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THE SECOND ALL BREAST CANCER REPORT

Focussing on Inequalities: Variation in breast cancer outcomes with age and deprivation

West Midlands
Cancer Intelligence Unit

Acknowledgements

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Foreword

Foreword

This is the second All Breast Cancer Report and draws information from a number of sources on over 50,000 people with newly diagnosed breast tumours in the UK in 2007, of whom 89% had invasive disease.

Despite a continuing overall improvement in UK breast cancer outcomes, significant differences remain in the presentation and management of the disease that are associated with age, deprivation and ethnicity. This report focuses on the differences related to age and deprivation. It sends out clear messages on variations in treatment and differences in outcome and shows where we can focus our attention to address variations in stage at diagnosis and treatment provided.

There are some very positive messages on experience and outcome that demonstrate real improvements for patients: rates of breast conservation surgery are high, immediate breast reconstruction is being performed more often for women undergoing mastectomy, and 1-year and 5-year relative survival rates are increasing. The beneficial impact of the NHS Breast Screening Programme is clearly apparent in the predominance of cancers that are small at diagnosis, and in its effect of reducing the inequalities associated with age and deprivation.

Whilst I very much welcome this report, and commend the detailed and dedicated work that has been put in to produce it, there is a concern that it is based on UK data from 2007. If we are to be more effective in the future in reducing variation and dealing with inequality, we will require information that is more contemporaneous, and it is therefore encouraging to know that a more streamlined approach to national cancer data collection is being developed that should enable zthis.

Mr Martin Lee
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There is an increasing need to publish data on the outcomes of care - what actually happens to the health of the patient as a result of the treatment and care they receive. In order to place a stronger focus on clinical issues, the *National Cancer Peer Review Evidence Guide* published in February 2010 introduced clinical lines of enquiry into the review process. In this, the second *All Breast Cancer Report*, as well as including chapters on cohort and tumour characteristics similar to those in the first *All Breast Cancer Report*, we have focussed on surgical treatment and how this varies with age, deprivation and route of presentation. The analyses include, for breast cancers diagnosed in women in 2007, the cancer peer review headline clinical indicators:

- access to immediate reconstruction
- ratio of mastectomy to breast conserving surgery
- surgical caseload
- average length of stay
- 1-year and 5-year relative survival rates.

The report also includes analyses on

- the use of sentinel lymph node biopsy
- repeat operations
- 30 day mortality.

Cohort Characteristics

Of the 50,286 cases of invasive (44,782; 89%) and non/micro-invasive (5,490; 11%) breast cancer diagnosed in the UK in 2007, 292 (0.6%) were diagnosed in men. 81% were diagnosed in patients aged 50 and over, and 32% of all breast cancers and 56% of breast cancers diagnosed in women between the ages of 50 and 69 years, were screen-detected. Breast cancer increases with affluence; 23% of cases were diagnosed in the least deprived group compared with 15% in the most deprived group. Three quarters of cases in English women were diagnosed in White women (20% unknown ethnicity).

Tumour Characteristics

Of the surgically treated invasive breast cancers, 58% were small with an invasive tumour size of 20mm or less, 17% were grade 1, 62% were lymph node negative, 39% were in the excellent (EPG) and good (GPG) Nottingham Prognostic Index prognostic groups, 29% had vascular invasion, 84% were ER positive and 15% were HER2 positive.

Screen-detected invasive breast cancers were more likely to be smaller in size, of a lower grade, node negative and in the EPG and GPG prognostic groups. Screen-detected cancers were also less likely to have vascular invasion, more likely to be ER positive and less likely to be HER2 positive. These differences between symptomatic and screen-detected cancers were evident across all ages and deprivation quintiles.

Compared with women in the screening age group, older women were more likely to have node negative cancers, and less likely to have small cancers, HER2 positive cancers and vascular invasion present. Women aged less than 40 were less likely to have grade 1 tumours and cancers in the EPG and GPG prognostic groups and more likely to have vascular invasion present.

For symptomatic invasive breast cancers, the proportions with good prognosis (small, node negative, ER positive, EPG and GPG prognostic groups) decreased with increasing deprivation. Equivalent trends were not apparent for screen-detected cancers, indicating that screening reduces the observable inequalities in tumour characteristics associated with deprivation.

Executive Summary

Surgical Treatment

82% of women diagnosed with breast cancer in 2007 had surgery, and 57% of those had a breast conserving procedure. Significantly more women with screen-detected breast cancer had surgery (98% compared with 75% for those presenting symptomatically), and significantly fewer had a mastectomy (27% compared with 53%). Of the 524 surgeons who treated female breast cancer patients in 2007, 139 (27%) had a caseload of less than 30 patients, 27 had a significantly high mastectomy rate and 44 a significantly low mastectomy rate.

For symptomatic breast cancers, surgical treatment decreased with age at diagnosis; with only 74% of women aged 70-79 and 39% of women aged 80 and above having surgery compared with 90% of women aged under 50. Women in the most deprived quintile were less likely to have surgery than those in the least deprived quintile (72% compared with 78%). This effect was not apparent for women with screen-detected breast cancers.

Overall, 11% of female mastectomy patients had immediate reconstruction. A greater proportion of non/micro-invasive cancers had immediate reconstruction (27% compared with 10% of invasive cancers), and women with screen-detected cancers were more likely to have an immediate reconstruction (16% versus 10%). For screen-detected cancers, immediate reconstruction was more likely to be undertaken in women from a less deprived background. 32% of women had a sentinel lymph node biopsy (SLNB). Older women were less likely to have a SLNB.

The median length of stay for female mastectomy patients was 4 days compared to 2 days for women having breast conserving surgery. Screening patients had a shorter length of stay, mainly because more were treated with breast conserving surgery. Repeat operation rates were higher for non/micro-invasive cancers (25% compared with 14% for invasive cancers), for women with screen-detected cancer (18%) and for younger women (19%). 860 women (2%) died within 30 days of their diagnosis. 51% of these were death certificate only (DCO) cases. Of the non-DCO cases who died within 30 days, 64% died of breast cancer. A significantly higher proportion of women in the most deprived quintile died within 30 days of their cancer diagnosis.

Survival

1-year relative survival was significantly higher for women diagnosed with breast cancer in 2007 (96% compared to 94% in 2002/03). 1-year and 5-year relative survival rates were significantly higher for women with screen-detected breast cancer (100% compared to 93%-94% at 1 year and 97% compared to 77% at 5 years). For women with symptomatic breast cancer, 5-year relative survival decreased with age (from 86% in women aged 40-49 years to only 62% in women aged 80 years and above).

For women with symptomatic breast cancer, there were marked decreases in 1-year survival with deprivation (from 90%-92% for the most deprived women to 96%-97% for the least deprived women). These differences were not apparent for women with screen-detected breast cancer. Although 5-year relative survival for women with screen-detected cancer did decrease from 99% in the least deprived to 94% in the most deprived, there was a much more marked difference for women with symptomatic breast cancer; 5-year relative survival being 83% in the least deprived and 68% in the most deprived. Screening thus appears to reduce the observable inequalities in 1-year and 5-year relative survival associated with deprivation.

Introduction and Data Sources

Introduction

There is an increasing need to publish data on the outcomes of care - what actually happens to the health of the patient as a result of the treatment and care they receive. The White Paper *Equity and Excellence: Liberating the NHS*[1] sets out how improvements in outcomes will in future be the primary focus of the NHS. The associated document *Liberating the NHS: Transparency in outcomes; a framework for the NHS*[2] discusses how these outcomes will be measured. Breast cancer is, in some ways, ahead of the crowd in having clinical outcome measures defined by the Breast Cancer Clinical Outcome Measures (BCCOM) Project and an established track record of audit and reporting the processes of care at national level for screen-detected and symptomatic breast cancers. How breast cancer outcomes will be measured in future at national level will become clearer when the N*ational Institute for Health and Clinical Excellence (NICE) Quality Standards for Breast Cancer*[3] are published later this year.

In order to place a stronger focus on clinical issues to make cancer peer review clinically relevant and to sustain the continued support and involvement of clinical staff, the *National Cancer Peer Review Evidence Guide* published in February 2010[4] introduced clinical lines of enquiry into the review process. As part of this initiative, a number of headline clinical indicators were agreed with the National Cancer Intelligence Network (NCIN) Breast Clinical Reference Group (CRG), some of which are based on data collected at a national level.

In this, the second *All Breast Cancer Report* as well as including chapters on cohort and tumour characteristics similar to those in the first *All Breast Cancer Report*[5], we have focussed on surgical treatment and how this varies with age, deprivation status and route of presentation. The analyses include the cancer peer review headline clinical indicators:

- access to immediate reconstruction
- ratio of mastectomy to breast conserving surgery
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- average length of stay
- 1-year and 5-year relative survival rates.

The report also includes analyses on

- the use of sentinel lymph node biopsy
- repeat operations
- 30 day mortality.

Data Sources

Data from the different sources were linked using NHS number and amalgamated to produce a single record for each patient.

Cancer registry data – Population based data on the diagnosis, treatment and survival of breast cancer cases in the United Kingdom (UK) are collected by cancer registries in eight English regions and in Northern Ireland, Scotland and Wales (the Celtic countries). The dataset collected is defined in the Cancer Registration Minimum Data Set[6].

HES data – Hospital Episode Statistics (HES)[7] record details of the care provided by NHS hospitals in England. Information on patient age, gender and ethnicity, clinical diagnoses and operations, time waited and admission dates are recorded in HES. Details of self-reported ethnicity, surgery, chemotherapy and selected patient demographics from HES were used to supplement the cancer registry data. In Northern Ireland, hospital information is obtained from the Decision Support System through the cancer registry database. The Patient Episode Database for Wales (PEDW) records all episodes of inpatient or daycase activity in NHS Wales hospitals. The primary source of hospital level information in Scotland is the Scottish Morbidity Record (SMR01) which contains hospital inpatient or daycase discharge records.

Introduction and Data Sources

ONS data – The Office for National Statistics (ONS) collates data held by the English regional cancer registries and the Welsh Cancer Intelligence and Surveillance Unit to give aggregated data for England and Wales. The ONS cancer registration dataset contains patient demographics, some tumour characteristics and treatment flags indicating that the patient has had surgery, radiotherapy and/or chemotherapy. The ONS and HES datasets, were combined to obtain a database of all registered breast cancer patients, their demographics and their in-patient treatment.

Indices of Multiple Deprivation – The Index of Multiple Deprivation 2007 (ID2007) combines a number of indicators, covering a range of economic, social and housing issues, into a single deprivation score for each small area in England. This allows each area to be ranked according to its level of deprivation. ID2007 scores are produced at Lower Super Output Area (LSOA) level, of which there are 32,482 in England[8]. The income domain score was used as the deprivation indicator for England in this report. Income domain scores are grouped into 5 ranges (quintiles), each containing one fifth of the English population. To obtain an indication of the deprivation status of each breast cancer patient, postcode of residence was linked to the income domain score for the small area in which the patient lived at the time of diagnosis. Patients were then allocated to a deprivation quintile based on their score.

The Northern Ireland Cancer Registry uses the Output Area (OA) level Economic Deprivation Measure of the Northern Ireland Multiple Deprivation Measure (NIMDM) 2005 to derive deprivation scores. This measure combines income, employment and proximity to services domains, and used in conjunction with the patient's postcode was put into deprivation quintiles. The Welsh Cancer Intelligence and Surveillance Unit uses the Welsh Index of Multiple Deprivation (WIMD) 2008 to derive deprivation scores. The LSOA of the patient's residence was used to assign a quintile based upon the income domain using equal population in each quintile. In Scotland, patient postcodes are utilised in the generation of the Scottish Index of Multiple Deprivation (SIMD) 2006 which is then used to derive deprivation scores.

BCCOM audit validated data – Each year, to initiate the Breast Cancer Clinical Outcome Measures (BCCOM) audit, data for symptomatic breast cancers are downloaded from the UK cancer registries. The data are then sent to individual surgeons for validation. Validated data are returned to the WMCIU for analysis. In this report, where altered data were returned by surgeons in England, Wales and Northern Ireland, these have been used in the analysis in preference to the original cancer registration data. Data for Scotland were provided by the Information and Statistics Division Scotland which has managed the Scottish Cancer Registration scheme since 1997.

NHSBSP/ABS validated data – Data for the UK NHS Breast Screening Programme (NHSBSP) and Association of Breast Surgery (ABS) audit of screen-detected breast cancer are initially downloaded from the National Breast Screening System (NBSS) or other breast screening computer systems. Data are checked and signed off by the responsible surgeons and the regional breast screening QA reference centres prior to their inclusion in the audit. These data were used to assign a screen-detected flag to cases.

Cohort Characteristics

Key Findings

- In the UK in 2007, 50,286 new cases of invasive and non/micro-invasive breast cancer were registered. 44,782 cases were invasive (89%) and 5,490 cases (11%) were non-invasive or micro-invasive.
- 292 new breast cancers (0.6%) were diagnosed in men.
- 81% of new breast cancers were diagnosed in patients aged 50 and over.
- In women, 32% of all breast cancers and 56% of breast cancers diagnosed between the ages of 50 and 69 years were screen-detected.
- There was a marked relationship between deprivation and breast cancer incidence; with only 14-17% of breast cancers being diagnosed in people in the most deprived quintile compared with 20-23% in the least deprived quintile.
- Deprivation profiles varied to some extent with age at diagnosis, with patients aged less than 40 being more evenly distributed across the deprivation quintiles than other age groups, and significantly fewer patients aged 75 and over in the least deprived quintile (19% compared to 24% under 75).
- In women known to be Black, 46% of breast cancers were diagnosed under the age of 50. Conversely, 30% of breast cancers in women known to be White were diagnosed in those aged 70 and over.
- 75% of women with breast cancer known to be Black and 62% of women known to be Asian were in the two most deprived quintiles (Q1 and Q2). In contrast, 45% of women with breast cancer known to be White and 40% of women known to be Chinese were in the two least deprived quintiles (Q4 and Q5).
- Only 20% of women known to be Black had screen-detected breast cancers compared to 32% of all women.

Country Profile

A total of 50,286 cases of invasive and non/micro-invasive breast cancer diagnosed in the UK in 2007 are included in this report. Of these, 83.4% were diagnosed in England, 2.5% in Northern Ireland, 8.8% in Scotland and 5.3% in Wales. 49,994 breast cancers were diagnosed in women (99.4%) and 292 in men (0.6%). Details of the number of breast cancers diagnosed in women and men in each English region and Celtic country are given in Table 1.

