NHS BREAST SCREENING PROGRAMME

&

ASSOCIATION OF BREAST SURGERY

AN AUDIT OF SCREEN DETECTED BREAST CANCERS

FOR THE YEAR OF SCREENING

APRIL 2011 TO MARCH 2012

DISTRIBUTED AT THE ABS CONFERENCE

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NHS

Breast Screening Programme

FOREWORDS

I am pleased once again to write the foreword to this report on the NHSBSP & ABS Audit of screen-detected breast cancers. This is our first report since the launch of Public Health England. Public Health England's mission is to work with and alongside others to protect and improve the public's health and well-being, and to reduce inequalities through a range of means including transparent reporting of outcomes. This is something this audit has aimed to do from its inception, and over the years we have demonstrated how robust audit, accurate data and timely reporting of outcomes can facilitate change and improvements in service delivery.

This year the audit publishes, for the first time, unit-level survival data. Inevitably the numbers of cases in some units are small; with numbers ranging from 57 to 767 breast cancer cases diagnosed in each unit over the two-year period 2005-2007. However eight units are shown to have survival rates that are statistically significantly lower than the national average of 98%. Further work is required to understand these differences which may result solely from factors which have not been taken into account in the analyses.

In recent years the audit has moved to reporting at screening unit level rather than at the larger regional level. This gives more precise information about performance and activity. Instances where practice differs significantly have been highlighted and regional QA reference centres, with their QA teams, have been tasked with following up the issues. Following feedback from the QA reference centres the members of the audit group have reviewed these specific audit areas so as to ensure that that these are clinically relevant and appropriate.

Thanks as ever are due to the surgical and screening teams who contributed the data, to the West Midlands Breast Screening QA Reference Centre and to Neil Rothnie and the ABS Screening Audit Group.

Professor Julietta Patnick, CBE
Director for the NHS Cancer Screening Programmes

We are delighted to present the latest annual NHSBSP & ABS Audit report for the screening year 1 April 2011 to 31 March 2012, with adjuvant therapy data from the preceding year. There is much of interest in this report. This year we are pleased to be able to present more in-depth data on nodal assessment type. In past years, we collected data on whether or not a patient had sentinel lymph node biopsy (SLNB) and the procedure type. This year we know when they had their SLNB, the SLNB type and we have information on whether a patient then had an axillary clearance or sampling. Such comprehensive data on axillary management allows more thorough quality assurance and highlights any true outliers. Last year Dr Gill Lawrence in her presentation highlighted that a large proportion of the cases included in the audit had previously been diagnosed with cancer. This topic has been examined in more detail this year and the findings summarised in Chapter 8. The presence of such cases can have a significant impact on outcomes, and it is therefore appropriate that they are now being identified.

Any audit is dependent on good quality data and this continues to get better each year. This is due to the meticulous efforts of the staff in screening units and QA reference centres. I am grateful to you all for your hard work. Thanks are also due to the members of the Screening Audit Steering Group, particularly to Shan Cheung, Sam Read, Gill Lawrence and Olive Kearins, for their dedication to this unique National Audit. This is my final year as the audit chair. I have greatly enjoyed the role and wish my successor Mr Mark Sibbering well for the future.

Neil Rothnie
Chair of the NHSBSP and ABS Screening Audit Group

ACKNOWLEDGEMENTS

The 2011/12 audit of screen-detected breast cancers was designed and directed by the NHS Breast Screening Programme and Association of Breast Surgery Screening Audit Group.

Mr Neil Rothnie	Chair, Consultant Surgeon, Southend Hospital, Essex
Ms Shan Cheung	Breast Screening QA Senior Information Analyst, West Midlands Breast Screening QA Reference Centre
Dr Pauline Carder	Consultant Pathologist, Bradford Teaching Hospitals, Yorkshire
Prof. David Dodwell	Consultant in Clinical Oncology, St James Hospital, Leeds
Mrs Jacquie Jenkins	Assistant Director of QA, East Midlands Breast Screening QA Reference Centre
Ms Olive Kearins	Acting Regional Director of Breast Screening Quality Assurance, West Midlands Breast Screening QA Reference Centre
Dr Gill Lawrence	Regional Director of Cancer Screening Quality Assurance, West Midlands Cancer Intelligence Unit
Prof. Julietta Patnick	Director of the NHS Cancer Screening Programmes
Mr Sam Read	Breast Screening QA Information Assistant, West Midlands Breast Screening QA Reference Centre
Dr Nisha Sharma	Director of Breast Screening Leeks/Wakefield, Seacroft Hospital
Dr Matthew Wallis	Consultant Radiologist, Addenbrooke's Hospital, Cambridge
Mrs Margot Wheaton	Chair of the National Breast Screening System Users Group and Programme Manager, University Hospital, Coventry

The Screening Audit Group would like to extend its thanks to the following individuals and groups for their contributions to the 2011/12 audit of screen-detected breast cancer.

NHSBSP Surgical QA Co-ordinators, QA Co-ordinators and Programme Directors for overseeing regional data collection and validation at the regional QA reference centres.

QA Data Managers, Screening Office Managers and staff within the NHSBSP for collecting, collating and validating the regional data.

Regional cancer registry staff who co-operated with their regional QA reference centres to collect survival audit data.

Mrs Diane Edwards, GIS Specialist Cancer Information, at the West Midlands Cancer Intelligence Unit for producing the map of the NHSBSP.

Ms Lucy Davies at the ABS office for valuable assistance and support, including the distribution of booklets.

Mr Steve Hales at the West Midlands Public Health Observatory for enabling the members of the Screening Audit Group to edit the NHSBSP and ABS audit report online

The Screening Audit Group would also like to thank the NHSBSP National Office for its financial assistance in support of the 2011/12 audit of screen-detected breast cancers.

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INTRODUCTION

AIMS AND OBJECTIVES

The 2011/12 NHS Breast Screening Programme (NHSBSP) and Association of Breast Surgery (ABS) audit of screen-detected breast cancer was undertaken to examine NHSBSP clinical activity in the period 1 April 2011 to 31 March 2012. The audit is designed to assess clinical performance by comparison of data with as many as possible of the clinical Quality Assurance (QA) standards recommended by the UK NHS Breast Screening Programme. These include the standards set in the following publications:

Quality Assurance Guidelines for Surgeons in Breast Cancer Screening
NHSBSP Publication No. 20, 4th Edition, March 2009

Guidelines for Quality Assurance Visits
NHSBSP Publication No. 40, Revised, October 2000

Reference is also made to the following publications:

Surgical Guidelines for the Management of Breast Cancer
Association of Breast Surgery, 2009

Guidelines for Non-operative Diagnostic Procedures and Reporting in Breast Cancer Screening.
NHSBSP Publication No.50, June 2001

NHS Clinical Guidelines for Breast Screening Assessment, Publication No.50. January 2005

NICE Clinical Guideline 80 Early and Locally Advanced Breast Cancer: Diagnosis and Treatment (February 2009)

The 2011/12 NHSBSP & ABS audit covers the following main topic areas:

- The number and invasive status of screen-detected breast cancers
- The age profile of women with screen-detected breast cancers
- Non-operative diagnosis, number of assessment visits, diagnostic open biopsies
- Tumour characteristics, cytonuclear grade and non-invasive tumour size, invasive tumour size, lymph node status, invasive grade, NPI score and receptor status
- Surgical treatment of the breast, immediate reconstruction, neo-adjuvant therapy
- Surgical caseload
- Repeat operations to the breast
- The axilla: pre-operative assessment, sentinel lymph node biopsy, nodal status, surgical treatment to the axilla
- Previous cancers, adjuvant therapy, waiting time for radiotherapy, variation in adjuvant therapy with tumour characteristics
- Survival analysis

ORGANISATION OF THE AUDIT

Organisation of Data Collection

As in previous years, responsibility for regional data collection was devolved to regional QA reference centres under the direction of surgical QA co-ordinators, QA directors and QA co-ordinators. Prior to the start of data collection an information pack was sent to all surgical QA co-ordinators, QA directors, QA co-ordinators and directors of regional cancer registries. This pack included, in both electronic and paper format:

- a timetable of events (Appendix A)
- a main NHSBSP & ABS breast audit questionnaire with guidance notes (Appendix B)
- an adjuvant therapy data collection form with guidance notes (Appendix C)
- a survival audit data collection form with guidance notes (Appendix D)

The format of the audit was designed by the NHSBSP & ABS Screening Audit Group and was subject to comment from the surgical QA co-ordinators, QA directors and QA co-ordinators in an attempt to ensure that, as far as possible, ambiguities were eliminated. Guidance notes and data checks, designed to assist the collection of consistent data, were incorporated.

Main Audit Questionnaire

The NHSBSP & ABS Breast Screening Audit main questionnaire was designed to enable collection of data describing breast screening activity in the 2011/12 screening year. The cohort of women included was selected to be identical to that included in the statistical KC62 reports for 2011/12, from which UK NHSBSP core screening measures are routinely calculated. Information was sought in such a way as to allow comparison of findings with current QA standards.

Adjuvant Therapy Audit

Each screening surgeon was asked to collect information for women with a date of first offered screening appointment from 1 April 2010 to 31 March 2011 inclusive. Information was sought regarding start dates for radiotherapy, where applicable, and whether or not the women had started chemotherapy and/or endocrine therapy. These data were linked to data collected in the main audit for 2010/11 to provide information on waiting times for adjuvant therapy and patterns of treatment.

Survival Audit

The survival audit utilised existing links between QA reference centres and regional cancer registries to obtain death data for women with screen-detected breast cancer. Details of the women with screen-detected breast cancer screened between 1 April 2006 and 31 March 2007 (with a minimum of five years follow-up) were obtained by the breast screening services and matched with databases held at regional cancer registries to identify the date of death for any woman who died on or before 31 March 2012.

Responsibility for survival audit data collection rested with regional breast screening QA co-ordinators. Effective communication and collaboration with regional cancer registries is a vital element in the success of the survival audit.

Unit Level Data

Data for 93 screening units were included in the 2011/12 NHSBSP & ABS Breast Screening Audit. The smallest units, defined as the twenty units with the smallest number of women screened, are highlighted in white in the graphs throughout this booklet. The number of women screened by the 20 smallest units in 2011/12 varied from 6,246 to 15,027.

Responsibility for Data Collection

NHSBSP & ABS Breast Screening Audit information packs were sent to NHSBSP representatives in nine QA reference centres in England, and to breast screening information centres in Wales, Scotland and Northern Ireland. Data for the nine QA reference centres in England and data for Wales, Northern Ireland, Scotland and the Isle of Man are presented in this document. Screening cases in Isle of Man are reported by the Warwickshire, Solihull & Coventry Breast Screening Service.

In each English region and country, the surgical QA co-ordinator, QA director and QA co-ordinator and their equivalents in the Celtic countries were responsible for working together to ensure that the data were collected from their breast screening services. Lead surgeons in each breast screening service were responsible for making sure that the data were available and complete, and lead surgeons in each screening service were asked to give confirmation to their QA co-ordinator that the data for their breast screening service were a fair representation of screening activity in the audit period (to “sign off” the data). The QA co-ordinator in each region was given the responsibility for ensuring that all the data were signed off before submission. The identification of individuals with responsibility for ensuring that data are gathered and are a true reflection of clinical work is intended to clarify ownership of the information for the

audit. Ownership of the information is essential if a need for change is highlighted which must be accepted and implemented.

The ground level data collection was carried out by a range of staff, including individual surgeons, QA reference centre staff, breast screening service office staff, staff at regional cancer registries, oncology staff, some non-surgical clinicians who have an interest in QA and some dedicated clinical data collection officers. For those screening services supported by the National Breast Screening System (NBSS), a set of standard analytical crystal reports was designed to allow the audit data to be retrieved from screening computer systems. These reports were created by Mrs Margot Wheaton and were available to all regions. Data were collated on a regional basis by QA reference centres under the direction of the surgical QA co-ordinators, QA directors and QA co-ordinators and submitted to the West Midlands QA Reference Centre for collation and evaluation.

Obtaining Complete and Valid Audit Data

Ensuring that audit data were supplied in a consistent format was essential to the validation process. The West Midlands QA Reference Centre has developed specialist spreadsheets in Microsoft Excel which are used by each regional QA reference centre to collate regional data in a standard format. Individual screening services either provide the data to their regional QA reference centre in the Excel spreadsheet or by hand on a paper copy. The spreadsheet includes data validation checks. A specially designed spreadsheet was also provided for the survival audit. The collection of data at breast screening service/ unit level involved detailed consideration of cases and cross checks against existing KC62 reports.

Data Evaluation

The West Midlands QA Reference Centre, guided by the NHSBSP & ABS Screening Audit Group, acted as the central collection and collation point for national data. During the collation of national data, extensive validation checks were used to ensure that the data were an accurate reflection of clinical activity in the UK NHSBSP. National data were evaluated in comparison to current QA standards where these were available. Commentary and recommendations were made by the NHSBSP & ABS Screening Audit Group.

Publication of Audit Data

The NHSBSP & ABS 2011/12 Audit of Screen-detected Breast Cancers is published as a booklet with financial assistance from the NHSBSP National Office. The booklet will be distributed at the ABS Annual Conference on **21 May 2013.** Once published, the booklet will be available to download from the following web sites.

West Midlands Cancer Intelligence Unit	www.wmpho.org.uk/wmciu/
NHS Cancer Screening Programmes	www.cancerscreening.nhs.uk

The NHSBSP & ABS Audit of Screen-detected Breast Cancers data are also available via an E-atlas on www.wmciu.nhs.uk/atlas/BreastAtlas/atlas.

Referencing this Document

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USING THE AUDIT DATA TO IMPROVE PERFORMANCE

Recommended uses of the NHSBSP & ABS Breast Screening Audit data are as follows:

At National Level

The NHSBSP & ABS Breast Screening Audit data should be considered formally at meetings of the regional breast screening QA directors and QA surgeons to identify recommendations for action where performance does not meet a QA standard. This may include suggestions for training, and recommendations for the management and organisation of services.

At Local/Regional Level

The annual NHSBSP & ABS Breast Screening Audit data should be considered formally at a meeting of the regional breast screening QA team, and also at a regional workshop where the data for individual screening units in each region are analysed and presented.

Where the audit identifies a screening service as an 'outlier' in a particular area, regional QA reference centres and regional surgical QA co-ordinators should ensure that screening services audit the cases involved to establish whether the results reflect a data collection or recording problem. If the data are found to represent clinical practice correctly, the reasons for the failure to follow recommended guidelines should be ascertained.

Regional QA reference centres and regional surgical QA co-ordinators should follow up any failures to meet national QA standards with individual screening services. There should be formal recording of the plans put in place to achieve each of the standards failed, and routine monitoring to ensure that action has been taken to rectify the problem.

The annual NHSBSP & ABS Breast Screening Audit data should also be used to celebrate high quality services. Attention should not only be focused on failure to meet QA standards. Achievement of standards should also be recorded and recognition for high quality work given. It is important that audits such as this do not demoralise the dedicated professionals within the breast cancer screening and treatment teams.

YOUR COMMENTS

The NHSBSP & ABS audit of screen-detected breast cancers has developed over the years, with improvements in design and organisation resulting in improved data quality and increasingly useful audit results. To continue this development process your comments and suggestions are extremely useful. If you have any comments or suggestions about the 2011/12 audit, about this document or about the development of future NHSBSP & ABS Breast Screening Audits please put them in writing to:

NHSBSP & ABS Screening Audit Group
West Midlands Breast Screening QA Reference Centre
Public Health Building
The University of Birmingham
Birmingham B15 2TT

Tel: 0121 414 7713

Fax: 0121 414 7714

E-mail: shan.cheung@nhs.net

PROVISION OF DATA FOR THE 2011/12 AUDIT

The map below shows the areas covered by the nine English QA reference centres and breast screening information centres in Wales, Scotland, Northern Ireland and the Isle of Man. Data from the North East and Yorkshire and Humber Strategic Health Authorities are collated in one QA reference centre, called North East, Yorkshire & Humber.

KEY FINDINGS AND RECOMMENDATIONS

CANCERS DETECTED BY SCREENING

Between 1 April 2011 and 31 March 2012, 2,261,942 women were screened by the UK NHSBSP in England, Wales, Northern Ireland and Scotland. Of the 18,745 cancers detected in women of all ages; 80% were invasive, 20% non-invasive and 1% micro-invasive. The invasive status of 24 cancers was unknown. In the UK as a whole in 2011/12, the cancer detection rates for all cancers and for small invasive cancers (<15mm in diameter) were 8.3 per 1,000 women screened and 3.4 per 1,000 women screened respectively. Nine screening units have had cancer detection rates for small (<15mm in diameter) cancers below 3.0 per 1,000 women screened throughout the 3-year period 2009/10-2011/12. Four of these were small units which screened fewer than 13,000 women in 2011/12. Regional QA reference centres should carry out audits with these screening units to ascertain the reasons for these consistently low results. When they were first invited to attend the screening appointment leading to their diagnosis, 61% of women with a screen-detected breast cancer were aged between 50 and 64 years. Twenty seven percent of screen-detected breast cancers were diagnosed in women aged 65-70 years; 8% of cancers were detected in women aged 70 years or more. Although in Scotland and Wales there are currently no plans to implement the randomised controlled trial age extension, in 2011/12 in these countries, 8% and 10% of cancers respectively were detected in these older women, which is in line with the UK average of 8%.

NON-OPERATIVE DIAGNOSIS

In 2011/12, 96% of cancers detected in the UK NHSBSP were diagnosed non-operatively; 744 cancers did not have a non-operative diagnosis. In the UK as a whole, 27 cases had C5 cytology only diagnosis. In Northern Ireland, 56% of cancers were diagnosed non-operatively by both C5 cytology and B5 core biopsy. Relatively high numbers of cancers were also diagnosed by both C5 cytology and B5 core biopsy in North East, Yorkshire & Humber and in Scotland. Five units (3 in Northern Ireland, 1 in North East, Yorkshire & Humber and 1 in Scotland) had a diagnosis rate for both C5 cytology and B5 core biopsy of over 40% and in 1 unit in North East Yorkshire & Humber this rate was above 20%. These 6 units have had the highest C5 cytology and B5 core biopsy rates in the last three audit years. In the units in Northern Ireland and North East, Yorkshire & Humber the majority of women had their cytology and core biopsy samples taken at a single assessment visit. Scotland did not provide information on the procedures undertaken at individual assessment visits.

The UK non-operative diagnosis rate for invasive cancers was 99%; only 210 invasive cancers did not have a non-operative diagnosis. All screening units met the 90% minimum standard. Only 2 units in South West and North East Yorkshire and Humber (at 94.3% and 94.9% respectively) just failed to meet the 95% target. The non-operative diagnosis rate for non-invasive cancers was 86%; 527 non-invasive cancers did not have a non-operative diagnosis. The proportion of non-invasive cancers without a non-operative diagnosis varied from 10% in Northern Ireland to 22% in East of England. In 2011/12, 43 screening units failed to meet the 85% minimum standard for the non-operative diagnosis of non-invasive cancers. If cases of LCIS were excluded, the non-operative diagnosis rate for 17 of these units was above 85%. In the 3-year period 2009/10-2011/12, 28 units had an average non-operative diagnosis rate for non-invasive cancers excluding LCIS of less than 85%. In South Central, 5 of the 9 screening units did not meet the 85% standard. Regional QA reference centres should investigate why screening units in their regions have failed to meet the 85% minimum standard for the non-operative diagnosis of non-invasive cancers excluding LCIS over this 3-year period.

In 2010/11, 127 cancers (1%) had invasive status B5c (Not Assessable or Unknown) at core biopsy. Some units code micropapillary cancers and cancers with micro-invasion as B5c, and these have been included in the B5c category for the purposes of this audit. The core biopsy coding system is still under discussion by the Pathology Big 18. Invasive disease was found at surgery for 19% of cancers with a B5a (Non-invasive) non-operative diagnosis. Five screening units have had rates significantly higher

than the UK average rate in the 3-year period 2009/10-2011/12 and, in 6 screening units, more than half of the under-diagnosed cancers had an invasive size of at least 10mm. Ninety seven cancers with a B5b (Invasive) non-operative diagnosis were found to have non-invasive or micro-invasive cancer with no associated invasive disease following surgery. For 83 cancers with a B5b (Invasive) non-operative diagnosis, no malignant disease was identified at surgery, but subsequent audit confirmed that a correct diagnosis of invasive cancer had been reported in the non-operative core biopsy. The steady reduction in the number of cancers with a B5a (Non-invasive) non-operative diagnosis which are found to be "non-invasive - biopsy only" is probably mainly due to fewer cancers converting from B5a (Non-invasive) to invasive at surgery because of the wider use of vacuum assisted biopsy with larger volume cores within which small invasive components can be identified. The increase in the proportion of cases with a B5b (Invasive) core biopsy which were not confirmed to be invasive following surgery also probably reflects the wider use of vacuum assisted biopsy with larger volume cores within which small invasive tumours are fully excised.

NUMBER OF ASSESSMENT VISITS

Of the 18,745 women with screen-detected breast cancer diagnosed in the UK in 2011/12, 89% of women with invasive cancer and 73% of women with non-invasive cancer had only one assessment visit. Of these, 97% had a B5/C5 non-operative diagnosis result and 493 did not achieve a non-operative diagnosis. In 7 units over 25% of women required more than one assessment visit to obtain a B5/C5 non -operative diagnosis result. Of the 16,993 screen-detected breast cancers diagnosed in England, Wales and Northern Ireland in 2011/12, 884 (5% of all cancers; 3% of invasive cancers and 12% of non-invasive cancers) did not have a core/cytology result from the first assessment visit. In 8 screening units, over 20% of cancers had their first core/cytology result from second or later assessment visit. Nine hundred and ninety four cancers (6% of all cancers; 5% of invasive cancers and 12% of non-invasive cancers) had at least one repeat visit for core biopsy/cytology. In 7 screening units, over 20% of the non-invasive cancers with a non-operative diagnosis had more than one needle biopsy visit to obtain a B5/C5 diagnosis. It is possible that, in these units when an initial core biopsy was B3, a subsequent vacuum assisted biopsy revealed the presence of DCIS. There were 391 invasive cancers and 374 non-invasive cancers where repeat needle biopsies were performed at a subsequent assessment visit to obtain a B5/ C5 diagnosis. There were 271 invasive cancers and 110 non-invasive cancers where a B5/C5 result was obtained at the first assessment visit, but where repeat needle biopsy was undertaken at a subsequent visit, apparently to confirm the result. Three percent of all women with invasive breast cancer and 3% of all women with non-invasive breast cancer came back to an assessment clinic for other investigations. These extra visits could have been for pre-operative nodal assessment, MRI, clinical assessment or needle biopsy of another lesion. In order to identify the reasons for unusual clinical practice, using the detailed information on individual assessments gathered in this year's audit, regional QA reference centres and regional radiology QA co-ordinators should examine the non-operative diagnosis results for all their screening units to identify those where relatively high proportions of cancers had their first definitive core/cytology result from second or later assessment visit, or where cancers with a B5 result from a first assessment visit result were brought back for further investigations.

DIAGNOSTIC OPEN BIOPSIES

In 2011/12, 2,397 diagnostic open biopsies were performed. Of these 1,653 (69%) were benign and 744 (31%) were malignant. The benign open biopsy rate was 1.74 and 0.51 per 1,000 women screened for prevalent (first) and incident (subsequent) screens respectively. Eight regions exceeded the minimum standards for prevalent screens. Three units (1 in East of England, 1 in Wales and 1 in South Central) did not achieve the minimum standard for incident screens. Regional QA reference centres should investigate the reasons for their relatively high prevalent and incident benign open biopsy rates. The malignant open biopsy rate has fallen from 2.04 per 1,000 women screened in 1996/97 to 0.33 per 1,000 women screened in 2011/12 as the non-operative diagnosis rate has increased from 63% to 96%. In 20011/12, the malignant open biopsy rate varied at screening unit level from 0.06 per 1,000 women screened in a unit in North East, Yorkshire & Humber to 0.87 per 1,000 women screened in a unit in East of England. The UK benign open biopsy rate has fallen over 14 years from 1.50 per 1,000 women screened in 1996/97 to 0.77 per 1,000 women screened in 2011/12.

There were 2 false positive core biopsies recorded in 2011/12. Regional QA reference centres and their pathology QA co-ordinators should review these cases to ascertain the reason(s) for these results,

implementing corrective action as appropriate. Thirteen cancers which were diagnosed by open biopsy had a mastectomy or a mastectomy with axillary surgery as the first surgical operation. Regional QA reference centres and regional surgical QA co-ordinators should review these cases to ascertain the reasons for these unusual results. Twenty four invasive cancers and 7 non/micro-invasive cancers diagnosed by open biopsy had no non-operative procedure recorded. Regional QA reference centres and regional surgical QA co-ordinators should audit these 31 cases to establish whether they reflect a data collection problem. If the data are found to represent clinical practice correctly, the reasons for the failure to attempt non-operative diagnosis should be ascertained.

Twenty eight percent of invasive cancers and 28% of non/micro-invasive cancers diagnosed by malignant open biopsy had a B4/C4 needle biopsy result indicating suspicion of malignant disease. Fifty two percent of invasive cancers and 67% of non/micro-invasive cancers diagnosed by malignant open biopsy had a B3/C3 needle biopsy result. The proportion of non-invasive lesions diagnosed by malignant open biopsy which had a B3 core biopsy result has gradually increased with time. This increase could reflect better targeting of calcifications, as B3 results for non/micro-invasive cancers and also for invasive carcinomas may represent atypical intraductal epithelial proliferations resulting from partial sampling of ductal carcinoma in situ. The Sloane Project is actively collecting screen-detected cases of lobular in situ neoplasia, atypical ductal hyperplasia and flat epithelial atypia, and will still accept new cases of ductal carcinoma in situ screened before 1 April 2012. Increases in B3 diagnoses may also in part be due to the classification by pathologists of core biopsies which are considered to represent lobular neoplasia (atypical lobular hyperplasia and lobular carcinoma in situ) as B3, in line with current NHSBSP guidelines. In 2011/12, of the 464 cancers that were diagnosed as B3/C3 and had an operation, 110 were found to be invasive at surgery and 119 (26%) had only LCIS in the surgical specimen. In 2009/10-2011/12, 4 screening units had B3/C3 rates significantly higher and 9 had rates significantly lower than the average rate of 55% and 2 units had B4/C4 rates significantly higher than the average rate. Regional QA reference centres should carry out audits with these units to confirm the reasons for the unusually high or low proportions of B3/C3 and B4/C4 non-operative diagnosis results.

TUMOUR CHARACTERISTICS

Of the 143 surgically treated non-invasive cancers with unknown size, 101 (71%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen. The size of 184 non -invasive cancers (5%) was not assessable. Of the 181 non-invasive cancers with grade not assessable, 93% were LCIS alone. Four percent of all surgically treated non-invasive cancers had incomplete cytonuclear grade or/and size data. In 10 units, data incompleteness was greater than 10%. Two of the four screening units in Northern Ireland were included within this group. Regional QA reference centres and regional pathology QA co-ordinators should audit non-invasive cancers with unknown cytonuclear grade and/or size to ascertain the reason that these important prognostic indicators were not recorded. Of the 3,608 surgically treated non-invasive cancers, 37% were less than 15mm in diameter and 15% were larger than 40mm. 57% of the surgically treated non-invasive cancers had high cytonuclear grade, 28% had intermediate cytonuclear grade and 9% had low cytonuclear grade. Eighteen units had significantly higher and 12 units had significantly lower proportions of non-invasive cancers with a high cytonuclear grade. Regional QA reference centres and regional pathology QA co-ordinators should carry out audits with these outlier units to ascertain the reason for their unusual cytonuclear grade distributions.

Fifty three percent of surgically treated cancers had an invasive tumour diameter of less than 15mm. For only 260 cases (2%) was the invasive tumour diameter greater than 50mm. The whole tumour size was not provided for 209 (1%) surgically treated invasive cancers. 20% of these cancers were in London. Regional QA reference centres should ascertain why this important information was not available from their screening units.

In the UK as a whole, 98% of surgically treated invasive cancers had known nodal status. A total of 218 invasive cancers were recorded as having no nodes obtained. Overall, 21% of invasive cancers had positive nodes; this varied from 15% to 42% in individual screening units. It would be interesting to determine whether this wide range of node positivity is related to differences in pathological handling or the number of nodes examined. It might also be related to the number of recurrences and multiple primary cancers detected in each screening unit. For 14,439 invasive cancers nodes were examined at surgery, and 1,541 (11%) had one positive node at the first axillary operation. Of these, 1,432 (93%)

had more detailed information of the type of single node positivity. Four hundred and three (28%) contained micro-metastases and 1,029 (72%) contained metastases. The proportion of single positive nodes containing micro-metastases as opposed to metastases decreased with tumour size (from 32% for cancers with an invasive tumour diameter of less than 15mm to 24% for cancers with an invasive tumour diameter greater than 50mm), and with increasing grade (from 32% for Grade 1 cancers to 22% for Grade 3 cancers). Of the 3,608 surgically treated non-invasive cancers, 29% had known nodal status. This varied from 23% in South East Coast to 34% in Wales and North East, Yorkshire & Humber. 85% of non-invasive cancers treated with mastectomy had known nodal status, compared with 8% of those treated with breast conserving surgery. Of the 1,034 non-invasive cancers with known nodal status, 13 (1%) had positive nodal status recorded.

Overall, 25% of invasive cancers were Grade 1, 54% Grade 2 and 20% Grade 3. Grade was not assessable for 52 cancers and unknown for 53 cancers. In the Grade 1 control chart, four units have been outliers every year during the 3-year period 2009/10-2011/12. In the Grade 2 control chart, 1 unit has been an outlier every year during the 3-year audit period 2009/10-2011/12. In the Grade 3 control chart, 2 units have been outliers every year during the 3-year audit period 2009/10-2011/12. Regional QA reference centres and their regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for unusual invasive grade distributions seen in these 7 screening units.

A Nottingham Prognostic Index (NPI) score could be calculated for 97% of surgically treated invasive cancers. Although an NPI score was provided for 554 of the 625 surgically treated invasive cancers with neo-adjuvant therapy; all cancers with neo-adjuvant therapy recorded have been excluded from the following analyses as the NPI scores provided may not have reflected the true tumour characteristics at diagnosis. One unit in the EPG and GPG cancer control chart has been an outlier every year during the 3-year audit period 2009/10-2011/12. One unit in the MPG cancer control chart has been an outlier every year during the 3-year audit period 2009/10-2011/12. No similar patterns are seen in the PPG or unknown NPI group cancer control charts. Seven units in the unknown NPI group control chart are outliers with a significantly higher proportion of cases with unknown NPI than the UK average. Regional QA reference centres and their regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for unusual NPI distributions seen in these 2 units and for the high proportion of cases with unknown NPI group seen in 7 screening units.

ER status was unknown for 66 invasive cancers. Regional QA reference centres should ensure that the ER status is recorded for all invasive cancers and that the results are available for discussion at multi-disciplinary meetings. Of the invasive cancers with known ER status, 92% were ER positive. In the 3-year period 2009/10-2011/12, 11 units had a significantly higher proportion of ER positive cancers and 11 had a significantly lower proportion. In 9 units fewer than 88% of invasive cancers were ER positive. Three of these were in North East, Yorkshire & Humber and 2 in East Midlands. Regional QA reference centres and their regional pathology QA co-ordinators should investigate the reasons for the unusual results seen in the 22 outlier units. PgR status was known for 60% of invasive cancers compared with 75% in 2007/08. This varied from 32% in North East, Yorkshire & Humber to 97% in North West and 95% in London. Of the invasive cancers with known PgR status, 76% were positive. Of the 1,209 invasive cancers that were known to be ER negative, 84% had known PgR status; 5% were PgR positive and 78% were PgR negative.

HER-2 status data were available for 98% of invasive cancers. Twenty percent of the invasive cancers without a HER-2 status were in London where, in one screening unit, 20% of the 242 invasive cancers had unknown HER-2 status. The regional QA reference centres should audit cases with unknown HER-2 status to determine whether this is a data recording problem or if the data reflect clinical practice. Of the invasive cancers with known HER-2 status, 10% were positive, 88% were negative and 2% were borderline. In the 3-year period 2009/10-2011/12, 10 units had a significantly higher proportion of HER-2 positive invasive cancers and 8 a significantly lower proportion. In 1 unit in South West, 23% of invasive cancers were HER2 positive. Regional QA reference centres and their regional pathology QA co-ordinators should investigate the reasons for the unusual results seen in the 18 outlier units.

ER status was not known for 53% of non/micro-invasive cancers. Only 82% of non-invasive cancers with known ER status were ER positive. The wide variation between screening units in the proportion of non/micro-invasive cancers with known ER status reflects the variable practice that has developed in the UK since the publication in 2009 of *NICE Clinical Guidance 80: Early and locally advanced breast cancer, diagnosis and treatment* which states that Tamoxifen should not be offered to women with non-invasive

breast cancers. In the rest of Europe and the US, consideration of endocrine therapy is still recommended for ER positive non-invasive breast cancers.

SURGICAL TREATMENT

72% of non-invasive cancers were treated with breast conserving surgery; 64 cancers apparently received no surgery. Mastectomy rates for non-invasive cancers varied from 23% in South East Coast and East of England to 32% in North East, Yorkshire & Humber. One hundred and twenty potentially large high cytonuclear grade non-invasive cancers were treated with breast conserving surgery. Regional QA reference centres and regional surgical QA co-ordinators should review the data recorded for these cases to ensure that they were not under-treated.

In the UK as a whole, 23% of invasive breast cancers had a mastectomy. Mastectomy rates in individual screening units varied between 11% and 38%. 247 invasive cancers had no surgery, and treatment information was unavailable for 4 invasive cancers in Scotland. Regional QA reference centres and regional surgical QA co-ordinators should audit the 132 invasive cancers without surgery that did not have neo-adjuvant therapy recorded, and the 4 invasive cancers with unknown surgery to ascertain why surgical treatment was not given or why the surgical treatment that was given was not recorded. In most regions there was a clear variation in mastectomy rate with invasive tumour size. In South West (61%), London (66%) and South Central (68%) mastectomy rates for cancers with invasive tumour diameters in the two largest size categories were lower compared to other regions and the UK average (74%).

Since 2005/06, the mastectomy rate for small (<15mm) invasive cancers has decreased to an all time low of 15% in 2011/12. Only 9% of cancers with whole tumour size less than 15mm were treated with mastectomy compared with 90% of small invasive (less than 15mm diameter) cancers with whole tumour diameter greater than 50mm. These data indicate that the presence of non-invasive disease which extends beyond the invasive lesion accounts for a proportion of the mastectomies performed on small invasive cancers. In the 3-year period 2009/10-2011/12, 16 units had significantly higher or lower mastectomy rates for invasive cancers with whole tumour size <15mm. In order to ascertain the reasons for non-random variation in clinical practice, regional QA reference centres and regional surgical QA co-ordinators should review the data for all of these screening units. In South West (57%), London (66%) and Wales (65%) mastectomy rates for cancers with whole tumour diameters in the two largest size categories were particularly low compared to other regions and the UK average (72%).

IMMEDIATE RECONSTRUCTION

Of the cancers treated with mastectomy in 2010/11, 29% were recorded as having immediate reconstruction. The highest immediate reconstruction rate was in London (37%), and the lowest in South Central and Northern Ireland (15%). Immediate reconstruction rates after mastectomy were almost twice as high for non/micro-invasive cancers (42%) than for invasive cancers (23%). For invasive cancers treated with mastectomy, immediate reconstruction rates varied from 13% in Northern Ireland to 36% in London. For non/micro-invasive cancers, immediate reconstruction rates varied from 28% in South Central to 55% in North West. In 2009/10-2011/12, 19 screening units had significantly higher immediate reconstruction rates for invasive cancers and 23 had significantly lower rates. 14 screening units had significantly higher immediate reconstruction rates for non/micro-invasive cancers and 8 had significantly lower rates. Of the 23 screening units which were low outliers for immediate reconstruction for invasive cancers, 6 also had unusually high mastectomy rates for small (<15mm) invasive cancers. Of these, 3 were in North East, Yorkshire & Humber, 1 in North West, 1 in East Midlands and 1 in Wales. Regional QA reference centres should audit units with low immediate reconstruction rates to determine whether this is a data recording issue or indicative of unusual clinical practice or patient choice.

NEO-ADJUVANT THERAPY

A total of 625 cancer patients received neo-adjuvant therapy in 2011/12. Of these, 601 were invasive and 18 non-invasive. Of the 247 women with invasive breast cancer who did not have surgery, 115 (2%) had neo-adjuvant therapy recorded. The use of neo-adjuvant endocrine therapy was highest for the older women aged 71 years or more; 41% (25 cases) of whom had no surgery recorded. All of the women aged less than 50 years who had neo-adjuvant therapy recorded also had surgery. Of the 340 cancers (2%) with neo-adjuvant endocrine therapy recorded, 327 (96%) were ER and/or PgR positive, 11 had

unknown ER and PgR status and 2 were ER and PgR negative; 89 (26%) had no surgery and 76% were aged 60 years or over.

Neo-adjuvant chemotherapy was recorded for 298 breast cancers (2% of all cancers diagnosed); 289 were invasive, 4 were non-invasive and 5 had unknown invasive status. The 4 non-invasive cases were audited by their regional QA reference centres. Five of the invasive cancers treated with neo-adjuvant chemotherapy were small (20mm or less), Grade 1 and were not proven to have abnormal lymph nodes. Regional QA reference centres should ascertain if the data for these cancers were recorded correctly. In 2011/12, 24 breast cancers (all invasive) were recorded as having received neo-adjuvant Trastuzumab. Regional QA reference centres should audit the 5 HER2 positive breast cancers that were treated with Trastuzumab which had no neo-adjuvant chemotherapy recorded, and the HER2 negative cancer that was recorded as receiving Trastuzumab.

SURGICAL CASELOAD

In 2011/12, 582 consultant breast surgeons treated women diagnosed in the UK NHSBSP and 580 of these were included in the audit and assigned to a single region. Ninety three percent of women were treated by a surgeon with a screening caseload of at least 20 cases. One hundred and forty two surgeons treated fewer than 10 screen-detected cases in 2011/12. Of the 142 surgeons treating fewer than 10 screening cases per year, 46 (32%) had a symptomatic caseload of more than 30 cases per year and 24 (17%) either joined or left the NHSBSP during 2011/12. Combining the data submitted for the 3-year period 2009/10-2011/12, 288 surgeons (39%) had an annual average caseload of fewer than 10 cases and 6 treated an average of at least 100 cases per year. The highest proportion of surgeons with a screening caseload of fewer than 10 screening cases per year was in Scotland (54%) where some low caseload surgeons also work elsewhere in the UK. It is not possible to resolve this double counting problem because the codes used to identify surgeons in Scotland are different to those used in the rest of the UK. Surgical specialisation was highest in Wales, where only 3 surgeons treated fewer than 10 screening cases per year.

During the period 2009/10-2011/12, of the 288 low caseload surgeons, 22% treated more than 30 symptomatic breast cancers each year. Thirteen of the 26 surgeons who had a screening caseload of fewer than 10 cases because of private practice were in London. Information was unavailable to explain the low caseload of 111 surgeons treating a total of 865 women in the 3-year period 2009/10-2011/12. Thirty three of these surgeons were in Scotland and could have also treated women elsewhere in the UK. Regional QA reference centres and regional surgical QA co-ordinators should ensure that all screening cases treated by low caseload surgeons have received satisfactory treatment.

REPEAT OPERATIONS

Twenty four percent of breast cancers ((4,507) had more than one operation. Regional QA reference centres and regional surgical QA co-ordinators should review the data for the 47 screening units with significantly higher or lower repeat operation rates over the 3-year period 2009/10-2011/12 to ascertain the reasons for their unusual practice. Seventy nine percent of invasive cancers and 42% of non/micro-invasive cancers without a non-operative diagnosis had a repeat operation. Although the overall repeat operation rate for the 742 surgically treated cancers (with known invasive status) without a non-operative diagnosis was 52%, repeat operations for cancers without a non-operative diagnosis formed only 9% of the total repeat operations. Thirty cancers without a non-operative diagnosis, which were not LCIS, had no further surgery despite the margins being involved or of unknown status. None of these cancers received neo-adjuvant therapy. Twenty five of these were in Scotland, where margin data were not available. Regional QA reference centres should audit cases where no repeat operation appears to have been undertaken for cancers with involved margins or with unknown margin status. Twenty three percent of invasive cancers and 25% of non/micro-invasive cancers with a non-operative diagnosis had a repeat therapeutic operation. Twenty cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery had more than three therapeutic operations in 2011/12. Seven of these were in South East Coast and 4 were in a single unit within this region. Regional QA reference centres and regional surgical QA co-ordinators should audit these cancers to ascertain the reason for this unusual practice. Regional QA reference centres and regional surgical QA co-ordinators should review the data for the 42 screening units and 95 surgeons with significantly higher or lower repeat therapeutic operation rates for cancers initially treated with therapeutic breast conserving surgery over the 3-year period 2009/10-2011/12.

Nineteen percent of all cancers with a non-operative diagnosis, which were initially treated with breast conserving surgery, had repeat therapeutic operations (breast conserving surgery or mastectomy) to clear margins. This varied from 15% in Scotland to 23% in South West and Wales. Thirteen percent of all cancers with a non-operative diagnosis had repeat breast conserving surgery to clear margins. This varied between 11% in Scotland and Northern Ireland to 17% in Wales and South West. Twelve percent of invasive cancers with a B5b (Invasive) non-operative diagnosis, initially treated with breast conserving surgery, had repeat breast conserving surgery to clear margins. This varied from 9% in Northern Ireland and Scotland to 15% in Wales. Twenty nine percent of invasive cancers and 18% of non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had repeat therapeutic breast conserving surgery to clear margins. In the 3-year period 2009/10-2011/12, 18 screening units and 48 surgeons had unusually high repeat breast conserving surgery rates. Twenty screening units and 35 surgeons had unusually low repeat conservation operation rates. Regional QA reference centres and regional QA surgeons should review the data for screening units and individual surgeons with atypical practice. Repeat operation rates to clear margins were higher for non/micro-invasive cancers than for invasive cancers (18% compared to 12%). The repeat operation rate for non/micro-invasive cancers varied between screening units from 0 cases in 6 units to 47% in a unit in South Central. The repeat operation rate for invasive cancers varied between screening units from 2% in a unit in South West to 23% in a screening unit in London. In the 3-year period 2009/10-2011/12, for non/micro-invasive cancers 11 units had high and 2 had low repeat operation rates. For invasive cancers 16 units had high and 19 had low repeat operation rates. Regional QA reference centres and regional QA surgical co-ordinators should audit these high and low outliers to ascertain the reasons for this unusual clinical practice.

Six percent of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery, were eventually converted to a mastectomy. Conversion rates to mastectomy were higher for non/micro-invasive cancers than for invasive cancers (9% compared to 5%). Seventeen screening units and 27 surgeons had unusually high repeat rates and 10 screening units and 32 surgeons had unusually low rates. For non/micro-invasive cancers 5 units were high outliers and 2 low outliers, and for invasive cancers 15 units were high outliers and 11 low outliers. Regional QA reference centres and regional QA surgeons should review the data for surgeons and screening units with unusual practice. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest conversion of breast conserving surgery to mastectomy (17%). This varied from 5% in Wales to 47% in Northern Ireland. Non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had an initial mastectomy rate of 20%. This varied from 12% in West Midlands to 28% in East Midlands. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest initial mastectomy rate (28%). This varied from 12% in Northern Ireland to 46% in East Midlands. Eighteen percent of all cancers with a non-operative diagnosis had an initial therapeutic mastectomy at the first operation, and 5% had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent repeat operation. For cancers with a non-operative diagnosis, the initial therapeutic mastectomy rate was higher for non/micro-invasive cancers than for invasive cancers (20% compared to 17%), as was the proportion of non/micro-invasive cancers that had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent repeat operation (7% compared to 4%). Sixteen units had an overall mastectomy rate above 30% (4 of these were in North East, Yorkshire & Humber and 3 in West Midlands). Within this group, 4 units (I of which was small) had mastectomy conversion rates in excess of 10% and 10 units (3 of which were small) had a mastectomy rate at first operation equal to or greater than 25%. Regional QA reference centres and regional surgical QA co-ordinators should explore the reasons for the relatively high overall mastectomy rates in these 16 units.

Of the 16,472 cases which had surgery to the breast and were found to be malignant (invasive or non/micro-invasive) at surgery, 88% had complete margin data for all operations. For the first operation, 99% of cases had information on whether or not the radial margin was clear, and 91% of the cases had the margin distance recorded. Of the 12,469 cancers treated with breast conserving surgery, 98% were recorded as having clear margins at their final operation. Of the 4,002 cases treated with a mastectomy, 97% were recorded as having clear margins at their final operation. Regional QA reference centres should audit the 280 cases recorded as not having had clear margins at the final operation and the 92 cases where the final margin status was recorded as unknown to ensure that these cancers were not under-treated.

