MINISTRY OF HEALTH
MANATŪ HAUORA

New Zealand Government

Code of Practice for Radiation Therapy

ORS C3

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Contents

Introduction

Purpose and commencement

This Code of Practice for Radiation Therapy ('code') is issued by the Director for Radiation Safety ('the Director') under section 86 of the Radiation Safety Act 2016 ('the Act'). It provides operational details necessary to comply with the fundamental requirements in sections 9 to 12 of the Act. Appendix 1 sets out cross-references between clauses in this code and those fundamental requirements. The requirements in this code do not limit the general nature of the fundamental requirements.

This code comes into force on 9 August 2019.

Scope

This code applies to all activities associated with the use of irradiating apparatus and sealed radioactive material for medical therapeutic purposes. This includes computed tomography equipment used solely for radiotherapy treatment planning or verification.

Activities can include manufacturing, possessing, controlling, managing, using, storing, importing, exporting, selling, supplying and disposing of equipment.

The following are excluded from the scope of this code:

- irradiating apparatus used for diagnostic radiology and image-guided interventional procedures
- unsealed radioactive material used for medical diagnostic or therapeutic purposes
- transport of radioactive material
- security of radioactive material.

Compliance with this code does not imply compliance in related areas such as health practitioner clinical competence, occupational safety, hazards in the workplace, resource management and transport of hazardous substances.

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Roles and responsibilities

The following individuals and bodies have roles and responsibilities in relation to this code.

Director for Radiation Safety – the individual appointed under section 76 of the Act to perform functions and duties and exercise powers set out in the Act, including the power to issue this code.

Ethics committee – a committee that approves programmes of medical research, including the justification of medical exposure of volunteers.

Managing entity – a legal entity that manages or controls radiation sources and must, therefore, obtain a source licence as required by section 13(a) of the Act. This could be, for example, a district health board, company, partnership, trust or individual person.

Manufacturer/supplier – a person or organisation that designs, manufactures, produces, constructs, assembles, installs, distributes, sells, exports or imports radiation sources or develops software that could influence the delivery of medical exposures.

Medical physicist – an individual with specialist education and training in the concepts and techniques of applying physics in medicine and competent to practise independently in the radiation therapy specialty of medical physics and who provides specialist expertise for radiation protection of the patient.

Radiation safety officer – a person competent in radiation protection and safety who the managing entity designates to oversee the application of regulatory requirements for occupational and public radiation protection and safety. In radiation therapy, this role is normally assigned to a medical physicist.

Radiation practitioner – a health practitioner with specialist education and training in the medical uses of radiation who is competent to perform independently and oversee radiation procedures. In radiation therapy, this person is normally a radiation oncologist.

Radiation therapist – a health practitioner with specialist education and training in radiation therapy who plans and delivers radiation treatments, including by creating and evaluating images for localising, planning and delivering radiation treatment according to the prescription of the radiation practitioner.

Referring practitioner – a health practitioner who is approved by the managing entity to refer individuals to a radiation practitioner for medical exposure.

Servicing engineer – a person who has expertise in installing, servicing and maintaining radiation sources and equipment.

Standards dosimetry laboratory – a laboratory that is certified or accredited to develop, maintain or improve primary or secondary standards for radiation dosimetry.

Definitions

Defined terms are identified in **bold** and have the following meanings.

Accident – any **unintended medical exposure** or other unintended event, including operating errors, equipment failures and other mishaps, the consequences or potential consequences of which are not negligible from the point of view of **protection and safety**.

Ancillary equipment – equipment other than **radiation sources** and **protective equipment** that has an impact on the performance of a **radiation procedure**, such as digital image display devices, patient immobilisation devices, treatment planning systems, verification systems and quality assurance equipment.

Comforter/carer – a person who willingly and voluntarily helps (other than in the person's occupation) in the care, support and comfort of a **patient**.