English Region/ Celtic Country	Population Covered (million)	No. Breast Cancers in 2007			% Breast Cancers in UK
		Men	Women	Total	
Eastern	5.66	37	4,800	4,837	9.6%
North West	6.58	31	5,394	5,425	10.8%
Northern & Yorkshire	6.76	34	5,492	5,526	11.0%
Oxford	2.86	10	2,236	2,246	4.5%
South West	7.02	43	6,698	6,741	13.4%
Thames	11.84	47	8,434	8,481	16.9%
Trent	4.99	25	3,945	3,970	7.9%
West Midlands	5.38	25	4,710	4,735	9.4%
England	**51.09**	**252**	**41,709**	**41,961**	**83.4%**
Northern Ireland	1.76	3	1,269	1,272	2.5%
Scotland	5.14	26	4,382	4,408	8.8%
Wales	2.98	11	2,634	2,645	5.3%
UK	**60.98**	**292**	**49,994**	**50,286**	

Table 1: English region and Celtic country profiles

Cohort Characteristics

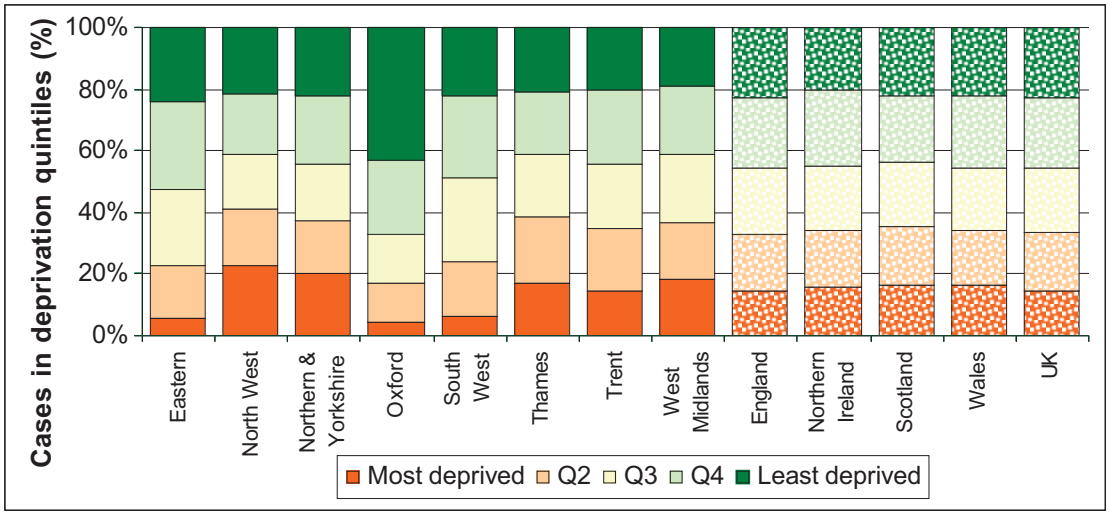


Figure 1: Proportion of breast cancer cases in each region in each deprivation group

In England as a whole, there was a marked relationship between deprivation and breast cancer incidence; with only 14% of breast cancers being diagnosed in people in the most deprived quintile compared with 23% in the least deprived quintile (Figure 1). Each deprivation quintile covers 20% of the English population. The proportion of breast cancers diagnosed in the most deprived group is significantly smaller that the expected 20% and the proportion in the least deprived group significantly in excess. This implies that people in the least deprived population are more likely to be diagnosed with breast cancer. The large regional differences in the proportions of breast cancer diagnosed in each deprivation quintile within England reflect the marked variation in deprivation levels between the regions; the Eastern, Oxford and South West regions being less deprived compared to the rest of the England. The proportions of breast cancer in the five deprivation groups in the Celtic countries are similar to those in England; with a higher proportion diagnosed in people in the least deprived quintile (20%-22% compared with 16-17% in the most deprived quintile).

Age, Gender and Deprivation

The cohort of patients diagnosed with breast cancer in 2007 had an age distribution ranging from 17 to 103 years. 81% of breast cancers were diagnosed in patients aged 50 and over (Table 2). The median age at diagnosis in men was higher than in women (72 compared to 62); 54% of breast cancers were diagnosed in men aged 70 and over compared with 31% in women. Men diagnosed with breast cancer were less likely to have non-invasive or micro-invasive tumours (7.9% compared to 10.9%), but this difference was not statistically significant.

Because of the small number of micro-invasive breast cancers and because they are treated in a similar way, in the remainder of this report, non-invasive and micro-invasive breast cancers have been combined into a single non/micro-invasive category.

Cohort Characteristics

Characteristic	Women		Men		Total	
	No.	%	No.	%	No.	%
All breast cancers	49,994	99%	292	1%	50,286	100%
Age at Diagnosis (years)						
< 30	193	0%	3	1%	196	0%
30 - 49	9,136	18%	18	6%	9,154	18%
50 - 69	25,124	50%	113	39%	25,237	50%
70 - 89	14,154	28%	149	51%	14,303	28%
90 +	1,387	3%	9	3%	1,396	3%
Deprivation Quintile						
Q1 Most deprived	7,349	15%	37	13%	7,386	15%
Q2	9,202	18%	67	23%	9,269	18%
Q3	10,590	21%	54	18%	10,644	21%
Q4	11,393	23%	75	26%	11,468	23%
Q5 Least deprived	11,262	22%	59	20%	11,321	23%
Unknown	198	0%		0%	198	0%
Tumour Invasive Status						
Invasive	44,513	89%	269	92%	44,782	89%
Micro-invasive	258	1%	2	0%	260	1%
Non-invasive	5,209	10%	21	7%	5,230	10%
Unknown	14	0%		0%	14	0%

Table 2: Characteristics of breast cancers diagnosed in women and men

The deprivation profiles for breast cancers diagnosed in men and women were similar, with 46% and 45% respectively being diagnosed in patients in the two least deprived quintiles (Q4 and Q5) (Table 2). Deprivation profiles varied to some extent with age at diagnosis, with patients aged less than 40 being more evenly distributed across the deprivation quintiles than other age groups, and significantly fewer patients aged 75 and over in the least deprived quintile (19% compared to 24% under 75).

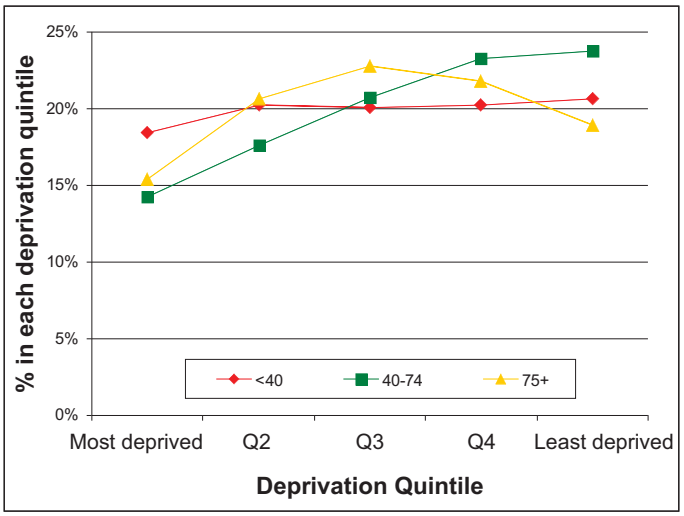


Figure 2: Variation in deprivation status with age at diagnosis for women diagnosed with breast cancer in 2007

Cohort Characteristics

The flat deprivation profile for women aged less than 40 seen in Figure 2 may reflect the relatively high proportion of these cancers which are familial rather than being linked to the lifestyle factors which are believed to influence the incidence of sporadic breast cancer. The decrease in the proportion of breast cancers in the two least deprived quintiles in women aged 75 and over may be due to the earlier diagnosis by the NHS Breast Screening Programme of breast cancers that would have occurred in this age group.

Because of the relatively small number of breast cancers diagnosed in men, the remainder of this report includes only breast cancers diagnosed in women. A future publication on breast cancer in men is planned which will include data aggregated over a number of years.

Route of Presentation

Of the 49,994 female breast cancers diagnosed in 2007, 15,783 (32%) were detected by the NHS Breast Screening Programme. The majority were diagnosed in women in the screening age range (50-70 years in 2007), with a small number detected in women aged less than 50 who were called early to screening to ensure that they would be invited before they were aged 53, and 416 in women aged 75 years and over who had self-referred for screening.

The age distribution of screen-detected and symptomatic breast cancers diagnosed in women in the UK in 2007 is shown in Figure 3. 50% of all breast cancers were diagnosed in women between the ages of 50 and 69 years, and 56% of these were screen-detected. Although 31% of all breast cancers in women were diagnosed in patients aged 70 and over, only 7% of these were screen-detected. 2% of breast cancers diagnosed in women aged less than 50 were detected via screening. In England, 5% of female breast cancer patients (2,176 women) were 47-49 years old at diagnosis, and a further 5% (1,914 women) were 71-73 years old. These groups of women are covered by the extension of the NHS Breast Screening Programme outlined in the Cancer Reform Strategy and therefore, in future, more breast cancers in these age groups may be screen-detected.

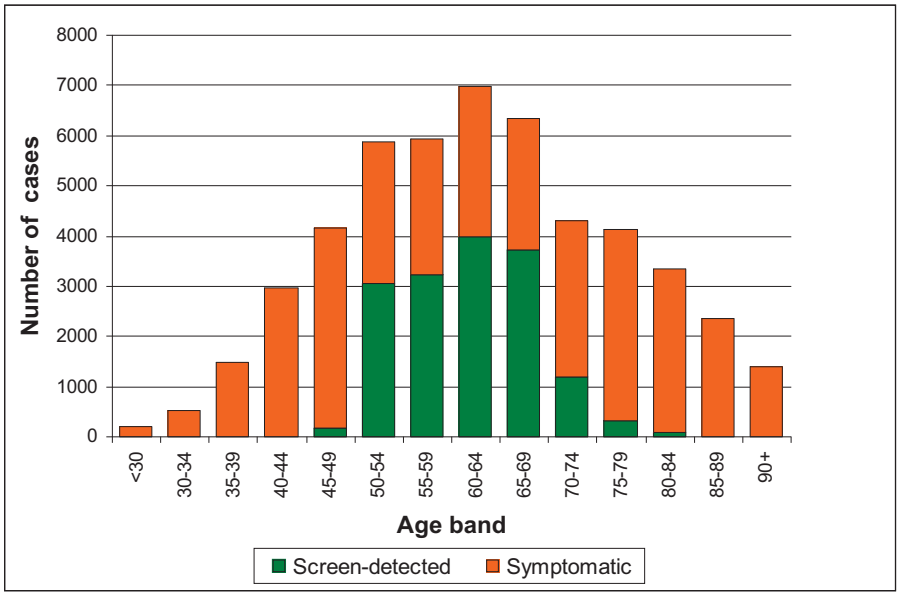


Figure 3: Age profile and route of presentation for women diagnosed with breast cancer in 2007

Cohort Characteristics

The proportion of screen-detected breast cancers was significantly lower in the Thames region than in the rest of the UK (27% compared to 32%). This probably partly reflects the relatively high proportion of women in minority ethnic groups in this region (15% in Thames and 3% in the rest of England) as these women are known to be less likely to accept their invitation to attend for screening[9]. The proportion of screen-detected cancers in Northern Ireland was also significantly lower than the rest of the UK (25% compared to 32%). This is partly because in 2007 the Northern Ireland Breast Screening Programme had not been expanded to cover women aged 65-70 years, with the result that only 49% of cancers diagnosed in this age group were screen-detected compared with 56% in the rest of the UK where the expansion had occurred.

Ethnicity

Ethnicity data were not available for the Celtic countries. 33,250 (79.7%) of the women diagnosed with breast cancer in England had a recorded ethnic group. Of the 8,459 cases where ethnicity was unknown, half were women aged 65 years and over. This is in part because ethnicity is obtained from Hospital Episode Statistics data and older women are less likely to have surgery and thus a hospital admission record.

Characteristic	Ethnic Group							
	White	Asian	Black	Chinese	Mixed	Other	Unknown	Total
Number of cases	31,443	820	505	85	114	283	8,459	41,709
% cases	75%	2%	1.2%	0.2%	0.3%	0.7%	20%	
Age at Diagnosis (years)								
< 30	0%	1%	1%	1%	1%	0%	0%	0%
30 - 49	18%	27%	45%	31%	31%	34%	16%	18%
50 - 69	52%	59%	39%	59%	52%	48%	44%	50%
70 - 89	28%	12%	14%	8%	16%	17%	34%	28%
90 +	2%	0%	1%	1%	1%	0%	6%	3%
Deprivation Quintile								
Q1 Most deprived	14%	41%	50%	15%	22%	30%	11%	14%
Q2	19%	21%	25%	25%	28%	23%	17%	18%
Q3	22%	16%	12%	20%	18%	17%	21%	21%
Q4	23%	9%	6%	28%	18%	17%	24%	23%
Q5 Least deprived	22%	13%	7%	12%	13%	12%	27%	23%
Unknown	0%	0%	0%	0%	1%	0%	1%	0%
Tumour Invasive Status								
Invasive	89%	89%	87%	81%	87%	89%	88%	89%
Non/micro-invasive	11%	11%	13%	19%	13%	11%	12%	11%
Unknown	0%	0%	0%	0%	0%	0%	0%	0%
Presentation Route								
Screen-detected	33%	31%	20%	35%	32%	28%	26%	32%
Symptomatic	67%	69%	80%	65%	68%	72%	74%	68%

Table 3: Variations in age, deprivation status, invasive status and presentation route with ethnic group for women diagnosed with breast cancer in England in 2007

