We agree that the comparison of our data with that of another population using exactly the same classification system could be useful. This must, however, be carried out with care. There is, for example, a danger of overestimation if the cohort born after intracytoplasmic sperm injection is approached differently from the general population. Further research is needed on the risks of major malformations, particularly those of the genitourinary and gastrointestinal systems,[1 2] in order to prove differences and to find out if specific risk factors can be identified. A controlled study would be the best and probably the only valid scientific approach, but, for obvious reasons, it would be difficult to perform.

1 Bonduelle M, Legein J, Derde MP, Buysse A, Schiettecatte J, Wisanto A, et al. Comparative follow-up study of 130 children born after ICSI and 130 children born after IVF. *Hum Reprod* 1995;10:3327-31.
2 Bonduelle M, Willikens J, Buysse A, Van Assche E, Wisanto A, Devroey P, et al. Prospective study of 877 children born after intracytoplasmic sperm injection, with ejaculated epididymal and testicular spermatozoa and after replacement of cryopreserved embryos obtained after ICSI. *Hum Reprod* 1996;11(suppl 4):131-59.

Variation in management of small invasive breast cancers detected on screening in the former South East Thames region: observational study

S Moritz, T Bates, S M Henderson, S Humphreys, M J Michell

South Thames East Breast Screening Quality Assurance Reference Centre, King's College Hospital, London SE5 9RS
S Moritz, *data manager*
S M Henderson, *quality assurance administrator*
William Harvey Hospital, Ashford, Kent TN24 OLZ
T Bates, *consultant surgeon*
King's College Hospital, London SE5 9RS
S Humphreys, *consultant histopathologist*
M J Michell, *consultant radiologist*
Correspondence to: Mr Bates bates9304@aol.com

BMJ 1997;315:1266–72

Abstract

Objective: To examine the variation in surgical and adjuvant treatment of breast cancer of known histology and detected on screening in a large cohort of patients treated by the surgeons of a health region.
Design: Part prospective, part retrospective observational study using the databases of a region's breast screening programme and of the cancer registry.
Setting: The former South East Thames region.
Subjects: 600 women aged 49-79 who presented during 1991-2 with invasive breast cancer up to 20 mm in diameter that had been detected on screening. These patients were treated by 35 surgeons.
Main outcome measures: Mastectomy rate by surgeon and the use of adjuvant treatment (radiotherapy, tamoxifen, and chemotherapy) were compared with risk factors, tumour grade, resection margins, and axillary node status.
Results: The mastectomy rate varied between nil and 80%, although the numbers at these extremes were small (0/13 *v* 8/10). Surgeons operating on more than 20 such cases had a lower mastectomy rate (15%) than surgeons treating fewer cases (23%), but this difference was confounded by variation in casemix. There were also wide variations in mastectomy rates and in axillary sampling rates that were independent of casemix or caseload. There was broad agreement on the use of adjuvant tamoxifen (94%), but few patients received chemotherapy (2.5%). 78 patients (19%) did not receive radiotherapy, including 51 out of 317 patients with unfavourable tumours, and 26 patients did not receive tamoxifen. Whether the patient received adjuvant treatment was more dependent on referral by the surgeon than the risk factors for local recurrence and was independent of caseload.
Conclusion: Mastectomy rates for similar tumours vary widely by surgeon independently of casemix or caseload, but surgeons with a higher caseload tend to have a lower mastectomy rate. Omission of postoperative radiotherapy or tamoxifen after conservative treatment is not related to risk factors for local recurrence or caseload. Confidential feedback of treatment profiles to individual surgeons has been used, but when benefit has been established treatment should be guided by evidence based protocol.

Introduction

Apparent variations in the outcome of breast cancer in England and Wales[1] and across Europe[2] are thought to be due to variations in treatment. Variations in caseload may also be related to outcome,[3 4] but doubt remains about the methodological soundness of some of the studies.[5] The management of breast cancer may vary between teaching and non-teaching hospitals, geographically,[6–11] and according to patient choice,[12] but difference in outcome may be solely due to differences in the severity of disease.[13] Suboptimal treatment of breast cancer could compromise the success of the NHS breast screening programme in the United Kingdom, which started in 1988 with the aim of reducing the mortality in women aged 50-64 by 25% by 2000.[14] The strong quality assurance component of the programme may have lead to a more uniform approach to the management of cancer detected on screening, but Chouillet et al found variations in the treatment of breast cancer across the four former Thames health regions.[15]

Breast conserving surgery followed by radiotherapy is a safe alternative to mastectomy.[16 17] This was confirmed by an overview of world practice,[18] but Van Dongen et al concluded that only 60% of tumours were suitable for breast conservation.[19] The quality assurance guidelines for the NHS breast screening programme state that more than 50% of patients with small invasive tumours should have them locally excised.[20] Radiotherapy after conservative surgery, which reduces the rate of local recurrence,[16 18 21] does not affect overall survival, but adjuvant tamoxifen gives

a clear survival benefit for postmenopausal patients and the benefits outweigh the risk of side effects.[22 23] Chemotherapy may prolong the recurrence-free interval in postmenopausal patients with node positive disease, but this evidence may not have influenced management in 1991-2.[22 23] The implementation of the screening programme in 1988 was precipitous, and the necessary documentation and computer facilities for retrieval and analysis were not in place at the outset so that data collection was in part retrospective.

