in use in Australia or New Zealand, as that will allow due diligence for equipment, the skills sets, peer review elements and physics quality assurance to be acquired.
- In setting up the program, envision an integrated and networked services approach between regional centres and larger established stereotactic centres. This plays a crucial role in safe and sustained delivery of stereotactic radiation therapy programs. A networked approach will also allow resilience and shared roles to be considered. The regional centre, as well as the centre supporting the regional centre in a networked fashion, need to also account for the added human resourcing that will be required.
- Credentialling and CPD: it is essential that centre staff be given the opportunity to train and lead the program to ensure the skills set is acquired and sustained. Mentorship, peer review and credentialing of competencies are critical.
- Workload: SABR treatments require greater human resources input from all craft groups, critical dependence on specific equipment and greater linac time—all of which impact on the workflow of the centre. An action plan of how this will be executed and integrated as business as usual needs to be considered.
- Given that only one machine in a centre generally is geared for stereotactic capability, and a core set of staff are credentialled, consideration should be be given to of back-up and service continuity planning.

- Establish mechanisms to capture and audit quality metrics of treatment delivery and patient outcomes. Benchmarking of clinical cases against those of a more established program should be undertaken to ensure quality of treatment.
- Establish mechanisms to take part in clinical trials that involved SABR patients.

8.1.1 Parallel benefits of a SABR program

The establishment of a SABR program in a regional centre has a number of benefits for both patients and staff. Patients receive equitable care, whilst staff have the opportunity to develop knowledge, skills and experience in a multi-disciplinary approach to care. Opportunities such as these contribute to recruitment and retention and ongoing staff satisfaction.

8.2 Recommendations

a) When choosing to establish a stereotactic program, follow established guidelines and aim to do so with the support of an established centre delivering stereotactic radiation therapy.
b) Establish a robust plan for training, credentialing and ongoing supervision, both in-house and within the network.
c) Maintain ongoing support structures within the established network to ensure ongoing sustainability and improvement of the program over time.

9. THE ZEST REPORT – THE FAMILY ELEMENT

9.1 Commentary

In 2015, RANZCR commissioned a ZEST Healthcare Communications report on methods to increase the retention and attractiveness of regional and rural work for training radiation oncology registrars(40), focussing on methods to support this aim. The report emphasises a number of points on topics relating to networks, education, opportunities for continuous education and, in principle, can be applied to other elements of the radiation oncology workforce. Although the ZEST report is several years old, its message and teachings remain pertinent, contemporary and undeniably essential in this document.

Of note is the emphasis respondents gave to the elements of supporting partners and children to recruit and retain a satisfied and stable workforce. Although this is not in the direct remit of a radiation therapy centre generally, it is essential to the formula of success for regional and rural health services. The radiation therapy centre can certainly inculcate a culture to support the staff member and their family, whether it is in a tangible or an intangible manner. The power of this point should not be underestimated. If staff are moving to a regional or rural location for lifestyle change or family-friendly factors, then a centre orientated to the needs of staff can go a long way to improving staff attraction and retention.

9.2 Recommendations

a) Include regional / rural origin as a selection criterion for training and staff positions.
b) Establish mentoring or coaching programs – to assist staff in transitioning to a non-metropolitan training post or practice.
c) Establish professional support networks or interest groups for staff to share information and seek advice.
d) Participate in links between hospitals, medical schools and healthcare networks to enhance regional training opportunities.
e) Develop promotional resources to challenge negative perceptions of non-metropolitan practice.
f) Engage with research and clinical trials groups to advocate for non-metropolitan-relevant clinical research.

CONCLUSION

Establishing a regional or rural radiation therapy centre requires early involvement of all stakeholders to create a strategic vision for the centre and how it plans to contribute to the long-term benefit of the patient, community and health system in the region. Safe, sustainable and quality service provision occurs when a centre is part of integrated cancer management, demonstrates good governance and aligns with its health network at the outset.

