

Radiation Oncology Services

Module overview

Please note: This module must be read in conjunction with the Fundamentals of the Framework (including the glossary and acronym list), the Preamble to Cancer Services and the Children's Radiation Oncology Services module.

Radiation oncology plays a major role in cancer treatment. Radiation therapy is either used alone or combined with surgery, chemotherapy, hormonal therapy and newer biological therapies in the curative or palliative treatment of cancer. The significance of radiation treatment to cancer service delivery is indicated by the number of cancer patients requiring treatment and by the benefit for long-term survival and quality of life. Evidence suggests that approximately 52 percent of all cancer patients need radiation as an optimal part of their management.^{1,2}

Recent reviews have indicated areas for improvement in the quality and accessibility of radiation treatment in the context of cancer service delivery.¹ The strategic vision for cancer services in Queensland is that service delivery will be improved by integration, standardisation of clinical processes, provision of transparent accountability and coordination of service delivery to patients. Services will be patient-focused, coordinated and linked across government and all health sectors for patients and their families.

Radiation oncology services are included in a range of strategies designed to optimise cancer service delivery in Queensland.³ The implementation of these strategies requires a clear understanding of service capability and how it fits within the broader context of cancer service delivery. Radiation oncology services are available 7 days a week, with staff available as required by the service. Services are provided for adult patients with the occasional exception of providing palliative care for paediatric patients.

Children have specific needs in health services—please refer to the relevant children's services modules.

Radiation oncology services have a highly coordinated, multidisciplinary and patient-focused approach to treatment, and provide a range of treatment services in accordance with standardised evidence-based guidelines and protocols. Where standardised radiation therapy protocols do not exist or patients are not eligible for clinical trials, it is expected that the service will have a mechanism in place for planning, monitoring and reviewing the standard of care provided to these patients (e.g. peer review or audit meetings).

Radiation oncologists participate in formal multidisciplinary teams responsible for staging the patient's cancer and recommending appropriate evidence-based treatment. Documented pathways are available for timely referral to ambulatory services in other disciplines for associated comorbidities, such as cardiac and renal disease. The delivery of radiation oncology services requires specialised facilities and equipment, and is supported by a range of clinical specialties and support services.

The Framework recognises two levels of complexity for radiation oncology service provision: Levels 5 and 6. In addition, consultative radiation oncology services may be provided by a Level 5 or 6 radiation oncology service either on-site or off-site at a health service that provides a Level 3, 4, 5 and/or 6 medical oncology/haematological malignancy service.

The levels of complexity for radiation oncology services, including provision of multidisciplinary-focused consultative services and their relationship to other cancer services, are illustrated in Table 1.

Table 1: Levels of complexity for radiation oncology services

Radiation oncology services	Level 3	Level 4	Level 5	Level 6
	Not applicable	Not applicable	Consultative service (provider) that consults with Level 6, as required	Consultative service (provider)
Medical oncology and haematological malignancy services	Level 3	Level 4	Level 5	Level 6
	May host a consultative/outreach service from the same or a higher level radiation oncology service			

Service networks

In addition to the requirements outlined in the Fundamentals of the Framework, specific service network requirements include:

- documented referral pathways for complications associated with radiation therapy
- documented processes with psychology/psychiatric services
- access to other components of cancer treatment, such as systemic therapy and/or surgery
- documented processes with medical oncology services, haematological malignancy services, diagnostic services (including high-quality imaging and pathology services), surgical and medical subspecialties, and allied health and palliative care services⁴
- access to a lymphoedema service
- access to appropriate allied health professionals
- access to pastoral care, rehabilitation and psychosocial support services (including assistance with organising transport and accommodation)
- documented processes for access to a brachytherapy service
- documented processes with community support services
- some radiation planning workup, such as computed tomography, which may be undertaken off-site at another health service
- outreach services—a necessary part of the provision of cancer services in Queensland, particularly to rural and remote areas—including consultative radiation oncology services, which may be provided by a Level 5 or 6 radiation oncology service to a health service that provides a Level 3, 4 and/or 5 medical oncology/haematological malignancy service.