Constraint – a prospective and source-related value of individual dose (dose constraint) or of individual risk (risk constraint) that is used in **planned exposure situations** as a parameter for the **optimisation** of **protection and safety** for the source, and that serves as a boundary in defining the range of options in **optimisation**. Constraints for **occupational exposure**, **public exposure** and **medical exposure** of **comforters/carers** are established or approved by the Director and, if established, are published in a compliance guide issued under this code. Constraints for **medical exposure** of **volunteers** are established or approved by the ethics committee on a case-by-case basis as part of the proposal for medical research.

Controlled area – a defined area in which specific measures for **protection and safety** are or could be required for controlling exposures in normal working conditions, and preventing or limiting the likelihood and magnitude of **potential exposures**.

Dose limit – the value of **effective dose** or **equivalent dose** set out in Schedule 3 of the Act.

Effective dose – the tissue-weighted sum of **equivalent doses** in all specified tissues and organs of the body.

Emergency – any non-routine situation that necessitates prompt action, primarily to mitigate actual or perceived hazards or adverse consequences for human health and safety, quality of life, property or the environment. This includes **radiation emergencies** and conventional emergencies such as fires, release of hazardous chemicals, storms or earthquakes.

Employer – the legal entity that employs **workers**. A self-employed person is regarded as being both an employer and a worker.

Equivalent dose – the radiation-weighted dose in a tissue or organ of the body.

Facility – the location where **radiation sources** and **ancillary equipment** are installed, used, handled or stored.

Health practitioner – an individual who is, or is deemed to be, registered with an authority as a practitioner of a particular health profession under the Health Practitioners Competence Assurance Act 2003.

In-room protective device – device or equipment to reduce exposure to radiation but not worn by a person, such as ceiling-suspended protective screens, protective lead curtains, mobile shields and disposable protective drapes.

Incident – any **accident** or other unintended event, including initiating events, accident precursors, near misses or other mishaps; or unauthorised acts, malicious or non-malicious, the consequences or potential consequences of which are not negligible from the point of view of **protection and safety.**

Individual monitoring – **monitoring** using equipment worn by individuals.

Investigation level – value of a quantity such as **effective dose**, intake or contamination per unit area or volume at or above which an investigation would be conducted.

Irradiating apparatus – electrical equipment that generates ionising radiation as defined in section 5 of the Act.

Justify – determine that the expected benefits to individuals and society from introducing or continuing a practice outweigh the harm, including the radiation detriment, resulting from the practice. For individual **radiation procedures**, this involves weighing expected benefits against the radiation detriment that might be caused, taking account of the benefits and risks of available alternative techniques that do not involve **medical exposure**. 'Justifies', 'justified' and 'justification' have corresponding meanings.

Medical exposure – exposure to ionising radiation experienced by **patients** for the purposes of medical treatment, by **comforters/carers** while caring for, supporting or comforting **patients** undergoing **radiation procedures**, and by **volunteers** in a programme of medical research.

Member of the public – for purposes of **protection and safety**, any individual in the population except when subject to **occupational exposure** or **medical exposure**.

Monitoring – the measurement of dose or dose rate to enable the assessment or control of exposure due to radiation, and the interpretation of the results.

Occupational exposure – exposure of **workers** incurred in the course of their work.

Occupationally exposed person – any person who is subject to **occupational exposure**.

Operational limits and conditions – limits and conditions that are established or approved by the Director and, if established, are published in compliance guides issued under this code.

Optimise – implement a level of **protection and safety** that results in the magnitude of individual doses, the number of individuals (**workers** and **members of the public**) subject to exposure and the likelihood of exposure being as low as reasonably achievable, taking economic and social factors into account. For **medical exposures** of **patients**, this requires managing the radiation dose to the **patient** commensurate with

the medical purpose. 'Optimises', 'optimised' and 'optimisation' have corresponding meanings.

Patient – a person who is subject to **medical exposure** for their own medical benefit.