The first part of this document outlines key minimum requirements to be achieved for any regional centre. Subsequent commentary in each section represents a collective wisdom of those who have been involved in such initiatives. It continues to be an evolving document as the cancer care requirements for regional Australia and New Zealand change over time.

Having a long-term strategic plan is wise and once established, a strategic review periodically is advised to continue to develop the centre in line with governance, risk, and requirements of progress, to continue to provide optimal outcomes for patients and the community.

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APPENDIX 1

A Lesson Illustrated

A programmatic and integrated networked approach to provision of radiation therapy services

In 2019, the United Kingdom (UK) All Party Parliamentary Group for Radiotherapy (APPGRT) published their findings in a series of documents with the aim of investigating the current UK radiation therapy provision and ability to meet present demands and future needs. The purpose of the APPGRT was to provide an effective voice for radiation therapy in the UK, improve access for patients, and guide funding decisions.

In parallel, the National Health Service (NHS) published service documents on provision of radiation therapy services.

The documents are listed below:

- Radiotherapy: Securing the future of Britain's secret lifesaver(54)
- Adult External Beam Radiotherapy Services Delivered as Part of a Radiotherapy Network(55)
- Operational Delivery Networks for Adult External Beam Radiotherapy Services(56)
- Health Building Note 02-01: Cancer treatment facilities(57)

The purpose of highlighting these documents is to illustrate:

- a good example of a programmatic and networked approach to radiation therapy provision to optimise cancer care at a population level being tackled by other first-world countries with health systems similar to Australia and New Zealand.
- Although challenges in other countries can be quite different, there are many similarities and the principles of the worked solutions and recommendations offer much to be learnt in the execution of our regional service provision solutions. In Australia and New Zealand, we do not necessarily need to re-work the solutions ourselves.
- The success and failures of large-scale pieces of work being done around the world.

REFERENCES

1. National Rural Health Alliance. Fact sheet 8: Cancer in rural Australia: National Rural Health Alliance; 2012. Available from: https://www.ruralhealth.org.au/sites/default/files/publications/fact-sheet-08-cancer-rural-australia.pdf.
2. Emery JD, Gray V, Walter FM, Cheetham S, Croager EJ, Slevin T, et al. The Improving Rural Cancer Outcomes Trial: A cluster-randomised controlled trial of a complex intervention to reduce time to diagnosis in rural cancer patients in Western Australia. British Journal of Cancer. 2017;117:1459-69.
3. Baskar R, Lee KA, Yeo R, Yeoh K-W. Cancer and radiation therapy: Current advances and future directions. Int J Med Sci. 2012;9(3):193-9.