THE AXILLA

In the UK excluding Scotland, 13,051 (77%) cases had a record of an axillary ultrasound at assessment; 86% were confirmed to be invasive after surgery and 13% non-invasive. Overall, 83% of the invasive cancers and 51% of non-invasive cancers had axillary ultrasound recorded. Of the 1,898 invasive breast cancers with an abnormal axillary ultrasound result recorded, 897 were node positive at surgery giving a positive predictive value of an abnormal ultrasound of 47%. Of the 9,104 invasive cancers with a normal axillary ultrasound result recorded which had axillary assessment during surgery, 1,492 (16%) had positive nodes found after surgery. For 14 units in England (4 of which were in South central and 3 in London), fewer than 70% of invasive breast cancers had an axillary ultrasound result recorded. Regional QA reference centres should audit these 14 units to ascertain whether this is a true reflection of clinical practice or a data recording issue. Regional QA reference centres should also audit the 69 invasive cancers where a needle biopsy was performed despite a normal ultrasound result and, given the poor positive predictive value of abnormal axillary ultrasound (46%), the 177 invasive cancers where an abnormal ultrasound result was apparently not followed up with a needle biopsy.

In 29 screening units (7 of which were in North East, Yorkshire & Humber) more than 50% of invasive cancers had C2/B2 to C4/B4 recorded as the worst axillary biopsy result. In 19 screening units (5 of which were in West Midlands and 4 in South Central) more than 20% of invasive cancers had C1/B1 recorded as the worst axillary biopsy result. Of the 630 invasive cancers with a C5/B5 diagnosis with abnormal ultrasound and the 10 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 499 had no or unknown neo-adjuvant therapy recorded and had axillary surgery. Of these, 486 were node positive at surgery (giving an overall positive predictive value of a C5/B5 of 97%). Of the 107 C5/B5 invasive cancers with a normal or abnormal ultrasound result and with neo-adjuvant therapy and axillary surgery recorded, 78 (73%) had positive nodes at surgery. Of the 490 invasive cancers with a C5/B5 result and abnormal ultrasound and the 9 invasive cancers with a C5/B5 results and normal ultrasound which had no or unknown neo-adjuvant therapy recorded and had axillary surgery, 13 (3%) had false positive results, i.e. were found to be node negative at surgery. Eight of these had axillary clearance. Regional QA reference centres and regional radiology QA co-ordinators should review these 13 cases as the axilla appears to have been over-treated.

Axillary ultrasound failed to accurately identify positive nodes for 248 invasive breast cancers. Of the 2,586 invasive breast cancers without neo-adjuvant therapy recorded that were confirmed to be node positive on surgery, 20% had positive nodes diagnosed pre-operatively by means of needle biopsy. This is similar to the proportion of positive nodes found at surgery (17%) for the 12,212 invasive breast cancers without neo-adjuvant therapy in the UK that did not have an axillary biopsy before surgery. Regional QA reference centres and regional radiology QA co-ordinators should audit the 25 units with high proportions of node positive cancers with C1/B1, C2/B2 or C3/B3 results to find out the reasons for these inaccurate results.

Of the 14,449 invasive breast cancers with axillary surgery, 12,068 (84%) had a SLNB. This varied from 78% in South East Coast to 90% in Wales and London. The overall use of SLNB has increased by 7% since 2010/11. A much more variable increase is apparent in individual regions; from 13% in Scotland (71% in 2010/11) to 1% in South West (85% in 2010/11). Regional QA reference centres and regional surgical QA co-ordinators should ensure that SLNB is available in all of their screening units. Of the 12,068 invasive cases with a SLNB, 79% were recorded as having had the full dual SLNB procedure using isotope and blue dye. This varied from 32% in East of England to 98% in West Midlands. Regional QA reference centres and regional surgical QA co-ordinators should investigate why some units appear not to be using the recommended full dual SLNB technique. Two units used SLNB for fewer than 20% of women with invasive cancer who had axillary surgery; 1 of these was in Scotland and 1 in East of England. This variation could in part reflect differences between screening units in the proportion of cancers where positive nodes were confirmed by pre-operative axillary core biopsy, but this is unlikely to account for the very low use of SLNB in some units.

In 2011/12 the proportion of invasive cancers with fewer than 4 nodes examined increased again to 58.6%; this falls to 1.5% when invasive cancers with a SLNB are excluded. Of the 2,381 invasive breast cancers, which either did not have a SLNB procedure or where the type of nodal procedure was unknown, 91% had 4 or more nodes taken; 29 screening units did not achieve the 90% minimum standard. Three units (1 in South Central and 2 in Scotland) had more than 10% of cases with an unknown axillary procedure. Of the 14,438 invasive breast cancers with known nodal status, 3,091 (21%) had positive nodes. The proportion of cases with positive nodal status (16%) was lower for cases which underwent a SLNB procedure compared with cases which did not have a SLNB procedure (49%). This could be due to the selection of patients for axillary sampling or clearance, who were considered to be of high risk (e.g. high grade, palpable nodes) or who had positive nodes on non-operative ultrasound guided cytology or core biopsy. Of the 14,664 surgically treated invasive breast cancers, 226 (2%) had unknown nodal status, 202 (1%) had their negative nodal status determined on the basis of 1, 2 or 3 nodes without a SLNB procedure. Of the 331 cancers with positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure, 127 (38%) had micro-metastases and therefore further axillary surgery may not have been appropriate. Since the publication of the results of the Z11 Trial and the IBSCG study, decisions on systemic therapy are increasingly being made on the basis of the available axillary staging (which may include fewer than 4 nodes), rather than subjecting women to unnecessary axillary clearance. Under these circumstances, women may have been treated with axillary radiotherapy or have been advised not to have any further axillary intervention. Regional QA reference centres and regional surgical QA co-ordinators should, nevertheless, audit all such cancers to ensure that the axilla has been treated appropriately.

Although nodal assessment is not always indicated for non-invasive cancers, 29% of non-invasive cancers had known nodal status. 85% of non-invasive cancers treated with mastectomy had known nodal status, compared with 8% of those treated with breast conserving surgery. Of the 1,034 non-invasive cancers with known nodal status, 13 (1%) had positive nodal status recorded. Eighty three percent of non-invasive cancers treated with a mastectomy and 87% of non-invasive cancers treated with breast conserving surgery had their nodal status determined on the basis of a SLNB. The former varied widely between screening units. The maximum numbers of nodes taken for non-invasive cancers treated with breast conserving surgery or mastectomy were 13 and 18 respectively. Thirty four non-invasive cancers treated with mastectomy and 3 non-invasive cancers treated with breast conserving surgery had their nodal status determined on the basis of an axillary clearance. Regional QA reference centres should determine the reason that this invasive procedure was used on women with non-invasive disease. Thirteen non-invasive cancers had positive nodal status recorded.

144 invasive cancers with a B5b (Invasive) core biopsy, 43 invasive cancers with a B5a (Non-invasive) core biopsy and 24 invasive cancers without a non-operative diagnosis had no axillary procedure recorded. Regional QA reference centres and regional surgical QA co-ordinators should audit the invasive cancers with no surgery to the axilla recorded to ascertain whether the data for these cases are recorded correctly and, if so, why the nodal status was not determined. It is possible that under some circumstances, (e.g. a very small, grade 1 cancer, diagnosed after a B5a (Non-invasive) non-operative diagnosis) a further operation to assess nodal involvement may not be appropriate.

Axillary surgery was performed for 99% of invasive breast cancers with a B5b (Invasive) core biopsy and all invasive cancers diagnosed by C5 cytology only. Although 94% of invasive cancers with a B5a (Non-invasive) diagnosis had axillary surgery, only 340 (47%) of these cancers had their axillary surgery at the first operation; this varied from 29% in Northern Ireland to 69% in Scotland. Of the 340 cases with axillary assessment at first operation, 87% had SLNB performed, compared to 83% of those with axillary assessment at later operation. During the period 2009/10-2011/12, 9 screening units had significantly lower rates of axillary surgery at first operation for invasive cancers with a B5a (Non-invasive) diagnosis, and 6 had significantly higher rates. Regional QA reference centres and regional surgical QA co-ordinators should investigate the reasons for the unusual clinical practice in the 15 outlier units. It could, for instance, be that the high outliers were using

predictive models to identify cases which were more likely to have invasion so that the appropriate surgery could be carried out at a single operation.

Forty percent of invasive cancers with a positive nodal status had a repeat operation to the axilla. This varied from 58% in Wales to 24% in South Central, and from 5% in 1 unit in South Central to over 60% in 20 units (only 4 of which are small). Thirty seven percent of invasive cancers with positive nodal status had a repeat operation to the axilla following a SLNB and 3% after an axillary operation which did not involve a SLNB. Overall in the UK, 92% of repeat operations on the axilla were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB. This varied between 86% in Scotland and 100% in Northern Ireland. In most screening units; the majority of repeat operations were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB. Twenty one units had significantly higher rates of repeat axillary surgery for invasive cancers where the positive nodal status was determined on the basis of a SLNB. Bearing in mind the increased use of pre-operative ultrasound and needle biopsy to identify invasive cancers with positive nodes prior to surgery, regional QA reference centres and regional surgical QA co-ordinators should audit the 21 units with unusually high repeat axillary operation rates for cancers with positive nodes determined on the basis of a SLNB to determine the reason for this unusual clinical practice.

PREVIOUS CANCERS

This is the first year that that it has been possible to obtain detailed information on previous cancers diagnosed in women with screen-detected breast cancer. Interpretation of the adjuvant audit data for previous years thus needs to reflect the fact that around 10% of women are likely to have had a history of a previous malignancy. Of the 1,665 women with previous cancers, 576 (35%) had previous invasive/micro-invasive breast cancers and 101 (6%) had previous non-invasive breast cancers. The second most common previous type of invasive cancer was gynaecological cancer (1%). In situ cervical cancer was the most common type of non-invasive cancer. In 2010/11, only 43% of women who had a previous breast cancer had radiotherapy for their screen-detected breast cancer compared with 73% of those without a previous breast cancer. This is mainly because the surgical treatment of the two cohorts is very different, with 53% of women who had a previous breast cancer having a mastectomy compared to only 24% of women with no previous history of breast cancer. However, even after adjusting for operation type, women with a previous breast cancer were still less likely to receive radiotherapy; 83% of women with a previous breast cancer who had breast conserving surgery for their subsequent cancer had radiotherapy compared to 91% in women who had not had a previous breast cancer.

ADJUVANT THERAPY

16,015 cases (90% of all cases) were included in the adjuvant therapy audit. Scotland had the highest proportion of eligible cases (94%). Eighty two percent of invasive cancers, 56% of micro-invasive cancers and 46% of non-invasive cancers had radiotherapy recorded 29% of the invasive cancers and 12 patients with non/micro-invasive cancer had chemotherapy recorded. Regional QA reference centres should audit these 12 cases to ascertain if this is a data recording issue. Eighty seven percent of invasive cancers and 13% of non/micro-invasive cancers had endocrine therapy recorded. Some women with non-invasive breast cancer may have received endocrine therapy as part of a clinical trial. Overall, endocrine was the second most used adjuvant therapy for invasive breast cancers at all ages. The proportion of women with invasive breast cancer treated with breast conserving surgery who received endocrine therapy varied little with age (ranging between 86% and 92%). With the exception of those aged 52 years and under, a slightly smaller proportion of women in every age group treated with mastectomy received endocrine therapy (range 81% to 86%) compared with those who had breast conserving surgery. Ninety eight percent of women aged 50 to 65 years with invasive breast cancer treated with breast conserving surgery received radiotherapy, and there was only 4% decrease in the use of radiotherapy for women aged 71 years and over. Overall, only 36% of women treated with mastectomy had radiotherapy, and there was a gradual decrease in the use of radiotherapy with age. For women with non/micro-invasive breast cancer treated by breast conserving surgery, the use of radiotherapy peaked at 70% for women aged 53-58

years and then fell to 59% for those aged older than 70. Only 3% of women with non-invasive breast cancer treated with mastectomy had radiotherapy. Chemotherapy was the least used adjuvant therapy; being recorded for only 29% of women with invasive breast cancer. Overall, a higher proportion of women treated with mastectomy received chemotherapy (47% compared with 23%) and this difference was evident in every age group. There was also a clear decrease in the use of chemotherapy with age in both treatment groups. Surgery, radiotherapy and endocrine therapy was the most common treatment pattern for invasive breast cancers treated with breast conserving surgery, with 70% receiving this treatment combination. 51% of non/micro-invasive breast cancers treated with breast conserving surgery had surgery with radiotherapy. Surgery and endocrine therapy was the most common treatment pattern for invasive breast cancers treated with mastectomy, with 43% receiving this treatment combination. Eighty nine percent of non/micro-invasive breast cancers treated with mastectomy had surgery only.

Overall, 57% of women received radiotherapy within 60 days of their final surgery and 92% within 90 days. Thirty two women had not received radiotherapy 200 days after their final surgery. Only 46% of women with invasive breast cancer and 37% of women with non/micro-invasive breast cancer had started their radiotherapy within 90 days of their first assessment visit and 153 women (3%) with invasive breast cancer had not started radiotherapy after 200 days. In the *Cancer Reform Strategy* published in December 2007, a radiotherapy waiting times standard was introduced which specifies that the time between the date when a person is determined to be 'fit to treat' after surgery and the start of radiotherapy should be no more than 31 days. If this standard is to be achieved, considerable reductions in the time between final surgery and radiotherapy will be required in many screening services. Regional QA reference centres should review the screening units where less than 50% of invasive breast cancers which were not treated with chemotherapy started their radiotherapy within 52 days of the final surgery.

Ninety seven percent of women with invasive cancer treated with breast conserving surgery had radiotherapy recorded, compared to only 36% of women with invasive cancers treated with mastectomy. Sixty five percent of women with non/micro-invasive cancer treated with breast conserving surgery had radiotherapy recorded, compared to only 3% of women with non/micro-invasive cancers treated with mastectomy. Four percent of the conservatively treated invasive cancers which did not receive radiotherapy were larger than 20mm in diameter, 19% were Grade 3 and 20% were node positive. In the 3-year period 2008/09-2010/11, 12 screening units had significantly lower rates of radiotherapy for invasive cancers treated with breast conserving surgery. Three of these units were in South Central and 3 in London. The unit with the highest proportion of cases without radiotherapy was in South Central (21%). Given the benefits demonstrated in clinical trials from the provision of radiotherapy to patients with invasive breast cancer treated with breast conserving surgery, regional QA reference centres should audit all invasive breast cancers treated with breast conserving surgery which did not have radiotherapy recorded to ascertain if this is a true reflection of clinical practice or a data recording issue. One hundred and forty eight non-invasive cancers without radiotherapy recorded were high cytonuclear grade and 12 were more than 40mm in diameter. In the 3-year period 2008/09-2010/11, 14 units lie above the upper control limit and had significantly lower rates of radiotherapy for the high grade non-invasive cancers. Four of these units were in South Central and 4 in South West. The unit with the highest proportion of cases without radiotherapy was in South Central (79%). Regional QA reference centres should ascertain each screening unit's policy regarding the provision of radiotherapy to non/micro-invasive breast cancers treated with breast conserving surgery since there is evidence from clinical trials that this can reduce recurrence rates.

29% of women with node positive invasive cancer did not have chemotherapy recorded. East of England and South East Coast have consistently had higher proportions of node positive invasive cancers without chemotherapy recorded throughout the 3-year period 2008/09-2010/11. In 2010/11, 11 screening units had significantly higher numbers of node positive invasive breast cancers not treated with chemotherapy. Of these, 3 were in South Central and 2 in West Midlands. Twenty three percent of women aged less than 65 years with a node positive invasive cancer had no chemotherapy recorded, compared to 44% of the women aged 65 years and above. Of the 830 node positive invasive cancers with no chemotherapy recorded, 19 (2%) were ER negative, 99 (12%) were Grade 3 and 27 (3%) were HER-2 positive. Decisions regarding the provision of

chemotherapy to node positive invasive breast cancers should take into account the number of positive nodes, tumour size, grade, ER status and HER-2 status and comorbidity in order to make a judgement on the relative risks and benefits to an individual patient and it may be that all of the patients without chemotherapy recorded were treated appropriately. However, given the relatively small numbers of cancers involved, all regional QA reference centres and regional surgical QA co-ordinators should audit ER negative, Grade 3 and/or HER-2 positive, node positive invasive cancers with no chemotherapy recorded to determine whether the absence of chemotherapy data is a true reflection of clinical practice or a data recording issue.

The decision to give endocrine therapy did appear to depend to a large extent on ER and PgR status. However, 554 (5%) ER positive invasive cancers and 16 (32%) ER negative PgR positive invasive cancers did not have endocrine therapy recorded. The proportion of ER positive invasive cancers that did not have endocrine therapy recorded varied from 1% in Northern Ireland to 10% in East Midlands and 15% in East of England. Over the 3-year period 2008/09-2010/11, 15 units had significantly lower numbers of ER positive invasive EPG breast cancers treated with endocrine therapy. Fifteen percent of the ER positive invasive cancers not treated with endocrine therapy were Grade 3 and 14% were node positive. In East of England, 21% of cancers that did not receive endocrine therapy were Grade 3 and 23% were node positive. Regional QA reference centres and regional surgical QA co-ordinators should review the treatment of women with Grade 3 or node positive ER positive invasive cancers who did not have endocrine therapy recorded to determine whether the absence of endocrine therapy data is a true reflection of clinical practice or a data recording issue. Regional QA reference centres and regional surgical QA co-ordinators should determine the reasons why endocrine therapy was not given to ER negative invasive cancers which were PgR positive, and why endocrine therapy does appear to have been given to ER/PgR negative invasive cancers. In the UK as a whole in 2010/11, 13% of non/micro-invasive cancers had endocrine therapy and 27% of ER positive non/micro-invasive cancers had endocrine therapy. The latter varied widely between regions from 8% in West Midlands and 9% in Scotland to 44% in London, 45% in North West and 46% in South Central. Regional QA reference centres should determine the reason for this wide variation between regions.

SURVIVAL

Of the 15.567 cancers submitted to the survival analysis for the period 1 April 2006 to 31 March 2007, 67 were excluded because they were not registered at the cancer registries. A further 374 cancers were excluded because they were not confirmed to be primary tumours and 21 because their invasive status was not known. The 5-year relative survival for women with screen-detected invasive breast cancer who were screened in 2006/07 is 98.0%. Five-year relative survival has improved significantly from 93.7% in 1990/91. The unit level 5-year relative survival for women screened in 2005/06 and 2006/07 varies from 90.5% in a unit in East of England to 102.5% in a unit in South Central. For 8 units, 5-year relative survival rates are statistically significantly lower than the national average of 98.0%. The 5-year relative survival of women with a less than 15mm diameter invasive breast cancer is 100.4% compared with a 5-year relative survival rate of 87.9% for women with tumours with a diameter greater than 50mm. The 5-year survival rate for women with a Grade 1 invasive breast cancer is 100.9%, compared to 92.2% for those with a Grade 3 invasive breast cancer. Women with positive nodal status have a 5-year survival rate of 92.9%, compared to 100.0% for those with negative nodal status. The 5-year relative survival rates for women with invasive breast cancers in the Excellent Prognostic Group (EPG), Good Prognostic Group (GPG) are 101.3% and 100.9% respectively. At 98.8%, the 5-year relative survival rate for the 11% of women with cancers in the Moderate Prognostic Group 1 (MPG1) is significantly worse than that of women with cancers in the EPG and GPG groups. The 5-year relative survival rates for the women with cancers in Moderate Prognostic Group 2 (MPG2) and the Poor Prognostic Group (PPG) are even lower at 93.8% and 81.3% respectively.

TOPICS TO BE AUDITED BY REGIONAL QA REFERENCE CENTRES

Topic	*Region/unit (number of cases affected)*	*Reference*
<15mm invasive detection rate below 3.0 per 1000 women screened over 3 years	9 screening units	Ch1 P22
Low non-operative diagnosis rate for non-invasive cancers (excluding LCIS) – 3 year rolling data	28 screening units	Ch2 P27
B5a cancers which become invasive after surgery - outliers in 3-year rolling data	5 screening units	Ch2 P.28
Over 20% of cases did not have the first core/cytology biopsy at first assessment visit	8 screening units	Ch2 P.30
Additional core biopsy or cytology sample taken from the same lesion at further assessment visits	All regions	Ch2 P.31
Investigate in reasons to have further visit after biopsy	All regions	Ch2 P.32
Benign open biopsy rate exceeds the minimum standard (<15 per 10,000 women screened) for prevalent (first) screens	53 screening units	Ch2 P.33
Benign open biopsy rate exceeds the minimum standard (<10 per 10,000 women screened) for incident (subsequent) screens	3 screening units	Ch2 P.33
False positive cytology and core biopsy cases	2 cases	Ch2 P.34
Mastectomy as diagnostic open biopsy	13 cases	Ch2 P.34
No non-operative diagnosis attempted	31 cases	Ch2 P.35
Unknown size/grade for non-invasive cancers	144 cases	Ch3 P.37
High/low proportion of high cytonuclear grade non invasive cancers - outliers in 3-year rolling data control chart	30 screening units	Ch3 P.39
Unknown invasive whole tumour size information	209 cases	Ch3 P.39
Interpretation of invasive grade definition - outliers every year over the most recent 3-year period	7 screening units	Ch3 P.42
Significant variance in proportion of cancers in NPI groups - outliers every year over the most recent 3 year period	2 screening units	Ch3 P.45
High proportion of cases with unknown NPI group	7 screening units	Ch3 P.45
Availability of ER status for all invasive cancers	66 cases	Ch3 P.45
Availability of HER-2 data for all invasive cancers	285 cases	Ch3 P.46
Large non-invasive cancers with breast conserving surgery	106 cases	Ch4 P.49
Non-invasive cancers with unknown size and high/unknown grade treated with breast conserving surgery	14 cases	Ch4 P.49
No/unknown surgery for invasive cancers without/with unknown neo-adjuvant therapy	136 cases	Ch4 P.50
Mastectomy rate for small invasive cancers - outliers in 3-year rolling data	16 screening units	Ch4 P.52
Low proportion of mastectomy cases having immediate reconstruction - outliers in 3-year rolling data	23 screening units	Ch4 P.55
Small, Grade 1 with no abnormal lymph nodes invasive cancers with neo-adjuvant chemotherapy	5 cases	Ch4 P.57
Satisfactory treatment for low screening caseload surgeons - in 3-year rolling data	All regions (288 surgeons)	Ch5 P.61
High/low repeat operation rates by unit - outliers in 3-year rolling data	47 units	Ch6 P.63

Topic	*Region/unit (number of cases affected)*	*Reference*
No repeat operation for cancers with not clear/unknown margin status at initial diagnostic BCS - LCIS cases excluded	30 cases	Ch6 P.63
More than 3 therapeutic operations	27 cases	Ch6 P.63
High/low repeat operation rates by unit after initial therapeutic BCS - outliers in 3-year rolling data	42 units	Ch6 P.64
High/low repeat operation rates by surgeon after initial therapeutic BCS - outliers in 3-year rolling data	92 surgeons	Ch6 P.65
Initial therapeutic mastectomy carried out on C5 only invasive cancers	3 cases	Ch6 P.78
Overall mastectomy rate above 30%	16 units	Ch6 P.80
Final margins status not clear or unknown	372 cases	Ch6 P.82
Low proportion of invasive cancers with axillary ultrasound (less than 70%)	14 screening units	Ch7 P.84
Cases with normal ultrasound result but an axillary biopsy was taken	69 cases	Ch7 P.84
Invasive cancers with an abnormal ultrasound result and no axillary biopsy	177 cases	Ch7 P.84
Cases with abnormal/normal ultrasound result and C5/B5 axillary biopsy result but had no positive nodes found at surgery – excluded cases with neo-adjuvant therapy	13 cases	Ch7 P.85
High proportion of node positive patients with C1/B1, C2/B2 and C3/B3 recorded as the worst axillary biopsy result	25 screening units	Ch7 P.86
Low proportion of invasive cases with a SLNB (less than 50%)	5 screening units	Ch7 P.88
Units not using full dual SLNB technique	All regions	Ch7 P.88
Invasive cancers without a SLNB or with an unknown nodal procedure should have at least 4 nodes obtained - Units did not meet 90% standard	29 screening units	Ch7 P.90
Positive nodal status determined by less than 4 nodes and no sentinel lymph node biopsy procedure	13 cases	Ch7 P.91
>10 nodes taken for non-invasive cancers	11 cases	Ch7 P.95
Invasive cancers with no surgery to the axilla	225 cases	Ch7 P96
B5a to invasive cancers with axillary surgery at first operation - outliers in 3-year rolling data	15 screening units	Ch7 P98
High repeat operation rates for cancers with positive nodes determined on the basis of a SLNB - outliers in 3-year rolling data	21 screening units	Ch7 P101
Non/micro-invasive cancers with chemotherapy recorded	12 cases	Ch8 P104
Cancers with no surgery and with radiotherapy recorded	26 cases	Ch8 P104
Invasive cancers with no surgery and with chemotherapy recorded	35 cases	Ch8 P104
Low proportion (less than 50%) of invasive cases without chemotherapy receiving radiotherapy within 52 days of final surgery	All regions	Ch8 P109
High proportion of invasive with BCS and no radiotherapy - outliers in 3-year rolling data	12 screening units	Ch8 P112
Ascertain each unit's policy regarding the provision of radiotherapy to non-invasive cancers treated with BCS	All screening units	Ch8 P114
No chemotherapy for node positive invasive cancers with ER negative, Grade 3 and/or HER2 positive	123 cases	Ch8 P116
No endocrine therapy for ER positive invasive cancers, with Grade 3 and/or positive nodes	131 cases	Ch8 P118
Endocrine therapy given to cancers with ER/PgR negative/unknown status	100 cases	Ch8 P119

CHAPTER 1
BREAST CANCERS DETECTED BY THE UK NHSBSP

1.1 Number and Invasive Status of Screen-Detected Breast Cancers and Total Women Screened

The 2011/12 UK NHSBSP & ABS audit examines surgical activity undertaken for the 2,261,942 women screened in England, Wales, Northern Ireland and Scotland between 1 April 2011 and 31 March 2012. Ninety three screening units in the UK were included in the audit. The number of women screened varied from 6,246 in a screening unit in South Central (where 58 cancers were detected) to 62,556 in a screening unit in Scotland (where 624 cancers were detected).

In 2011/12, 18,745 cancers were detected in women of all ages, 14,911 (80%) were invasive, 3,672 (20%) were non-invasive and 138 (1%) were micro-invasive. The invasive status of 24 cancers was unknown. Figure 1 shows the numbers of invasive and non/micro-invasive cancers and cancers with unknown invasive status detected in each English region and in Wales, Northern Ireland, Scotland and the Isle of Man. Due to the small numbers (21 cancers in total), data for the Isle of Man have only been included in Chapter 1.

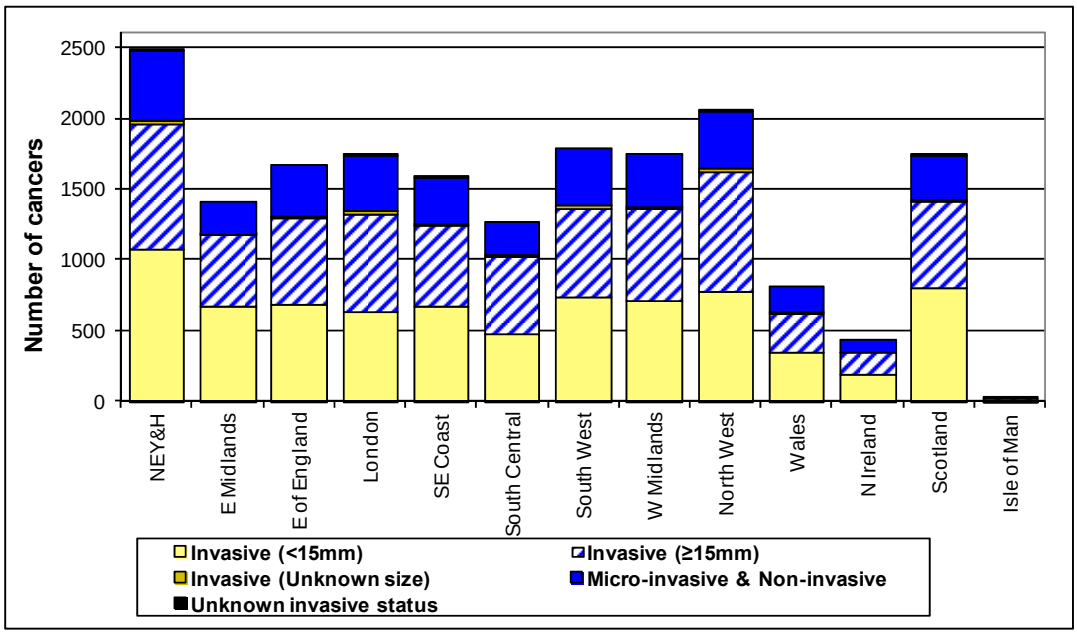

Figure 1 (Table 1): Variation in the number and invasive status of screen-detected breast cancers in each region and country contributing to the 2011/12 NHSBSP & ABS audit

The following 16 year summary table shows that total and invasive cancer detection rates increased gradually from 1996/97 to 2001/02, and then rose steeply between 2001/02 and 2003/04. The latter probably reflects the impact of the introduction of two views at incident screen. Between 2003/04 and 2010/11, the total and invasive cancer detection rates changed very little, levelling off at around 8.1 per 1,000 women screened and 6.4 per 1,000 women screened respectively.

In 2011/12, the number of women screened rose by 2% compared with 2010/11, and the number of cancers found increased by 5%. This change probably reflects the introduction of the randomised controlled trial age extension of the NHSBSP in England. By 31 March 2012, 55 screening units in England had started to randomise women aged 47-49 and 71-73 years for invitation to screening in addition to the core 50-70 year age range. The cancer detection rate in 2011/12 for all cancers was 8.3 per 1,000 women screened. This varied from 7.4 per 1,000 women screened in Northern Ireland to 9.8 per 1,000 women screened in Wales and Scotland.

16 YEAR COMPARISON: NUMBER OF CANCERS DETECTED									
Year of data collection	Number of invasive cancers	Number of <15mm cancers	Number of non/ micro-invasive cancers	Total cancers	Number of women screened	Cancer detection rates per 1,000 women screened			
						Invasive	Invasive (<15mm)	Non/Micro -invasive	Total
1996/97	5,860	-	1,468	7,410	1,340,175	4.4	-	1.1	5.5
1997/98	6,427	-	1,726	8,215	1,419,287	4.5	-	1.2	5.8
1998/99*	6,337	-	1,634	8,028	1,308,751	4.7	-	1.2	6.1
1999/00	7,675	-	2,076	9,797	1,550,285	5.0	-	1.3	6.3
2000/01	7,945	4,190	2,080	10,079	1,535,019	5.2	2.7	1.4	6.6
2001/02	7,911	4,244	2,218	10,191	1,507,987	5.2	2.8	1.5	6.8
2002/03	8,931	4,971	2,416	11,593	1,579,165	5.7	3.1	1.5	7.3
2003/04	10,400	5,488	2,868	13,290	1,685,661	6.2	3.3	1.7	7.9
2004/05	11,063	5,869	2,953	14,040	1,748,997	6.3	3.4	1.7	8.0
2005/06	12,600	6,673	3,317	15,944	1,942,449	6.5	3.4	1.7	8.2
2006/07	12,491	6,577	3,337	15,856	1,955,825	6.4	3.4	1.7	8.1
2007/08	13,305	7,005	3,466	16,792	2,042,497	6.5	3.4	1.7	8.2
2008/09	13,532	7,028	3,491	17,045	2,116,588	6.4	3.3	1.6	8.1
2009/10	13,672	7,169	3,333	17,013	2,133,189	6.4	3.4	1.6	8.0
2010/11	14,219	7,314	3,612	17,838	2,221,938	6.4	3.3	1.6	8.0
2011/12	14,911	7,764	3,810	18,745	2,261,942	6.6	3.4	1.7	8.3

* Data from Scotland are absent in 1998/99. Isle of Man figures are not included in this table.

Invasive cancer detection rates varied between 5.9 per 1,000 women screened in Northern Ireland and 7.9 per 1,000 women screened in Scotland. The UK cancer detection rate for non/micro-invasive cancers was 1.7 per 1,000 women screened. This varied from 1.3 per 1,000 women screened in East Midlands to 2.2 per 1,000 women screened in Wales.

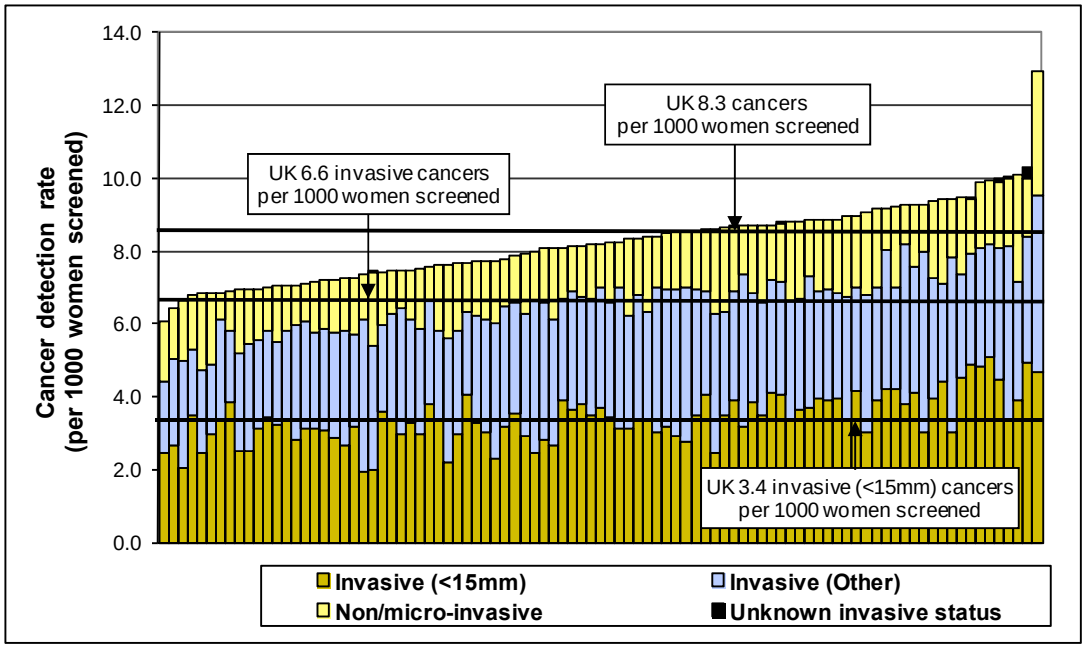

Figure 2: Variation with screening unit in cancer detection rates expressed as the number of cancers detected per 1,000 women screened

Figure 2 shows how the cancer detection rates in each screening unit varied according to invasive status. The overall cancer detection rate varied from 6.1 per 1,000 women screened in a unit screening 16,569 women to 13.0 per 1,000 women screened in a unit screening 16,440 women annually. In two screening units, the cancer detection rate for all cancers was below 6.5 per 1,000 women screened.

For small invasive cancers (<15mm in diameter), the UK cancer detection rate was 3.4 per 1,000 women screened; varying between 1.9 per 1,000 women screened in a screening unit in North West and 5.1 per 1,000 women screened in a screening unit in East of England. Nine screening units (3 in North West, 2 in London, 1 in South Central, 1 in West Midlands, 1 in South West and 1 in North East, Yorkshire & Humber) have had cancer detection rates for small (<15mm in diameter) cancers below 3.0 per 1,000 women screened every year throughout the 3-year period 2009/10-2011/12. Of these 9 units 4 (2 in North West, 1 in North East, Yorkshire & Humber and 1 in South West) are small units each of which screened fewer than 13,000 women in 2011/12. Regional QA reference centres should carry out audits with these nine screening units to ascertain the reasons for these consistently low results.

1.2 Age Profile of Women with Screen-Detected Breast Cancer

By 31 March 2012, 59% of screening units in England had started the randomised controlled trial age extension of the NHSBP. The table below shows an increase in the proportion of women in the age groups 47 to 49 and 71 to 73 years in 2011/12 compared with previous years.

AGE DISTRIBUTION OF SCREEN-DETECTED BREAST CANCERS (%)

Age	*2009/10*	*2010/11*	*2011/12*
<47	0.1	0.1	0.3
47-49	2.0	2.8	4.3
50-64	65.0	63.3	60.5
65-70	26.2	26.4	26.8
71-73	2.9	3.4	4.1
74+	3.8	3.9	4.0
Total	***100***	***100***	***100***

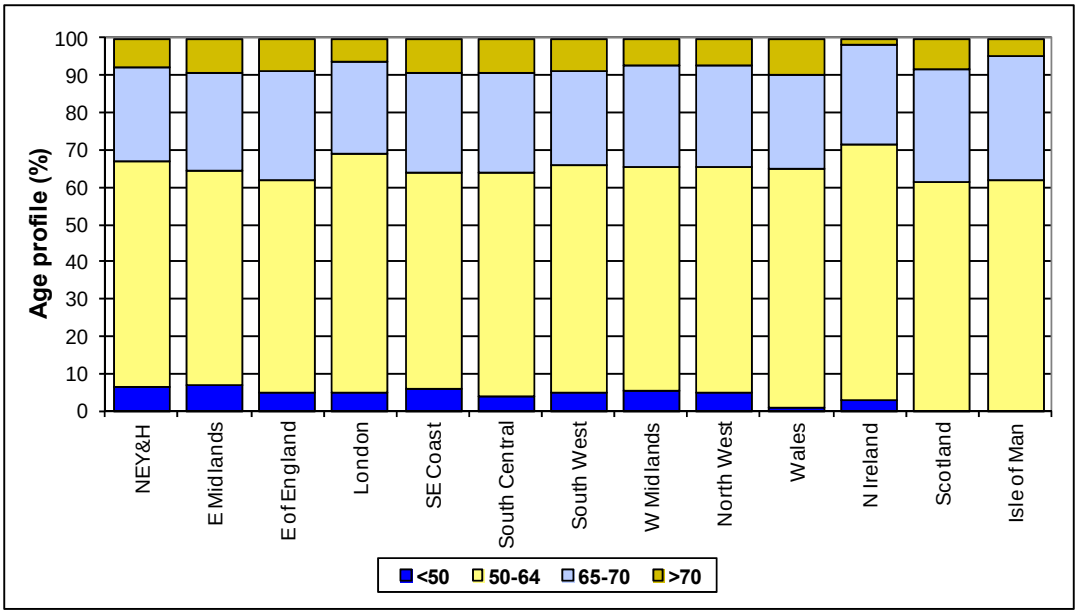

Figure 3 (Table 2): Age at first offered screening appointment

Figure 3 shows how the age at first offered screening appointment varied with UK region and country in 2011/12. In England, the proportion of cancers detected in women aged over 70 varied from 9% in East Midlands, East of England, South East Coast, South Central and South West to 6% in London and 7% in West Midlands. Wales, Northern Ireland and Scotland currently have no plans to implement the randomised controlled trial age extension. Figure 3 and Table 2 clearly demonstrate the relatively small

proportion (2%) of cancers in Northern Ireland detected in women aged over 70. However, in Scotland and Wales in 2011/12, 8% and 10% of cancers respectively were detected in these older women, which is in line with the UK average of 8%. In Wales, more than 50% of the women screened over the age of 70 were regular attendees of the screening programme prior to becoming ineligible for automatic invitation, and this may have had a bearing on their desire to self refer post 70 years of age.

KEY FINDINGS

- Between 1 April 2011 and 31 March 2012, 2,261,942 women were screened by the UK NHSBSP in England, Wales, Northern Ireland and Scotland.
- Of the 18,745 cancers detected in women of all ages; 80% were invasive, 20% non-invasive and 1% micro-invasive. The invasive status of 24 cancers was unknown.
- In the UK as a whole in 2011/12, the cancer detection rates for all cancers and for small invasive cancers (<15mm in diameter) were 8.3 per 1,000 women screened and 3.4 per 1,000 women screened respectively.
- Nine screening units have had cancer detection rates for small (<15mm in diameter) cancers below 3.0 per 1,000 women screened throughout the 3-year period 2009/10-2011/12. Four of these were small units which screened fewer than 13,000 women in 2011/12. Regional QA reference centres should carry out audits with these screening units to ascertain the reasons for these consistently low results.
- When they were first invited to attend the screening appointment leading to their diagnosis, 61% of women with a screen-detected breast cancer were aged between 50 and 64 years.
- Twenty seven percent of screen-detected breast cancers were diagnosed in women aged 65-70 years; 8% of cancers were detected in women aged 70 years or more.
- Although in Scotland and Wales there are currently no plans to implement the randomised controlled trial age extension, in 2011/12 in these countries, 8% and 10% of cancers respectively were detected

CHAPTER 2
DIAGNOSIS

2.1 Non-operative Diagnosis

The following are mutually exclusive diagnostic categories into which all screen-detected breast cancers fall:

DIAGNOSTIC CATEGORIES		
Non-operative diagnosis by C5 cytology or malignant core biopsy (B5)	Malignant open biopsy	Clinical and/or radiological grounds only, referred direct to non-surgical treatment

The UK NHSBSP definition of a non-operative diagnosis is a diagnosis by C5 cytology or B5 core biopsy. Other than cancers diagnosed by diagnostic open biopsy, the only remaining diagnostic category is that of diagnosis on radiological and/or clinical grounds alone. Such cancers are rare in the UK NHSBSP; there being only four in 2011/12. These cancers are only included in Table 3.

In 2011/12, 18,001 (96%) of the cancers detected in the UK NHSBSP were diagnosed non-operatively; 744 cancers did not have a non-operative diagnosis (Table 4). The following summary table shows that over the last 16 years the non-operative diagnosis rate for the UK as a whole has risen from 63% to 96%. This rise has been accompanied by an increase from 17% to 92% in the proportion of cancers diagnosed by B5 core biopsy alone.

16 YEAR COMPARISON: NON-OPERATIVE DIAGNOSIS RATES

Year of data collection	*Total cancers*	*Number of cancers with C5 and/or B5*	*% with non-operative diagnosis by*				*Non-operative diagnosis rate (%)*
			C5 only	*C5 and B5*	*C5 (+/- B5)*	*B5 only (no C5)*	
1996/97	*7,310*	*4,576*	*-*	*-*	*45*	*17*	*63*
1997/98	*8,215*	*5,866*	*-*	*-*	*42*	*29*	*71*
*1998/99**	*8,002*	*6,449*	*-*	*-*	*36*	*44*	*81*
*1999/00**	*8,906*	*7,590*	*-*	*-*	*31*	*54*	*85*
2000/01	*10,079*	*8,775*	*19*	*8*	*-*	*60*	*87*
2001/02	*10,191*	*9,043*	*13*	*9*	*-*	*66*	*89*
2002/03	*11,593*	*10,575*	*10*	*8*	*-*	*73*	*91*
2003/04	*13,290*	*12,338*	*8*	*7*	*-*	*77*	*93*
*2004/05**	*13,783*	*12,856*	*7*	*6*	*-*	*80*	*93*
2005/06	*15,944*	*15,000*	*5*	*6*	*-*	*83*	*94*
2006/07	*15,856*	*14,968*	*4*	*6*	*-*	*84*	*94*
2007/08	*16,792*	*15,977*	*4*	*5*	*-*	*86*	*95*
2008/09	*17,045*	*16,243*	*3*	*5*	*-*	*87*	*95*
2009/10	*17,013*	*16,270*	*1*	*6*	*-*	*88*	*96*
2010/11	*17,838*	*17,128*	*<1%*	*5*	*-*	*91*	*96*
2011/12	*18,745*	*18,001*	*<1%*	*4*	*-*	*92*	*96*

*Data from Scotland are absent in 1998/99 and 1999/00. 275 cancers from East of England are absent in 2004/05

Figure 4 shows how the non-operative diagnosis rate and the proportion of cancers diagnosed by C5 cytology only, B5 core biopsy alone, and by both C5 cytology and B5 core biopsy varied between

regions. In the UK as a whole, 27 cases had a C5 cytology only diagnosis. In Northern Ireland, 56% of cancers were diagnosed non-operatively by both C5 cytology and B5 core biopsy (243 cancers). Relatively high numbers of cancers were also diagnosed by both C5 cytology and B5 core biopsy in North East, Yorkshire & Humber (177 cancers) and in Scotland (165 cancers).