Personal protective equipment – equipment a person wears to reduce exposure to radiation, such as a protective apron, organ shields, protective eyewear and protective gloves.

Planned exposure situation – situation of exposure that arises from the planned operation of **radiation sources** or from a planned activity that results in an exposure due to a **radiation source.**

Potential exposure – possible future exposure that may result from an anticipated operational occurrence or **accident** at a source or due to an event or sequence of events of a probabilistic nature, including equipment faults and operating errors.

Protection and safety – the protection of people against exposure to ionising radiation and the safety of **radiation sources**, including the means for achieving this, and the means for preventing **accidents** and for mitigating the consequences of **accidents** if they do occur.

Protective equipment – **personal protective equipment** and **in-room protective devices**.

Public exposure – exposure to ionising radiation that a **member of the public** experiences, but excluding any **occupational exposure** or **medical exposure**.

Radiation emergency – an **emergency** in which there is, or is perceived to be, a hazard due to radiation exposure.

Radiation procedure – a procedure that is intended to result in a **medical exposure** delivered by a **radiation source**.

Radiation source – **radioactive material** to which the Act applies or an **irradiating apparatus**.

Radioactive material – any material that spontaneously emits ionising radiation.

Reportable incident – an **incident** reportable to the Director resulting in (a) a **dose limit** being exceeded, (b) a **radiation source** that is lost, missing or beyond regulatory control, or (c) the potential for, serious unintended or unexpected health effects due to radiation exposure, such as the likelihood of a similar event occurring in other radiation therapy facilities, a large number of patients having been affected, and gross misconduct or negligence by the responsible health professionals.

Safety assessment – assessment of all aspects of a practice that are relevant to **protection and safety** to determine the adequacy of provisions for **protection and safety**.

Supervised area – an area other than a **controlled area** for which occupational exposure conditions need to be kept under review, even though specific measures for **protection and safety** are not normally needed.

Unintended medical exposure – exposure of the wrong individual, tissue or organ; exposure that is substantially greater than intended; inadvertent exposure of the embryo or fetus; or failure of a **radiation source**, failure of software or system failure, or error, mishap or another unusual occurrence with the potential for subjecting the **patient** to a **medical exposure** that is substantially different from what was intended.

Volunteer – an individual other than a **comforter/carer** who may be subjected to **medical exposure** as part of a programme of medical research.

Worker – an individual who works, whether full time, part time or temporarily, for the managing entity or another **employer** and who has recognised rights and duties in relation to occupational radiation protection. A self-employed person is regarded as being both an employer and a worker.

Workplace monitoring – **monitoring** carried out in the working environment.

Managing entity

General

1. The managing entity must:

   (a) take prime responsibility for protection and safety

   (b) establish a management system to enhance protection and safety that includes:

      (i) effectively integrating protection and safety into the overall management system of the organisation

      (ii) making a commitment to protection and safety from the highest level of management at the facility, and by providing all required resources

      (iii) promoting continuous improvement and a safety culture

      (iv) appointing a radiation safety officer to oversee the application of regulatory requirements for occupational and public radiation protection and safety

      (v) delegating the planning and delivery of medical exposures to a radiation practitioner[1]

      (vi) ensuring that requirements for shielding, calibration, dosimetry and quality assurance, including the acceptance and commissioning of radiation sources, are fulfilled by or under the supervision of a medical physicist

      (vii) consulting with and engaging the services of other experts and interested parties as necessary

   (c) for all delegations under sub-clauses 1(b)(iv) and 1(b)(v):

      (i) ensure delegates are notified of their duties in relation to protection and safety and assume responsibility for performing them

      (ii) fully document the delegations

   (d) ensure that:

      (i) all activities associated with radiation sources are justified and optimised for protection and safety

      (ii) dose limits for occupational and public exposure are not exceeded as a result of those activities.