4. Faithfull S, Wells M, editors. Supportive care in radiotherapy. Philadelphia: Churchill Livingstone; 2003.
5. Palma D, Olson R, Harrow S, Gaede S, Louie A, Haasbeek C, et al. Stereotactic ablative radiotherapy versus standard of care palliative treatment in patients with oligometastatic cancers (SABR-COMET): a randomised, phase 2, open-label trial. The Lancet. 2019;393(10185):2051-8.
6. Parker CC, James ND, Brawley CD, Clarke NW, Hoyle AP, Ali A, et al. Radiotherapy to the primary tumour for newly diagnosed, metastatic prostate cancer (STAMPEDED): a randomised controlled phase 3 trial. The Lancet. 2018.
7. Phillips R, Lim S, Shi W, Antonarakis E, Rows S, Gorin M, et al. Primary outcomes of a phase II randomized trial of Bbservation versus stereotactic ablative RadiatIon for OLigometastatic prostate cancEr (ORIOLE). Radiation Oncology. 2019;105(3):681.
8. Barton M, Jacob S, Shafig J, Wong K, Thompson S, Hanna T, et al. Review of radiotherapy optimal utilisation rates. Sydney: Ingham Institute for Applied Medical Research (IIAMR); 2013. Available from: https://inghaminstitute.org.au/wp-content/uploads/2017/05/RTU-Review-Final-v3-02042013.compressed.pdf.
9. The Royal Australian and New Zealand College of Radiologists. Radiation therapy for cancer treatment - Targeting Cancer 2016 [Available from: http://www.targetingcancer.com.au/.
10. Butler SM. Changes to radiotherapy utilisation in Western NSW after the opening of a local service. Journal of Medical Radiation Sciences. 2017;64(4):251-8.
11. Australian Institute of Radiography, Australasian College of Physical Scientists and Engineers in Medicine, The Royal Australian and New Zealand College of Radiologists Faculty of Radiation Oncology. National strategic plan for radiation oncology. Sydney, NSW: The Royal Australian and New Zealand College of Radiologists, Faculty of Radiation Oncology; 2001.
12. Morgan G. Why has radiotherapy utilisation not improved since 1999? Journal of Medical Imaging and Radiation Oncology. 2011;55(4):347-50.
13. Barton M, Delaney G. A decade of investment in radiotherapy in New South Wales: Why does the gap between optimal and actual persist? Journal of Medical Imaging and Radiation Oncology. 2011;55(4):433-41.
14. Ministry of Health. Radiation Oncology Online Tool Wellington, NZ: Ministry of Health; 2019 [updated 2019 May 1; cited 2019. Available from: https://minhealthnz.shinyapps.io/radiation-oncology-online-tool-test-version-2/.
15. Bogdanich W. Radiation offers new cures, and ways to do harm. The New York Times. 2010 2010 Jan 23.
16. Peters LJ, O'Sullivan B, Giralt J, Fitzgerald TJ, Trotti A, Bernier J, et al. Critical impact of radiotherapy protocol compliance and quality in the treatment of advanced head and neck cancer: Results from TROG 02.02. Journal of clinical oncology : official journal of the American Society of Clinical Oncology. 2010;28(18):2996-3001.
17. The Royal Australian and New Zealand College of Radiologists. Radiation Oncology Practice Standards: Part A - Fundamentals. Sydney: The Royal Australian and New Zealand College