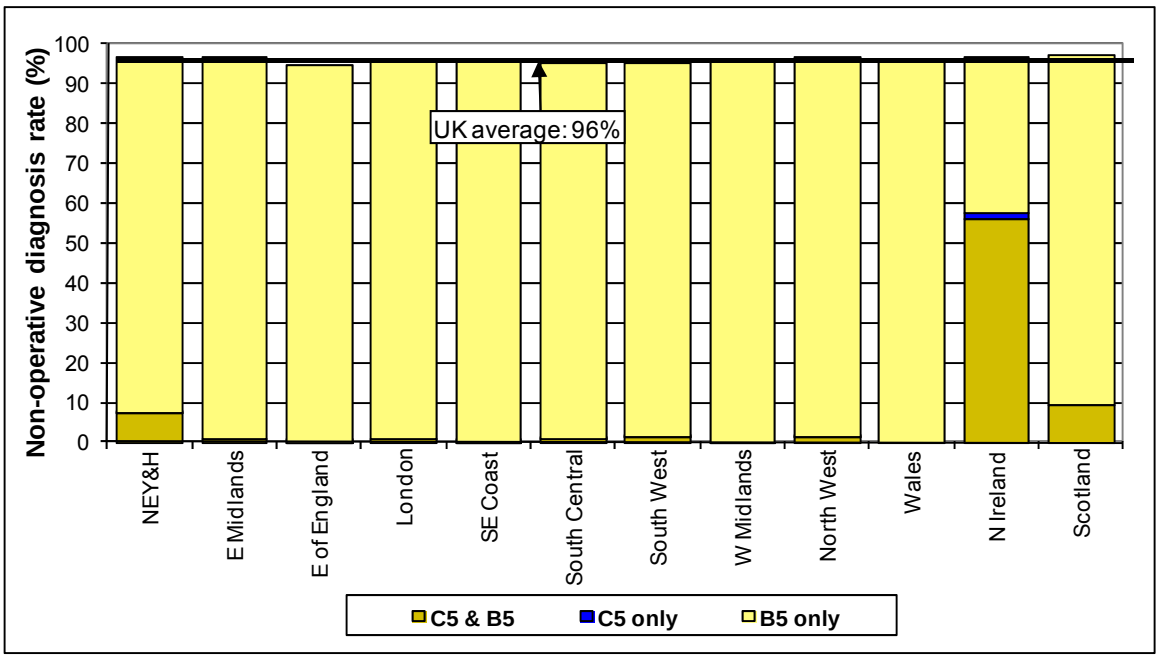

Figure 4 (Table 4): Variation in non-operative diagnosis rate and the proportion of cancers detected by cytology alone, core biopsy alone or cytology and core biopsy as a percentage of cancers detected

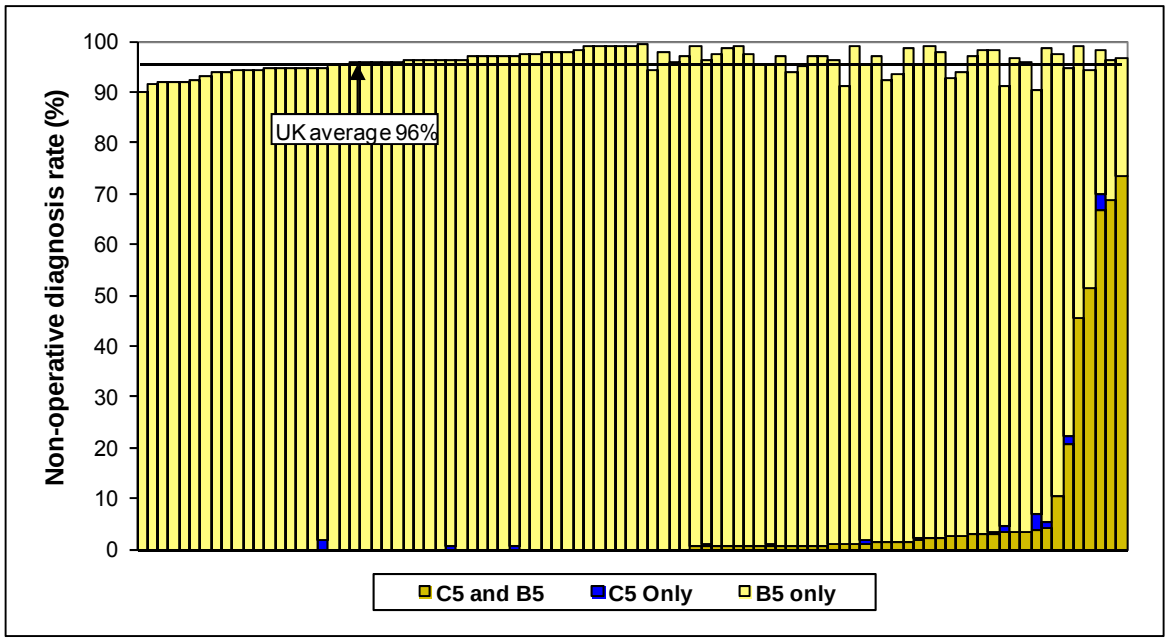

Figure 5: Variation between screening units in non-operative diagnosis rate and in the proportion of cancers detected by cytology alone, core biopsy alone or cytology and core biopsy as a percentage of cancers detected

Figure 5 shows how the non-operative diagnosis rate and the proportion of cancers diagnosed by C5 cytology only, B5 core biopsy alone, and by both C5 cytology and B5 core biopsy varied between screening units in 2011/12. Five units (3 in Northern Ireland, 1 in North East, Yorkshire & Humber and 1 in Scotland) had a diagnosis rate for both C5 cytology and B5 core biopsy of over 40% and in 1 unit in North East Yorkshire & Humber this rate was above 20%. These 6 units have had the highest C5 cytology and B5 core biopsy rates in the last three audit years. In the units in Northern Ireland and North East, Yorkshire & Humber, the majority of women had their cytology and core biopsy samples taken at a single assessment visit. Scotland did not provide information on the procedures undertaken at individual assessment visits.

KEY FINDINGS

- In 2011/12, 96% of cancers detected in the UK NHSBSP were diagnosed non-operatively; 744 cancers did not have a non-operative diagnosis.
- In the UK as a whole, only 27 cases had C5 cytology only diagnosis.
- In Northern Ireland, 56% of cancers were diagnosed non-operatively by both C5 cytology and B5 core biopsy. Relatively high numbers of cancers were also diagnosed by both C5 cytology and B5 core biopsy in North East, Yorkshire & Humber and in Scotland.
- Five units (3 in Northern Ireland, 1 in North East, Yorkshire & Humber and 1 in Scotland) had a diagnosis rate for both C5 cytology and B5 core biopsy of over 40% and in 1 unit in North East Yorkshire & Humber this rate was above 20%. These 6 units have had the highest C5 cytology and B5 core biopsy rates in the last three audit years.
- In the units in Northern Ireland and North East, Yorkshire & Humber the majority of women had their cytology and core biopsy samples taken at a single assessment visit. Scotland did not provide information on the procedures undertaken at individual assessment visits.

2.1.1 Non-operative Diagnosis Rate for Invasive Cancers

Quality Objective	**To minimise unnecessary surgery (i.e. diagnostic open surgical biopsies that prove to be malignant)**
Minimum Standard	**90% of all invasive cancers should have a non-operative pathological diagnosis**
Target Standard	**95% of all invasive cancers should have a non-operative pathological diagnosis**

(Quality Assurance Guidelines for Surgeons in Breast Cancer Screening, NHSBSP Publication No 20, 4th Edition, March 2009)

In the UK as a whole, the non-operative diagnosis rate for invasive cancers was 99% and only 210 invasive cancers did not have a non-operative diagnosis (Table 5). All screening units met the 90% minimum standard. Only 2 units in South West and in North East, Yorkshire and Humber (at 94.3% and 94.9% respectively) just failed to meet the 95% target. In 17 units all the invasive cancers had a non-operative diagnosis.

2.1.2 Non-operative Diagnosis Rate for Non-invasive Cancers

Quality Objective	**To minimise unnecessary surgery (i.e. diagnostic open surgical biopsies that prove to be malignant)**
Minimum Standard	**85% of all non-invasive cancers should have a non-operative pathological diagnosis**
Target Standard	**90% of all non-invasive cancers should have a non-operative pathological diagnosis**

(Quality Assurance Guidelines for Surgeons in Breast Cancer Screening, NHSBSP Publication No 20, 4th Edition, March 2009)

In 2011/12, the UK's non-operative diagnosis rate for non-invasive cancers was 86%; 527 non-invasive cancers did not have a non-operative diagnosis (Table 6). The proportion of non-invasive cancers without a non-operative diagnosis varied from 10% in Northern Ireland to 22% in East of England. The following summary table shows how the non-operative diagnosis rate for non-invasive cancers has changed in each region over the last three audit periods. Since 2009/10, non-operative diagnosis rates in South Central, Scotland and Northern Ireland have increased from 77% to 84%, from 82% to 88% and from 84% to 90% respectively. The increase in Northern Ireland has been accompanied by an increase in the use of core biopsy from 91% to 99%.

3 YEAR SUMMARY: NON-OPERATIVE DIAGNOSIS RATES FOR NON-INVASIVE CANCERS				
Region	**2009/10**	**2010/11**	**2011/12**	**3 Years 2009/12**
N East, Yorks & Humber	*87*	*88*	*89*	*88*
East Midlands	*87*	*85*	*87*	*86*
East of England	*82*	*83*	*78*	*81*
London	*83*	*88*	*86*	*86*
South East Coast	*83*	*79*	*84*	*82*
South Central	*77*	*78*	*84*	*80*
South West	*82*	*86*	*84*	*84*
West Midlands	*87*	*87*	*85*	*86*
North West	*86*	*87*	*88*	*87*
Wales	*86*	*82*	*88*	*85*
Northern Ireland	*84*	*82*	*90*	*85*
Scotland	*82*	*90*	*88*	*87*
United Kingdom	***84***	***85***	***86***	***85***

Figure 6 shows the variation between screening units in the proportion of non-invasive cancers with a non-operative diagnosis. Only 32 screening units achieved the 90% non-operative diagnosis target for non-invasive cancers. Forty three units failed to meet the 85% minimum standard. This has decreased slightly from 45 units in 2010/11.

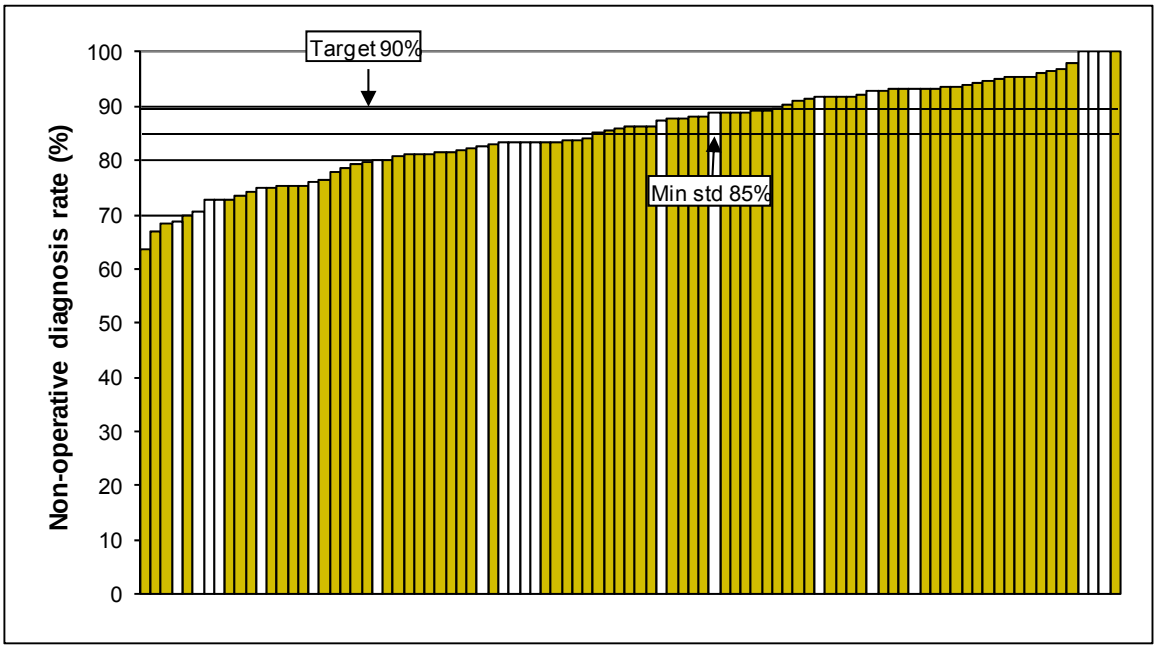

Figure 6: Variation between screening units in the proportion of non-invasive cancers with a non-operative diagnosis (The 20 smallest units are highlighted in white)

If cases of LCIS were excluded, the non-operative diagnosis rate for 17 of the 43 screening units which did not meet the 85% minimum standard for all non-invasive cancers was above 85%. In the 3-year period 2009/10-2011/12, 28 units had an average non-operative diagnosis rate for non-invasive cancers excluding LCIS of less than 85%. In South Central, 5 of the 9 screening units did not meet the 85% standard. Regional QA reference centres should investigate why screening units in their regions have failed to meet the 85% minimum standard for the non-operative diagnosis of non-invasive cancers excluding LCIS over this 3-year period.

KEY FINDINGS

- The UK non-operative diagnosis rate for invasive cancers was 99%; only 210 invasive cancers did not have a non-operative diagnosis. All screening units met the 90% minimum standard. Only 2 units in South West and North East Yorkshire and Humber (at 94.3% and 94.9% respectively) just failed to meet the 95% target.
- The non-operative diagnosis rate for non-invasive cancers was 86%; 527 non-invasive cancers did not have a non-operative diagnosis. The proportion of non-invasive cancers without a non-operative diagnosis varied from 10% in Northern Ireland to 22% in East of England.
- In 2011/12, 43 screening units failed to meet the 85% minimum standard for the non-operative diagnosis of non-invasive cancers. If cases of LCIS were excluded, the non-operative diagnosis rate for 17 of these units was above 85%.
- In the 3-year period 2009/10-2011/12, 28 units had an average non-operative diagnosis rate for non-invasive cancers excluding LCIS of less than 85%. In South Central, 5 of the 9 screening units did not meet the 85% standard. Regional QA reference centres should investigate why screening units in their regions have failed to meet the 85% minimum standard for the non-operative diagnosis of non-invasive cancers excluding LCIS over this 3-year period.

2.1.3 Invasive Status at Core Biopsy

Screening units were asked to supply the invasive status predicted at core biopsy for those cancers with a B5 diagnosis. Of the 17,974 cancers with a B5 diagnosis, 3,935 (22%) were B5a (Non-invasive) and 13,919 (77%) were B5b (Invasive) at core biopsy. The proportion of cancers with a B5a (Non-invasive) diagnosis varied from 18% in East Midlands to 25% in London. One hundred and twenty cancers (1%) had invasive status B5c (Not Assessable or Unknown) at core biopsy (Table 7), of these, 33 were in North East, Yorkshire & Humber and 22 were in West Midlands. Some units code micropapillary cancers and cancers with micro-invasion as B5c, and these have been included in the B5c category for the purposes of this audit. The core biopsy coding system is still under discussion by the Pathology Big 18.

2.1.4 Invasive Status at Core Biopsy Compared with Invasive Status of Surgical Specimen

The majority of cancers diagnosed by core biopsy go on to have surgery, at which a definitive invasive status is determined. Sixty four of the 3,935 cancers with a B5a (Non-invasive) non-operative diagnosis had no surgery and 3 cancers had unknown surgical treatment, so the non-operative diagnosis of non-invasive cancer was retained. A retrospective audit of non-invasive cancers which have no surgery recorded by cancer registries is currently being carried out in the '*Forget Me Not'* study in order to obtain information on the outcomes for women with non-invasive breast cancer who have received no treatment.

Of the 3,868 cancers with a B5a (Non-invasive) non-operative diagnosis where a definitive invasive status was obtained at surgery, 2,914 (75%) were non-invasive and 124 (3%) were micro-invasive cancer (Table 8). For 718 cancers (19%), invasive disease was found at surgery. This varied from 15% in Wales to 20% in East of England, London, South East Coast, South Central and North West. For 111 cancers (3%), no malignant disease was identified at surgery, but subsequent audit confirmed that a correct diagnosis of non-invasive cancer had been reported in the non-operative core biopsy. For 1 further cancer, the histological status after surgery was unknown.

Figure 7 shows for the 3-year period 2009/10-2011/12, the variation between screening units in the proportion of cancers with a B5a (Non-invasive) diagnosis which were found to have an invasive component in the surgical specimen, expressed as a percentage of cancers diagnosed as B5a (Non-invasive). The dashed lines in Figure 7 are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate (solid line). Five screening units (open blue diamonds) are outside the upper control limit and have rates significantly higher than the average rate of 20%. Regional QA reference centres should carry out audits with these units to confirm the reasons for the unusually high proportion of B5a (Non-invasive) cancers found to be invasive at surgery. In 6 screening units, at least half of the B5a (non-invasive) cancers found to be invasive at surgery had an invasive size of at least 10mm (yellow diamonds in Figure 7).

Of the 13,919 cancers with a B5b (Invasive) non-operative diagnosis, 246 had no surgery and 16 had unknown surgical treatment (12 of these cancers were from Scotland). Of the cancers with no surgery,

118 (45%) had neo-adjuvant therapy. In the UK as a whole, 99% of the remaining 13,657 cancers had surgical confirmation of invasive cancer (Table 9). Ninety seven cancers with a B5b (Invasive) non-operative diagnosis were found to be non-invasive (82 cancers) or micro-invasive (15 cancers) with no associated invasive disease in the surgical specimen. For 83 cancers, no malignant disease was identified at surgery, but subsequent audit confirmed that a correct diagnosis of invasive cancer had been reported in the non-operative core biopsy. These cancers are referred to as "invasive - biopsy only". A further 14 cancers had unknown histological status at surgery. Of these, 9 had surgery to the axilla only, and for 5 the histological status at surgery was not provided by the Scottish QA reference centre.

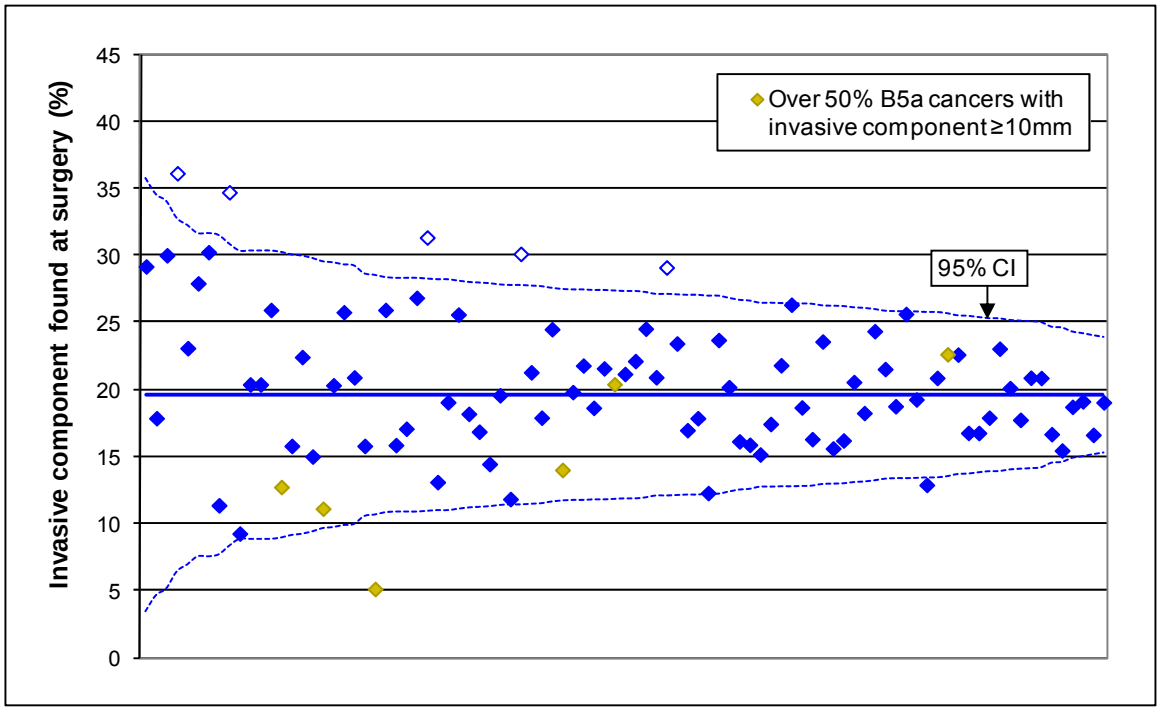

Figure 7: Variation between screening units in the proportion of cancers with a B5a (Non-invasive) non-operative diagnosis found to be invasive at surgery in the 3-year period 2009/10-2011/12 (Open diamonds represent units which lie outside the upper control limits)

12 YEAR COMPARISON: INVASIVE STATUS FOLLOWING CORE BIOPSY

Year of data collection	B5a (Non-invasive)			B5b (Invasive)		
	Total with surgery	Not non-invasive at surgery*		Total with surgery	Not invasive at surgery**	
		No.	%		No.	%
2000/01	1,660	482	29	5,026	63	1.3
2001/02	1,881	542	29	5,405	45	0.8
2002/03	2,274	635	28	6,743	69	1.0
2003/04	2,748	717	26	8,357	95	1.4
2004/05	2,750	666	24	8,999	46	0.5
2005/06	3,267	838	26	10,685	60	0.6
2006/07	3,351	895	27	10,569	85	0.8
2007/08	3,590	967	27	11,312	105	0.9
2008/09	3,598	933	26	11,702	131	1.1
2009/10	3,404	890	26	12,249	153	1.2
2010/11	3,736	972	26	12,943	134	1.0
2011/12	3,868	954	25	13,657	194	1.4

*Not non-invasive includes invasive, micro-invasive, "non-invasive - biopsy only" and unknown invasive status
**Not invasive at surgery includes non-invasive, micro-invasive, "invasive - biopsy only" and unknown invasive status

The preceding summary table shows that the proportion of cancers that had a B5a (Non-invasive) non-operative diagnosis which were found to be "non-invasive - biopsy only", micro-invasive, invasive or to

have unknown invasive status after surgery has fallen by 4 percentage points in the past 12 years (from 29% to 25%). This reduction is probably mainly due to fewer cancers converting from a B5a (Non-invasive) non-operative diagnosis to invasive at surgery because of the wider use of vacuum assisted biopsy with larger volume cores within which small invasive components can be identified. The proportion of cases with a B5b (Invasive) core biopsy which were not confirmed to be invasive following surgery has increased gradually from 0.5% in 2004/05 to 1.4% in 2011/12. The absence of residual tumour in the surgical specimen is the main reason for this increase. This probably reflects the wider use of vacuum assisted biopsy with larger volume cores within which small invasive tumours are fully excised.

KEY FINDINGS

- In 2010/11 127 cancers (1%) had invasive status B5c (Not Assessable or Unknown) at core biopsy. Some units code micropapillary cancers and cancers with micro-invasion as B5c, and these have been included in the B5c category for the purposes of this audit. The core biopsy coding system is still under discussion by the Pathology Big 18.
- Invasive disease was found at surgery for 19% of cancers with a B5a (Non-invasive) non-operative diagnosis. Five screening units have had rates significantly higher than the UK average rate in the 3-year period 2009/10-2011/12 and, in 6 screening units, more than half of the under-diagnosed cancers had an invasive size of at least 10mm.
- Ninety seven cancers with a B5b (Invasive) non-operative diagnosis were found to have non-invasive or micro-invasive cancer with no associated invasive disease following surgery.
- For 83 cancers with a B5b (Invasive) non-operative diagnosis, no malignant disease was identified at surgery, but subsequent audit confirmed that a correct diagnosis of invasive cancer had been reported in the non-operative core biopsy.
- The steady reduction in the number of cancers with a B5a (Non-invasive) non-operative diagnosis which are found to be “non-invasive - biopsy only” is probably mainly due to fewer cancers converting from B5a (Non-invasive) to invasive at surgery because of the wider use of vacuum assisted biopsy with larger volume cores within which small invasive components can be identified.
- The increase in the proportion of cases with a B5b (Invasive) core biopsy which were not confirmed to be invasive following surgery also probably reflects the wider use of vacuum assisted biopsy with larger volume cores within which small invasive tumours are fully excised.

2.2 Number of Assessment Visits

It is possible that the drive to increase non-operative diagnosis has led to more anxiety, with women having to return to the assessment clinic for repeat diagnostic tests before receiving a definitive diagnosis. In order to track the diagnostic pathway, the total number of assessment visits for the patient (excluding results clinics) and the worst core biopsy and cytology results for each visit for the chosen lesion were collected.

Of the 18,745 women with screen-detected breast cancer diagnosed in the UK in 2011/12, 16,158 (86%) had one assessment visit (Table 11). Of these, 15,665 (97%) had a B5/C5 non-operative diagnosis result and 493 did not achieve a non-operative diagnosis. Eighty nine percent (13,339 women) of all women with invasive breast cancer and 73% (2,692 women) of all women with non-invasive breast cancer had one assessment visit. In 7 screening units, over 25% of patients required more than 1 assessment visit to obtain a B5/C5 non-operative diagnosis result.

2.2.1 Cases with no core/cytology result at the first visit

Scotland was unable to provide cytology and core biopsy results for individual assessment visits. The analyses in Sections 2.2.1 – 2.2.3 are thus only for cancers diagnosed in England, Wales and Northern Ireland. Of the 16,993 women in England, Wales and Northern Ireland diagnosed with screen-detected breast cancer in 2011/12, 16,964 had a needle biopsy at an assessment visit. Of these, 884 (5%) did not have a core/cytology result from their first visit (Table 12). Of these, 876 had their first core/cytology result from their second assessment visit and 8 had their first core/cytology result from their third or fourth assessment visits. In 8 screening units (4 in South West, 2 in South East Coast, 1 in West Midlands and 1 in North West), over 20% of women had their first core/cytology result from second or later assessment visits. Three percent (474 cancers) of invasive cancers and 12% (422 cancers) of non-invasive cancers had no core/cytology results from the first assessment visit.

2.2.2 Multiple visits for cytology or core biopsy

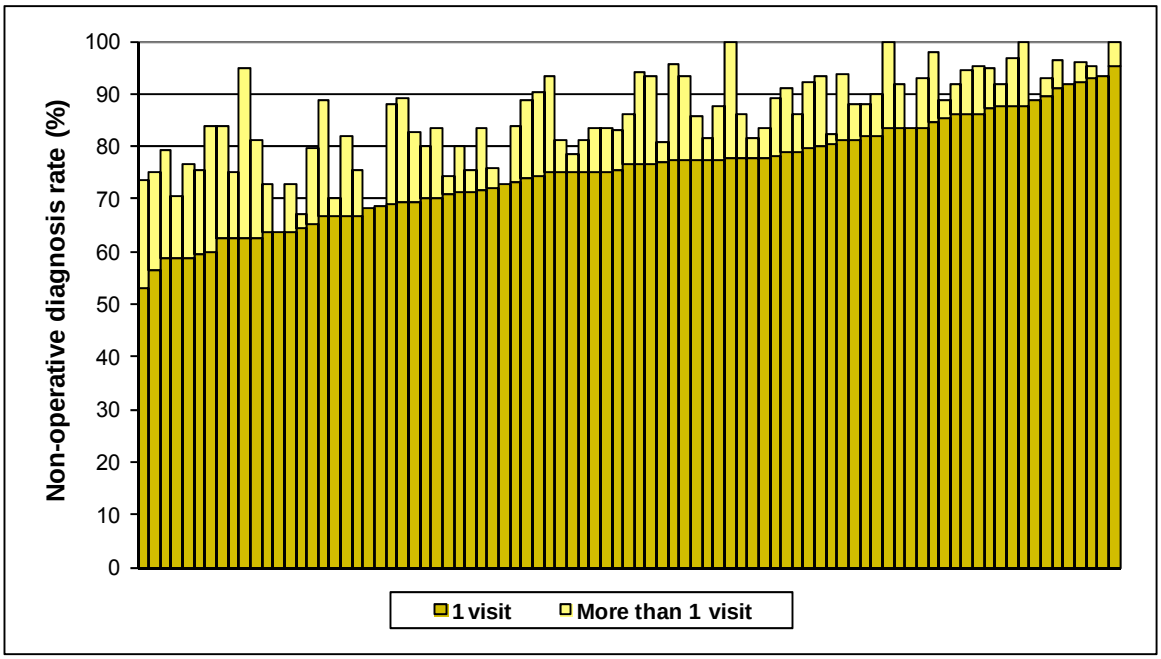

Figure 8: Variation between units in the proportion of non-invasive cancers with a non-operative diagnosis after one biopsy visit and more than one biopsy visit. Data for Scotland are not available

Of the 16,300 women with a B5/C5 non-operative diagnosis result, the majority (94%) had one core biopsy and/or cytology fine needle aspiration performed at a single assessment clinic visit (Table 13). Six percent (994 women) of women came back at least once for repeat core biopsy/cytology. Five percent of all women with invasive breast cancer (623 women) and 12% of all women with non-invasive breast cancer (357 women) had more than one visit involving a needle biopsy. Nineteen women with non-invasive cancer required more than two biopsy visits to obtain a definitive diagnosis. In 7 screening units, over 20% of the non-invasive cancers with a non-operative diagnosis had more than one needle biopsy visit to obtain a B5/C5 diagnosis (Figure 8). It is possible that, in these units when an initial core biopsy was B3, a subsequent vacuum assisted biopsy revealed the presence of DCIS.

Of the 662 invasive cancers with more than one assessment visit involving a needle biopsy, 391 (59%) did not achieve a B5/C5 diagnosis after one assessment visit, and repeat needle biopsies were performed at a subsequent visit. A non-operative diagnosis was achieved for 352 (90%) of these cancers and 39 (10%) required an open diagnostic surgical biopsy. There were 271 invasive cancers where a B5/C5 result was obtained at the first biopsy visit but where repeat needle biopsy was undertaken at a subsequent visit, apparently to confirm the result. Of these, 29 had a C5 only cytology result from the first biopsy visit and 27 had further core biopsies at subsequent visits. Seven invasive cancers had a B5c result from the first biopsy visit and had further core biopsies at subsequent visits. Eighteen invasive cancers had a B5a result from the first biopsy visit and were upgraded to B5b following an additional biopsy at a subsequent visit. Thirty four invasive cancers had a B5a result from the first biopsy visit and, despite further needle biopsy, the invasive components were not diagnosed non-operatively and were diagnosed at surgery.

Of the 484 non-invasive cancers with more than one assessment visit involving a needle biopsy, 374 (77%) did not achieve B5/C5 result at one assessment visit and repeat needle biopsies were performed at a subsequent visit to obtain a diagnosis; 33% had a B1/B2 diagnosis at their first visit and 67% a B3/B4 diagnosis. A B5/C5 non-operative diagnosis was eventually achieved for 357 (74%) of the 484 cancers with more than one assessment visit, but 127 (26%) had their diagnosis confirmed in an open diagnostic surgical biopsy. Table 14 shows that, of the 247 (9%) non-invasive cancers which did not achieve a B5/C5 result at the first biopsy visit and had further biopsy visits to obtain a non-operative diagnosis, 86 (35%) had a B1/B2 needle biopsy result at their first assessment visit and 161 (65%) a B3/B4 result.

One hundred and ten non-invasive cancers had a B5/C5 result at the first visit involving a needle biopsy but had repeated core/cytology biopsies at subsequent visits, apparently to confirm the result. Four cancers had a B5c result from the first biopsy visit and had further core biopsies at subsequent visits. Of

these, 3 were B5a, and 1 remained as B5c. Sixty four non-invasive cancers had no surgery. For the majority of cancers, there was no explanation of why additional needle biopsies were taken from the same lesion at further assessment visits.

2.2.3 Assessment visits after the core/cytology biopsy

In England, Northern Ireland and Wales, of the 16,964 women who had a definitive needle biopsy result, 571 (3%) were recalled for further investigations (only 1 lesion per woman was recorded in the audit). Three percent of all women with invasive breast cancer (469 women) and 3% of all women with non-invasive breast cancer (99 women) came back to an assessment clinic for other investigations (Table 15). These extra visits could have been for pre-operative nodal assessment, MRI, clinical assessment or needle biopsy of another lesion. The reason for each extra visit was not requested as part of the audit.

In order to identify the reasons for unusual clinical practice, using the detailed information on individual assessments gathered in this year's audit, QA reference centres and QA radiologists should examine the non-operative diagnosis results for all their screening units to identify those where relatively high proportions of cancers had their first definitive core/cytology result from second or later assessment visit, or where cancers with a B5 result from a first assessment visit result were brought back for further investigations.

KEY FINDINGS

- Of the 18,745 women with screen-detected breast cancer diagnosed in the UK in 2011/12, 89% of women with invasive cancer and 73% of women with non-invasive cancer had only one assessment visit. Of these, 97% had a B5/C5 non-operative diagnosis result and 493 did not achieve a non-operative diagnosis. In 7 units over 25% of women required more than one assessment visit to obtain a B5/C5 non-operative diagnosis result.
- Of the 16,993 screen-detected breast cancers diagnosed in England, Wales and Northern Ireland in 2011/12, 884 did not have a core/cytology result from the first assessment visit. In 8 screening units, over 20% of cancers had their first core/cytology result from second or later assessment visit.
- Nine hundred and ninety four cancers had at least one repeat visit for core biopsy/cytology. In 7 screening units, over 20% of the non-invasive cancers with a non-operative diagnosis had more than one needle biopsy visit to obtain a B5/C5 diagnosis. It is possible that, in these units when an initial core biopsy was B3, a subsequent vacuum assisted biopsy revealed the presence of DCIS.
- There were 391 invasive cancers and 374 non-invasive cancers where repeat needle biopsies were performed at a subsequent assessment visit to obtain a B5/C5 diagnosis. There were 271 invasive cancers and 110 non-invasive cancers where a B5/C5 result was obtained at the first assessment visit, but where repeat needle biopsy was undertaken at a subsequent visit, apparently to confirm the result.
- Three percent of all women with invasive breast cancer and 3% of all women with non-invasive breast cancer came back to an assessment clinic for other investigations. These extra visits could have been for pre-operative nodal assessment, MRI, clinical assessment or needle biopsy of another lesion.
- In order to identify the reasons for unusual clinical practice, using the detailed information on individual assessments gathered in this year's audit, regional QA reference centres and regional radiology QA co-ordinators should examine the non-operative diagnosis results for all their screening units to identify those where relatively high proportions of cancers had their first definitive core/cytology result from second or later assessment visit, or where cancers with a B5 result from a first assessment visit result were brought back for further investigations.

2.3 Diagnostic Open Biopsies

Quality Objective	**To minimise benign diagnostic open surgical biopsies**
Maximum Standard	**<15 per 10,000 prevalent screen (1.5 per 1,000)** **<10 per 10,000 incident screen (1.0 per 1,000)**
Target Standard	**<10 per 10,000 prevalent screen (1.0 per 1,000)** **<7.5 per 10,000 incident screen (0.75 per 1,000)**

(Quality Assurance Guidelines for Surgeons in Breast Cancer Screening, NHSBSP Publication No 20, 4th Edition, March 2009)

2.3.1 Status of Diagnostic Open Biopsies

In 2011/12, 2,397 diagnostic open biopsies were performed. Of these 1,653 (69%) were benign and 744 (31%) were malignant. The UK prevalent (first screen) benign open biopsy rate was 1.74 per 1,000 women screened (Table 16), which is higher than the 1.5 per 1,000 women screened minimum standard. Eight out of 12 regions exceeded the minimum standard for prevalent (first) screens, and no region achieved the 1.0 per 1,000 women screened target. At screening unit level, only 23 units achieved the target, and 53 units (over half of the UK screening units) did not achieve the minimum standard for prevalent (first) screens (Figure 9).

The UK incident (subsequent screen) benign open biopsy rate was 0.51 per 1,000 women screened (Table 16). This varied from 0.34 per 1,000 women screened in North East, Yorkshire & Humber to 0.69 per 1,000 women screened in Scotland. All regions achieved the 1.0 per 1,000 women screened minimum standard and the 0.75 per 1,000 women screened target. At screening unit level, the incident (subsequent screen) benign open biopsy rate varied from 0.04 to 1.9 per 1,000 women screened. Three units (1 in East of England, 1 in Wales and 1 in South Central) did not achieve the minimum standard. Regional QA reference centres should investigate the reasons for relatively high prevalent (first screen) and incident (subsequent screen) benign open biopsy rates.

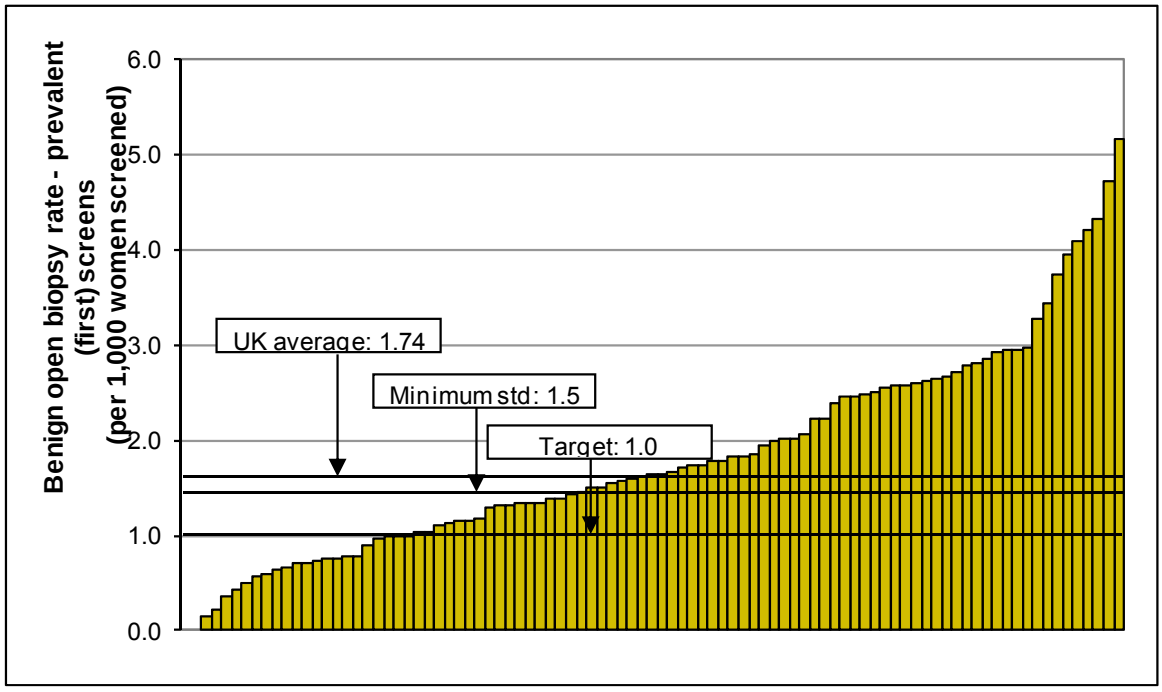

Figure 9 : Variation between screening units in benign diagnostic open biopsy rates for prevalent (first) screens expressed as the number of diagnostic open biopsies undertaken per 1,000 women screened

In the UK as a whole, 744 malignant diagnostic open biopsies were performed in 2011/12. The malignant open biopsy rate was 0.33 per 1,000 women screened; varying from 0.24 per 1,000 women screened in Northern Ireland to 0.43 per 1,000 women screened in East of England. The malignant open biopsy rate varied at screening unit level from 0.06 per 1,000 women screened in a unit in North East, Yorkshire & Humber to 0.87 per 1,000 women screened in a unit in East of England.

The following summary table shows that the UK malignant open biopsy rate has fallen from 2.04 per 1,000 women screened in 1996/97 to 0.33 per 1,000 women screened in 2011/12 because the non-operative diagnosis rate has increased from 63% to 96%. Over the same 16-year period, the UK benign open biopsy rate has fallen from 1.50 per 1,000 women screened in 1996/97 to 0.77 per 1,000 women screened in 2011/12.

16 YEAR COMPARISON: BENIGN AND MALIGNANT DIAGNOSTIC OPEN BIOPSY RATES						
Year of data collection	Number of women screened	Number of benign open biopsies	Number of malignant open biopsies	Benign open biopsy rate per 1000 women screened	Malignant open biopsy rate per 1000 women screened	Non-operative diagnosis rate (%)
1996/97	1,340,175	2,015	2,734	1.50	2.04	63
1997/98	1,419,287	2,251	2,349	1.59	1.66	71
1998/99*	1,308,751	1,830	1,553	1.40	1.19	81
1999/00*	1,429,905	1,838	1,316	1.29	0.92	85
2000/01	1,535,019	2,042	1,304	1.33	0.85	87
2001/02	1,507,987	2,018	1,148	1.34	0.76	89
2002/03	1,582,269	1,901	1,018	1.20	0.64	91
2003/04	1,685,661	1,825	952	1.08	0.56	93
2004/05*	1,717,170	1,795	927	1.05	0.54	93
2005/06	1,942,449	1,847	944	0.95	0.49	94
2006/07	1,955,825	1,811	888	0.93	0.45	94
2007/08	2,042,497	1,801	815	0.87	0.40	95
2008/09	2,116,588	1,765	802	0.83	0.38	95
2009/10	2,133,189	1,681	743	0.79	0.35	96
2010/11	2,221,938	1,532	710	0.73	0.32	96
2011/12	2,261,942	1,653	744	0.77	0.33	96

*Data from Scotland are absent in 1998/99 and 1999/00. Data for 2 units from East of England are absent in 2004/05

Table 17 shows the false positive cytology and core biopsy figures obtained from CQA* and BQA* reports for each region. In the UK as a whole, there were two false positive core biopsy cases and no false positive cytology cases recorded. Regional QA reference centres in North East, Yorkshire and Humber and East of England and their pathology QA co-ordinators should review their false positive core biopsy cases to ascertain the reason(s) for these results, implementing corrective action as appropriate.

*All breast screening service are required to audit their false positive cancers annually. The details of all relevant cases are obtained from the BQA and CQA reports on the NBSS. CQA and BQA reports are essentially the same except that one is a summary of results from cytology procedures (CQA) and the other core biopsy procedures (BQA).

2.3.2 Non-operative Histories for Cancers Diagnosed by Diagnostic Open Biopsy

The number of cancers diagnosed by open biopsy increased slightly from 710 in 2010/11 to 744 in 2011/12. Of the latter, 210 (28%) were invasive, 5 (1%) micro-invasive and 527 (71%) non-invasive (Table 18). A further 2 cancers had unknown invasive status. One of these was confirmed to be cancer because of malignant cells in the lymph node, and the other was recorded as cancer without further information on invasive status. Three hundred and fifty six (48%) of the 744 cancers did not have further surgical treatment after their diagnostic open biopsy. Of these, 3 had no surgery to the breast, but did have axillary assessment. Thirteen cancers diagnosed by open biopsy were treated by mastectomy or mastectomy with axillary surgery as their first surgical treatment. Regional QA reference centres and regional surgical QA co-ordinators should ascertain the reason that mastectomies were performed as the first operation for these cancers. This may be because radiological and clinical opinion was strongly supportive of the presence of malignant disease, because the screen-detected cancers were recurrences or because of patient choice.

Tables 19 and 20 describe the non-operative history of cancers diagnosed by open biopsy. For 81% of invasive cancers diagnosed by open biopsy there had been unsuccessful attempts to obtain a non-operative diagnosis using core biopsy alone (Table 19). For non/micro-invasive cancers, the proportion of cases where non-operative diagnosis had been attempted with core biopsy alone was higher at 96% (Table 20). Tables 19 and 20 also show that, of the 210 invasive cancers diagnosed by open biopsy, 24 (11%) had no non-operative procedure recorded and that, of the 532 non/micro-

invasive cancers diagnosed by open biopsy, 7 (1%) had no non-operative procedure recorded. Regional QA reference centres and regional surgical QA co-ordinators should audit these 31 cases to establish whether they reflect a data collection problem. If the data are found to represent clinical practice correctly, the reasons for the failure to attempt non-operative diagnosis should be ascertained.

Of the 210 invasive cancers diagnosed by open biopsy in 2011/12, 4% (9 cancers) had an inadequate (C1) cytology sample or a normal (B1) core biopsy sample (Table 21). Four percent had a benign result (B2/C2, 8 cancers). Fifty two percent (110 cancers) were lesions of uncertain malignant potential (B3) or were atypia and probably benign (C3), and a further 28% were suspicious of malignant disease (B4/C4, 59 cases). Of the 532 non/micro-invasive cancers which had a malignant open biopsy in 2011/12, 28% (147 cancers) had a B4 and/or C4 needle biopsy result and 67% (354 cancers) had a B3/C3 non-operative result (Table 22).

The proportion of non-invasive lesions diagnosed by malignant open biopsy which had a B3 core biopsy result has gradually increased with time. This increase could reflect better targeting of calcifications, as B3 results for non/micro-invasive cancers and also for invasive carcinomas may represent atypical intraductal epithelial proliferations resulting from partial sampling of ductal carcinoma in situ. The Sloane Project is actively collecting screen-detected cases of lobular in situ neoplasia, atypical ductal hyperplasia and flat epithelial atypia, and will still accept new cases of ductal carcinoma in situ screened before 1 April 2012.

