DRAFT: Palliative radiotherapy guidance

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Section 1: Introduction

Thankamma Ajithkumar

Palliative radiotherapy and brachytherapy in the UK currently lack unified best-practice guidance, resulting in considerable variation in pathways, techniques and service provision across centres. Although historically delivered using simple approaches, the expanding indications for stereotactic ablative radiotherapy (SABR) in oligometastatic disease and the wider availability of advanced radiotherapy technologies have introduced uncertainty about when these modalities should be used safely and appropriately in the palliative setting. Brachytherapy practice is similarly inconsistent, often shaped more by local expertise and resource availability than by clinical need.

The overarching aim of palliative radiotherapy is to provide timely treatment using simple, efficient techniques and appropriate dose-fractionation to achieve rapid and meaningful symptom relief, without compromising patient experience or placing unnecessary pressure on radiotherapy services.

This guidance seeks to establish evidence-based standards by clearly defining the palliative intent of treatment, setting realistic expectations of benefit, and positioning radiotherapy as one component of holistic, multidisciplinary care. It emphasises careful patient selection, individualised assessment, and the supportive—but not prescriptive—role of prognostic models, alongside the importance of effective communication with referrers and shared understanding across pathways. The guidance does not cover situations in which radiotherapy is used for purposes other than symptom control or prevention.

Assessing performance status is an essential component of decision making in palliative care settings. In most cases, World Health Organization (WHO)/ Eastern Cooperative Oncology Group (ECOG) performance status, which use a 5-point scale, enables a simple and quick assessment to guide clinical decision-making on palliative radiotherapy. Karnofsky Performance Status (KPS) is a more detailed 11-point scale tool, which is more sensitive to assessing gradual functional decline and is therefore commonly used for decision making in neuro-oncology (e.g. brain metastases). This guidance uses both scales of performance status appropriately.

This guidance also highlights examples of good practice, including departmental case studies and innovative pathways that support the safe, efficient and patient-centred delivery of palliative radiotherapy, ultimately improving clinical outcomes and patient experience.

Section 2. Patient selection for palliative radiotherapy, and prediction of life expectancy

Jenny Callender, Amerdeep Tank

Key recommendations

- Palliative radiotherapy is not appropriate for patients who are actively dying.
- Where prognosis is estimated to be in the range of weeks to less than 3 months, the likely benefit of radiotherapy should be weighed carefully against treatment burden and alternative symptom-management options.
- Prognostic information should support, rather than limit, consideration of palliative radiotherapy.
- Validated prognostic tools may be used to support decisions on palliative dose and fractionation but should not replace clinical judgement.
- Local audit of prognosis and outcomes, including 30-day mortality, is recommended where prognostic tools are used to guide treatment.
- Multidisciplinary discussion should be considered in complex cases to support appropriate, patient-centred decision-making.

Background

Patient selection for palliative radiotherapy

Palliative radiotherapy, where indicated, should be offered as part of an interdisciplinary approach to support ongoing symptom management and optimise patients' function and wellbeing. Palliative radiotherapy is not appropriate for patients who are thought likely to die within the next two weeks and should be considered carefully in those with life expectancy of less than three months and more importantly those with less than 30 days.[1] However, prediction of life expectancy can be difficult, and radiotherapy can achieve meaningful symptom relief within days to a few weeks; prognostic information should therefore support clinical decision-making rather than limit consideration of treatment.

Where prognosis is estimated to be less than three months, careful consideration should be given to the impact on the patient of transfer for radiotherapy planning and treatment, compared with alternative options, including medical management of symptoms and best supportive care.

The treatment goal of palliative radiotherapy must be communicated clearly to the patient as part of shared decision-making and informed consent, to ensure that they understand that palliative radiotherapy treatment is intended to relieve symptoms, or to prevent symptomatic deterioration (e.g. neurological function in metastatic spinal cord compression), rather than to cure disease.[2,3]

Prediction of life expectancy

Literature suggests that clinicians tend to overestimate survival times in more than 85% of patients and palliative care providers could accurately predict time of death only for 41% of patients.[4,5] There are several prognostic models to estimate survival in patients with advanced cancer and patients undergoing palliative radiotherapy.

Three previously validated prognostic tools for use in patients with cancer receiving radiotherapy are highlighted below.[6]

Chow model

The Chow model scores six factors shown to have a statistically significant impact on survival: primary cancer site, site of metastases, KPS, fatigue, appetite, and dyspnoea.[7] This model has

informed the development of subsequent prognostic tools; however, advances in systemic anti-cancer therapy since its initial publication in 2002 may reduce its applicability in some tumour groups, such as lung cancer.

TEACHH life expectancy model[8]

The TEACHH life expectancy model was developed in patients with metastatic cancer receiving palliative radiotherapy. It is based on the following factors: type of cancer, ECOG performance status, age, prior palliative chemotherapy, prior hospitalisation, and hepatic metastases. The model categorises patients into three distinct life expectancy groups at clinically informative points across the survival spectrum and may be helpful in guiding decisions about dose, technique, and, in the case of metastatic spinal cord compression, the role of surgery. Although originally developed in patients receiving first-course palliative radiotherapy, it has also been evaluated in the re-irradiation setting.

Palliative Prognostic Score[9]

The Palliative Prognostic Score (PaP) can be used to predict survival beyond 30 days in patients receiving palliative radiotherapy. It incorporates dyspnoea, anorexia, KPS, clinical prediction of survival, total white blood cell count and lymphocyte percentage, and stratifies patients into one of three groups:

- **Group A:** 30-day survival probability greater than 70%
- **Group B:** 30-day survival probability 30% to 70%
- **Group C:** 30-day survival probability less than 30%

Summary of prognostic models: uses and limitations)

Model	Use	Limitations
PaP	Accurate for short-term survival; integrates clinical and laboratory data	Requires blood tests; less practical in urgent cases
Chow	Designed for bone metastases; relatively simple to apply	Limited to bone radiotherapy; not generalisable to all settings
TEACHH	Predicts life expectancy in advanced cancer; uses clinical history	Requires detailed clinical history; moderate accuracy

Neither the Chow nor TEACHH model accurately predicts prognosis in patients with less than 3 months of life expectancy.[10] The PaP model requires an estimate of prognosis and therefore, depends on oncology or palliative care expertise, but it has been shown to provide a high degree of confidence in prognostic assessment for short-term survival. Although there is no single validated prognostic model to accurately predict life expectancy, these tools may be used to support clinical decision-making, particularly when considering multifractionated regimens. These tools may also help to initiate discussions about end-of-life care where appropriate. Tools based on standard clinical assessment measures, which do not require prolonged observation as part of a geriatric frailty assessment, may be preferable in the palliative setting in order to minimise referral or treatment delays.[11]

Audit recommendations:

1. Where prognostic tools are implemented to guide the use of palliative radiotherapy, local audit of prognosis and patient outcomes is recommended.
2. While death within 30 days (30-day mortality) of systemic therapy is an accepted quality metric, considering 30-day mortality following palliative radiotherapy as a quality metric for patient selection is challenging. This is because single-fraction radiotherapy could result in significant

symptomatic relief within a few days. The 30-day mortality following palliative radiotherapy ranges from 9-20% and RCR recommendation is ‘no more than 20% patients should die within 30 days of receiving their palliative radiotherapy’. Audit of 30-day mortality can support optimisation of treatment pathways and improve patient selection, and should include details on dose fractionation schedule, treatment site, and patient characteristics, including tumour type and performance status or prognosis.[12] While, prediction of 30-day mortality is challenging, it is important to minimise treatment burden without compromising clinical benefit, particularly when multi-fraction regimens are being considered.

Multidisciplinary considerations in complex cases

During palliative radiotherapy, involvement of the wider multidisciplinary team (MDT) helps to ensure holistic, patient-centred care. In complex cases, MDT discussion may improve the timeliness and appropriateness of treatment, strengthen communication and shared decision-making, reduce unnecessary treatment burden, support integration with palliative and supportive care, and promote efficiency and equitable access. Together, these factors help to ensure that palliative radiotherapy delivers maximum symptom relief with minimal burden, aligned with what matters most to patients.

Section 3. Bone metastases

Matt Jones, Amerdeep Tank

Key recommendations

- Single-fraction radiotherapy with 8 Gy is an effective treatment for uncomplicated painful bone metastases.
- Fractionated radiotherapy may be appropriate in selected patients, including those requiring larger treatment fields, those at greater risk of toxicity, or those in whom longer-term disease control is anticipated.
- Bone metastases associated with neurological compromise, fracture, impending fracture or instability require urgent assessment and multidisciplinary input, including surgical opinion where appropriate.
- Simple radiotherapy techniques are generally appropriate for single-fraction treatment, particularly in urgent or rapid-access settings.
- Re-irradiation may be considered for recurrent or persistent pain after previous treatment, with dose and fractionation individualised according to prior treatment, expected benefit and normal tissue tolerance.