We examined the management of patients with small invasive breast cancers detected by the South Thames East breast screening programme during 1991-2. Small invasive tumours are mostly detected on screening, and patients are likely to benefit from early detection if treated appropriately.[24]

Subjects and methods

Data on treatment of all invasive breast cancers were obtained from the participating surgeons by the South Thames East Breast Screening Quality Assurance Reference Centre by means of a standard biopsy and treatment form. Operation details were considered to be correct if the data were consistent with details in the pathology report. We could not check the surgeons' data on adjuvant treatment in a similar way, but after a pilot study showed recording errors these data were checked against data from the Thames Cancer Registry. Registry data are collected directly from patients' notes at regular hospital visits by trained staff. Completeness of registration for breast cancer in women aged 50-64 at screening is estimated to be 82% two years after diagnosis and 87.9% after three years (J Lutz, scientific meeting of the Thames Cancer Registry, London, July 1994). Since the registry collects detailed information on adjuvant treatment, including date of starting and dosage, we considered it certain that treatment had been given. However, the registry's records on adjuvant treatment are not complete.[25] When the registry database did not confirm the treatment on the database of the breast screening programme or when cases were not recorded by the registry, further written evidence was sought from the surgeons to confirm adjuvant treatment. We also confirmed with the four radiotherapy units in the region and with one outside unit that patients who were recorded as not having had radiotherapy had not received it.

Tumour diameter was taken as the largest pathological diameter of invasive carcinoma. The clinical palpability of the tumour was not available for the whole cohort, but a percentage has been extrapolated to the whole database for each surgeon. Palpability may depend on knowledge of the radiologically detected tumour site, and for both these reasons the data cannot be regarded as robust.

Data analysis was conducted with the help of the database system of the breast screening programme. This holds details of patient identification, screening, surgery, pathology, and radiology for all women who attended screening who were found to have an abnormality and were subsequently referred for surgical biopsy.

Preliminary analysis showed that some patients with invasive cancer that was not treated by mastectomy did not receive radiotherapy or, in a few cases, tamoxifen. We therefore used the criteria for the second trial of the British Association of Surgical Oncology, in which patients with small well differentiated tumours were randomly allocated in a two by two trial for and against radiotherapy and for and against tamoxifen.[26] We relaxed the criteria to include patients in whom vascular invasion had not been reported and in whom the node status was unknown.

Favourable tumours were defined as those up to 20 mm in diameter that had clear resection margins, that were grade I, and in which axillary lymph node status was negative or unknown.

Cases

A total of 817 women had invasive cancers detected between 1 January 1991 and 31 December 1992; 620 of these cancers had a tumour size of up to 20 mm in diameter. Surgical data were available for 600 cases, which were included in the analysis. A total of 493 patients had the cancer locally excised, of which 460 had full data, including a pathology report. Of these 460 patients, 328 had adjuvant treatment data cross checked against the registry data and 80 were confirmed by the surgeon. We included only these 408 patients whose treatment details could be confirmed in the analysis of adjuvant treatment after conservative surgery.

Breast screening started in the former South East Thames region between 1988 and 1992 so that most of the women in this study were given their diagnosis at their first attendance, the prevalent round of screening. The median age at diagnosis was 59 (range 49-79).

Results

Surgical workload

Thirty five surgeons were concerned with the management of the patients in this study, the number of patients per surgeon varying between 1 and 70 (median 13) (table 1). Five surgeons treated only one patient, and another five surgeons managed five or fewer patients. Eleven surgeons treated more than 20 patients in two years, and 24 treated 20 or fewer.

Casemix and caseload

All tumours were 20 mm or less on largest pathological diameter, but 160 out of 211 (76%) tumours were palpable among surgeons treating 20 or fewer such patients compared with 196 out of 389 (50%) tumours among surgeons with a higher caseload. The data on palpability are not robust, but the mean tumour size for the 408 patients treated by conservative surgery fell from 13.5 mm if they were treated by surgeons with a low caseload (<5 cases) to 11.9 mm if they were treated by surgeons with a high caseload (>30 cases) (table 1). However, among the six surgeons with a high caseload, the mean tumour diameter varied from 10.7 mm for one surgeon who referred all palpable tumours to local surgeons to 13.1 mm for another who treated all referred patients. The mean tumour diameter in patients treated by mastectomy (12.8 mm) was little different from the mean diameter in those treated by conservative surgery (12.3 mm).

The proportion of node negative, or favourable tumours, was no higher among surgeons with the highest caseload (table 1).