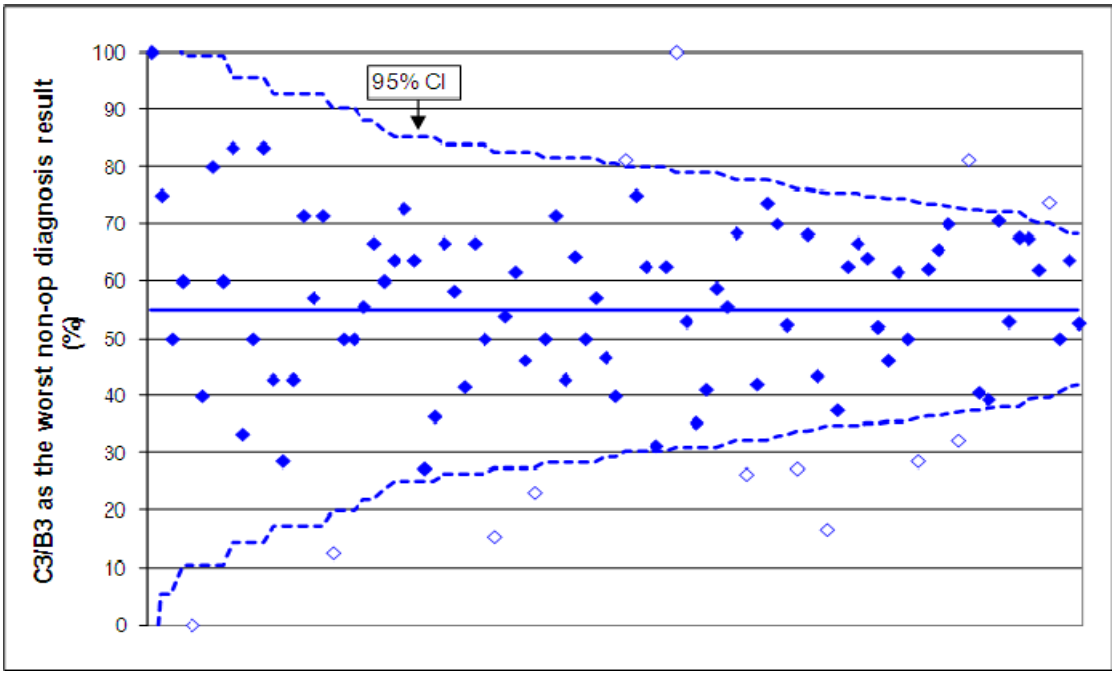

Figure 10: Variation between screening units in the proportion of invasive cancers where during the 3-year period 2009/10-2011/12 the worst non-operative result was B3/C3 (Open diamonds represent units which lie outside the control limits)

Increases in B3 diagnoses may also in part be due to the classification by pathologists of core biopsies which are considered to represent lobular neoplasia (atypical lobular hyperplasia and lobular carcinoma in situ) as B3, in line with current NHSBSP guidelines (*Guidelines for Non-operative Diagnostic Procedures and Reporting in Breast Cancer Screening, NHSBSP Publication No.50 [June 2001]*). When lobular carcinoma in situ (LCIS) is verified in the surgical specimen, this would, according to current guidelines, be coded as malignant and such cases could contribute to a lower non-operative diagnosis rate for non-invasive cancers. In 2011/12, of the 464 cancers that were diagnosed as B3/C3 and had an operation, 110 were found to be invasive at surgery and 119 (26%) had only LCIS in the surgical specimen.

Figure 10 shows the variation between screening units in the proportion of invasive cancers where during the 3-year period 2009/10-2011/12 the worst non-operative result was B3/C3. The dashed

lines in Figure 10 are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate (solid line). Four units (open blue diamonds) are outside the upper control limit and 9 units are below the lower control limits and have rates statistically significantly different from the average rate of 55%. Two units were outside the upper control limits in a similar control chart where the worst non-operative result was B4/C4 (control charts not shown). Regional QA reference centres should carry out audits to ascertain the reasons for the unusually high or low proportions of B3/C3 and B4/C4 non-operative diagnosis results in the 15 units lying outside the control limits in these control charts.

KEY FINDINGS

- In 2011/12, 2,397 diagnostic open biopsies were performed. Of these 1,653 (69%) were benign and 744 (31%) were malignant.
- The benign open biopsy rate was 1.74 and 0.51 per 1,000 women screened for prevalent (first) and incident (subsequent) screens respectively. Eight regions exceeded the minimum standards for prevalent screens. Three units (1 in East of England, 1 in Wales and 1 in South Central) did not achieve the minimum standard for incident screens. Regional QA reference centres should investigate the reasons for their relatively high prevalent and incident benign open biopsy rates.
- The malignant open biopsy rate has fallen from 2.04 per 1,000 women screened in 1996/97 to 0.33 per 1,000 women screened in 2011/12 as the non-operative diagnosis rate has increased from 63% to 96%. In 20011/12, the malignant open biopsy rate varied at screening unit level from 0.06 per 1,000 women screened in a unit in North East, Yorkshire & Humber to 0.87 per 1,000 women screened in a unit in East of England.
- The UK benign open biopsy rate has fallen over 14 years from 1.50 per 1,000 women screened in 1996/97 to 0.77 per 1,000 women screened in 2011/12.
- There were 2 false positive core biopsies recorded in 2011/12. Regional QA reference centres and their pathology QA co-ordinators should review these cases to ascertain the reason(s) for these results, implementing corrective action as appropriate.
- Thirteen cancers which were diagnosed by open biopsy had a mastectomy or a mastectomy with axillary surgery as the first surgical operation. Regional QA reference centres and regional surgical QA co-ordinators should review these cases to ascertain the reasons for these unusual results.
- Twenty four invasive cancers and 7 non/micro-invasive cancers diagnosed by open biopsy had no non-operative procedure recorded. Regional QA reference centres and regional surgical QA co-ordinators should audit these 31 cases to establish whether they reflect a data collection problem. If the data are found to represent clinical practice correctly, the reasons for the failure to attempt non-operative diagnosis should be ascertained.
- Twenty eight percent of invasive cancers and 28% of non/micro-invasive cancers diagnosed by malignant open biopsy had a B4/C4 needle biopsy result indicating suspicion of malignant disease. Fifty two percent of invasive cancers and 67% of non/micro-invasive cancers diagnosed by malignant open biopsy had a B3/C3 needle biopsy result.
- The proportion of non-invasive lesions diagnosed by malignant open biopsy which had a B3 core biopsy result has gradually increased with time. This increase could reflect better targeting of calcifications, as B3 results for non/micro-invasive cancers and also for invasive carcinomas may represent atypical intraductal epithelial proliferations resulting from partial sampling of ductal carcinoma in situ.
- Increases in B3 diagnoses may also in part be due to the classification by pathologists of core biopsies which are considered to represent lobular neoplasia (atypical lobular hyperplasia and lobular carcinoma in situ) as B3, in line with current NHSBSP guidelines. In 2011/12, of the 464 cancers that were diagnosed as B3/C3 and had an operation, 110 were found to be invasive at surgery and 119 (26%) had only LCIS in the surgical specimen.
- In 2009/10-2011/12, 4 screening units had B3/C3 rates significantly higher and 9 had rates significantly lower than the average rate of 55% and 2 units had B4/C4 rates significantly higher than the average rate. Regional QA reference centres should carry out audits with these units to confirm the reasons for the unusually high or low proportions of B3/C3 and B4/C4 non-operative diagnosis results.

CHAPTER 3
TUMOUR CHARACTERISTICS

3.1 Cytonuclear Grade and Size for Non-invasive Breast Cancers

3.1.1 Data Completeness

The following summary table shows that in the UK as a whole, data completeness for non-invasive cancers has improved markedly since 2000/01. In 2011/12, the incompleteness of cytonuclear grade and/or size data varied from 2% in East of England, South Central and West Midlands to 7% in Northern Ireland and South West (Table 23). Of the 143 surgically treated non-invasive cancers with unknown size (Table 23), 101 (71%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen. Of the 19 surgically treated non-invasive cancers with unknown cytonuclear grade (Table 23), 16 (84%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen. Of the 181 non-invasive cancers with cytonuclear grade not assessable (Table 24), 168 (93%) were LCIS alone. The size of 184 non-invasive cancers (5%) was not assessable (Table 25).

12 YEAR COMPARISON:
DATA COMPLETENESS FOR
SURGICALLY TREATED NON-INVASIVE CANCERS (%)

Year of data collection	*Unknown cytonuclear grade*	*Unknown size*	*Unknown cytonuclear grade and/or size*
2000/01	*6*	*11*	*14*
2001/02	*10*	*13*	*19*
2002/03	*10*	*14*	*20*
2003/04	*3*	*11*	*11*
*2004/05**	*2*	*7*	*7*
2005/06	*3*	*7*	*8*
2006/07	*2*	*6*	*7*
2007/08	*4*	*7*	*8*
2008/09	*3*	*6*	*7*
2009/10	*3*	*6*	*7*
2010/11	*<1%*	*3*	*3*
2011/12	*<1%*	*4*	*4*

*Data for 2 units from East of England are absent in 2004/05

Figure 11 shows how the proportion of surgically treated non-invasive cancers with unknown cytonuclear grade and/or size varied between screening units in 2011/12. LCIS cases have been excluded. Thirty one units had 100% complete data for cytonuclear grade and size, and only 4% (144 cases) of all surgically treated non-invasive cancers had incomplete cytonuclear grade or/and size (Table 23). However, in 10 units, data incompleteness was greater than 10%. Two of the 4 screening units in Northern Ireland were included within this group. Regional QA reference centres and regional pathology QA co-ordinators should audit non-invasive cancers with unknown cytonuclear grade and/or size to ascertain the reason that these important prognostic indicators were not recorded.

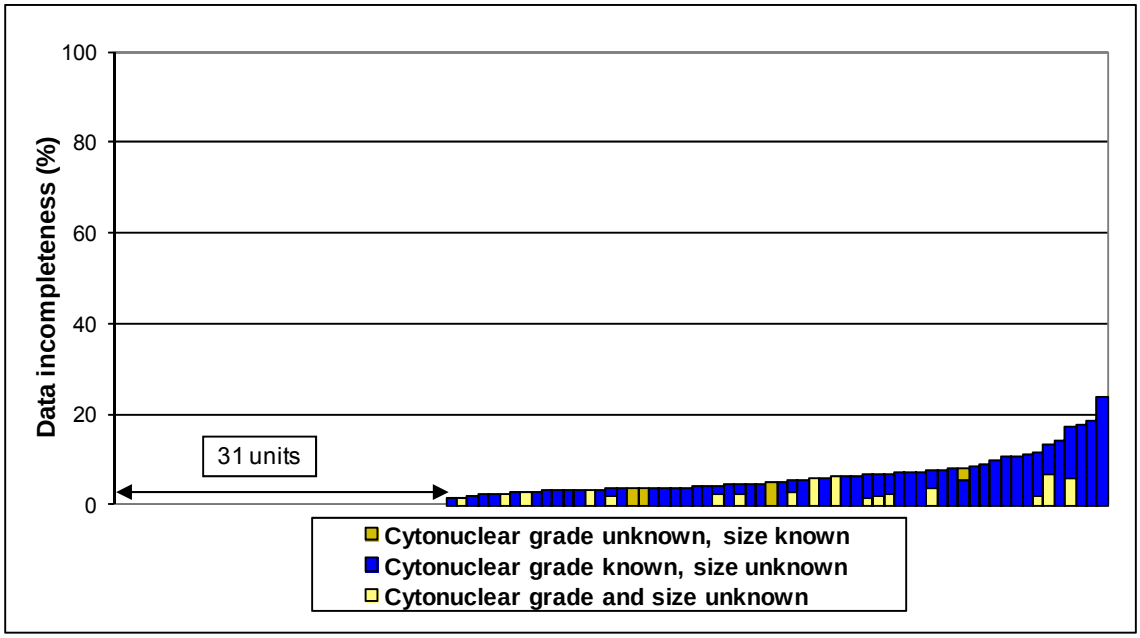

Figure 11: Variation between screening units in the incompleteness of cytonuclear grade and size data for non-invasive cancers (Cases with no surgery and LCIS cases are excluded)

3.1.2 Non-invasive Cancer Size and Cytonuclear Grade

In 2011/12, 37% of the 3,608 surgically treated non-invasive cancers were less than 15mm in diameter and 15% were larger than 40mm (Table 25). The former varied from 30% in South Central to 44% in East of England and the latter from 10% in East of England to 20% in South Central. Overall, 2,074 (57%) surgically treated non-invasive cancers had high cytonuclear grade, 996 (28%) had intermediate cytonuclear grade, and 338 (9%) had low cytonuclear grade (Table 24).

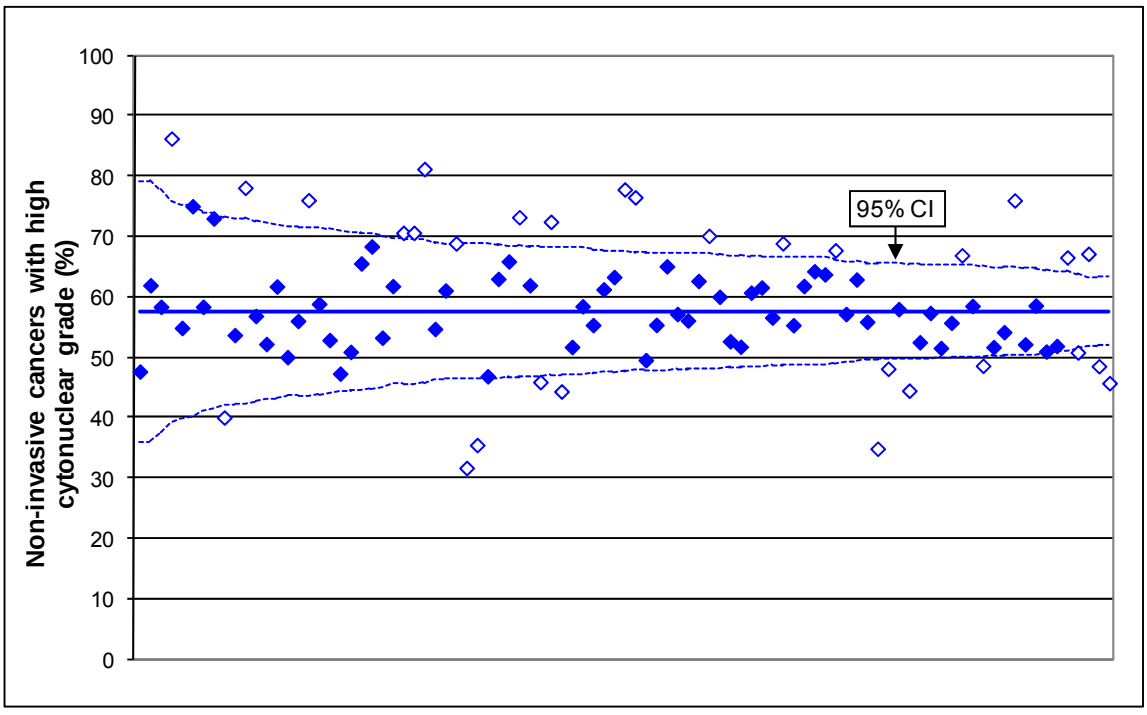

Figure 12: Variation between screening units in the proportion of non-invasive cancers with a high cytonuclear grade in (2009/10-2011/12)
(Open diamonds represent units which lie outside the control limits)
(Cases with no surgery are excluded)

Figure 12 shows for each screening unit over the 3-year period 2009/10-2011/12, the proportion of non-invasive cancers with a high cytonuclear grade. The two dashed lines are the upper and lower control limits which approximate to the 95% confidence intervals of the average proportion of cases with high

cytonuclear grade (solid line). There is considerable variation between units; with 18 lying above the upper control limit and 12 below the lower control limit. One unit in East of England (32%), 1 unit in London and 1 unit in South Central (both 35%) have had particularly low proportions of non-invasive cancers with high cytonuclear grade over the 3-year period. Regional QA reference centres and regional pathology QA co-ordinators should carry out audits with all outlier units to ascertain to ascertain the reason for their unusual cytonuclear grade distributions.

KEY FINDINGS

- Of the 143 surgically treated non-invasive cancers with unknown size, 101 (71%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen.
- The size of 184 non-invasive cancers (5%) was not assessable.
- Of the 181 non-invasive cancers with grade not assessable, 93% were LCIS alone.
- Four percent of all surgically treated non-invasive cancers had incomplete cytonuclear grade or/and size data. In 10 units, data incompleteness was greater than 10%. Two of the four screening units in Northern Ireland were included within this group.
- Regional QA reference centres and regional pathology QA co-ordinators should audit non-invasive cancers with unknown cytonuclear grade and/or size to ascertain the reason that these important prognostic indicators were not recorded.
- Of the 3,608 surgically treated non-invasive cancers, 37% were less than 15mm in diameter and 15% were larger than 40mm.
- 57% of the surgically treated non-invasive cancers had high cytonuclear grade, 28% had intermediate cytonuclear grade and 9% had low cytonuclear grade.
- Eighteen units had significantly higher and 12 units had significantly lower proportions of non-invasive cancers with a high cytonuclear grade. Regional QA reference centres and regional pathology QA co-ordinators should carry out audits with these outlier units to ascertain the reason for their unusual cytonuclear grade distributions.

3.2 Tumour Size for Invasive Breast Cancers

Of the 14,664 surgically treated invasive cancers, 3,791 (26%) had an invasive tumour diameter of less than 10mm, 3,973 (27%) were at least 10mm but less than 15mm in diameter, 3,429 (23%) were between 15mm and 20mm in diameter, 2,497 (17%) were greater than 20mm but less than or equal to 35mm in diameter and 521 (4%) had a diameter greater than 35mm but less than or equal to 50mm. Only 260 cases (2%) were greater than 50mm in diameter (Table 26).

The whole tumour size is the maximum diameter of the whole tumour, including any non-invasive component which extends beyond the invasive lesion. Whole tumour size was not provided for 209 (1%) of the surgically treated invasive cancers (Table 27). Forty two (20%) of these cancers were in London. Regional QA reference centres should ascertain why this important information was not available from their screening units.

KEY FINDINGS

- Fifty three percent of surgically treated cancers had an invasive tumour diameter of less than 15mm. For only 260 cases (2%) was the invasive tumour diameter greater than 50mm.
- The whole tumour size was not provided for 209 (1%) surgically treated invasive cancers. 20% of these cancers were in London. Regional QA reference centres should ascertain why this important information was not available from their screening units.

3.3 Lymph Node Status

Screening guidelines recommend that invasive cancers should have axillary node assessment. Two hundred and forty seven invasive cancers which did not have surgery have been excluded from this section as no information was available concerning their lymph node status (Table 44).

3.3.1 Availability of Nodal Status for Invasive Cancers

In 2011/12, nodal status was known for 98% of surgically treated invasive cancers, this varied between 97% and 99% across regions (Table 84). A total of 218 invasive cancers were recorded as having no nodes obtained. Of these, 6 had the entire invasive tumour removed at core biopsy, 2 were benign at surgery and 4 were non-invasive at surgery. Previous axillary surgery, patient choice and co-morbidities, no nodes found, MDT decision, papillary cancer, Phyllodes tumour and low risk were amongst the explanations provided. No explanations were provided for 41 cases. One invasive cancer had nodes obtained but the nodal status was still unknown, and 7 invasive cancers did not have a record of whether or not nodes were obtained. Nodal status was known for 100% of invasive cancers in 24 screening units, the same number as in 2010/11. All screening units met the 90% minimum standard.

3.3.2 Lymph Node Status for Invasive Cancers

Of the 14,438 invasive cancers with known nodal status, 3,091 (21%) had positive nodes (Table 87). There was some regional variation in lymph node status, with the proportion of node positive cancers varying from 19% in East Midlands, Wales and Northern Ireland to 24% in South Central. Figure 13 shows that there was a wider variation in nodal status in individual screening units; with 6 units lying outside the control limits (5 above and 1 below). It would be interesting to determine whether this wide range of node positivity is related to differences in pathological handling (e.g. number of levels or blocks taken, use of immunohistochemistry and molecular techniques such as PCR) or total number of nodes examined. It might also be related to the number of recurrences and multiple primary cancers detected in each screening unit.

For 14,439 invasive cancers nodes were examined at surgery, and 1,541 (11%) had one positive node at the first axillary operation. Of these, 1,432 (93%) had more detailed information of the type of single node positivity. Four hundred and three (28%) contained micro-metastases and 1,029 (72%) contained metastases. The proportion of single positive nodes containing micro-metastases as opposed to metastases decreased with tumour size (from 32% for cancers with an invasive tumour diameter of less than 15mm to 24% for cancers with an invasive tumour diameter greater than 50mm), and with increasing grade (from 32% for Grade 1 cancers to 22% for Grade 3 cancers).

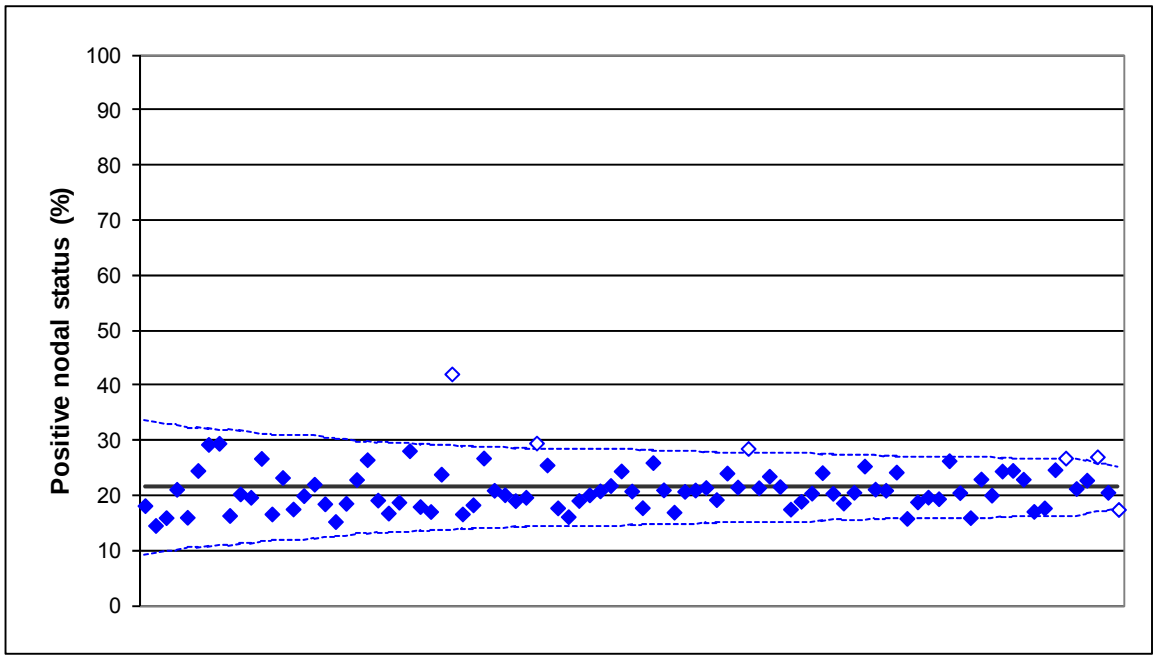

Figure 13: Variation between screening units in the proportion of invasive cancers with positive nodal status expressed as a percentage of cases with known nodal status (Open diamonds represent units which lie outside the control limits)

3.3.3 Availability of Nodal Status for Non-invasive Cancers

Sixty four non-invasive cancers which did not have surgery have been excluded from this section as no data were available concerning their lymph node status (Table 39). Although nodal assessment is not usually indicated for non-invasive cancers, nodes are often obtained when a mastectomy is performed, especially if the assessment process provides suspicion of invasive disease.

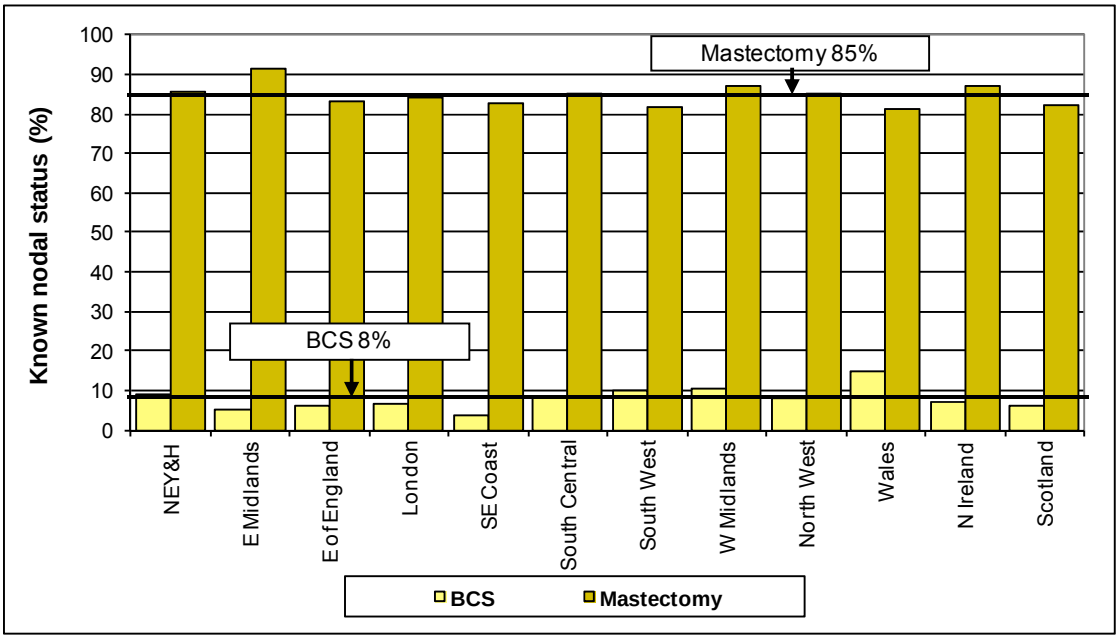

Figure 14 (Table 92): The proportion of non-invasive cancers treated with breast conserving surgery (BCS) or mastectomy with known nodal status

Of the 3,608 surgically treated non-invasive cancers, 29% had known nodal status. This varied from 23% in South East Coast to 34% in Wales and North East, Yorkshire & Humber (Table 91). Of the non-invasive cancers treated by mastectomy, 85% had known nodal status. This varied from 81% in Wales to 91% in East Midlands (Figure 14). In 6 units fewer than 60% of non-invasive cancers treated by mastectomy had known nodal status. Only 8% of non-invasive cancers treated with breast conserving surgery had known nodal status (Table 92). Of the 1,034 non-invasive cancers with known nodal status, 13 (1%) had positive nodal status recorded (Table 93).

KEY FINDINGS

- In the UK as a whole, 98% of surgically treated invasive cancers had known nodal status. A total of 218 invasive cancers were recorded as having no nodes obtained.
- Overall, 21% of invasive cancers had positive nodes; this varied from 15% to 42% in individual screening units. It would be interesting to determine whether this wide range of node positivity is related to differences in pathological handling or the number of nodes examined. It might also be related to the number of recurrences and multiple primary cancers detected in each screening unit.
- For 14,439 invasive cancers nodes were examined at surgery, and 1,541 (11%) had one positive node at the first axillary operation. Of these, 1,432 (93%) had more detailed information of the type of single node positivity. Four hundred and three (28%) contained micro-metastases and 1,029 (72%) contained metastases.
- The proportion of single positive nodes containing micro-metastases as opposed to metastases decreased with tumour size (from 32% for cancers with an invasive tumour diameter of less than 15mm to 24% for cancers with an invasive tumour diameter greater than 50mm), and with increasing grade (from 32% for Grade 1 cancers to 22% for Grade 3 cancers).
- Of the 3,608 surgically treated non-invasive cancers, 29% had known nodal status. This varied from 23% in South East Coast to 34% in Wales and North East, Yorkshire & Humber.
- 85% of non-invasive cancers treated with mastectomy had known nodal status, compared with 8% of those treated with breast conserving surgery.
- Of the 1,034 non-invasive cancers with known nodal status, 13 (1%) had positive nodal status recorded.

3.4 Grade of Invasive Cancers

Of the 14,664 invasive cancers which had surgery, 3,694 (25%) were Grade 1, 7,930 (54%) were Grade 2 and 2,935 (20%) were Grade 3 (Table 29). Grade was not assessable for 52 cancers diagnosed in 27 units and grade was unknown for 53 cancers diagnosed in 28 units.

The control charts in Figure 15 show the variation in the proportions of Grade 1, 2 and 3 cancers recorded for individual screening units. The cancers were plotted with the assumption that the proportions are normally distributed. The screening units are positioned with the same x-value in the three graphs, according to the total number of invasive cancers which had surgery, so that the units with the highest number of invasive cancers are located at the right hand side of the graphs. The three points (Grade 1, 2 and 3) for a single unit can thus be compared vertically. Any points that are outside the two dashed lines (95% upper and lower control limits) are considered as significantly higher or lower than the average represented by the solid line.

The control charts in Figure 15 suggest that there are local variations in the interpretation of invasive grade definitions which should be investigated by regional QA reference centres and their regional pathology QA co-ordinators if persistent or suggestive of systemic bias. For example, 5 of the 12 units in North East, Yorkshire & Humber are outliers in the Grade 1 control chart (3 high outliers and 2 low outliers) and 4 of the 8 units in West Midlands are outliers in the Grade 1 control chart (1 is a high outlier and 3 are low outliers).

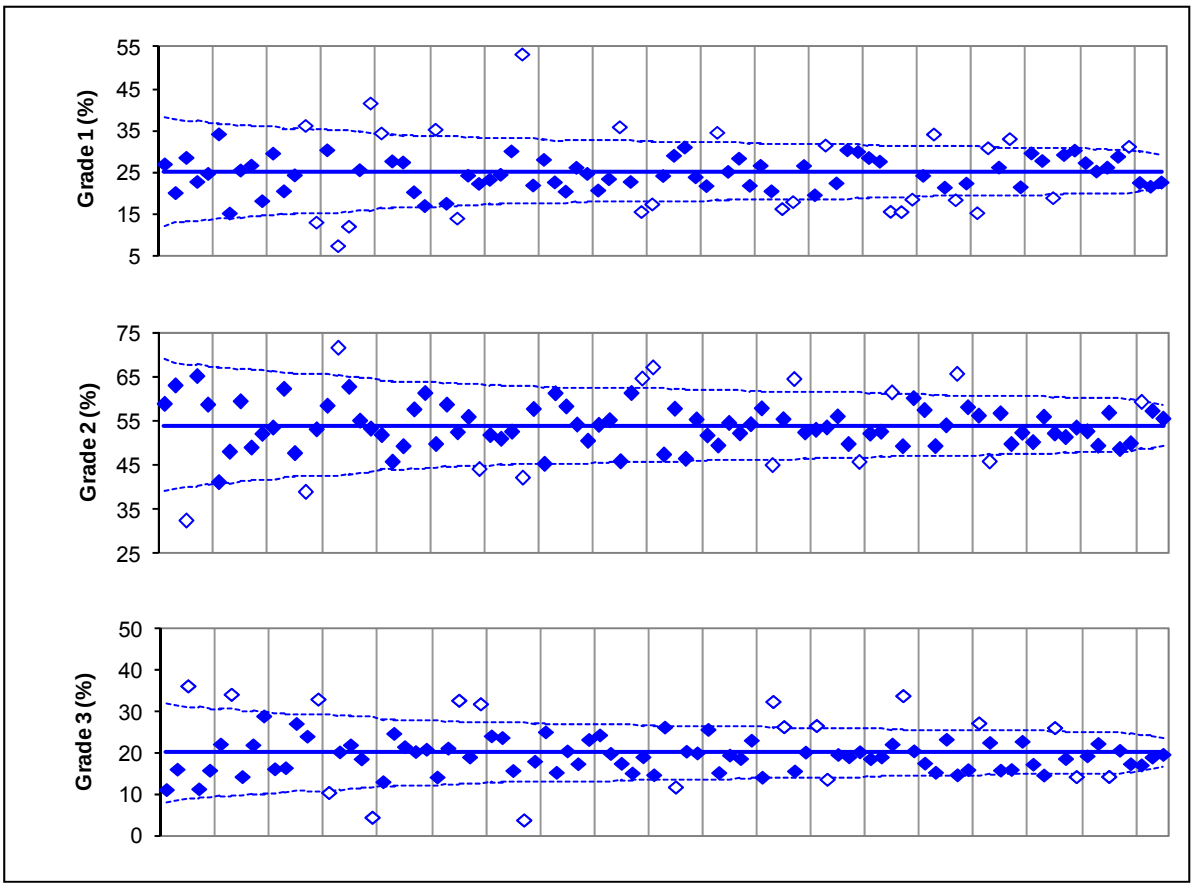

Figure 15: Variation between screening units in the grade of surgically treated invasive cancers (Open diamonds represent units which lie outside the control limits)

In the Grade 1 control chart, 4 units have been outliers every year during the 3-year audit period 2009/10-2011/12 (1 each in North West, Wales, East Midlands and North East, Yorkshire & Humber). In the Grade 2 control chart, 1 unit in Wales has been an outlier every year during the 3-year audit period 2009/10-2011/12. In the Grade 3 control chart, 2 units have been outliers every year during the 3-year audit period 2009/10-2011/12 (1 in North West and 1 in North East, Yorkshire & Humber). Regional QA reference centres and their regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for unusual invasive grade distributions seen in these 7 screening units.

KEY FINDINGS

- Overall, 25% of invasive cancers were Grade 1, 54% Grade 2 and 20% Grade 3. Grade was not assessable for 52 cancers and unknown for 53 cancers.
- In the Grade 1 control chart, four units have been outliers every year during the 3-year period 2009/10-2011/12. In the Grade 2 control chart, 1 unit has been an outlier every year during the 3-year audit period 2009/10-2011/12. In the Grade 3 control chart, 2 units have been outliers every year during the 3-year audit period 2009/10-2011/12.
- Regional QA reference centres and their regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for unusual invasive grade distributions seen in these 7 screening units.

3.5 NPI of Invasive Cancers

A Nottingham Prognostic Index (NPI) score was calculated for surgically treated invasive cancers in order to allocate them to one of five prognostic groups. An NPI score was calculated for all surgically treated invasive cancers with complete size, grade and nodal status information, even if nodal status was based on fewer than 4 nodes. An NPI score was not calculated if patients have had neo-adjuvant treatment. It should be noted that the differences in invasive grade outlined in Figure 15 will have affected the NPI groupings.

NPI Score = 0.2 x Invasive Size (cm) + Grade + Nodes
where Nodes equals 1 (0 positive nodes), 2 (1, 2 or 3 positive nodes) or 3 (≥4 positive nodes)

EPG	(Excellent Prognostic Group)	≤2.4
GPG	(Good Prognostic Group)	2.401-3.4
MPG1	(Moderate Prognostic Group 1)	3.401-4.4
MPG2	(Moderate Prognostic Group 2)	4.401-5.4
PPG	(Poor Prognostic Group)	>5.4

Although an NPI score was provided for 554 of the 625 surgically treated invasive cancers with neo-adjuvant therapy; all cancers with neo-adjuvant therapy recorded have been excluded from the following analyses as the NPI scores provided may not have reflected the true tumour characteristics at diagnosis.

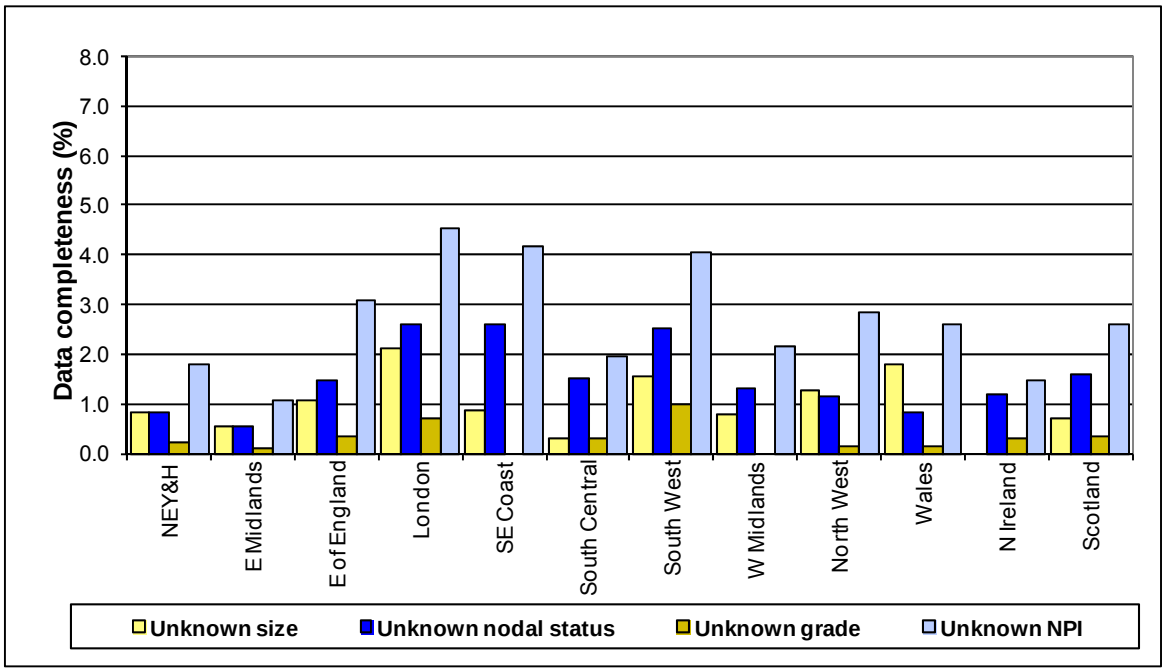

Figure 16 (Table 30): Data completeness of the tumour characteristics of surgically treated invasive cancers (excluding cases with neo-adjuvant therapy)

Overall, an NPI score could not be calculated for 387 (2.8%) surgically treated invasive cancers with no known neo-adjuvant therapy (Table 30). Of these, 43 had no residual tumour found at surgery, with no cancer cells found in the surgical specimen. Figure 16 shows that the proportion of cancers with unknown NPI was lowest in East Midlands (1.1%) and highest in London (4.6%). The proportions of cancers with an unknown NPI score varied from 0 cases in 9 screening units to 7.3% in 2 screening units (1 in London and 1 in South West).

Of the 13,652 surgically treated invasive cancers with known NPI score (excluding cases with neo-adjuvant therapy), the highest proportion fell into the Good Prognostic Group (GPG) (39%), with only 6% (751 cases) in the Poor Prognostic Group (PPG) (Table 31). As expected with cancers detected by screening, in the UK as a whole, the majority (60%) of cancers fell into the two best prognostic groups, EPG (Excellent Prognostic Group) and GPG. The proportion of EPG and GPG cancers varied from 55% in South Central to 66% in East Midlands.

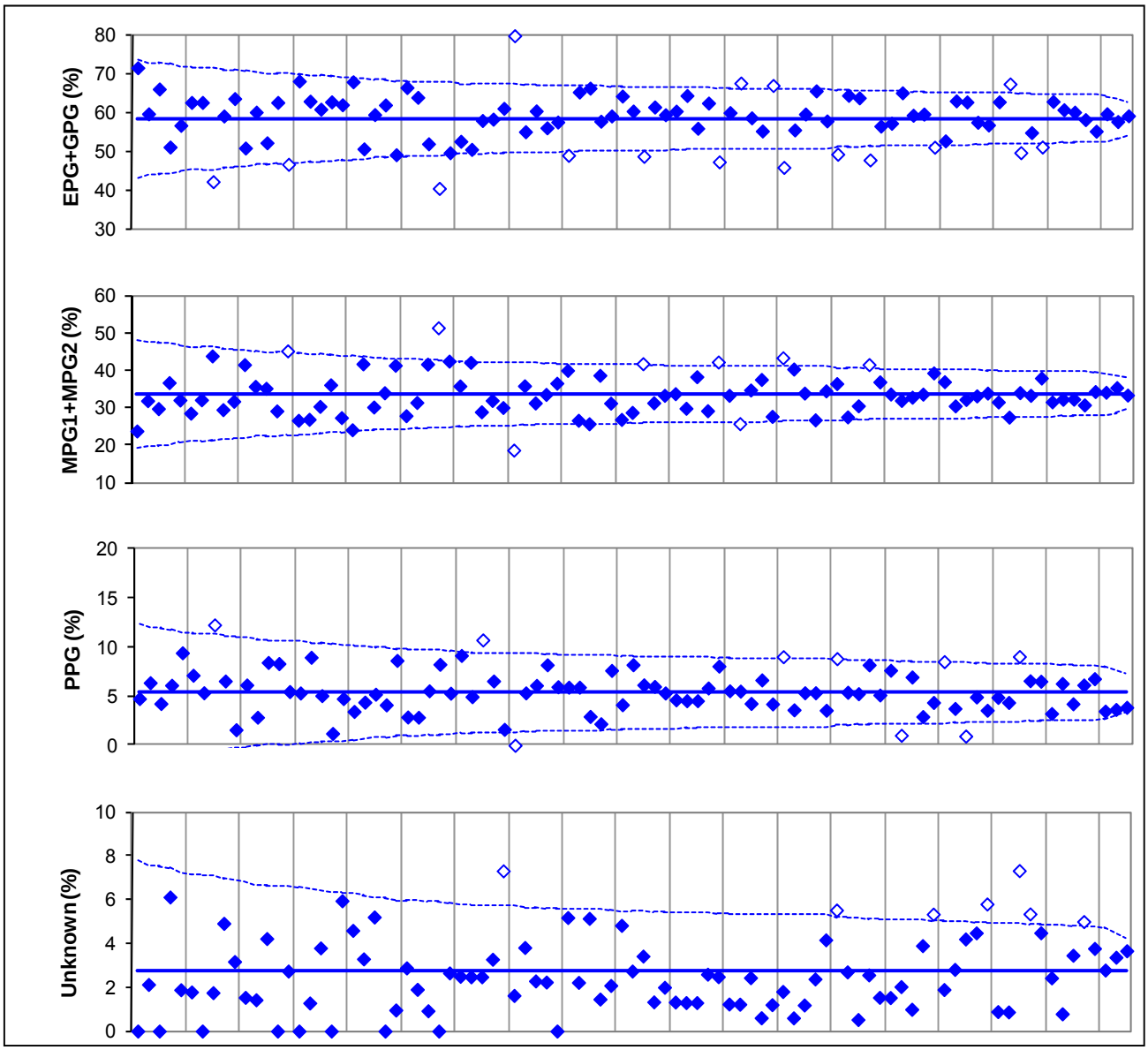

Figure 17: Variation between screening units in NPI groups for surgically treated invasive cancers - excluding cases with neo-adjuvant therapy
(Open diamonds represent units which lie outside the control limits)

In Figure 17, the proportion of invasive cancers in each NPI group and with unknown NPI group is plotted in the control charts for individual screening units. As in Figure 15, data for the same unit can be compared vertically across the 4 graphs. Any points that are outside the 2 dashed lines (95% upper and lower control limits) are considered as significantly higher or lower than the average, represented by the solid line. The first control chart in Figure 17 shows that 16 units have a significantly higher or lower

proportion of EPG and GPG cancers than the UK as a whole. The second control chart shows that 8 units have a significantly higher or lower proportion of MPG cancers. The third control chart shows that 9 units have a significantly higher or lower proportion of PPG cancers. Seven units (3 in London, 2 in South East Coast, 1 in South West and 1 in North West) have a significantly higher proportion than the average with unknown NPI group (fourth control chart).

In the EPG and GPG cancer control chart (Figure 17), 1 unit in East Midlands has been an outlier every year during the 3-year audit period 2009/10-2011/12. In the MPG cancer control chart, 1 unit in North West has been an outlier every year during the 3-year audit period 2009/10-2011/12. No similar patterns are seen in the PPG or unknown NPI group cancer control charts. Regional QA reference centres and their regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for unusual NPI distributions seen in these 2 units and for the high proportion of cases with unknown NPI group seen in 7 screening units.

KEY FINDINGS

- A Nottingham Prognostic Index (NPI) score could be calculated for 97% of surgically treated invasive cancers.
- Although an NPI score was provided for 554 of the 625 surgically treated invasive cancers with neo-adjuvant therapy; all cancers with neo-adjuvant therapy recorded have been excluded from the following analyses as the NPI scores provided may not have reflected the true tumour characteristics at diagnosis.
- One unit in the EPG and GPG cancer control chart has been an outlier every year during the 3-year audit period 2009/10-2011/12. One unit in the MPG cancer control chart has been an outlier every year during the 3-year audit period 2009/10-2011/12. No similar patterns are seen in the PPG or unknown NPI group cancer control charts.
- Seven units in the unknown NPI group control chart are outliers with a significantly higher proportion of cases with unknown NPI than the UK average.
- Regional QA reference centres and their regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for unusual NPI distributions seen in these 2 units and for the high proportion of cases with unknown NPI group seen in 7 screening units.

3.6 Receptor Status

Oestrogen Receptor (ER) and Human Epidermal Growth Factor Receptor 2 (HER-2 status) should be available for all invasive cancers when they are discussed at multi-disciplinary meetings in order to plan the most appropriate neo-adjuvant or adjuvant treatment. Progesterone Receptor (PgR) status may provide additional prognostic information for ER negative cancers.

3.6.1 Invasive Cancers

In the UK as a whole, ER status was unknown for only 66 invasive cancers included in the main audit (Table 33). This may be because the test was not done, the test result was unknown or no information on ER status was provided. Regional QA reference centres should ensure that the ER status is recorded for all invasive cancers and that the results are available for discussion at multi-disciplinary meetings.

In the UK as a whole in 2011/12, 13,636 (91%) of the 14,911 invasive cancers were ER positive (Table 33). Of the 14,845 invasive cancers with known ER status, 13,636 (92%) were ER positive. This varied between regions from 90% in North East, Yorkshire & Humber to 93% in South West, East of England, London and Scotland. ER positivity for invasive cancers with known ER status varied even more widely between screening units; from 83% in a unit in North East, Yorkshire & Humber to 99% in a unit in South West. When the significance of the variation between screening units in the proportion of ER positive invasive cancers with known ER status over the 3-year period 2009/10-2011/12 was examined in a control chart (not shown), 11 units were high outliers and 11 low outliers. In 9 units fewer than 88% of invasive cancers with known ER status were ER positive. Three of these units were in North East, Yorkshire & Humber and 2 in East Midlands. Regional QA

reference centres and their regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for the unusual ER status results seen in the 22 outlier units.