Patient selection

Selection of patients for palliative radiotherapy for bone metastases depends on the life expectancy, severity of pain, performance status and the extent of bone disease (e.g. oligometastatic disease in patients with good prognosis may be treated with SABR and patients with metastatic prostatic cancer with widespread bone pain are considered for molecular radiotherapy as discussed in section 12).

Selection of dose fractionation

WHO/ ECOG performance status can be used to help guide the choice of palliative radiotherapy approach and fractionation. Single-fraction radiotherapy with 8 Gy is an effective treatment for painful bone metastases, although retreatment rates are higher than with fractionated schedules.[19]

Guidance from the National Institute for Health and Care Excellence (NICE)[13], The Royal College of Radiologists (RCR) and the European Society for Radiotherapy and Oncology Advisory Committee on Radiation Oncology Practice (ESTRO ACROP) recommend a single-fraction of 8 Gy for painful bone metastases, based on prospective studies demonstrating similar overall clinical benefit with single-fraction and fractionated radiotherapy. Single-fraction treatment also reduces treatment burden and may improve patient experience. Fractionated radiotherapy, such as 20 Gy in 5 fractions or 30 Gy in 10 fractions, may be appropriate in selected situations, for example where larger treatment fields are required, where previous radiotherapy increases the risk of toxicity, or where longer-term disease control is anticipated.

A different approach is required when bone metastases are associated with neurological compromise, fracture, impending fracture, or structural instability at high risk of pathological fractures. In these situations, depending on the clinical context and performance status, urgent intervention with input from the MDT, including surgical opinion where appropriate, may be required to prevent disease-related morbidity and optimise symptom control and quality of life.

There is no robust evidence that post-operative radiotherapy improves outcomes after surgery for metastatic pathological fractures. The PORTRAIT trial is expected to provide the first definitive data to guide practice on whether radiotherapy should remain routine or be used selectively.[14,15] The trial has

national importance for optimising patient care, reducing unnecessary treatment, and improving evidence-based standards across the UK.

Optimal radiotherapy technique based on dose fractionation

For single-fraction palliative radiotherapy, simple radiotherapy techniques should be used. This is particularly important in urgent or rapid access radiotherapy.

For fractionated radiotherapy either a simple or a conformal technique may be used. Conformal technique should be used only where there are clear dosimetric advantages, such as reducing the risk of acute radiotherapy effects or late effects when long-term disease control is anticipated.

Role of re-irradiation

After initial radiotherapy, 25-40% of patients may require re-irradiation for recurrent or persistent pain. Patients should be considered for re-irradiation only if there was a previous durable response (normally three months or more) with careful consideration of the previous dose, treatment site, and tolerance of relevant organs at risk, including the spinal cord where applicable.[16] In some cases, it may be appropriate to repeat the same dose-fractionation, for example, where a single-fraction of 8 Gy was used initially, repeat treatment with the same schedule may be appropriate, as this approach is simple, well tolerated, and has previously been shown to be effective.

Single-fraction 8 Gy remains an appropriate option for retreatment, with response rates similar to those seen after initial treatment.[17,18] Evidence indicates no clear difference between single-fraction and multi-fraction retreatment schedules, suggesting both are acceptable.[19]

Re-irradiation can provide symptomatic benefit for many patients; retreatment fractionation varies and toxicity data are limited. Evidence supports re-irradiation as a reasonable option, but dose/fractionation choices should be individualised.[20,21]

Section 4. Brain metastases

Sheena Lam, Naveen Mummudi

Key recommendations

- WBRT (30 Gy/10 fractions or 20 Gy/5 fractions) may be offered to patients with multiple brain metastases or when stereotactic treatment is not suitable.[19]
- SRS or HFRT may be offered to patients with limited brain metastases, with referral to specialist stereotactic services.[22,23]
- Hippocampal avoidance WBRT may be considered in selected patients where resources and expertise allow, to reduce neurocognitive toxicity.[24]
- Best supportive care alone should be considered for patients with poor prognosis, poor performance status, or predicted survival of less than 3 months, where the expected benefit of WBRT is low.[25,26]

Background

Patients with brain metastases represent a heterogeneous group with variable prognoses influenced by performance status, extracranial disease control, and primary tumour histology. Prognostic models such as the disease-specific graded prognostic assessment (ds-GPA) and the basic score for brain metastases (BSBM) may help to stratify patients, estimate prognosis, and support clinical decision-making, although their use in routine UK practice remains inconsistent.[26] Radiotherapy aims to optimise symptom control and maintain neurocognitive function while balancing treatment burden and expected survival. Multidisciplinary decision-making remains central to optimal management. [22]

This section focuses on the role of whole-brain radiotherapy (WBRT) in the palliative management of brain metastases. Detailed recommendations regarding stereotactic radiosurgery (SRS), hypofractionated stereotactic radiotherapy (HFSRT), and post-operative cavity irradiation fall within specialised commissioned services and are referenced rather than described in detail here.[22,23]

Patient selection

Appropriate selection for radiotherapy should incorporate prognosis, disease extent, and performance status. Patients with a predicted survival of less than three months or poor performance status (KPS <50) are unlikely to derive substantial benefit from radiotherapy.

WBRT is most likely to be beneficial in patients with symptomatic multiple metastases, reasonable performance status (KPS ≥60), and an anticipated survival sufficient to experience clinical benefit. Surgery can be considered in patients with large brain metastases, particularly where there is significant mass effect or neurological compromise, and where systemic disease is limited or controlled.[23]

Prognostic tools

Prognostic tools may assist with stratification and shared decision-making but should not be used in isolation to determine treatment; clinical judgement remains paramount.[26] The general principles relating to prognostic assessment are set out in Section 2.

Model	Core variables	Clinical use
ds-GPA / Lung-molGPA / Breast-GPA	Age, KPS, extracranial disease, number of metastases ± molecular status	Primary prognostic framework
BSBM / RPA	KPS, control of primary, extracranial metastases	Rapid estimation in acute settings
Rades / Treatment-specific indices	KPS, lesion volume, systemic disease	Supplemental risk stratification

Key prognostic factors consistently identified across models include:

- Performance status (KPS or ECOG)
- Number and volume of brain metastases
- Control of extracranial disease
- Primary tumour histology and molecular features (where applicable)
- Age

Selection of dose fractionation

Stereotactic Radiosurgery and Hypofractionated Stereotactic Radiotherapy

Stereotactic Radiosurgery (SRS) or Hypofractionated Stereotactic Radiotherapy (HFSRT) is preferred for patients with 1 to 10 brain metastases, a total intracranial volume of up to 15–20 cm³, KPS ≥70, and controlled extracranial disease. Hypo-fractionation may reduce the risk of radio-necrosis and improve local control for larger lesions (>2 cm).[22,23] These techniques are delivered within specialised commissioned services and are not described in detail here. Where clinically appropriate, referral and management should align with current NHS England commissioning policies and relevant RCR guidance.[19,27,28]

Whole-brain Radiotherapy

Whole-brain Radiotherapy (WBRT) remains the principal radiotherapy modality within a palliative context, particularly for:[22]

- Patients with multiple brain metastases
- Extensive intracranial disease burden
- Patients unsuitable for stereotactic approaches
- Situations where symptom control is the primary goal
- Patients with an anticipated survival long enough to experience symptomatic benefit from treatment

Recommended regimen:

- 20 Gy in 5 fractions over one week

Where resources and expertise are available, and with a predicted prognosis of approximately 1–1.5 years or longer, neurocognitive toxicity may be minimised using hippocampal-sparing techniques providing no lesion lies within close proximity of the hippocampus.[24]

WBRT may reasonably be omitted in favour of best supportive care in patients with:

- Predicted survival of less than 3 months
- Poor performance status (KPS <50 or ECOG ≥3) without major neurological symptoms
- Patients meeting QUARTZ criteria (poor-prognosis, unsuitable for surgery/SRS).[25]

Section 5. Spinal cord compression, cauda equina compression and nerve root compression

Jon Wadsley

Key recommendations

- Patients with malignant spinal cord compression should be assessed and treated urgently, with radiotherapy delivered within 24 hours of a decision to treat where appropriate.
- The aim of treatment should be preservation of neurological function and improvement of symptoms.
- Urgent radiotherapy should be offered to patients with malignant spinal cord compression who are not suitable for surgery, unless they have had complete paraplegia for 2 weeks or longer with well-controlled pain, or their overall prognosis is poor.
- Single-fraction 8 Gy radiotherapy should be used in most patients receiving radiotherapy for malignant spinal cord compression, unless they are at high risk of side effects.
- A validated prognostic tool, such as the revised Tokuhashi score, may be used alongside clinical factors to support treatment decisions.
- Re-irradiation and postoperative radiotherapy may be considered in selected patients.

Background

Malignant spinal cord compression (MSCC) is a devastating complication of advanced malignancy that can have profound effects on a patient's quality of life and prognosis. NICE guidance recommends that clear care pathways are in place for referral, diagnosis, treatment, rehabilitation, and ongoing care of people with suspected or confirmed spinal metastases or MSCC.