Table 1 Variation in casemix of and treatment of breast cancer by surgeons according to caseload

	Caseload (No of invasive cancers <20 mm detected by screening, 1991-2)					
	<5 (n=8)	5-12 (n=8)	13-19 (n=7)	20-30 (n=6)	>30 (n=6)	Total (n=35)
No of patients	13	65	107	138	271	600*
No of patients with palpaple tumour	13	51	72	97	119	354
Mean diameter of tumour (mm)	13.5	13.1	13.1	12.7	11.9	12.5
Mastectomy rate (No (%) of cases)	0	21 (32)	21 (20)	32 (23)	33 (12)	108 (18)
No of patients treated conservatively:	13	44	86	106	239	492*
With full data	10	33	57	91	215	408*
With one or more nodes sampled	10	11	31	55	120	227
With positive nodes	0	3	7	4	29	43
Without tamoxifen treatment	1	3	2	10	10	26
Favourable tumours:	2	8	11	20	50	91
Radiotherapy given	2	6	8	15	33	64
Non-favourable tumours:	8	28	46	71	164	317
Radiotherapy given	8	17	40	60	141	266

*Includes 6 patients who were operated on by other surgeons outside the region; 2 of them had a mastectomy and full data were available for 2 of the 4 patients who did not have a mastectomy.

Extent of surgery

Among the 600 patients with an invasive breast cancer of up to 20 mm in diameter the overall mastectomy rate was 18%, but among the 35 surgeons the individual rate varied from nil to 80%. The numbers at these extremes were small (0/13 *v* 8/10), but surgeons with a higher caseload (>20 cases in the two years) had a mastectomy rate of 59 out of 389 (15%) compared with 48 out of 211 (23%) for the surgeons who treated fewer cases (χ^2 test for continuity with Yates's correction 4.86, $P < 0.03$).

These variations were partly explained by the variations in casemix, but the mastectomy rate among surgeons with a low caseload (5-12 cases) varied by surgeon from 0 out of 5 and 1 out of 12 (8.3%) to 8 out of 10 (80%) when the mean tumour diameter was 13.8, 13.4, and 14.2 mm respectively. Similarly, among surgeons with a high caseload (>30 cases) mastectomy rates varied between 1 out of 32 (3%) and 10 out of 39 (26%) when the mean diameter was 12.7 and 11.3 mm respectively. These differences could not be explained by knowledge of tumour grade or node status.

Axillary node status

In the 408 patients with complete data on pathology and treatment, axillary node status was determined by histological examination of at least one node in 224 patients (55%), of whom 43 showed metastases (19%). Variations in axillary sampling rates seemed to be independent of casemix in surgeons with both a low and a high caseload. For example, one surgeon who operated on 5 cases sampled axillary nodes in none of them compared with another who operated on 6 cases and sampled nodes in 5, and one surgeon who operated on 28 cases sampled nodes in only 2 compared with another who operated on 34 cases and sampled nodes in 30.

In 84 women treated by conservative surgery in whom data on treatment were incomplete, the axillary sampling rate was similar, the overall rate being 282/492 (57%).

Ninety three of the 108 patients treated by mastectomy (86%) had a node sample taken, of whom 28 (30%) had positive nodes.

Adjuvant treatment after conservative surgery

Table 2 shows the distribution of adjuvant treatment after conservative surgery in 408 patients. Fifteen patients did not receive any adjuvant treatment, and in all of them the axillary lymph node status was negative or undetermined. Four patients had cancers that were grade I and had clear excision margins, 1 patient had a minimal cancer of 1 mm in diameter whose grade and excision margins were not known, and another patient had a grade I tumour which reached the excision margins. Three of the remaining 9 patients had tumours with positive excision margins; in 6 of these 9 patients the tumour was grade II and in 3 the grade was unknown.

Adjuvant tamoxifen was given to 382 of the 408 patients treated conservatively (table 2). Overall, 330 of them received radiotherapy after conservative surgery. Of the 78 patients who were not treated with radiotherapy (table 2), 15 did not receive any adjuvant treatment, 1 received chemotherapy alone, 61 received endocrine treatment alone, and 1 received chemotherapy plus endocrine treatment. In total, 311 of the 408 patients received both tamoxifen and radiotherapy. Chemotherapy was given to just 10 patients. Four of them had lymph node involvement—2 had grade III tumours, 1 a grade I tumour, and 1 an ungraded tumour. Of the 6 patients with negative or unknown axillary nodal status, 2 had grade II tumours, 1 a grade III tumour, and 3 ungraded tumours.

Table 2 Numbers of patients given adjuvant treatment for invasive breast cancer that was treated conservatively, according to type of tumour

Treatment type	Favourable tumours (n=91)*	Non-favourable tumours (n=317)†	Total (n=408)
No adjuvant treatment	4	11	15
Tamoxifen only	23	38	61
Radiotherapy only	1	11	12
Radiotherapy and tamoxifen	63	247	310
Chemotherapy only	0	1	1
Tamoxifen and chemotherapy	0	1	1
Radiotherapy and tamoxifen and chemotherapy	0	8	8

*Up to 20 mm in diameter, grade I, clear margins, node negative or nodes not sampled.
†Up to 20 mm in diameter but which do not meet the above other criteria.