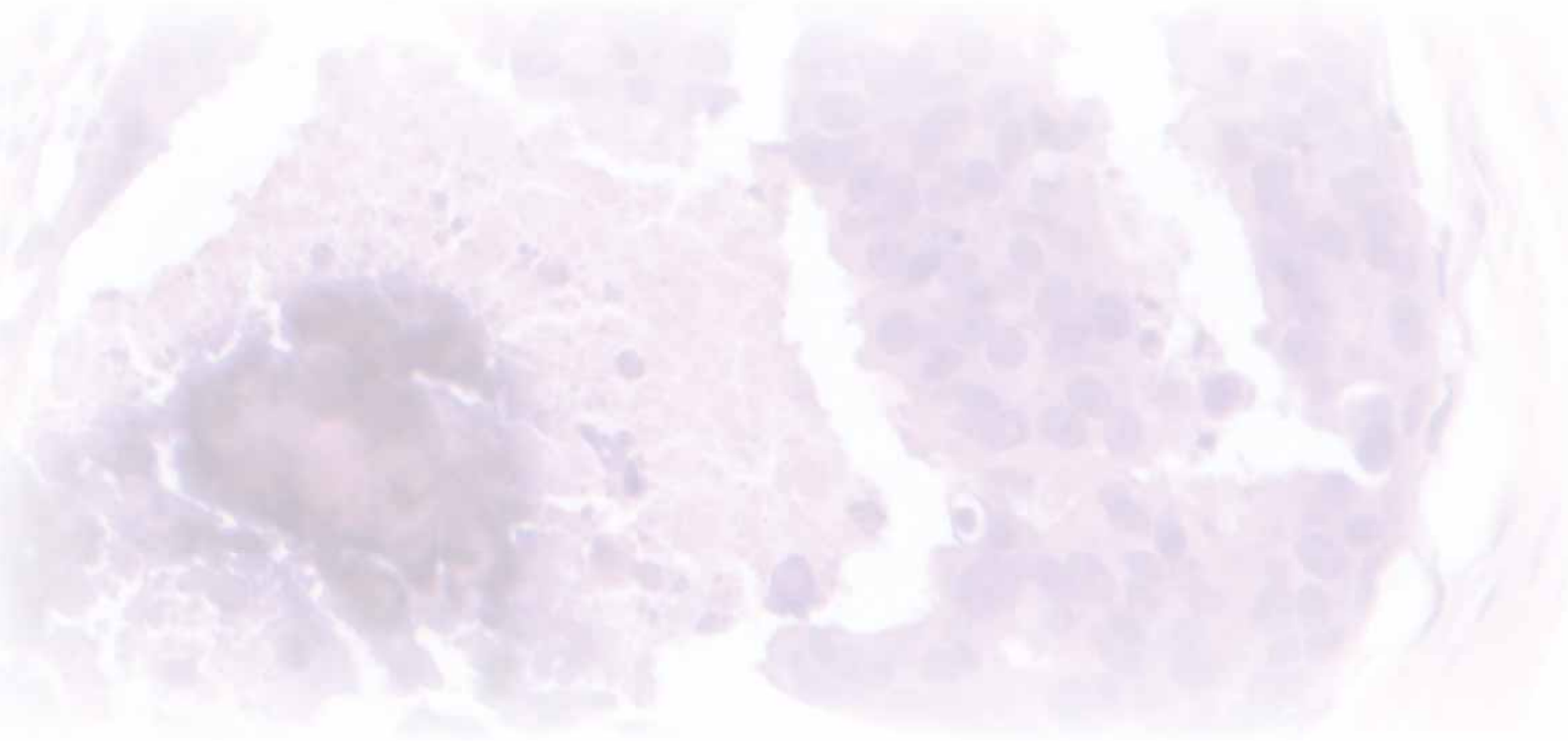
Cohort Characteristics

In women of known Black ethnicity, 46% of breast cancers were diagnosed under the age of 50, compared to 32% in women known to be Chinese or of Mixed ethnicity, 28% in women known to be Asian and 18% in women known to be White. Conversely, 30% of breast cancers in women known to be White were diagnosed in those aged 70 and over compared with 9-17% of women known to be Chinese, Asian, Black or of Mixed ethnicity. These differences will in part reflect differences in age distribution in the minority ethnic groups compared to the White population and have not been examined further in this report.

75% of women diagnosed with breast cancer known to be Black and 62% of women known to be Asian were in the two most deprived quintiles (Q1 and Q2) compared to 33% of women known to be White, 40% of women known to be Chinese and 50% of women known to be of Mixed ethnicity. In contrast, 45% of women diagnosed with breast cancer known to be White and 40% of women known to be Chinese were in the two least deprived quintiles (Q4 and Q5) compared with 32% of women known to be of Mixed ethnicity, 22% of women known to be Asian and 13% of women known to be Black. As noted in the first *All Breast Cancer Report*[5], women known to be Chinese had a higher proportion of non/micro-invasive cancers (19% compared to 11% in the rest of England), but this difference is not statistically significant.

Only 20% of women known to be Black had screen-detected breast cancers compared to 32% of all women. The low proportion of women of known Black ethnicity with screen-detected breast cancer may in part be explained by the relatively high proportion of cancers (46%) diagnosed in these women under the age of 50. However, there were also relatively high proportions of breast cancers diagnosed in women under the age of 50 known to be Asian (28%), Chinese (32%) or of Mixed ethnicity (32%), and 31-35% of their cancers were screen-detected so this cannot be the only reason.

The remainder of this report does not include analyses for individual ethnic groups. A future publication on breast cancer and ethnicity is planned which will include data aggregated over a number of years to allow more meaningful analysis of the differences between the minority ethnic groups.



Tumour Characteristics

Key Findings

- Of the surgically treated women diagnosed with invasive breast cancer with known tumour characteristics, 58% had small cancers with an invasive tumour size of 20mm or less, 17% were diagnosed with grade 1 tumours, 62% had lymph node negative tumours, 39% had tumours in the excellent (EPG) and good (GPG) Nottingham Prognostic Index groups, 29% had vascular invasion, 84% had ER positive tumours and 15% had HER2 positive tumours.
- Screen-detected invasive breast cancers were more likely to be smaller in size, of a lower grade, node negative and in the EPG and GPG prognostic groups. These cancers were also less likely to have vascular invasion, more likely to be ER positive and less likely to be HER2 positive. These differences between symptomatic and screen-detected cancers were evident across all ages and deprivation quintiles.
- Older women diagnosed symptomatically, were more likely to have node negative cancers and EPG/GPG cancers, and less likely to have small cancers, HER2 positive cancers and vascular invasion present. Older women diagnosed via screening were also more likely to have node negative cancers, and less likely to have HER2 positive cancers and vascular invasion.
- Women aged less than 40 diagnosed symptomatically were less likely to have grade 1 tumours and cancers in the EPG and GPG prognostic groups, and more likely to have vascular invasion present.
- For symptomatic invasive breast cancers, the proportions of small cancers, node negative cancers, cancers in the EPG and GPG prognostic groups and ER positive cancers decreased with increasing deprivation. Equivalent trends were not apparent for screen-detected invasive breast cancers indicating that screening reduces the observable inequalities associated with deprivation.

Tumour Characteristics

Tumour characteristics data were available for the whole of the UK. Tables summarising the completeness of each data item for invasive breast cancers diagnosed in each English region and Celtic country are provided in Appendix 3. Variations in tumour size, degree of spread, aggressiveness and receptor status are considered in terms of age at diagnosis, deprivation and presentation route in women diagnosed with invasive breast cancer in 2007. Breast cancers in men have been excluded from this section and the remainder of the report, as has the effect of ethnicity on tumour characteristics and treatment outcomes.

Invasive Tumour Size

In the UK, invasive tumour size was known for 76% of all invasive cancers and for 89% of surgically treated invasive cancers. The former varied from 41% in the Trent region to 90% in the Eastern region, and the latter from 53% in the Trent region to 98% in the West Midlands region (Appendix 3).

Tumour Characteristics

Age Band (years)	Invasive Cancers Tumour Size 20mm or less			
	Screen-detected	Sympto-matic	All cases	Total no. cases
<40	-	48.4%	48.4%	1462
40-49	74.4%	49.2%	49.8%	4864
50-59	77.4%	47.8%	64.3%	8480
60-69	79.2%	49.4%	68.1%	9700
70-79	79.4%	41.1%	49.7%	5392
80+	69.6%	36.2%	37.3%	2216
All ages	78.4%	45.8%	58.2%	32114

Depriva-tion Quintile	Invasive Cancers Tumour Size 20mm or less			
	Screen-detected	Sympto-matic	All cases	Total no. cases
Q1 Most deprived	76.7%	42.9%	54.7%	4589
Q2	78.9%	44.1%	56.6%	5826
Q3	79.2%	45.1%	57.9%	6760
Q4	78.7%	48.0%	60.2%	7388
Q5 Least deprived	78.2%	47.5%	60.0%	7478
All cases	78.4%	45.8%	58.2%	32041

Tables 4a and 4b: Variation in the proportion of surgically treated small (maximum diameter 20mm or less) invasive breast cancers with a) age and route of presentation and b) deprivation quintile and route of presentation expressed as a proportion of the cancers with known invasive tumour size

Overall, 58% of surgically treated women diagnosed with invasive breast cancer in 2007 had small cancers with an invasive tumour size 20mm or less (Table 4a). The proportion of screen-detected cancers with an invasive tumour size 20mm or less was significantly higher than that for symptomatic cancers (78% compared to 46%). Women aged 70 years and older who presented symptomatically were less likely to be diagnosed with a small cancer (41% in women aged 70-79 and 36% in women aged 80 or over). Women aged 80 and over were less likely to have small tumours regardless of their route of presentation. This difference was statistically significant for symptomatic but not screen-detected cases.

The proportions of surgically treated women with small (20mm or less) invasive breast cancers were lowest in the most deprived quintile for both screen-detected and symptomatic cancers (Table 4b), but in every quintile the proportion of small (20mm or less) breast cancers was significantly higher for screen-detected cancers. For symptomatic cancers there is a statistically significant relationship between the proportion of small (20mm or less) invasive cancers and deprivation. The proportion of small (20mm or less) invasive cancers increased from 43% in the most deprived quintile to 48% in the two least deprived quintiles. This relationship is not apparent for screen-detected cancers.

Invasive Tumour Grade

Invasive tumour grade was known for 90% of all invasive cancers and for 97% of surgically treated invasive cancers. The former varied from 85% in Northern Ireland to 94% in the Oxford region, and the latter from 93% in Northern Ireland to 99% in the Oxford and West Midlands regions (Appendix 3).

Tumour Characteristics

Age Band (years)	Invasive Cancers Grade 1			
	Screen-detected	Sympto-matic	All cases	Total no. cases
<40	-	5.9%	5.9%	1713
40-49	28.6%	10.7%	11.1%	5613
50-59	28.5%	11.3%	20.4%	8938
60-69	26.3%	11.0%	20.1%	10129
70-79	26.6%	11.5%	14.6%	5836
80+	21.7%	11.5%	11.8%	2510
All ages	27.2%	10.7%	16.5%	34739

Depriva-tion Quintile	Invasive Cancers Grade 1			
	Screen-detected	Sympto-matic	All cases	Total no. cases
Q1 Most deprived	24.8%	10.6%	15.2%	4957
Q2	26.1%	10.7%	15.7%	6341
Q3	29.2%	10.4%	17.0%	7275
Q4	27.0%	10.7%	16.6%	7991
Q5 Least deprived	27.7%	11.2%	17.4%	8100
All cases	27.2%	10.7%	16.5%	34664

Tables 5a and 5b: Variation in the proportion of surgically treated grade 1 invasive breast cancers with a) age and route of presentation and b) deprivation quintile and route of presentation expressed as a proportion of the cancers with known grade

Grade 1 cancers are known to have a better prognosis than higher grade disease. Overall, 17% of surgically treated women diagnosed with invasive breast cancer in 2007 had a grade 1 cancer (Table 5a). The proportion of screen-detected grade 1 cancers was significantly higher than that for symptomatic cancers (27% compared to 11%). The proportion of grade 1 cancers varied with age at diagnosis for both presentation routes. Women aged less than 40 with symptomatic cancers had a significantly smaller proportion of grade 1 tumours (6%), as did women aged 80 or over with screen-detected cancers (22%) but, for the latter age group, this variation was not statistically significant. The proportions of surgically treated women with grade 1 cancers were significantly higher for screen-detected tumours in all deprivation quintiles (Table 5b). There was no overall trend across the deprivation quintiles for either screen-detected or symptomatic cancers.

Nodal Status

Within the UK, the nodal status of invasive cancers was known for 66% of all invasive cancers and for 80% of surgically treated invasive cancers. The former varied from 45% in Wales to 84% in Northern Ireland, and the latter from 52% in the Trent region to 96% in the West Midlands region and Scotland (Appendix 3).

Tumour Characteristics

Age Band (years)	Invasive Cancers Negative Nodal Status			
	Screen-detected	Sympto-matic	All cases	Total no. cases
<40	-	45.8%	45.8%	1285
40-49	74.6%	47.8%	48.6%	4235
50-59	75.1%	48.9%	64.6%	7838
60-69	79.0%	52.0%	70.0%	9037
70-79	79.8%	52.9%	59.8%	4621
80+	71.0%	50.9%	51.6%	1613
All ages	77.5%	50.0%	61.6%	28629

Depriva-tion Quintile	Invasive Cancers Negative Nodal Status			
	Screen-detected	Sympto-matic	All cases	Total no. cases
Q1 Most deprived	75.4%	47.6%	58.7%	3959
Q2	77.4%	48.4%	60.1%	5100
Q3	79.8%	50.1%	62.3%	6096
Q4	76.6%	51.3%	62.4%	6648
Q5 Least deprived	77.6%	50.9%	62.8%	6758
All cases	77.5%	49.9%	61.6%	28561

Tables 6a and 6b: Variation in the proportion of surgically treated node negative invasive breast cancers with a) age and route of presentation and b) deprivation quintile and route of presentation expressed as a proportion of the cancers with known nodal status

Node negative breast cancers are known to have a better prognosis than node positive cancers. In 2007, 62% of surgically treated women diagnosed with invasive breast cancer had node negative cancers (Table 6a). The proportion of screen-detected node negative cancers was significantly higher than the proportion of symptomatic cancers (78% compared to 50%). For symptomatic cancers there is a statistically significant increase in the proportion of node negative cancers with increasing age at diagnosis. Node negative cancers increased from 46% in women aged less than 40 to 53% in those aged 70-79. A similar statistically significant relationship is also apparent for screen-detected cancers up to the age of 70-79 years. Women aged 80 and over with screen-detected cancers had a smaller proportion of node negative cancers (71%), but this difference is not statistically significant.

The proportions of surgically treated women with node negative invasive breast cancers were significantly higher for screen-detected cancers in all deprivation quintiles (Table 6b). For surgically treated women with symptomatic cancers, there is a statistically significant increase in the proportion of node negative cancers with decreasing deprivation. The proportion of node negative cancers increased from 48% in the most deprived quintile to 51% in the two least deprived quintiles. This relationship is not apparent for screen-detected cancers.

Nottingham Prognostic Index (NPI)

The Nottingham Prognostic Index (NPI)[10] is used to determine the prognosis of surgically treated invasive breast cancers. An NPI score is calculated using three pathological criteria: invasive size, number of involved nodes and tumour grade. The scores can be grouped into five distinct prognostic groups: Excellent (EPG), Good (GPG), Moderate 1 (MPG1), Moderate 2 (MPG2) and Poor (PPG). In the UK as a whole, the Nottingham Prognostic Index was known for 63% of all invasive cancers and 76% of surgically treated invasive cancers. The former varied from 40% in Trent to 79% in the West Midlands region, and the latter from 51% in the Trent region to 95% in the West Midlands region (Appendix 3).

Tumour Characteristics

Age Band (years)	Invasive Cancers EPG/GPG			
	Screen-detected	Sympto-matic	All cases	Total no. cases
<40	-	14.8%	14.8%	1149
40-49	60.0%	23.6%	24.8%	3907
50-59	56.5%	23.4%	43.5%	7579
60-69	60.2%	25.6%	49.0%	8792
70-79	62.2%	26.0%	35.4%	4476
80+	41.9%	25.5%	26.2%	1562
All ages	58.9%	24.0%	39.1%	27465

Depriva-tion Quintile	Invasive Cancers EPG/GPG			
	Screen-detected	Sympto-matic	All cases	Total no. cases
Q1 Most deprived	54.6%	20.1%	34.3%	3808
Q2	58.7%	22.5%	37.5%	4889
Q3	61.6%	24.4%	40.1%	5872
Q4	57.8%	25.9%	40.2%	6370
Q5 Least deprived	60.0%	25.1%	41.1%	6461
All cases	58.9%	23.9%	39.1%	27400

Tables 7a and 7b: Variation in the proportion of surgically treated invasive breast cancers in the Excellent (EPG) and Good (GPG) NPI groups with a) age and route of presentation and b) deprivation quintile and route of presentation expressed as a proportion of the cancers with known NPI

Overall, 39% of surgically treated women diagnosed with invasive breast cancer in 2007 had EPG or GPG cancers (Table 7a). The proportion of EPG/GPG cancers was significantly higher in the screen-detected cohort than for symptomatic cancers (59% compared to 24%). For symptomatic cancers, there is a statistically significant relationship between the proportion of EPG/GPG cancers and age at diagnosis; older women having a higher proportion of EPG/GPG cancers. Women aged less than 40 had the lowest proportion of EPG/GPG cancers (15%). Women aged 80 or over with screen-detected cancers had a significantly smaller proportion of EPG/GPG cancers than women with screen-detected cancers in the other age groups, but this was higher than in women in the same age group with symptomatic cancers.