Service requirements

In addition to the requirements outlined in the Fundamentals of the Framework, specific service requirements include:

- supporting infrastructure, including information management, scientific, biomedical and technical services

- policies and procedures for special-case patients, such as pregnant patients and those with an intracardiac defibrillator or pacemaker
- assessment, treatment, evaluation and risk management, and approved treatment protocols for the radiotherapeutic management of specific tumours and/or tumour sites (both radical and palliative radiotherapy)
- possession of an approved radiation safety and protection plan
- management of clinical data that support clinical audit, clinical trials, outcome analysis and cancer registry requirements (e.g. diagnosis and staging)
- service participation in dosimetric intercomparisons of at least one photon beam
- equipment requirements that include, but are not limited to:
 - dual-modality linear accelerators equipped with a multileaf collimator, electronic portal imaging and an internal wedging system
 - a three-dimensional planning system
 - access to a digital imaging service for patient image acquisition suitable for planning
 - appropriate immobilisation and shielding requirements (e.g. blocks or a multileaf collimator)
 - access to a dosimeter calibrated by the Australian Radiation Protection and Nuclear Safety Agency or an equivalent primary-standard dosimetry laboratory
 - access to a three-dimensional, water-phantom scanning system
 - access to ion chambers and dosimetry phantoms
 - beam modification devices
 - access to an *in vivo* dose monitoring system
- may have access to a superficial/orthovoltage x-ray machine.

Workforce requirements

In addition to the requirements outlined in the Fundamentals of the Framework, specific workforce requirements include:

- staffing numbers appropriate to meet planned patient-care capacity
- a registered medical specialist with credentials in radiation oncology who:
 - provides expert opinion and integrated management for patients
 - participates in multidisciplinary teams as a core member
 - determines treatment regimens (including treatment volumes, doses and organs at risk)
 - writes the radiation treatment prescription
 - oversees the care of patients before, during and after treatment
- radiation therapists who:
 - are core members of the radiation treatment planning team
 - acquire relevant imaging studies
 - design radiation treatment plans
 - implement radiation treatment
 - provide quality assurance for planning and treatment activities
 - manage department workloads
 - contribute to the development of departmental procedures

- provide patient care
- qualified radiation oncology medical physicists whose role includes, but is not limited to:
 - equipment quality assurance
 - dosimetry
 - provision of radiation beam data
 - advice on radiation oncology
 - involvement in the planning and treatment of complex external beam treatments
 - involvement in the quality assurance of external beam treatment planning
 - evaluation of the accuracy of treatment planning and treatment techniques
 - planning and delivery of brachytherapy treatments
 - calibration of external beam and brachytherapy sources
 - commissioning of new equipment
 - provision of scientific and technical advice for the selection of new equipment
 - provision of advice on radiation protection and safety⁵
- all nursing staff involved in radiation oncology have appropriate training and skills, and evidence of ongoing competency in the safe delivery of care for radiation patients (including knowledge of common side effects and consequences of radiation therapy, and other systemic cancer therapies)
- access to allied health professionals, as required (including dentists, speech pathologists and dieticians for head and neck patients)
- x-ray engineering and radiation mechanics on-site during business hours and available after hours, as required
- Aboriginal and Torres Strait Islander liaison officers may provide cultural support and advocacy relevant to Aboriginal and Torres Strait Islander patients, as required.

Level 5 Radiation Oncology Service

Service description

A Level 5 service provides radiation oncology consultative services plus a range of radiation oncology treatment services. The service is provided primarily for adult patients. Treatment services at this level include external beam therapy, but exclude specialist radiation oncology services, such as brachytherapy. The range of radiation oncology treatment services depends on caseload considerations, available expertise, equipment and infrastructure.

