

ORIGINAL ARTICLE

Costs of breast cancer treatment in the United Kingdom

P. Dolan, D. J. Torgerson and J. Wolstenholme

School of Health and Related Research, University of Sheffield, Sheffield S1 4DA, UK

SUMMARY. Breast cancer is a major source of mortality and morbidity to women in the UK. In this paper we estimate the costs of treating breast cancer using random samples of secondary and primary care records. We estimate the average cost per case of breast cancer to be £7247 which gives a total cost of £243 million per annum for the whole of the UK.

© 1999 Harcourt Publishers Ltd

INTRODUCTION

Breast cancer is a major cause of mortality and morbidity among women in the UK. Indeed, the UK has one of the highest incidences of the disease in the world.¹ In order to try and reduce this high incidence, the Government accepted the recommendations of the Forrest report and instituted a routine screening programme for women aged between 50 and 64.² In addition, there is increasing interest in the use and safety of pharmaceutical agents in women at high risk of breast cancer.

An important aspect of the economics of breast cancer prevention is averted treatment costs. Successful prevention will mean cost savings as a result of treating fewer women with advanced breast and metastatic disease. Estimating the costs of treating breast cancer can be difficult. Using price data provided by local hospitals can be unsatisfactory as quoted prices may not reflect the true costs of treatment. For example, a recent report showed that prices quoted for a mastectomy ranged from £700 to £2600.³ An alternative approach is to 'audit' a sample of patient's medical records and cost individual resource events.

As well as uncertainty in cost ascertainment, no previous study has estimated the total costs associated with breast cancer. The aim of this study, therefore, was to estimate the total costs of breast cancer in the UK.

METHODS

Epidemiology

A key factor influencing the total costs of breast cancer is, of course, breast cancer incidence. The epidemiology of cancer in the UK is well documented in the Cancer

Registries. We have used the most recent data which relates to 1994, 1995 and 1991 for England and Wales, Scotland, and Northern Ireland, respectively (personal communication, National Cancer Registries of England & Wales, Scotland & Northern Ireland).

Secondary care costs

First, we undertook a review of the literature to examine whether there were any suitable studies which had a comprehensive coverage of costs. The most recent, and most comprehensive, study was by Wolstenholme et al.⁴ In this study, the authors took a random sample of the case notes (of 200 patients) (from a local cancer registry in central England) who had cancer diagnosed in 1991. Using 137 records from patients with complete data, the proportion of patients with cancers at stages 1 to 4 were 74%, 9%, 12% and 4% respectively. The authors reported a 5-year cost per stage (beginning in 1991) of: £3576, £3996, £3916 and £6590 for stages 1 to 4, respectively. Inflating these figures to 1995/1996 prices gives the following: £7218, £6140, £5336 and £8926 for the four stages.

The costs included in this study were all secondary care costs of breast cancer, such as surgery, radiotherapy, chemotherapy, hospital palliative care and all inpatient and outpatient treatments. In addition, primary care costs which could be directly related to breast cancer (e.g. pain relief) were included. Costs which were not included were some primary care costs (such as GP visits, prescriptions, referrals for depression which are not directly related to breast cancer but are likely to be associated with it), breast reconstruction and hospice care.

Primary care costs

Data for primary care costs were taken from the EPIC general practice data base. It was decided to randomly sample

Address correspondence to: D. Torgerson, Centre for Health Economics, University of York, York YO10 5DD, UK

100 records of patients with breast cancer for each year from 1991 to 1995. It was not possible from this data set to identify records according to stage of breast cancer. Each of these 500 patients was matched by age and practice with a control. Thus, in total, 1000 anonymized patient records were used. The mean ages of both the patients and their age matched controls was 64.78 (with standard deviations of 13.89 and 13.88, respectively).

The primary care costs based on this dataset were estimated by looking at the difference in resource use between cases and controls in 1996 according to year of diagnosis. The quantities of resources were priced using published estimates from the University of Kent.⁵

Other costs

Given that the diagnosis of breast cancer may adversely affect the mental health of the patient, we examined the EPIC records for differential referral rates for psychiatric care across cases and controls. In terms of breast reconstruction, we assumed that 5% of women would undergo breast reconstruction after their primary operation (estimated from the GPRD) and this would cost £2046 per operation, which includes all relevant costs, e.g. breast implant (Dinnes personal communication). The costs associated with this intervention were estimated using cost data from Dundee NHS Trust teaching hospitals.

Patients with terminal breast cancer will die within one of three care settings: in hospital, at home or in a hospice. The percentages dying in each of these locations are assumed to be the same as the percentages reported for all cancers by Addington-Hall et al.⁶ The costs of dying in hospital are included in the cost estimates by Wolstenholme et al.⁴ The costs of dying at home are assumed to be zero. There may be additional nursing support costs but we were unable to find any data on this and thus total costs are likely to be underestimated. The costs associated with hospice care are calculated by multiplying the average length of stay at any

Table 1 Secondary care costs for breast cancer treatment in the UK (1995/6)

Stage	Number of women with cancer stage	Cost per case (£)	Total cost
1	24 987	7218	180 356 166
2	3168	6140	19 451 520
3	3935	5336	20 997 160
4	1456	8926	12 996 256
Total	33 546		233 801 102
	Number of women having breast reconstruction*		
Total	1677	£2046	£3431 142 237 232 244

*Based upon a prevalence rate of 1/20.

one hospice visit by the average cost per day of hospice care. Therefore, this figure represents a conservative estimate of the costs of hospice care since some patients may have had more than one hospice visit.