Across all deprivation quintiles, the proportions of surgically treated women with EPG/GPG cancers were significantly higher for screen-detected breast cancers (Table 7b). For women with symptomatic cancers, the proportion of EPG/GPG cancers increased from 20% in the most deprived quintile to 25% in the least deprived quintile, and women in the most deprived quintile were significantly less likely to have EPG/GPG cancers. Although the overall relationship between the proportion of early stage cancers and deprivation was not apparent for screen-detected cancers, women in the most deprived quintile with screen-detected cancers did have a significantly lower proportion of EPG/GPG cancers.

Vascular Invasion

Vascular invasion data were not available for Northern Ireland and Scotland. In England and Wales, vascular invasion was known for 37% of all invasive cancers and for 44% of surgically treated invasive cancers. The former varied from 9% in the Thames region to 84% in the Oxford region, and the latter from 10% in the Thames region to 93% in the West Midlands region (Appendix 3).

Tumour Characteristics

Age Band (years)	Invasive Cancers Vascular Invasion Present			
	Screen-detected	Sympto-matic	All cases	Total no. cases
<40	-	40.8%	40.8%	732
40-49	17.0%	35.0%	34.7%	2442
50-59	16.8%	33.1%	25.7%	3294
60-69	16.3%	32.0%	24.0%	3781
70-79	15.6%	32.0%	29.4%	2562
80+	5.0%	30.4%	30.0%	1137
All ages	16.4%	33.4%	28.6%	13948

Depriva-tion Quintile	Invasive Cancers Vascular Invasion Present			
	Screen-detected	Sympto-matic	All cases	Total no. cases
Q1 Most deprived	17.9%	32.9%	29.5%	1709
Q2	16.1%	34.3%	29.6%	2379
Q3	15.0%	33.0%	27.9%	3073
Q4	15.7%	32.1%	27.5%	3347
Q5 Least deprived	17.7%	35.0%	29.6%	3386
All cases	16.4%	33.5%	28.7%	13894

Tables 8a and 8b: Variation in the proportion of surgically treated invasive breast cancers with vascular invasion present with a) age and route of presentation and b) deprivation quintile and route of presentation expressed as a proportion of cancers with known vascular invasion

Overall, 29% of surgically treated women diagnosed with invasive breast cancer in 2007 had vascular invasion present. The proportion of screen-detected cancers with vascular invasion present was significantly lower than for that for symptomatic cancers (16% compared to 33%) (Table 8a). The proportions of cancers with vascular invasion present decreased with increasing age for both presentation routes. Women aged less than 40 with symptomatic cancer had a significantly higher proportion with vascular invasion present (41% compared with 29% overall). Women aged 80 and over, with screen-detected or symptomatic cancer, had a lower proportion of cancers with vascular invasion present, but these differences are not statistically significant.

The proportions of surgically treated women with invasive breast cancers with vascular invasion present were significantly lower for screen-detected cancers in all deprivation quintiles, but there was no clear trend in the presence of vascular invasion across the deprivation quintiles for either presentation route (Table 8b).

Oestrogen Receptor Status (ER Status)

Data on ER status were not available for Northern Ireland. For the remaining countries, ER status was known for 56% of all invasive cancers and 61% of surgically treated invasive cancers. The former varied from 32% in the Thames region to 96% in the West Midlands region, and the latter from 37% in the Thames region to 99% in the West Midlands region (Appendix 3).

Tumour Characteristics

Age Band (years)	Invasive Cancers ER Positive			
	Screen-detected	Sympto-matic	All cases	Total no. cases
<40	-	67.9%	67.9%	724
40-49	95.0%	79.2%	80.0%	2484
50-59	89.3%	73.1%	84.4%	6257
60-69	90.2%	76.4%	86.9%	7593
70-79	91.4%	79.7%	83.8%	3233
80+	91.0%	78.4%	79.1%	1162
All ages	90.0%	76.7%	83.8%	21453

Depriva-tion Quintile	Invasive Cancers ER Positive			
	Screen-detected	Sympto-matic	All cases	Total no. cases
Q1 Most deprived	88.5%	75.5%	82.1%	3053
Q2	89.2%	74.9%	82.3%	3833
Q3	90.8%	76.9%	84.1%	4563
Q4	90.8%	76.7%	84.5%	4971
Q5 Least deprived	89.9%	78.9%	85.2%	4970
All cases	90.0%	76.7%	83.8%	21390

Tables 9a and 9b: Variation in the proportion of surgically treated ER positive invasive breast cancers with a) age and route of presentation and b) deprivation quintile and route of presentation expressed as a proportion of the cancers with known ER status

Overall, 84% of surgically treated women diagnosed with invasive breast cancer in 2007 had ER positive tumours (Table 9a). The proportion of screen-detected ER positive cancers was significantly higher than that for symptomatic cancers overall (90% compared to 77%) and in every age group. There is a non linear relationship between age and ER positive status for both screen-detected and symptomatic cancers. For screen-detected cases the highest proportion of ER positive cancers was in the relatively small cohort of women aged 40-49, but this difference is not statistically significant.

The proportions of surgically treated women with ER positive invasive breast cancers were significantly higher for screen-detected cancers in all deprivation quintiles (Table 9b). For symptomatic cancers, the proportion of ER positive cancers increased significantly with decreasing deprivation. The proportion of ER positive invasive breast cancers was 75% in the most deprived quintile and 79% in the least deprived quintile. This relationship is not apparent for screen-detected cancers.

Human Epidermal Growth Factor Receptor 2 Status (HER2 Status)

Data on HER2 status were not available for Northern Ireland and Scotland. In England and Wales, HER2 status was known for only 43% of all invasive cancers and for only 50% of surgically treated invasive cancers. The former varied from 26% in the Thames region to 87% in the West Midlands region, and the latter from 30% in the Thames region to 92% in the West Midlands region (Appendix 3).

Tumour Characteristics

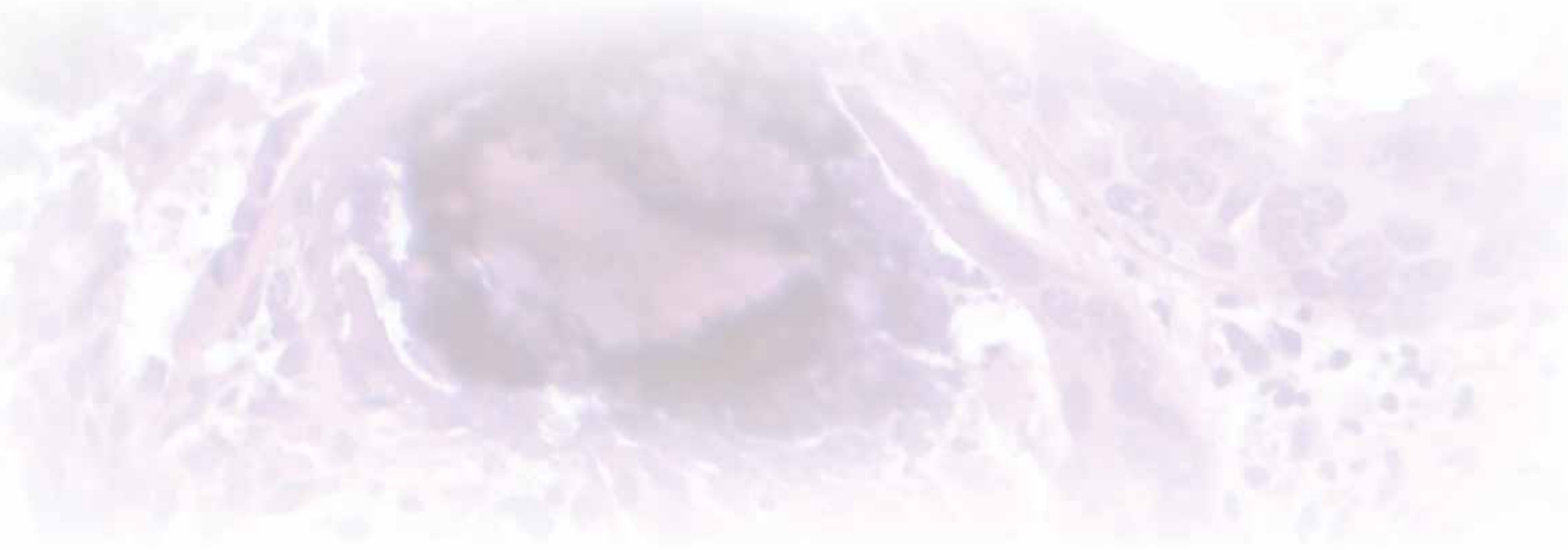
Age Band (years)	Invasive Cancers HER2 Positive			
	Screen-detected	Sympto-matic	All cases	Total no. cases
<40	-	26.1%	26.1%	532
40-49	20.5%	19.0%	19.1%	1789
50-59	14.9%	19.0%	16.1%	4702
60-69	11.8%	18.3%	13.2%	5771
70-79	8.8%	14.9%	12.6%	2257
80+	5.0%	12.8%	12.4%	764
All ages	12.8%	17.9%	15.0%	15815

Depriva-tion Quintile	Invasive Cancers HER2 Positive			
	Screen-detected	Sympto-matic	All cases	Total no. cases
Q1 Most deprived	11.2%	18.1%	6.0%	2276
Q2	13.3%	17.2%	7.3%	2821
Q3	12.0%	16.5%	6.6%	3282
Q4	13.7%	19.6%	7.9%	3690
Q5 Least deprived	13.0%	18.3%	7.7%	3694
All cases	12.8%	18.0%	7.2%	15763

Tables 10a and 10b: Variation in the proportion of surgically treated HER2 positive invasive breast cancers with a) age and route of presentation and b) deprivation quintile and route of presentation expressed as a proportion of the cancers with known HER2 status

Overall, 15% of surgically treated women diagnosed with invasive breast cancer in 2007 had HER2 positive tumours (Table 10a). This is significantly lower than the early data that indicated over-expression levels of 20-25%[11], but it is in line with more recent publications that have revised the figure to as low as 9% in some series[12,13]. Overall, the proportion of screen-detected HER2 positive invasive breast cancers was significantly lower than for that for symptomatic cancers (13% compared to 18%). There are significant inverse relationships between increasing age and HER2 positivity for screen-detected and symptomatic cancers; invasive breast cancers in older patients being significantly less likely to be HER2 positive.

The proportions of surgically treated women with HER2 positive invasive breast cancers were significantly lower for screen-detected cancers compared to symptomatic cancers in all deprivation quintiles (Table 10b). However, there was no significant variation between deprivation quintiles in the proportions of HER2 positivity for screen-detected or symptomatic cancers.



Surgical Treatment Outcomes

Key Findings

- 82% of women diagnosed with breast cancer in the UK in 2007 had surgery. Significantly more women with screen-detected breast cancer had surgery recorded (98% compared to 75% of women presenting symptomatically).
- For symptomatic breast cancers, surgical treatment decreased with age at diagnosis with only 74% of women aged 70-79 and 39% of women aged 80 and above having surgical treatment compared with 90% of women aged under 50.
- Women aged 50-69 in the most deprived group with symptomatic breast cancers were less likely to have surgery than women in the least deprived group (72% compared to 78%). This effect was not seen in women with screen-detected breast cancer.
- Overall 57% all women with surgically treated breast cancer had a breast conserving procedure. The mastectomy rate was lower for women with screen-detected breast cancer (27% compared to 53%), and a higher proportion of women with screen-detected breast cancer had breast conserving surgery in every age band.
- For women with symptomatic but not screen-detected cancer, the likelihood of having breast conserving surgery decreased with increasing deprivation.
- Although the overall mastectomy rate for invasive breast cancers was significantly higher than that for non/micro-invasive breast cancers (44% compared to 38%), for screen-detected cases, the mastectomy rate for non/micro-invasive breast cancers was significantly higher (30% compared to 26%). The latter may reflect the higher rate of immediate reconstruction for non/micro-invasive breast cancers which form a much higher proportion of screen-detected cases (20% compared to 8% of symptomatic cancers).
- In the UK as a whole for all breast cancers, the MX:BCS ratio was 1:1.3. This is indicative of a higher level of breast conserving surgery (BCS) than anticipated by the national reference figure of 1:1. The MX:BCS ratio was lower (i.e. the proportion of cases treated with breast conserving surgery was higher) for screen-detected breast cancers than for symptomatic breast cancers and for non/micro-invasive breast cancers than for invasive breast cancers.
- Overall, 11% of female mastectomy patients had an immediate reconstruction. A greater proportion of non/micro-invasive cases had a reconstruction (27% versus 10% of invasive cases). Women with screen-detected cancer were more likely to have reconstruction (16% versus 10%), and for these patients, reconstruction was significantly more likely to be undertaken in those from a less deprived background.
- Overall, 32% of women had a Sentinel Lymph Node Biopsy (SLNB). Women with poor prognostic group cancers and older women were less likely to have this procedure.
- The median length of stay in hospital for women having a mastectomy was 4 days compared to 2 days for those having breast conserving surgery. Screening patients had an overall shorter length of stay mainly because more were treated with breast conserving surgery. Older women and more deprived women had a longer length of stay.
- Repeat operation rates were higher for women with non/micro-invasive cancer (25% compared with 14% for invasive cancers), for screen-detected cancers (18%) and for younger women (19%).
- 860 women (2%) with breast cancer died within 30 days of their diagnosis. 51% of these were death certificate only (DCO) registrations. Of the non-DCO cases who died within 30 days, 64% died of breast cancer. A significantly higher proportion of women in the most deprived quintile died within 30 days of their diagnosis of breast cancer.
- In 2007 in England, Wales and Northern Ireland, 524 surgeons operated on female breast cancer patients. 129 (27%) surgeons had a caseload of less than 30 patients. 27 surgeons had a significantly high mastectomy rate and 44 surgeons a significantly low mastectomy rate.