Management of favourable and non-favourable tumours after conservative surgery

Ninety one patients had favourable tumours, of whom 64 (70%) received radiotherapy compared with 317 patients with non-favourable tumours, of whom 266

Table 3 Details of tumours in patients who did not receive radiotherapy for breast cancer that was treated conservatively. Values are numbers of patients

	Favourable tumours (n=27)*	Non-favourable tumours (n=51)
Grade:		
I	27	6
II	0	29
III	0	1
Not available	0	15
Axillary nodes:		
Positive	0	3
Negative	8	21
Not known	19	27
Resection margin:		
Clear	27	37
Uncertain	0	4
Positive	0	6
Not known	0	4

*Up to 20 mm in diameter, grade I, clear margin, node negative or nodes not sampled.

(84%) received radiotherapy (table 2). Of the 22 surgeons who managed patients with favourable tumours, 12 referred all of them for radiotherapy, 8 referred a proportion, and 2 did not give radiotherapy at all. Comparison of the treatment of favourable tumours with that of non-favourable tumours showed no clear differences in management. Twenty two surgeons treated patients from both prognostic groups. Ten surgeons referred all their patients for radiotherapy, 10 omitted the treatment in some patients irrespective of which prognostic group they belonged to, and 2 omitted radiotherapy only in patients with favourable tumours. Of the 78 patients who were not given radiotherapy, 51 had non-favourable tumours and 27 favourable tumours (table 3). The radiotherapy referral rates by surgeon caseload groups are shown in table 1.

Of the 26 patients who were not given tamoxifen, only 5 had favourable tumours, with the node status being unknown in 3. Omission of tamoxifen was not confined to surgeons with a low caseload (table 1). All 10 patients who received chemotherapy had non-favourable tumours.

Management of patients with lymph node positive disease

Of the 43 patients with node positive disease, 36 were treated with radiotherapy and tamoxifen; 3 received radiotherapy, tamoxifen, and chemotherapy; 1 chemotherapy and tamoxifen; 2 tamoxifen alone; and 1 radiotherapy alone. Ten out of 13 surgeons treated all patients with node positive disease with radiotherapy and tamoxifen.

As part of the South Thames East Breast Screening Surgical Quality Assurance Programme data on treatment were confidentially reported to the surgeons every 6 months so that all surgeons are aware of their treatment profile with respect to their peers.

Variation between regions

Recent unpublished quality assurance data from 16 regions in the United Kingdom for 1995-6 showed that South Thames (East) region has the highest number of patients with screen detected cancers operated on by surgeons with a caseload of less than 10 cases per year. Of those regions that provided data, South Thames had the lowest proportion of benign biopsy specimens weighing less than 20 g and had comparatively long waiting times. However, in none of the therapeutic quality standards, which included the ratio of malignant to benign biopsies, preoperative diagnosis, node status, and mastectomy rate, was the region an outlier compared with other regions (J Patrick, British Association of Surgical Oncology Breast Group study day, Solihull, April 1997).

Treatment outcome

Follow up data on this patient cohort is collected prospectively, but the number of treatment failures is as yet too low to indicate whether variation in treatment will result in different outcomes as measured by disease-free interval and overall survival.

Discussion

The introduction of the screening programme meant that for the first time the specificity of radiologists' work was publicly audited, with publication of recall rates and ratios of malignant to benign biopsy specimens for each screening centre. Pathologists set up a process of peer review, with circulation of histological slides so that the boundaries between invasive and in situ disease and between in situ disease and atypical ductal hyperplasia were defined and monitored. The surgeons were issued with guidelines which included quality criteria, each with a quality objective, outcome measure, and target.[20] These were published in 1992 but had been circulated and discussed in draft form during the period of our study. Regular multidisciplinary meetings of radiologists, surgeons, and pathologists concerned with screening were taking place. However, radiotherapists and oncologists had not been drawn into the consultative process on the best management of screen detected breast cancer at this stage, and in many centres the use of adjuvant treatment was dependent on the referral practice of the individual surgeon treating each patient.

Variations in treatment with caseload

Although the overall mastectomy rate in this study was well below the target of 50% for invasive tumours of 15 mm or less set by the surgical quality assurance guidelines,[20] there was considerable variation between surgeons. Surgeons with a higher caseload performed fewer mastectomies than surgeons with a lower caseload. This trend was also noted in Edinburgh,[27] but in our study the lower mastectomy rate of surgeons with higher caseloads may partly be due to differences in casemix since there was a trend for them to treat smaller impalpable tumours. This tendency was further confounded by variation in referral practice for palpable tumours. However, none of the few patients treated by surgeons seeing fewer than 5 cases received a mastectomy, and all these tumours were palpable. There was clearly a difference in clinical practice for apparently similar tumours between surgeons with both high and low caseloads.

