# Accuracy and reproducibility of soft tissue sarcoma radiotherapy

**Descriptor:**

This audit assessed the accuracy of neo-adjuvant and adjuvant radiotherapy immobilisation and reproducibility of treatment in soft tissue sarcoma (STS) radiotherapy.

**Background:**

STS are tumours that develop from connective tissue or mesenchymal tissue. They account for 1% of all malignant tumours [1]. STS can arise from any anatomic site where connective tissue is found. Surgery with or without radiotherapy is the main form of treatment of STS. Radiotherapy has been proven to be highly effective in reducing risk of local recurrence [2].

Due to the anatomical presentation of the majority of STS being in the extremities, delivering accurate and reproducible radiotherapy is often challenging. This audit assessed the accuracy of radiotherapy immobilisation and reproducibility of treatment.

The Van Herk formula (2.5S +0.7s, S= systematic error, s= random error) was employed to derive the clinical target volume-planning target volume (CTV-PTV) margin [3]. The margins derived from the online data were compared against the offline data and the institution’s CTV-PTV margin. To assess reproducibility of the online verifications, two radiographers re-matched the patient set-up offline.

## The Cycle

**The standard:**

1. All patients should be treated within the institution’s CTV-PTV margin

2. The treatment setup should be reproducible

**Target:**

1. 100%

2. 100%

## Assess local practice

**Indicators:**

• Proportion of patients treated out of tolerance

• Proportion of non-reproducible treatment setups

• Calculated CTV-PTV margin from online verification data

**Data items to be collected:**

• Total number of patients

• Treatment intent (neo-adjuvant/adjuvant)

• Site of disease

• Number of verification images taken per patient

• Proportion of patients with orthogonal images taken

• Displacement in anterior-posterior, medial-lateral and superior-inferior directions during online verification to derive CTV-PTV margins

**Suggested number:**

20 patients with at least 5 images per patient [4]

**Suggestions for change if target not met:**

• Identify reason for target not being met. Generally, upper limb tumours tend to be more challenging to immobilise with good reproducibility

• Review method of immobilisation of limb. Our data suggests that standardised immobilisation technique using a thermoplastic shell, AccuformTM cushion and an indexed base-plate attached to the couch top and the thermoplastic mould is more accurate than individualised custom-made devices [5]

• Review adherence to protocol

• Amendment of institution’s CTV-PTV margin according to the derived margin

• Re-audit once a further 20 patients have been treated

**Resources:**

Personnel:

• Audit lead

• Two treatment radiographers

Time: 1 day to re-match patients offline, collate and analyse data and prepare report

**References:**

1. Rydholm A. Improving the management of soft tissue sarcoma. Diagnosis and treatment should be given in specialist centres. BMJ 1998; 317(7151): 93-4.
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3. Van Herk M, Remeijer P, Rasch C, Lebesque JV. The probability of correct target dosage: dose-population histograms for deriving treatment margins in radiotherapy. Int J Radiat Oncol Biol Phys 2000; 47(4): 1121-35.
4. The Royal College of Radiologists, Society and College of Radiographers, Institute of Physics and Engineering in Medicine. On Target: ensuring geometric accuracy in radiotherapy. London. The Royal College of Radiolgoists, 2008.
5. Dickie CI, Parent A, Griffin A, Craig T, Catton C, Chung P, et al. A device and procedure for immobilization of patients receiving limb-preserving radiotherapy for soft tissue sarcoma. Med Dosim 2009; 34(3): 243-9.

**Editor's comments:**

This audit would determine the accuracy of soft tissue sarcoma radiotherapy and the same method may be applied to assess accuracy of radiotherapy in other tumour sites.

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