A Level 5 service has access to inpatient beds, and participates in multidisciplinary clinics for breast, colorectal, gynaecology, lung, melanoma and skin cancers. This service may provide a short course of palliative radiation therapy to children for symptom relief under the supervision of a Level 6 radiation oncology service that specialises in paediatrics.

Services provided at this level may be limited by the need to have a critical mass of expertise to ensure quality care. This service may be collocated with a health service or stand-alone.

Service requirements

As per module overview, plus:

- access to a specialised positron emission tomography (PET) service
- on-site, or a documented process for, access to palliative care services supporting participation in patient assessment, management and/or referral by a palliative care team
- on-site, or documented processes for, access to renal dialysis, respiratory, cardiology and infectious diseases services within 24 hours
- inclusion in a service network with higher level services ensuring access to information related to the latest evidence-based care and treatments
- may provide consultative services (visiting or telehealth) by radiation oncologists, including initial assessment and long-term follow-up of patients within lower level medical oncology and haematological malignancy services.

Workforce requirements

As per module overview, plus:

Medical

- a registered medical specialist with credentials in radiation oncology available 24 hours
- a registered medical specialist with credentials in radiation oncology available for consultation services, including telephone consultation for complications of treatment and admission for complications within 24 hours
- all registered medical practitioners have credentials in radiation oncology and at least a broad understanding of both common and unusual side effects associated with radiation therapy

Nursing

- a senior registered nurse in charge on each shift
- nursing staff to support the senior registered nurse in charge of the shift

Allied health

- radiation therapists to meet planning and treatment capacity requirements and clinical need
- adequate numbers of qualified radiation oncology medical physicists (or equivalent support) on-site during business hours and available after hours, as required.

Support service requirements

A Level 5 service requires:

Service	On-site	Accessible
cardiac (relevant section/s)		4
haematological malignancy		4
medical		4
medical imaging		5
medical oncology		4
medication		5
nuclear medicine		5
palliative care		4
pathology		3
renal		4
surgical		4
surgical oncology		4

Level 6 Radiation Oncology Service

Service description

A Level 6 service provides a comprehensive range of specialised and highly specialised radiation oncology services, including external beam and brachytherapy services. This level of service provides regional or statewide radiation oncology services. Level 6 radiation oncology services are restricted to a limited number of sites due to the need to have a critical mass of expertise to ensure quality care.

A Level 6 service provides one or more of the following services:

- intensive chemoradiation schedules for head and neck cancer
- prostate brachytherapy
- gynaecological brachytherapy
- intraluminal brachytherapy
- ocular brachytherapy
- brachytherapy for rare tumours.

This level service provides specialised radiation treatment services for rare tumours, including Wilm's tumours, sarcomas, bone tumours and germ cell tumours. Other areas requiring a recognised volume of highly specialised work include total body irradiation, stereotactic radiosurgery, total skin electron beam treatment, intensive chemoradiation schedules for head and neck cancer, and paediatric radiotherapy services.

Additional special treatments and techniques may include:

- remote-control intracavity equipment with afterloading technique
- brachytherapy using eye plaques
- intraluminal brachytherapy for bronchus and oesophagus
- intravascular brachytherapy for coronary artery stenosis
- total body irradiation
- stereotactic radiosurgery
- intraoperative radiotherapy.

Some highly specialised radiation oncology services, such as treatment for retinoblastomas, may be available only at a specialised centre outside Queensland.