The determination of axillary node status again showed variations in individual clinical practice which were not related to caseload, casemix, or mastectomy

rate. Failure to refer patients for postoperative radiotherapy after conservative surgery for invasive breast cancer or to prescribe tamoxifen was not related to caseload but was related to the surgeon and seemed to be idiosyncratic.

The number of surgeons treating women with breast cancer detected on screening was much higher in South Thames (East) region than in other regions. It has been suggested that only breast experts should treat screen detected breast cancer, but should the management of symptomatic cases be any different? In a population of 250 000 served by a district general hospital it is probably appropriate to have two surgeons with a major interest in breast disease; in South Thames (East) region the 15 districts would require 30 surgeons. At the outset there were 37 surgeons treating breast cancer, and with time this has only been reduced to 33—all of whom are members of the British Association of Surgical Oncology Breast Specialty Group. Several of the surgeons treating only a few cases no longer do so, but the pattern established at the outset of the screening programme has tended to persist. Although South Thames (East) region has more surgeons treating screen detected cancer than is considered appropriate, variation in clinical practice and omission of optimal adjuvant treatment is just as prevalent in patients treated by surgeons with a high caseload. Recent comparison of the surgical audits of the former South East and South West Thames regions shows that the same variations may occur with fewer surgeons treating more patients (T Bates, M Kissin, sixth Brighton breast day, April 1996). The mastectomy rate in these two adjacent regions is similar but lower than that in the northern regions of the United Kingdom (J Patrick, British Association of Surgical Oncology Breast Group study day, Solihull, April 1997). Variations in breast cancer treatment can relate to socioeconomic factors.[28] Although there is no suggestion of this in our study, we did not look for such evidence. Variation may also arise from insufficient knowledge of or disagreements with guidelines among physicians,[28] and in a recent British survey half of the surgeons who undertake breast work spend less than a fifth of their time doing such work.[29]

Quality assurance visits to the regional screening centres with an external assessor have only taken place over the past 12 months, but they have highlighted the need for a weekly multidisciplinary meeting attended by a radiotherapist or an oncologist. Such meetings have tended to be sporadic and retrospective rather than to plan treatment. Audit of these data with feedback of individual data every 6 months to surgeons was in place at the time of the study, but these measures seemed to be comparatively ineffective in changing practice. The lack of site visits rather than the number of surgeons may have been more of a problem in keeping variations to a minimum.

Place of radiotherapy and adjuvant treatment

One of the aims of the NHS breast screening programme is to detect breast cancer at an early stage when tumour size allows for less radical surgery. The safety of conservative surgery plus radiotherapy has been established,[18] and the option of breast conservation should therefore be offered to women whenever possible. However, women should not be put at increased risk of local recurrence by not having radiotherapy because the quality rather than the quantity of life must suffer.

It is uncertain whether all patients with early breast cancer require radiation after local excision or whether there is a subset of patients with a good prognosis whose risk of recurrence of breast cancer with conservative surgery is so small that radiotherapy can safely be omitted.[30] In a randomised trial no low risk subgroup could be identified among patients with node negative disease, but tumour size (greater than 20 mm) and high tumour grade were associated with a higher risk of local relapse.[31] The investigators concluded that until an acceptable low risk group for breast relapse could be identified, all patients should be treated with breast irradiation, a view supported in a recent review by Dixon.[32] Schnitt et al have recently reported the abandonment of a trial of radiotherapy after conservative surgery for breast cancer with a good prognosis,[33] but the preliminary results of the second trial of the British Association of Surgical Oncology have not been reported. The separation of tumours into favourable and non-favourable tumours was not intended to condone the omission of radiotherapy after conservative surgery but to examine whether this had been in the mind of the referring surgeon. It seems that this was not the case.

The use of postoperative radiotherapy for favourable and non-favourable tumours was 70% and 84% respectively, but overall comparison of the treatment of favourable with non-favourable tumours showed no clear differences in management. Most surgeons either referred patients from both prognostic groups for radiotherapy or omitted the treatment in a proportion of cases irrespective of which prognostic group they belonged to. Only two surgeons distinguished between prognostic groups and omitted radiotherapy only in patients with favourable tumours. These data suggest that patient management varied from surgeon to surgeon rather than by risk factors for local recurrence. When the best treatment of favourable tumours is uncertain, clinical practice needs to be established by large, well designed, randomised trials rather than by surgical preference.

