

Module Six

Part Two – Providing care for the person having radiotherapy for cancer

Overview

The aim of this module is to develop the ability of the beginning specialist cancer nurse to demonstrate competence across all domains of practice when caring for the person having radiotherapy for cancer.

Key concepts

The key concepts associated with providing care for the person having radiotherapy for cancer include:

- Factors influencing selection of radiotherapy for treatment of cancer.
- Experience and impact of radiotherapy on various health domains.
- Prevention, detection, and management of common health alterations experienced by people receiving radiotherapy to treat cancer.
- Providing comprehensive, coordinated, specialised and individualised information and education to the person having radiotherapy for cancer – demonstrated application of EdCaN Competency Standard practice dimension 3.4 Information provision and education within the ICAT.

Learning activities

At times, you will have learning activities to complete. The questions will relate to the content you've just read or the video you've just watched.

Resource links

Resource links may be included throughout the module. These links lead to interesting resources, articles or websites, and are designed to encourage you to explore other available information.

Videos

You may be prompted to access EdCaN videos throughout this module.

Estimated time to complete

20 hours

Objectives

On completion of this supporting resource, you should be able to:

1. Perform a comprehensive health assessment on a person prior to, during, and following radiotherapy.
2. Analyse clinical, psychological and social data to formulate and implement an individualised plan of care for the person having radiotherapy
3. Demonstrate delivery of effective nursing care to prevent, detect, and manage early and late effects associated with radiotherapy.
4. Demonstrate safe practice based on ALARA principles.
5. Demonstrate effective educational strategies in providing individualised information to the person having radiotherapy.

Factors influencing the use of radiotherapy

The treating team considers a range of factors when deciding on a course of radiotherapy. Tumour related factors include:^{1, 2}

- the site of the cancer
- an histologically-proven cell type
- the grade and stage of the tumour
- the radiosensitivity of the tumour.

Individual factors that can influence the decision to use radiotherapy include comorbidities, performance status, and lack of suitability for surgical resection or anaesthesia.

A significant proportion (approximately 50%) of the population undergoing radiotherapy are treated palliatively to manage local recurrence and alleviation of unresectable tumours.³ Palliative indications include:³⁻⁵

- treating pain from bony metastases and pathological fractures
- providing relief from symptoms caused by cerebral metastases
- relieving spinal cord compression
- superior vena cava obstruction
- control of bleeding
- reducing fungating lesions.

Resource link

The key concepts underpinning radiotherapy were reviewed in Module 4: Cancer treatment principles. Review that content and the learning activities before completing this module.

Learning Activity

Completed

Activity

1. Complete a comprehensive health assessment on an individual prior to treatment with radiotherapy and complete the following:
 - identify the intent of the therapy
 - access relevant clinical practice guidelines and outline the evidence supporting this treatment approach
 - describe other factors which influenced the person's decision making process.

Care of the person having radiotherapy

There are three phases of the person's radiotherapy treatment journey including:⁶

1. treatment planning and preparation
2. treatment delivery
3. treatment completion and management of responses to radiotherapy.

Treatment planning and preparation

Treatment planning is essential to ensure accuracy and reproducibility of the radiotherapy.^{6, 7} This procedure determines the dimensions, shape, and appropriate number of radiation beams (or treatment fields) required to treat the tumour while limiting the dose to the surrounding normal tissues. Through this process, radiotherapy treatments are tailored to the individual.⁸

Positioning and stabilisation

The chosen treatment position depends on the site of the person's tumour. Individuals are positioned to avoid unnecessary irradiation of normal tissues. The position needs to be easily reproducible each day. Stabilisation devices include face masks and custom made positioning supports for different areas of the body (e.g. neck, arms, pelvis, and knees). Such devices help the person maintain the required position during treatment.⁹

