Children's 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 Children's Services, the Preamble to Cancer Services and the Radiation Oncology Services module.

Radiation therapy is an important therapy for cancers in children. This type of therapy is used either alone or combined with surgery, chemotherapy and newer biological therapies in the curative or palliative treatment of cancer. Radiation therapy also has a palliative role for metastatic and locally recurrent disease.[1] Radiation oncology services are provided 7 days a week, with staff available, as required by the service.

Radiation oncology services are included in a range of strategies designed to optimise cancer service delivery in Queensland.[2] Strategies include integration of delivery and performance across the continuum of care that includes supportive care and palliative care.

Radiation oncology services provide a range of treatment services in accordance with standardised, evidence-based guidelines and protocols as appropriate. Where standardised radiation therapy protocols do not exist, or patients are not eligible for clinical trials, it is expected that the service will have mechanisms in place for planning, monitoring and reviewing the standard of care provided to these patients.

In addition, radiation oncology services for children provide:

- age- and family-appropriate facilities
- a highly coordinated, multidisciplinary and patient-focused approach to treatment
- supporting infrastructure, including information management, scientific, biomedical and technical services
- documented referral pathways for complications associated with radiation therapy
- access to paediatric rehabilitation and psychosocial support services (including psychology/psychiatry, social work and welfare)
- access to appropriate paediatric allied health professional specialties, particularly occupational therapy for the preparation of children to reduce the need for a general anaesthetic (e.g. use of a mock radiotherapy machine)
- documented processes to manage paediatric emergencies within an adult environment
- documented processes with community support services.

The delivery of radiation oncology services requires specialised facilities and equipment, and is supported by a range of clinical specialities and support services.

The Framework recognises two levels of complexity for radiation oncology service provision for children: Levels 5 and 6. Radiation therapy for children is provided almost entirely at a Level 6 service, principally at the Queensland Children's Cancer Centre. Palliative treatment for children may be provided at a Level 5 service in conjunction with a Level 6 service (Table 1).

Table 1: Levels of complexity for children's radiation oncology services

Service complexity	Level 5	Level 6
	Consults with specialist service (Level 6) for all delivery of radiation therapy for children (e.g. palliation)	Provides primary service and consults with Level 5, as required

Service networks

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

- close integration with children's oncology services, diagnostic services (including high-quality imaging), and allied health and palliative care services,[3] as radiation treatment is often used along with other components of cancer treatment, such as systemic therapy and/or surgery (with these interactions based on the principles of multidisciplinary care)
- utilisation of the Queensland Paediatric Haematology/Oncology Network to enhance the seamless delivery of cancer services and manage/reduce risks of gaps in treatment
- very limited outreach radiation oncology services provided for children due to the service's specialised nature and because radiation therapy for children is provided principally at the Queensland Children's Cancer Centre
- palliative radiation treatment for children may be provided at a Level 5 service with input from a Level 6 service.

Service requirements

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

- demonstrable and documented policies and procedures for the assessment, treatment, evaluation and risk management, and approved treatment protocols for the radiotherapeutic management, of specific tumours and/or tumour sites (i.e. both radical and palliative radiotherapy)
- registers of current registrations/licences to practise for all applicable staff
- management of clinical data is planned, systematic, and supports clinical audits, clinical trials, outcome analyses and cancer registry requirements
- service participation in dosimetric intercomparisons of at least one photon beam
- equipment requirements 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 that has been 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
  - access to an information and treatment management system
  - access to information technology services
  - access to clinical information systems
  - resuscitation equipment specifically for infants, children and adolescents
- the service may have documented processes for access to a brachytherapy service, and 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 established to meet planned patient-care capacity
- a registered medical specialist with credentials in radiation oncology and paediatric expertise
- technician, nursing and allied health staff have experience in paediatrics
- a registered medical specialist with credentials in anaesthetics and subspecialty in paediatric anaesthetics available 24 hours for urgent and elective procedures requiring general anaesthesia
- a registered medical specialist with credentials in radiation oncology to: provide an expert opinion on, and integrated management of, children with cancer; participate in paediatric multidisciplinary teams as a core member; determine treatment regimens, (including treatment volumes, doses and organs at risk) in consultation with a registered medical specialist with credentials in paediatric oncology; write radiation treatment prescriptions; review the treatment plans; and manage the care of patients before, during and after treatment
- radiation therapists who are core members of the radiation treatment planning team and who 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, and provide patient care
- qualified radiation oncology medical physicists, whose roles include:
  - equipment quality assurance
  - dosimetry
  - the 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
  - the evaluation of the accuracy of treatment planning and treatment techniques
  - the planning and delivery of brachytherapy treatments

  - the calibration of external beam and brachytherapy sources
  - the commissioning of new equipment
  - the provision of scientific and technical advice on the selection of new equipment
  - the provision of advice on radiation protection and safety[4]
- nursing staff with appropriate training, knowledge, skills and evidence of ongoing competency in the safe delivery of care for children receiving radiation, who are competent in providing paediatric life support and have knowledge of the common side effects and consequences of radiation therapy and other systemic cancer therapies
- allied health professionals with expertise or interest in childhood cancer, or discipline-specific documented processes with specialty allied health staff within a Level 6 service
- 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 and/or carers, as required.

Level 5 Children's Radiation Oncology Service

Service description

The full suite of radiation oncology services for children, including consultative services and treatment, are delivered in a Level 5 radiation oncology service for children. A Level 5 service may provide a short course of palliative radiation therapy for symptom relief at a Level 5 (adult) radiation oncology service under the supervision of a Level 6 service that specialises in children's services. This service ideally provides day-stay, children-specific beds.