Surgical Treatment Outcomes

Surgical Treatment

Overall, 82% of the women diagnosed with breast cancer in the UK in 2007 had surgery recorded. This varied from 76% in Northern Ireland to 88% in the Oxford region. Significantly more women with screen-detected breast cancer had surgery recorded (98% compared to 75% of women presenting symptomatically). This difference is likely to be due in part to the better prognosis of screen-detected cancers and to the younger age of the majority of the women with screen-detected cancer. Also, as symptomatic women were more likely to be deprived, they may have had more co-morbid conditions which could have affected their eligibility for surgery[14].

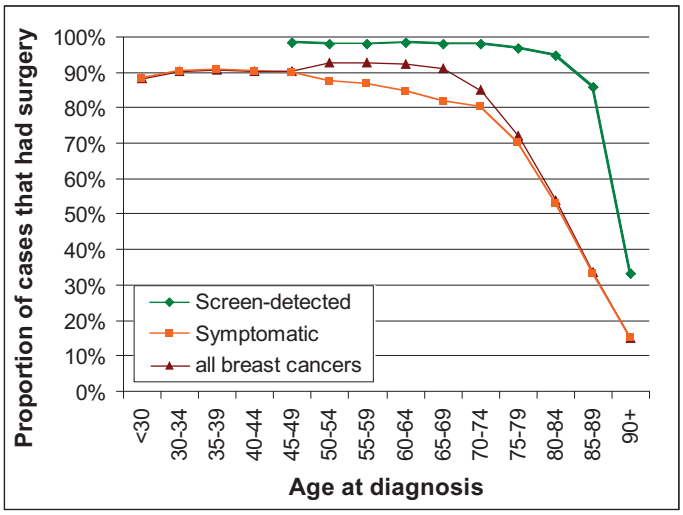


Figure 4: Variation in surgical treatment with age and route of presentation for breast cancers diagnosed in women in 2007

For symptomatic breast cancers, there was a significant relationship between surgical treatment and age at diagnosis; 90% of the women aged under 50 had surgical treatment recorded compared to only 74% of women aged 70-79 and 39% of patients aged 80 and above. Significantly higher proportions of women with screen-detected breast cancer had surgery recorded in all age bands, and there was much less variation in surgical treatment in women under 80 years of age (Figure 4).

Deprivation Quintile	Surgical Treatment			
	Screen-detected	Symptomatic	All cases	Total no. cases
Q1 Most deprived	98%	72%	79%	7344
Q2	98%	74%	81%	9201
Q3	97%	74%	82%	10582
Q4	98%	76%	83%	11385
Q5 Least deprived	98%	78%	85%	11253
All cases	98%	75%	82%	49765

Table 11: Variation in surgical treatment with deprivation quintile and route of presentation

For symptomatic breast cancers, there was a significant relationship between surgical treatment and deprivation quintile, with women in the most deprived group being less likely to have surgery (72% compared to 78% in women in the least deprived group) (Table 11). This variation with deprivation was not apparent in women with screen-detected breast cancer, and significantly higher proportions of women with screen-detected breast cancer had surgery in all deprivation quintiles.

Surgical Treatment Outcomes

Breast Conserving Surgery and Mastectomy

In the UK as a whole, 57% of women with surgically treated breast cancer had breast conserving surgery and the remaining (43%) had a mastectomy. The mastectomy rate was significantly lower for screen-detected breast cancers (27% compared to 53% for symptomatic cancers), and a higher proportion of screen-detected breast cancers had breast conserving surgery in every age band (Figure 5). This difference is likely to be mainly due to the smaller size of the screen-detected cancers.

The proportions of women treated with breast conserving surgery were always significantly higher for screen-detected breast cancers in all deprivation quintiles (Table 12). For symptomatic breast cancers there is a statistically significant relationship between the proportion of cancers treated with breast conserving surgery and deprivation; the proportion of breast cancers treated with breast conserving surgery increased from 44% in the most deprived quintile to 50% in the least deprived quintile. This pattern is similar to that reported in other series such as Raine et al[14] who analysed breast cancers diagnosed in women aged 50 years and above in 1999-2006. However, the more recent data in the present study show a narrowing of the variation with deprivation (1999/2006: 54% versus 64%; 2007: 44% versus 50%) suggesting that this inequity may be decreasing. The relationship between surgical procedure and deprivation is not apparent for screen-detected breast cancers.

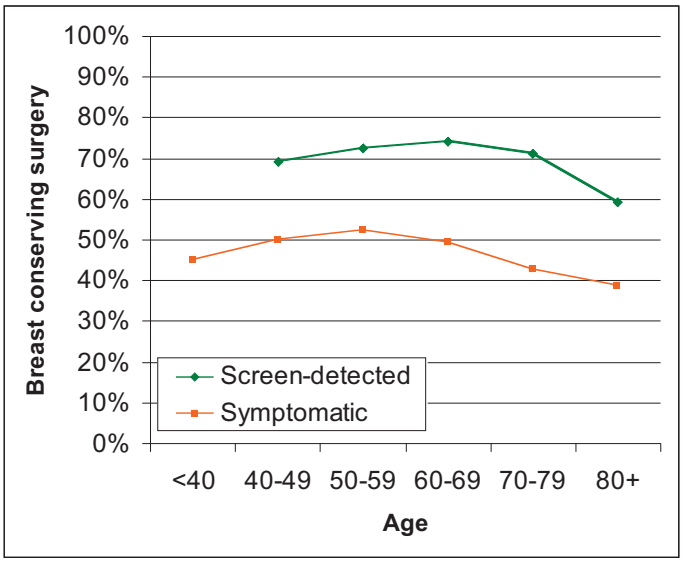


Figure 5: Variation in breast conserving surgery with age and presentation route for breast cancers diagnosed in women in 2007

Deprivation Quintile	Breast Conserving Surgery			
	Screen-detected	Symptomatic	All cases	Total no. cases
Q1 Most deprived	72%	44%	54%	5797
Q2	73%	46%	55%	7419
Q3	74%	47%	57%	8635
Q4	73%	49%	58%	9478
Q5 Least deprived	74%	50%	59%	9612
All cases	73%	47%	57%	40941

Table 12: Variation in breast conserving surgery with deprivation quintile and route of presentation

Surgical Treatment Outcomes

The overall mastectomy rate for women with invasive breast cancer was significantly higher than that for women with non/micro-invasive breast cancer (44% compared to 38%). For symptomatic cases, the mastectomy rate for non/micro-invasive breast cancers was slightly but not significantly lower (51% compared to 53% for invasive breast cancers), while for screen-detected cases, the mastectomy rate for non/micro-invasive breast cancers was significantly higher (30% compared to 26% for invasive breast cancers). The latter may reflect the higher rate of immediate reconstruction for non/micro-invasive breast cancers which form a much higher proportion of screen-detected cases (20% compared to 8% of symptomatic breast cancers). Overall, 10% of all mastectomies undertaken on female breast cancer patients in 2007 were for non-invasive disease. The pattern of care for non/micro-invasive breast cancers diagnosed through the NHS Breast Screening Programme highlights the difficulties in determining the optimal management for this disease, which can result in patients with a non-life threatening condition having more radical surgery than those with invasive breast cancer. Due to this uncertainty, the NICE Guideline *Early and locally advanced breast cancer: Diagnosis and treatment*[15] recommends that all patients with screen-detected non-invasive breast cancer should be entered into the Sloane Project[16].

Mastectomy: Breast Conserving Surgery Ratio

The national reference figure for the MX:BCS ratio has previously been reported as 1:1[17], which assumes that the proportions of mastectomies (MX) and breast conserving surgery (BCS) operations are the same. In the UK as a whole for all breast cancers diagnosed in women, the MX:BCS ratio was 1:1.3. This is indicative of a higher level of BCS than anticipated by the national reference figure of 1:1. The MX:BCS ratio for all breast cancers varied from 1:1.1 in the North West, Northern & Yorkshire and Trent regions to 1:1.7 in the Oxford region. The MX:BCS ratio was lower (i.e. the proportion of cases treated with BCS was higher) for screen-detected breast cancers than for symptomatic breast cancers (1:2.7 compared to 1:0.9), and for non/micro-invasive breast cancers than for invasive breast cancers (1:1.6 compared to 1:1.3).

Age Band (years)	MX:BCS ratio		
	Screen-detected	Sympto-matic	Overall
<40	-	1:0.8	1:0.8
40-49	1:2.3	1:1.0	1:1.0
50-59	1:2.6	1:1.1	1:1.8
60-69	1:2.9	1:1.0	1:1.8
70-79	1:2.5	1:0.7	1:1.0
80+	1:1.5	1:0.6	1:0.7
All ages	1:2.7	1:0.9	1:1.3

Age Band (years)	MX:BCS ratio		
	Screen-detected	Sympto-matic	Overall
<40	-	1:0.8	1:0.8
40-49	1:2.3	1:1.0	1:1.0
50-59	1:2.6	1:1.1	1:1.8
60-69	1:2.9	1:1.0	1:1.8
70-79	1:2.5	1:0.7	1:1.0
80+	1:1.5	1:0.6	1:0.7
All ages	1:2.7	1:0.9	1:1.3

Tables 13a and 13b: Variation in the MX:BCS ratio with a) age and route of presentation and b) deprivation quintile and route of presentation

Surgical Treatment Outcomes

MX:BCS ratios were also influenced by age and deprivation status. Because of the very high proportion of breast conserving surgery in women with screen-detected breast cancer, the overall MX:BCS ratio was lowest (1:1.8) in women aged 50-69 (Table 13a). For symptomatic breast cancers, the MX:BCS ratio was considerably higher in the youngest and oldest age bands (1:0.8 in women aged less than 40, 1:0.7 in women aged 70-79 and 1:0.6 in women aged 80 and over), indicating a relatively lower proportion of breast conserving surgery in these age bands. These age-related differences were less apparent in women with screen-detected breast cancers.

The overall MX:BCS ratio decreased with decreasing deprivation (from 1:1.2 in the most deprived quintile to 1:1.5 in the least deprived quintile), indicating a higher proportion of breast conserving surgery in women in the least deprived quintile (Table 13b). When the deprivation data were spilt by route of presentation, a similar pattern was evident for symptomatic but not screen-detected breast cancers, and in every deprivation quintile the MX:BCS ratio was lower (i.e. the proportion of breast conserving surgery was higher) for screen-detected breast cancers.

The MX:BCS ratio increased from 1:5.1 and 1:2.6 for NPI Excellent and Good Prognostic Group breast cancers to 1:1.4 for Moderate Group 1 cancers, 1:0.9 for Moderate Group 2 cancers and 1:0.4 for Poor Prognosis Group cancers. These data are consistent with the proportion of mastectomy operations increasing with increasing invasive tumour size in the poorer prognostic groups.

Immediate Reconstruction

The time period covered in this report precedes the publication in 2009 of the NICE Guideline *Early and locally advanced breast cancer: Diagnosis and treatment*[15] which states that immediate breast reconstruction should be discussed with all patients who are considering having a mastectomy, and offered as an option except where significant co-morbidity or (the need for) adjuvant therapy may preclude this choice.

In England, Wales and Scotland in 2007, 17,218 women with breast cancer were treated with mastectomy and 11% of these had an immediate reconstruction recorded. 10% of invasive breast cancers and 27% of non/micro-invasive breast cancers had immediate reconstruction recorded. Screen-detected cancers were more likely to have immediate reconstruction (16% compared to 10% of symptomatic cancers). This may be due, in part, to the higher proportion of screen-detected breast cancers that are non/micro-invasive (20% compared to 8% for symptomatic cases), and to the increased need for adjuvant therapy for symptomatic invasive breast cancers.

Surgical Treatment Outcomes

Age Band (years)	Immediate Reconstruction			
	Screen-detected	Sympto-matic	All cases	Total no. cases
<40	-	26%	26%	1063
40-49	22%	20%	20%	3102
50-59	24%	12%	17%	3885
60-69	12%	5%	8%	4216
70-79	4%	1%	1%	3293
80+	0%	0%	0%	1654
All ages	16%	10%	11%	17213

Depriva-tion Quintile	Immediate Reconstruction			
	Screen-detected	Sympto-matic	All cases	Total no. cases
Q1 Most deprived	12%	10%	10%	2631
Q2	13%	10%	10%	3225
Q3	16%	10%	11%	3631
Q4	19%	10%	12%	3860
Q5 Least deprived	17%	11%	13%	3834
All cases	16%	10%	11%	17181

Tables 14a and 14b: Variation with a) age and route of presentation and b) deprivation quintile and route of presentation in the proportions of immediate reconstruction for breast cancers treated with mastectomy

Immediate reconstruction rates were also influenced by age and deprivation status (Tables 14a and 14b). Older women were less likely to have immediate reconstruction; no women aged 80 or over and only 1% of women aged 70 to 79 had immediate reconstruction, compared to 26% of women aged under 40. In women aged between 50 and 79 years, those with screen-detected breast cancer were significantly more likely to have an immediate reconstruction.

Among the women with screen-detected breast cancer treated with mastectomy, immediate reconstruction was significantly more likely to be undertaken in those from a less deprived background (12% of women in the most deprived quintile (Q1) compared with 19% and 17% in the least deprived quintiles (Q4 and Q5)). This relationship was not apparent for symptomatic breast cancers, but in all but the most deprived quintile (Q1), women with symptomatic breast cancer were significantly less likely to undergo immediate reconstruction than those with screen-detected breast cancer.

Figure 6 shows that 16% of the invasive breast cancers in the Excellent Prognostic Group (EPG) had an immediate reconstruction, compared to only 6% of the cancers in the Poor Prognosis Group (PPG). This reflects the increased frequency of the complicating factors associated with adjuvant therapy[18,19] in women with breast cancers in the worse prognostic groups.

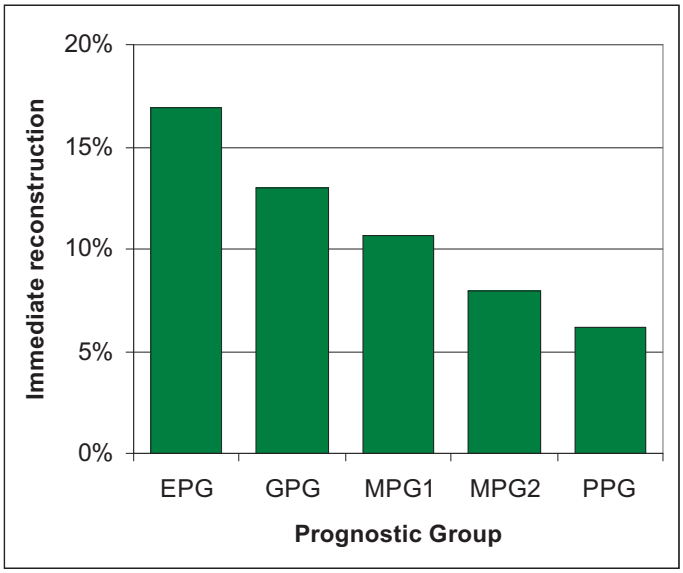


Figure 6: Immediate reconstruction after mastectomy for invasive breast cancers

Surgical Treatment Outcomes

Sentinel Lymph Node Biopsy (SLNB)

In England and Wales, 32% of women with surgically treated breast cancer had a SLNB recorded. This varied from 23% in the Trent region to 54% in the Oxford region. Of the cancers known to have received a SLNB, a significantly higher proportion of invasive breast cancers received a SLNB (35% compared to 13% of non/micro-invasive cancers). The use of SLNB has increased over time; in 2006 only 27% of invasive breast cancers had this procedure[5].