Simulation

A simulator 'simulates' the movement and set-up parameters of the linear accelerator involved in radiotherapy treatment delivery.^{10, 11} Virtual simulation may be completed using results from imaging procedures imported into a 3D treatment planning computer. Virtual representation of the person may be generated through:

- computed tomography image (also called a planning CT)
- magnetic resonance imaging (MRI) or positron emission tomography (PET) scans (provides enhanced anatomical or metabolic tumour information, supplementing the planning CT scan through the process of image fusion)¹²
- 4D or respiratory-gated planning CT scans (tracks the movement of a lung or abdominal tumour during breathing to ensure the tumour is always in the path of the treatment fields).¹³

The simulation process determines placement of external marks on a person that are used to accurately direct the treatment fields of the person's daily treatment. External treatment marks are often small tattoos, usually the size of a small freckle. Some stabilisation devices (such as face masks) also allow for the treatment marks to be placed on the device rather than the person's skin to avoid embarrassing marks on the face.⁹

Once the simulation process is complete, dose calculations determine the amount of radiation to be delivered each day. The isodose curve is the basis of all calculations, and is used to: ¹⁴

- determine the daily dose
- show the total distributed radiation dose in an individual for the intended course of treatment
- act as a record of the treatment delivered.

Planning and preparation can be a lengthy process that adds to the anxiety and concerns for the person undergoing radiotherapy. Providing an orientation to the treatment area, information and education, and assessment of levels of anxiety and depression before radiotherapy can reduce anxieties and enhance compliance with therapy.¹⁵

Learning activities

Completed

Activities

1. Follow a person through a treatment planning session and reflect upon actual and potential needs an individual can experience in the process.
2. For the individual assessed in the previous learning activity, outline potential and actual supportive care needs they can experience due to their proposed treatment approach.
 - Outline information and resources you can provide for them and their family at this time.

Treatment delivery

There are a variety of external or internal cancer treatment delivery methods including:

1. Gamma Knife
2. External beam radiotherapy (EBRT)
3. Brachytherapy
4. Combined modality treatment.

This enables a range of radiotherapy schedules that best suit the tumour type and stage of a cancer to be considered.^{16, 17}

Gamma Knife

Gamma Knife® technology delivers a highly precise form of radiosurgery called stereotactic radiosurgery. It is a non-invasive alternative to neurosurgery which uses radioactive sources to predominantly treat brain tumours. Malignant or benign brain tumours may be treated with the Gamma Knife, and can be performed on an outpatient basis, thus reducing the risk of complications and side effects. Multiple lesions can also be treated simultaneously and accurately⁶⁴. At present, Gamma Knife radiosurgery is available in Australia at the [Princess Alexandra Hospital, Brisbane](#), and at [Macquarie University Hospital, Sydney](#). A [patient information video](#) on Gamma Knife discusses the mechanism and benefits of Gamma Knife technology.

External beam radiotherapy (EBRT)

EBRT is delivered via a linear accelerator. The linear accelerator is an ionising, radiation-generating machine capable of producing radiation energies 1000 times greater than a conventional diagnostic x-ray unit. X-rays (also called photons) used in radiotherapy are in the magnitude of mega-volts (MV - millions of volts).¹¹ Electrons (the most common particle beam produced by linear accelerators) are used to treat superficial disease.¹⁴ Photon or electron beams produced by a linear accelerator can be projected into a person from any angle. Photons – significantly more penetrating than electrons – are used to treat deep tumours.¹⁴

Brachytherapy

Brachytherapy is the temporary or permanent placement of a sealed or unsealed radioactive isotope into a body tissue or cavity. The rationale for using brachytherapy includes preservation of vital organ function, reduction of damage to surrounding tissues, improvement in control of local disease, and treatment of areas that may be at high risk for recurrence.¹

Brachytherapy is used for cancers of the endometrium, breast, cervix, lung, head and neck, colon, prostate, thyroid, and ocular melanoma.¹⁸ Individuals receiving brachytherapy are often treated as an outpatient (but can be an inpatient) depending on the type of therapy to be delivered.¹⁹ Due to the nature of the delivery of the radioactive source, specific safety precautions and procedures must be adhered to.