of Radiologists; 2018. Available from: https://www.ranzcr.com/search/radiation-oncology-practice-standards-part-a-fundamentals.
18. The Royal Australian and New Zealand College of Radiologists. Radiation Oncology Practice Standards: Part B - Guidelines. Sydney: The Royal Australian and New Zealand College of Radiologists; 2018. Available from: https://www.ranzcr.com/search/radiation-oncology-practice-standards-part-b-guidelines.
19. Masoud Rahbari R, Winkley L, Hill J, Thair ARM, McKay M, Last A, et al. Definitive intensity-modulated radiotherapy concurrent with systemic therapy for oropharyngeal squamous cell carcinoma: Outcomes from an integrated regional Australian cancer centre. Journal of Medical Imaging and Radiation Oncology. 2016;60:414-9.
20. Wilcox SW, Aherne NJ, Benjamin LC, Wu B, de Campos Silva T, McLachlan CS, et al. Long-term outcomes from does-escalated image-guided intensity-modulated radotherapy with androgen deprivation: Encouraging results for intermediate- and high-risk prostate cancer. OncoTargets and Therapy. 2014;7:1519-23.
21. Baume P. A vision for radiotherapy: Report of the Radiation Oncology Inquiry. Canberra, ACT: Department of Health and Ageing; 2002. Available from: http://www.health.gov.au/internet/main/publishing.nsf/Content/health-roi-inquiry-report.htm.
22. Cancer Australia. Cancer Australia strategic plan 2014-2019. Surry Hills, NSW: Cancer Australia; 2014. Available from: https://canceraustralia.gov.au/sites/default/files/publications/cancer-australias-strategic-plan-2014-2019/pdf/2014_strategic_plan.pdf.
23. Baade PD, Dasgupta P, Aitken JF, Turrell G. Distance to the closest radiotherapy facility and survival after a diagnosis of rectal cancer in Queensland. Medical Journal of Australia. 2011;195(6):350-4.
24. Chan J, Polo A, Zubizarreta E, Bourque J-M, Hanna TP, Gaudet M, et al. Access to radiotherapy and its association with cancer outcomes in a high-income country: Addressing the inequity in Canada. Radiiotherapy and Oncology. 2019;In press.
25. Cancer Australia. National Aboriginal and Torres Strait Islander cancer framework. Surry Hills, NSW: Cancer Australia; 2015. Available from: https://canceraustralia.gov.au/sites/default/files/publications/national-aboriginal-and-torres-strait-islander-cancer-framework/pdf/2015_atsi_framework_1.pdf.
26. Masoud Rahbari R, Winkley L, Hill J, Tahir ARM, McKay M, Last A, et al. Definitive intensity-modulated radiotherapy concurrent with systemic therapy for oropharyngeal squamous cell carcinoma: Outcomes from an integrated regional Australian cancer centre. Journal of Medical Imaging and Radiation Oncology. 2016;60:414-9.
27. The Royal Australian and New Zealand College of Radiologists. Planning for the Best. Tripartite National Strategic Plan for Radiation Oncology 2012-2022. Sydney, NSW: The Royal Australian and New Zealand College of Radiologists; 2012. Available from: http://www.radiationoncology.com.au/.
28. New Zealand Ministry of Health. New Zealand Cancer Action Plan 2019–2029. Te Mahere mō te Mate Pukupuku o Aotearoa 2019–2029. Wellington, NZ: Ministry of Health; 2019. Available from: https://www.health.govt.nz/system/files/documents/publications/new-zealand-cancer-action-plan-revised-january-2020.pdf.
29. Australasian Health Infrastructure Alliance. Australasian Health Facilities Guidelines 2016. Available from: https://healthfacilityguidelines.com.au/full-guidelines.
30. Chapman A, Shakespeare T, Turner MB. Improving acess to radiotherapy for regional cancer patients - the National Radiotherapy Single Machine Unit Trial. CancerForum [Internet]. 2007; 31(2). Available from: https://cancer.org.au/content/healthprofessional/CancerForum/issues/2007-July.pdf.
31. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney: Australian Commission on Safety and Quality in Health Care; 2017. p. 86.
32. Victorian Allied Health Leaders Council. Best practice guidelines and workforce requirements for allied health workers in cancer. Melbourne: Victorian Allied Health Leaders Council; 2015. p. 82.