Treatment services for children at a Level 5 service may include external beam therapy, but exclude specialist children's radiation oncology services.

Service requirements

As per module overview, plus:

- provides a limited range of radiation oncology treatment services in accordance with standardised, evidence-based guidelines and protocols, as appropriate
- inclusion in a service network with higher level services, ensuring access to information related to the latest evidence-based care and treatments.

Workforce requirements

As per module overview, plus:

Medical

- a registered medical specialist with credentials in paediatrics and an interest in oncology for patient supervision
- registered medical practitioners competent in providing advanced paediatric life support
- a registered medical specialist with credentials in radiation oncology, available 24 hours for consultation and for children admitted with complications
- all registered medical practitioners have at least a broad understanding of both common and unusual side effects associated with radiation therapy

Allied health

- access—during business hours—to paediatric allied health professionals
- a general physiotherapist available 24 hours
- 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
- allied health professionals who have access to specialty allied health professionals within a Level 6 service who have expertise in the management of children undergoing radiation therapy.

Support service requirements

A Level 5 service requires:

Service	On-site	Accessible
children’s anaesthetic	5	
medical imaging		5
medication		5
nuclear medicine		5
palliative care		5
pathology		3
radiation oncology		5

Level 6 Children's Radiation Oncology Service

Service description

A Level 6 service provides a comprehensive range of specialised radiation oncology treatment services, including total body irradiation, and external beam and brachytherapy services. This service provides regional or statewide services, including treatment for rare tumours, delivered by a highly skilled, multidisciplinary workforce. This service provides support to statewide mortality and morbidity meetings, and has a critical mass of expertise or recognised volume of work to ensure quality care.

Patients should be cared for by a highly skilled, multidisciplinary care team with core members capable of providing the full range of management and support. Core multidisciplinary members will usually include: registered medical specialists with credentials in subspecialties, such as paediatric surgery and paediatric oncology; registered medical specialists with credentials in radiation oncology, radiology and pathology; and registered nurses and allied health professionals who are experts in the care of children and their families.

The service participates in the multidisciplinary clinics in the Queensland Children's Cancer Centre, which ensures that the child's cancer is staged and that appropriate evidence-based treatment recommendations are recorded. Additional special treatments/techniques may include:

- remote-control intracavity equipment with afterloading technique
- brachytherapy using eye plaques
- stereotactic radiosurgery
- intraoperative radiotherapy.

Some treatments (such as unsealed source radiotherapy) may not be available at all Level 6 services.

Service requirements

As per Level 5, plus:

- all clinical staff are competent in providing advanced paediatric life support
- an 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 and Children's Anaesthetic Services module)
- a fully integrated, computer-assisted, networked planning and treatment system with capability for verifying precision, planning and treatment modalities
- the capacity for the safe delivery of sealed and unsealed radioisotopes or radiopharmaceuticals
- appropriate facilities for children's anaesthetics with induction rooms and a recovery area 24 hours
- support areas (consulting rooms and offices) must be collocated with the radiotherapy service

- in preparation for radiation therapy, a room available for the education of children, which may include a mock radiotherapy machine
- facilities available for specialised procedures
- documented processes for subspecialist paediatric services (including a process to manage paediatric emergencies within an adult environment)
- documented processes for adolescent and young adult specialty services when these become available.

Workforce requirements

As per Level 5, plus:

Medical

- a registered medical specialist with credentials in radiation oncology and a special interest in paediatrics to develop and supervise treatment regimes in consultation with a registered medical specialist with credentials in paediatric oncology
- a registered medical specialist with credentials in radiation oncology available 24 hours
- a registered medical practitioner with credentials in radiation oncology available to inpatients 24 hours
- a service for all specialties, where clinically relevant, 24 hours
- a dedicated registered medical specialist with credentials in paediatrics

Allied health

- access to radiation oncology staff with a special interest in paediatric radiation services (e.g. total body irradiation, stereotactic radiosurgery, stereotactic radiotherapy and brachytherapy)
- access to paediatric allied health professionals, as required (e.g. occupational therapists, dentists, speech pathologists and dieticians).

Support service requirements

A Level 6 service requires:

Service	On-site	Accessible
children's anaesthetic	5	
medical imaging		5
medication		5
nuclear medicine		6
palliative care		6
pathology		3
radiation oncology		6

Legislation, regulations and legislative standards

Refer to the Fundamentals of the Framework, the Preamble to Children's Services the Preamble to Cancer Services and the Radiation Oncology Services module for details.

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

In addition to what is outlined in the Fundamentals of the Framework, the Preamble to Children's Services, the Preamble to Cancer Services, the Radiation Oncology Services module and the Children's Cancer Services module, the following is relevant to children's radiation oncology services:

- The Royal Australasian College of Physicians. National Standards for the Care of Children and Adolescents in Health Services. Sydney: RACP; 2008. www.racp.edu.au/page/child-adol.

Reference list

1. Gibbs IC, Tuamokumo N, Yock TI. Role of radiation therapy in pediatric cancer. Hematol Oncol Clin North Am 2006;20(2):455–70.
2. Queensland Statewide Cancer Treatment Services Plan 2008–17. Brisbane: Queensland Health; 2008. www.health.qld.gov.au/publications/qh_plans/QS_cancer_plan_final.pdf
3. National Health Service (UK). Manual of cancer services standards. London: NHS Executive; 2001
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 (ACPSEM) Position Paper. nd.