Since radiotherapy is a key component of the treatment of MSCC, services should ensure that radiotherapy and simulator facilities are available for urgent (within 24 hours) daytime sessions, 7 days a week for people with MSCC so that where appropriate, radiotherapy can be given within 24 hours of a decision to treat.[29]

The focus of treatment should be on preserving neurological function and improving symptoms. Similar principles should be applied to the management of related syndromes such as cauda equina compression and nerve root compression, and symptomatic cases should be treated with similar urgency.

Patients presenting with spinal cord compression without a known cancer diagnosis pose particular challenges. The possibility of alternative diagnoses such as infection must be considered and urgent multidisciplinary discussion is required. There may be circumstances in which it is appropriate to proceed to radiotherapy treatment without an established histological diagnosis in order to preserve neurological function and improve symptoms.

Patient selection

Offer urgent radiotherapy (to be delivered as soon as possible and within 24 hours) to patients with MSCC who are not suitable for spinal surgery unless they have had complete paraplegia for two weeks or longer and pain well controlled, or their life expectancy is less than two weeks.

Consider using a validated prognostic scoring system with good evidence of accuracy (e.g., the revised Tokuhashi scoring system) alongside recognised prognostic factors (such as comorbidities) to inform treatment decisions.[30]

Selection of dose fractionation

Use 8 Gy single-fraction radiotherapy for patients with MSCC receiving radiotherapy unless they are at high risk of side effects.[31]

Consider multi-fraction radiotherapy for people at high risk of side effects from radiation, for example if large treatment fields are required or if they have received previous radiotherapy treatment.

Optimal radiotherapy technique based on dose fractionation

To facilitate rapid commencement of treatment use of the simplest technique to achieve the intended clinical outcome is advised. Traditionally, this is a single direct posterior field, treating at least one vertebra above and below the site of compression and prescribed at depth. If clinically required, more complex techniques may be used.

Role of re-irradiation

Consider further radiotherapy for patients with MSCC who have had a good response to previous radiotherapy and who develop recurrent symptoms at least 3 months after initial radiotherapy.

If further radiotherapy is being considered, take into account the following factors:

- total biological equivalent dose
- time since previous treatment
- volume of tissue to be irradiated

Other considerations

Offer post-operative radiotherapy after the person has recovered from surgery for spinal metastases or MSCC.

The role of stereotactic ablative radiotherapy in the management of MSCC, particularly in the post-operative setting, remains the subject of research.

A flow diagram outlining the suggested management of spinal cord compression is provided in Appendix A.

Section 6. Pain from primary or metastatic tumour

Mohammed Abdul-Latif

Key recommendations

- Palliative radiotherapy should be considered for localised cancer-related pain where symptoms correlate with an identifiable tumour target.[32,33,34]
- Single-fraction radiotherapy is an appropriate treatment for uncomplicated painful bone metastases; further detail is provided in Section 3.[35,36,37,38]
- Fractionated regimens may be considered where longer-term local control is expected or where retreatment would be difficult.[35,36,37,38]
- Re-irradiation may be considered for recurrent pain following previous radiotherapy, taking into account cumulative dose, prognosis and toxicity.[36]
- Simple techniques remain suitable in many palliative scenarios, but conformal techniques may be appropriate in selected situations to minimise radiotherapy toxicities (including Intensity Modulated Radiation Therapy (IMRT) or SABR**).** Further detail is provided in Section 3

Scope and purpose

This section provides guidance on the use of external beam radiotherapy for palliation of pain arising from primary tumours or metastatic disease. It applies to adult patients receiving palliative radiotherapy across tumour sites and care settings. Management of oncological emergencies (for example, metastatic spinal cord compression) and the use of radiopharmaceuticals are outside the scope of this section.

Background

Cancer-related pain is common and may arise from bone involvement, soft-tissue masses, visceral disease, or neural compression. Palliative radiotherapy is an effective treatment for pain relief and is an important component of multidisciplinary symptom management alongside optimal analgesia and systemic anticancer therapies. The principal aims are symptom control, minimisation of treatment burden and avoidance of unnecessary toxicity.[32,33,34]

Evidence summary

High-quality randomised evidence supports the use of palliative radiotherapy for painful bone metastases. Multiple randomised controlled trials and meta-analyses demonstrate equivalent overall pain response rates between single-fraction and multi-fraction regimens, with overall response rates of approximately 60–70% and complete pain relief in around 20–30% of patients.[35,36,37,38] Single-fraction radiotherapy as discussed in Section 3, is associated with a higher likelihood of retreatment but provides similar pain control with greater convenience and reduced treatment burden.[35,36,37,38].

Simple techniques remain suitable in many palliative scenarios, but conformal techniques may be appropriate in selected situations to minimise radiotherapy toxicities (e.g. large tumours in abdomen and pelvis). Selected patients with metachronous extracranial oligometastatic disease may be suitable for SABR.[39]

For pain arising from non-osseous disease, the evidence base is more heterogeneous and largely site-specific. Prospective studies and systematic reviews support the use of hypofractionated palliative radiotherapy for pain related to thoracic, abdominal, and pelvic malignancies where symptoms correlate with a defined local tumour target.[34,40,41]

Section 7. Bleeding from primary or metastatic tumour

Thankamma Ajithkumar

Key recommendations

- Palliative radiotherapy is a treatment option for non-life-threatening tumour-related bleeding when haemostatic ablative procedures are unsuitable or unsuccessful.
- Dose fractionation should be selected according to performance status, prognosis, disease burden and eligibility for further systemic therapy.
- Single-fraction radiotherapy may be appropriate for patients with poor performance status or limited prognosis.
- Fractionated radiotherapy may be appropriate for selected patients with better performance status and longer anticipated survival.
- Re-irradiation may be considered in selected patients with recurrent symptoms after a durable response to previous treatment.
- Brachytherapy may be considered in selected indications where expertise is available; further detail is provided in Section 10.

Background

Approximately 10% of patients with advanced and metastatic cancers present with bleeding. Bleeding can present as frank bleeding (e.g., haemoptysis, haematuria) or as a significant drop in haemoglobin levels due to internal bleeds (e.g., gastrointestinal bleeds). Palliative radiotherapy is useful in achieving haemostasis in non-life-threatening bleeds from advanced primary or metastatic tumours.

Usually, tumour bleeding starts to resolve within 24-48 hours after the start of radiotherapy. Palliative radiotherapy is effective for tumour-related bleeding across multiple cancer types, with control rates generally ranging from 40% to nearly 100%, depending on site and dose. Dose-fractionation ranges from 8-10 Gy single-fraction to 30 Gy in 10 fractions. Both external beam radiotherapy and brachytherapy are used where appropriate.

Patient selection

Patients presenting with bleeding from primary and metastatic tumours and are not suitable for or after unsuccessful haemostatic ablative procedures, should be considered for palliative radiotherapy.

Selection of dose fractionation

Dose fractionation depends on the performance status and predicted prognosis based on natural history, metastatic tumour burden, and eligibility for further systemic therapy.

Patients with poor performance status (WHO Performance status of 2 or above) and poor prognosis (predicted survival of less than 6 months) should be treated with 8-10 Gy single-fraction palliative radiotherapy.

Patients with good performance status and predicted survival of 6-12 months should be considered for intermediate dose palliative radiotherapy with 20 Gy in 5 fractions.

Patients with good performance status, predicted survival of more than 12 months and without significant metastatic disease burden should be considered for high dose palliative radiotherapy with 30 Gy in 10 fractions. Selected patients with specific tumour sites may also be eligible for prolonged fractionation with concurrent chemotherapy.

Optimal radiotherapy technique based on dose fractionation (planning and verification)

To facilitate the rapid start of treatment, a simple planning or virtual simulation technique is preferred, typically a single direct field for superficial tumours or parallel opposed beams for deep-seated tumours. Superficial tumours can be treated with deep X-rays, electrons, or a direct photon field, depending on the depth of the tumour.

Selected patients planning to be treated with 10 fractions or more may benefit from conformal techniques or simple IMRT plans to minimise acute toxicities (e.g. gut toxicities while treating pelvic tumours).

Role of re-irradiation

Patients who have had a durable (more than 3 months) benefit from prior radiotherapy may be considered for re-irradiation upon recurrence of symptoms. Given that many patients have a limited prognosis, late toxicity is often of less concern; in appropriate cases, a second course of single-fraction (8 Gy) or fractionated (20 Gy in 5 fractions) radiotherapy may be considered. If available, HDR brachytherapy (10–15 Gy as a single-fraction) may be an alternative for bleeding from the bronchus or cervix. Further detail on the role of brachytherapy is provided in Section 10.