The best management of favourable tumours may be uncertain, but variation in treatment was also seen in the use of adjuvant radiotherapy when the literature gives clear guidance.[18] Non-favourable tumours carry an increased risk of local and distant recurrence if adjuvant treatment is omitted after conservative surgery, but it is not known to what extent variations in treatment were influenced by patient choice. Patients must be free to refuse adjuvant treatment, having been fully informed of the potential benefits and risk. The reason why 22% of patients did not receive both adjuvant tamoxifen and radiotherapy is unknown, but it may have been patient choice, contraindication, or oversight. These results are similar to the findings in south east England in a study of all four of the former Thames regions, of which South Thames (East) was one.[15] The management of screen detected and symptomatic tumours in 1990 was examined, and only 63% of patients in the screening age group were treated with tamoxifen and radiotherapy. However, there was significant underreporting of adjuvant treatment in this study by the Thames

Cancer Registry—radiotherapy 20%, tamoxifen 23% and chemotherapy 29%.[25] Underreporting of adjuvant treatment has also been a problem in the screening programme, but in this study we confirmed the absence of treatment in each case.

Axillary node status was only determined in 56% of patients treated conservatively, and, although the expected rate of positive nodes is lower in screen detected tumours, this clearly remains controversial.[34 35] The NHS guidelines revised in 1996 state that histological node status should normally be obtained on all invasive cancers, either by sampling or clearance to ensure that all necessary data are obtained for deciding on adjuvant radiotherapy or systemic treatment.[20] The data collection at the time of this study was not sufficiently robust to record the extent of axillary surgery or the number of nodes sampled. Repeated discussion at quality assurance meetings every 6 months indicate that some surgeons strongly disagree with these guidelines. Node status is a powerful predictor of prognosis, but the evidence that it should determine the indications for adjuvant treatment in postmenopausal women was arguable in 1991-2.[22 23] In our study most patients had tamoxifen, and few had chemotherapy. The unpublished data from the 1995 overview of the world literature on adjuvant treatment for breast cancer may lead to an increase in the use of chemotherapy in the United Kingdom, but they are unlikely to resolve the controversy over surgical exploration of the axilla.

Climate of change

At the time of this study some pathologists did not report tumour grade, lymphovascular invasion, or the margin status of invasive breast cancers treated conservatively. This deficiency was independent of workload but has now been resolved by peer pressure.

The introduction of the NHS breast screening programme has undoubtedly changed the treatment of breast cancer in the United Kingdom so that surgeons treating cancers detected on screening have gradually been referred more patients with breast symptoms. Regular multidisciplinary meetings between radiologist, pathologist, and surgeon are now attended by a radiotherapist or an oncologist, a breast care nurse, and the data manager. The frequency and attendance at such meetings has not been uniform across the region, although the regular feedback of treatment data to each surgeon seems to have gradually changed practice. External audit of screening units has now been put in place, and the first site visit took place in June 1996. Initial experience suggests that this latter form of audit is more effective in highlighting variations in the management of breast cancer whether screen detected or symptomatic and in effecting change of practice.

Several lessons can be learnt from this prospective audit, but the guidelines issued to surgeons are also deficient. The 1996 update of the guidelines warned surgeons to take note of tumour margins and insist on axillary node status, but they do not mention tumour grade or lymphovascular invasion. More disturbingly, the weekly meeting of the multidisciplinary team to plan patient management is still not attended by a radiotherapist or an oncologist. Only the contraindications to radiotherapy are specified. Perhaps it is not altogether surprising that the adjuvant treatment of screen detected breast cancer has sometimes fallen below optimal standards.

Key messages

- In this health region mastectomy rate varied between surgeons, surgeons with higher caseloads tending to be more conservative, but the wide variation in clinical practice was not related to caseload
- The use of adjuvant tamoxifen in postmenopausal women with invasive breast cancer was high (94%) and the use of adjuvant chemotherapy low (2.5%)
- Adjuvant radiotherapy after conservative surgery was omitted in 1 in 5 cases, but the omission was not related to risk factors for local recurrence
- A weekly multidisciplinary meeting is an important safeguard to ensure optimal treatment, and the team should include a radiotherapist or an oncologist
- When benefit has already been clearly established, treatment should be guided by evidence based protocols and audited by regular site visits

In the face of variations in the treatment and possibly of outcome,[3 4 36] there has been considerable pressure to centralise cancer care in the United Kingdom,[37] to which the Department of Health has responded with proposals to set up specialised centres.[38] Doubts remain as to whether variations in treatment cause major differences in survival[5] and centralisation should not be essential to improve the quality of care of the many women presenting each year with breast cancer. When there is uncertainty about best management, the question should be addressed by an appropriate randomised controlled trial. When benefit has already been clearly established, treatment should be guided by evidence based protocols and audited by regular site visits.

We thank Mrs Jacquetta Goy and Dr Jane Dobbs and the Thames Cancer Registry for their help.

Funding: South Thames East Region Breast Screening Quality Assurance Programme.

Conflict of interest: To maintain confidentiality of surgeons.

