# An audit of breast radiotherapy practice and timeliness of treatment in early breast cancer after breast conserving surgery

**Descriptor:**

This audit will measure local breast radiotherapy practice and the implementation of 3D based planning and treatment against national guidelines. Timeliness of treatment will be assessed against Department of Health 31 day standards for subsequent treatments. Departments should have local protocols in place specifying indications for the use of a tumour bed boost and this audit measures compliance against local standards.

**Background:**

As more patients survive breast cancer, the long term toxicities of treatment become even more important. For many women, increasingly diagnosed with small screen-detected cancers, it is the late complications of radiotherapy, rather than the risk of loco-regional cancer recurrence, that is the dominant hazard. Adverse cosmetic effects of radiotherapy include breast shrinkage and hardening, breast discomfort and skin changes. Less common but important late effects include damage to heart (left-sided cases), lung fibrosis and rib fracture. These late effects on normal tissues can also have important psychological and quality of life impact. Curative radiotherapy treatment planning for other tumour sites has traditionally aimed to fulfill the target volume dose homogeneity criteria contained in the recommendations of the International Commission on Radiation Units and Measurements (ICRU) Reports 50 and 62 (+7%; -5%). This has not been the situation for planning of breast radiotherapy. For example, a baseline survey of breast radiotherapy practice prior to the commencement of the national Standardisation of Radiotherapy (START) trials A and B in the late nineties demonstrated considerable variation in the quality and complexity of breast radiotherapy available in UK radiotherapy centres with widespread use of 2D simulator-based technology and breast radiotherapy planning based on standard wedge compensators which does not take into account dose inhomogeneity away from the central plane of the breast.

Modern radiotherapy techniques may reduce both unwanted late normal tissue toxicity and the excess of non-breast cancer deaths, particularly attributable to long-term cardiac morbidity, seen in follow up of older trials of adjuvant breast radiotherapy. However, implementation of modern breast radiotherapy planning, treatment and verification techniques has been patchy across the UK. NICE Improving Outcomes Guidance (IOG) for breast cancer published in Aug 2002 recommended that imaging showing the heart and major blood vessels should be used in radiotherapy planning ‘so that the cardiovascular system can be adequately protected during treatment’. The IOG states that whenever possible, 3D computerised planning should be used with the optimal delivery of breast radiotherapy facilitated by the use of linear accelerators with electronic portal imaging and multileaf collimators. Full dose (3D) compensation in the breast is now possible in most UK radiotherapy departments, and can be planned and delivered using simple methods of intensity modulation.

Adjuvant breast radiotherapy should be delivered in a timely fashion as there is evidence of poorer outcomes with delays. A recent study published in the BMJ investigated whether the length of interval between breast conserving surgery and start of radiotherapy affected local recurrence in a retrospective cohort analysis of older women (age >65 yrs) from the SEER database. The population included 18 050 with stage 0-II breast cancer diagnosed in 1991-2002 who received breast conserving surgery and radiotherapy but not chemotherapy. The overall local recurrence rate was just over 4% (n=734) and intervals over six weeks were associated with increased likelihood of local recurrence (hazard ratio 1.19, 95% confidence interval 1.01 to 1.39, P=0.033).

The concept of a tumour bed boost has been supported by the observation from multiple prospective randomized trials, comparing the outcome of patients treated with excision alone or excision followed by whole breast radiotherapy that the majority of ipsilateral breast recurrences occur in the region of the tumour bed. Several randomised trials have demonstrated that in-breast recurrences can be reduced by the addition of a tumour bed boost to whole breast radiotherapy. The largest of these boost studies was European Organization for Research and Treatment of Cancer (EORTC) trial involving 5318 patients with early breast cancer who had clear resection margins following lumpectomy (23). The reduction in local recurrence associated with a tumour bed boost at 5 years was about 40% (4.3% vs 7.3%, p < 0.001). The relative reduction in risk of local recurrence is similar across age groups from under 40 yrs to over 60 years. However, the absolute benefit varies with a number of factors determining baseline risk including age, tumour size, mitotic index and grade. Younger women had a higher risk of local recurrence than older woman and a greater absolute gain associated with tumour bed boost. In women ?40 years local recurrence risk was reduced from 19.5% to 10.2% at 8 years (odds ratio = 0.59; 95% CI 0.43-0.81). Women over 50 years gained less in absolute terms, although the odds ratio was similar to that in younger women. NICE Clinical Guideline 80 (1.11.7) recommends that ‘an external beam boost to the site of local excision to patients with early invasive breast cancer and a high risk of local recurrence, following breast conserving surgery with clear margins and whole breast radiotherapy should be offered’. However the guidance does not define the threshold for ‘high risk’ and there is no robust consensus model for defining this risk. The IOG recommends an additional boost dose of radiation to the tumour bed should be considered for younger women, particularly those below the age of 40.