Section 8. Obstructive and compressive symptoms: Superior vena cava obstruction, Oesophageal compression and airway obstruction

Thankamma Ajithkumar

Key recommendations

- Radiotherapy is generally a secondary option for superior vena cava obstruction, oesophageal obstruction and airway compromise, and should be considered when stenting or ablative procedures are not feasible, contraindicated, unsuccessful, or when symptoms recur.
- Radiotherapy may be appropriate in selected frail patients who are not candidates for systemic therapy.
- Dose fractionation should be selected according to performance status, prognosis, disease burden and eligibility for further systemic therapy.
- Parallel opposed anteroposterior fields are generally appropriate where urgent treatment is required, with more conformal techniques considered in selected patients receiving longer-course treatment.
- Re-irradiation may be considered in selected patients with recurrent symptoms after a durable response to previous treatment.
- The role of brachytherapy in selected obstructive indications should be considered only where expertise is available; further detail is provided in Section 10.

Background

Radiotherapy is now an uncommon indication for managing superior vena cava obstruction (SVCO), oesophageal obstruction and airway compromise, as modern interventional radiology, and endoscopic techniques—particularly stenting—provide faster and more reliable symptom relief. Radiologically inserted stents often provide prompt symptom relief (within 0-72 hours) in most patients (80-95%). Endovascular stents for SVCO have a high technical success rate (98.8%), a low major complication rate (3.7%), and a 10% recurrence rate. Mechanical debulking, ablative procedures, and stents rapidly restore airway patency. The treatment of choice for dysphagia due to oesophageal cancers is usually endoscopic ablative therapies and stents. However, radiotherapy is an appropriate palliative treatment for selected frail patients who are not candidates for systemic therapy, even if there is no obstruction. Radiotherapy is also indicated when stenting or ablative procedures are not feasible, contraindicated, unsuccessful, or when symptoms recur, and further intervention is not possible. Historical literature suggests that radiotherapy results in improvement or relief of obstructive symptoms in 30-90% of patients within 3-30 days.

The Radiotherapy after Oesophageal Cancer Stenting (ROCS) study showed that palliative radiotherapy after stent insertion for advanced oesophageal cancer does not improve survival or, crucially, reduce the recurrence of swallowing difficulties (dysphagia) at 12 weeks and therefore radiotherapy is not routinely recommended.

In current pathways, radiotherapy is best viewed as a secondary option, used only when stenting or ablative procedures are not feasible, contraindicated, unsuccessful, or when symptoms recur, and further intervention is not possible. Historical literature suggests that radiotherapy results in improvement or relief of obstructive symptoms in 30-90% of patients within 3-30 days.

Patient selection

- Radiotherapy is considered when stents are not feasible, and the tumours are not chemo-sensitive (e.g. chemo-sensitive tumours are small cell lung cancer, lymphomas, and germ cell tumours)
- Obstructive symptoms after a previous stent/tumour ablative procedure, and a further stent/ablation is not feasible

Selection of dose fractionation

Dose fractionation depends on the performance status and predicted prognosis based on natural history, metastatic tumour burden, and eligibility for further systemic therapy.

- Patients with poor performance status (WHO performance status of 2 or above) and poor prognosis (predicted survival of less than 6 months) should be treated with 8-10 Gy single-fraction radiotherapy.
- Patients with good performance status and predicted survival of 6-12 months should be considered for intermediate dose palliative radiotherapy with 20 Gy in 5 fractions
- Patients with good performance status, predicted survival of more than 12 months and without significant metastatic disease burden are considered for 30 Gy in 10 fractions. Selected patients with specific tumour sites may also be eligible for prolonged fractionation with concurrent chemotherapy.
- When facilities and resources are available, HDR brachytherapy, gives effective palliation for endobronchial and oesophageal obstruction. Usually, a single fraction of 10-15 Gy is given.

Optimal radiotherapy technique based on dose fractionation (planning and verification)

- To facilitate the rapid start of the treatment, parallel opposed anteroposterior fields are used.
- Selected patients planning to be treated with 10 fractions or more may benefit from conformal techniques or IMRT plans to minimise acute toxicities.

Role of re-irradiation

- Patients who have had a durable (more than 3 months) benefit from prior radiotherapy may be considered for re-irradiation upon recurrence of symptoms. Given that many patients have a limited prognosis, late toxicity is often of less concern; in appropriate cases, a second course of single-fraction (8 Gy) or fractionated (20 Gy in 5 fractions) radiotherapy may be considered. When facilities and resources are available, HDR brachytherapy (10-15 Gy as a single fraction) would be an alternative for obstructive tumours in the airway or oesophagus.

Section 9. Prophylactic palliative radiotherapy

Sarah Bowen Jones. Conor Fitzpatrick

Key recommendations

- Prophylactic cranial irradiation may be considered in selected patients with small cell lung cancer according to stage, treatment response and neurocognitive risk.
- Prophylactic radiotherapy for selected patients with high-risk asymptomatic bone metastases may be considered cautiously, but further confirmatory evidence is needed before it can be recommended routinely.
- Use of prophylactic radiotherapy to prevent local complications such as fungation or ulceration remains investigational and should be approached cautiously.
- Evidence supporting prophylactic radiotherapy remains limited and is highly dependent on the target site being treated.
  Further research is needed across this topic. In particular, additional evidence is required to support the consideration of radiotherapy for selected patients with high-risk asymptomatic bone metastases within routine practice, ideally via a larger phase III effectiveness trial to confirm previous observations and allow subgroup analyses to help better inform patient selection.

Background

While traditional palliative radiotherapy is used to relieve existing pain, prophylactic treatment aims to prevent the development of symptoms in high-risk, asymptomatic areas. Evidence to support the use of prophylactic radiotherapy is mixed and heavily dependent on the target site being treated.

Prophylactic cranial Irradiation

A meta-analysis of previous older clinical trials (conducted prior to routine MRI-brain imaging or immunotherapy, with varying dose/fractionations) in limited stage small cell lung cancer (SCLC) setting have reported a significant survival advantage and a reduction in incidence of brain metastasis following prophylactic cranial irradiation (PCI).[42] In the extensive stage setting, trials reported a reduction in symptomatic brain metastasis following PCI, but the impact on survival is debated.[43,44] However, PCI associated with morbidity and a risk of long-term neurotoxicity. Clinical trials are ongoing to determine whether MRI surveillance is non-inferior to PCI in patients with SCLC.[45,46]

Patient selection

- Patients at higher risk of neurocognitive toxicity (Including those aged over 70 years, those with baseline cognitive or neurological disease, or those with poor performance status (≥2) should be referred to consider PCI on an individual basis.[47]
- Patients with limited stage (stage I) SCLC, PCI may be considered on an individual basis, but PCI is not routinely recommended.
- Patients with limited stage (II-III) SCLC, who respond to primary thoracic concurrent or sequential platinum-based chemoradiotherapy, should be considered for PCI.
- Patients with extensive stage (stage IV) SCLC who respond to standard first-line platinum-based chemotherapy (+/- immunotherapy) should be considered for PCI.

Selection of dose fractionation

As per RCR dose fractionation (4th edition) guidance.[19]

- 25 Gy in 10 fractions over two weeks
- 20 Gy in 5 fractions over one week may be appropriate for patients with extensive stage SCLC.
- Higher doses above 30 Gy should be avoided due to risk of neurotoxicity.

Optimal radiotherapy technique based on dose fractionation

A virtual simulation technique is used for PCI planning and simulation, enabling timely initiation of treatment.

Role of re-irradiation

In patients who develop brain metastases following PCI, cases should be discussed in a specialist neuro-oncology MDT. In patients who remain in good performance status, with controlled or controllable extracranial disease and limited intracranial metastases, SRS may be appropriate; further guidance is provided in Section 4. Repeat whole-brain radiotherapy may be considered in carefully selected patients, in line with the principles outlined in Section 4. The graded prognostic assessment (GPA) tool for SCLC may be useful in estimating prognosis.

Other considerations

Risk mitigation options including hippocampal-avoidance PCI and memantine are not currently recommended outside of clinical trials.

Prophylactic irradiation of bone metastases

Selection of dose fractionation

A multicentre randomised, phase II clinical trial assessed the efficacy of radiotherapy in adult (aged 18 years and older) patients with histologically confirmed metastatic cancer of solid tumour origin with at least one asymptomatic high-risk bone metastasis compared to standard of care treatment alone.[48]

High risk was defined as:

- bulky site of disease in bone (≥2cm)
- disease involving the hip (acetabulum, femoral head, and femoral neck), shoulder (acromion, glenoid, and humeral head), or sacroiliac joints
- disease in long bones occupying one third to two thirds of the cortical thickness (including the humerus, radius, ulna, clavicle, femur, tibia, fibula, metacarpals, and phalanges)
- disease in vertebrae of the junctional spine (C7-T1, T12-L1, and L5-S1) and/or disease with posterior element involvement.

Most patients (90%) had systemic therapy as their planned standard of care.

Those within the radiotherapy arm of the study were associated with a lower incidence of skeletal related events (including fracture or spinal cord compression), reduced hospitalisation and pain, as well as extended overall survival.