1 Department of Health. *Population health outcome indicators 1993*. London: HMSO, 1993.
2 Berrino F, Sant M, Verdecchia A, Capocaccia R, Hakulinen T, Esteve J, eds. *Survival of cancer patients in Europe. The Eurocare study*. Lyons: International Agency for Research on Cancer, 1995. (IARC scientific publication No 132.)
3 Sainsbury R, Haward B, Rider L, Johnston C, Round C. Influence of clinician workload and patterns of treatment on survival from breast cancer. *Lancet* 1995;345:1265-70
4 Gillis CR, Hole DJ. Survival outcome of care by specialist surgeons in breast cancer: a study of 3786 patients in the west of Scotland. *BMJ* 1996;312:145-8.
5 Baum M. Specialist surgeons and survival in breast cancer. Large differences in survival are not explained. *BMJ* 1996;312:1155.
6 McCarthy M, Bore J. Treatment of breast cancer in two teaching hospitals: a comparison with consensus guidelines. *Eur J Cancer* 1991;28:579-82.
7 Basnett I, Gill M, Tobias JS. Variations in breast cancer management between a teaching and a non-teaching district. *Eur J Cancer* 1992;28A: 1945-50.
8 Ansell D, Whitman S, Lipton R, Cooper R. Race, income and survival from breast cancer at two public hospitals. *Cancer* 1993;72:2974-8.
9 Morris J. Regional variation in the surgical treatment of early breast cancer. *Br J Surg* 1992;79:1312-3.

10 Nattinger AB, Gottlieb MS, Veum J, Yahnke D, Goodwin JS. Geographic variation in the use of breast-conserving treatment for breast cancer. *N Engl J Med* 1992;326:1102-7.
11 Iscoe NA, Goel V, Wu K, Fehringer G, Holowaty EJ, Naylor CD. Variation in breast cancer surgery in Ontario. *Can Med Assoc J* 1994;150:345-52.
12 Campbell I, Royle G, Coddington R, Herbert A, Rubin C, Taylor I, et al. Management of screen-detected breast cancer: audit of the first 100 cases in the Southampton and Salisbury breast screening programme. *Ann R Coll Surg Engl* 1993;75:13-7.
13 Baak JPA, Wisse-Brekelmans ECM, Kurver PHJ, Gorp LHM, Voorhorst FJ, Miettinen OS. Regional differences in breast cancer survival are correlated with differences in differentiation and rate of proliferation. *Hum Pathol* 1992;23:989-92.
14 Moss SM, Ellman R, Coleman D, Chamberlain J. Survival of patients with breast cancer diagnosed in the United Kingdom trial of early detection of breast cancer. *J Med Screening* 1994;1:193-8.
15 Chouillet AM, Bell CMJ, Hiscox JG. Management of breast cancer in southeast England. *BMJ* 1994;308:168-71.
16 Fisher B, Anderson S, Redmond CK, Woolmark N, Wickerman DL, Cronin WM. Reanalysis and results after 12 years of follow-up in a randomised clinical trial comparing total mastectomy and lumpectomy with or without irradiation in the treatment of breast cancer. *N Engl J Med* 1995;333:1456-61.
17 Veronesi V, Banfi A, Salvadori B, Luini A, Saccozzi R, Zucali R, et al. Breast conservation is the treatment of choice in small breast cancer: longterm results of a randomised trial. *Eur J Cancer* 1990;26:668-70.
18 Early Breast Cancer Trialists' Collaborative Group. Effects of radiotherapy and surgery in early breast cancer. An overview of the randomised trials. *N Engl J Med* 1995;333:1444-55.
19 Van Dongen J, Bartelink H, Fentiman I, Lerut T, Mignolet F, Olthuis G, et al. Factors influencing local relapse and survival and results of salvage treatment after breast conserving therapy in operable breast cancer: EORTC Trial 10801. breast conservation compared with mastectomy in TNM stage I and II breast cancer. *Eur J Cancer* 1992;28A:801-5.
20 National Coordination Group for Surgeons Working in Breast Cancer Screening. *Quality assurance guidelines for surgeons in breast cancer screening*. Sheffield: BHS Breast Screening Programme, 1996. (NHS BSP publication No 20.)
21 Liljegren G, Holmberg L, Adami H, Westman G, Graffman S, Bergh J, Uppsala-Orebro Breast Cancer Study Group. Sector resection with or without postoperative radiotherapy for stage I breast cancer: five year results of a randomised trial. *J Natl Cancer Inst* 1994;86:717-22.
22 Early Breast Cancer Trialists' Collaborative Group. Systemic treatment of early breast cancer by hormonal, cytotoxic, or immune therapy; 133 randomised trials involving 31 000 recurrences and 24 000 deaths among 75 000 women. *Lancet* 1992;339:1-15.
23 Early Breast Cancer Trialists' Collaborative Group. Systemic treatment of early breast cancer by hormonal, cytotoxic, or immune therapy; 133 randomised trials involving 31 000 recurrences and 24 000 deaths among 75 000 women. *Lancet* 1992;339:71-84.
24 Blamey RW, Wilson ARM, Patnick J, Dixon JM. Screening for breast cancer. *BMJ* 1994;309:1076-9.
25 Bell J, Chouillet AM. Management of breast cancer. *BMJ* 1994;308:1508.
26 British Association of Surgical Oncology Breast Group. *BASO II trial: protocol of a randomised trial for the management of small well-differentiated and special type carcinomas of the breast*. London: BASO, 1992. (Revised 1993.)
27 Dixon JM, Ravisekar O, Cunningham M, Anderson EDC, Anderson TJ, Brown HK. Factors affecting outcome of patients with impalpable breast cancer detected by breast screening. *Br J Surg* 1996;83:997-1001.
28 Ayanian JZ, Guadagrosi E. Variations in breast cancer treament by patient and provider characteristics. *Breast Cancer Res Treat* 1996;40:65-74.
29 Harries SA, Scrivener R, Lawrence RN, Fieldman NR, Kissin MW, Bates T. Workload of surgeons involved in the treatment of breast cancer. *Breast* 1997;6:21-5.
30 Gelber RD, Goldhirsch A. Radiotherapy to the conserved breast: is it avoidable if the cancer is small? *J Natl Cancer Inst* 1994;86:652-4.
31 Clark RM, McCulloch PB, Levine MN, Lipa M, Wilkinson RH, Mahoney LJ, et al. Randomised clinical trial to assess the effectiveness of breast irradiation following lumpectomy and axillary dissection for node negative breast cancer. *J Natl Cancer Inst* 1992;84:683-9.
32 Dixon JM. Surgery and radiotherapy for early breast cancer. *BMJ* 1995;311:151-6.
33 Schnitt SJ, Hayman J, Gelman R, Eberlein TJ, Love SM, Mayzel K, et al. A prospective study of conservative surgery alone in the treatment of selected patients with stage 1 breast cancer. *Cancer* 1996;77:1094-100.
34 Fentiman IS, Mansell RE. The axilla: not a no-go-zone. *Lancet* 1991;337:221-3.
35 Sacks NPM, Barr LC, Allan SM, Baum M. The role of axillary dissection in operable breat cancer. *Breast* 1992;1:41-9.
36 Richards MA, Wolfe CDA, Tilling K, Barton J, Bourne HM, Gregory WM. Variations in the management and survival of women under 50 years with breast cancer in the South East Thames Region. *Br J Cancer* 1996;73:751-7.
37 Yarnold JR, Bliss JM, Brunt M, Earl H, Kaye S, Mason M, et al. Management of breast cancer; refer women to multidisciplinary clinics. *BMJ* 1994;308:714-5.
38 Department of Health. *A policy frame work for commissioning cancer services*. London: DoH, 1994.