The use of SLNB was higher for women with screen-detected breast cancer than for symptomatic women (38% compared to 29%). More recent data from the NHSBSP demonstrate that 58% of screening patients had a SLNB in 2008/09. Over 80% of UK breast surgeons have now been trained in SLNB[20] so it is anticipated that the increased use of this technique, particularly in the treatment of early breast cancer, will continue. Women with invasive breast cancers in the Excellent Prognostic Group (EPG) were significantly more likely to undergo a SLNB; 50% of EPG cancers had a SLNB compared to 20% of cancers in the Poor Prognostic Group. This may in part explain the higher use of SLNB for screen-detected breast cancers.

Age Band (years)	Sentinel lymph node biopsy			
	Screen-detected	Sympto-matic	All cases	Total no. cases
<40	-	28%	28%	1760
40-49	34%	31%	31%	5719
50-59	38%	31%	35%	9709
60-69	38%	30%	35%	10974
70-79	37%	27%	29%	5852
80+	29%	20%	20%	2535
All ages	38%	29%	32%	36549

Deprivation Quintile	Sentinel lymph node biopsy			
	Screen-detected	Sympto-matic	All cases	Total no. cases
Q1 Most deprived	37%	26%	30%	5107
Q2	36%	26%	30%	6567
Q3	37%	28%	31%	7681
Q4	37%	29%	32%	8490
Q5 Least deprived	40%	33%	36%	8627
All cases	38%	29%	32%	36472

Tables 15a and 15b: Variation with a) age and route of presentation and b) deprivation quintile and route of presentation in the proportions of breast cancers having a sentinel lymph node biopsy

Older women were significantly less likely to have a SLNB; 20% of women aged at least 80 years had the procedure compared with 32% of all patients (Table 15a). Women in the least deprived quintile (Q5) were significantly more likely to have a SLNB (36% compared to 30% in Q1 overall), regardless of whether their cancers were detected symptomatically or through screening (Table 15b).

Surgical Treatment Outcomes

Length of Hospital Stay

Length of hospital stay is recorded as the number of days from the date of admission to the date of discharge for the most radical surgical treatment. Data were available for England and Scotland only.

Of the 38,032 surgically treated female breast cancer cases diagnosed in England and Scotland, 21% had no length of stay recorded. This varied from 9.7% in the North West region to 30.6% in the Thames region. For the remaining 30,156 cases, 57% had a length of stay of between 2 to 5 days. Women who had a mastectomy (M_X) stayed in hospital longer than women who had breast conserving surgery (BCS) (Figure 7). 70% of women treated with breast conserving surgery were discharged from hospital within 2 days compared with 21% of those treated with a mastectomy. The median number of days a woman treated with breast conserving surgery stayed in hospital was 2 days, compared to 4 days for mastectomy cases.

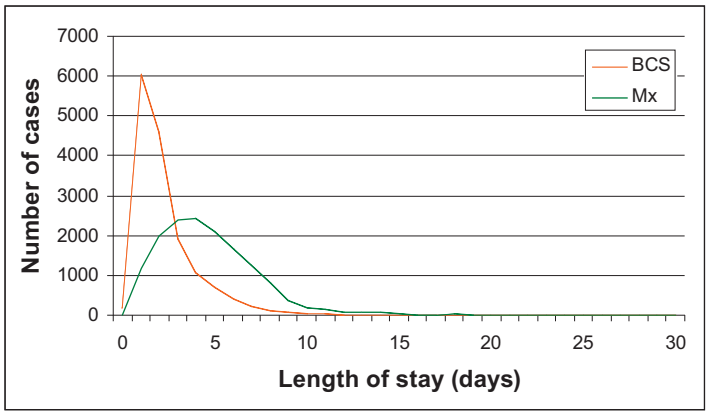


Figure 7: Variation in length of stay with surgical procedure for female breast cancer patients treated with breast conserving surgery (BCS) or mastectomy (M_X)

These overall differences were not affected by presentation route but, for women with symptomatic breast cancer, the median length of stay varied from 2 days in the West Midlands to 4 days in Scotland and the North West region. The median length of stay for patients with screen-detected breast cancer was 2 days and did not vary between regions. The broader spread of length of stay observed for mastectomy patients is consistent with the increased risk of developing complications after mastectomy and reconstructive surgery. The shorter overall length of stay for patients with screen-detected cancer reflects the higher breast conserving surgery rate for patients with these better prognosis cancers (73% compared to 47% for symptomatic cancers).

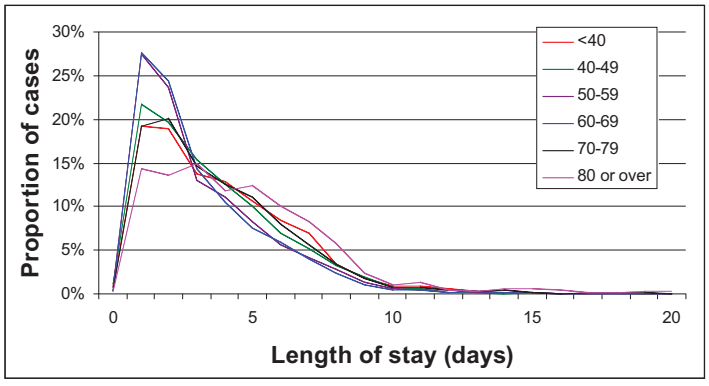


Figure 8: Variation in length of stay with age band for female breast cancer patients

Surgical Treatment Outcomes

Length of stay varied significantly with age at diagnosis (Figure 8). Within the 50-69 year age band, 28% of women remained in hospital for 1 day or less, with a further 24% staying in hospital for 2 days. In contrast, 27% of women aged 80 or over spent between 6 and 10 days in hospital following their surgery compared to only 15% of women in the 50-69 year age band. Women aged 70 years and over formed 63% of the 72 patients who remained in hospital for 20 days or longer. Only 42% of women aged less than 50 stayed in hospital for 2 days or less compared with 52% of women aged 50-69 years; this may reflect the higher mastectomy with immediate reconstruction rates in the younger women.

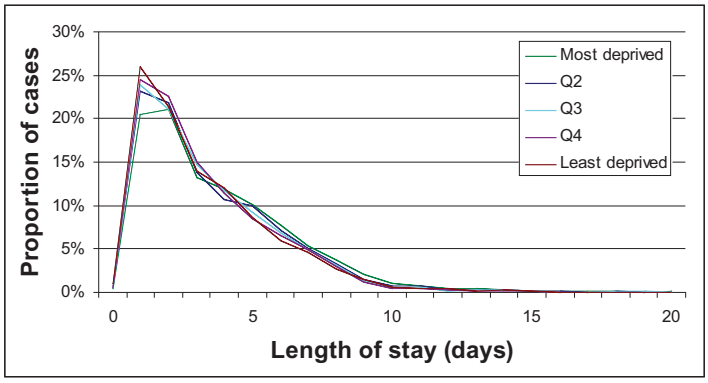


Figure 9: Variation in length of stay with deprivation quintile for female breast cancer patients

Length of stay also varied significantly with deprivation quintile (Figure 9). When compared to women in the least deprived quintile, women in the most deprived quintile were less likely to stay in hospital for 2 days or less (42% compared with 48%). They were also more likely to stay in hospital for more than 5 days (23% compared to 17% for women in the least deprived quintile). As breast units implement 23 hour mastectomies, it will be interesting to monitor these data to ascertain which patients are able to access this emerging model of care.

Repeat Operation Rates

In England, Wales and Scotland significantly more women with non/micro-invasive breast cancers were known to have had a repeat operation (25% compared to 14% for women with invasive breast cancer). The overall repeat operation rate for women presenting via screening was higher than in those presenting symptomatically (18% versus 15%). This reflects the higher proportion of non/micro-invasive cancers and the greater use of breast conserving surgery in women with screen-detected breast cancer.

For both screen-detected and symptomatic cases, repeat operation rates varied with the age of the woman; older women were less likely to have repeat operations (Table 16). The trend was more obvious for symptomatic women; only 15% of the surgically treated cancers in women aged 70 or over had a repeat operation, compared to 20% of those aged less than 40. There was no relationship between repeat operation rates and deprivation for women with screen-detected or symptomatic breast cancers.

Age Band (years)	Screen-Detected		Symptomatic	
	Repeat operation	Total no. cases	Repeat	Total no. cases
<40	-	-	20%	1696
40-49	19%	155	19%	5358
50-59	19%	5235	17%	4125
60-69	17%	6714	15%	4042
70-79	17%	1315	10%	4605
80+	13%	79	5%	2399
All ages	18%	13503	15%	22225

Table 16: Variation in repeat operation rate with age for women with screen-detected and symptomatic breast cancers

Surgical Treatment Outcomes

30 Day Mortality

In 2007, 860 women (2%) with breast cancer died within 30 days of their diagnosis. 51% of these were death certificate only (DCO) registrations where the date of diagnosis was the date of death. 87% of the DCO registrations were aged 70 years or more; 58 were below 70 years of age. 78% of the 426 non-DCO cases who died within 30 days of diagnosis were aged 70 years or more; 94 were below 70 years of age. Only 7 of the non-DCO cases who died within 30 days had undergone surgical treatment for their breast cancer.

Of the DCO cases, 66% died from breast cancer, 4% from other cancers and 30% from other non-cancer or unknown causes. Of the non-DCO cases who died within 30 days, 64% died of breast cancer. The latter varied with age at diagnosis; 72% of those aged less than 70 died of breast cancer compared with 62% of those aged 70 years and over. Overall, 9% of the non-DCO cases died from another cancer and 27% died from other causes. The proportion dying of another cancer was higher in women aged less than 70 years (12% compared to 8% in women aged 70 and over) and the proportion dying from other causes was lower (12% compared to 27% in women aged 70 and over).

Deprivation status was not known for 7 women who died within 30 days of their diagnosis of breast cancer. There was a significant relationship between 30 day mortality and deprivation; 2.8% of all cases and 1.4% of non-DCO cases dying within 30 days were women in the most deprived quintile compared with only 1.4% and 0.7% respectively of women in the least deprived quintile (Table 17).

Deprivation quintile	All cases	Total no. cases	Non-DCO cases	Total no. cases
Q1 Most deprived	2.8%	165	1.4%	84
Q2	2.4%	180	1.2%	88
Q3	2.2%	192	1.1%	93
Q4	1.9%	185	1.0%	95
Q5 Least deprived	1.4%	131	0.7%	62
All cases	2.1%	853	1.0%	422

Table 17: Variation with deprivation quintile in the proportion of all breast cancer patients and DCO patients who died within 30 days of their diagnosis

Surgical Treatment Outcomes

Surgical Caseload

In England, Wales and Northern Ireland in 2007, 524 surgeons were recorded as having treated a total of 36,695 women with breast cancer. Their caseload ranged from 1 to 258 cases, with a median caseload of 69. 385 (73%) of the surgeons treated at least 30 breast cancer cases, and therefore met or exceeded the recommended caseload. Figure 10 shows the mastectomy rate for the 524 surgeons. 27 surgeons have a significantly high mastectomy rate and 44 surgeons have a significantly low mastectomy rate.

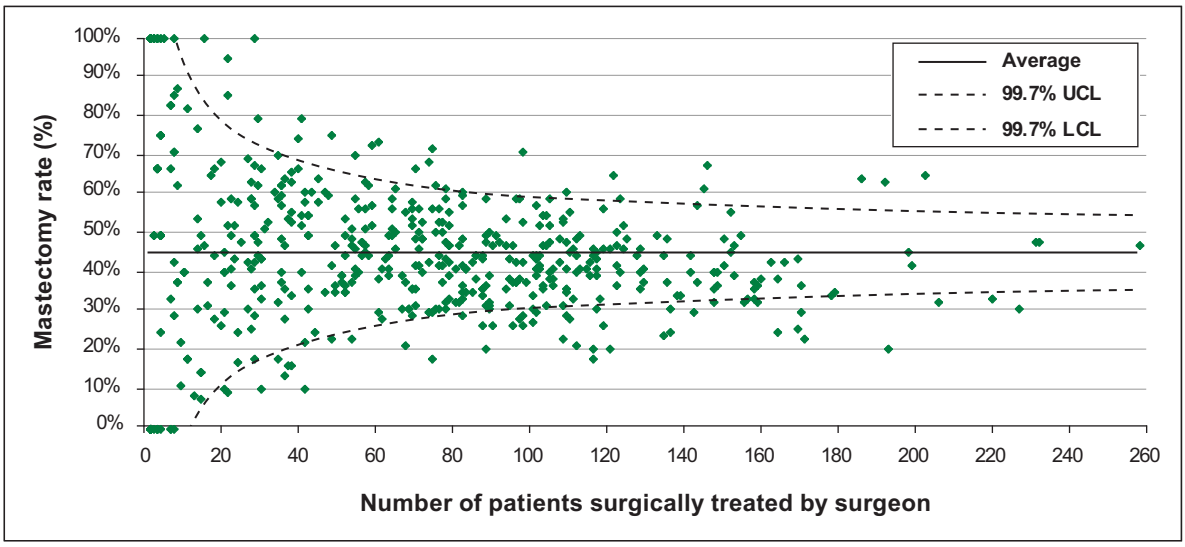


Figure 10: Variation in mastectomy rates between surgeons

Survival

Key Findings

- Survival analyses were performed on 39,879 invasive and micro-invasive breast cancers diagnosed in women in the UK between 1 April 2002 and 31 March 2003, and 44,069 invasive and micro-invasive breast cancers diagnosed between 1 January 2007 and 31 December 2007.
- 1-year relative survival was significantly higher for women diagnosed with breast cancer in 2007 (96% compared to 94% in 2002/03).
- 1-year and 5-year relative survival rates were significantly higher for women with screen-detected breast cancer (100% compared to 93%-94% at 1 year and 97% compared to 77% at 5 years).
- For women with symptomatic breast cancer, 5-year relative survival decreased with age (from 86% in women aged 40-49 years to only 62% in women aged 80 years and above).
- For women with screen-detected breast cancer, 1-year relative survival was approximately 100% for all age bands, indicating that these women were no more likely to die than those in the population as a whole.
- 1-year and 5-year relative survival rates for women with symptomatic breast cancer were significantly lower than those for women with screen-detected breast cancer in all deprivation quintiles.
- For women with symptomatic breast cancer, there were marked decreases in 1-year survival with deprivation (from 90%-92% for women in the most deprived quintile to 96%-97% for women in the least deprived quintile). These differences were not apparent for women with screen-detected breast cancer.
- For women with screen-detected breast cancer, 5-year relative survival increased from 94% in the most deprived quintile to 99% in the least deprived quintile. There was a much more marked difference in 5-year relative survival between the most and least deprived quintiles for women with symptomatic breast cancer; 5-year relative survival being 68% in the most deprived quintile and 83% in the least deprived quintile.

