West Midlands Radiotherapy Clinical Protocol

Skin Cancer

Revision history

Version	Date	Summary of changes
0.1	28.6.24	Initial draft based on working group discussions/revision of UHCW skin protocol (see appendix for contributors)
0.2	19.7.24	Improved draft based on working group discussion (see appendix for contributors)
0.3	23.7.24	Draft ready for consultation
0.4	21.1.25	Further amendments based on feedback from consultation August – Dec 2024
0.5	5.2.25	Administrative changes to ensure consistency when referring to RCR dose fractionation guidance
1.0	14.2.25	Ratified by EAG
1.1	9.7.26	Peer review wording amended
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Ratification

This document was ratified by the following people at the Radiotherapy Expert Advisory Group:

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WEST MIDLANDS RADIOTHERAPY NETWORK

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1. INTRODUCTION

Skin cancers should be managed by a multidisciplinary team, including a dermatologist, a clinical and medical oncologist and a plastic surgeon/maxilla facial surgeon.

2. BASAL CELL CARCINOMA (BCC) AND SQUAMOUS CELL CARCINOMA (SCC)

2.1. CLINICAL INDICATIONS FOR RADIOTHERAPY

Surgery and radiotherapy are equally effective for treating Basal Cell Carcinomas (BCCs) and Squamous Cell Carcinomas (SCCs).

Radiotherapy is usually preferred/more appropriate:

- When the position of the tumour is such that the cosmetic result from surgery is poor or require extensive reconstruction e.g. nose, lower eyelid, inner canthus, lip, nasolabial sulcus, pre and post auricular areas and ear.
- Adjuvant to surgery if risk of recurrence is high.
- Large superficial lesions
- Older patients > 75 years
- Patients who refuse or are unfit for surgery.

Surgery is usually preferred/more appropriate:

- In younger patients (especially <50 years)
- When the tumour is on the trunk, extremities or upper eyelids (especially middle), lower leg/foot, dorsum of hand.
- When there is fixity to bone, cartilage or other deep structures
- Upon recurrence post radiotherapy
- In sites of previous scars, burns, fragile tissue paper skin after steroids
- In patients with Gorlins, xeroderma pigmentosa, ataxia telangiectasia.

For SCC's generally but also can consider in advanced BCCs, also see 2020 BAD SCC guidelines below

Adjuvant radiotherapy to primary site

Consider for lesions at high risk of local recurrence

- Invasion of deeper tissue such as subcutaneous tissue
- Poorly differentiated histology
- Involved/close resection margins
- Perineural invasion

Adjuvant radiotherapy to nodal basins

Consider if there is/are:

- Extra capsular spread
- Incomplete macroscopic or microscopic clearance
- Large node involved (≥ 3 cms)
- Multiple nodes involved (≥ 2)

The British Association of Dermatologists' guidelines for the management of people with cutaneous squamous cell carcinoma 2020 gives further recommendations (see extract below):

Radiotherapy: primary and postoperative (adjuvant radiotherapy)

- R17 (↑↑) Discuss people with histologically proven cSCC being considered for radiotherapy at an MDT (LSMDT or SSMDT) with a clinical oncologist present.

- R18 (↑↑) Offer primary radiotherapy:
  - to selected people with cSCC as a treatment option following appropriate discussion at the appropriate skin MDT and/or with a clinical or radiation oncologist, factoring in patient preference, and
  - to people with cSCC when surgery is not feasible or would be challenging or likely to result in an unacceptable functional or aesthetic outcome

- R19 (↑) Consider adjuvant radiotherapy in people with cSCC
  - if pathological excision margins are clear but close (< 1mm) following discussion at an appropriate skin MDT, where a clinical oncologist is present, and
  - with completely excised T3 tumours, where there are mul[1]tiple high-risk factors, including those > 6 mm in thickness (depth) and invasion beyond subcutaneous fat.