Learning activities

Completed

Activities

1. Outline the education you would provide for a person admitted for treatment with iodine-131 for thyroid cancer to promote safety for the person and health workers.

- 2. Demonstrate safe and effective management of a mock spill of blood or body fluid from a person who received iodine-131 within the last 24 hours.
- 3. Describe interventions the nurse can use to ensure the psychosocial well-being of a woman having brachytherapy for cervical cancer.

Combined modality treatment (CMT)

In combined modality treatment (CMT), antineoplastic agents are delivered at specific, prescribed intervals with radiation treatment to elicit a targeted response.^{20, 21} The treatment approaches may be termed:²²

- neoadjuvant therapy (administered before local radiation to shrink a tumour)
- concomitant therapy (administered during radiation to enhance or increase radiation cell kill)
- adjuvant therapy (administered after a course of radiation to control micrometastases and subclinical disease).

The goal of CMT is to achieve a greater therapeutic gain than can be obtained by using either therapy alone. Improved 'cell kill' in the oesophagus, rectum, lung and head and neck have been reported with CMT.²³⁻²⁶ Radiation effects are augmented in normal tissue when an antineoplastic agent is added to the treatment regime, causing normal tissues to become increasingly vulnerable to both acute reactions and chronic late sequelae. The inclusion of the antineoplastic agent(s):²⁴

- creates a synergism with the local effects of the radiation therapy and sensitises the cells to the radiation cell kill
- improves tumour oxygenation and cell kill
- protects normal tissues in the radiation pathway and therefore allowing an increase in radiation dose
- plays a role in eradicating micrometastases due to systemic effects.

The impact and complexity of effects for people receiving this treatment are increased, requiring targeted education and a range of specific supportive care interventions.^{26, 27}

Learning activities

Completed

Activities

1. Identify examples of treatment protocols for the following CMT approaches:

- Neoadjuvant
- Concomitant
- Adjuvant.

2. Review the EdCaN case study for [Burt](#).²⁸



- Outline how you can ensure that health and safety considerations for staff and Burt are maintained in hospital and in the community whilst he receives concomitant therapy.

Management of responses to radiotherapy

Radiotherapy effects can have a debilitating impact on an individual's quality of life, and the severity and frequency of adverse effects can affect treatment delivery. The effect of radiation is a complex series of interactions that can occur within a fraction of a second or several years after treatment.²⁹

While radiotherapy affects all body tissues in the path of the radiation treatment beam, every person will react differently to the radiotherapy due to a range of treatment factors and individual characteristics.³⁰

Factors influencing responses to ionising radiation include:³¹

- body site
- treatment intent (curative/palliative)
- dose
- treatment volume
- machine energy
- neoadjuvant therapy.

The individual's emotional responses to radiotherapy are influenced by:

- the severity of symptoms and specific side effects of treatment^{32, 33}
- the need to be accommodated away from home for the duration of the radiation treatment
- difficulties managing in an unfamiliar environment away from usual support system
- long distance travel for treatment each day^{34, 35}
- limited knowledge or resources to manage these problems.³⁶⁻³⁸

Radiation treatment effects can be divided into acute and late reactions. Acute radiotherapy reactions occur within days to weeks after commencing treatment, whereas late effects occur weeks to years after completing treatment.³⁹ Healthy tissue responds to radiotherapy with an inflammatory response. The greatest adverse effects occur in tissues that are radiosensitive such as the skin and mucous membranes.^{6, 31} The severity of effects is related to the cumulative radiation dose over time.^{40, 41}

There is a lack of standardised assessment of radiation side-effects and cancer treatment toxicity. Symptoms develop in several stages, further compromising effective assessment and monitoring of toxicities associated with radiotherapy.¹⁵

Learning activity

Completed

Activity

1. Appraise current assessment tools in your health care facility for their capacity to effectively assess the following effects:
 - radiation skin reactions
 - xerostomia
 - diarrhoea.