(Accepted 8 July 1997)

A memorable patient

Mental illness became real and personal

Arthur was the object of some ridicule when I arrived on the ward as a fresh faced psychiatry SHO. He would stride up to the nursing station each morning attired in his pin stripe with accompanying umbrella and case. Requesting to pay his bill he also asked for a taxi to be called, for he was late for the office.

Arthur was a retired executive in his late sixties. He was a Sergeant Wilson of a man, an English gentleman, very likeable and seemingly quite mad.

Life had been good to Arthur, loving wife, two children, nice house, good pension and until recently, good health. Latterly, however, fate had played some darker cards, he had lost his mother from a rapidly progressing dementia, also his father from pneumonia. The most devastating blow, though, seemed to be that his heavily pregnant daughter had died in a road traffic accident, the car having been driven by his son.

Arthur held the family together throughout this period, he read the eulogies at all three funerals. After the last funeral though there was a change, he became forgetful. Over a week, he began living in a fantasy world set ten years past.

No organic cause for Arthur's condition was found. A whole variety of physical and psychological treatments had been tried and my arrival coincided with a review of these. I suggested ECT, it had been mooted before, now the consultant agreed. Second opinions were sought and Arthur was examined with the usual battery of investigations.

The effect was dramatic, after the fourth treatment Arthur was orientated. By the seventh he was discussing his daughter. I felt just a little smug. However, there was a curiosity. Each day Arthur would wake and go to his groups; throughout the course of the morning there would be some reminder of his daughter's death. Each day he expressed horror at her death, saying it was the first he had heard of it. He would grieve intensely, in much distress until the evening. Sleep seemingly wiped the slate clean and the next day he would repeat the process.

The ECT finished but the cycle continued. Arthur seemed in intolerable personal grief, each day ended with utter despair. All staff were affected by this; the search for new ways forward intensified.

One week later I answered a crash call to find Arthur quite dead slumped against a wall. The pathologist said heart attack, no other pathology was found. Perhaps broken heart would have been more apt.

Arthur was unusual, but more than this he changed, forever, the way I view mental illness. It stopped being a curious intellectual pursuit, to become very real, distressing, and personal. Perhaps he also taught me a valuable, if unpleasant lesson of life, that most of the things we hold dearest are ultimately flawed.

Jonathan Hare *MRCPsych specialist registrar Royal Free rotation in psychiatry.*