33. Cancer Australia. Optimal Care Pathway for Aboriginal and Torres Strait Islander people with cancer. Canberra: Cancer Australia; 2018.
34. The Royal Australian and New Zealand College of Radiologists. Guidelines for Safe Practice of Stereotactic (Ablative) Body Radiation Therapy. Sydney, NSW; 2015.
35. ACIL Consulting. Review of Radiotherapy Services in Victoria. Melbourne: Victorian Department of Human Services; 1998.
36. Queensland Health. Cancer care statewide health service strategy. Brisbane: Queensland Health; 2014.
37. North West Radiotherapy Clinical Expert Panel. Advice for provision of radiotherapy services to people with cancer from North West Tasmania. 2011.
38. HealthConsult Pty Ltd. Radiation Oncology Workforce Planning - Final Report. Sydney, NSW: HealthConsult Pty Ltd; 2009. Available from: http://www.healthconsult.com.au/wp-content/uploads/knowledgebase/2009_HealthConsultRadOncWorkPlanFinalReportDoHA.pdf
39. Smith LJ, Kearvell R, Arnold AJ, Choma K, Cooper A, Young MR, et al. Radiation therapy staffing model 2014. Journal of Medical Radiation Sciences. 2016;63:209-16.
40. Zest Health Strategies. The Royal Australian and New Zealand College of Radiologists Regional and Rural Needs Analysis. Sydney, NSW: Zest Health Strategies; 2015.
41. Shah SK, Nodell B, Montano SM, Zunt JR. Clinical research and global health: Mentoring the next generation of health care students. Glob Public Health. 2011;6(3):234-46.
42. McIntyre E, Mills J. Fact sheet: Mentoring matters2009. Available from: http://www.health.nsw.gov.au/mentalhealth/workforcedev/Documents/prac-guide/ment-mattrs.pdf.
43. Hamilton E, Van Veldhuizen E, Brown A, Brennan S, Sabesan S. Telehealth in radiation oncology at the Townsville Cancer Centre: Service evaluation and patient satisfaction. Clinical and Translational Radiation Oncology. 2019;15:20-5.
44. Australian College of Rural and Remote Medicine (ACRRM). ACRRM Telehealth Advisory Committee Standards Framework. Brisbane, Qld: ACRRM; 2012. Available from: http://www.ehealth.acrrm.org.au/system/files/private/ATHAC%20Telehealth%20Standards%20Framework%202014-10.pdf.
45. Australian Medical Association (AMA). Technology-based patient consultation. Canberra, ACT: AMA; 2013. Available from: https://ama.com.au/position-statement/technology-based-patient-consultations-2013.
46. Australian Bureau of Statistics. 3238.0.55.001 - Estimates of Aboriginal and Torres Strait Islander Australians, June 2016: Australian Bureau of Statistics; 2013 [updated 2018 Sept 18. Available from: https://www.abs.gov.au/ausstats/abs@.nsf/mf/3238.0.55.001.
47. StatsNZ. 2013 Census QuickStats about Māori Wellington, NZ: StatsNZ; 2013 [Available from: http://archive.stats.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-about-maori-english/location.aspx.
48. Clinical Oncology Society of Australia (COSA). Cancer Care Coordinator Position Statement. Sydney, NSW: COSA; 2015.
49. Woolley T, Sen Gupta T, Murray R. James Cook University's decentralised medical training model: An important part of the rural workforce pipeline in northern Australia. The International Electronic Journal of Rural and Remote Health Research, Education, Practice and Policy [Internet]. 2016 7 June 2016; 16(3611). Available from: http://www.rrh.org.au/articles/subviewnew.asp?ArticleID=3611.
50. Australian Radiation Protection and Nuclear Safety Agency. Radiation Protection in Radiotherapy. Canberra, ACT: Australian Radiation Protection and Nuclear Safety Agency; 2008. Available from: http://www.arpansa.gov.au/pubs/rps/rps14_3.pdf.
51. Environment Protection Agency. Radiation Guideline 7. Radiation shielding design assessment and verification requirements. Sydney, NSW: The NSW Environment Protection Agency; 2015. Available from: http://www.epa.nsw.gov.au/resources/radiation/150136-radiation-guideline-7.pdf.
52. International Atomic Energy Agency. IAEA Human Health Reports No.10. Radiotherapy facilities: Master planning and concept design considerations. Vienna: IAEA; 2014.
53. Ball D, Tao Mai G, Vinod S, Babbington S, Ruben J, Kron T, et al. Stereotactic ablative radiotherapy versus standard radiotherapy in stage 1 non-small-cell lung cancer (TROG

09.02 CHISEL): A phase 3, open label, randomised controlled trial. Lancet Oncol. 2019;20(4):494-503.
54. All Party Parliamentary Group for Radiotherapy. Radiotherapy: Securing the future of Britain's secret lifesaver. London: APPGRT; 2019.
55. NHS England. Adult external beam radiotherapy services delivered as part of a radiotherapy network. Schedule 2 - Services. London: NHS England; 2019.
56. NHS England. Operational delivery networks for adult external beam radiotherapy services. Schedule 2 - Services. London: NHS England; 2019. p. 9.
57. Department of Health (UK). Health Building Note 02-01 - Cancer treatment facilities. London: Department of Health; 2013.

All URLs checked and valid as at 23 March 2020.