[1] The successful completion of radiation therapy procedures relies heavily on a multidisciplinary approach involving radiation practitioners, radiation therapists and medical physicists. The requirement in sub-clause 1(b)(v) relates only to the overall responsibility and should be read in conjunction with other clauses that require further formal delegations and supervision or involvement of other professionals.

2. The managing entity must ensure that no practice or procedure is undertaken unless it has:

   (a) been justified generically by a health authority

   (b) been:

      (i) approved by an ethics committee for medical exposures incurred as part of a programme of medical research

      (ii) justified individually for the patient by a radiation practitioner in any other case.

Safety assessment

3. The managing entity must conduct, document and keep up to date a safety assessment to:

   (a) identify the ways in which occupational, public and medical exposures could be incurred

   (b) determine the expected likelihood and magnitudes of exposures in normal operation and, to the extent reasonable and practicable, assess potential exposures, including the possibility of unintended or accidental medical exposures

   (c) assess the adequacy of provisions for protection and safety in respect of siting, design and operation.

Facilities

4. The managing entity must:

   (a) provide facilities that are located, designed, manufactured, constructed, assembled, commissioned, operated, maintained and decommissioned through adopting good engineering practice, minimising the need to rely on administrative controls and personal protective equipment for protection and safety

   (b) shield all areas in which radiation procedures are performed, so that protection and safety are optimised

   (c) designate and delineate appropriate areas as controlled areas or supervised areas and periodically review those designations and delineations

   (d) prominently display signs:

      (i) specifying the actual or potential presence of ionising radiation, using the symbol recommended by the International Organization for Standardization at access points to controlled areas and supervised areas and at appropriate locations within controlled areas

      (ii) controlling access by members of the public to controlled areas and supervised areas

Radiation sources and equipment

5. The managing entity must:

   (a) provide, maintain, test and service radiation sources, protective equipment and ancillary equipment so that:

      (i) they are appropriate for the radiation procedures to be performed

      (ii) they remain capable of fulfilling their design requirements for protection and safety, and performance specifications throughout their lifetime

      (iii) the protective value of protective equipment is clearly displayed on the equipment

   (b) cooperate with manufacturers/suppliers to:

      (i) ensure that the requirements in sub-clause 5(a) are met

      (ii) ensure that radiation sources are used only if they conform to the applicable standards of the International Electrotechnical Commission and the International Organization for Standardization

      (iii) share information on use and operating experience that may be important for protection and safety

      (iv) apply the principles of optimisation in the design, planning, operation and decommissioning of a radiation source

   (c) safely manage all radiation sources, including through acceptance, commissioning and ongoing quality assurance, to maintain performance and safety whether or not they are in use

   (d) maintain an accurate inventory of all radiation sources, including their:

      (i) location, description and serial number if any

      (ii) activity and form if they are radioactive sources

      (iii) source categorisation if they are sealed radioactive sources

   (e) maintain a record of maintenance for each item, including a fault log and faults and remedial actions taken (interim and subsequent repairs), service reports, the results of testing before an item is reintroduced to clinical use, and any reports from servicing engineers

   (f) maintain control of radiation sources to prevent loss or damage and to prevent any person from carrying out unauthorised activities including by:

      (i) periodically checking that they are under control and in the locations recorded in the inventory maintained under clause 5(d)

      (ii) releasing them only to people who are authorised to assume management and control under the Act

   (g) take immediate steps to regain control of any radiation source that is abandoned, lost, misplaced, stolen or otherwise transferred without proper authorisation.

6. The managing entity must ensure that:

(a) all sources giving rise to medical exposure are calibrated in terms of appropriate quantities, using internationally accepted protocols

(b) calibrations are carried out at the time of commissioning radiation sources before clinical use, after any maintenance procedure that could affect the dosimetry and at intervals approved by the Director, and published in compliance guides issued under this code

(c) calibrations of radiation therapy units are subject to independent verification before they are used clinically, and periodically thereafter[2]

(d) all dosimeters used for the calibration of sources are calibrated at least every two years and that such calibrations are traceable to a standards dosimetry laboratory.