Acute effects

The following list outlines common acute radiation toxicities associated with specific treatment sites:⁴²

Brain

- alopecia and scalp erythema
- ear and external auditory canal
- cerebral oedema
- nausea and vomiting
- somnolence syndrome.

Eye

- conjunctival oedema and tearing.

Head and neck

- oral mucositis
- oral candidiasis
- oral herpes
- xerostomia
- oesophagitis and pharyngitis
- taste changes (dysguesia, ageusia)
- laryngitis
- dental caries.

Breast

- skin reactions
- oesophagitis.

Chest and lung

- oesophagitis and pharyngitis
- taste changes
- pneumonitis.

Abdomen and pelvis

- nausea and vomiting
- diarrhoea and proctitis
- cystitis
- vaginal dryness.

Learning activities

Completed

Activities

- 1. Explain why some tissues are more prone to radiation effects than others.
- 2. Reassess the person identified in the pretreatment phase.
 - Use evidence based assessment tools to appraise their treatment related effects. Summarise how their supportive care needs have changed compared with the earlier assessment.
 - Outline nursing interventions to prevent and manage their treatment related effects.
- 3. Demonstrate principles of information provision and supportive care in an education session regarding the prevention and/or management of an acute radiotherapy effect.

Managing acute treatment related effects

Individuals receiving radiation treatment often have multiple and complex care requirements and supportive interventions are required to maximise wellbeing and quality of life. Common effects specifically associated with radiotherapy include:

- fatigue
- radiation enteritis
- radiation skin reactions
- sexual dysfunction
- mucositis.

Fatigue

Fatigue is a significant symptom associated with radiotherapy. Affected individuals experience tiredness, weakness, exhaustion, lack of energy, malaise, and impaired ability to concentrate and complete activities of daily living.⁴²

Prepare people affected by cancer for the possibility of fatigue related to their radiotherapy. To prevent further anxiety, they should also be prepared for the potential severity and extended duration of fatigue following completion of treatment.¹⁵

Assessment is important in managing fatigue, which needs to be differentiated from depression. Anaemia related to disease, radiotherapy or adjuvant therapies also needs to be excluded. Subjective assessment using a 0 to 10 scale is recommended.¹⁵

Due to the lack of clear aetiology and mechanism of radiation-induced fatigue, interventions are mainly based on behavioural or psychosocial strategies. It appears that fatigue management needs to be individually tailored. Physical exercise and psychosocial interventions have been associated with positive effects against fatigue both during and after treatment for cancer.⁴³

The management of fatigue should be in line with supportive care principles as discussed in Module 5: Cancer supportive care principles.

Learning Activities

Completed

Activities

1. Access the EdCaN case studies and hear [Libby's experience](#)⁴⁴ of radiotherapy.



- Review current literature and outline evidence based recommendations you could provide to Libby regarding management of her fatigue and cognitive dysfunction.

Radiation enteritis

Radiation enteritis is a common effect of radiotherapy with fields that involve the pelvis or abdomen. Symptoms include nausea, diarrhoea, abdominal cramps and proctitis.⁴⁵

Diarrhoea is the most common acute side effect of radiation to the abdomen and pelvis and may vary from mild to severe. Diarrhoea may be a treatment-limiting side effect and requires careful monitoring and swift treatment. The individual may also experience abdominal cramping, tenesmus, and proctalgia.²³

These effects may be severe and impact on wellbeing (both physically and emotionally) as pain and discomfort and frequent trips to the toilet can interfere with sleep and rest patterns, and may limit normal activities.⁴⁵ Education, reassurance, a low residue diet and anti-diarrhoeals are beneficial in managing this symptom.⁴⁶

The management of radiation enteritis should be in line with supportive care principles as discussed in Module 5: Cancer supportive care principles.

