

# HERU Briefing Paper

HEALTH ECONOMICS RESEARCH UNIT

Briefing paper for the NHS

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## COST-EFFECTIVENESS OF POST-OPERATIVE RADIOTHERAPY IN MINIMUM RISK ELDERLY

1. Based on a trial with a 15 month follow-up adjuvant breast irradiation after breast conserving surgery and adjuvant endocrine therapy should not be provided to low risk older patients.
2. Not providing radiotherapy to low risk older patients will free up around 120,000 radiotherapy sessions annually in the UK.
3. Further evidence on the impact of radiotherapy on longer term local recurrence is required.

Key Messages

### References

1. Prescott RJ, Kunkler IH, Williams LJ, King CC, Jack W, Pol van der M, Goh TT, Lindley R, Cairns J. A randomised controlled trial of postoperative radiotherapy following breast-conserving surgery in a minimum-risk older population: the PRIME trial. *Health Technology Assessment* 2007; 11:31.
2. Karnon J, Kerr GR, Jack W, Papo N, Cameron D. Health care costs for the treatment of breast cancer recurrent events: estimates from a UK-based patient-level analysis. *British Journal of Cancer* 2007; 97: 479-486.
3. Hayman JA, Hillner BE, Harris JR, Weeks JC. Cost-effectiveness of routine radiation therapy following conservative surgery for early-stage breast cancer. *Journal of Clinical Oncology* 1998;16:1022-1029.

### Background

The use of post-operative breast irradiation (radiotherapy) following breast conserving surgery reduces the risk of local recurrence. However, radiotherapy has side-effects such as fatigue and therefore may reduce quality of life. Also, radiotherapy places substantial demands upon hard pressed radiotherapy departments. Because of these concerns the need for postoperative radiotherapy in tumours with

a low risk of recurrence has been questioned. The risk of local recurrence after conservation surgery and postoperative radiotherapy declines with age and it may therefore be appropriate to withhold radiotherapy in older women. Given the potential impact on both resource use and health outcomes, it is important to assess the cost-effectiveness of radiotherapy.

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# Methods

This study assessed the cost-effectiveness of omitting adjuvant breast irradiation in low risk older patients after breast conserving surgery and endocrine therapy. The economic evaluation was conducted as part of a randomised controlled trial comparing post operative radiotherapy with no radiotherapy in 255 participants who were followed up for 1.5 year.<sup>1</sup>

The health service costs considered were those of radiotherapy treatment (including NHS transport to radiotherapy sessions), treatment of recurrence, medication, endocrine therapy, primary care (GP and nurse visits) and secondary care (inpatient or outpatient hospital visits). These costs were estimated from data collected using specially designed forms completed by oncologists and patient diaries along with published unit cost data.

Effectiveness was measured using Quality Adjusted Life Years (QALYs). The advantage of using QALYs is that they enable length as well as quality of life to be combined into a single measure. The QALYs were derived using the EQ-5D instrument which is a generic quality of life measure and which the trial participant completed at baseline, 3.5 months, 9 months and 15 months.

# Results

The table reports the mean costs for both the radiotherapy and no radiotherapy arms of the trial. As would be expected, radiotherapy was the main cost driver for the radiotherapy arm contributing 61% of total cost. On average the patients attended 20 sessions of radiotherapy, with a mean cost of £2,128. Patients in the no-radiotherapy arm received relatively more expensive endocrine therapy and other medication costs were also higher. The mean total costs were £1,893 for the no-radiotherapy arm and £3,500 for the radiotherapy arm. No local recurrence was reported in either arm. The difference in mean total cost was £1,607.

The table also shows the mean QALYs. After adjusting for baseline difference, the difference in QALYs was extremely small (-0.008).

## Mean Costs and QALYs

	Radiotherapy N= 102	No-radiotherapy N=101
<b>Costs*</b>		
Radiotherapy	£2,128	-
Recurrence	£0	£0
Endocrine therapy	£215	£293
Other medication	£402	£915
Primary/ secondary care	£755	£685
Total cost	£3,500	£1,893
<b>QALYs</b>		
Unadjusted	0.946	0.915
Difference in QALYs when adjusting for baseline differences = -0.008		

\* costs are presented in 2004/05 pounds sterling

The difference in QALYs is close to zero and it might be argued that no-radiotherapy is better as it produces a similar number of QALYs at less cost. However, if the difference in mean QALYs is considered important then no radiotherapy produces fewer QALYs and is less costly. The incremental cost per additional QALY gained is £215,160. This means that withholding radiotherapy saves £215,160 at a loss of one QALY.

The figure shows the cost-effectiveness acceptability curve which indicates the probability that no radiotherapy is cost-effective compared with radiotherapy for various amounts that a decision maker might be willing to pay for an additional QALY. When a QALY is worth £30,000 (conventional threshold), the probability that no-radiotherapy is cost-effective is very high, (94%).

An important part of any evaluation is to check that the results do not greatly vary when plausible changes are made to the methods or data. In this study it was found that varying the cost for radiotherapy and excluding four patients who consumed a relatively high amount of health care resources, but which were unlikely to be related to radiotherapy, did not change the findings.

No recurrence was reported in the 15 month follow-up of the trial. It was found that withholding radiotherapy would have to result in a 6.5% increase in local recurrence within the 15 month time horizon before radiotherapy would be considered cost-effective at the £30,000 threshold. This calculation was based on a cost of diagnosing and treating a recurrence of £15,000<sup>2</sup>, and that recurrence reduces quality of life by 9%<sup>3</sup> but has no impact on life expectancy.

# Conclusions

If the findings of this study are maintained in further research, then they suggest that adjuvant breast irradiation after breast conserving surgery and adjuvant endocrine therapy should not be provided to low risk older patients. The estimated difference in health outcomes, measured in QALYs, was close to zero whilst the costs were substantially higher in the radiotherapy arm. The probability that no-radiotherapy is cost-effective relative to radiotherapy was very high, namely 94%.

Radiotherapy capacity in Scotland and the UK is considered to be inadequate. If radiotherapy is not provided to this patient group then this will free up some of this very scarce radiotherapy capacity. There were around 20,000 new breast cancer patients aged

over 65 in the UK in 2003. Around 31% would be classified as low risk resulting in freeing up around 120,000 radiotherapy sessions.

The magnitude of any excess local recurrence in patients not receiving radiotherapy is still uncertain. The follow-up was 15 months and no recurrences were reported. A longer-term trial is required to assess the longer term clinical outcome in this patient population. The PRIME II trial, which is currently recruiting, will meet this need.

The executive summary and full text of the report (reference<sup>(1)</sup>) is available at the NHS HTA Programme website: <http://www.hta.nhsweb.nhs.uk/>.

This briefing paper describes work conducted by the Economic Evaluation Programme of HERU. Further information about this topic can be obtained by contacting Dr Marjon van der Pol, HERU, University of Aberdeen, Foresterhill, AB25 2ZD (tel: 01224 553269; email: [m.vanderpol@abdn.ac.uk](mailto:m.vanderpol@abdn.ac.uk)).

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Cost-effectiveness acceptability curve for 'no radiotherapy' compared to radiotherapy