## The Cycle

**The standard:**

1. IOG 2002 & NRAG Report 2007 defines standard for technical radiotherapy as a ‘3D based environment for imaging, planning and radiotherapy delivery’

2. NICE IOG 2002 recommended that imaging showing the heart and major blood vessels should be used in planning ‘so that the cardiovascular system can be adequately protected during treatment’

3. NICE CG 80 Use 40Gy in 15 fractions schedule as standard practice after breast conserving surgery or mastectomy

4. Cancer Reform Strategy - Going Forward on Cancer Waits. Radiotherapy should commence within 31 days of DTT/ECAD after surgery/completion of chemotherapy

5. Tumour Bed Boost – the department should have a local protocol specifying indications for a tumour bed boost. IOG 2002. An additional boost dose of radiation to the tumour bed should be considered for younger women, particularly < 40yrs. NICE CG80 2009 Offer boost to the site of local excision to patients with early invasive breast cancer and a high risk of local recurrence

**Target:**

• 100% planned/treated using 3D imaging/dose compensation

• 100% of women with left sided breast cancer the dose to heart tissue should be as low as reasonably achievable

• 100% of patients receiving whole breast radiotherapy after breast-conserving surgery should receive 40Gy/15 fractions

• 94% of patients should start radiotherapy as a subsequent treatment within 31days of DTT/ECAD

• 95% of women under the age of 40 years should have tumour bed boost after breast conserving surgery100% compliance

## Assess local practice

**Indicators:**

1. Proportion 3D planned

2. Proportion of women with left sided breast cancer having appropriate methods to reduce the radiation dose to heart tissue

3. Proportion of patients receiving adjuvant whole breast radiotherapy treated with 40Gy/15 fractions

4. Proportion commencing radiotherapy < 31 days as subsequent treatment

5. Proportion of women < 40yrs receiving boost after breast-conserving surgery

6. Percentage compliance with local departmental boost protocol

**Data items to be collected:**

In addition to the data items required for the above indicators:

• Laterality - left or right sided

• Cardiac Shielding for left sided tumours Y/N

• If heart in the radiation field reason for not using cardiac shielding

• Staging information (TNM)

• Factors potentially influencing decision to use a tumour bed boost - Patient Age, Tumour Histological subtype, Grade, LVI, presence/absence of Extensive Intraductal Component, margin status (radial, deep and superficial) ER/PR status and HER2 status

• Chemotherapy Y/N and dates

• Record whether radiotherapy delivered as part of clinical trial – treatment within a clinical trial may not reflect routine clinical practice

• Method of localisation of the tumour bed boost

**Suggested number:**

An audit of patients commencing whole breast radiotherapy after breast conserving surgery for early invasive breast cancer over a one month period.

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

• Identify reasons for lack of implementation of 3D planning for whole breast radiotherapy – these may include lack of virtual CT simulation, lack of expertise, lack of medical physics personnel, shortage of radiographers, training issues etc. The information collected in this audit could be used to support a business case for additional resources

• Identify reasons for not using cardiac protection when clinical appropriate and develop plan for implementation

• Identify delays in treatment pathway to ensure patients start subsequent treatment within 31 days

• Review adherence to departmental protocol for tumour bed boost and discuss this at departmental meeting if there is variation in practice. Review protocol against current national guidelines and identify reasons for non- adherence

• Re-audit in 12 months time

**Resources:**

- Personnel: Clinical director, audit lead, clinical oncologist, therapy radiographer

- Time: 12 hours to check records, review information and prepare report

[**23\_RCR\_Breast\_Pilot\_Tool\_v11\_17.06.11.doc**](https://www.rcr.ac.uk/sites/default/files/audit_template/co/23_RCR_Breast_Pilot_Tool_v11_17.06.11.doc)WORD - 253.5 KB

**References:**

1. Winfield E, Deighton A, Venables K et al. Survey of UK Breast Radiotherapy Techniques:Background Prior to the Introduction of the Quality Assurance Programme for the START (Standardisation of Radiotherapy) Trial in Breast Cancer. Clin Onc 2002;14: 267–271
2. NICE. Improving Outcomes in Breast Cancer: National Institute for Clinical Excellence; 2002.
3. National Radiotherapy Advisory Group. Radiotherapy: developing a world class service for England; 2007
4. Bentel, G., Marks, L. B., Hardenbergh, P., Prosnitz, L., Variability of the location of internal mammary vessels and glandular breast tissue in breast cancer patients undergoing routine CT-based treatment planning. Int J Radiat Oncol Biol Phys, 1999. 44(5): p. 1017-25
5. Donovan E, Bleakley N, Denholm E, Evans P, Gothard L, Hanson J, Peckitt C, Reise S, Ross G, Sharp G, Symonds-Tayler R, Tait D, Yarnold J. Randomised trial of standard 2D radiotherapy (RT) versus intensity modulated radiotherapy (IMRT) in patients prescribed breast radiotherapy. Radiother Oncol 2007 Mar;82(3):254-64
6. Canney, P.A., Deehan, C., Glegg, M., Dickson, J., Reducing cardiac dose in post-operative irradiation of breast cancer patients: the relative importance of patient positioning and CT scan planning. Br J Radiol, 1999;72 (862): p. 986-93
7. MV Williams, KJ Drinkwater. Radiotherapy in England in 2007: Modelled demand and audited activity. Clin Onc 2009 21:575-590
8. Bartelink H, Horiot JC, Poortmans P Struikmans H, Van den Bogaert W, Barillot I et al. Recurrence rates after treatment of breast cancer with standard radiotherapy with or without additional irradiation. N Engl J Med 2001; 345: 1378-1387
9. Whelan T et al for the Steering Committee on clinical practice guidelines for the care and treatment of breast cancer. Clinical practice guidelines for the care and treatment of breast cancer: breast radiotherapy after breast-conserving surgery (summary of the 2003 update). CMSJ 2003;168: 437-439
10. BASO Guidelines 2009.

**Editor's comments:**

This is an audit of breast radiotherapy technique and timing suitable to for a trainee to undertake

• Consultants may wish to undertake more focussed audits on specific aspects of breast radiotherapy technique such as cardiac doses in women with left sided breast cancer, tumour bed localisation for boost or IMRT to support service development activity

**Submitted by:**

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**Published Date:**

Thursday 4 August 2011

**Last Reviewed:**

Tuesday 17 May 2022