- R20 (↑↑) Offer adjuvant radiotherapy to people with incompletely excised cSCC, where further surgery is not possible (or is not chosen by the patient) and in those at high risk of local recurrence
  - in the case of perineural invasion (multifocal, named nerve and/or diameter of nerve > 01 mm, below the dermis)
  - in recurrent disease, and
  - in those who are immunocompromised (see R21)

- R21 (↓↓) Do not offer postoperative radiotherapy to people with completely excised T1 or T2 cSCC and with microscopic, dermal-only, nerve diameter < 01 mm perineural invasion.

- R22 (↑) Consider conformal radiotherapy including the entire course of the involved nerve in people with cSCC with symptomatic perineural invasion and/or radiological evidence of perineural invasion when surgery is inappropriate, after carefully weighing the benefits and side-effects from radiotherapy to such an extensive radiotherapy treatment field.

- R23 (GPP) Inform younger people with cSCC (age < 60 years), especially if they are an organ transplant recipient, of the very low risk of radiation-induced, in-field malignancy in the future. Take this risk into account when making any treatment decision.

The strength of these recommendations is determined by the key below:

(↑↑) – strong recommendation for the use of an intervention
(↑) – weak recommendation for the use of an intervention
(↓↓) – no recommendation; or strong recommendation against the use of an intervention

2.2. STAGING INVESTIGATIONS

- Histology/cytology (skin scrape, punch biopsy, excision biopsy)
- Clinical examination of primary and regional lymph node areas.
- Consider CT imaging if clinically indicated, e.g. fixed lesion on head and neck, clinically involved nodes
- Imaging in high risk sites to delineate deep extent and bone/cartilage involvement
- Photography – pre and post operatively

2.3. CHEMOTHERAPY

- Refer to NICE technical appraisals for each disease type

2.4. CLINICAL TRIALS

- All patients should be encouraged to join clinical trials for which they are eligible. Refer to West Midlands Radiotherapy Network website at www.westmidlandsradiotherapynetwork.nhs.uk

2.5. INFORMATION AND CONSENT

- Local patient information sheet
- Patient consented with information on individualised benefits and toxicities
- Patients consented with individualised information of planned treatment
- Booking form consent completed

2.6. PLANNING TECHNIQUE

	BCC/SCC single applied fields
Energy / modality	Low energy photons/electrons depending on depth, site and size of lesion Some patients may need a high energy photon plan. Superficial radiotherapy should be considered for: • PTV ≤ 4 cms • Peri-orbital tumours due to electron scatter and required lead shielding thickness Electron therapy should be considered for: • Deep tumours • Tumours overlying cartilage (e.g. pinna, nose) or bone due to increased absorption Volumetric modulated arc therapy (VMAT) might be considered
Patient position, including immobilisation equipment and technique.	Patients are treated in a position that best suits the location of the lesion. The aim is to make the patient as comfortable as possible whilst ensuring adequate immobilisation is achieved, and that the required position is reproducible.

Localisation	Patients are clinically marked up by the referring oncology consultant or a consultant radiographer. Patients should be examined under a bright light with a magnifying glass/dermatoscope. The set-up information should be recorded in the R&V system and a clinical photograph taken of the treatment area.
Planning Technique	Prescriptions are applied doses and aim is to give a skin dose of 90 – 100%. Aim is to cover the PTV with the 90% isodose both laterally and at depth. Build-up will usually be appropriate when treating with lower energy electrons due to reduced surface dose.
OAR	Cornea/Lens – Consider appropriate internal eye shield when treating peri-orbital lesions and lesions of the eyelid. As per site specific guidance for OAR,
Bolus	Build up/bolus requirements should be discussed with a member of the physics department to bring the skin dose up to 95% or more and to encompass the target depth to at least 80% isodose. Depth dose charts should be consulted.
Shielding	Customised lead cut out for irregular shaped lesions and lesions around the eye, ear, nose and throat. Internal eye shield when treating eyelid and peri-orbital lesions. Nasal septum and gum shielding should be considered when treating lower nose and lip.
Gap compensation	SCC is included in RCR guidelines as category 1 if macroscopic disease is present. Interruptions in treatment should be avoided.
Patient instructions	Gentle washing using mild, un-perfumed soap. Avoid shaving in treatment area. Use un-perfumed, non-metallic moisturiser. Avoid exposure to sunlight.