Learning activities

Completed

Activity

1. Access current literature and provide evidence based rationales for the following interventions in the management of acute radiation enteritis:
 - low-fat diet
 - low-residue diet
 - anti-diarrhoeal medication
 - sucralfate.

Radiation skin reactions

The skin response to radiation depends on numerous radiation- and individual-related factors and can vary in intensity and duration.^{20, 47} The single most important factor is the location of the radiation field.⁴² Nursing interventions are targeted at the assessment of skin reactions, teaching skin care and managing skin breakdown if it occurs.

Acute effects of radiation skin reactions are visually assessed and defined in stages from erythema to dry or moist desquamation.⁴² Digital photography is an effective tool for recording skin erythema.¹⁵

Education on the basic principles of skin care in radiation oncology includes avoiding mechanical, thermal and chemical irritation. Radiation treatment has a drying and irritant effect on skin, and recent studies have supported the application of a moisturising cream to the treated area at least twice a day from the beginning of treatment.^{40, 48, 49}

The goals of skin care management are to enhance comfort, promote healing, minimise trauma and prevent infection if skin breakdown occurs.⁴²

Dressings

Dressings are required once the skin has broken. Exposure of superficial nerves can cause moderate to severe pain. Sera may be released from damaged cells, and dressings need to be moist and non-adherent so that new epithelial cells are not separated from the vascular bed. A wound with serous loss is a potential site for infection, and the dressing needs to maintain cleanliness and prohibit the growth of damaging microorganisms.

Dressings to broken skin areas also need to protect against friction from clothes and other irritants. Hydrogel and hydrocolloid wound dressings can provide protection, and maintain a moist, healing environment.^{40, 46, 50}

The management of radiation skin reactions should be in line with supportive care principles as discussed in Module 5: Cancer supportive care principles.

Learning activities

Completed

Activities

- 1. Access the article [*Factors influencing the severity of radiation skin and oral mucosal reactions: development of a conceptual framework*²⁰](#) (free resource, but you must register and log in to access it) and describe the individual and radiation-related factors which influence skin response to radiation.
- 2. Describe the clinical presentation of the following tissue responses to radiation:
 - erythema
 - pruritis
 - hyperpigmentation
 - dry desquamation
 - moist desquamation.
- 3. Appraise the effectiveness of current tools in your health care facility to assess radiation skin reactions.
- 4. Summarise evidence based recommendations in the treatment and management of the following radiation skin reactions:
 - erythema
 - dry desquamation
 - moist desquamation.

Sexual dysfunction

Sexual desire, function and fertility are significantly affected during radiotherapy. The cause of sexual dysfunction is likely to be multifactorial with radiotherapy or adjuvant therapies, disease, social and cultural factors and other symptoms affecting the individual.¹⁵

Women treated with radiotherapy for gynaecological cancers may experience changes in the vaginal canal and ovaries, which may lead to effects such as:¹⁵

- decrease in vaginal lubrication and sensation
- narrowing and lack of elasticity in the vaginal canal
- cessation of ovulation
- pain during intercourse
- post-coital bleeding.

Men receiving treatment for genitourinary cancers may experience:¹⁵

- impotence
- reduction in libido
- erectile dysfunction
- cessation of sperm production
- pain on ejaculation
- permanent decrease in semen volume.

Assessment of risk and appropriate referral for sexual counseling is an essential element of the role of the nurse in the radiotherapy department.¹⁵

The management of sexual dysfunction should be in line with supportive care principles as discussed in Module 5: Cancer supportive care principles.

Learning activities

Completed	Activities
<input type="checkbox"/>	1. Reflect on your experiences discussing sexual effects of treatment with individuals and discuss barriers and enablers to the process
<input type="checkbox"/>	2. Access Module 3.1, Psychosexual communication principles within the PSGC resource ⁵¹ , and identify evidence based strategies you could use to improve communication about sexuality with the person having radiotherapy.
<input type="checkbox"/>	3. Identify resources and referral pathways for a person at risk of sexual dysfunction in your health facility.