These findings may support the consideration of radiotherapy for select patients with high-risk asymptomatic bone metastases within routine practice, however, a larger phase III effectiveness trial to confirm these observations and allow subgroup analyses to help better inform patient selection is required.

Optimal radiotherapy technique based on dose fractionation

Please refer to Section 3 for guidance on optimal radiotherapy technique based on dose fractionation.

Prevention of tumour fungation

While radiotherapy is frequently used to treat existing ulcerating tumour masses, it can be employed proactively to reduce the tumour burden, alleviate pain, reduce/stop bleeding/weeping from a site, and improve patient quality of life, particularly when a tumour has rapidly grown, causing ulceration, or is threatening skin integrity.[49]

Studies, however, do not generally describe the use of radiotherapy as a preventative measure in this group, but as a palliative measure once skin breakdown and/or tumour fungation has occurred. Further research is required to better understand the efficacy of such treatments earlier in a patients care, as well as to define the most appropriate dose and fractionation regimes.

A multi-centre phase III randomised control trial has not identified justification to use prophylactic radiotherapy in patients with mesothelioma to prevent pleural tract metastases, instead recommending close monitoring and treatment of such sites in the event of the patient becoming symptomatic.[50]

Section 10. Clinical application of palliative brachytherapy

Mohammed Abdul-Latif

Key recommendations

- Palliative brachytherapy may be considered for focal symptoms arising from endoluminal or intracavitary disease where anatomy is suitable and specialist expertise is available.[51]
- Palliative brachytherapy may be considered in selected previously irradiated sites where further external beam radiotherapy is limited by normal tissue tolerance.[52,53]
- Short hypofractionated high-dose-rate regimens may be used, tailored to tumour site, symptom burden, prior treatment and prognosis.[51,54,55,56]
- Multidisciplinary discussion and careful patient selection are essential, including assessment of procedural risk and anticipated benefit.[51]
- Palliative brachytherapy should be delivered only within centres with appropriate governance, imaging, planning and emergency support pathways.[52]
- Use of palliative brachytherapy should align with relevant NICE interventional procedures guidance and commissioning arrangements where applicable.[52]

Scope and background

This section outlines the role of brachytherapy in the palliation of symptoms such as pain, bleeding and obstruction in patients with advanced cancer. It applies to centres with established brachytherapy expertise and infrastructure. This section focuses on the palliative use of brachytherapy and does not cover curative-intent or salvage brachytherapy, or detailed technical guidance on treatment delivery.

Background

Palliative brachytherapy delivers a high, localised radiation dose with rapid dose fall-off, allowing effective symptom control while limiting irradiation of surrounding normal tissues. It may be particularly useful for endoluminal or intracavitary tumours and in selected patients who have previously received external beam radiotherapy.[51]

Brachytherapy is a specialised option in the palliative setting. It is appropriate for selected patients and is delivered by expert centres rather than as standard palliative practice. Access to brachytherapy varies across the UK and is often influenced by local expertise, infrastructure, and commissioning arrangements.

Evidence summary

The evidence base for palliative brachytherapy consists predominantly of prospective cohort studies, institutional series, and a limited number of randomised trials. Despite heterogeneity in technique and fractionation, symptom response rates are consistently high across tumour sites for focal symptoms including pain, bleeding, and obstruction.[51]

In oesophageal cancer, randomised trials demonstrate that high-dose-rate brachytherapy provides effective and durable palliation of dysphagia and may offer advantages over stenting in patients with a longer expected survival.[33,34,35] Endobronchial brachytherapy has been shown to improve symptoms related to airway obstruction and haemoptysis, particularly in selected patients with predominantly endoluminal disease or prior thoracic radiotherapy.[52,53]

In locally advanced or recurrent gynaecological malignancies, particularly cervical cancer, small observational series support the use of high-dose-rate intracavitary brachytherapy for rapid palliation of tumour-related bleeding and pelvic pain, with high rates of haemostatic control reported in carefully selected patients. The evidence is largely non-randomised but supports use where anatomy is suitable and procedural risk is acceptable.[57,58,59]

For locally advanced or recurrent rectal cancer, endoluminal or contact brachytherapy has been reported to provide effective palliation of pain, bleeding, and obstructive symptoms in selected patients, including those previously treated with external beam radiotherapy. Evidence is limited to small prospective and retrospective series but suggests meaningful symptom relief with acceptable toxicity when delivered in experienced centres.[60,61,62]

Dose and fractionation schedules vary widely and should be individualised according to tumour site, symptom burden, prior treatment, and patient prognosis.[51,52,53,54,55,56,57,58,59,60,61,62]

Section 11. Palliative radiotherapy in combination with systemic therapies

Olivier Haas, Agata Rembielak

Key recommendations

- When palliative radiotherapy is being considered in a patient receiving systemic therapy, relevant consensus statements and drug-specific safety information should be reviewed.
- A personalised treatment pathway involving the relevant multidisciplinary teams is important in order to assess potential risks, benefits, uncertainties, treatment sequencing, and patient preference.
- Combining systemic therapies and radiotherapy can be beneficial; however, modification of timing, radiotherapy technique, dose, or fractionation may be required in selected cases to mitigate toxicity.
- The elimination half-life of the drug should be considered when deciding whether systemic therapy should be interrupted before radiotherapy and when it may be restarted. A period of 4.5 to 5 half-lives is often used as a practical guide, although radio sensitisation may persist beyond this for some agents.

Background

An expanding range of systemic therapies is now used in palliative oncology, including:

- Immune checkpoint Inhibitors (ICI)
- Cell Signalling Pathway Modulators (MAPK pathway Inhibitors, Epidermal Growth Factor Receptor-EGFR- inhibitors, Antiangiogenic Agents, Vascular Endothelial Growth factor (Receptor) [VEGF(R)] inhibitors and mTOR Inhibitors),
- Cell Cycle Modulators (CDK4/6 inhibitors)
- DNA Damage Response (DDR) Modulators.

These agents are increasingly used across haematologic, gastrointestinal, lung, breast, gynaecologic, and genitourinary cancer, with approximately 41% prescribed with palliative intent

Some systemic agents have known overlapping toxicities when combined with radiotherapy.[63]., but high-quality evidence on the safety and effectiveness of many newer combinations remains limited. Therefore, careful evaluation is required to assess potential synergistic effects and the risk of toxicities in the irradiated area.

In many cases, no modification of the palliative radiotherapy or interruption of systemic therapy is required. However, when interactions are anticipated, adaptation of fractionation, technique or timing may be necessary. More conformal techniques are preferred over opposed parallel beams when there is a theoretical or known risk of increased toxicity. The choice of modification depends on the class of systemic therapy. For example, ESMO/ESTRO guidance notes that concurrent use of cell signalling pathway modulators may increase toxicity and recommends drug interruption or dose reduction, with lower levels of radiotherapy adaptation required in palliative settings compared with radical treatment.[64]

The European Study Group of Bone Metastases has reviewed efficacy and side effects of systemic therapies in combination with radiotherapy for bone metastases and provided clinical recommendations.[65]

A recent ESMO-ESTRO consensus statement supports combining some novel systemic agents with low-dose palliative radiotherapy (e.g., 8 Gy single-fraction, 20 Gy in 5 fractions, or 30 Gy in 10 fractions), when appropriate modifications are made based on the irradiation site.[66]

Some drugs have long elimination half-lives (e.g. anti-HER2 monoclonal antibodies) which influence decision about drug interruption and radiotherapy adaptation.[67]

Patient selection

When a patient undergoing systemic therapy needs palliative radiotherapy, potential synergistic effects must be carefully evaluated to avoid increased acute toxicity in the irradiated region. The risks, benefits, and uncertainties of combining radiotherapy with new systemic treatments should be fully discussed with the patient. A personalised therapeutic pathway should be established after considering the timing and sequencing of treatment, treatment volume and technique, risk of toxicities, patients' wishes, prognosis, and anticipated clinical benefits.

Selection of dose fractionation

Dose fractionation should be based on performance status, prognosis, and clinical indication, as outlined in earlier sections. Fractionated radiotherapy may be considered if there is a theoretical or known risk of synergistic effect and interruption of systemic therapy is not desirable.

Optimal radiotherapy technique based on dose fractionation

- When there is no or minimal interaction with concurrent systemic therapy, simple planning or virtual simulation should be used. (e.g. a single direct field for superficial tumours or parallel opposed beams for deep-seated tumours for single-fraction radiotherapy)
- When there is minimal risk of synergistic effect, and fractionated palliative radiotherapy is used (20 Gy in 5 fractions or 30 Gy in 10 fractions) with simple conformal techniques.
- When there is a known or theoretical high-risk of synergistic effects, a fractionated conformal technique with 20% reduction in the prescription dose with concurrent systemic therapy, if continuing systemic therapy is essential. Alternatively, a fractionated conformal technique with the full dose radiotherapy with appropriate interruption of systemic therapy should be considered (see case study)

Case study

When decide to stop the drug, it should be stopped for a period equivalent to 4-5 drug half-lives before radiotherapy to allow 94%-97% elimination from the body. Example: Olaparib (half-life of ~12 hours) should be stopped three days (five half-lives equal 60 hours) before radiotherapy, and it can be restarted within one week after radiotherapy, provided there is no persistent or severe acute radiation toxicity.