RESULTS

Using the latest available estimates from the National Cancer Registries, there are 29 599, 3136 and 811 reported cases of breast cancer for England and Wales, Scotland, and Northern Ireland, respectively. Therefore, all total costs based in this paper are based on 33 546 breast cancer cases.

Table 1 shows the total treatment costs of secondary care for breast cancer by stage. The total cost of £237 232 244 corresponds to an average cost per case of £7072. In Table 2, we show the number and cost of extra GP visits incurred by breast cancer patients compared to their controls. An average annual GP cost of £141 per patient was incurred which gave a total cost of £4729 986. Table 3 shows the costs associated with hospice and residential care, which total £1137 690. Finally, in Table 4 we present the total cost and cost per patient.

Table 2 Costs of GP visits for 1996 by year of diagnosis

Year of diagnosis	Mean number of visits by cases (SD in parentheses)	Mean number of visits by controls (SD in parentheses)	Difference	Significance of difference	Cost per patient (@£16 per visit)
1995	15.95 (15.76)	10.61 (11.65)	5.32	0.0074	£85
1994	12.33 (13.56)	8.81 (9.91)	3.52	0.037	£56
1993	8.23 (11.40)	6.81 (9.85)	1.42	0.35	NA
1992	10.87 (25.61)	7.08 (8.55)	3.80	0.17	NA
1991	7.24 (11.71)	8.61 (11.78)	-1.37	0.41	NA

Table 3 Costs of hospice and nursing residential care

Where patients received terminal care (proportion of all deaths)	Length of stay	Cost per day	Annual number of patients ^c	Annual total cost ^d
Hospital (50%)	— ^a	—	1107	—
Home (29%)	— ^b	—	642	—
Hospice (13%)	15 days	£202	288	$288 \times 15 \times 202 = \text{£}872\,640$
Nursing/residential (7%)	15 days	£114	155	$155 \times 15 \times 114 = \text{£}265\,050$

The location of where patients die are based on Addington-Hall et al.⁶ ^aThese costs are included in the secondary care costs by Wolstenholme et al.⁴ ^bIt is assumed for these patients that no cost is incurred. ^cThis is based on an assumed annual mortality rate of 6.6%. ^dThe cost per day is based on Netten and Denett.⁵

Table 4 Total annual costs of breast cancer in 1995/1996 prices

Cost description	Total cost	Average cost
Secondary care	237 232 244	7072
GP visits	4729 986	141
Hospice and nursing/residential care	1137 690	34
Total	243 099 920	7247

We did examine the use of anti-depressant medication, but found that there was no difference between the two groups (9.6% and 9.8% had been prescribed an anti-depressant for cases and controls, respectively). In addition, it does not appear that there are any additional costs associated with referrals of this kind (there were three referrals to psychiatric care amongst cases and four amongst controls).

DISCUSSION

In this paper the costs of breast cancer in the UK have been estimated. The total cost has been estimated to be somewhere in the region of £250m, per annum, which represents a considerable drain on NHS resources. Most of the costs are incurred through secondary care interventions and only about 2.5% are incurred elsewhere. This study has not estimated the loss in production due to breast cancer which might be important in this disease, where many women would otherwise have been employed in the formal labour market. Total costs may also be underestimated as it has not

been possible to include any costs associated with dying at home.

Given the high profile that breast cancer has within the NHS, particularly since the 1997 White Paper, screening programmes and the development of new pharmaceuticals may have a dramatic effect on the incidence of breast cancer in the future. Our paper suggests that a one-third reduction in incidence could save the NHS in the region of £80m per year. Of course, this estimate is based on the assumption that prevented cases would have incurred the same costs as the diagnosed cases in this study. However, the results presented here give some idea of the broad sums that are involved when considering reductions in the incidence of breast cancer.

References

1. Department of Health. The Health of the Nation – One year on. London, Department of Health, 1993.
2. Forrest P. Breast Screening. Report to the health ministries of England, Wales, Scotland and Northern Ireland by a working group chaired by P Forrest. London HMSO 1986.
3. Street A D, Posnett D, Threlfall A G. et al. Report on cost effectiveness of extending the UK National Breast Screening Programme, Yorkshire Health Economics Consortium, York, 1997.
4. Wolstenholme J L, Smith S J, Whyne D K. Economic Burden of Breast Cancer in the Trent Region Int J Health Tech Ass 1998; 14: 277–289.
5. Netten A, Denett J. Unit costs of health and social care 1996. Canterbury: PSSRU. University of Kent 1996.
6. Addington-Hall J. Regional Study of Care of the Dying. Department of Epidemiology and Public Health, University College, London 1993.