In 2011/12, PgR status was known for 60% of invasive cancers (Table 35). This is a marked decrease from 2007/08 when PgR status was known for 75% of invasive cancers. The proportion of invasive cancers with known PgR status varied from 32% in North East, Yorkshire & Humber to 97% in North West and 95% in London. Of the 8,956 invasive cancers with known PgR status, 76% were positive. Of the 1,209 invasive cancers that were known to be ER negative, 84% had known PgR status; 5% were PgR positive and 78% were PgR negative (Table 36).

HER-2 status data were available for 98% of the 14,911 invasive cancers included in the main audit (Table 37). This is a slight increase from 97% of cancers with known HER-2 status at an equivalent point in time in 2010/11. The proportion of cases with known HER-2 status was lowest in London (96%) (Figure 18). Twenty percent of the invasive cancers without a HER-2 status were in London (58 cases) where, in 1 unit, 20% of the 242 invasive cancers had unknown HER-2 status. In 1 unit in East of England, 15% of the 61 invasive cancers had unknown HER-2 status and in 1 unit in North East, Yorkshire & Humber, 14% of the 209 invasive cancers had unknown HER-2 status. Regional QA reference centres should audit cases with unknown HER-2 status to determine whether these are data recording issues or true clinical practice.

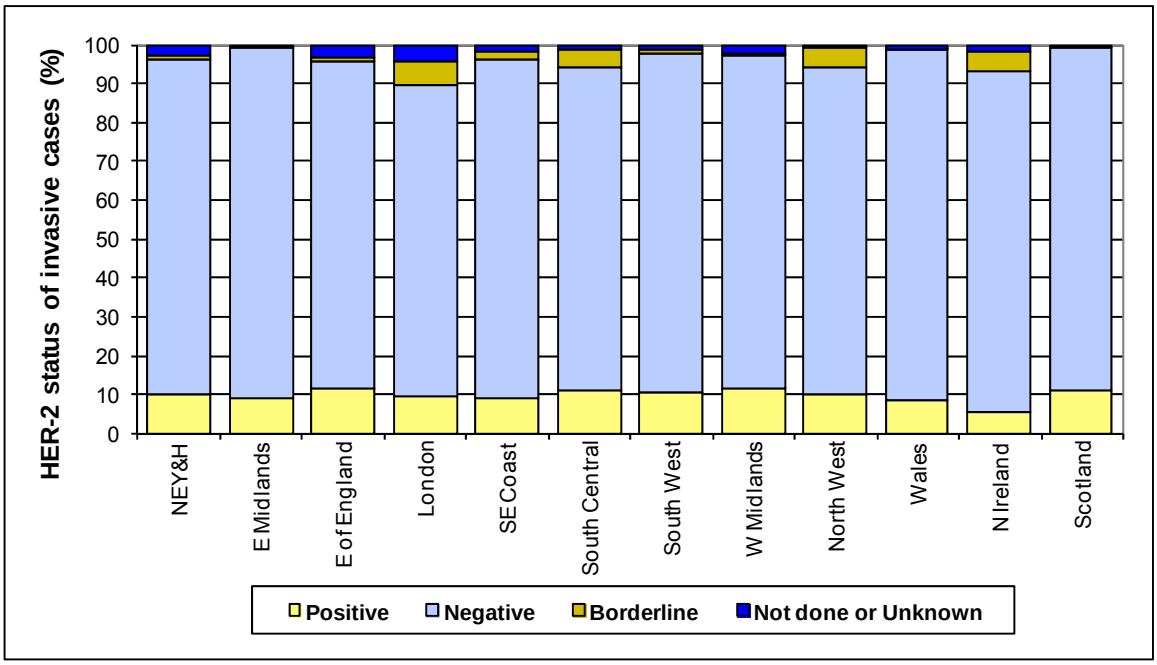

Figure 18 (Table 37): Variation in HER-2 status for invasive cancers

Of the 14,626 invasive cancers with known HER-2 status, 10% were positive, 88% were negative and 2% were borderline (Table 37). HER-2 positivity for invasive cancers varied from 5% in Northern Ireland to 11% in East of England, South Central, West Midlands and Scotland. Of the 285 cases without a HER-2 status, 35% had an invasive size of less than 10mm, 25% were Grade 1 and 66% had negative nodal status (Table 38). In 2011/12, HER2 positivity varied widely between screening units from 3% in a unit in Northern Ireland to 19% in a unit in West Midlands. When the significance of the variation between screening units in the proportion of HER2 positive invasive cancers over the 3-year period 2009/10-2011/12 was examined in a control chart (not shown), 10 units were high outliers and 8 low outliers. In 1 unit in South West, 23% of invasive cancers were HER2 positive. Regional QA reference centres and their regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for the unusual HER2 positivity results seen in the 18 outlier units.

3.6.2 Non/micro-Invasive Cancers

ER status was not known for 53% of non/micro-invasive cancers (Table 34). The proportion of non/micro-invasive cancers with unknown ER status varied from 26% in North West to 77% in Wales. Of the non/micro-invasive cancers with known ER status, 82% were ER positive compared with 92% of invasive cancers with known ER status. There was, however, very wide variation between screening units in the proportion of ER positive non/micro-invasive cancers with known ER status (Figure 19); from 25% in a unit in North East, Yorkshire & Humber to 100% in 14 units. The wide variation between screening units in the proportion of non/micro-invasive cancers with known ER status reflects the variable practice that has developed in the UK since the publication in 2009 of *NICE Clinical Guidance 80: Early and locally advanced breast cancer, Diagnosis and treatment* which states that Tamoxifen should not be offered to women with non-invasive breast cancers. In the rest of Europe and the US, consideration of endocrine therapy is still recommended for ER positive non-invasive breast cancers. In 2011/12, PgR status was known 24% of non/micro-invasive cancers. This is a marked decrease from 2007/08 when PgR status was known 40% of non-invasive cancers.

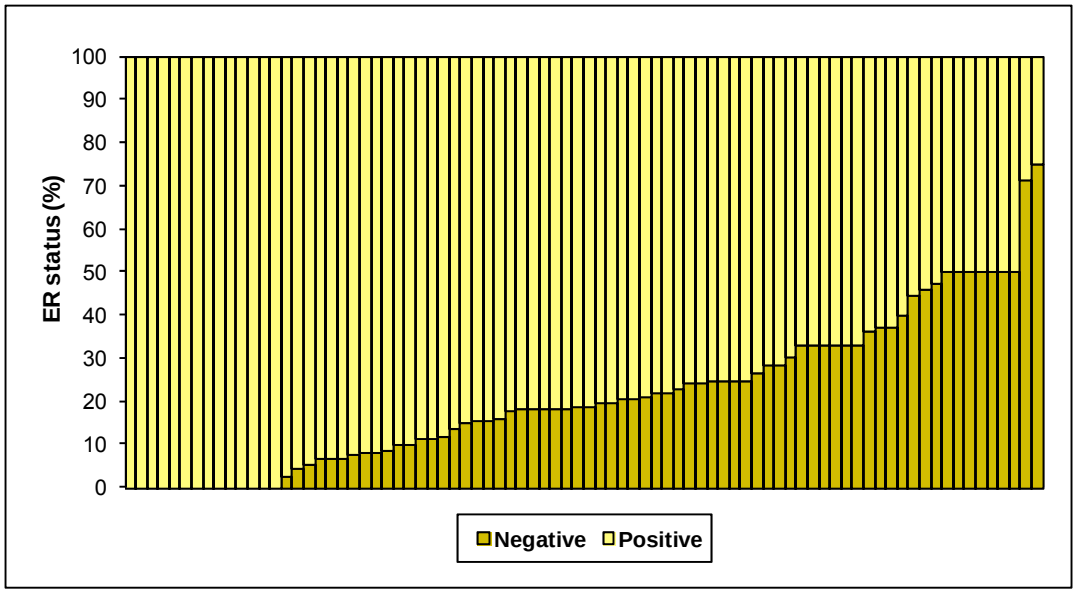

Figure 19: Variation between screening units in the ER status of non/micro-invasive cancers with known ER status (11 screening unit excluded because they had 100% unknown ER)

KEY FINDINGS

- ER status was unknown for 66 invasive cancers. Regional QA reference centres should ensure that the ER status is recorded for all invasive cancers and that the results are available for discussion at multi-disciplinary meetings.
- Of the invasive cancers with known ER status, 92% were ER positive.
- In the 3-year period 2009/10-2011/12, 11 units had a significantly higher proportion of ER positive cancers and 11 had a significantly lower proportion. In 9 units fewer than 88% of invasive cancers were ER positive. Three of these were in North East, Yorkshire & Humber and 2 in East Midlands. Regional QA reference centres and their regional pathology QA co-ordinators should investigate the reasons for the unusual results seen in the 22 outlier units.
- PgR status was known for 60% of invasive cancers compared with 75% in 2007/08. This varied from 32% in North East, Yorkshire & Humber to 97% in North West and 95% in London. Of the invasive cancers with known PgR status, 76% were positive. Of the 1,209 invasive cancers that were known to be ER negative, 84% had known PgR status; 5% were PgR positive and 78% were PgR negative.
- HER-2 status data were available for 98% of invasive cancers. Twenty percent of the invasive cancers without a HER-2 status were in London where, in one screening unit, 20% of the 242 invasive cancers had unknown HER-2 status. The regional QA reference centres should audit cases with unknown HER -2 status to determine whether this is a data recording problem or if the data reflect clinical practice.

KEY FINDINGS (cont.)

- Of the invasive cancers with known HER-2 status, 10% were positive, 88% were negative and 2% were borderline.
- In the 3-year period 2009/10-2011/12, 10 units had a significantly higher proportion of HER-2 positive invasive cancers and 8 a significantly lower proportion. In 1 unit in South West, 23% of invasive cancers were HER2 positive. Regional QA reference centres and their regional pathology QA co-ordinators should investigate the reasons for the unusual results seen in the 18 outlier units.
- ER status was not known for 53% of non/micro-invasive cancers. Only 82% of non-invasive cancers with known ER status were ER positive.
- The wide variation between screening units in the proportion of non/micro-invasive cancers with known ER status reflects the variable practice that has developed in the UK since the publication in 2009 of *NICE Clinical Guidance 80: Early and locally advanced breast cancer, diagnosis and treatment* which states that Tamoxifen should not be offered to women with non-invasive breast cancers. In the rest of Europe and the US, consideration of endocrine therapy is still recommended for ER positive non-invasive breast cancers.

CHAPTER 4
SURGICAL TREATMENT

4.1 Surgical Treatment for Non-invasive and Micro-invasive Breast Cancer

In the UK as a whole in 2011/12, 72% of the 3,672 non-invasive cancers were treated by breast conserving surgery, 27% were treated by mastectomy, 64 cancers (2%) apparently received no surgery and for 3 cancers it was not known whether or not surgery had been performed (Table 39). The mastectomy rate varied from 23% in South East Coast and East of England to 32% in North East, Yorkshire & Humber. All 138 micro-invasive cancers received surgery, 59% had breast conserving surgery and 41% had a mastectomy (Table 40).

Quality Objective **To minimise local recurrence after breast conservation surgery for DCIS**

Outcome Measure **Patients with extensive (>40mm diameter) or multicentric disease should usually undergo treatment by mastectomy**

(Quality Assurance Guidelines for Surgeons in Breast Cancer Screening, NHSBSP Publication No 20, 4th Edition, March 2009)

In 2011/12, 37% of the 3,608 non-invasive cases with surgery were less than 15mm in diameter and 15% were larger than 40mm in diameter (Table 25). Of the 536 non-invasive cancers larger than 40mm in diameter, 106 (20%) had breast conserving surgery (Table 41). Of these cancers, 75 were high cytonuclear grade (see summary table). A further 14 non-invasive cancers with unknown size, were either high cytonuclear grade or had unknown cytonuclear grade. Regional QA reference centres and regional surgical QA co-ordinators should audit the 106 large non-invasive cancers and the 14 non-invasive cancers with unknown size with high or unknown cytonuclear grade that had breast conserving surgery to ensure that they were not under-treated.

NUMBER OF NON-INVASIVE CANCERS TREATED WITH BREAST CONSERVING SURGERY

Region	>40mm		Unknown size		Total*
	High cytonuclear grade (Table 42)	Unknown cytonuclear grade	High cytonuclear grade	Unknown cytonuclear grade (Table 43)	
N East, Yorks & Humber	9	0	0	0	9
East Midlands	5	0	1	0	6
East of England	6	0	1	0	7
London	5	0	1	1	7
South East Coast	11	0	0	0	11
South Central	6	0	2	0	8
South West	8	0	1	0	9
West Midlands	2	0	0	0	2
North West	5	0	1	0	6
Wales	4	0	4	0	8
Northern Ireland	4	0	0	0	4
Scotland	10	0	1	1	12
United Kingdom	***75***	***0***	***12***	***2***	***89***

*Each non-invasive cancer is counted once only; “non-invasive - biopsy only” cases are excluded

KEY FINDINGS

- 72% of non-invasive cancers were treated with breast conserving surgery; 64 cancers apparently received no surgery. Mastectomy rates for non-invasive cancers varied from 23% in South East Coast and East of England to 32% in North East, Yorkshire & Humber.
- 120 potentially large high cytonuclear grade non-invasive cancers were treated with breast conserving surgery. Regional QA reference centres and regional surgical QA co-ordinators should review the data recorded for these cases to ensure that they were not under-treated.

4.2 Surgical Treatment for Invasive Breast Cancer

Of the 14,911 invasive breast cancers detected by the UK NHSBSP in 2011/12, 11,282 (76%) underwent breast conserving surgery and 3,378 (23%) had a mastectomy. Figure 20 shows the regional variation in invasive cancer mastectomy rates which ranged from 20% in South West and Wales to 26% in North East, Yorkshire & Humber. Mastectomy rates in individual screening units varied between 11% (one unit in South West) and 38% (one unit in North East, Yorkshire & Humber). Two hundred and forty seven invasive cancers (2%) had no surgery, and treatment information was unavailable for 4 invasive cancers. Of the invasive cancers with no surgery, 115 (47%) had neo-adjuvant therapy. Regional QA reference centres and regional surgical QA co-ordinators should audit the 132 invasive cancers without surgery that did not have neo-adjuvant therapy recorded and the 4 invasive cancers with unknown surgery to ascertain why surgical treatment was not given or why the surgical treatment that was given was not recorded.

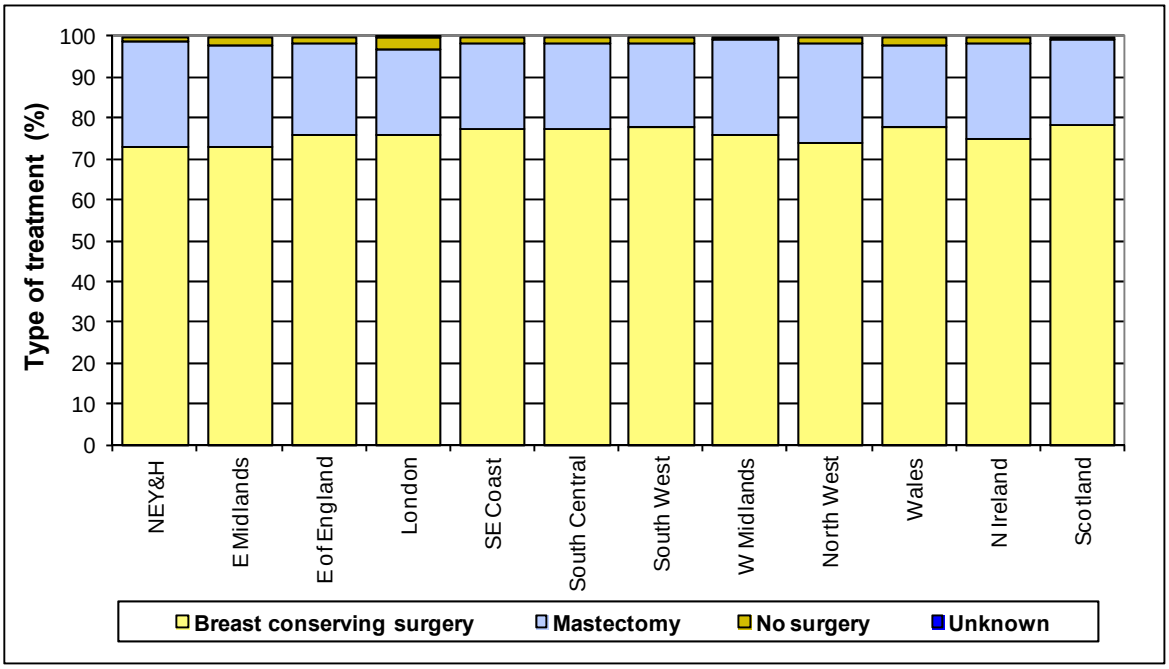

Figure 20 (Table 44): Type of treatment for invasive cancers (all sizes)

4.2.1 Surgical Treatment of Invasive Cancers According to Invasive Size

In most regions there was a clear variation in mastectomy rate with invasive tumour size; the overall rates being 15%, 20%, 36%, 69% and 84% for cancers with invasive tumour diameters of less than 15mm, 15mm-20mm, greater than 20mm to 35mm, greater than 35mm to 50mm and greater than 50mm respectively (Table 45). In South West (61%), London (66%) and South Central (68%) mastectomy rates for cancers with invasive tumour diameters in the two largest size categories were lower compared to other regions and the UK average (74%).

The overall mastectomy rate for small (<15mm) invasive cancers remained fairly stable between 1996/97 and 2005/06, varying between 18% and 21%. Since 2005/06, the mastectomy rate has gradually decreased to an all time low of 15% in 2011/12. The highest mastectomy rates in 2011/12

for small (<15mm) invasive cancers were recorded in North East, Yorkshire & Humber (20%) and the lowest rates (13%) in London, South West and Scotland (Table 45).

4.2.2 Surgical Treatment of Invasive Cancers According to Whole Tumour Size

The whole tumour size is the maximum diameter of the whole tumour, including any non-invasive component which extends beyond the invasive lesion. The following table shows how mastectomy rates in 2011/12 varied with the size of the invasive cancer and with whole tumour size. As expected, mastectomy rates increased with invasive tumour size from 15% for small (<15mm diameter) tumours, to 84% for very large (>50mm diameter) tumours. For small (<15mm) invasive cancers, mastectomy rates also increased as the whole tumour size increased. Thus, while only 9% of small (<15mm) cancers with whole tumour size <15mm were treated with a mastectomy, 90% of small (<15mm) cancers with whole tumour size >50mm had a mastectomy. The lower mastectomy rate for small (<15mm) cancers with whole tumour size <15mm indicates that the presence of non-invasive disease which extends beyond the invasive lesion accounts for a significant proportion of the mastectomies performed on small (<15mm) invasive cancers.

INVASIVE CANCER TREATMENT – VARIATION WITH TUMOUR SIZE

Size	***Invasive size*** *(Table 45)*		***Whole tumour size for cancers with invasive component <15mm*** *(Table 47)*	
	No.	***Mastectomy Rate (%)***	***No.***	***Mastectomy Rate (%)***
<15mm	*1182*	*15*	*543*	*9*
15-≤20mm	*677*	*20*	*129*	*14*
>20-≤35mm	*893*	*36*	*201*	*30*
>35-≤50mm	*359*	*69*	*130*	*59*
>50mm	*219*	*84*	*172*	*90*

Tables 45 and 47 show that in every region, the mastectomy rate for cancers with whole tumour size <15mm was lower than that for cancers with an invasive tumour size <15mm. The difference was greatest in Northern Ireland (18% compared to 10%) and North East, Yorkshire & Humber (20% compared to 11%), and least in South West (13% compared to 10%).

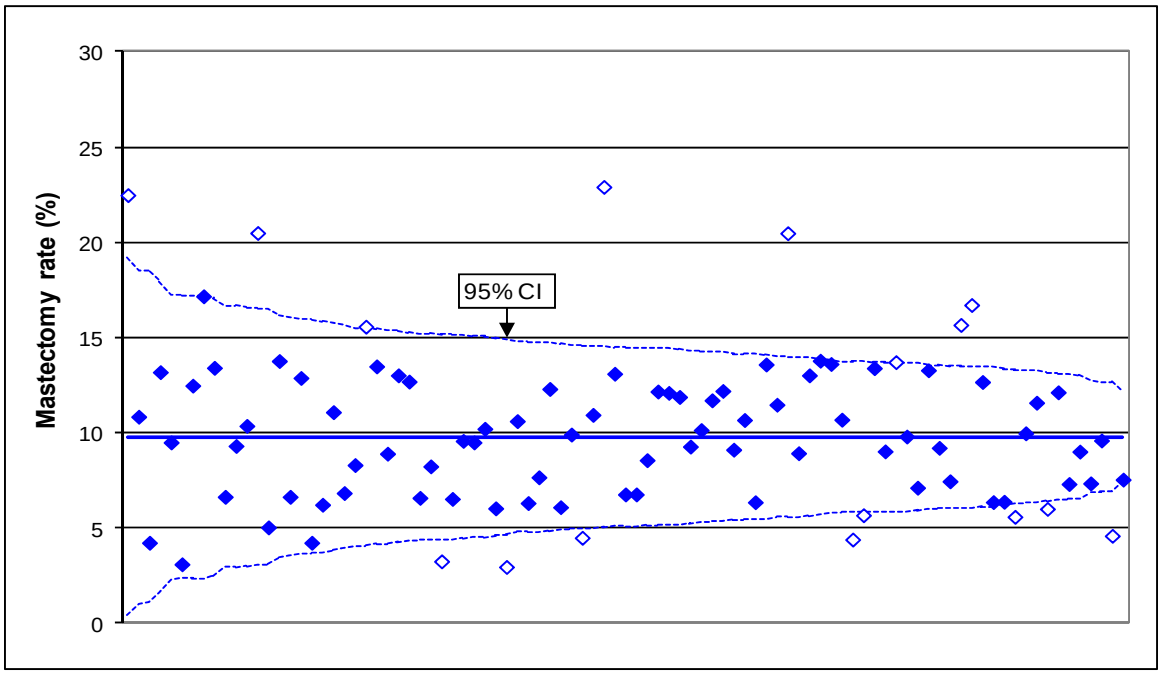

Figure 21: Variation between screening units in the mastectomy rates for invasive cancers with whole tumour size <15mm in 2009/10-2011/12
(Open diamonds represent units which lie outside the control limits)

Figure 21 shows the variation between screening units in the mastectomy rate for invasive cancers with whole tumour size <15mm in the 3-year period 2009/10-2011/12. The two dashed lines are the upper and lower control limits which approximate to the 95% confidence intervals of the average mastectomy rate (solid line). Mastectomy rates which are outside the control limits are significantly higher (eight units) or lower (eight units) than the average rate of 10%.

Of the 8 units with unusually high mastectomy rates, 2 were in East Midlands, 3 in North East, Yorkshire & Humber, 2 in North West, and 1 in Wales. Two of the 8 units with unusually low mastectomy rates were in West Midlands; the remainder were in South West, South East Coast, North East, Yorkshire & Humber, North West, London and Scotland. Regional QA reference centres and regional surgical QA co-ordinators should review the data for screening units lying outside (above and below) the control limits to ascertain the reasons for this unusual clinical practice. For units with unusually high mastectomy rates, access to reconstruction (immediate and delayed) and the role of patient choice would be of particular interest. For units with unusually low mastectomy rates, cosmetic outcomes and recurrence rates would be particularly relevant.

As with invasive tumour size, in most regions there was a clear variation in mastectomy rate with whole tumour size (Figure 22); the overall rates being 9%, 15%, 31%, 63% and 85% for cancers with invasive tumour diameters of less than 15mm, 15mm-20mm, greater than 20mm to 35mm, greater than 35mm to 50mm and greater than 50mm respectively (Table 46). In South West (57%), London (66%) and Wales (65%) mastectomy rates for cancers with whole tumour diameters in the two largest size categories were particularly low compared to other regions and the UK average (72%).

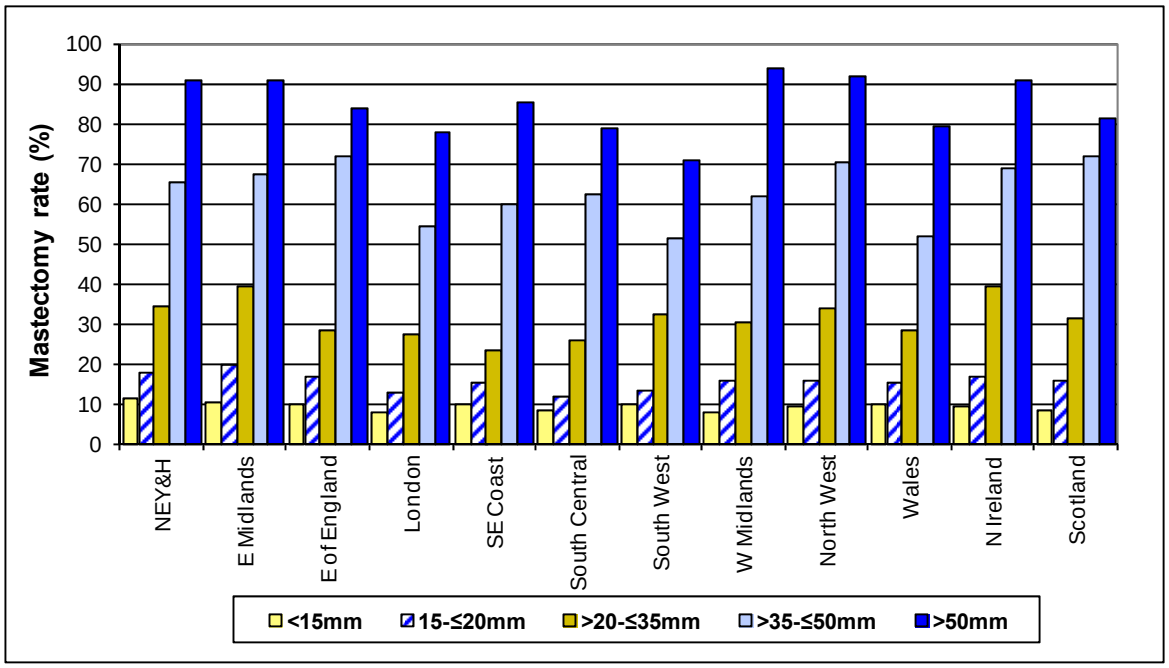

Figure 22 (Table 46): Variation in mastectomy rates with whole tumour size

KEY FINDINGS

- In the UK as a whole, 23% of invasive breast cancers had a mastectomy. Mastectomy rates in individual screening units varied between 11% and 38%.
- Two hundred and forty seven invasive cancers had no surgery, and treatment information was unavailable for 4 invasive cancers in Scotland. Regional QA reference centres and regional surgical QA co-ordinators should audit the 132 invasive cancers without surgery that did not have neo-adjuvant therapy recorded, and the 4 invasive cancers with unknown surgery to ascertain why surgical treatment was not given or why the surgical treatment that was given was not recorded.
- In most regions there was a clear variation in mastectomy rate with invasive tumour size. In South West (61%), London (66%) and South Central (68%) mastectomy rates for cancers with invasive tumour diameters in the two largest size categories were lower compared to other regions and the UK average (74%).

KEY FINDINGS (cont.)

- Since 2005/06, the mastectomy rate for small (<15mm) invasive cancers has decreased to an all time low of 15% in 2011/12.
- Only 9% of cancers with whole tumour size less than 15mm were treated with mastectomy compared with 90% of small invasive (less than 15mm diameter) cancers with whole tumour diameter greater than 50mm. These data indicate that the presence of non-invasive disease which extends beyond the invasive lesion accounts for a proportion of the mastectomies performed on small invasive cancers.
- In the 3-year period 2009/10-2011/12, 16 units had significantly higher or lower mastectomy rates for invasive cancers with whole tumour size <15mm. In order to ascertain the reasons for non-random variation in clinical practice, regional QA reference centres and regional surgical QA co-ordinators should review the data for all of these screening units.
- In South West (57%), London (66%) and Wales (65%) mastectomy rates for cancers with whole tumour diameters in the two largest size categories were particularly low compared to other regions and the UK average (72%).

4.3 Immediate Reconstruction Following Mastectomy

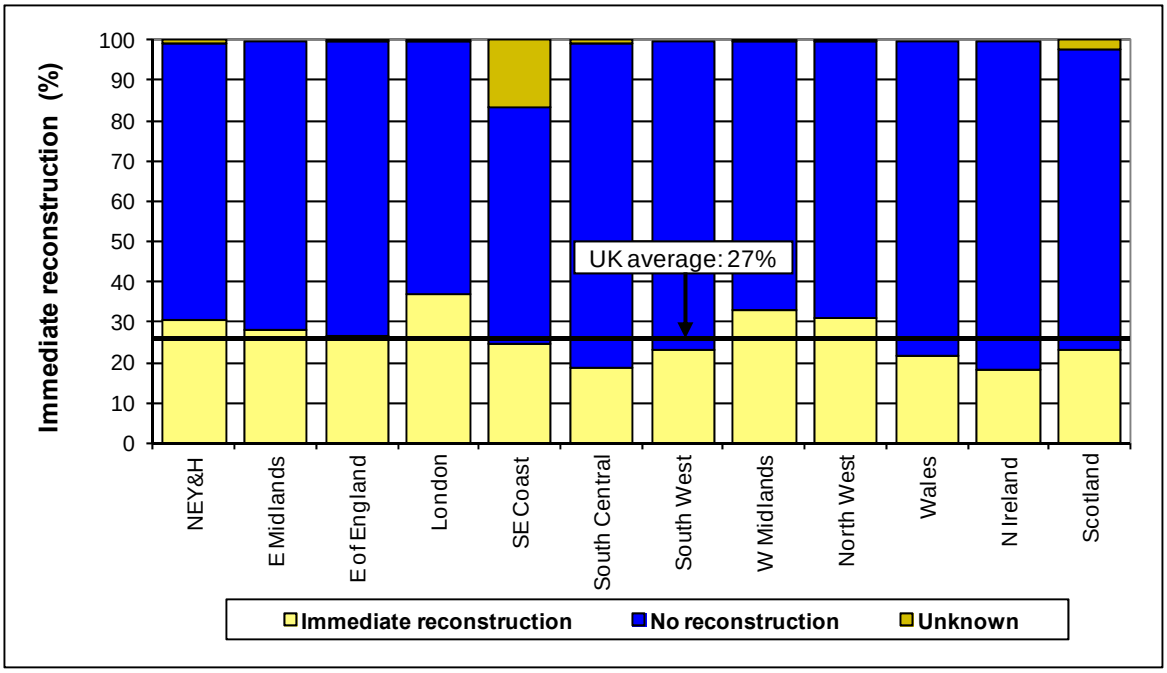

Figure 23 (Table 48): Proportion of all cancers having immediate reconstruction following a mastectomy

Overall, of the 18,745 cancers detected in 2011/12, 4,412 (24%) were treated with mastectomy. Of these, 3,121 (71%) cases had no immediate reconstruction recorded, and for 79 (2%) cases it was unknown whether or not immediate reconstruction was performed (Table 48). 1,212 cancers (27%) were recorded as having immediate reconstruction. Table 49 shows that, of the 1,212 cancers known to have had immediate reconstruction following mastectomy, 777 (64%) were invasive, 23 (2%) were micro-invasive and 412 (34%) were non-invasive. Only 777 (23%) of the 3,378 invasive cancers treated with mastectomy (Tables 44 and 49) had immediate reconstruction recorded compared with 412 (42%) of the 975 non-invasive cancers (Tables 39 and 49) and 23 (40%) of the 57 micro-invasive cancers treated with mastectomy (Tables 40 and 49).

Figure 23 shows how recorded immediate reconstruction rates for all screen-detected cancers treated with mastectomy varied between regions in 2011/12. The highest rate was in London (37%) and the lowest in South Central and Northern Ireland (18%). South East Coast had 57 cases (17%) where it was not known whether or not immediate reconstruction was performed.

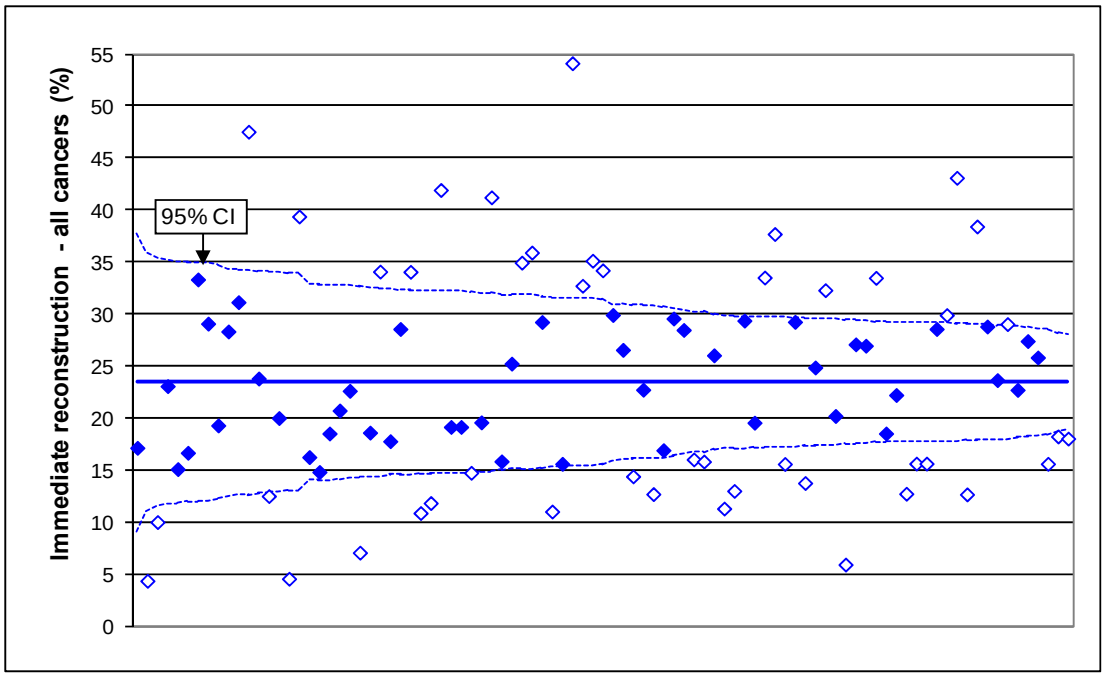

Figure 24: Variation in immediate reconstruction following mastectomy for all cancers in each screening unit in 2009/10-2011/12 (Open diamonds represent units which lie outside the control limits)

Figure 24 demonstrates the variation between screening units in the proportion of cases having immediate reconstruction in the 3-year period 2009/10-2011/12. The two dashed lines are the upper and lower control limits which approximate to the 95% confidence intervals of the average mastectomy rate (solid line). Immediate reconstruction rates which are outside the control limits are significantly higher (20 units) or lower (25 units) than the average rate of 23%. Of the 20 units with high immediate reconstruction rates, 4 were in South East Coast, 4 in West Midlands, 3 in London, 3 in North West and 2 in East of England. Of the 25 units with low immediate reconstruction rates for all cancers, 5 were in North East, Yorkshire & Humber, 5 in South Central and 3 in Scotland. In 4 units (2 in South Central, 1 in Wales and 1 in Northern Ireland), fewer than 10% of cases had immediate reconstruction recorded. In the UK as a whole, immediate reconstruction rates after mastectomy were almost twice as high for non/micro-invasive cancers (42%) than for invasive cancers (23%). For invasive cancers treated with mastectomy, immediate reconstruction rates varied from 13% in Northern Ireland to 36% in London, and for non/micro-invasive cancers treated with mastectomy, immediate reconstruction rates varied from 28% in South Central to 55% in North West (Figure 25).

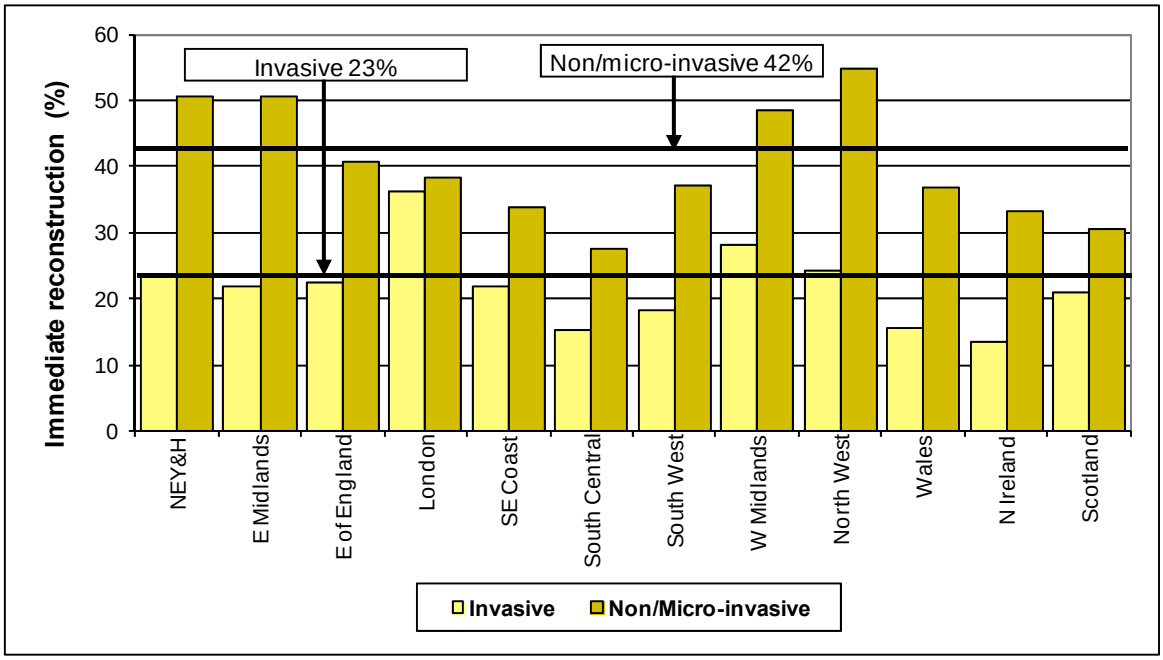

Figure 25: Variation in the proportion of invasive and non/micro-invasive cancers with immediate reconstruction

The following summary table shows that, for invasive and non/micro-invasive cancers, immediate reconstruction rates after a mastectomy have increased by 7-8% since 2009/10.

IMMEDIATE RECONSTRUCTION RATES FOR BREAST CANCER PATIENTS TREATED BY MASTECTOMY			
Invasive Status	***2009/10***	***2010/11***	***2011/12***
Invasive	*16%*	*19%*	*23%*
Non/micro-invasive	*33%*	*37%*	*42%*
Overall	***19%***	***23%***	***27%***

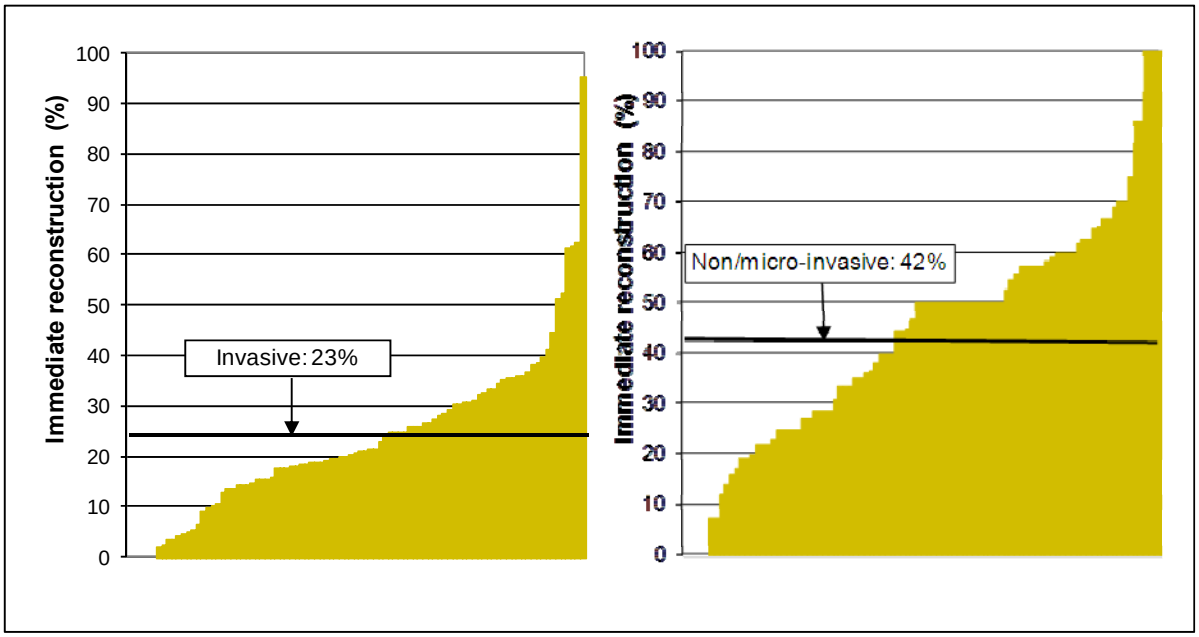

Figure 26: Variation between screening units in immediate reconstruction rates for invasive and non/micro-invasive cancers

Figure 26 shows the very wide variation in recorded immediate reconstruction between screening units in 2011/12; with rates for invasive cancers ranging from 0 cancers in 6 screening units to over 40% of cancers in 8 units and for non/micro-invasive cancers ranging from 0 cancers in 6 screening units to over 60% of cancers in 16 units. Immediate reconstruction rates were higher for non/micro-invasive cancers in the majority of units (77 units). For invasive cancers, there was no obvious relationship between immediate reconstruction rates and whole tumour size.

In control charts (not shown) examining the variation in immediate reconstruction rates over the 3-year period 2009/10-2011/12 for invasive and non/micro-invasive cancers separately, 19 screening units had significantly higher immediate reconstruction rates for invasive cancers and 23 had significantly lower rates. 14 screening units had significantly higher immediate reconstruction rates for non/micro-invasive cancers and 8 had significantly lower rates. Five screening units (two in South Central, 1 in London, 1 in North East, Yorkshire & Humber, and 1 in Wales) were low outliers for invasive and non/micro-invasive cancers. Of the 23 screening units which were low outliers for immediate reconstruction for invasive cancers, 6 are also high outliers in Figure 21 and had unusually high mastectomy rates for small (<15mm) invasive cancers over the same 3-year time period. Three of these units were in North East, Yorkshire & Humber, 1 in North West, 1 in East Midlands and 1 in Wales. One of these screening units in North East, Yorkshire & Humber and the unit in Wales were also low outliers for immediate reconstruction after mastectomy for non/micro-invasive cancers. Regional QA reference centres should audit units with low immediate reconstruction rates to determine whether this is a data recording issue or indicative of unusual clinical practice or patient choice.

KEY FINDINGS

- Of the cancers treated with mastectomy in 2010/11, 29% were recorded as having immediate reconstruction. The highest immediate reconstruction rate was in London (37%), and the lowest in South Central and Northern Ireland (15%).
- Immediate reconstruction rates after mastectomy were almost twice as high for non/micro-invasive cancers (42%) than for invasive cancers (23%).
- For invasive cancers treated with mastectomy, immediate reconstruction rates varied from 13% in Northern Ireland to 36% in London. For non/micro-invasive cancers, immediate reconstruction rates varied from 28% in South Central to 55% in North West.
- In 2009/10-2011/12, 19 screening units had significantly higher immediate reconstruction rates for invasive cancers and 23 had significantly lower rates. 14 screening units had significantly higher immediate reconstruction rates for non/micro-invasive cancers and 8 had significantly lower rates.
- Of the 23 screening units which were low outliers for immediate reconstruction for invasive cancers, 6 also had unusually high mastectomy rates for small (<15mm) invasive cancers. Of these, 3 were in North East, Yorkshire & Humber, 1 in North West, 1 in East Midlands and 1 in Wales.
- Regional QA reference centres should audit units with low immediate reconstruction rates to determine whether this is a data recording issue or indicative of unusual clinical practice or patient choice.

4.4 Neo-adjuvant Therapy

A total of 625 cancer patients received neo-adjuvant therapy in 2011/12 (Table 50). This included 601 (4%) of the 14,911 patients with invasive cancer, 18 patients with non-invasive cancer and 6 patients with unknown invasive status. For 15 cases (all in Scotland), it was not confirmed whether the patient did or did not receive neo-adjuvant therapy. Of the 18 patients with non-invasive cancer receiving neo -adjuvant therapy, 14 received neo-adjuvant endocrine therapy and 4 were recorded as having had neo-adjuvant chemotherapy.

Two hundred and forty seven women with invasive breast cancer (2%) had no surgery. Of these, 115 had neo-adjuvant therapy recorded. This may be because neo-adjuvant therapy was the only treatment received by the patient or because surgery was not planned until the course of neo-adjuvant therapy was completed and, as a result, the surgery took place after the audit cut off date.

The following table shows how the use of neo-adjuvant therapy varied with age for all women with breast cancer (invasive or non/micro-invasive). As with adjuvant chemotherapy, the use of neo-adjuvant chemotherapy was higher in younger women. The use of neo-adjuvant endocrine therapy was highest for the older women aged 71 years or more; 41% (25 cases) of whom had no surgery recorded. All of the women aged less than 50 years who had neo-adjuvant therapy recorded also had surgery.