Mucositis

Mucositis refers to mucosal damage in the oropharyngeal cavity. When the salivary glands are included in the radiation treatment field, salivary secretion decreases rapidly, particularly if the parotid and submandibular glands are irradiated.^{52, 53} As the radiation treatment accumulates, the mucosa becomes denuded, then ulcerated, and covered with an exudate.^{53, 54}

Mucositis affects eating and nutritional levels and causes pain and sensations of coughing and choking. Changes in saliva, taste, and pain impact on an individual's quality of life.¹⁵ The degree of mucositis and vulnerability of the individual depends on treatment factors such as:¹⁵

- radiation regimen
- dose
- fractionation
- area and volume
- anatomic location.

Distress from the symptoms of mucositis can be reduced by providing information, early assessment and support to provide symptomatic relief and prevent secondary infections. Assessment of the oral cavity before treatment may eliminate sources of infection and chronic irritation.¹⁵

The management of mucositis should be in line with supportive care principles as discussed in Module 5: Cancer supportive care principles.

Learning activities

Completed	Activities
<input type="checkbox"/>	1. Access the following Cochrane reviews: <i>Interventions for preventing oral mucositis for patients with cancer receiving treatment (Review)</i> ⁵⁵ <i>Interventions for treating oral mucositis for patients with cancer receiving treatment (Review)</i> ⁵⁶ , and: <ul style="list-style-type: none">• summarise current recommendations for the prevention and treatment of oral mucositis in individuals receiving radiotherapy.
<input type="checkbox"/>	2. Access the article <i>Oral Assessment Guide: test of reliability and validity for patients receiving radiotherapy to the head and neck region</i> ⁵⁷ , and discuss the reliability and validity of the oral assessment tool within your health care facility.
<input type="checkbox"/>	3. Demonstrate safe and effective oral assessment for a person affected by mucositis: <ul style="list-style-type: none">• Summarise the findings of your assessment.• Develop a nursing care plan to manage the mucositis.• Outline referrals required for further MDT management.

Late effects

Late or delayed effects of radiotherapy can become apparent months to years after radiation treatment, and are related mainly to vascular and connective tissue changes as a result of chronic inflammatory effects.^{15, 46}

Skin and mucous membranes changes

Normal skin functions such as elasticity, flexibility, and protection against physical trauma may be impaired as a result of radiation damage to the skin and its appendages.⁵⁸ Late skin effects include:⁵⁰

- fibrosis
- atrophy
- altered pigmentation
- slow healing of trauma
- telangiectasia (dilated vascular channels which may be seen within one to two years after completion of treatment).

With high doses of radiation there may be:

- loss of sebaceous and sweat gland activity
- hyperpigmentation
- fibrosis of the subcutaneous tissues
- impairment of lymphatic drainage.

Late effects of radiation to the oral cavity may result in tooth decay and changes in the structure of the gums. Trismus is the reduced capacity to open the mouth due to scar formation following surgery which leads to contraction of the muscles of mastication.⁵⁹

Tooth decay and caries may occur as a result of the decreased saliva and from radiation damage. The ultimate radiation insult to the structure of the mouth is osteoradionecrosis.⁴⁶

Bowel dysfunction

Late effects of radiation enteritis occur from 6 to 18 months following treatment. Symptoms may be insidious in onset and include colicky abdominal pain, weight loss, or bleeding from the rectum, or diarrhoea. Late effects include proctitis, colitis, enteritis, ulceration, fistular formation, and obstruction.¹⁵

Genitourinary dysfunction

Radiation to the female pelvis may result in:⁶⁰

- inflammation
- mucosal atrophy
- lack of elasticity
- ulceration of the vaginal tissue
- vaginal stenosis.