7. The managing entity must provide, maintain, test, calibrate and service equipment, other than radiation sources, to a level sufficient to ensure compliance with this code. This includes equipment for personal protection, monitoring and measurement for compliance verification, accident verification, emergency response, and protection and safety of members of the public.

Training and authorisation

8. The managing entity must ensure that all people with responsibilities for protection and safety:

(a) are specialised, qualified, educated and trained in protection and safety so that they understand their duties and can perform them competently

(b) satisfy the training requirements in Appendix 2

(c) are named in a current list with details of their specialisation, qualification, education and training

(d) are notified of their duties in relation to protection and safety

(e) are authorised to assume their roles and responsibilities.

Policies, procedures and local rules

9. The managing entity must establish, implement and maintain policies and procedures to meet the requirements of this code including, without limitation, policies and procedures to:

(a) control access to areas where people can be exposed to radiation

(b) use constraints to optimise radiation protection and safety

[2] Independent verification' ideally means verification by a different, independent medical physicist using different dosimetry equipment. However, other options, such as verification by a second medical physicist or verification using a second set of equipment, or even using a form of verification by postal thermoluminescence dosimetry, could be acceptable. In checking for compliance, the regulatory body needs to be aware of the limitations on local resources.

(c) prevent accidents and mitigate the consequences of any that occur

(d) report on and learn from accidents and other incidents

(e) comply with operational limits and conditions relating to public exposure

(f) ascertain the pregnancy status of female patients who have reproductive capacity before performing any radiation procedure that could result in a significant dose to the embryo or fetus

(g) comply with directions issued by the Director about releasing patients who are emitting radiation as a result of radiation therapy treatment

(h) provide protection and safety by applying preventive measures in the following hierarchy:

(i) engineered controls

(ii) administrative controls

(iii) personal protective equipment

(i) set investigation levels and establish procedures to follow if such a level is exceeded

(j) implement procedures for verifying compliance with this code

(k) periodically review the overall effectiveness of measures for protection and safety.

10. The managing entity must maintain, publish and enforce any written local rules that are necessary for protection and safety.

Patient dosimetry

11. The managing entity must, in consultation as appropriate with the radiation practitioner, radiation therapist and medical physicist:

(a) perform and document dosimetry of patients to identify absorbed doses to the planning target volume or alternative dose reference point or volume, and relevant organs at risk as the radiation practitioner specifies for each patient

(b) in order to satisfy the requirements in sub-clause 11(a):

(i) follow internationally accepted protocols

(ii) use only dosimeters with current calibrations traceable to a standards dosimetry laboratory.

Monitoring and measurement

12. The managing entity must establish and maintain:

(a) a programme of continuous individual monitoring whenever appropriate, adequate and feasible, which is sufficient to assess occupational exposures

for workers who usually work in a controlled area or who may receive a dose exceeding 10 percent of the dose limits

(b) a programme of workplace monitoring under the supervision of a radiation safety officer that is sufficient to:

(i) evaluate radiation conditions in all workplaces

(ii) assess exposures in controlled areas and supervised areas that are not assessed under sub-clause 12(a)

(iii) review the classification of controlled areas and supervised areas

(c) a monitoring programme for all workers who could be subject to exposure due to contamination, which is sufficient to:

(i) demonstrate the effectiveness of the measures for protection and safety

(ii) assess intakes of radionuclides and committed effective doses

(d) programmes of source monitoring or environmental monitoring that are sufficient to assess public exposure arising from radiation sources under the responsibility of the managing entity

(e) a capability that is sufficient to monitor unexpected increases in radiation levels due to an incident attributed to a source or facility for which the managing entity is responsible

(f) other monitoring or measurement programmes as necessary to verify compliance with the requirements in this code.