USE OF NEO-ADJUVANT THERAPIES

Age	*Chemotherapy*	*Herceptin*	*Endocrine therapy*
<50	2.8%	0.2%	0.6%
50 – 64	1.8%	0.1%	1.4%
65 – 70	1.2%	0.1%	2.4%
71+	0.5%	0.1%	4.0%

4.4.1 Neo-adjuvant Endocrine Therapy

Of the 340 breast cancers (2%) with neo-adjuvant endocrine therapy recorded (Table 51), 325 were invasive, 14 were non-invasive and the invasive status of 1 cancer was unknown. The proportion of cancers receiving neo-adjuvant endocrine therapy varied between regions from 0% (2 cases) in Northern Ireland to 3% (45 cancers) in South East Coast. Of the cancers with neo-adjuvant endocrine therapy recorded, 327 (96%) were ER and/or PgR positive, 3% (11 cancers) had unknown ER and

PgR status and the remaining 2 cancers were ER and PgR negative. It was not known whether the endocrine receptor status was determined from the core biopsy or from resection specimens. Of the 340 cancers that had neo-adjuvant endocrine therapy recorded, 89 (26%) had no surgery and 18 (5%) also had other adjuvant therapy. Two hundred and fifty eight (76%) of the cancers receiving neo -adjuvant endocrine therapy were diagnosed in women aged 60 years or over.

4.4.2 Neo-adjuvant Chemotherapy

Neo-adjuvant chemotherapy was recorded for 298 breast cancers (2% of all cancers diagnosed in 2011/12) (Table 52); 289 were invasive, 4 were non-invasive and 5 had unknown invasive status. The 4 non-invasive cases were audited by their QA reference centres; in one case the surgical specimen contained only DCIS and in another no primary cancer was found at surgery, in another the pathology result was particularly complex, and one patient had neo-adjuvant chemotherapy because they chose not to have surgery but had distant metastases. The proportion of cancers having neo-adjuvant chemotherapy varied very little between regions. Of the 289 invasive cancers for which neo-adjuvant chemotherapy was recorded, 39 (13%) did not have surgery. A further 36 (11%) had surgery, but no malignant component was found in the surgical specimen. This is probably because the neo-chemotherapy had removed the cancer.

Of the 289 invasive cancers treated with neo-adjuvant chemotherapy, 130 (45%) had a tumour size larger than 20mm on mammography, and 84 (29%) had a tumour size of 20mm or less on mammography. One hundred and thirty seven (47%) had an abnormal axillary ultrasound result. Of these 137 cancers, 115 (84%) had a needle core biopsy, and for 48 (42%) of these a C5/B5 result was recorded. Only 12 of the 289 invasive cancers treated with neo-adjuvant chemotherapy were Grade 1 and, 80% were Grade 2 or 3. Five cancers were small (20mm or less), Grade 1 and were not proven to have abnormal lymph nodes. Regional QA reference centres should ascertain if the data for these cancers were recorded correctly.

4.4.3 Neo-adjuvant Trastuzumab

In the UK as a whole in 2011/12, 24 breast cancers (all invasive) were recorded as having received neo-adjuvant Trastuzumab (Table 53). Of these, 22 were HER-2 positive, 1 was HER-2 negative and 1 had unknown HER-2 status. Of the 24 cancers treated with Trastuzumab, 19 (79%) also had neo-adjuvant chemotherapy recorded. Regional QA reference centres should audit the 5 HER2 positive breast cancers that were treated with Trastuzumab which had no neo-adjuvant chemotherapy recorded, and the HER2 negative cancer that was recorded as receiving Trastuzumab.

KEY FINDINGS

- A total of 625 cancer patients received neo-adjuvant therapy in 2011/12. Of these, 601 were invasive and 18 non-invasive.
- Of the 247 women with invasive breast cancer who did not have surgery, 115 (2%) had neo-adjuvant therapy recorded.
- The use of neo-adjuvant endocrine therapy was highest for the older women aged 71 years or more; 41% (25 cases) of whom had no surgery recorded. All of the women aged less than 50 years who had neo-adjuvant therapy recorded also had surgery.
- Of the 340 cancers (2%) with neo-adjuvant endocrine therapy recorded, 327 (96%) were ER and/or PgR positive, 11 had unknown ER and PgR status and 2 were ER and PgR negative; 89 (26%) had no surgery and 76% were aged 60 years or over.
- Neo-adjuvant chemotherapy was recorded for 298 breast cancers (2% of all cancers diagnosed in 2011/12); 289 were invasive, 4 were non-invasive and 5 had unknown invasive status. The 4 non-invasive cases were audited by their QA reference centres.
- Five of the invasive cancers treated with neo-adjuvant chemotherapy were small (20mm or less), Grade 1 and were not proven to have abnormal lymph nodes. Regional QA reference centres should ascertain if the data for these cancers were recorded correctly.
- In 2011/12, 24 breast cancers (all invasive) were recorded as having received neo-adjuvant Trastuzumab. Regional QA reference centres should audit the 5 HER2 positive breast cancers that were treated with Trastuzumab which had no neo-adjuvant chemotherapy recorded, and the HER2 negative cancer that was recorded as receiving Trastuzumab.

CHAPTER 5
SURGICAL CASELOAD

For each patient in the NHSBSP audit, one surgeon is recorded as the main person responsible for the case. Many surgeons now work in teams and it is possible that a woman may have seen or have been treated by more than one consultant surgeon during her cancer journey, whilst only one surgeon has been recorded on the National Breast Screening Computer System. Currently, only the responsible consultant, and not necessarily the surgeon who actually undertook the operation, is recorded in this audit. The caseload for some surgeons will thus include patients operated on by associate specialists or supervised trainees.

For patients without surgery, a responsible surgeon is occasionally recorded, and these 'no surgery' cases have been included in the surgeon's caseload. In this year's audit, for the first time, if a surgeon has treated cases in more than one region, the totals in each region have been combined, and the surgeon and their combined caseload have been assigned to only one region. This revised allocation method has also been used in the 3-year comparisons, and has had the overall effect of decreasing slightly compared with previous years, the number of surgeons who have a low caseload.

Quality Objective	**To ensure specialist surgical care**
Outcome Measure	**Breast cancer surgery should be performed only by surgeons with a specialist interest in breast disease (defined as at least 30 surgically treated cases per annum [screening and symptomatic]). Each surgeon involved in the NHSBSP should maintain a surgical caseload of at least 10 screen-detected cancers per year averaged over a three year period.**

(Quality Assurance Guidelines for Surgeons in Breast Cancer Screening, NHSBSP Publication No 20, 4th Edition, March 2009)

In 2011/12, 582 consultant breast surgeons treated patients with cancers diagnosed through the UK NHSBSP. Two low caseload surgeons were not assigned to any region in the UK and have been excluded from the analyses. Of the 580 consultant surgeons included in the audit (Table 54), 51 treated patients from more than one region and their overall caseload was allocated to only one region. Five hundred and six surgeons were identified by their name or unique GMC registration code. A code other than the GMC code was provided for a further 57 surgeons from Scotland. Data for the remaining 17 unidentified surgeons have been assumed to be for 17 individual surgeons.

The perceding 12 year summary table shows that the proportion of women managed or treated by surgeons with a screening caseload of 20 or more has increased from 86% in 2000/01 to 93% in 2011/12. In 2011/12, 82% of women were treated by surgeons with an annual caseload of more than 30 screen-detected cancers, and only 2% (419) were treated by surgeons with an annual caseload of fewer than 10 screen-detected cancers (Table 55). Of the 142 surgeons treating fewer than 10 screening cases per year, 46 (32%) had a symptomatic caseload of more than 30 cases per year and 24 (17%) either joined or left the NHSBSP during 2011/12.

Combining the data submitted for 2009/10, 2010/11 and 2011/12 NHSBSP/ABS audits, an annual average screening caseload could be calculated for 744 consultant surgeons who managed or treated patients with screen-detected cancers. The 2 low caseload surgeons who were not assigned to any region in the UK were again excluded from these analyses. Of the remaining 742 surgeons (Table 56), 122 (16%) surgeons treated patients from more than one region and their overall caseload was allocated to only one region.

12 YEAR SUMMARY: SCREENING SURGICAL CASELOAD					
Year of data collection	*Number of screening surgeons*	*Median screening caseload*	*Proportion of women treated by a surgeon with screening caseload 20+ (%)*	*Number of surgeons with screening caseload <10*	*Number of surgeons with no information to explain screening caseload <10*
2000/01	*419*	*17*	*86*	*159*	*25*
2001/02	*439*	*18*	*85*	*156*	*52*
2002/03	*472*	*18*	*86*	*174*	*55*
2003/04	*481*	*19*	*89*	*161*	*15*
*2004/05**	*484*	*20*	*91*	*151*	*10*
2005/06	*511*	*23*	*93*	*149*	*11*
2006/07	*559*	*22*	*91*	*186*	*16*
2007/08	*526*	*30*	*92*	*142*	*6*
2008/09	*549*	*27*	*92*	*149*	*4*
2009/10	*544*	*29*	*92*	*138*	*6*
2010/11	*592*	*28*	*91*	*160*	*25*
2011/12	*580*	*30*	*93*	*142*	*18*

*Data for 2 units from East of England are absent in 2004/05

The variation in screening surgical caseload in each region in the 3-year period 2009/10-2011/12 is shown in Figure 27. Two hundred and seventy six surgeons (37%) treated 30-99 screening cases per year, 85 (11%) treated 20-29 screening cases per year and 87 (12%) treated 10-19 screening cases per year. Two hundred and eighty eight surgeons (39%) had an annual screening caseload of fewer than 10 cases. The highest proportion of surgeons with a screening caseload of fewer than 10 screening cases per year was in Scotland (54%), where some low caseload surgeons also work elsewhere in the UK. It is not possible to resolve this double counting problem because the codes used to identify surgeons in Scotland are different to those used in the rest of the UK. Surgical specialisation was highest in Wales, where only 3 surgeons (14%) treated fewer than 10 screening cases per year.

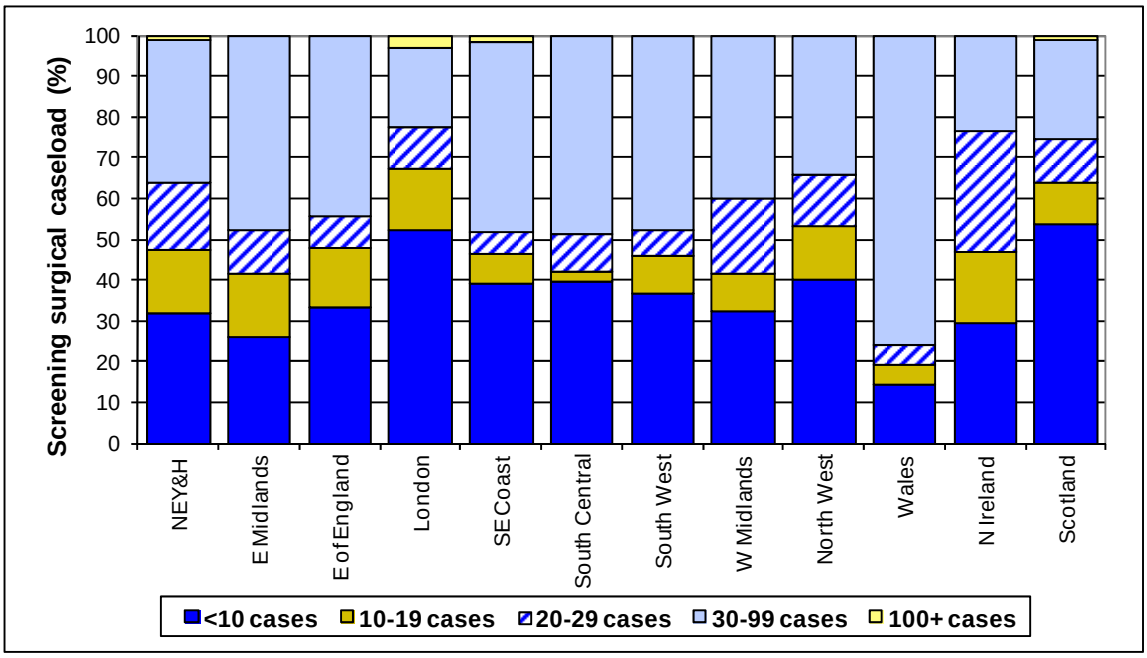

Figure 27 (Table 56): Variation in annual screening surgical caseload expressed as number of cases per surgeon (3-year data 2009/10-2011/12)

Figure 28 shows the variation in the proportion of women treated by surgeons with differing average annual screening caseloads in the 3-year period 2009/10-2011/12. Of the 53,661 women who were under the care of a consultant surgeon, 1,888 (4%) were treated by 6 surgeons who had an average annual screening caseload of 100 cases or more. A further 39,659 women (74%) were treated by a

surgeon with an average annual screening caseload of 30-99 cases. In the UK as a whole, 2,019 women (4%) were treated by a surgeon with an average annual screening caseload of fewer than 10 cases. In Northern Ireland, 7% of women were treated by surgeons with an average annual screening caseload of fewer than 10 cases.

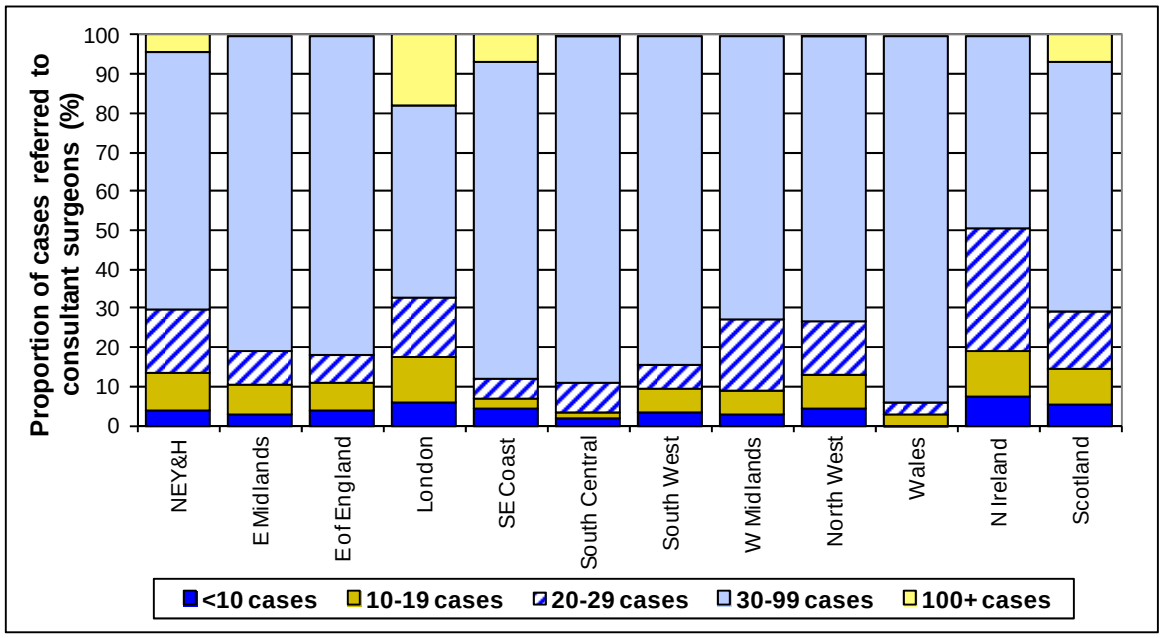

Figure 28 (Table 57): Variation in the proportion of women treated by surgeons with differing screening caseloads (3-year data 2009/10-2011/12)

A list of 6 possible reasons was provided to explain why surgeons had an average annual screening caseload of fewer than 10 cases. If multiple reasons were given, only one was included. The reasons given to explain average annual caseloads of fewer than 10 cases are shown in Figure 29.

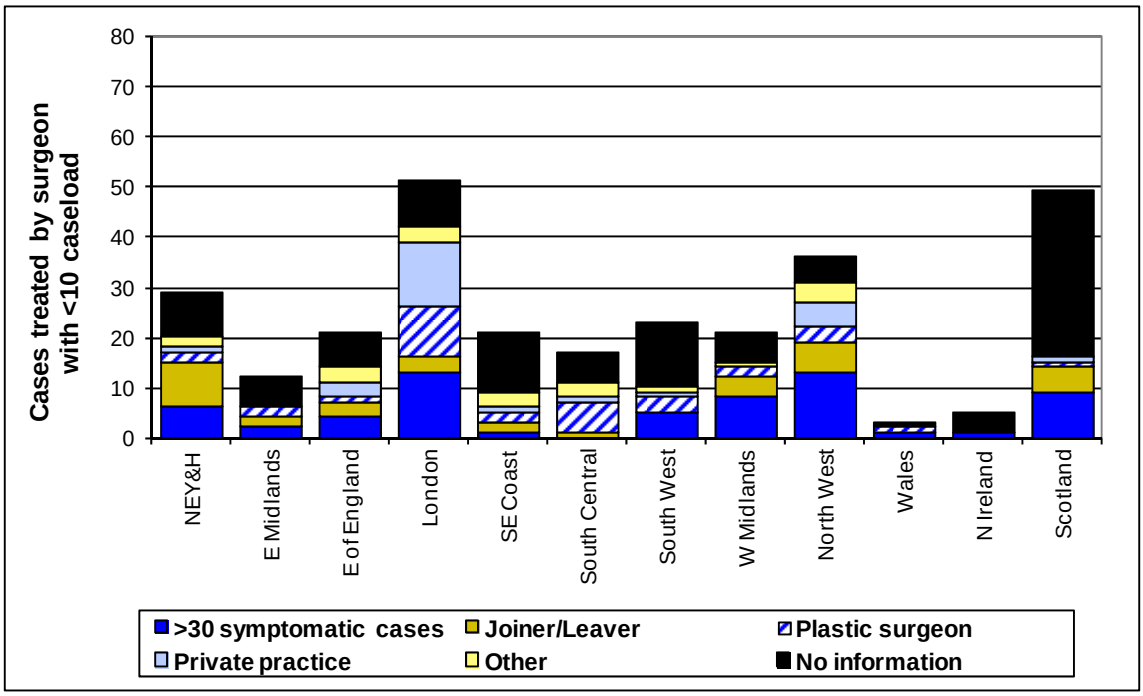

Figure 29 (Table 59): Explanations provided for surgeons treating fewer than 10 screening cases (3-year data 2009/10-2011/12)

Of the 288 surgeons in the UK with an average annual screening caseload of fewer than 10 cases in the 3-year period 2009/10-2011/12, 63 (22%) treated more than 30 symptomatic breast cancers each year during this period, and 35 (12%) either joined or left the NHSBSP during the 3-year period. Other reasons (plastic surgeon, private practice) were given for 59 surgeons (20%). Thirteen (50%)

of the 26 surgeons who had an average annual screening caseload of fewer than 10 cases due to private practice were in London.

For 20 surgeons who treated a total of 90 women, a reason other than one of the 6 listed reasons was given. There was no information provided to explain the low average annual screening caseload recorded for 111 surgeons who treated a total of 865 women. Thirty three (30%) of these surgeons were in Scotland (Table 59) and, as previously stated, could have also treated women elsewhere in the UK. Regional QA reference centres and regional surgical QA co-ordinators should ensure that all screening cases treated by low caseload surgeons have received satisfactory treatment.

KEY FINDINGS

- In 2011/12, 582 consultant breast surgeons treated women diagnosed in the UK NHSBSP and 580 of these were included in the audit and assigned to a single region. Ninety three percent of women were treated by a surgeon with a screening caseload of at least 20 cases. One hundred and forty two surgeons treated fewer than 10 screen-detected cases in 2011/12.
- Of the 142 surgeons treating fewer than 10 screening cases per year, 46 (32%) had a symptomatic caseload of more than 30 cases per year and 24 (17%) either joined or left the NHSBSP during 2011/12.
- Combining the data submitted for the 3-year period 2009/10-2011/12, 288 surgeons (39%) had an annual average caseload of fewer than 10 cases and 6 treated an average of at least 100 cases per year.
- The highest proportion of surgeons with a screening caseload of fewer than 10 screening cases per year was in Scotland (54%) where some low caseload surgeons also work elsewhere in the UK. It is not possible to resolve this double counting problem because the codes used to identify surgeons in Scotland are different to those used in the rest of the UK.
- Surgical specialisation was highest in Wales, where only 3 surgeons treated fewer than 10 screening cases per year.
- During the period 2009/10-2011/12, of the 288 low caseload surgeons, 22% treated more than 30 symptomatic breast cancers each year. Thirteen of the 26 surgeons who had a screening caseload of fewer than 10 cases because of private practice were in London.
- Information was unavailable to explain the low caseload of 111 surgeons treating a total of 865 women in the 3-year period 2009/10-2011/12. Thirty three of these surgeons were in Scotland and could have also treated women elsewhere in the UK. Regional QA reference centres and regional surgical QA co-ordinators should ensure that all screening cases treated by low caseload surgeons have received satisfactory treatment.

CHAPTER 6
REPEAT OPERATIONS

6.1 Repeat Operations

Details of each operation were requested so that the reasons for repeat operations could be examined. All operations, both diagnostic and therapeutic, were coded as either breast conserving surgery alone (Cons), mastectomy alone (Mx), axillary surgery alone (Ax) or a combination (e.g. Cons & Ax, Mx & Ax). Diagnostic open biopsies were coded as breast conserving surgery. For a cancer without a non-operative diagnosis by B5 core biopsy or C5 cytology, the first operation was defined to be diagnostic even if there was also therapeutic intent. The number of therapeutic operations is thus one fewer than the total number of operations and the number of therapeutic operations is counted from the second operation. The number of therapeutic operations for cases with a non-operative diagnosis is the same as the total number of operations. It should also be noted that attempting axillary surgery does not necessarily mean that axillary lymph nodes are successfully harvested. Conversely, incidental axillary lymph nodes can be obtained during a mastectomy or breast conserving surgery procedure.

In the UK as a whole, 4,507 (24%) of the 18,430 surgically treated breast cancers had more than one operation; 3,493 invasive cancers (24%) and 1,013 non/micro-invasive cancers (27%) had more than one operation (Table 60). Figure 30 shows how repeat operation rates for invasive and non/micro-invasive cancers varied between regions. The highest repeat operation rate for non/micro-invasive cancers was in Wales (33%) and the highest repeat operation rates for invasive cancers were in Wales and South West (28%).

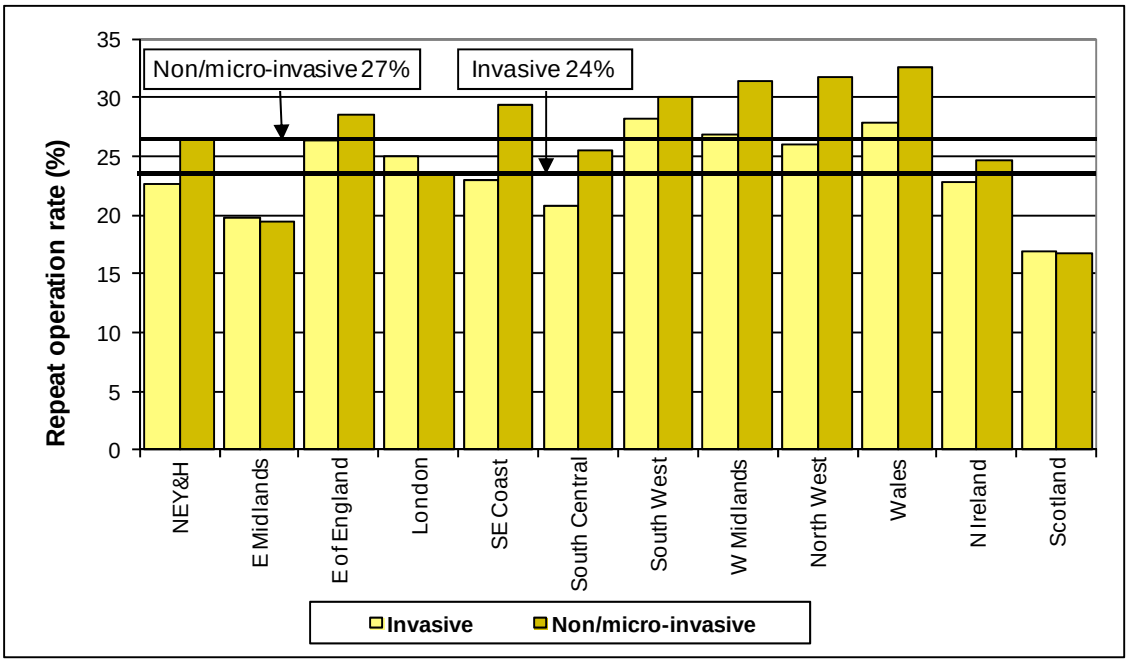

Figure 30 (Table 60): Proportions of surgically treated invasive and non/micro-invasive cancers undergoing two or more operations

When the significance of the variation between screening units in the proportion of surgically treated invasive and non/micro-invasive breast cancers undergoing two or more operations over the 3-year period 2009/10-2011/12 was examined in a control chart (not shown), 25 units were high outliers and 22 were low outliers. Of the 25 units with significantly higher repeat operation rates, 5 were in South West, 4 in East of England and 4 in West Midlands. The highest repeat operation rates (37%

and 41%) were in 2 units in South West. Regional QA reference centres and regional surgical QA co-ordinators should review the data for the 47 screening units with significantly higher or lower repeat operation rates over the 3-year period 2009/10-2011/12 to ascertain the reasons for their unusual practice.

Table 61 shows the repeat operation rates in each region for the 742 surgically treated breast cancers (with known invasive status) that did not have a non-operative diagnosis. Although the overall repeat operation rate for these cancers was 52% (386 cases), repeat operations for cancers without a non-operative diagnosis formed only 9% of the total repeat operations. Of the 210 invasive cancers without a non-operative diagnosis, 79% had a repeat operation. This varied from 54% in Scotland to 100% in Wales. Only 42% of the 532 non/micro-invasive cancers without a non-operative diagnosis had a repeat operation. This varied from 24% in Scotland to 62% in Wales.

Of the remaining 356 surgically treated breast cancers without a non-operative diagnosis which had only one operation, 12 had a mastectomy and 3 had surgery to the axilla alone as their diagnostic/ final operation. A further 341 had breast conserving surgery as their diagnostic/final surgery; 283 (83%) of these had clear margins (tumour removed no further operation), 57 (17%) had involved or unknown margin status and one had no residual tumour found at surgery. Of the 57 cancers with involved or unknown margin status, 27 (47%) had LCIS only and therefore had no further surgery. Thirty cancers were not LCIS and had no further surgery despite the margins being involved or of unknown status. None of these cancers received neo-adjuvant therapy. Twenty five of these cancers were in Scotland, where margin data were not available. Regional QA reference centres should audit cases where no repeat operation appears to have been undertaken for cancers with involved margins or with unknown margin status (LCIS cases excluded).

6.2 Repeat Therapeutic Operations

Quality Objective	**To minimise the number of therapeutic operations in women undergoing conservation surgery for an invasive cancer or DCIS**
Minimum Standard	**>95% of women should have three or fewer operations**
Target Standard	**100% of women should have three or fewer operations**

(Quality Assurance Guidelines for Surgeons in Breast Cancer Screening, NHSBSP Publication No 20, 4th Edition, March 2009)

Of the 17,686 surgically treated breast cancers with a non-operative diagnosis, 4,120 (23%) underwent more than one therapeutic operation. This is 1% lower than the repeat operation rate for all breast cancers. Twenty three percent of invasive breast cancers with a non-operative diagnosis (3,328 cancers) and 25% of non/micro-invasive breast cancers with a non-operative diagnosis (792 cancers) underwent more than one therapeutic operation.

Of the 14,454 invasive breast cancers with a non-operative diagnosis, 11,638 were initially treated by therapeutic breast conserving surgery. Of these, 24% had repeat therapeutic operations (Figure 31). Two hundred and thirty five cancers had three operations and 20 had more than three operations. Of the 2,457 non/micro-invasive cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery, 28% had repeat therapeutic operations. One hundred and seven had three operations and 7 had more than three operations. Seven of the 27 cases (invasive and micro/non-invasive) with more than three operations were in South East Coast and 4 were in a single unit within this region. Regional QA reference centres and regional surgical QA co-ordinators should audit the 27 cancers which had more than three therapeutic operations to ascertain the reason for this unusual practice.

When the significance of the variation between screening units in the proportion of surgically treated invasive and non/micro-invasive breast cancers undergoing two or more therapeutic operations to the

breast (breast conserving surgery or mastectomy) after initial breast conserving surgery over the 3-year period 2009/10-2011/12 was examined in a control chart (not shown), 23 units were high outliers and 19 were low outliers. Of the 23 units with significantly higher repeat therapeutic operation rates, 4 were in South West. However, the highest repeat therapeutic operation rates (31%) were in units in North West, South West and London. Regional QA reference centres and regional surgical QA co-ordinators should review the data for the 42 screening units with significantly higher or lower repeat operation rates to the breast (breast conserving surgery or mastectomy) for cancers initially treated with therapeutic breast conserving surgery over the 3-year period 2009/10-2011/12 to ascertain the reasons for their unusual practice.

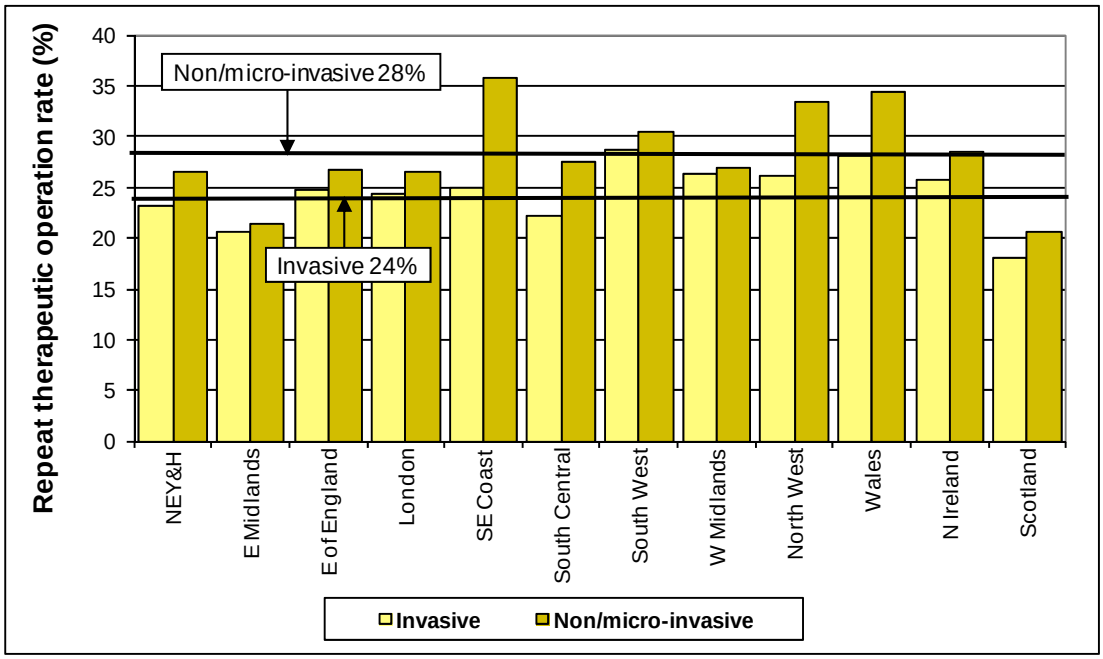

Figure 31 (Tables 62 & 63): Proportions of invasive and non/micro-invasive cancers undergoing two or more operations after initial therapeutic breast conserving surgery

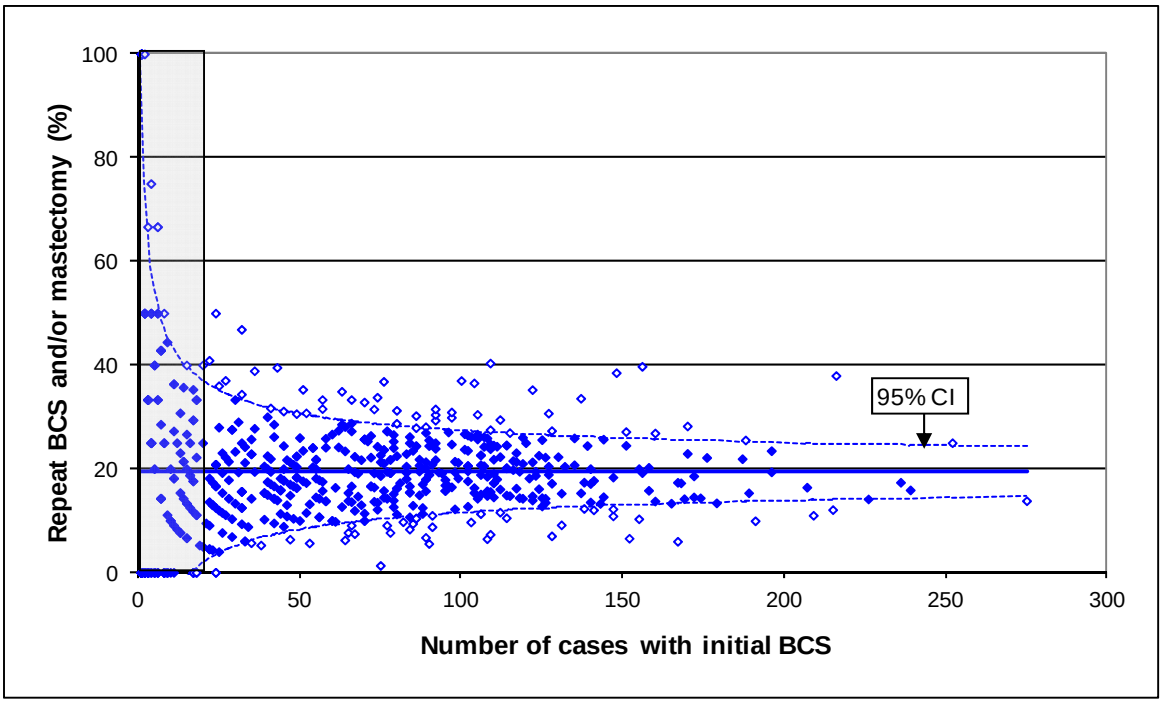

Figure 32: Variation between surgeons in the proportion of cancers initially treated with breast conserving surgery (BCS) that underwent repeat operations to the breast in the 3-year period 2009/10-2011/12 (only patients with one consultant surgeon are included) (Open diamonds represent surgeons who lie outside the control limits)

Figure 32 shows how the proportion of cancers with a non-operative diagnosis undergoing repeat breast conserving surgery or mastectomy after initial therapeutic breast conserving surgery varied between surgeons during the 3-year period 2009/10-2011/12. Cancers treated by more than one surgeon have been excluded, and 191 surgeons who initially treated fewer than 20 cancers with breast conserving surgery over the 3-year period are shaded.

Four hundred and fifty eight surgeons had 20 or more cancers with initial breast conserving surgery. Overall, 19% of cancers with initial therapeutic breast conserving surgery had one or more repeat therapeutic operations (breast conserving surgery or mastectomy). Fifty one surgeons had a repeat therapeutic operation rate above the 95% upper control limit and 41 had a rate under the 95% lower control limit. Eight of the surgeons with high repeat therapeutic operation rates were in units in West Midlands and 21 were in units in South West, North East, Yorkshire & Humber and East of England (7 in each unit). Regional QA reference centres and regional surgical QA co-ordinators should audit the work of the 92 surgeons with significantly higher or lower repeat therapeutic operation rates (breast conserving surgery or mastectomy) for cancers initially treated with therapeutic breast conserving surgery over the 3-year period 2009/10-2011/12 to ascertain the reasons for this unusual practice.

KEY FINDINGS

- Twenty four percent (4,507 cases) of breast cancers had more than one operation. Regional QA reference centres and regional surgical QA co-ordinators should review the data for the 47 screening units with significantly higher or lower repeat operation rates over the 3-year period 2009/10-2011/12 to ascertain the reasons for their unusual practice.
- Seventy nine percent of invasive cancers and 42% of non/micro-invasive cancers without a non-operative diagnosis had a repeat operation. Although the overall repeat operation rate for the 742 surgically treated cancers (with known invasive status) without a non-operative diagnosis was 52%, repeat operations for cancers without a non-operative diagnosis formed only 9% of the total repeat operations.
- Thirty cancers without a non-operative diagnosis, which were not LCIS, had no further surgery despite the margins being involved or of unknown status. None of these cancers received neo-adjuvant therapy. Twenty five of these were in Scotland, where margin data were not available. Regional QA reference centres should audit cases where no repeat operation appears to have been undertaken for cancers with involved margins or with unknown margin status.
- Twenty three percent of invasive cancers and 25% of non/micro-invasive cancers with a non-operative diagnosis had a repeat therapeutic operation.
- Twenty cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery had more than three therapeutic operations in 2011/12. Seven of these were in South East Coast and 4 were in a single unit within this region. Regional QA reference centres and regional surgical QA co-ordinators should audit these cancers to ascertain the reason for this unusual practice.
- Regional QA reference centres and regional surgical QA co-ordinators should review the data for the 42 screening units and 95 surgeons with significantly higher or lower repeat therapeutic operation rates for cancers initially treated with therapeutic breast conserving surgery over the 3-year period 2009/10-2011/12.

6.3 Type and Sequence of Therapeutic Operations

The reasons for repeat therapeutic operations for cancers with a non-operative diagnosis vary with the invasive status predicted by the non-operative diagnosis. The following scenarios could result in a repeat therapeutic operation to the breast.

Scenario 1 : Margins not clear for the expected tumour component (invasive or non-invasive)
- repeat operation (breast conserving surgery or mastectomy) to clear involved margin(s)

Scenario 2 : Margins not clear because of an unexpected tumour component (invasive or non-invasive) and a repeat operation (breast conserving surgery or mastectomy) undertaken to clear involved margin(s)

- multi-focal invasive or non-invasive cancer present
- small cancers with a B5b (Invasive) non-operative diagnosis found after surgery to have DCIS present which reaches the excision margin(s)

Scenario 3 : Re-excision to improve cosmesis

The following scenarios could result in a repeat operation involving the axilla. These are dealt with briefly in this chapter and in more detail in Chapter 7.

Scenario 4 : Invasion present which was not predicted by the non-operative diagnosis and a repeat operation is undertaken to obtain axillary lymph nodes

- cancers with a B5a (Non-invasive) non-operative diagnosis found to be invasive after surgery where nodes were not taken at first operation
- cancers with a C5 diagnosis where the invasive status could not be predicted and where nodes were not taken at the first operation in line with local protocol

Scenario 5 : Additional therapeutic nodal procedure(s)

- insufficient number of nodes harvested at first operation
- therapeutic clearance of nodes when a large number of the nodes taken at the first operation are positive
- clearance of nodes following a positive sentinel lymph node biopsy procedure

Repeat operation rates for various groups of screen-detected breast cancers with differing non-operative diagnoses are presented in flow charts which show the number and proportion of the different types and sequences of therapeutic operations undertaken in the UK as a whole. Figure 33 shows the flow chart for cancers with a B5b (Invasive) core biopsy, Figure 34 for cancers with C5 cytology only, Figure 35 for non/micro-invasive cancers with a B5a (Non-invasive) core biopsy and Figure 36 for cancers with a B5a (Non-invasive) core biopsy which were found to be invasive at surgery. Each flow chart shows the type of surgery performed at the first, second, third or, in rare cases, fourth operation.

Ninety nine percent (13,463) of the 13,657 cancers with a B5b (Invasive) core biopsy result (Table 9) proved to be invasive following therapeutic surgery. With a B5b (Invasive) core biopsy result therapeutic surgery can be planned in advance and these cases are least likely to require a repeat therapeutic operation. Of the 242 B5b (Invasive) cancers with a first operation involving only the axilla (Figure 33), 212 (88%) used a SLNB procedure and for 7 (37%) of the 19 cases where the only operation was to the axilla, a SLNB procedure was used. Fifty six (23%) of the 242 B5b (Invasive) cancers with a first operation involving only the axilla had neo-adjuvant therapy and 8 of these had no further surgery. However, surgery might have taken place after the audit data submission. 182 (75%) B5b (Invasive) cancers had a subsequent mastectomy and 129 (71%) of these had an immediate reconstruction recorded.

Twenty (96%) of the 25 surgically treated cancers with C5 cytology only and no B5 core biopsy (Table 10) proved to be invasive after surgery. For these cancers, where the invasive status cannot be determined microscopically, radiological or clinical features are of increased importance when planning the therapeutic operation. Overall, 3,038 (79%) of the 3,868 surgically treated cancers with a B5a (Non-invasive) core biopsy result (Table 8) were confirmed following surgery to be non/micro-invasive and 718 (19%) were identified as having invasive disease.

The following summary table shows the regional variation in repeat therapeutic operation rates for cancers with each type of non-operative diagnosis. The data in this and all other summary tables in this chapter exclude the 246 cancers with no surgery and with a B5b (Invasive) core biopsy diagnosis

(see Figure 33), and the 178 cancers with a B5a (Non-invasive) core biopsy which had no tumour in the surgical resection specimen or had unknown invasive status at surgery (see Figure 35). Invasive cancers with a B5b core biopsy diagnosis had the lowest proportion of repeat operations (21%). Invasive cancers with a C5 cytology only diagnosis had a repeat operation rate of 25% (6 cases). Non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had a repeat operation rate of 25%. This varied from 15% in East Midlands to 30% in South East Coast. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest repeat operation rate (61%). This varied from 47% in Scotland to 82% in Northern Ireland. Repeat operation rates in 2011/12 for invasive cancers with B5a (Non-invasive) or C5 cytology only were 4% and 8% higher than those in 2010/11 respectively, but repeat operation rates for invasive cancers with a B5b (Invasive) diagnosis and non/micro-invasive cancers with a B5a (Non-invasive) diagnosis have remained relatively stable.

REPEAT THERAPEUTIC OPERATION RATES

Region	***Invasive cancers***						***Non/micro-invasive cancers***	
	B5b *(Table 64)*		***C5 only, no B5*** *(Table 65)*		***B5a*** *(Table 66)*		***B5a*** *(Table 67)*	
	No.	*%*	***No.***	***%***	***No.***	***%***	***No.***	***%***
N East, Yorks & Humber	*366*	*20*	*1*	*17*	*54*	*61*	*100*	*24*
East Midlands	*187*	*17*	*-*	*-*	*22*	*54*	*31*	*15*
East of England	*278*	*23*	*0*	*0*	*47*	*69*	*72*	*26*
London	*272*	*22*	*-*	*-*	*41*	*53*	*73*	*23*
South East Coast	*223*	*20*	*0*	*0*	*46*	*69*	*78*	*30*
South Central	*157*	*17*	*2*	*100*	*30*	*61*	*41*	*21*
South West	*320*	*25*	*2*	*40*	*47*	*73*	*91*	*28*
West Midlands	*299*	*24*	*-*	*-*	*46*	*64*	*91*	*29*
North West	*351*	*23*	*0*	*0*	*51*	*58*	*96*	*28*
Wales	*147*	*25*	*-*	*-*	*16*	*59*	*44*	*29*
Northern Ireland	*58*	*19*	*1*	*20*	*14*	*82*	*18*	*23*
Scotland	*202*	*15*	*-*	*-*	*30*	*47*	*42*	*16*
United Kingdom	***2860***	***21***	***6***	***25***	***444***	***61***	***777***	***25***

Shaded if 5% or more above the value for the UK as a whole and more than 3 cancers are included

KEY FINDINGS

- Invasive cancers with a B5b core biopsy had a repeat operation rate of 21%.
- Non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had a repeat operation rate of 25%.
- Invasive cancers with a B5a (Non-invasive) core biopsy had the highest repeat operation rate (61%).