Relative Survival

Survival analyses were performed on 39,879 invasive and micro-invasive breast cancers diagnosed in women in the UK between 1 April 2002 and 31 March 2003, and 44,069 invasive and micro-invasive breast cancers diagnosed between 1 January 2007 and 31 December 2007. Relative survival can be interpreted as the ratio between the survival in the patient group examined and that in the general population. If the relative survival rate is 100%, the survival of the patient group is the same as that of the general population. The proportion of patients dying of breast cancer was not determined.

Survival

Mortality

The proportions of women in both cohorts who were alive on 31 December 2008 are shown in Table 18. Cases with unknown screening status have been excluded from this table. In the 2002/03 cohort, 70% of women were recorded as being alive on 31 December 2008, and in the 2007 cohort, 84% were alive on 31 December 2008. These percentages give no indication of the reason for the deaths. Notably, in both cohorts, women with symptomatic breast cancer were more likely to have died than women in the same age band with screen-detected breast cancer.

Age Band (years)	2002/03 Cohort Alive on 31 December 2008				2007 Cohort Alive on 31 December 2008			
	Screen-detected	Sympto-matic	All cases	Total no. cases	Screen-detected	Sympto-matic	All cases	Total no. cases
<40	-	78%	78%	2305	-	91%	91%	2007
40-49	93%	83%	83%	6090	96%	93%	93%	6491
50-59	93%	79%	86%	12069	98%	88%	93%	9997
60-69	91%	69%	79%	9493	97%	84%	91%	11446
70-79	86%	55%	57%	7765	94%	77%	79%	7804
80+	83%	26%	26%	6436	88%	53%	54%	6762
All ages	92%	63%	70%	44158	97%	79%	84%	44507

Table 18: Variation with age and route of presentation in the proportion of women diagnosed with breast cancers in 2002/03 and 2007 known to be alive on 31 December 2008

1-Year and 5-Year Relative Survival

5-year relative survival for all women diagnosed with invasive or micro-invasive breast cancer in 2002/03 was 81% (Table 19). 5-year relative survival for women with screen-detected breast cancer was significantly higher than that for women with symptomatic breast cancer (97% compared to 77%). 1-year relative survival was significantly higher for women diagnosed with breast cancer in 2007 (96% compared to 94% in 2002/03). For women with screen-detected breast cancer 1-year relative survival was 100% in both cohorts. 1-year relative survival for women with symptomatic breast cancer was significantly lower; 93% in the 2002/03 cohort and 94% in the 2007 cohort.

Presentation route	2002/03 Cohort		2007 Cohort
	1-year relative survival (LCI-UCI)	5-year relative survival (LCI-UCI)	1-year relative survival (LCI-UCI)
Screen-detected	100.0% (99.8%-100.2%)	97.1%(96.5%-97.6%)	100.2% (100.1%-100.4%)
Symptomatic	92.8% (92.4%-93.1%)	76.8% (76.2%-77.4%)	94.0% (93.6%-94.3%)
All cases	94.3% (94.1%-94.6%)	81.3% (80.8%-81.8%)	95.8% (95.6%-96.0%)

Table 19: 1-year and 5-year relative survival rates with presentation route for women diagnosed with invasive/micro-invasive breast cancer in 2002/03 and 2007 (LCI = 95% lower confidence interval; UCI = 95% upper confidence interval)

Survival

Age

Figure 11 shows how 5-year relative survival varied with age at diagnosis for women diagnosed with invasive or micro-invasive breast cancer in 2002/03. For women with screen-detected breast cancer, there was little variation in 5-year relative survival with age. At 104%, 5-year relative survival in women aged 70-79, was higher than in the general population, but this difference was not statistically significant. 5-year relative survival was significtantly lower in every age band for women with symptomatic breast cancer. For women aged 40 and above with symptomatic cancer, there was a marked decrease in 5-year relative survival with age; 5-year relative survival decreased from 86% in women aged 40-49 years to only 62% in women aged 80 years and above. 5-year relative survival for women aged less than 40 years was lower than that for women aged 40-49 and 50-59 years.

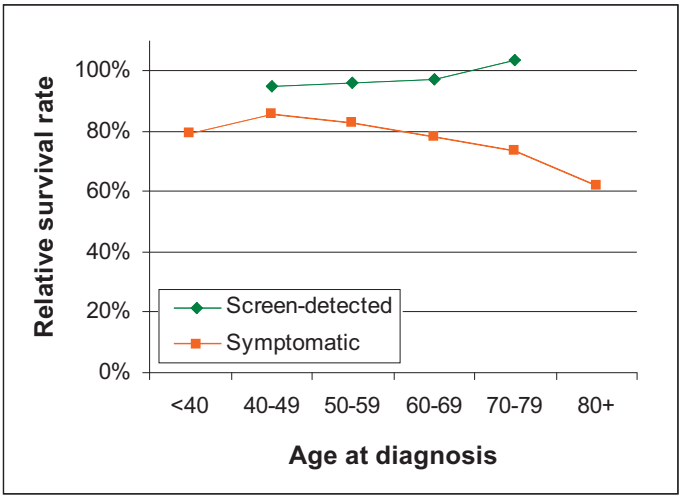


Figure 11: 5-year relative survival with age and presentation route for women diagnosed with invasive/micro-invasive breast cancer in 2002/03

1-year relative survival was similar in both cohorts of women with screen-detected breast cancer, and did not vary significantly with age band in either cohort (Table 20). 1-year relative survival was approximately 100% all age bands, indicating that women with screen-detected breast cancer were no more likely to die than those in the population as a whole. With the exception of women in the 40-49 year age band in 2007, 1-year relative survival for women with symptomatic breast cancer was significantly lower than that for women with screen-detected breast cancer. For women with symptomatic breast cancer, there were marked decreases in 1-year survival with age (from around 98% in women aged 40-49 years to 86% in women aged 80 years and above). 1-year relative survival rates were generally slightly higher in the 2007 cohort, and these differences were statistically significant in women aged 60 years and over.

Age Band (years)	1-year relative survival Screen-detected (LCI-UCI)		1-year relative survival Symptomatic (LCI-UCI)	
	2002/03 Cohort	2007 Cohort	2002/03 Cohort	2007 Cohort
<40	-	-	96.9% (96.1%-97.6%)	97.9% (97.2%-98.5%)
40-49	100.3% (100.3%-100.3%)	99.4% (94.2%-100.1%)	98.1% (97.7%-98.5%)	98.1% (97.7%-98.4%)
50-59	99.9% (99.6%-100.0%)	100.1% (99.9%-100.2%)	96.8% (96.3%-97.3%)	97.0% (96.5%-97.5%)
60-69	100.1% (99.7%-100.4%)	100.3% (100.0%-100.4%)	93.6% (92.9%-94.3%)	94.8% (94.1%-95.5%)
70-79	101.0% (99.5%-101.8%)	100.9% (100.0%-101.4%)	90.5% (89.7%-91.3%)	92.6% (91.8%-93.3%)
80+	103.4% (85.7%-106.2%)	102.2% (93.5%-105.6%)	83.0% (81.7%-84.2%)	86.1% (85.0%-87.2%)

Table 20: 1-year relative survival rates with age and presentation route for women diagnosed with invasive/micro-invasive breast cancer in 2002/03 and 2007 (LCI = 95% lower confidence interval; UCI = 95% upper confidence interval)

Survival

The relatively low survival rate for older patients is partly because of the high proportion of cases without surgery in this group. Figure 12 shows that the relative survival rate for patients without surgery is significantly lower than for those with surgery.

Deprivation

For women with screen-detected breast cancer, 5-year relative survival increased by 5% points from 94% in the most deprived quintile (Q1) to 99% in the least deprived quintile (Q5) (Figure 13), but this increase was not statistically significant. 5-year relative survival was significantly lower in every deprivation quintile for women with symptomatic breast cancer, and there was a much more marked and statistically significant 15% points difference between the 5-year relative survival of women in the most deprived quintile (Q1, 68%) and in the least deprived quintile (Q5, 83%).

1-year relative survival was similar for women diagnosed with screen-detected breast cancer in 2002/03 and 2007, and did not vary significantly with deprivation quintile in either cohort (Table 21). 1-year relative survival was approximately 100% in all deprivation quintiles, indicating that women with screen-detected breast cancer were no more likely to die than those in the population as a whole. 1-year relative survival for women with symptomatic breast cancer was significantly lower than that for women with screen-detected breast cancer in all deprivation quintiles in both cohorts. For women with symptomatic breast cancer, there were marked variations in 1-year survival with deprivation (from 90%-92% for women in the most deprived quintile (Q1) to 96%-97% for women in the least deprived quintile (Q5)). 1-year relative survival was generally slightly higher in the 2007 cohort, but the differences were not statistically significant.

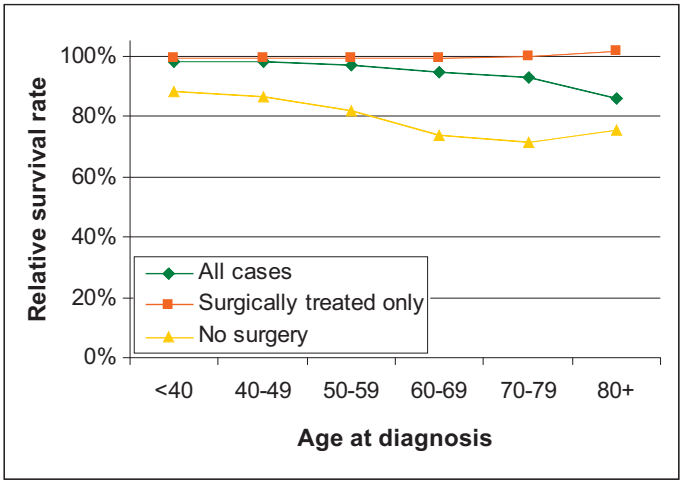


Figure 12: Variation in 1-year relative survival rate with age for symptomatic invasive and micro-invasive breast cancers diagnosed in 2007

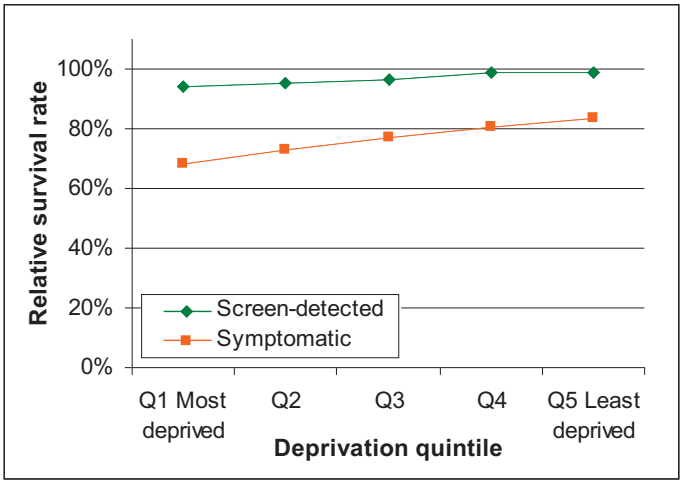


Figure 13: Variation in 5-year relative survival with deprivation quintile and presentation rate for women diagnosed with invasive/micro-invasive breast cancer in 2002/03

Survival

Deprivation Quintile	1-year relative survival Screen-detected (LCI-UCI)		1-year relative survival Symptomatic (LCI-UCI)	
	2002/03 Cohort	2007 Cohort	2002/03 Cohort	2007 Cohort
Q1 Most deprived	99.4% (98.6%-99.9%)	99.8% (99.2%-100.1%)	89.6% (88.6%-90.5%)	91.2% (90.3%-92.0%)
Q2	99.6% (99.0%-100.0%)	100.0% (99.5%-100.3%)	91.1% (90.2%-91.9%)	92.8% (92.0%-93.5%)
Q3	100.0% (99.5%-100.3%)	100.0% (99.6%-100.3%)	92.9% (92.1%-93.6%)	93.7% (92.9%-94.3%)
Q4	100.5% (100.1%-100.7%)	100.6% (100.3%-100.8%)	93.9% (93.2%-94.6%)	94.8% (94.1%-95.4%)
Q5 Least deprived	100.4% (99.9%-100.6%)	100.6% (100.2%-100.8%)	95.6% (95.0%-96.2%)	96.5% (95.9%-97.1%)

Table 21: 1-year relative survival rates with deprivation quintile and presentation route for women diagnosed with invasive/micro-invasive breast cancer in 2002/03 and 2007
(LCI = 95% lower confidence interval; UCI = 95% upper confidence interval)

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Appendix 1 - Participating Surgeons

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Mr IA Ahmed
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Mr MAA Al-Gailani
Mr D Ali
Mr SM Allan
Mr WH Allum
Miss A Anand
Mr IMF Anwar
Mr TJ Archer
Mr PR Armitstead
Mr AM Armstrong
Miss AC Athow
Mr RA Audisio
Mr A Aukland
Miss IAF Azmy
Mr AD Baildam
Mr B Balasubramanian
Mr D Banerjee
Mr MM Barkeji
Mr LC Barr
Mr N Beechey-Newman
Miss AM Bello
Mr JR Benson
Mr DA Berstock
Mr PK Bhaskar
Mr TS Bhatti
Mr HM Bishop
Mr RD Bliss
Mr GP Boland
Miss J Bonnema
Mr R Bonomi
Mr R Bourne
Mr HA Bradpiece
Mr PA Braithwaite
Miss MD Bramley
Miss RM Bright-Thomas
Mr JB Bristol
Mr PT Brookes
Mr R Brookstein
Mr DA Browell
Mr IM Brown
Mr JH Brown
Mr R Brown
Mr RM Bryan
Mr TE Bucknall
Prof NJ Bundred
Mr GJ Byrne
Mr MJ Callam
Mr JK Campbell
Mr PJ Cant
Miss AR Carmichael
Mr R Carpenter
Mr M Carr
Mr NJ Carty
Mr WG Case
Mr SJ Cawthorn
Mr DR Chadwick
Miss LS Chagla
Mr HY Chan
Miss VPP Chandran
Mr S Chandrasekharan
Mr MV Chandrashekar
Mr MJB Chare
Mr GHGM Charfare
Mr MA Chaudary
Mr IA Cheema
Mr KL Cheung
Mr CI Chianakwalam
Mr KH Chin
Mr AK Chouhan
Mr KR Clark
Miss PJ Clarke
Mr D Clarke
Mr DJ Clarke
Mr PR Clothier
Mr RA Cochrane
Mr NJ Coombs
Mr MJ Cooper
Mr GP Copeland
Mr AP Corder
Miss CA Courtney
Mr SP Courtney
Mr E Coveney
Mr PW Crane
Mr DJ Crawford
Mr RS Cummins
Mr GH Cunnick
Mr RA Daoud
Mr TI Davidson
Mr CJ Davies
Mr JW Dawson
Mr MN Dehalvi
Mr AZ Demian
Mr AJ Desai
Mr E Dinakara Babu
Mr LA Donaldson
Miss MA Donlon
Miss JS Donnelly
Mr PK Donnelly
Miss SE Downey
Mr EH Drabble
Prof PJ Drew
Miss PV Dudani
Mr TJ Duffy
Miss EJ Duggan
Miss JM Dunn
Miss P Durning
Mr GW Dyke
Mr S Dzumhur
Mr SR Ebbs
Mr S Ellenbogen
Mr DJ Ellis
Mr DW England
Prof OF Eremin
Miss AA Evans
Mr NW Everson
Prof IS Fentiman
Mr DJ Ferguson
Mr DRA Finch
Mr P Forouhi
Mr KD Fortes-Mayer
Miss CA Fowler
Mr JN Fox
Miss A Francis
Mr PB Frecker
Mr MH Galea
Mr NC Gallegos
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Mr TCS Gate
Mr CA Gateley
Miss JM Gattuso
Mr R Gendy
Mr PP George
Miss MW Ghilchik

