Queensland Health

Cancer services – radiation oncology

CSCF v3.2

Module overview

Please note: This module must be read in conjunction with the Fundamentals of the Framework (including glossary and acronym list), Cancer Services Preamble and Radiation Oncology Services - Children's 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 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 approximately 50 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 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 accessible 7 days a week, with staff rostered as required by the service. Services are provided for adult patients with the occasional exception of providing palliative care for children.

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 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 CSCF 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 providing a Level 3, 4, 5 and/or 6 medical oncology and/or 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) consulting with Level 6, as required	Consultative service (provider)
Medical oncology and haematological malignancy services	May host a consultative / outreach service from the same or 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 Medical 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 providing 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:

- adequate radiation safety measures must be observed and the service must comply with the Radiation Safety Act 1999 and Radiation Safety Regulation 2010
- certificates of compliance are required for any radiation apparatus, some radiation sources, and the rooms in which they are housed
- 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 information supporting 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 including, but not limited to:
  - dual-modality linear accelerators equipped with a multileaf collimator, electronic portal imaging and 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 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
- provide relevant clinical indicator data to satisfy accreditation and other statutory reporting obligations.

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
- 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 safety[5]
- all 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 dentists as required for head and neck patients
- access to allied health professionals, as required (including speech pathologists and dieticians for head and neck patients)
- access to x-ray engineering and radiation mechanics, 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.

Radiation Oncology Services

	Level 5	Level 6
Service description	• provides radiation oncology consultative services plus a range of radiation oncology treatment services, primarily for adult patients. • treatment services include external beam therapy, but exclude specialist radiation oncology services, such as brachytherapy. • range of radiation oncology treatment services depends on caseload considerations, available expertise, equipment and infrastructure and may include access to Intensity Modulated Radiation Therapy (IMRT). • access to inpatient beds, and participates in multidisciplinary clinics including but not limited to breast, colorectal, gynaecology, lung, melanoma and skin cancer clinics. • may provide short course of palliative radiation therapy to children for symptom relief under supervision of Level 6 radiation oncology service specialising in children. • services may be limited by need to have a critical mass of expertise to ensure quality care. • may be collocated with health service or stand-alone.	• provides a comprehensive range of specialised and highly specialised radiation oncology services, including external beam and brachytherapy services, at regional and statewide levels. • radiation treatment may include IMRT and rotational techniques. • oncology services restricted to limited number of sites due to need to have critical mass of expertise to ensure quality care. • 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. • provides specialised radiation treatment services for rare tumours, including Wilm's tumours, sarcomas, bone tumours and germ cell tumours. • other areas requiring 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 children's radiotherapy services. • additional special treatments and techniques may include: – remote-control intra-cavity equipment with after-loading technique – brachytherapy using eye plaques – intraluminal brachytherapy for bronchus and oesophagus

	Level 5	Level 6
		– 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 module overview, plus: • access to specialised positron emission tomography (PET) service. • on-site, or 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 service network with higher level services ensuring access to information related to 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. • where likely care may be split across two facilities i.e. gynaecology, thorough care planning should be undertaken with full participation by multidisciplinary team.	As per Level 5, plus: • acute inpatient beds 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. • nominal chairperson for each multidisciplinary clinic, responsible for ensuring patient's cancer is staged and appropriate evidence-based treatment recommendations are recorded (with clinic core members usually including surgeons, medical oncologists, radiation oncologists, radiologists and pathologists). • documented processes with children's 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.

	Level 5	Level 6
		• appropriate inverse planning system and independent Intensity Modulated Radiation Therapy dose verification system. • provision of appropriate anaesthetic equipment and expertise where anaesthetic procedures undertaken (refer to Anaesthetic Services module for adult care and Anaesthetic Services - Children's module) • 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 module overview, plus: **Medical** • access-24 hour/s-to registered medical specialist with credentials in radiation oncology. • access to registered medical specialist with credentials in radiation oncology for consultation services, including telephone consultation for complications of treatment and admission for complications within 24 hours. **Nursing** • suitably qualified and experienced registered nurse in charge on each shift. • adequate numbers of suitably qualified and experienced nursing staff on each shift, as required. **Allied health**	As per Level 5, plus: **Medical** • treatment regimens developed and supervised by registered medical specialist with credentials in radiation oncology. **Allied health** • radiation oncology staff to adequately provide special services (e.g. total body irradiation, stereotactic radiosurgery, stereotactic radiotherapy and brachytherapy).

	Level 5	Level 6
	• 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 accessible after hours, as required.	
Specific risk considerations	Nil	Nil

Support services requirements for radiation oncology services

	Level 5		Level 6	
	On-site	Accessible	On-site	Accessible
Anaesthetic				3
Cardiac (relevant section/x)		4		5
Children's anaesthetic				3
Haematological malignancy		4		5
Medical		4		5

	Level 5		Level 6	
Medical imaging		5		5
Medical oncology		4		5
Medication		5		5
Nuclear medicine		5		5
Palliative care		4		5
Pathology		3		3
Renal		4		5
Surgical		4		5
Surgical oncology		4		5

Table note: On-site means staff, services and/or resources located within the health facility or adjacent campus including third party providers.

Accessible means ability to utilise a service (either located on-site or off-site) or skills of a suitably qualified person (who may be either on-site or off-site)—without difficulty or delay—via various communication mediums including but not limited to face-to-face, telehealth, telepharmacy, and/or outreach.

Legislation, regulations and legislative standards

Refer to the Fundamentals of the Framework and Cancer Services Preamble for details.

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

(not exhaustive & hyperlinks current at date of release of CSCF v3.2)

In addition to what is outlined in the Fundamentals of the Framework and Cancer Services Preamble, 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/fileadmin/Public_Web_Site/ICH_Products/Guidelines/Efficacy/E6_R1/Step4/E6_R1__Guideline.pdf
- National Health Service (UK). Manual for Cancer Services. London: NHS Executive; 2004. www.dh.gov.uk/en/Healthcare/Cancer/DH_4135595
- Radiation Oncology Practice Standards, A Tripartite Initiative; 2011. http://www.ranzcr.edu.au/quality-a-safety/radiation-oncology/tripartite-radiation-oncology-practice-standards

Reference list

1. Delaney GP, Jacob S, Featherstone C, Barton MB. Radiotherapy in cancer care: estimating optimal utilisation from a review of evidence-based clinical guidelines. Collaboration for Cancer Outcomes Research and Evaluation (CCORE), Liverpool Hospital, Sydney; 2003.
2. Baume P (chair). A Vision for Radiotherapy: Report of the Radiation Oncology Inquiry. Canberra: Australian Government Department of Health and Ageing; 2002.
3. National Health Service (UK). Manual of Cancer Services Standards. London: NHS Executive; 2001. (Superseded by Manual for Cancer Services, 2004).
4. 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.