Vaginal stenosis is a late effect following external beam and/or brachytherapy and occurs as a result of the formation of adhesions and fibrosis of upper vaginal tissues, which in turn leads to contraction of the vaginal vault, and finally to a shortened vagina. This may result in discomfort and difficulty with

penetration in sexual intercourse, and can hinder medical examination of this area of the body during routine follow up.⁶¹

Learning activities

Completed

Activities [copy activities to your notebook]

1. Access the article [*Radiotherapy and wound healing*](#)⁶² (free resource, but you must register and login to access it) and summarise the chronic effects of radiotherapy on skin and wound healing.

2. Access the article [*A study to investigate women's experiences of radiation enteritis following radiotherapy for cervical cancer*](#)⁶³ (free resource, but you must register and login to access it), and summarise the impact of chronic radiation enteritis and the role of nurses in managing this symptom.

3. Outline information and resources you could give to a woman following treatment for a gynaecological cancer to prevent vaginal stenosis. You may wish to access [*Module 6.3.6 Managing vaginal stenosis*](#) within the [*PSGC*](#)⁵¹ resource.

Glossary of terms used in radiation oncology

Term	Description
3-dimensional conformal radiotherapy (3DCRT)	A form of external beam radiotherapy delivered by linear accelerators where a 3D CT data set and a 3D computer planning system are used to define and calculate treatment fields to deliver a conformal dose to a tumour.
Afterloading	Remote loading of the radioactive isotopes after positioning of the applicators during surgery; used for brachytherapy.
Beam's eye view (BEV)	An image generated by a 3D treatment planning system that is similar to a conventional simulator radiograph with the field dimensions (including shielding) added to the image.
Brachytherapy	The use of radioactive isotopes inserted into either tissue (interstitial) or body cavities (intracavity) to deliver radiation close to a tumour bed.
Computed tomography (CT)	A form of radiographic imaging whereby multiple axial sections of a patient are scanned. The images are displayed in a greyscale and are a useful tool for viewing cross sectional anatomy. These sections can be viewed slice-by-slice or combined to form a 3D image of the patient.
Dose	The amount of radiation in the form of Gys to be delivered to the target.
Digitally reconstructed radiograph (DRR)	An image generated from a 3D CT scan of a patient that looks like a conventional radiograph.
Electron	The smallest particle of negative electricity. Electrons have a useful property of limited penetration of tissue as opposed to the exponential absorption that occurs with x-rays.
External beam radiotherapy (EBRT)	Radiation therapy delivered at a distance from the body, most commonly by a linear accelerator (also called teletherapy).
Field	An area treated by the radiation beam at a particular angle. A radiotherapy treatment can be delivered using a single field or multiple fields at different angles.
Fractionation	The total dose of radiation to be delivered is divided by the daily dose (daily fraction) which gives a cumulative effect to the tumour but enables normal surrounding tissue to repair.
Gamma radiation	A photon produced from radioactive material.
Gray (Gy)	The modern unit of radiation dosage, equivalent to the deposition of one joule of energy per kilogram of tissue.

Image guided radiation therapy (IGRT)	The use of imaging technologies on the linear accelerator to enable accurate daily treatment delivery.
Intensity modulated radiotherapy (IMRT)	A form of EBRT where each treatment field is designed to have a highly varied (or modulated) intensity to treat tumours to a high dose that are adjacent to or surround radiosensitive normal tissues.
Linear accelerator (Linac)	A radiation treatment machine which produces beams of x-rays or high energy electrons that are focused on to a tumour within the body. Linear accelerators deliver millions of volts of radiation (MeV), depending on the type of machine and output.
Megavolts (MV)	A megavolt (millions of volts) is the unit of measurement of photons greater than 1 MeV energy. These are produced by Cobalt-60 apparatus and linear accelerators.
Photon	Energy produced by either gamma or x-rays. Commonly used to treat deep-seated tumours.

References for fundamentals of radiotherapy for cancer

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