A similar principle applies to all systemic therapies with known synergistic interactions with radiotherapy.

Role for re-irradiation

- Principle of indication and selection of patients for re-irradiation is the same as described in the previous sections. The principles of treatment modification, as described above, should be applied.

Section 12: Palliative molecular radiotherapy

Jonathan Wadsley

Key recommendations

- Radium-223 may be considered in selected patients with metastatic castration-resistant prostate cancer and progressive painful bone metastases.
- Patients considered for radium-223 should have adequate haematological and renal function, no known visceral metastases, and an anticipated life expectancy of at least 6 months.
- Radium-223 may improve overall survival, delay skeletal events and improve quality of life in appropriately selected patients.
- Treatment should be delivered through appropriately commissioned nuclear medicine or molecular radiotherapy services with the relevant expertise and radiation protection arrangements.

Background

In selected patients with progressive bone metastases from metastatic castrate resistant prostate cancer (mCRPC), an additional option to external beam radiotherapy for palliation of painful bone metastases is the use of the bone targeted radionuclide radium-223. The ALSYMPCA trial compared administration of radium-223 with placebo in patients with progressive mCRPC with at least two bone metastases and no known visceral metastases. In addition to study treatment, all patients received best standard of care, including local external beam radiotherapy and steroids.[66] The study demonstrated an improvement in median overall survival (the primary endpoint) from 11.3 months with placebo to 14.9 months with radium-223. Importantly, radium-223 was also shown to prolong the time to development of a skeletal event, including use of external-beam radiation therapy to relieve skeletal symptoms, new symptomatic pathologic vertebral or nonvertebral bone fractures, spinal cord compression, or tumour-related orthopaedic surgical intervention (15.6 months vs 9.8 months). A significantly higher percentage of patients who received radium-223 had a meaningful improvement in the quality of life according to the FACT-P total score during the period of study-drug administration (25% vs. 16%, P=0.02).

Patient selection

Patients considered for radium-223 should have adequate haematological and renal function, no known visceral metastases, and an anticipated life expectancy of at least 6 months.

Treatment

Radium-223 is typically administered at an activity of 50kBq per kg body weight, given intravenously every 4 weeks for 6 cycles.

Whilst nuclear medicine therapy facilities are required to safely administer the treatment, since radium-223 is an alpha emitter with low range, radiation protection restrictions are minimal following administration, and treatment can be safely delivered on an outpatient basis.

Section 13. Access, models of service delivery and timing of palliative radiotherapy

Elinor Gatfield, Kim Fell, Conor Fitzpatrick

Key recommendations:

1. Healthcare professionals should consider the various barriers that impact on the utilisation of palliative radiotherapy, to ensure all patients can access this treatment when it is clinically appropriate.
2. Radiotherapy departments are encouraged to re-design work practices and/or develop service delivery models to provide symptomatic patients receiving palliative radiotherapy with timely treatment. Examples include: radiographer-led services and dedicated rapid-access clinics or pathways.
3. Advanced techniques utilised within an efficient workflow can be justified where patient experience is also enhanced.

Access

Palliative radiotherapy plays a crucial role in the care of cancer patients, yet its provision remains uneven across populations due to the interplay of socioeconomic, geographic, educational, patient-related, and systemic barriers. A population study of a European publicly funded universal healthcare system identified those patients with low household income or who were diagnosed in a hospital without radiotherapy facilities had particularly reduced likelihoods of receiving palliative radiotherapy, adjusted odds ratio (OR) = 0.63 (CI 0.56-0.72) and = 0.70 (CI 0.64-0.77), respectively.[68] Furthermore, a meta-analysis of 21 studies showed travel distances of ≥ 50 kilometres are associated with decreased odds of receiving palliative radiotherapy, OR 0.84 (CI 0.80-0.88).[69] Knowledge gaps among healthcare providers have also been shown to hinder referral, due to unfamiliarity of the benefits and risks of palliative radiotherapy, and inter-professional education and collaboration can improve access.[70,71,72] Additionally, patient-specific factors including performance status, gender, age and patient or relative reluctance, influence treatment recommendations.[68,73] Some of these factors justifiably impact on decision-making, but clinicians need to be aware of the potential to under-utilise palliative radiotherapy when it is clinically indicated. Within healthcare systems, capacity constraints due to limited resources in terms of infrastructure and workforce, as well as fragmented referral pathways can also delay care.[70]

Models of palliative radiotherapy service delivery

Due to the pressures radiotherapy departments face, various models and pathways for palliative radiotherapy delivery have been developed worldwide to streamline patient flow and reduce delays.

Radiographer-led services

Radiographer-led services have emerged as an efficient approach, allowing trained therapeutic radiographers to work as autonomous practitioners; receiving referrals, assessing and consenting patients, independently planning and prescribing radiotherapy treatments, and co-ordinating care with the support of clinical mentors when required, within a defined scope of practice. These roles have been shown to enhance service flexibility, free oncologists' time for more complex cases, and have demonstrated safety and high patient satisfaction.[74,75,76,77] Moreover, the time patients are waiting for treatment can significantly reduce, and the navigator role improves continuity of care.[78,79,80] Therapeutic radiographers can also provide support and education for the trainee workforce.

Examples of consultant radiographer-led palliative radiotherapy service models are provided in Appendix B. This includes case studies from UK centres and supporting comparative material to illustrate different approaches to service delivery.

Rapid access clinics or pathways

Dedicated rapid access clinics or pathways represent other models of work, and their use has improved patient access to treatment, advanced roles within the multidisciplinary team, and educated trainees.[81,82] One-stop assessment clinics offering imaging, consultation, and treatment are particularly effective for patients with urgent needs such as painful bone metastases, spinal cord compression, or bleeding tumours, minimising waiting times and subsequently improving symptom control, and often report high levels of patient satisfaction.[82,83,84] One rapid access clinic model resulted in fewer hospital visits for patients and increased specialist palliative care referrals.[85] Similarly, rapid access pathways integrate multidisciplinary input to triage referrals swiftly, ensuring patients receive prompt care by standardising referral criteria, streamlining imaging and planning processes, and prioritising single-fraction or short-course treatments. Such pathways reduce inefficiencies and multiple UK centres have significantly decreased waiting times for symptomatic patients receiving palliative radiotherapy.[86,87]

Examples of rapid-access palliative radiotherapy service models are provided in Appendix C. This includes case studies from UK centres and supporting comparative material to illustrate different approaches to pathway design and delivery.

Pathway re-design

Research is also being done to assess the use of diagnostic CT scans for sim-free planning, using online adaptive radiotherapy, which may speed up workflows and decrease the number of hospital visits for patients.[88,89]

Timing of palliative radiotherapy

The 1993 Joint Collegiate Council for Oncology defined good and acceptable practice for radiotherapy delivery times from time of referral.[90] More than 30 years on, the service pressures on radiotherapy departments continue to have a negative impact on treatment wait times, but many radiotherapy departments have devised flexible pathways and services with improved prioritisation of symptomatic patients allowing them to receive expedited treatment.

The use of automation tools and artificial intelligence may also help to provide timely treatment, and it is important to remember that occasionally advanced planning techniques can be justified if this will speed up the patient pathway for example by decreasing time spent on discussion and deliberation of the optimal simulation.

The various service models discussed in this chapter represent crucial steps towards ensuring that all patients can access timely palliative radiotherapy that aligns with their needs and goals of care.

Section 14: Future of palliative radiotherapy

Thankamma Ajithkumar

Key recommendations

- Palliative radiotherapy is an essential component of holistic care but requires modernisation.
- Better prognostic tools are needed to avoid non-beneficial treatment.
- Integration with immunotherapy and targeted agents is a major frontier.
- Standardised endpoints and trial frameworks are urgently needed.
- AI and automation will reshape rapid-access palliative radiotherapy delivery.
- Services must remain adaptive, innovative, and audit driven.
- Excellent communication and person-centred care remains essential to ensure the best outcomes.

Palliative radiotherapy remains a cornerstone of symptom management in advanced cancer, offering meaningful improvements in comfort and quality of life. However, the current practice is still shaped by historical norms rather than contemporary evidence.

A persistent challenge is identifying patients who are likely to benefit from palliative radiotherapy. A meta-analysis of 88,516 patients demonstrated that 16% of patients die within 30 days of treatment, with a higher risk among inpatients, those with multiple treatment sites, hepatobiliary primaries, and ECOG 3–4. There is an urgent need for robust, validated prognostic tools to avoid futile treatment and support shared decision-making.