Appendix 1 - Participating Surgeons

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Mr S Goyal
Mr MD Graham
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Mr MHA Green
Mr MJ Greenall
Mr CDM Griffith
Mr AB Griffiths
Mr NJ Griffiths
Mr JW Groome
Mr E Gross
Mr G Gui
Mr DJ Hadjiminas
Mr MT Hallissey
Mr HHA Hamed
Miss C Harding-MacKean
Mr JS Harisha
Mr RNL Harland
Mr SA Harries
Mr KP Harris
Mr ME Harron
Miss DA Hassanally
Miss M Heitmann
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Mr MJ Higgs
Mr CP Hinton
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Miss RKF Hogben
Mr C Holcombe
Mr PA Holland
Mr HW Holliday
Mr S Holt
Mr SDH Holt
Mr HMR Hoque
Mr KM Horgan
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Mr IF Hutchinson
Miss J Iddon
Mr HT Ingle
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Mr WWM Ismail
Mr LR Jackson
Mr V Jaffe
Mr MA Jahan
Miss SC Jenkins
Mr AJ Jewkes
Mr JA Jibril
Mr SARJB Jmor
Mr JN Johnson
Mr OO Johnson
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Mr AK Johri
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Miss LE Jones
Miss SE Jones
Mr BG Jones
Mr LS Jones
Mr PA Jones
Prof AK Kakkar
Mr B Kald
Mr NHK Kazzazi
Mr CJ Kelley
Mr RJ Kennedy
Miss FS Kenny
Mr SN Khan
Mr AR Khawaja
Mr NI Khonji
Mr RM Kirby
Mr SJ Kirk
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Mr SM Musa
Mr R Nangalia
Mr A Nejim
Mr MH Niayesh
Mr S Nicholson
Mr AJ Ogedegbe
Mr AA Ojo
Miss JL Ooi
Mr MH Ornstein
Mr JA Pain
Mr SJ Pain
Mr SJ Parker
Mr JR Parmar
Mr R Parmeshwar
Mr AR Patel
Mr AG Paterson
Mr IS Paterson
Mr ALG Peel
Mr G Peley
Mr JH Pereira

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Mr R Prasad
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Mr CJ Pritchett
Mr AM Przyczyna
Mr JV Psaila
Mr NJ Purser
Prof AD Purushotham
Mr G Querci della Rovere
Mr RM Rainsbury
Mr NI Ramus
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Miss AP Tansley
Miss N Tayal
Miss AJ Taylor
Mr AR Taylor
Mr JL Taylor
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Mr SD Thomson
Miss AL Thorne
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Mr JC Tresadern
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Mr HN Umeh
Mr HC Umpleby
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Mr A Yelland
Mr C Yiangou
Mr MMKI Youssef
Mr C Zammit
Miss K Zechmeister
Surgeons in the Scottish Cancer Networks

Appendix 2 – Overall Data Quality and Completeness

Table A: Data items in each country included in the analyses

Data item	England	Northern Ireland	Scotland	Wales
Invasive size, invasive grade, nodal status and Nottingham Prognostic Index for invasive cancers	✓	✓	✓	✓
Vascular invasion	✓			✓
Oestrogen receptor status	✓		✓	✓
Human epidermal growth factor receptor status	✓			✓
Surgery	✓	✓	✓	✓
Final therapeutic operation type	✓	✓	✓	✓
Sentinel lymph node biopsy	✓			✓
Immediate reconstruction	✓		✓	✓
Length of stay	✓		✓	
Number of operations	✓		✓	✓
Surgical caseload	✓	✓		✓
Survival	✓	✓	✓	✓

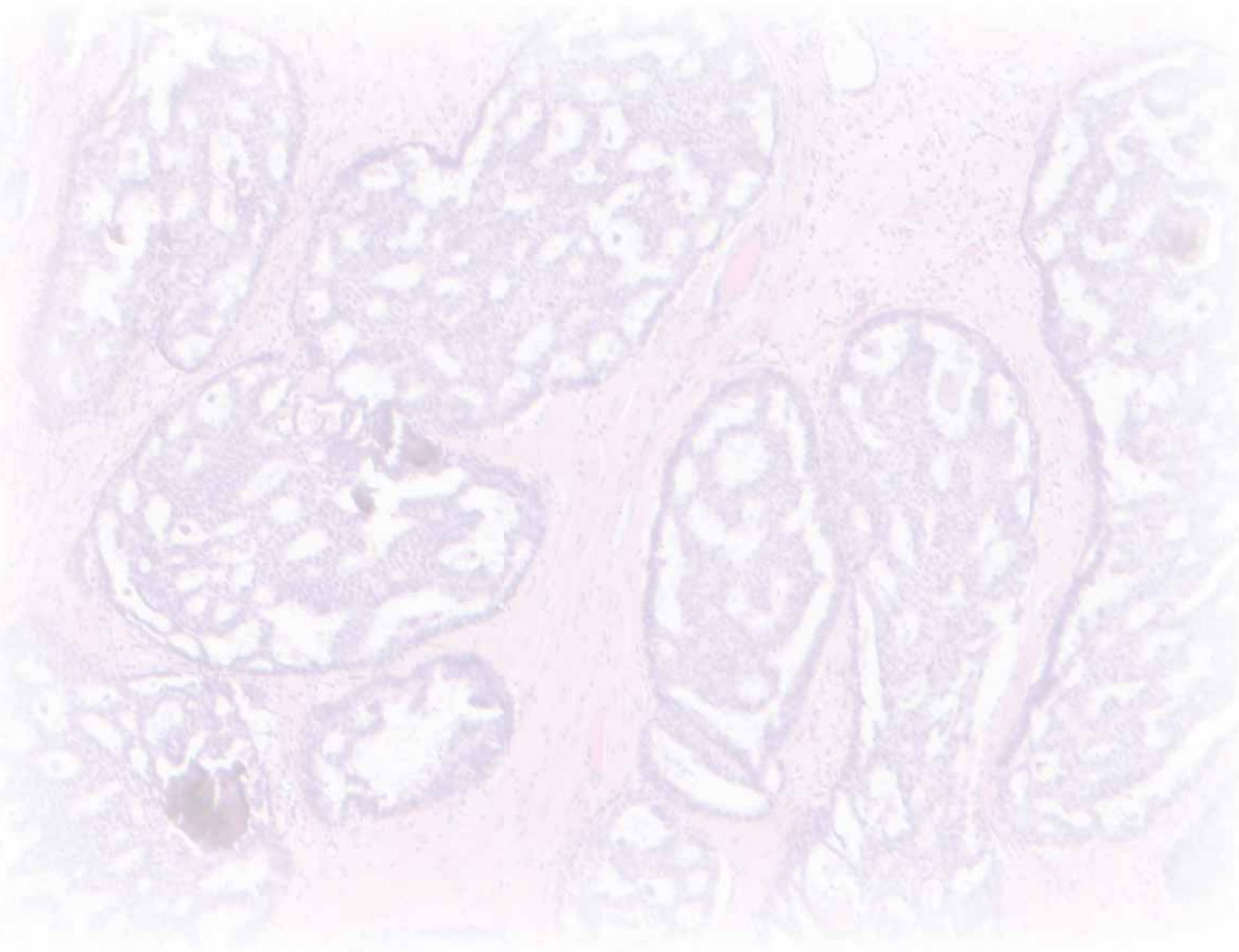
Table B: Numbers and proportions of data items with known values (UK female and male)

Data item	Number of cases	UK	England
UK cohort	50,286	-	-
Deprivation score	50,088	100%	100%
Ethnicity	33,648	67%	80%
Surgical treatment (BCS, MX and no surgery)	43,573	87%	86%
UK invasive cancers cohort	44,782	-	-
Surgical treatment (BCS, MX and no surgery)	38,373	86%	85%
UK invasive cancers cohort (BCS and MX only)	36,182	-	-
Invasive tumour size	32,296	89%	-
Invasive tumour grade	35,019	97%	-
Nodal status	28,786	80%	-
NPI	27,581	76%	-
Oestrogen receptor status	21,553	60%	-
Progesterone receptor status	14,582	40%	-
HER2 status	15,874	44%	-
Sentinel lymph node biopsy	16,809	46%	-
Immediate reconstruction	7,168	20%	-
Length of stay	27,159	75%	-

Appendix 2 – Overall Data Quality and Completeness

Table C: Proportion of cases with unknown values

Data Item	Screen-detected	Symptomatic
Age	0%	0%
Ethnicity	30%	34%
Deprivation	<1%	<1%
Surgical treatment	<1%	19%
Invasive size	<1%	16%
Invasive grade	<1%	5%
Nodal status	2%	30%
Nottingham Prognostic Index	3%	34%



Appendix 3 – Tumour Characteristics Data Completeness

Table D: Data completeness for invasive breast cancers diagnosed in females in 2007 (expressed as % of all invasive tumours)

English region/ Celtic country	Number of invasive tumours	% with known invasive tumour size	% with known invasive tumour grade	% with known nodal status	% with known NPI	% with known vascular invasion status	% with known ER status	% with known PgR status	% with known HER2 status
Eastern	4,194	90.0%	90.7%	78.6%	76.6%	16.2%	46.0%	28.5%	39.3%
North West	4,881	77.4%	88.8%	74.1%	72.0%	11.6%	40.9%	40.5%	34.4%
Northern & Yorkshire	4,824	88.1%	92.7%	53.6%	53.1%	27.3%	60.7%	53.1%	48.1%
Oxford	1,993	76.1%	94.1%	83.5%	72.8%	83.5%	43.0%	42.7%	36.6%
South West	5,949	78.5%	88.6%	74.1%	72.0%	72.0%	51.9%	38.3%	38.0%
Thames	7,521	70.8%	86.7%	50.6%	45.7%	8.5%	31.8%	29.7%	25.9%
Trent	3,501	41.0%	87.4%	40.6%	39.7%	11.4%	43.9%	11.5%	38.8%
W Midlands	4,225	84.5%	92.5%	80.6%	79.1%	79.9%	96.1%	86.8%	87.0%
England	**37,088**	**76.4%**	**89.7%**	**65.3%**	**62.5%**	**34.8%**	**50.7%**	**40.9%**	**42.1%**
N Ireland	1,132	84.5%	85.2%	84.3%	75.6%	0%	0%	0%	0%
Scotland	3,935	79.5%	89.0%	79.9%	75.2%	0%	92.1%	0%	0%
Wales	2,358	63.1%	90.2%	44.5%	42.9%	70.9%	71.5%	33.6%	59.0%
UK	**44,513**	**76.1%**	**89.5%**	**66.0%**	**62.9%**	**32.8%**	**54.1%**	**35.9%**	**38.2%**

Table E: Data completeness for invasive breast cancers diagnosed in females in 2007 (expressed as % of surgically treated invasive tumours)

English region/ Celtic country	Number of invasive tumours	% with known invasive tumour size	% with known invasive tumour grade	% with known nodal status	% with known NPI	% with known vascular invasion status	% with known ER status	% with known PgR status	% with known HER2 status
Eastern	3,532	96.3%	96.9%	92.8%	90.6%	18.7%	50.1%	31.3%	44.0%
North West	3,799	93.5%	96.7%	89.4%	87.4%	14.9%	52.1%	51.6%	43.9%
Northern & Yorkshire	3,959	96.5%	97.9%	65.3%	64.7%	31.9%	65.6%	57.8%	55.8%
Oxford	1,744	86.9%	98.7%	94.8%	83.1%	92.3%	47.2%	47.0%	40.5%
South West	4,847	94.4%	96.5%	89.9%	87.8%	83.7%	57.9%	42.7%	43.4%
Thames	6,057	85.1%	93.8%	61.5%	56.2%	9.7%	36.7%	34.4%	30.4%
Trent	2,726	52.7%	97.1%	52.1%	51.0%	14.5%	52.4%	14.2%	47.7%
W Midlands	3,525	98.3%	98.6%	96.3%	94.7%	93.0%	99.0%	89.5%	91.8%
England	**30,189**	**89.2%**	**96.6%**	**78.9%**	**75.9%**	**41.1%**	**56.7%**	**45.9%**	**48.4%**
N Ireland	882	93.3%	93.0%	93.7%	85.0%	0%	0%	0%	0%
Scotland	3,119	94.8%	97.3%	95.6%	90.5%	0%	94.1%	0%	0%
Wales	1,786	79.9%	96.4%	57.1%	55.1%	85.8%	78.7%	37.0%	67.1%
UK	**35,976**	**89.3%**	**96.6%**	**79.6%**	**76.4%**	**38.8%**	**59.7%**	**40.4%**	**44.0%**

Appendix 4 - Acronyms

Abbreviation	Full text
ABS	Association of Breast Surgery
BCCOM	Breast Cancer Clinical Outcome Measures
BCS	Breast Conserving Surgery
DCIS	Ductal Carcinoma In Situ
DCO	Death Certificate Only
EPG	Excellent Prognostic Group
ER	Oestrogen Receptor
GPG	Good Prognostic Group
HER2	Human Epidermal Growth Factor 2
HES	Hospital Episode Statistics
ID2007	Index of Multiple Deprivation 2007
LSOA	Lower Super Output Area
MPG1	Moderate Prognostic Group 1
MPG2	Moderate Prognostic Group 2
MX	Mastectomy
NBSS	National Breast Screening System
NCIN	National Cancer Intelligence Network
NHS	National Health Service
NHSBSP	National Health Service Breast Screening Programme
NIMDM	Northern Ireland Multiple Deprivation Measure 2005
NPI	Nottingham Prognostic Index
OA	Output Area
ONS	Office for National Statistics
PEDW	Patient Episode Database for Wales
PPG	Poor Prognostic Group
QA	Quality Assurance
SIMD	Scottish Index of Multiple Deprivation 2006
SLNB	Sentinel Lymph Node Biopsy
SMR01	Scottish Morbidity Record
WIMD	Welsh Index of Multiple Deprivation 2008
WMCIU	West Midlands Cancer Intelligence Unit

NCIN
national cancer
intelligence network
Using information to improve quality & choice