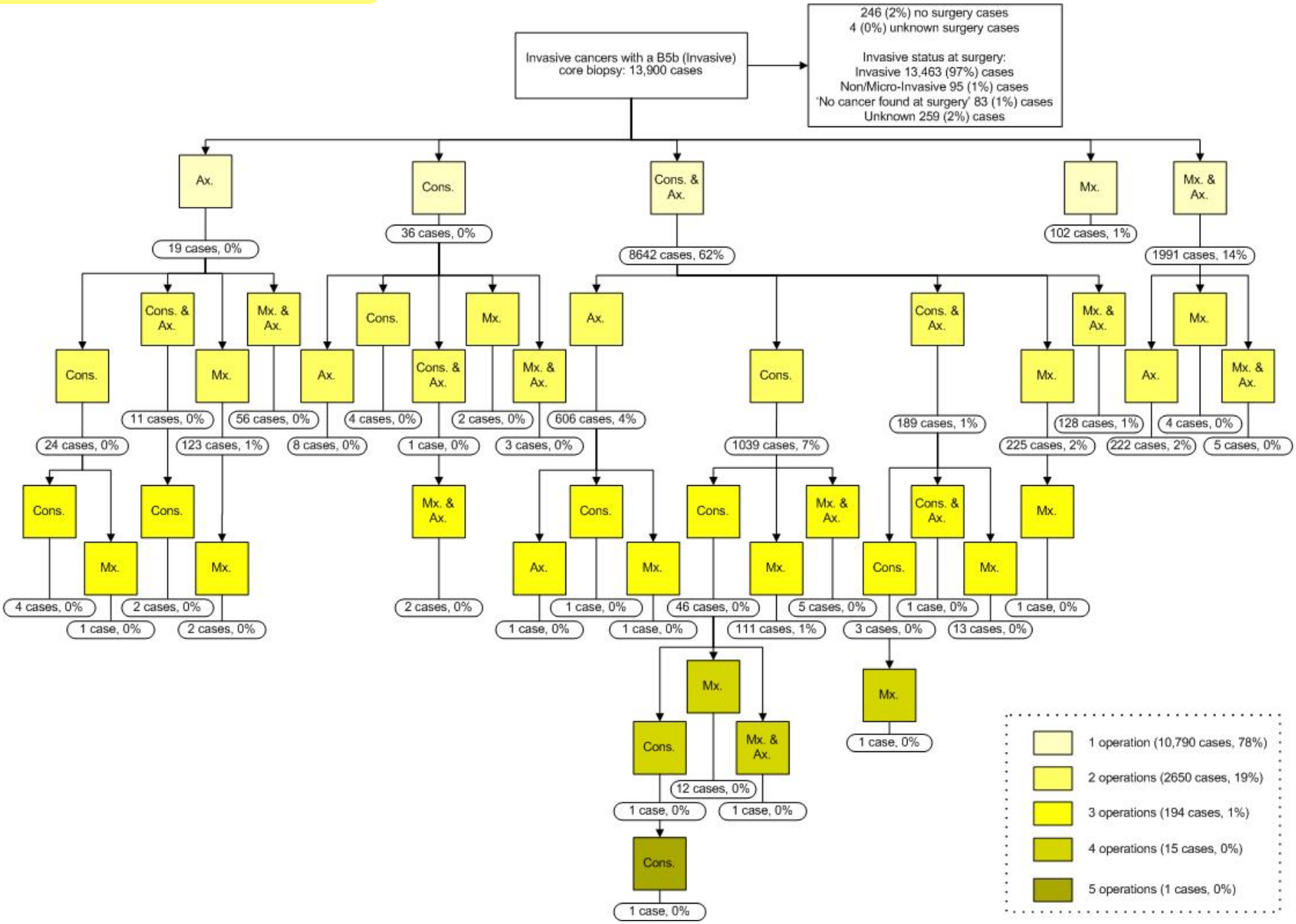

Figure 33: Sequence of operations for invasive cancers with a B5b (invasive) core biopsy

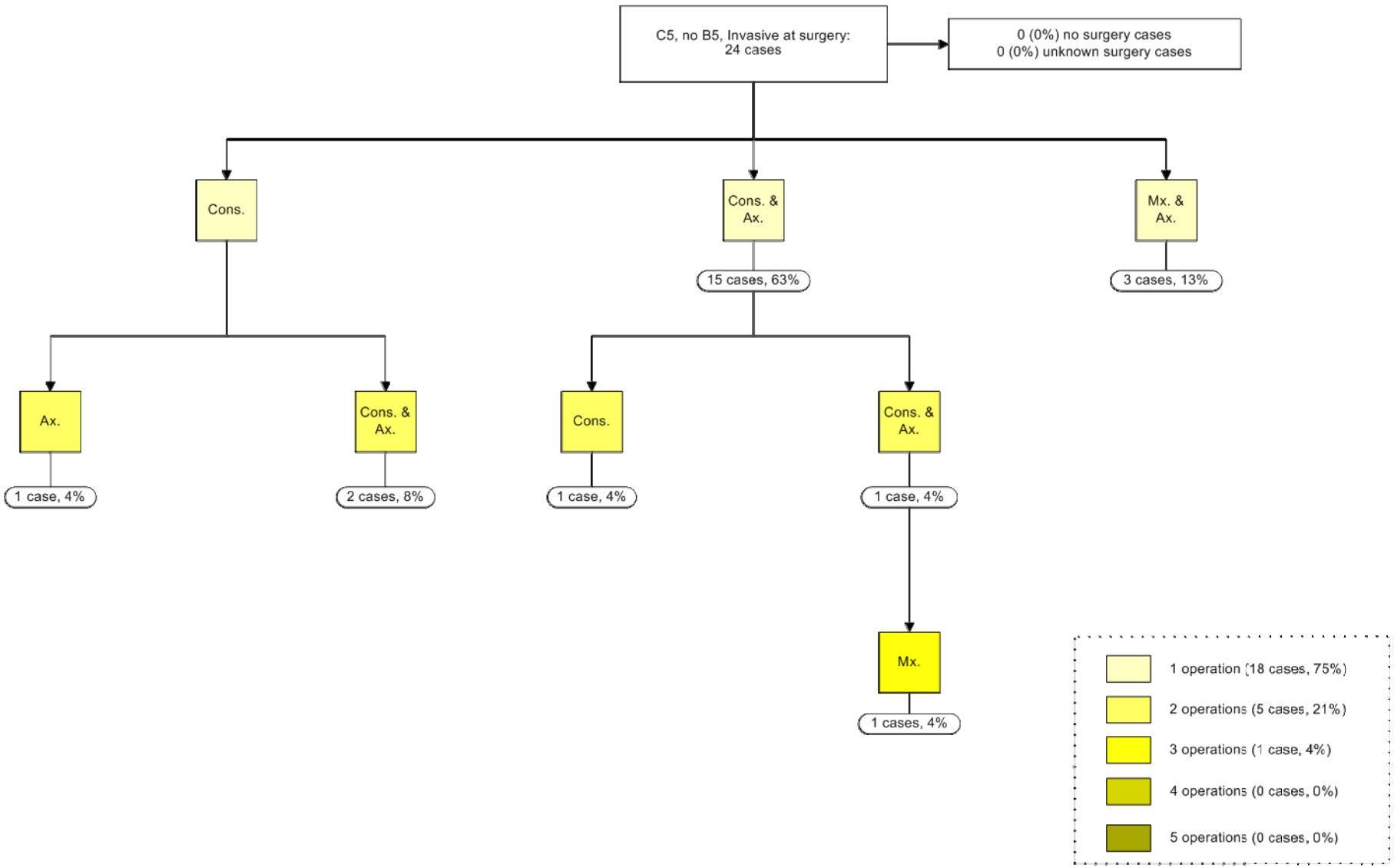

Figure 34: Sequence of operations for invasive cancers with a C5 cytology, no B5 core biopsy

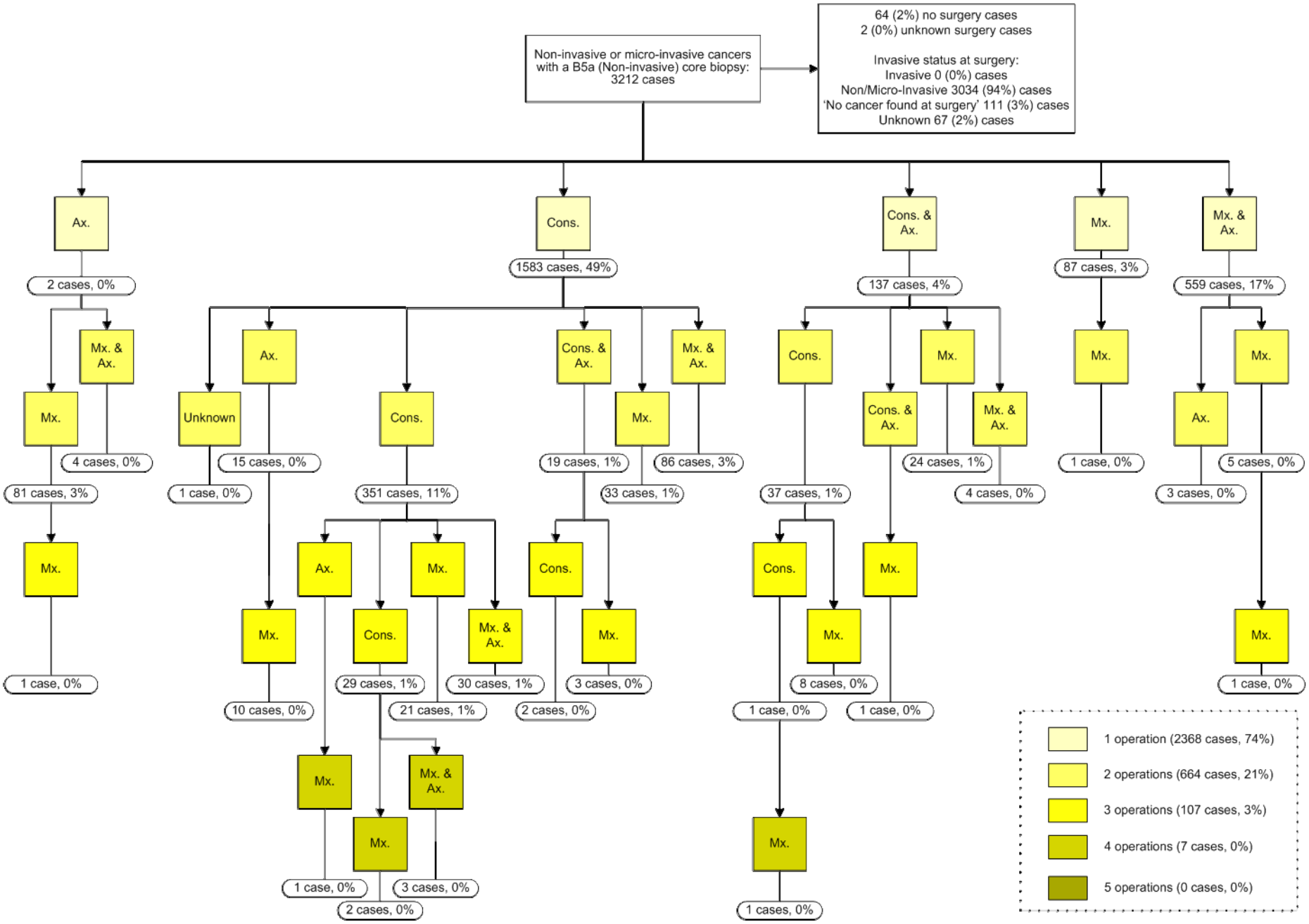

Figure 35: Sequence of operations for non/micro-invasive cancers with a B5a (non-invasive) core biopsy

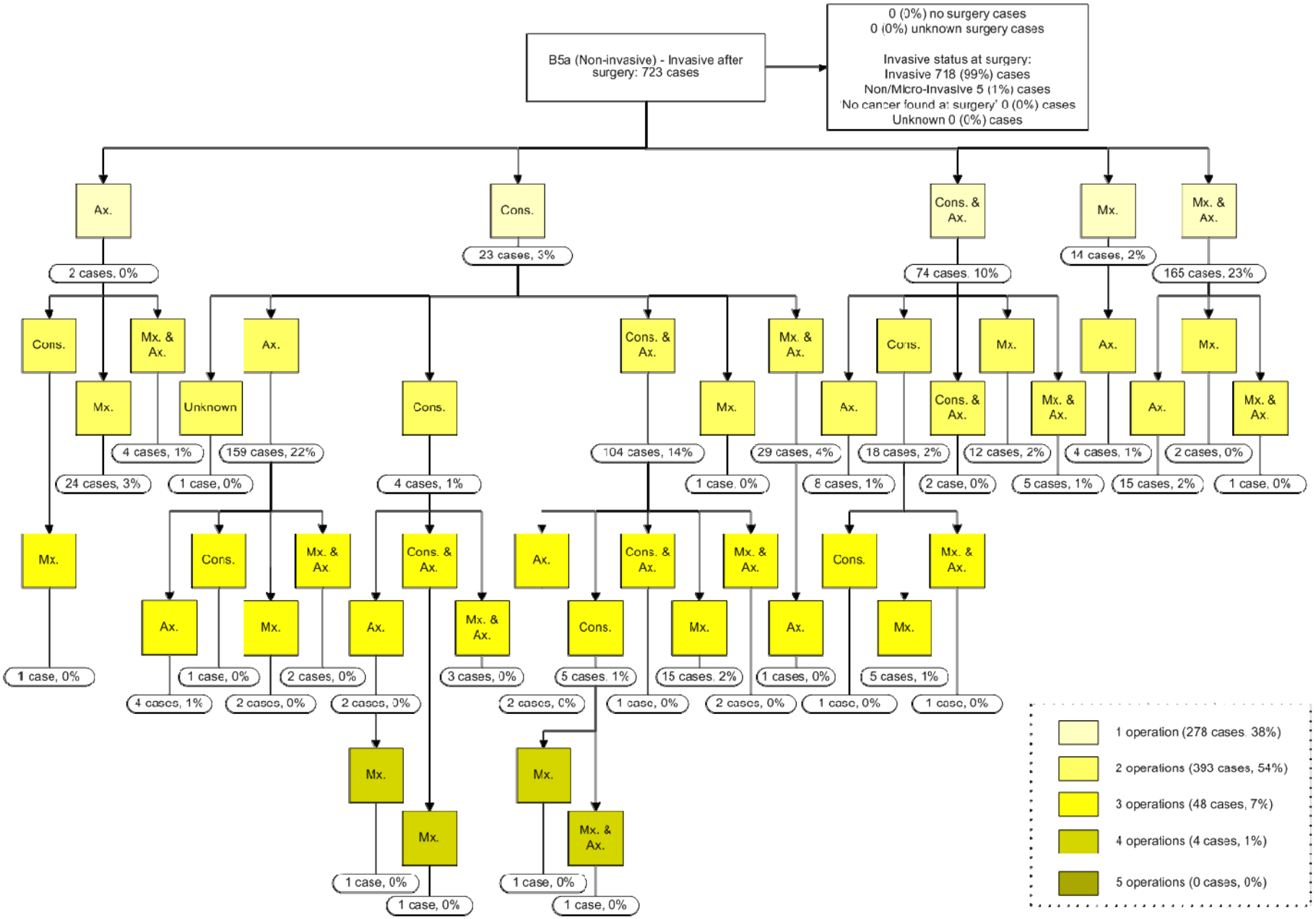

Figure 36: Sequence of operations for cancers with a B5a (non-invasive) core biopsy determined to be invasive after surgery

6.4 Repeat Breast Conserving Surgery to Clear Margins

In the UK as a whole, 19% of all cancers with a non-operative diagnosis, which were initially treated with breast conserving surgery, had repeat therapeutic operations (breast conserving surgery or mastectomy) to clear margins. This varied from 15% in Scotland to 23% in South West and Wales. Figure 37 shows that in the UK as a whole, 13% of all cancers with a non-operative diagnosis, which were initially treated with breast conserving surgery, had repeat breast conserving surgery to clear margins. This varied between 11% in Scotland and Northern Ireland to 17% in Wales and South West.

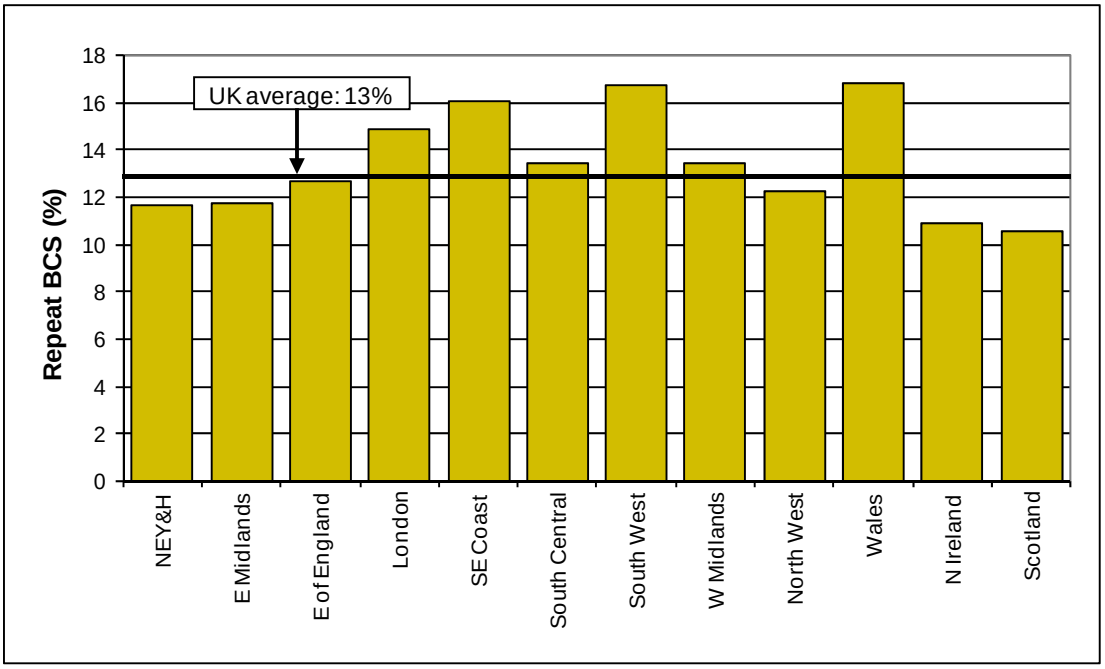

Figure 37 (Table 68): Proportion of cancers which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins

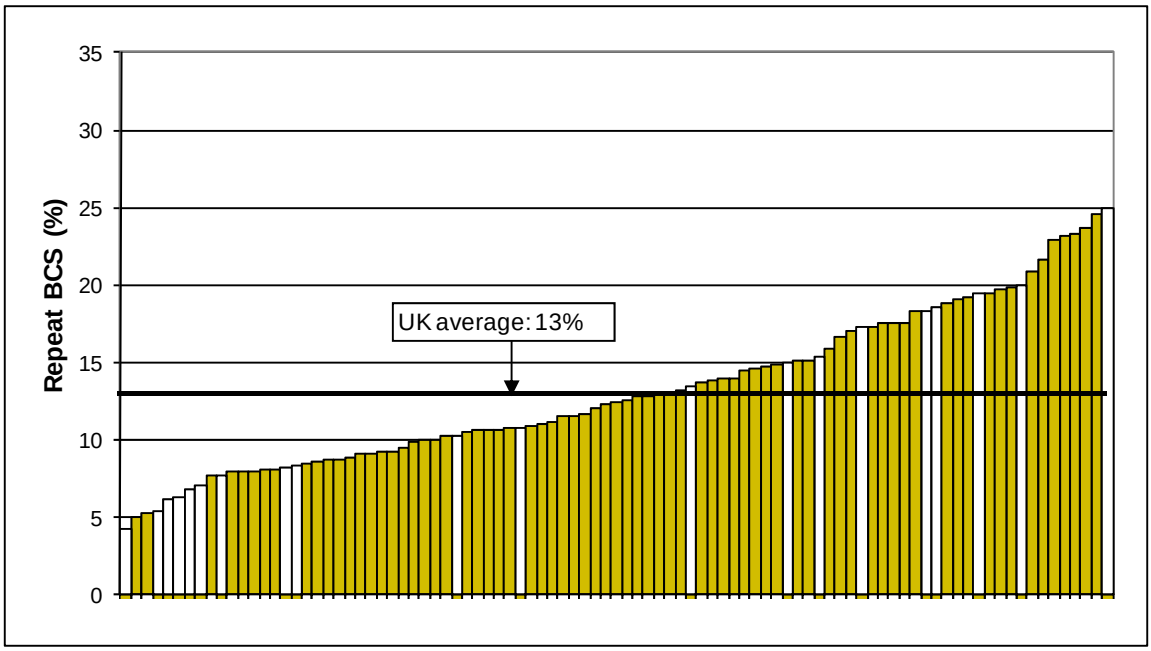

Figure 38: Proportion of cancers in each screening unit which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins (The 20 smallest units are highlighted in white)

Figure 38 shows the wide variation in 2011/12 between screening units in the proportion of all cancers initially treated with breast conserving surgery that had repeat breast conserving surgery to

clear margins. Eight units (1 of which was small) had repeat rates in excess of 20% and for 1 unit (which was small) the rate was below 5%.

The following summary table shows for cancers with various non-operative diagnoses, the regional variation in the proportion of cancers initially treated with breast conserving surgery that had repeat breast conserving surgery to clear margins. In the UK as a whole, 12% of invasive cancers with a B5b (Invasive) non-operative diagnosis, which were initially treated with breast conserving surgery, had repeat breast conserving surgery to clear margins. This varied from 9% in Northern Ireland and Scotland to 15% in Wales. There were 4 (19%) invasive cancers with a C5 cytology only non-operative diagnosis, which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins.

REPEAT BREAST CONSERVING SURGERY TO CLEAR MARGINS

	Invasive cancers						***Non/micro-invasive cancers***	
	B5b		***C5 only, no B5***		***B5a***		***B5a***	
Region	***No.***	***%***	***No.***	***%***	***No.***	***%***	***No.***	***%***
N East, Yorks & Humber	*143*	*10*	*1*	*25*	*18*	*35*	*43*	*15*
East Midlands	*95*	*11*	*-*	*-*	*7*	*32*	*19*	*13*
East of England	*104*	*11*	*0*	*0*	*14*	*25*	*40*	*19*
London	*136*	*14*	*-*	*-*	*12*	*21*	*44*	*18*
South East Coast	*125*	*13*	*0*	*0*	*11*	*24*	*54*	*26*
South Central	*90*	*12*	*2*	*100*	*8*	*24*	*25*	*17*
South West	*152*	*14*	*1*	*20*	*24*	*45*	*54*	*21*
West Midlands	*125*	*12*	*-*	*-*	*11*	*25*	*42*	*17*
North West	*116*	*10*	*0*	*0*	*14*	*26*	*55*	*21*
Wales	*72*	*15*	*-*	*-*	*7*	*32*	*27*	*23*
Northern Ireland	*24*	*9*	*0*	*0*	*4*	*27*	*9*	*14*
Scotland	*104*	*9*	*-*	*-*	*10*	*26*	*27*	*14*
United Kingdom	***1286***	***12***	***4***	***19***	***140***	***29***	***439***	***18***

Shaded if 5% or more above the value for the UK as a whole and more than one cancer is included

Eighteen percent of non/micro-invasive cancers with a B5a (Non-invasive) non-operative diagnosis initially treated with breast conserving surgery had repeat breast conserving surgery to clear margins. This varied from 13% in East Midlands to 26% in South East Coast. Invasive cancers with a B5a (Non-invasive) non-operative diagnosis, which were initially treated with breast conserving surgery, had the highest repeat breast conserving surgery rate to clear margins (29%). This varied from 21% in London to 45% in South West.

Repeat operation rates to clear margins were higher for non/micro-invasive cancers than for invasive cancers (18% compared to 12%). The repeat operation rate for non/micro-invasive cancers varied between screening units from 0 cases in 6 units to 47% in a unit in South Central (7 out of 15 cases). The repeat operation rate for invasive cancers varied between screening units from 2% in a unit in South West to 23% in a screening unit in London (40 out of 175 cases).

Figure 39 shows how proportion of cancers initially treated with breast conserving surgery that had repeat breast conserving surgery to clear margins varied with screening unit over the 3-year period 2009/10-2011/12. The dashed lines in Figure 39 are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate of 13% (solid line). Eighteen units had repeat rates above the upper control limit; 4 of these were in South West and 3 in South East Coast. Twenty units had rates below the lower control limit; 4 of these were in Scotland and 3 in North West.

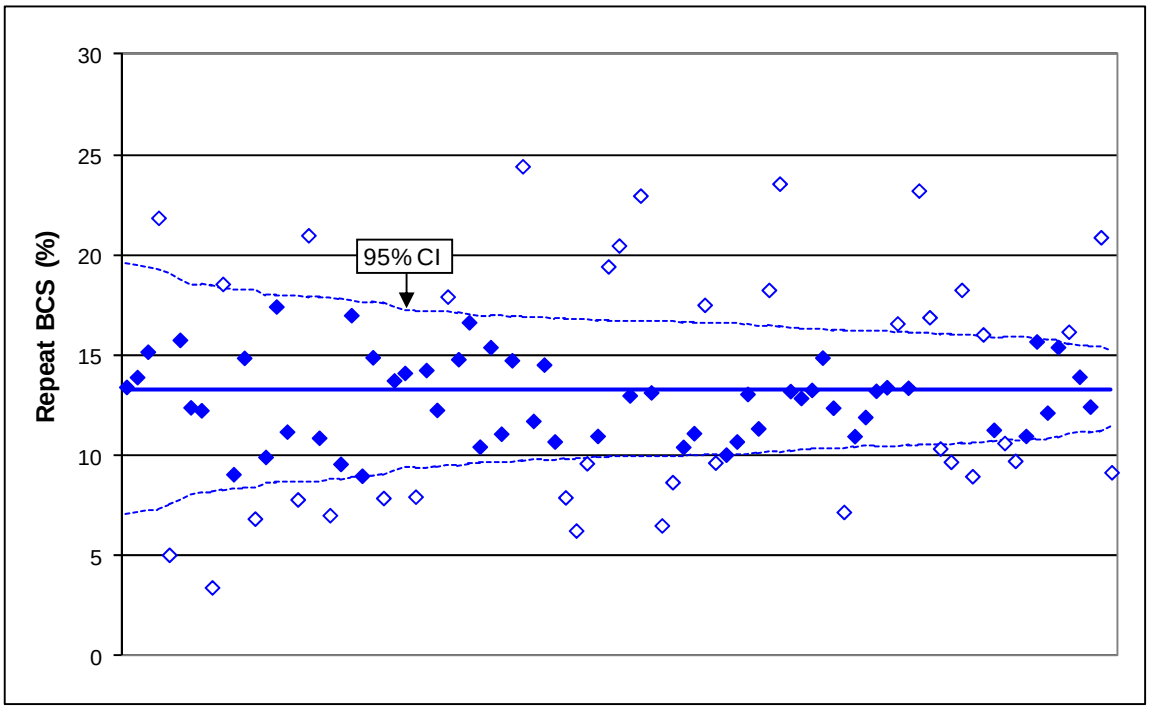

Figure 39: Variation between screening units in the proportion of cancers which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins in 2009/10-2011/12 (open diamonds represent units which lie outside the control limits)

When the data in Figure 39 are separated into non/micro-invasive and invasive cancers (control charts not shown), for non/micro-invasive cancers 11 units are high outliers and 2 low outliers, and for invasive cancers 16 units are high outliers and 19 low outliers. Six units (2 in South East Coast, 3 in South west and 1 in North West) are high outliers in both control charts and 1 unit in Scotland is a low outlier in both control charts. Regional QA reference centres and regional QA surgical co-ordinators should audit the high and low outliers in these three control charts to ascertain the reasons for this unusual clinical practice.

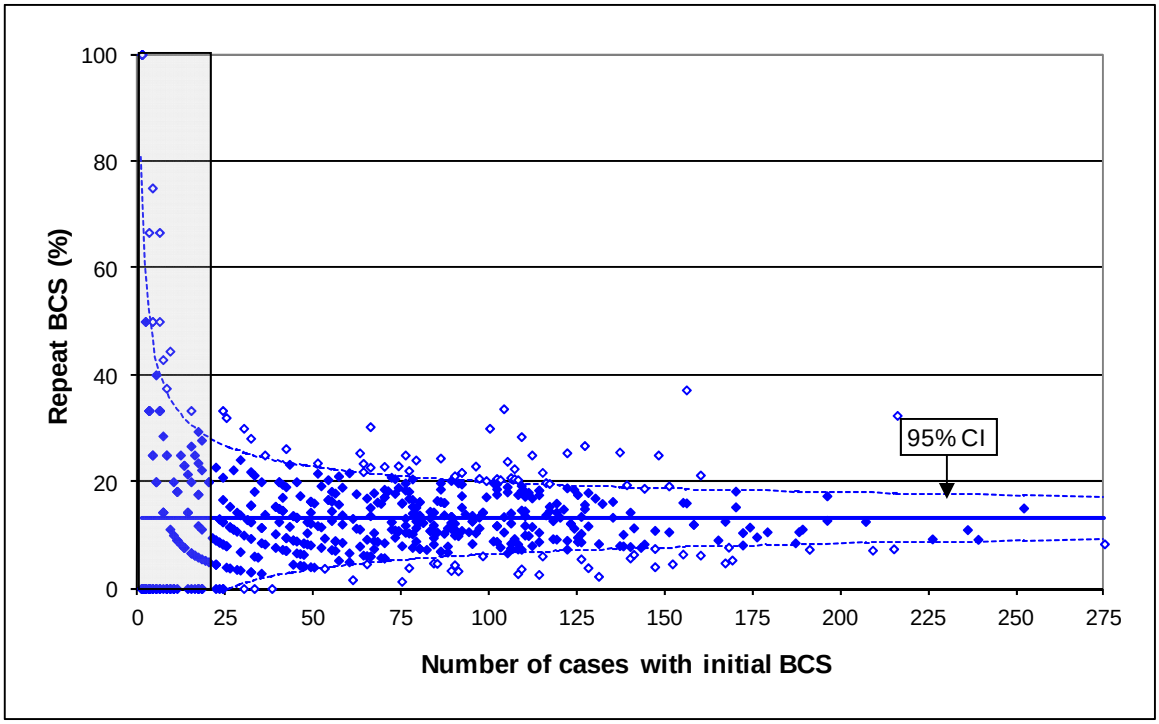

Figure 40: Variation between surgeons in the proportion of cancers which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins in 2009/10-2011/12 (Open diamonds represent surgeons who lie outside the control limits)

Figure 40 shows the variation between surgeons in the proportion of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery that had repeat breast conserving surgery to clear margins over the 3-year period 2009/10-2011/12. The dashed lines in Figure 40 are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate of 13% (solid line). Surgeons who initially treated fewer than 20 cases with breast conserving surgery over the 3-year period are shaded. Of the 649 surgeons, 458 had 20 or more cases with initial breast conserving surgery and, of these, 48 had repeat rates above the upper control limit and 35 had rates below the lower control limit. Regional QA reference centres and regional QA surgical co-ordinators should audit the high and low outliers in this control chart to ascertain the reasons for this unusual clinical practice.

KEY FINDINGS

- Nineteen percent of all cancers with a non-operative diagnosis, which were initially treated with breast conserving surgery, had repeat therapeutic operations (breast conserving surgery or mastectomy) to clear margins. This varied from 15% in Scotland to 23% in South West and Wales.
- Thirteen percent of all cancers with a non-operative diagnosis had repeat breast conserving surgery to clear margins. This varied between 11% in Scotland and Northern Ireland to 17% in Wales and South West.
- Twelve percent of invasive cancers with a B5b (Invasive) non-operative diagnosis, initially treated with breast conserving surgery, had repeat breast conserving surgery to clear margins. This varied from 9% in Northern Ireland and Scotland to 15% in Wales.
- Twenty nine percent of invasive cancers and 18% of non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had repeat therapeutic breast conserving surgery to clear margins.
- In the 3-year period 2009/10-2011/12, 18 screening units and 48 surgeons had unusually high repeat breast conserving surgery rates. Twenty screening units and 35 surgeons had unusually low repeat conservation operation rates. Regional QA reference centres and regional QA surgeons should review the data for screening units and individual surgeons with atypical practice.
- Repeat operation rates to clear margins were higher for non/micro-invasive cancers than for invasive cancers (18% compared to 12%). The repeat operation rate for non/micro-invasive cancers varied between screening units from 0 cases in 6 units to 47% in a unit in South Central. The repeat operation rate for invasive cancers varied between screening units from 2% in a unit in South West to 23% in a screening unit in London.
- In the 3-year period 2009/10-2011/12, for non/micro-invasive cancers 11 units had high and 2 had low repeat operation rates. For invasive cancers 16 units had high and 19 had low repeat operation rates. Regional QA reference centres and regional QA surgical co-ordinators should audit these high and low outliers to ascertain the reasons for this unusual clinical practice.

6.5 Breast Conserving Surgery Converted to Mastectomy

Figure 41 (Table 69) shows that in the UK as a whole, 6% of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery, were eventually converted to a mastectomy. This varied from 4% in Scotland to 9% in Northern Ireland. Conversion rates to mastectomy were higher for non/micro-invasive cancers than for invasive cancers (9% compared to 5%).

Figure 42 shows the variation in 2011/12 between screening units in the proportion of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery, which were eventually converted to a mastectomy. In 2 units, the conversion rate to mastectomy was in excess of 15% (1 of which was small unit). In the unit with the highest conversion rate, 11 cases were converted to mastectomies after receiving initial therapeutic breast conserving surgery. For non/micro-invasive cancers, conversion rates to mastectomy varied from 40% in one small unit in Northern Ireland to 0 cases in 10 units. For invasive cancers, conversion rates to mastectomy varied from 16% in a unit in East of England to 0 cases in 3 units.

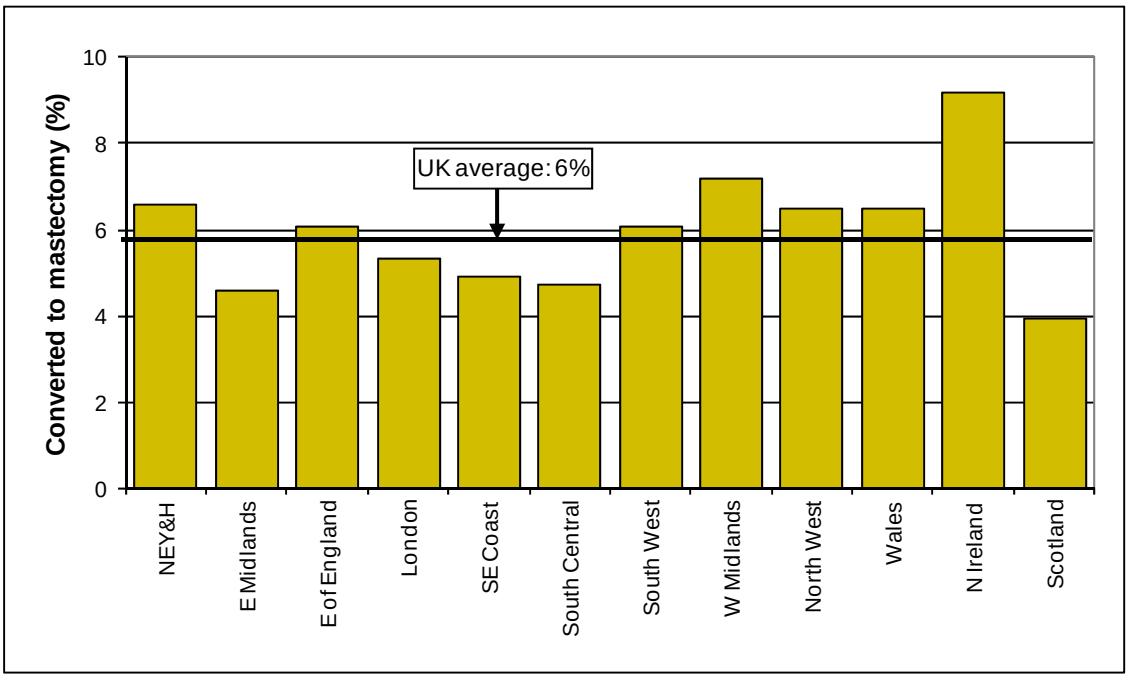

Figure 41 (Table 69): Proportion of cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy

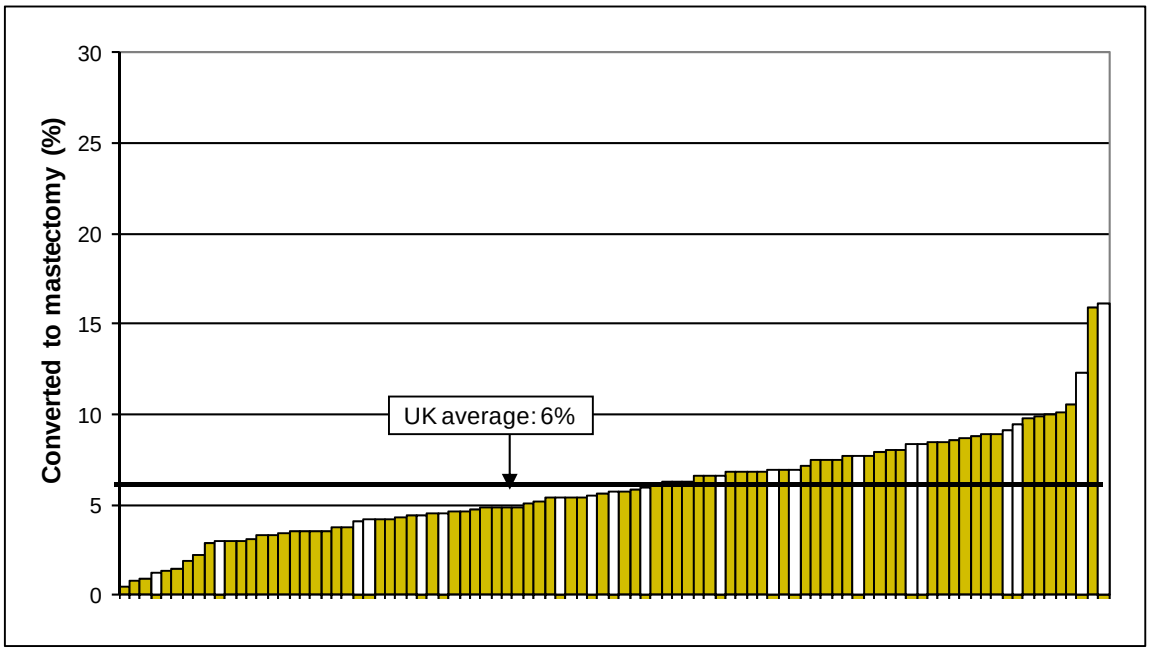

Figure 42: Variation between screening units in the proportion of cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy (The 20 smallest units are highlighted in white)

Figure 43 shows how the proportion of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery and were eventually converted to a mastectomy varied between screening units over the 3-year period 2009/10-2011/12. The dashed lines are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate of 6% (solid line). Seventeen units had repeat rates above the upper control limit; 3 of these were in South East Coast. Of the 10 units below the lower control limit; 5 were in North East, Yorkshire & Humber.

When the data in Figure 43 were separated into non/micro-invasive and invasive cancers (control charts not shown), for non/micro-invasive cancers 5 units were high outliers and 2 low outliers, and for invasive cancers 15 units were high outliers and 11 low outliers. Regional QA reference centres and regional QA surgical co-ordinators should audit the high and low outliers in these three control charts to ascertain the reasons for this unusual clinical practice.

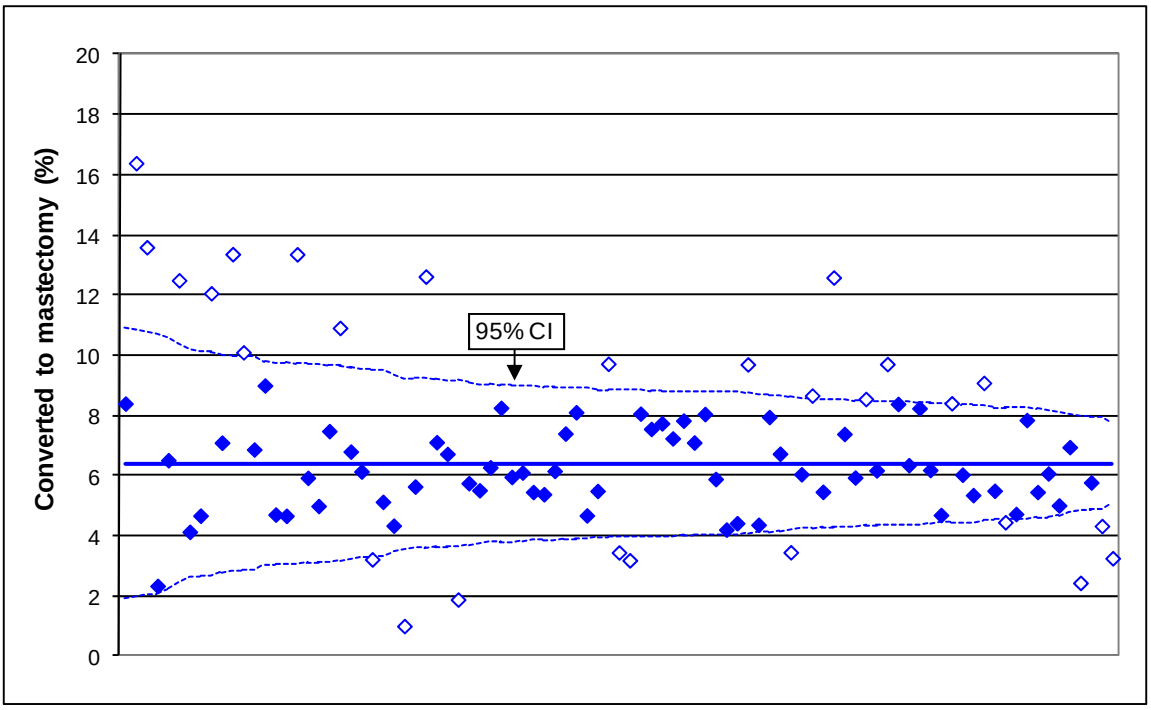

Figure 43: Variation between screening units in the proportion of cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy in 2009/10-2011/12 (Open diamonds represent units which lie outside the control limits)

Figure 44 shows the variation between surgeons in the proportion of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery and were eventually converted to a mastectomy over the 3-year period 2009/10-2011/12. The dashed lines in Figure 44 are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate of 7% (solid line). Surgeons who initially treated fewer than 20 cases with breast conserving surgery over the 3-year period are shaded.

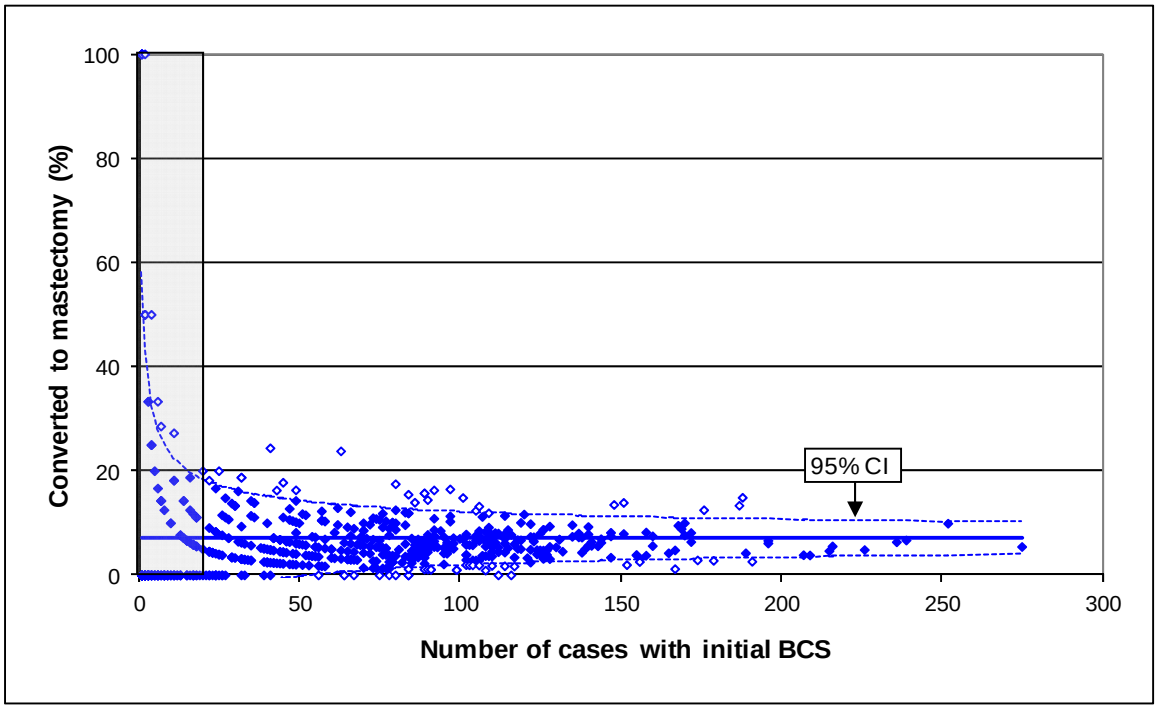

Figure 44: Variation between surgeons in the proportion of cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy in 2009/10-2011/12 (open diamonds represent surgeons who lie outside the control limits)

Of the 649 surgeons, 458 had 20 or more cases with initial breast conserving surgery and, of these, 27 had conversion to mastectomy rates above the upper control limit and 32 had rates below the lower control limit.

INITIALLY TREATED WITH BREAST CONSERVING SURGERY BUT WENT ON TO HAVE A MASTECTOMY

	Invasive cancers						***Non/micro-invasive cancers***	
	B5b		***C5 only, no B5***		***B5a***		***B5a***	
Region	***No.***	***%***	***No.***	***%***	***No.***	***%***	***No.***	***%***
N East, Yorks & Humber	*77*	*5*	*0*	*0*	*8*	*16*	*32*	*11*
East Midlands	*32*	*4*	*-*	*-*	*4*	*18*	*11*	*8*
East of England	*49*	*5*	*0*	*0*	*9*	*16*	*18*	*8*
London	*40*	*4*	*-*	*-*	*5*	*9*	*23*	*9*
South East Coast	*33*	*3*	*0*	*0*	*7*	*16*	*19*	*9*
South Central	*19*	*3*	*0*	*0*	*10*	*29*	*15*	*10*
South West	*54*	*5*	*1*	*20*	*6*	*11*	*22*	*9*
West Midlands	*63*	*6*	*-*	*-*	*12*	*27*	*22*	*9*
North West	*62*	*5*	*0*	*0*	*7*	*13*	*30*	*11*
Wales	*27*	*6*	*-*	*-*	*1*	*5*	*13*	*11*
Northern Ireland	*15*	*6*	*0*	*0*	*7*	*47*	*9*	*14*
Scotland	*34*	*3*	*-*	*-*	*6*	*15*	*13*	*7*
United Kingdom	***505***	***5***	***1***	***5***	***82***	***17***	***227***	***9***

Shaded if 5% or more above the value for the UK as a whole and more than five cancers are included

The preceding summary table shows the regional variation in the proportion of cancers initially treated with breast conserving surgery that eventually went on to have a mastectomy. In the UK as a whole, 5% of invasive cancers with a B5b (Invasive) non-operative diagnosis, initially treated with breast conserving surgery, went on to have a mastectomy. One of the 24 surgically treated invasive cancers diagnosed by C5 cytology only which were initially treated with breast conserving surgery, went on to have a mastectomy. Nine percent of non/micro-invasive cancers with a B5a (Non-invasive) non-operative diagnosis, initially treated with breast conserving surgery, went on to have a mastectomy. This varied from 7% in Scotland to 14% in Northern Ireland. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest conversion of breast conserving surgery to mastectomy (17%). This varied from 5% in Wales (1 case) to 47% in Northern Ireland (7 cases).