The rapid evolution of targeted therapies, immunotherapy, and cellular treatments has outpaced the integration of palliative radiotherapy into modern oncology pathways. Key uncertainties include:

- Optimal dose-fractionation in the era of prolonged survival
- Whether hypo-fractionated or ultra-hypofractionated schedules are more appropriate for at least a selection of patients planned to undergo palliative radiotherapy
- How best to exploit potential synergy between systemic therapy and palliative radiotherapy

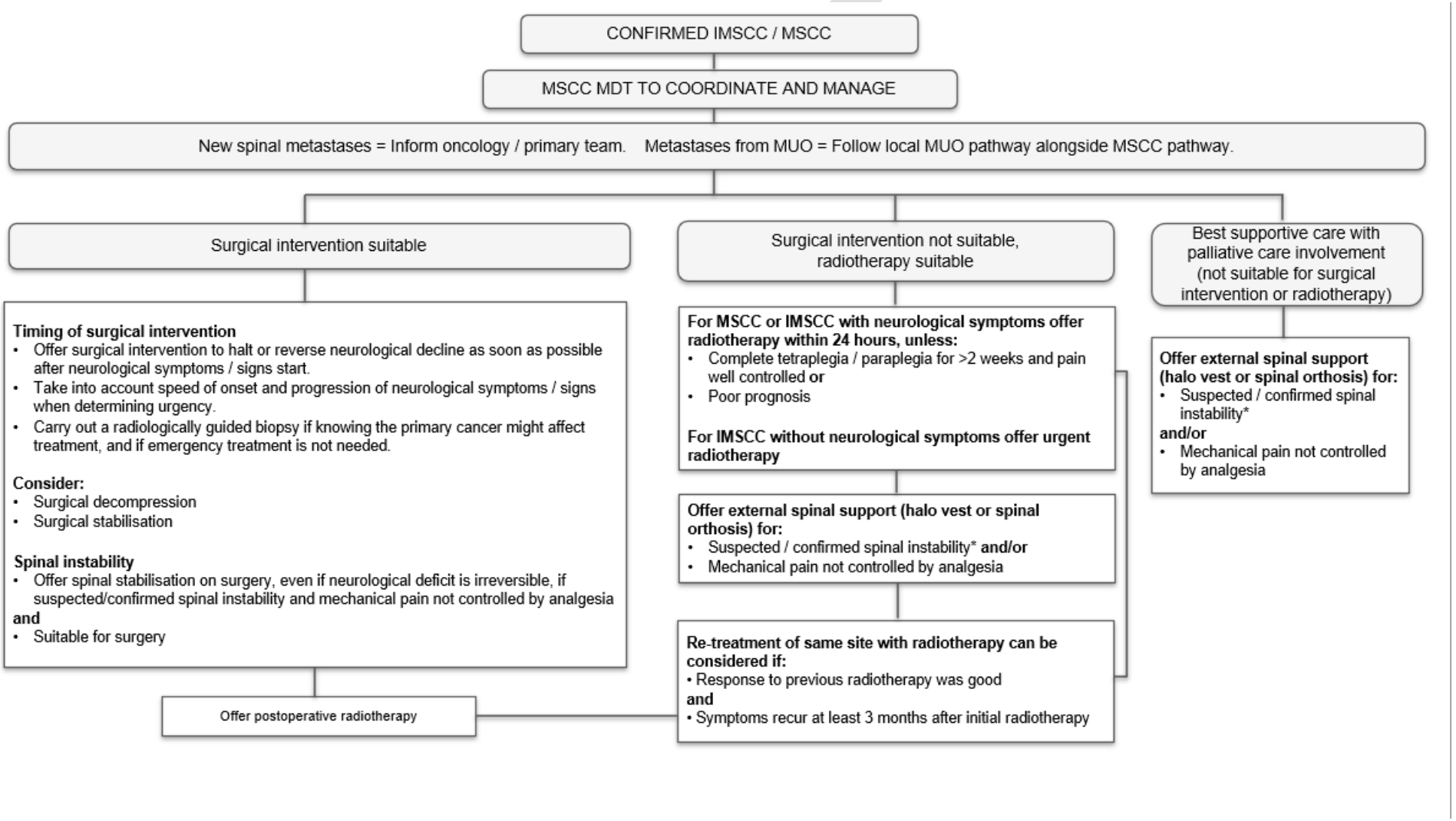
Randomised evidence in palliative radiotherapy remains sparse, with bone metastases being the only area with well-established trial frameworks. Early-phase studies combining palliative radiotherapy with novel agents (e.g., ATM inhibitors, immunotherapy) are emerging, but survival benefits remain unproven. This underscores the need for standardised endpoints, consensus on trial methodology and harmonised reporting frameworks.

The fundamental aim of palliative radiotherapy in achieving prompt symptom relief can only be achieved by fast delivery of treatment. There is no universal rapid-access model suitable for all institutions. Services must adapt to local resources, workforce capacity, and patient needs. Rapid assess radiotherapy models with same-day planning and treatment are attractive, but the clinical workflow models differ.

AI-enabled workflows offer major opportunities to streamline planning and reduce reliance on specialist staff. Future possibilities, such as synthetic CT generated from CBCT, will enable true one-table, same-day treatment and facilitate patient-centred rapid palliative radiotherapy services. Going forward, palliative radiotherapy services need to be constantly inventive and fluid in deriving optimal models of palliative radiotherapy delivery, and regularly modify pathways based on prospective service audits on clinical outcome, resource utilisation and patient experience.

Appendix A: Management of spinal cord compression

This flow diagram has been adapted from material developed by Cheshire and Merseyside Cancer Alliance and is reproduced with permission.



Appendix B: Consultant radiographer-led palliative radiotherapy service models

The Beacon Centre, Musgrove Park Hospital, Taunton

The rapid access palliative radiotherapy service is a Consultant Radiographer led service enabling safe, timely, and holistic access to palliative radiotherapy for patients with complex symptom burden. Patients are referred via a standardised referral form and are triaged into one of three pathways: Emergency (within 24 hours), Urgent+ (4-day), and Urgent (14-day), for treatment start times from referral.

The Consultant Radiographer undertakes holistic assessment, consent, virtual simulation, prescription, and premedication, ensuring continuity of care from referral to treatment delivery. A two-week post-treatment telephone follow-up clinic is embedded into routine practice, which enables ongoing symptom assessment, optimisation and step-down of medication, and early identification of treatment-related toxicities.

The Consultant Radiographer collaborates with Consultant Oncologists, engaging in case discussion where required, while maintaining autonomous practice within an agreed governance framework. The role supports education and shared learning within the multidisciplinary team, and continuous service evaluation is embedded within the rapid access model allowing for reflective practice, pathway refinement, and data-driven service improvement, ensuring patient safety and symptom control remain central to care delivery.

The Clatterbridge Cancer Centre, Liverpool

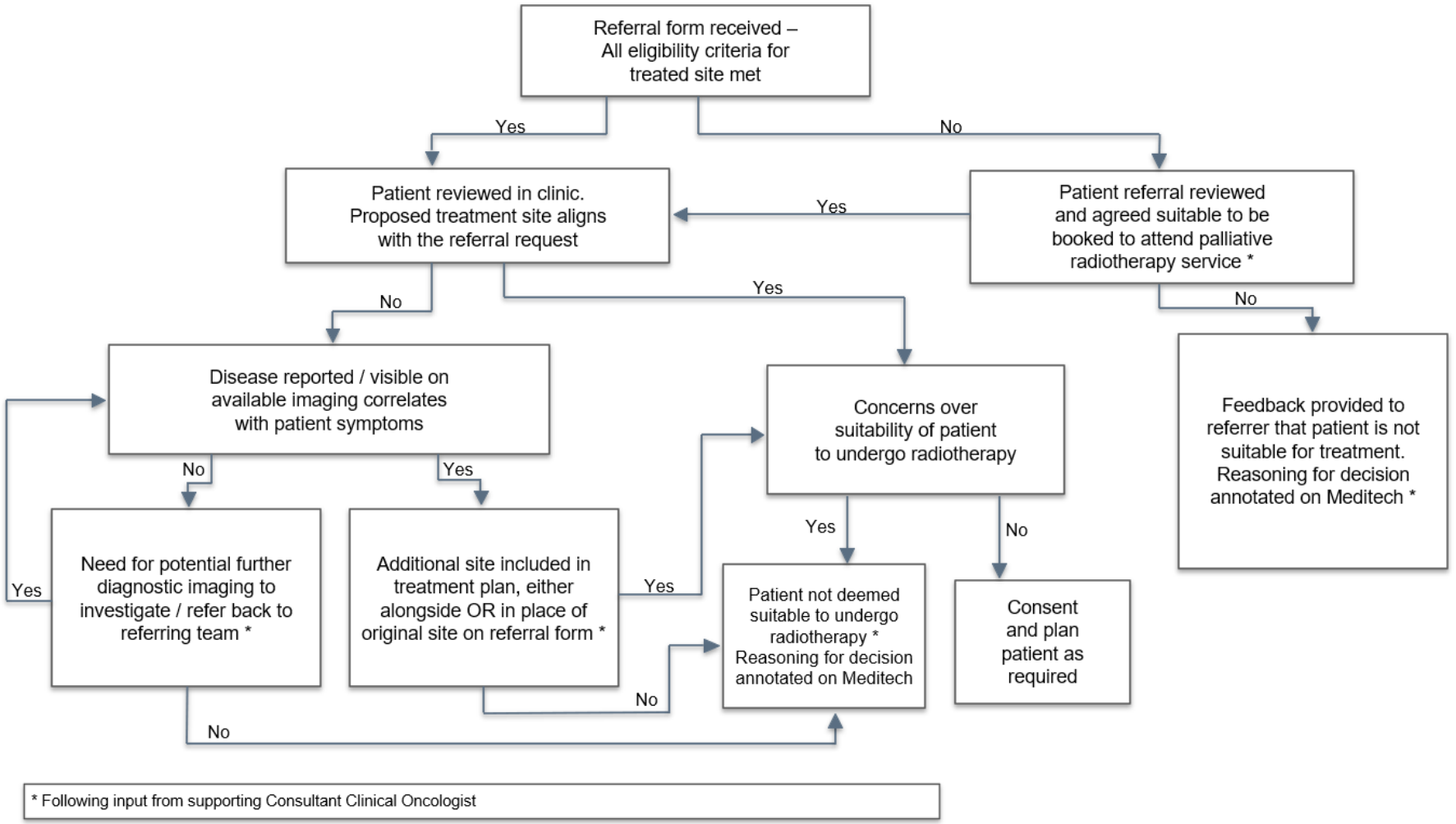
The Palliative Radiotherapy Service (PRS) is a Consultant Radiographer led service for patients requiring palliative radiotherapy for symptom control, and accepts referrals from across oncology, haematology and the community via a single referral form. The service manages patients with bone or soft tissue metastases, bleeding tumours, or those requiring whole brain radiotherapy.