13. To satisfy the monitoring and measurement requirements in clause 12, the managing entity must:

(a) use appropriate monitoring equipment

(b) for continuous individual monitoring under sub-clause 12(a), use an external service or internal capability only if that service or capability:

(i) is approved by the Director

(ii) returns results to the managing entity within 20 working days of receiving all necessary raw information.

14. The managing entity must:

(a) use best endeavours to obtain previous radiation dose records for all workers

(b) maintain records of all monitoring and verification of compliance, including records of:

(i) occupational exposure during and after the worker's working life, at least until the worker attains or would have attained the age of 75 years, and for not less than 30 years after ceasing work where the worker was subject to occupational exposure

(ii) estimated doses to members of the public

(iii) the tests and calibrations carried out

(c) provide records of occupational exposure to:

(i) individual workers in respect of their own exposure

(ii) subsequent employers of workers, subject to satisfying confidentiality criteria

(iii) the Director on request or if the managing entity is no longer able to maintain records as required under sub-clause 14(b)

(d) provide records of source monitoring and environmental monitoring to assess public exposure to:

(i) members of the public on request

(ii) the Director on request

(iii) the Director immediately, if any levels exceed operational limits and conditions relating to public exposure or there is a significant increase in dose rate that could be attributed to the authorised practice.

Incidents, accidents and emergencies

15. The managing entity must:

(a) take all practicable steps to minimise the likelihood of accidents, including by using a multilevel system of sequential, independent provisions for protection and safety, commensurate with the likelihood and magnitude of potential exposures

(b) take timely action to mitigate the consequences of any accident that does occur and restore radiation sources to a safe condition

(c) promptly investigate any incident, including by:

(i) calculating or estimating doses a person has received and, if applicable, the dose distribution within them

(ii) identifying corrective actions required to prevent a recurrence

(d) implement all corrective actions identified in sub-clause 15(c)(ii)

(e) keep a written record of the incident, including the:

(i) cause or suspected cause

(ii) calculations made under sub-clause 15(c)(i)

(iii) corrective actions identified under sub-clause 15(c)(ii)

(iv) details of the implementation of corrective actions under sub-clause 15(d)

(f) ensure that the referring practitioner and the patient (or the patient's legal representative) are informed of any unintended medical exposure

(g) promptly notify any reportable incident to the Director.

16. If the safety assessment required by clause 3 indicates that an emergency affecting either workers or members of the public is reasonably foreseeable, the

managing entity must prepare an emergency plan to protect people and the environment, which includes:

(a) arrangements for promptly identifying an emergency

(b) determining the correct level of emergency response

(c) provision for individual monitoring, area monitoring and arrangements for medical treatment

(d) arrangements for assessing and mitigating any consequences of an emergency.

Records

17. The managing entity must maintain adequate records, and make them available as necessary, including records of:

(a) the delegation of responsibilities

(b) the names of all people with responsibility for protection and safety, including details of their specialisation, qualifications, education and training

(c) results of calibrations and periodic checks of physical and clinical parameters selected during treatment of patients

(d) dosimetry of patients

(e) for all procedures involving planning target volumes, either:

(i) a description of the planning target volume, the absorbed dose to the centre of the planning target volume, and the maximum and minimum absorbed doses delivered to the planning target volume, or

(ii) equivalent alternative information on absorbed doses to the planning target volume and the absorbed doses to relevant tissues or organs, as the radiation practitioner decides

(f) for all external beam radiotherapy procedures involving planning target volumes:

(i) dose fractionation

(ii) overall duration of the treatment

(g) for all procedures not involving planning target volumes:

(i) dose

(ii) prescription point/isodose

(iii) dose fractionation and overall duration of the treatment

(iv) modality site, including laterality when relevant

(h) the quality assurance programme

(i) information necessary for the retrospective assessment of doses

(j) exposure records for volunteers subject to medical exposure as part of a programme of medical research

(k) reports on investigations of unintended and accidental medical exposures

(l) exemptions from this code granted under section 86(3) of the Act.