2.7. TARGET DELINEATION

Target definition. Field /volume	Clinicians will utilise all staging and imaging modalities to guide PTV/CTV mark-up. The treatment volume will need to be larger than the target volume due to dose fall off at field edges. **BCC (non-morphoeic)** CTV = GTV + 0.5 -0.7 cms PTV = CTV **BCC (morphoeic)** CTV = GTV + 0.5cm - 1.0 cm PTV = CTV **SCC –** CTV = GTV + 1.0 -1.5 or 2.0 cm For electrons, an additional margin is required to account for penumbra and bowing in at depth according to depth dose charts of selected energy. Any stand-off/stand-in should be measured and incorporated as required. **Adjuvant radiotherapy to nodal basins** The entire nodal region at risk should be treated, e.g. axillary and SCF nodes, iliac and inguinal nodes. Add 0.5 – 1.0 cms to the CTV to create the PTV.

2.8. DOSE AND FRACTIONATION

Dose / Fractionation & overall treatment time	Radiotherapy Dose Fractionation: Fourth Edition suggests: 18-20 Gy single fraction (≤ 3 cms) 32.5 - 35 Gy in 4-5#s over one week (≤ 4 cms) 45 Gy in 10#s over 2-3 weeks 50 Gy in 15-20#s over 3-4 weeks 55 Gy in 20#s over 4 weeks 60 Gy in 30# over 6 weeks (if large area and/or in area of poor radiation tolerance) There may be regional variation taking into account patient factors, tumour and field size, for example for frail and elderly patients. Adjuvant radiotherapy to nodal regions: 50 – 60Gy in 20 – 30# daily over 5 – 6 weeks. Head and neck region:

	66Gy in 33# daily over 6.5 weeks. 50 – 60Gy in 20 – 30# daily over 5 – 6 weeks. Consider head and neck guidelines as appropriate Additional fractionation schedules can be decided upon following peer review. Peer review should be undertaken in line with the West Midlands regional guidance agreed in December 2025 which identifies which cases should be subject (as a minimum) to peer review. Schedule chosen is influenced by the size of the lesion, cosmetic considerations patient factors, and histology. More fractionated regimens are likely to produce better long term cosmetic results, particularly when volumes are large. The dose is prescribed as an applied dose for kV photons and to the 100% isodose for electrons. Consider increasing the dose by 10% when using electrons to account for the reduction in RBE compared to photons (Radiotherapy Dose Fractionation: Fourth Edition). **Adjuvant radiotherapy to primary site** As above **Adjuvant radiotherapy to nodal basins** Can be considered but should include all at risk nodes. 40 Gy in 15#s to axilla/groins Consider head and neck regimes for head and neck lesions. 50 Gy in 20#s 60 Gy in 30#s increasing to 66 Gy in 33#s if there is residual macroscopic disease. **Palliative radiotherapy (including skin mets):** 8 Gy single # 20 Gy in 5#s 30 Gy in 10#s 30-36 Gy in 5-6#s over 5-6 weeks

2.9. ON TREATMENT REVIEW

Pre-Treatment/Treatment Verification

Verification imaging as per imaging protocol.
Patient on-treatment review as per local guidance.

2.10. FOLLOW UP AND LATE TOXICITIES

Review & follow up	• As per BAD guidelines or local protocol

Treatment Letter	• On completion of treatment a summary of the radiotherapy dose and toxicities experienced are documented. • In addition, expected acute and late side effects are detailed with recommended treatments.

3. MELANOMA

Radiotherapy Dose Fractionation: Fourth Edition suggests:

Adjuvant radiotherapy to the lymph node basin improves local control but is not consider as the standard of care for high-risk melanoma:

- 48 Gy in 20# over 4 weeks (Grade A)
- 50-60 Gy in 25-30# over 5-6 weeks (Grade C)

Definitive radiotherapy to primary unresectable disease:

- 50 Gy in 15# over 3 weeks (Grade C)

Desmoplastic melanoma:

- 48 Gy in 20# over 4 weeks (Grade C)

Palliative radiotherapy for melanoma

Depending on location of metastasis and patient's performance status, radiotherapy may improve symptomatic metastases.