Referrals are vetted and then booked into the next available clinic space within seven days of all relevant information being received and reviewed. There is a daily PRS clinic (Monday-Friday) accommodating up to four patients each, with an attached CT planning slot held to allow review, consent and planning to be undertaken in a single visit.

Additional needs are often also identified and actioned, including referral to community palliative care teams, district nursing, and physiotherapy. Clinical support via the wider Clinical Oncology team is available to provide advice and peer review when required.

The majority of patients commence treatment within three days of the CT planning scan, but plan and treat visits can be facilitated for patients where there is clinical urgency or those travelling significant distances. The PRS provides a high quality and safe service which consistently receives excellent patient and professional feedback.

Flow diagram for patients referred to the Clatterbridge Cancer Centre Palliative Radiotherapy Service



Appendix C: Rapid access palliative radiotherapy case studies

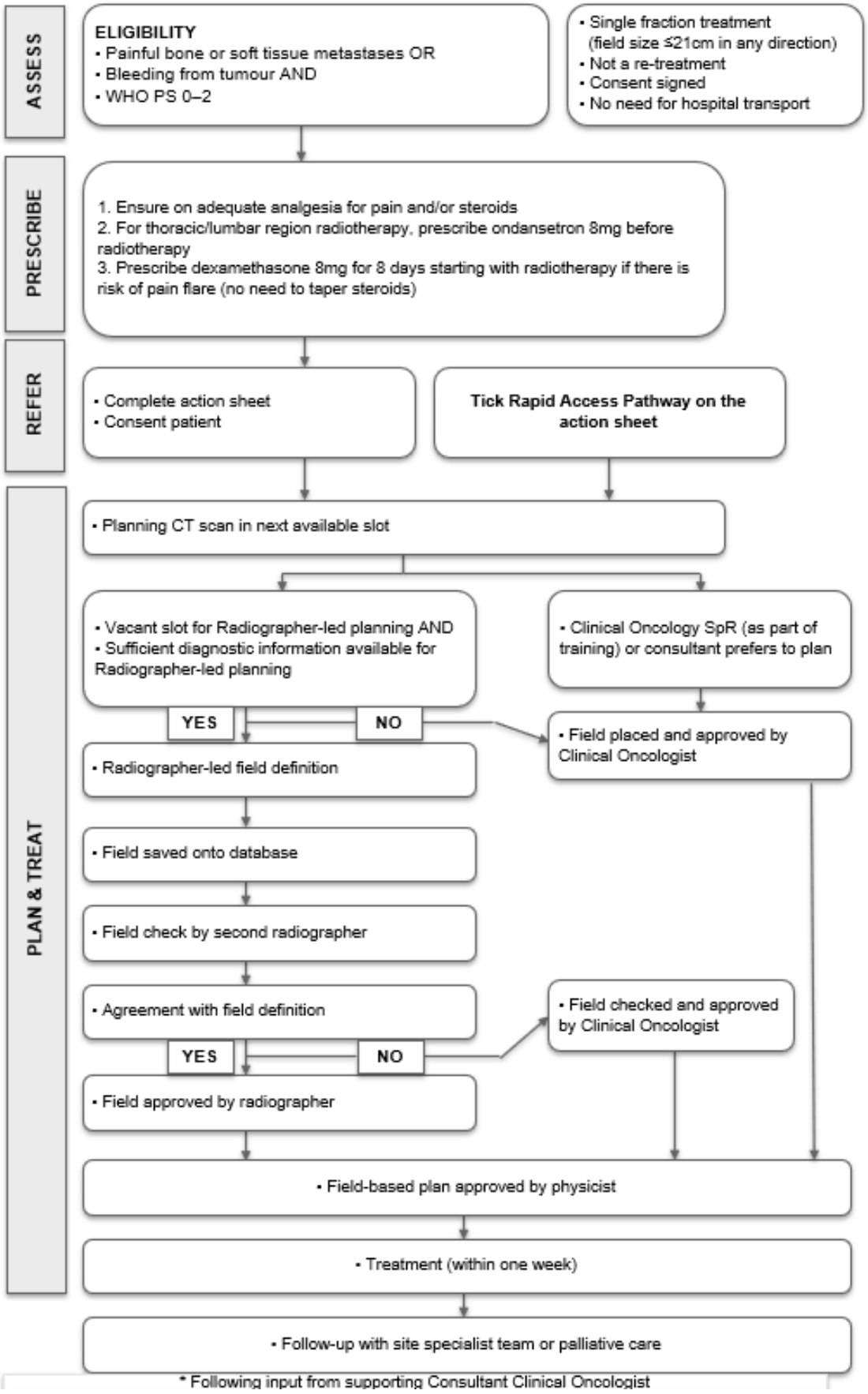
The Christie, Manchester

A Rapid Access Palliative Radiotherapy Clinic was established in order to provide timely access to palliative radiotherapy for patients with symptomatic metastatic and locally advanced cancer, including in post-operative settings. It is a consultant-led service with a team composed of nurse clinicians experienced in supportive care, pain management and wound care, and senior radiographers, providing radiographer-led planning and on-treatment reviews. The clinic is supported by an administration team arranging appointments and transport with short notice and Macmillan Cancer Information team providing holistic needs assessment. Given the rapid access nature of the clinic with urgent/emergency referrals, the patients' appointments are prioritised in order to provide the planning and treatment in a timely manner. The clinic set-up allows for same day referral, consultation, consent, planning and treatment, if required. Painful bone or soft tissue metastases make up the majority of the workload, and the treatment technique is predominantly based on virtual simulation, but other modalities, such as electrons or 3D computer planning, are also available. Patients are treated with both single and fractionated radiotherapy. Patient feedback has shown that the Rapid Access Palliative Radiotherapy Clinic continues to be an effective method of providing high quality, timely and holistic care to cancer patients with a limited life expectancy. All surveyed patients have reported an excellent experience within the department as a whole and all would recommend the clinic to others if similar treatment were required.

Addenbrooke's Hospital, Cambridge

The Rapid Access Pathway (RAP) is for patients with symptomatic disease, requiring a single fraction of palliative radiotherapy using a virtual simulation technique. Painful bone metastases make up the majority of the workload. Protected radiotherapy CT planning or treatment appointment slots are not possible due to service pressures, so the RAP has been refined to utilise the available capacity at short notice whilst prioritising the patient group most in need of timely treatment. Therefore, our eligibility criteria require the patient to be fully flexible with appointment times, which unfortunately excludes patients requiring hospital transport, and patient consent must be completed prior to the radiotherapy referral. Approved referrals are booked directly into the next available slot on the CT scanner, by-passing the booking process usually performed by administrative staff, and field placements can be completed by any available IR(ME)R duty holder, which might be a clinician or therapy radiographer. This flexible approach minimises the length of the RAP giving an average time from referral to treatment of five working days.

Flow diagram for patients referred to the Rapid Access Pathway for palliative radiotherapy at Addenbrooke's Hospital



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