Quality assurance

18. The managing entity must establish a comprehensive quality assurance programme for medical exposures, which covers:

    (a) measuring the physical parameters of radiation sources, including calibrating output in terms of appropriate quantities using internationally accepted protocols, which it carries out:

        (i) at the time it accepts and commissions the equipment, before practitioners use it clinically on patients

        (ii) periodically after that first check

        (iii) after any major maintenance procedure that could affect the protection and safety of patients

        (iv) after installing any new software or modifying any existing software that could affect the protection and safety of patients

    (b) performing quality control tests on ancillary equipment and personal protective equipment

    (c) adopting internationally accepted tolerance limits for the physical parameters mentioned in sub-clauses 18(a) and 18(b), and implementing corrective actions if measured values fall outside those tolerance limits

    (d) verifying the appropriateness of physical and clinical factors used in radiation procedures

    (e) maintaining records of relevant procedures and results

    (f) periodically checking the calibration and conditions of operation of dosimetry equipment and monitoring equipment.

19. The managing entity must ensure that regular internal or external independent audits are made of the quality assurance programme for medical exposures.

20. The managing entity must ensure that radiation practitioners, in cooperation with radiation therapists and medical physicists, periodically undertake a critical review of the current practical application of the radiation protection principles of justifying and optimising radiation procedures.

Radiation practitioner

General

21. The radiation practitioner:

    (a) is responsible for overall protection and safety in the planning and delivery of the medical exposure

    (b) must, to satisfy the responsibility in sub-clause 21(a), delegate functions and consult as appropriate with radiation therapists and medical physicists[3]

    (c) must inform in advance all individuals who may be subject to medical exposure (or their legal authorised representatives) of the expected benefits, risks and limitations of the procedure, as appropriate

    (d) must ensure that the clinical context of any procedure is documented.

Justification

22. The radiation practitioner must:

    (a) obtain information on the clinical context for any procedure

    (b) justify the medical exposure in consultation as appropriate with the referring practitioner, taking into account, in particular for paediatric or possibly pregnant individuals:

        (i) the appropriateness of the request

        (ii) the urgency of the procedure

        (iii) the characteristics of the medical exposure

        (iv) the characteristics of the individual patient

        (v) relevant information from the patient's previous radiation procedures

        (vi) relevant national or international referral guidelines.

Optimisation

23. The radiation practitioner must, in consultation as appropriate with medical physicists and operators, ensure that protection and safety are optimised for each medical exposure by:

[3] The managing entity has obligations under clause 1 to ensure that these delegations are notified and documented and that delegates assume responsibility for the delegated functions.

(a) keeping the exposure of volumes other than the planning target volume as low as reasonably achievable, consistent with the delivery of the prescribed dose to the planning target volume within required tolerances

(b) using constraints in any procedure in which an individual:

(i) acts as a comforter/carer

(ii) is subject to exposure as part of a programme of research.

24. The radiation practitioner must ensure that particular aspects of medical exposures are considered in the optimisation process for:

(a) paediatric patients

(b) volunteers subject to medical exposure as part of a programme of medical research

(c) procedures involving computed tomography

(d) exposure of the embryo or fetus.

Other parties

Referring practitioner

25. The referring practitioner must:

    (a) provide sufficient information on the clinical context of the procedure in the referral

    (b) cooperate with the radiation practitioner as part of the justification of the procedure in accordance with clause 22.