Service requirements

As per Level 5, plus:

- acute inpatient beds available on-site for specialised procedures, such as brachytherapy and administration of radioactive iodine, and for supportive care (e.g. for acute radiation reactions) and insertion of percutaneous gastrostomy feeding tubes
- a nominal chairperson for each multidisciplinary clinic, responsible for ensuring the patient's cancer is staged and that appropriate evidence-based treatment recommendations are recorded (with clinic core members usually including surgeons, medical oncologists, radiation oncologists, radiologists and pathologists)
- documented processes with paediatric superspecialist facilities where children are treated

- documented processes with adolescent and young adult specialty services when these become available
- documented processes with clinical genetics/medical genetics service, including genetic counselling
- capacity to support at least one radiation oncology fellow
- appropriate linear accelerator bunker and equipment to deliver total body irradiation and total skin electron beam therapy
- an appropriate inverse planning system and an independent Intensity Modulated Radiation Therapy dose verification system
- provision of appropriate anaesthetic equipment and expertise where anaesthetic procedures are undertaken (refer to the Anaesthetic Services module for adult care and the Children's Anaesthetic Services module)
- a fully integrated, computer-assisted, networked planning and treatment system with system for verifying precision, planning and treatment modalities
- capacity for safe delivery of sealed and unsealed radioisotopes/radiopharmaceuticals.

Workforce requirements

As per Level 5, plus:

Medical

- treatment regimens developed and supervised by a registered medical specialist with credentials in radiation oncology
- a registered medical practitioner with credentials in radiation oncology available 24 hours

Nursing

- as per Level 5 service

Allied health

- radiation oncology staff to adequately provide special services (e.g. total body irradiation, stereotactic radiosurgery, stereotactic radiotherapy and brachytherapy)
- access to allied health professionals to meet patients' needs, as required (including dentists, speech pathologists and dieticians for head and neck patients).

Support service requirements

A Level 6 service requires:

Service	On-site	Accessible
anaesthetic		3
cardiac (relevant section/s)		5
haematological malignancy		5
medical		5
medical imaging		5
medical oncology		5
medication		5
nuclear medicine		5
palliative care		5
pathology		3
renal		5
surgical		5
surgical oncology		5

Legislation, regulations and legislative standards

In addition to what is outlined in the Fundamentals of the Framework and the Preamble to Cancer Services, radiation oncology services must comply with the following:

- *Medical Radiation Technologists Registration Act 2001*
www.legislation.qld.gov.au/LEGISLTN/CURRENT/M/MedicalRTRegA01.pdf
- Medical Radiation Technologists Registration Regulation 2002
www.legislation.qld.gov.au/LEGISLTN/CURRENT/M/MedicalRTRegA01.pdf
- Registration requirements of the Medical Radiation Technologists Board Queensland.
www.legislation.qld.gov.au.

Non-legislative standards, guidelines, benchmarks, policies and frameworks

In addition to what is outlined in the Fundamentals of the Framework and the Preamble to Cancer Services, the following are relevant to radiation oncology services:

- Australasian College of Physical Scientists and Engineers in Medicine.
www.acpsem.org.au
- International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use: Guideline for Good Clinical Practice.
www.ich.org/LOB/media/MEDIA482.pdf
- National Health Service (UK). Manual for Cancer Services. London: NHS Executive; 2004. www.dh.gov.uk/en/Healthcare/Cancer/DH_4135595
- Tripartite Standards Working Group of Australian Institute of Radiography,

Australasian College of Physical Scientists and Engineers in Medicine, Royal Australian and New Zealand College of Radiologists. Radiation Oncology Practice Standards. AIR, ACPSEM, RANZCR; 2008. www.ranzcr.edu.au/.

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2. Baume P (chair). A Vision for Radiotherapy: Report of the Radiation Oncology Inquiry. Canberra: Australian Government Department of Health and Ageing; 2002.
3. Queensland Government. Queensland Statewide Cancer Treatment Services Plan 2008-17. Queensland Health; 2008.
www.health.qld.gov.au/publications/qh_plans/QS_cancer_plan_final.pdf
4. National Health Service (UK). Manual of Cancer Services Standards. London: NHS Executive; 2001. (Superseded by Manual for Cancer Services, 2004).
5. Oliver L, Fitchew R, Drew J. Requirements for radiation oncology physics in Australia and New Zealand: Australasian College of Physical Scientists and Engineers in Medicine Position Paper. Australas Phys Eng Sci Med 2001;24(1):1–18.