Where a CTV has been drawn an IMRT / Conformal planning technique may be used if clinically appropriate. Use immobilisation, set-up, localisation and imaging as per proximal site

Radiotherapy Dose Fractionation: Fourth Edition suggests:
30 Gy in 10# over 2 weeks (Grade C)
20 Gy in 5# over 1 week (Grade B)
8 Gy in 1# over 1 day (Grade B)

4. LENTIGO MALIGNA

Surgery is the mainstay of treatment for lentigo maligna but radiotherapy may successfully treat this disease in patients whereby surgery would provide excessive cosmetic morbidity.

kV or electrons with 2 cm margins to PTV depending on critical structures.

Doses the same as for BCC/SCC

Radiotherapy Dose Fractionation: Fourth Edition suggests:

Adjuvant radiotherapy to the lymph node basin improves local control but is not consider as the standard of care for high-risk melanoma:

- 48 Gy in 20# over 4 weeks (Grade A)
- 50-60 Gy in 25-30# over 5-6 weeks (Grade C)

Definitive radiotherapy to primary unresectable disease:

- 50 Gy in 15# over 3 weeks (Grade C)

Desmoplastic melanoma:

- 48 Gy in 20# over 4 weeks (Grade C)

For palliative, Radiotherapy Dose Fractionation: Fourth Edition suggests:
30 Gy in 10# over 2 weeks (Grade C)
20 Gy in 5# over 1 week (Grade B)
8 Gy in 1# over 1 day (Grade B)

5. MERKEL CELL TUMOUR

For direct skin treatment, CTV = GTV + 3cm. CTV = PTV (depending on critical structures)
For treatment to nodes, CTV is clinical, and PTV = CTV + 5mm – 1.0cm depending on site set-up. Where a CTV has been drawn an IMRT / Conformal planning technique may be used if clinically appropriate. Use immobilisation, set-up and localisation as per proximal site. Consideration should be made to margins used in proximal site.

Radiotherapy Dose Fractionation: Fourth Edition suggests:

Definitive treatment:
60-66 Gy in 30-33# over 6-6.5 weeks (Grade C)
50-55 Gy in 20-25# over 4-5 weeks (Grade C)
45-50 Gy in 20# over 4 weeks (Grade D)
30-35 Gy in 10# over 2 weeks (Grade D)

Adjuvant treatment:
50-60 Gy in 20-30 # over 5-6 weeks (Grade C)

6. KELOIDS

Radiotherapy can be highly effective in reducing keloid recurrence, and should be delivered 24 -48 hours after surgical excision. Caution should still be used when prescribing radiation therapy for keloids, particularly when treating younger patients due to the long term risks of induced malignancy. These patients will be treated with an applied direct beam, either with Electrons or Superficial X-rays.

Dose: 7-10 Gy single # within 24-48 hours of surgery.
Consider fractionated regime for larger treatment areas

	Direct Electrons or SXR
Energy / modality	Electrons or photons appropriate to the depth of tumour
Patient position, including immobilisation equipment and technique	Supine (or Prone if more applicable) Position as appropriate to access treatment site

Localisation	Clinical mark up. Appropriate lead cut outs may be required for unusual shaped areas
Planning technique	Direct applied field
Target definition. Field /volume. OAR	Clinical mark up, with minimal appropriate margin to scar
Boost:	N/A
Shielding	N/A
Bolus	N/A

7. LYMPHOMA AND SARCOMA

Refer to regional centre.

8. REFERENCES

- Royal College of Radiologists - Radiotherapy dose fractionation 4th edition Accessed at Radiotherapy Dose Fractionation: Fourth Edition on 19.7.24
- British Association of Dermatologists guidelines for the management of adults with basal cell carcinoma 2021* I. Nasr I - British Journal of Dermatology (2021) 185, pp899–920 Accessed at British Association of Dermatologists guidelines for the management of adults with basal cell carcinoma 2021 - PubMed (nih.gov) on 19.7.24
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