Manufacturer/supplier

26. The manufacturer/supplier of radiation sources, protective equipment and ancillary equipment must:

    (a) supply well-designed, well-manufactured and well-constructed radiation sources and equipment that:

        (i) provides for protection and safety in line with the requirements of this code

        (ii) meets engineering, performance and functional specifications

        (iii) meets quality standards appropriate to the significance of systems and components, including software, for protection and safety

        (iv) provides clear displays, gauges and instructions on operating consoles

    (b) test radiation sources and equipment to demonstrate compliance with relevant specifications

    (c) provide information on how to properly install and use radiation sources and equipment and on associated radiation risks, including performance specifications, instructions for operating and maintenance, and instructions for protection and safety

    (d) optimise the protection provided by shielding and other protective equipment

    (e) supply all radiation sources and equipment with all appropriate radiation protection tools as a default, rather than as optional extras.

27. The manufacturer/supplier must:

    (a) make suitable arrangements with managing entities to share information on use and operating experience that may be important for protection and safety

    (b) cooperate with the managing entity as required by sub-clause 5(b).

Servicing engineer

28. The servicing engineer must:

    (a) install and service radiation sources and equipment competently, so that they comply with the requirements in clause 5

    (b) cooperate with the managing entity to ensure that radiation sources and equipment cannot be used clinically while they are being installed or serviced

    (c) after installing or servicing the radiation sources or equipment:

        (i) collaborate with the managing entity and medical physicists to ensure necessary quality control tests are completed successfully

        (ii) provide a written report to the managing entity describing the fault (if any), the work done, parts replaced, adjustments made and any changes that may affect protection and safety.

Appendix 1: Cross-reference to Radiation Safety Act 2016

As required by section 87(1) of the Radiation Safety Act 2016, clauses in this code apply to the fundamental requirements in sections 9–12 of the Act as follows.

Section in Act	Clauses in this code
9(1)	1–3, 5, 8–10, 21–22, 25
9(2)	1, 3–5, 7–14, 17, 21, 23–24
9(3)	1, 3–5, 7–10, 12–14, 17
10	1, 3, 5, 7, 9–10, 15–20, 26–28
11	5
12	1, 3, 5, 7, 9–10, 15–20, 26–28

Appendix 2: Training requirements

	RO	RT	MP	SIE	RSO
Atomic structure, production and interaction of radiation	m	m	h	m	l
Nuclear structure and radioactivity	m	m	h	m	l
Radiation quantities and units	m	m	h	m	l
Physical characteristic of radiation sources	m	h	h	h	m
Fundamentals of radiation detection	m	h	h	h	m
Principle and process of justification	h	h	h	x	m
Fundamentals of radiobiology, biological effects of radiation	h	m	h	l	l
Risks of cancer and hereditary disease	h	h	h	l	l
Risks of deterministic effects	h	h	h	x	l
General principles of radiation protection, including optimisation	h	h	h	m	h
Operational radiation protection	h	h	h	m	h
Particular patient radiation protection aspects	h	h	h	m	l
Particular staff radiation protection aspects	h	h	h	m	h
Typical doses from therapeutic procedures	h	h	h	l	m
Risks from fetal exposure	h	h	h	l	l
Quality control and quality assurance	m	h	h	h	h
National regulations and international standards	m	m	h	h	h

Abbreviations used in this appendix

Parties

RO – radiation oncologist
RT – radiation therapist
MP – medical physicist
SIE – servicing and installation engineer
RSO – radiation safety officer

Level of knowledge

x – no requirement
l – low level of knowledge (general awareness and understanding of principles)
m – medium level of knowledge (basic understanding of the topic sufficient to influence practices undertaken)
h – high level of knowledge (detailed knowledge and understanding sufficient to be able to educate others)

Equivalences

The training requirements in this appendix are deemed to be satisfied as follows.

RO	Health practitioners registered in the radiation oncology scope of practice by the Medical Council of New Zealand
RT	Health practitioners registered in the radiation therapist scope of practice by the Medical Radiation Technologists Board
MP	People who are registered in the radiation oncology specialty of medical physics by the Australasian College of Physical Scientists and Engineers in Medicine
RSO	People who are registered in the radiation oncology specialty of medical physics by the Australasian College of Physical Scientists and Engineers in Medicine