In the UK as a whole, 18% of all cancers with a non-operative diagnosis had an initial therapeutic mastectomy at the first operation (Figure 45 and Table 70). The following table summarises the regional variation in the proportion of cancers in each diagnostic category that had a mastectomy as their first therapeutic operation. Invasive cancers with a B5b (Invasive) core biopsy had an initial mastectomy rate of 17%. This varied from 14% in South West and West Midlands to 21% in East Midlands. Three (12%) of the 24 surgically treated invasive cancers diagnosed by C5 cytology only had a mastectomy as their first therapeutic operation. Two (67%) of these cancers were in North East, Yorkshire & Humber and 1 (33%) in North West. Regional QA reference centres and regional surgical QA co-ordinators should audit these 3 cases to determine why cancers with unconfirmed invasive status had a mastectomy as an initial therapeutic operation. Non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had an initial mastectomy rate of 20%. This varied from 12% in West Midlands to 28% in East Midlands. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest initial mastectomy rate (28%). This varied from 12% in Northern Ireland to 46% in East Midlands.

MASTECTOMY AS FIRST THERAPEUTIC OPERATION

Region	Invasive cancers B5b No.	B5b %	C5 only, no B5 No.	C5 only, no B5 %	B5a No.	B5a %	Non/micro-invasive cancers B5a No.	Non/micro-invasive cancers B5a %
N East, Yorks & Humber	359	19	2	33	28	32	103	24
East Midlands	230	21	-	-	19	46	57	28
East of England	180	15	0	0	10	15	50	18
London	187	15	-	-	17	22	62	19
South East Coast	189	16	0	0	20	30	54	20
South Central	161	17	0	0	14	29	49	24
South West	186	14	0	0	9	14	56	17
West Midlands	180	14	-	-	21	29	38	12
North West	275	18	1	33	33	38	74	21
Wales	90	15	-	-	5	19	31	20
Northern Ireland	57	18	0	0	2	12	14	18
Scotland	230	17	-	-	23	36	68	25
United Kingdom	***2324***	***17***	***3***	***12***	***201***	***28***	***656***	***20***

Shaded if 5% or more above the value for the UK as a whole and five or more cancers are included

The proportion of all cancers with a non-operative diagnosis having an initial therapeutic mastectomy varied from 15% in East of England, South West and West Midlands to 22% in East Midlands (Figure 45). Figure 45 also shows that 5% of all cancers (820 cancers) with a non-operative diagnosis had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent repeat operation and that 2% of all cancers (298 cancers) with a non-operative diagnosis had initial surgery only to the axilla converted to a mastectomy at a subsequent repeat operation. The former varied from 3% in East Midlands and Scotland to 7% in Northern Ireland and the latter from 0% in East Midlands, Northern Ireland and Scotland to 4% in West Midlands.

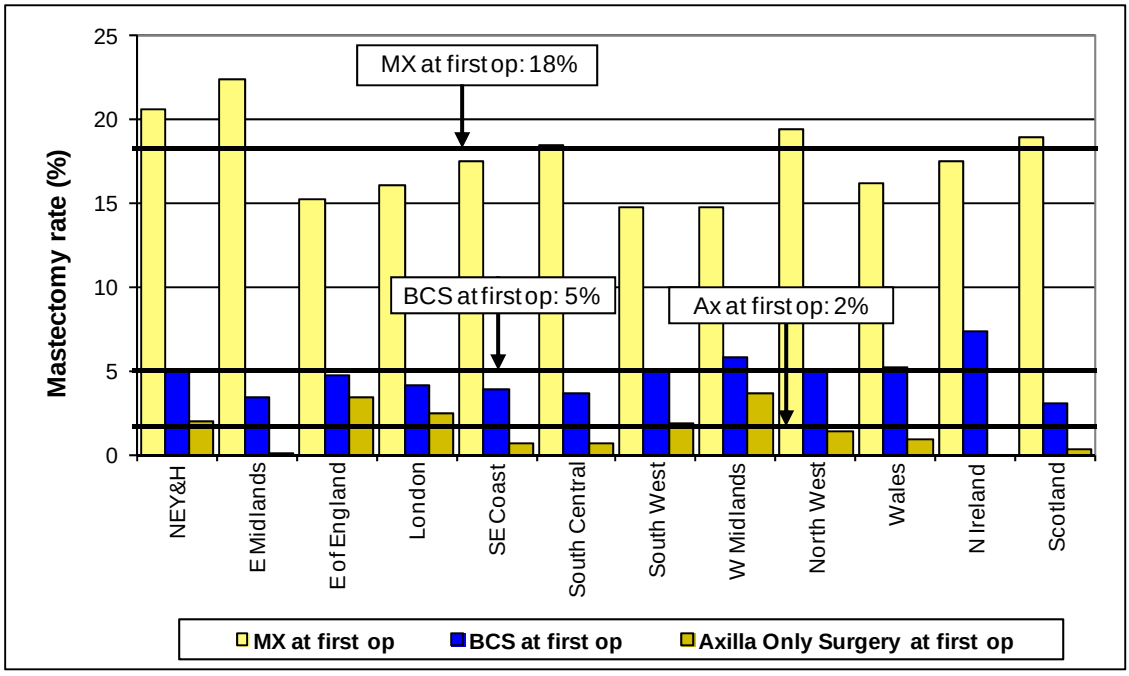

Figure 45 (Table 70): Proportions of all cancers with a non-operative diagnosis undergoing a mastectomy at first operation and at subsequent operations after BCS or surgery to the axilla

For cancers with a non-operative diagnosis, the initial therapeutic mastectomy rate was higher for non/micro-invasive cancers than for invasive cancers (20% compared to 17%), as was the proportion of

non/micro-invasive cancers that had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent repeat operation (7% compared to 4%). The proportion of non/micro-invasive cancers with a non-operative diagnosis that had initial surgery only to the axilla converted to a mastectomy at a subsequent repeat operation was also higher than for invasive cancers (3% compared to 1%).

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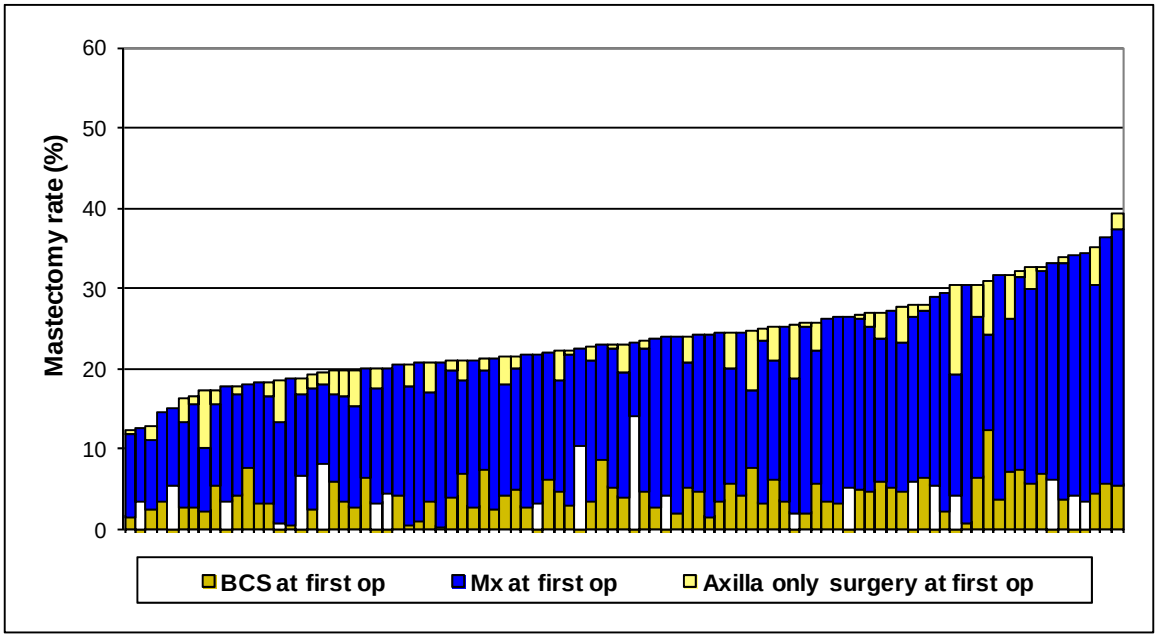

Figure 46: Variation between screening units in the proportions of all cancers with a non-operative diagnosis undergoing a mastectomy at first operation and at subsequent operations after BCS or surgery to the axilla (The 20 smallest units are highlighted in white)

Figure 46 shows the wide variation in 2011/12 between screening units in the proportion of all cancers with a non-operative diagnosis having a mastectomy either as an initial therapeutic operation, or because initial therapeutic breast conserving surgery or axillary surgery alone were converted to a mastectomy at a subsequent operation. Sixteen units had an overall mastectomy rate above 30% (4 of these units were in North East, Yorkshire & Humber and 3 in West Midlands). Within this group, 4 units (1 of which was small) had mastectomy conversion rates in excess of 10% and 10 units (3 of which were small) had a mastectomy rate at first operation equal to or greater than 25%. Regional QA reference centres and regional surgical QA co-ordinators should explore the reasons for the relatively high overall mastectomy rates in these 16 units.

KEY FINDINGS

- Six percent of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery, were eventually converted to a mastectomy. Conversion rates to mastectomy were higher for non/micro-invasive cancers than for invasive cancers (9% compared to 5%).
- Seventeen screening units and 27 surgeons had unusually high repeat rates and 10 screening units and 32 surgeons had unusually low rates for all cancers. For non/micro-invasive cancers 5 units were high outliers and 2 low outliers, and for invasive cancers 15 units were high outliers and 11 low outliers. Regional QA reference centres and regional QA surgeons should review the data for surgeons and screening units with unusual practice.
- Invasive cancers with a B5a (Non-invasive) core biopsy had the highest conversion of breast conserving surgery to mastectomy (17%). This varied from 5% in Wales to 47% in Northern Ireland.
- Non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had an initial mastectomy rate of 20%. This varied from 12% in West Midlands to 28% in East Midlands.
- Invasive cancers with a B5a (Non-invasive) core biopsy had the highest initial mastectomy rate (28%). This varied from 12% in Northern Ireland to 46% in East Midlands.

KEY FINDINGS

- Eighteen percent of all cancers with a non-operative diagnosis had an initial therapeutic mastectomy at the first operation, and 5% had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent repeat operation.
- For cancers with a non-operative diagnosis, the initial therapeutic mastectomy rate was higher for non/micro-invasive cancers than for invasive cancers (20% compared to 17%), as was the proportion of non/micro-invasive cancers that had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent repeat operation (7% compared to 4%)
- Sixteen units had an overall mastectomy rate above 30% (4 of these were in North East, Yorkshire & Humber and 3 in West Midlands). Within this group, 4 units (I of which was small) had mastectomy conversion rates in excess of 10% and 10 units (3 of which were small) had a mastectomy rate at first operation equal to or greater than 25%. Regional QA reference centres and regional surgical QA co-ordinators should explore the reasons for the relatively high overall mastectomy rates in these 16 units.

6.6 Excision Margins

Information on whether or not the radial excision margin was clear of tumour and the closest radial margin distance, were requested for all cancers. Scotland was not able to provide this information.

Of the 16,993 cancers diagnosed in England, Wales and Northern Ireland in 2011/12, 16,472 had surgery to the breast and were found to be malignant (invasive or non/micro-invasive) at surgery. Of these, 88% had complete margin data for all operations (Table 71). For the first operation, 99% of cases had information on whether or not the radial margin was clear, and 91% of the cases had the margin distance recorded (this represents a 1% increase from 2010/11). The completeness of the margin status data varied from 98% in Wales to 100% in Northern Ireland, South Central, London, East of England and East Midlands, and the completeness of the margin distance data varied from 77% in East Midlands to 99% in Northern Ireland (Figure 47).

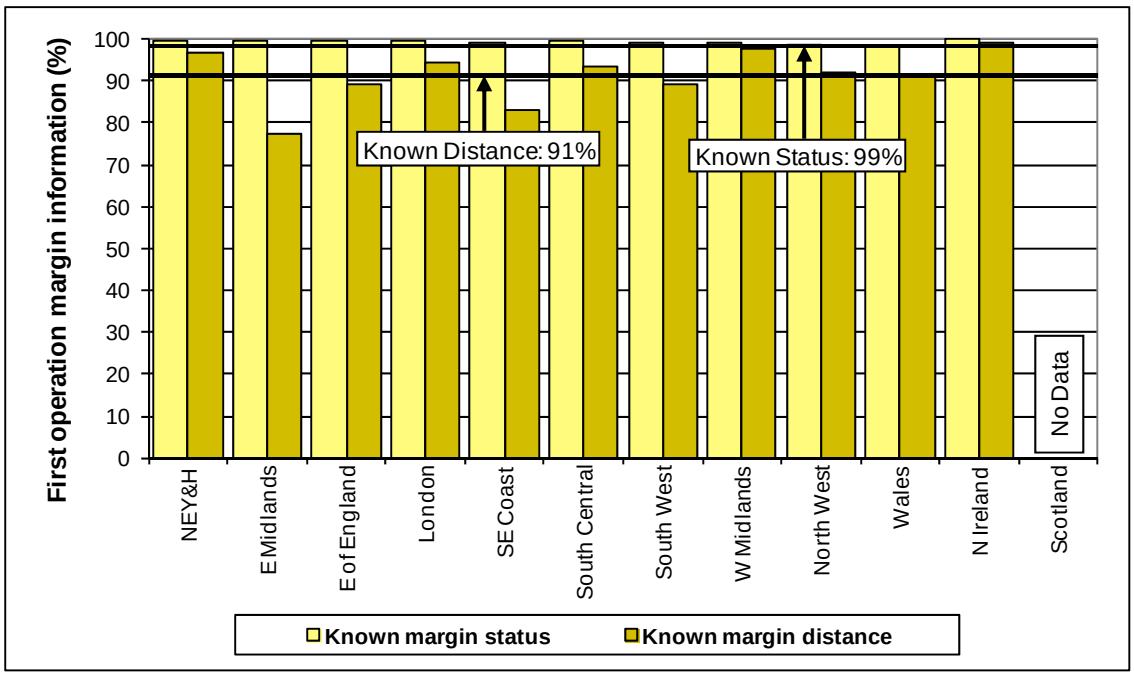

Figure 47 (Table 72): Data completeness for margins at first operation

Figure 48 shows how the completeness of margin status and margin distance varied between screening units. Excluding Scottish units for which no data were provided, 5 units had fewer than 75% of cases with known margin status and distance.

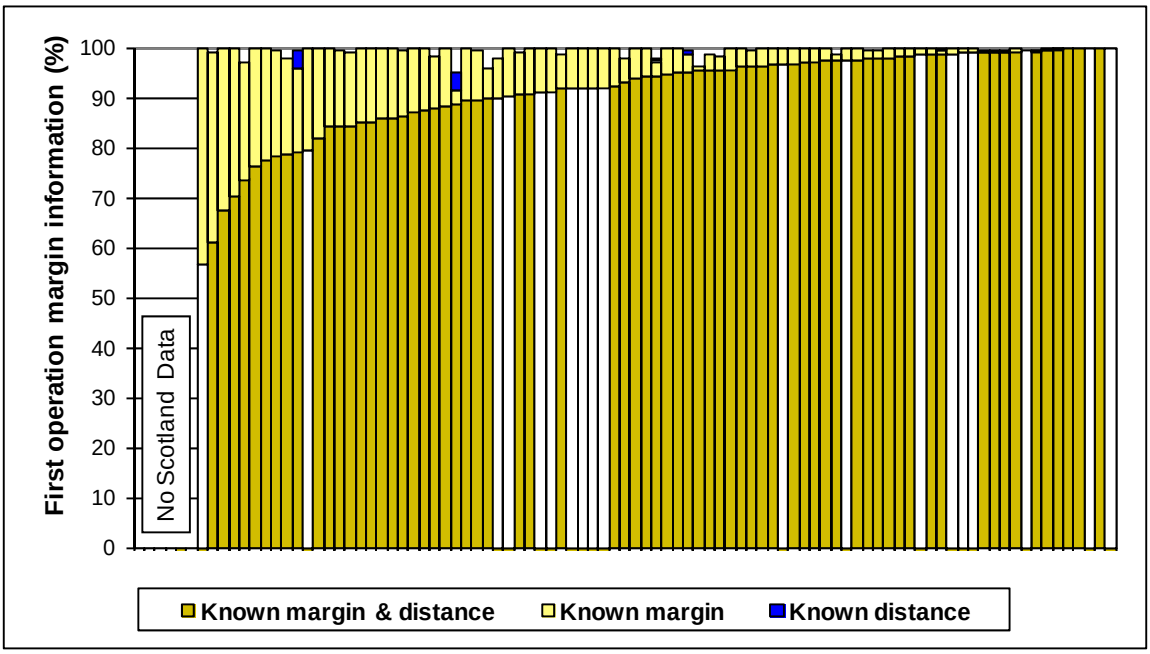

Figure 48: Variation between screening units in the proportions of cases with known margin information for first operation (The 19 smallest units are highlighted in white)

Of 16,472 cases with surgery to the breast which were invasive or non/micro-invasive at surgery, 12,469 were treated with breast conserving surgery. Of these, 98% (12,217 cases) were recorded as having clear margins at their final operation. The final margin status was recorded as unknown for a further 46 cases. Two hundred and six cases (2%) were recorded as not having had clear margins at the final operation (Table 73). This varied between 0% in Northern Ireland (1 case) and East Midlands (5 cases) to 5% in London.

Of the 4,002 cases treated with a mastectomy (Table 74), 3,882 (97%) had clear margins recorded at their final operation, 46 (1%) had their final margin status recorded as unknown and 74 (2%) were recorded as not having had clear margins at the final operation. In South East Coast 4% of cases treated with a mastectomy were recorded as not having had clear margins at the final operation. Regional QA reference centres should audit the 280 cases recorded as not having had clear margins at the final operation and the 92 cases where the final margin status was recorded as unknown to ensure that these cancers were not under-treated.

KEY FINDINGS

- Of the 16,472 cases which had surgery to the breast and were found to be malignant (invasive or non/micro-invasive) at surgery, 88% had complete margin data for all operations.
- For the first operation, 99% of cases had information on whether or not the radial margin was clear, and 91% of the cases had the margin distance recorded.
- Of the 12,469 cancers treated with breast conserving surgery, 98% were recorded as having clear margins at their final operation.
- Of the 4,002 cases treated with a mastectomy, 97% were recorded as having clear margins at their final operation.
- Regional QA reference centres should audit the 280 cases recorded as not having had clear margins at the final operation and the 92 cases where the final margin status was recorded as unknown to ensure that these cancers were not under-treated.

CHAPTER 7
THE AXILLA

This chapter draws together data on the use of pre-operative assessment and Sentinel Lymph Node Biopsy (SLNB) to determine axillary nodal status, and data on repeat operations to the axilla. Overall, of the 14,664 surgically treated invasive breast cancers included in the audit, 14,438 (98%) had known nodal status (Table 87), and of these 3,091 (21%) were node positive (Table 90).

7.1 Pre-operative Assessment of the Axilla

Quality Objective	**To increase the non-operative diagnosis of axillary node metastases**
Target Standard	**All patients diagnosed with invasive breast cancer undergoing surgical treatment should have a pre-operative axillary ultrasound scan, and if appropriate fine needle aspiration (FNA) or core biopsy should be carried out**

(Quality Assurance Guidelines for Surgeons in Breast Cancer Screening, NHSBSP Publication No 20, 4th Edition, March 2009)

Scotland was not able to provide information on axillary ultrasound examinations. Data from England, Wales and Northern Ireland for a total of 16,993 breast cancers are included in this section. 13,051 (77%) cancers had a record of an axillary ultrasound at assessment, compared to only 71% in 2010/11 and 58% in 2009/10. Of these, 11,252 (86%) were confirmed after surgery to have an invasive breast cancer, 87 (1%) a micro-invasive breast cancer, 1,709 (13%) a non-invasive breast cancer and a further 3 breast cancers had no confirmed invasive status. Thus, 83% of patients with invasive cancer, 65% with micro-invasive cancer and 51% with non-invasive cancer had axillary ultrasound recorded.

Of the 1,898 invasive breast cancers with an abnormal axillary ultrasound result recorded, 897 were node positive at surgery giving a positive predictive value of an abnormal ultrasound of 47%. Of the 9,104 invasive cancers with a normal axillary ultrasound result recorded which had axillary assessment during surgery, 1,492 (16%) had positive nodes found after surgery.

7.1.1 Axillary Ultrasound and Axillary Biopsy for Invasive Cancers

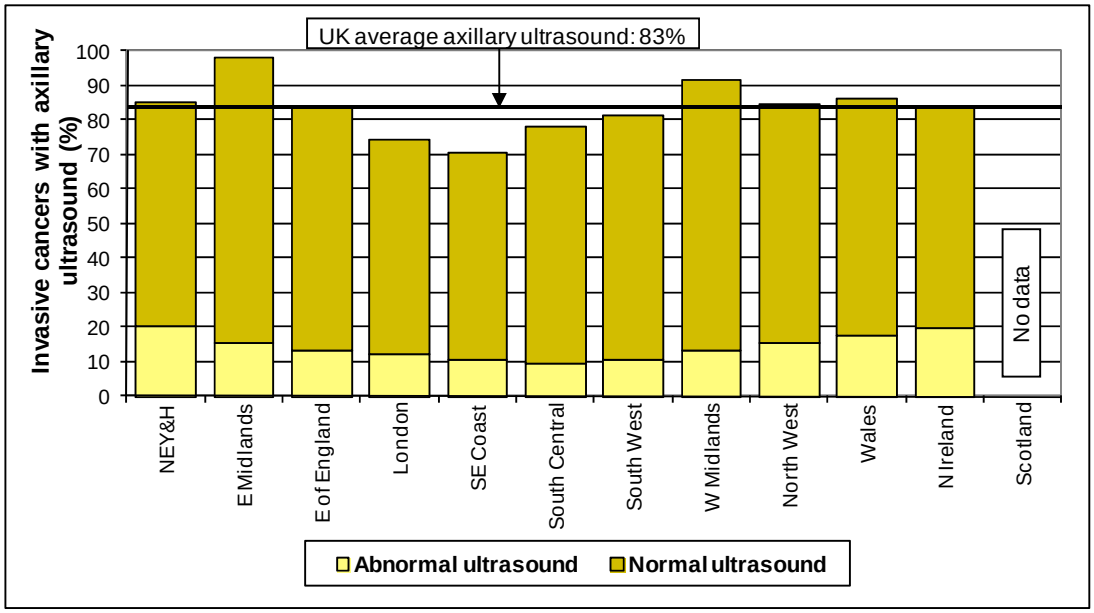

Figure 49 (Tables 75 and 76): Variation between regions in the proportion of invasive cancers with abnormal and normal axillary ultrasound results

Although 83% of invasive cancers had an axillary ultrasound result recorded overall, this varied widely between regions, from 71% in South East Coast to 98% in East Midlands (Figure 49 and Table 75). Overall, 17% of invasive cancers had an abnormal axillary ultrasound result (Table 76). Figure 50 shows the wide variation between screening units in the proportion of invasive cancers with an axillary result recorded and with an abnormal ultrasound result. For 14 units in England (4 of which were in South central and 3 in London), fewer than 70% of invasive breast cancers had an axillary ultrasound result recorded. Regional QA reference centres should audit these 14 units to ascertain whether this is a true reflection of clinical practice or a data recording issue.

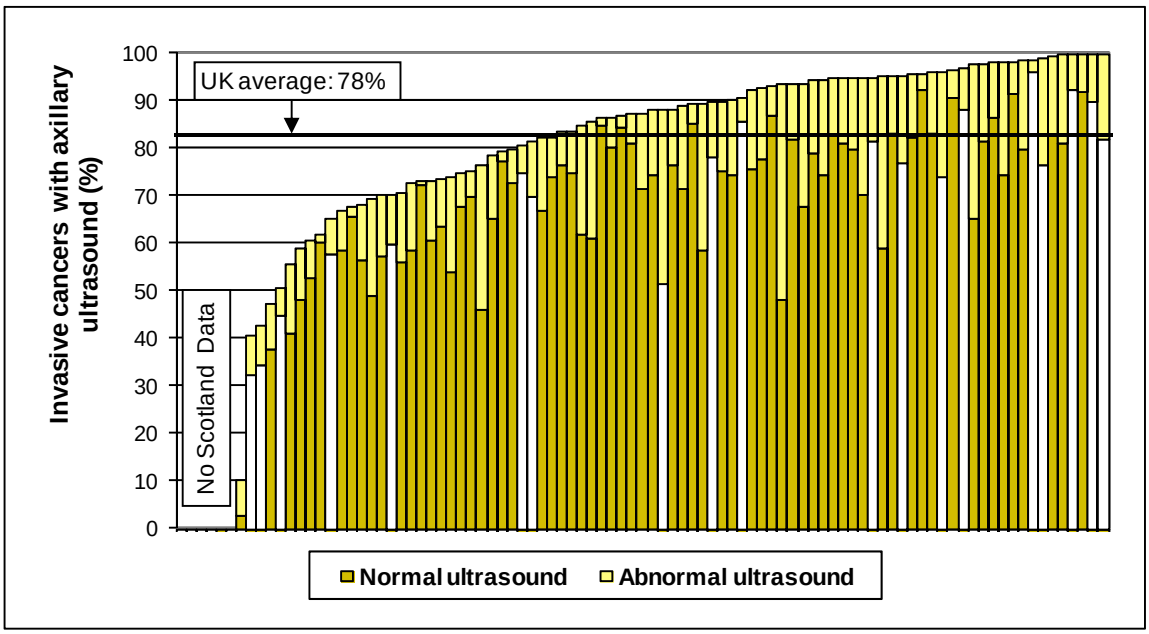

Figure 50: Variation between screening units in the proportion of invasive cancers with abnormal and normal axillary ultrasound results – Data for Scotland are not available (19 of the 20 smallest units are highlighted in white)

Of the 13,484 invasive cancers with axillary ultrasound data, 1,850 (14%) had an axillary biopsy at assessment; 69 of these had a normal ultrasound result. Regional QA reference centres should audit the 69 invasive cancers where a needle biopsy was performed despite a normal ultrasound result. Of the 1,898 invasive breast cancers with an abnormal ultrasound result, 1,715 (90%) had core biopsy or cytological assessment of the axillary nodes (Table 77). Given the poor positive predictive value (PPV) of abnormal axillary ultrasound (46%), regional QA reference centres should audit the 177 invasive cancers where an abnormal ultrasound result was apparently not followed up with a needle biopsy.

7.1.2 Worst Axillary Ultrasound Result for Invasive Cancers

Of the 1,715 invasive breast cancers with an abnormal ultrasound result which had an axillary node biopsy, 630 (37%) had a C5/B5 diagnosis, 870 (51%) had C2/B2 to C4/B4 diagnoses, and 215 (13%) had an inadequate or normal sample (C1/B1) (Table 78). The proportion of invasive cancers with a C5/B5 diagnosis varied between 27% in Wales and 49% in South Central (Figure 51). There was an even wider variation between screening units in the worst axillary biopsy result recorded for invasive cancers with an abnormal axillary ultrasound result (Figure 52). In 29 screening units (7 of which were in North East, Yorkshire & Humber) more than 50% of invasive cancers had C2/B2 to C4/B4 recorded as the worst axillary biopsy result. In 19 screening units (5 of which were in West Midlands and 4 in South Central) more than 20% of invasive cancers had C1/B1 recorded as the worst axillary biopsy result.

Of the 69 invasive cancers with a normal ultrasound result which had an axillary node biopsy (Table 79), 10 (14%) had a C5/B5 diagnosis, 47 (68%) had C2/B2 diagnoses, and 10 (14%) had an inadequate or normal sample (C1/B1).

Of the 630 invasive cancers with a B5/C5 diagnosis with abnormal ultrasound and the 10 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 490 and 9 respectively had no or unknown neo-adjuvant therapy recorded and had axillary surgery. Of these, 486 were node positive at surgery (giving an overall positive predictive value of a C5/B5 of 97% (Table 80). Of the 107 C5/B5 invasive cancers with a normal or abnormal ultrasound result and with neo-adjuvant therapy and axillary surgery recorded, 78 (73%) had positive nodes at surgery. Of the 490 invasive cancers with a C5/B5 result and abnormal ultrasound and the 9 invasive cancers with a C5/B5 result and normal ultrasound which had no neo-adjuvant therapy recorded and had axillary surgery, 13 (3%) had false positive results, i.e. were found to be node negative at surgery. Eight of these had axillary clearance. Regional QA reference centres and regional radiology QA co-ordinators should review these 13 cancers as the axilla appears to have been over-treated.

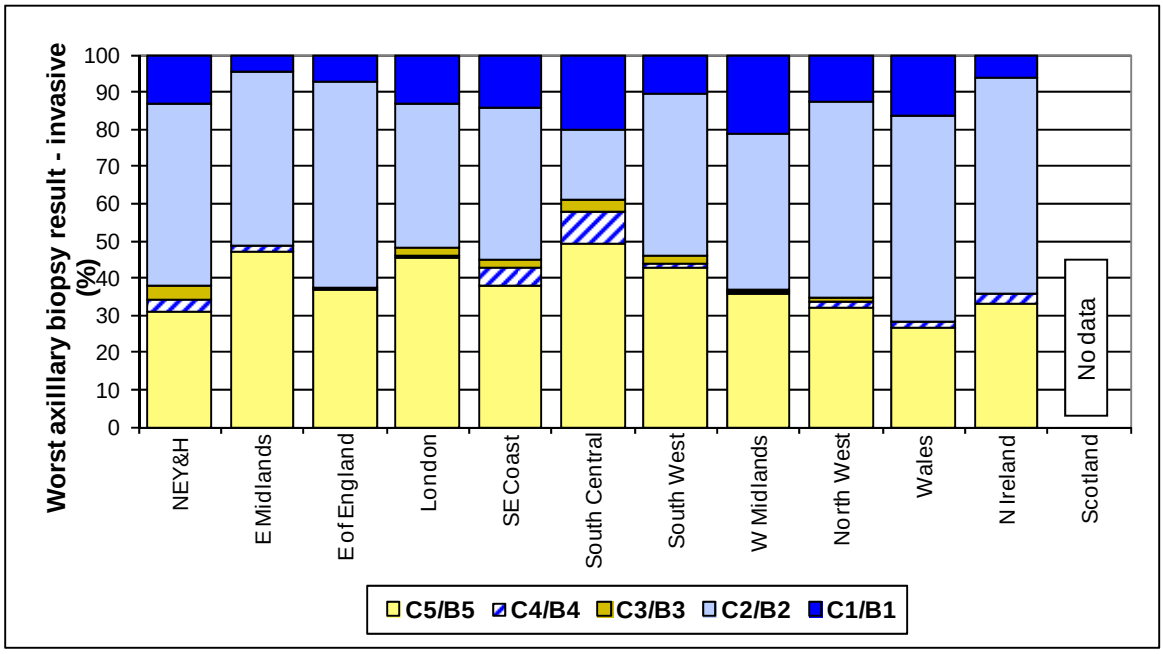

Figure 51 (Table 78): The worst axillary biopsy result for invasive cancers with an abnormal axillary ultrasound result

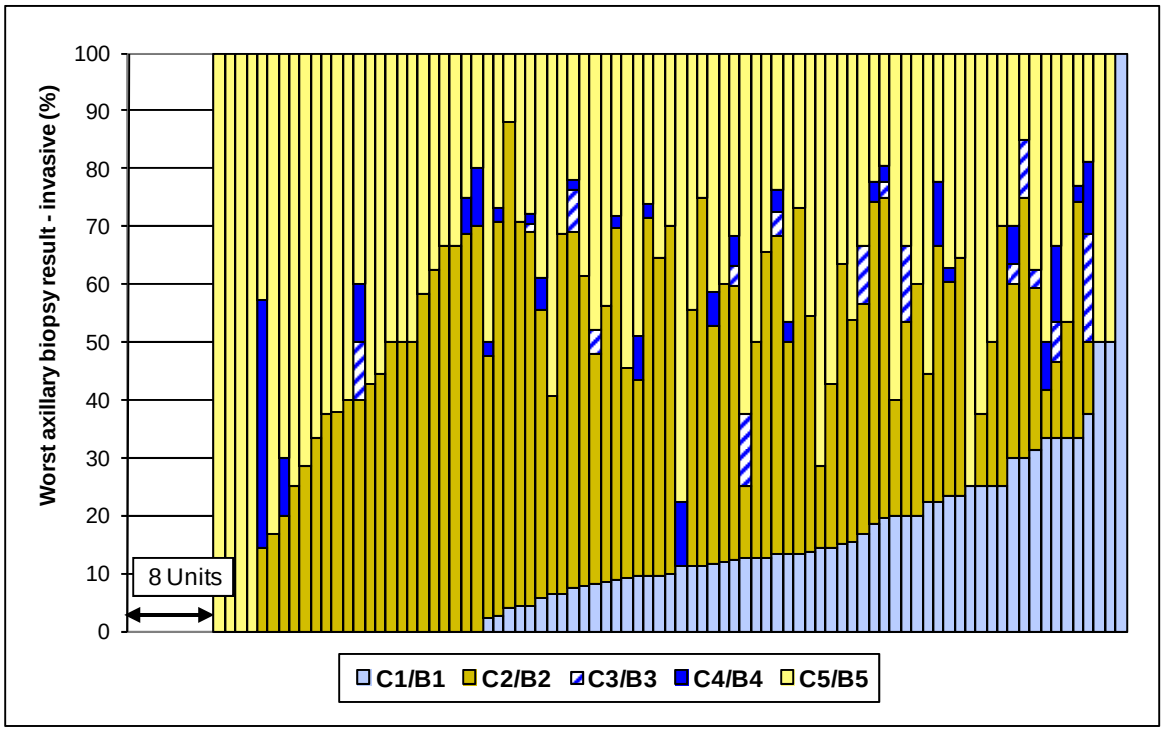

Figure 52: Variation between screening units in the worst axillary biopsy result for invasive cancers with an abnormal axillary ultrasound result – Data for Scotland are not available

Eight hundred and fifty seven invasive cancers with a normal or abnormal ultrasound result and with a C2/B2 to C4/B4 diagnosis had no or unknown neo-adjuvant therapy recorded and had axillary assessment at surgery. Of these, 179 (21%) had positive nodes at surgery. Of the 207 invasive cancers with a normal or abnormal ultrasound result, a C1/B1 diagnosis, no or unknown neo-adjuvant therapy recorded and axillary assessment at surgery 69 (33%) had positive nodes at surgery. Axillary ultrasound thus failed to accurately identify positive nodes for 248 invasive breast cancers.

7.1.3 Worst Axillary Ultrasound Result for Node Positive Invasive Cancers

In the UK excluding Scotland, of the 2,586 invasive breast cancers without neo-adjuvant therapy recorded that were confirmed to be node positive on surgery, 505 (20%) had positive nodes diagnosed pre-operatively by means of needle biopsy. This varied from 11% in South Central to 37% in Northern Ireland (Table 81). This is similar to the proportion of positive nodes found at surgery (17%) for the 12,212 invasive breast cancers without neo-adjuvant therapy in the UK that did not have an axillary biopsy before surgery or where it was not known whether an axillary biopsy was taken (Table 82).

Of the 2,816 invasive cancers in England, Wales and Northern Ireland with positive nodal status (Table 87), 80 (3%) had a C1/B1 axillary biopsy (this varied from 1% in East Midlands, East of England and South West to 5% in North East, Yorkshire & Humber), 164 (6%) had a C2/B2 axillary biopsy (this varied from 3% in South Central to 10% in Wales), 10 had a C3/B3 axillary biopsy (5 of these were in North East, Yorkshire & Humber), 23 (1%) had a C4/B4 axillary biopsy and 586 (21%) had a C5/B5 axillary biopsy (Table 83).

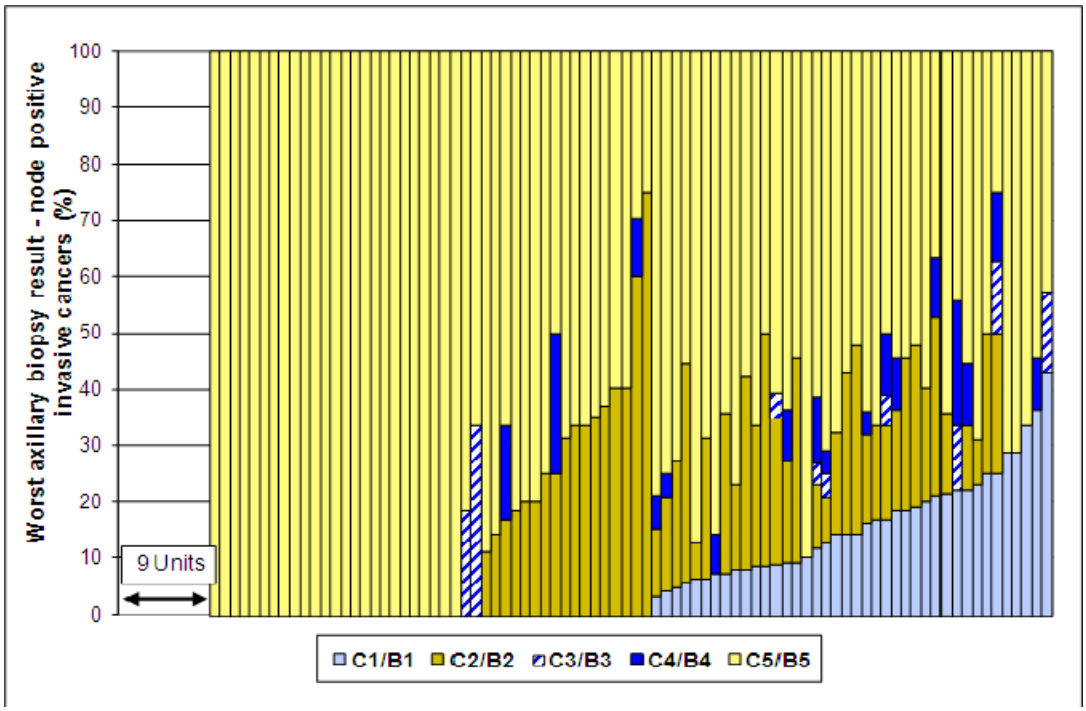

Figure 53: Variation between screening units in the worst axillary biopsy result recorded for node positive invasive cancers – Data for Scotland are not available

Figure 53 shows that for 12 screening units (3 in North West, 2 in South Central, 2 in South East Coast and 2 in North East, Yorkshire & Humber) more than 20% of node positive invasive cancers with an axillary biopsy recorded had C1/B1 recorded as the worst axillary biopsy result. In 8 screening units more than 35% of node positive invasive cancers with an axillary biopsy recorded had C2/B2 recorded as the worst axillary biopsy result. In 5 screening units more than 10% of node positive invasive cancers with an axillary biopsy recorded had C3/B3 recorded as the worst axillary biopsy result. Regional QA reference centres and regional radiology QA co-ordinators should audit the 25 units with high proportions of node positive cancers with C1/B1, C2/B2 or C3/B3 results to find out the reasons for these inaccurate results.

KEY FINDINGS

- In the UK excluding Scotland, 13,051 (77%) cases had a record of an axillary ultrasound at assessment; 86% were confirmed to be invasive after surgery and 13% non-invasive. Overall, 83% of the invasive cancers and 51% of non-invasive cancers had axillary ultrasound recorded.
- Of the 1,898 invasive breast cancers with an abnormal axillary ultrasound result recorded, 897 were node positive at surgery giving a positive predictive value of an abnormal ultrasound of 47%.
- Of the 9,104 invasive cancers with a normal axillary ultrasound result recorded which had axillary assessment during surgery, 1,492 (16%) had positive nodes found after surgery.
- For 14 units in England, fewer than 70% of invasive breast cancers had an axillary ultrasound result recorded. Regional QA reference centres should audit these 14 units to ascertain whether this is a true reflection of clinical practice or a data recording issue.
- Regional QA reference centres should audit the 69 invasive cancers where a needle biopsy was performed despite a normal ultrasound result.
- Given the poor positive predictive value of abnormal axillary ultrasound (46%), regional QA reference centres should audit the 177 invasive cancers where an abnormal ultrasound result was apparently not followed up with a needle biopsy.
- In 29 screening units more than 50% of invasive cancers had C2/B2 to C4/B4 recorded as the worst axillary biopsy result. In 19 screening units more than 20% of invasive cancers had C1/B1 recorded as the worst axillary biopsy result.
- Of the 630 invasive cancers with a C5/B5 diagnosis with abnormal ultrasound and the 10 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 499 had no or unknown neo-adjuvant therapy recorded and had axillary surgery. Of these, 486 were node positive at surgery, giving an overall positive predictive value of a C5/B5 of 97%.
- Of the 107 C5/B5 invasive cancers with a normal or abnormal ultrasound result and with neo-adjuvant therapy and axillary surgery recorded, 78 (73%) had positive nodes at surgery.
- Of the 490 invasive cancers with a C5/B5 result and abnormal ultrasound and the 9 invasive cancers with a C5/B5 results and normal ultrasound which had no or unknown neo-adjuvant therapy recorded and had axillary surgery, 13 (3%) had false positive results, i.e. were found to be node negative at surgery. Eight of these had axillary clearance. Regional QA reference centres and regional radiology QA co-ordinators should review these 13 cases as the axilla appears to have been over-treated.
- Axillary ultrasound failed to accurately identify positive nodes for 248 invasive breast cancers.
- Regional QA reference centres and regional radiology QA co-ordinators should audit the 25 units with high proportions of node positive cancers with C1/B1, C2/B2 or C3/B3 results to find out the reasons for these inaccurate results.

7.2 Invasive and Micro-invasive Cancers – Sentinel Lymph Node Biopsy and Nodal Status

In 2011/12, of the 14,449 invasive breast cancers with axillary surgery, 12,068 (84%) had a SLNB (Table 85). This varied from 78% in South East Coast to 90% in Wales and London. The overall use of SLNB has increased by 7% since 2010/11. A much more variable increase is apparent in individual regions; from 13% in Scotland (71% in 2010/11) to 1% in South West (85% in 2010/11).

Quality Objective	**To minimise morbidity from axillary surgery to obtain staging information**
Outcome Measure	**Sentinel node biopsy using the combined blue dye/radioisotope technique is a recommended axillary staging procedure for the majority of patients with early invasive breast cancer**

(Quality Assurance Guidelines for Surgeons in Breast Cancer Screening, NHSBSP Publication No 20, 4th Edition, March 2009)

The following table shows for invasive breast cancers which had a SLNB, how the SLNB technique recorded as having been used varied between regions in 2011/12. Of the 12,068 invasive cases with

a SLNB, 79% were recorded as having had the full dual SLNB procedure using isotope and blue dye. In West Midlands 98% of cases had the recommended dual procedure recorded, but in East of England for only 32% of cases was the recommended dual procedure recorded as having been used. For 16% of cancers in the UK the blue dye only SLNB technique was used and for 4% the isotope only SLNB technique was used.

SENTINEL LYMPH NODE BIOPSY (Invasive Cases with Axillary Surgery)				
Region	**% cases with SLNB**	**TECHNIQUE USED**		
		Isotope and blue dye	**Blue dye only**	**Isotope only**
N East, Yorks & Humber	*83*	*92%*	*5%*	*3%*
East Midlands	*80*	*96%*	*3%*	*0%*
East of England	*81*	*32%*	*38%*	*30%*
London	*90*	*59%*	*40%*	*2%*
South East Coast	*78*	*68%*	*31%*	*1%*
South Central	*81*	*91%*	*8%*	*1%*
South West	*86*	*82%*	*18%*	*0%*
West Midlands	*84*	*98%*	*2%*	*1%*
North West	*83*	*79%*	*17%*	*4%*
Wales	*90*	*80%*	*13%*	*6%*
Northern Ireland	*87*	*62%*	*30%*	*8%*
Scotland	*84*	*95%*	*5%*	*0%*
United Kingdom	***84***	***79%***	***16%***	***4%***

Figure 54 shows that the SLNB technique recorded varied widely between screening units; with some units using the recommended isotope and blue dye method for very few or none of their patients. In 5 screening units, less than 50% of the invasive cases had SLNB. Regional QA reference centres and regional surgical QA co-ordinators should ensure that SLNB is available to suitable patients in all their screening units, and they should investigate the why some units appear not to be using the recommended full dual SLNB technique.

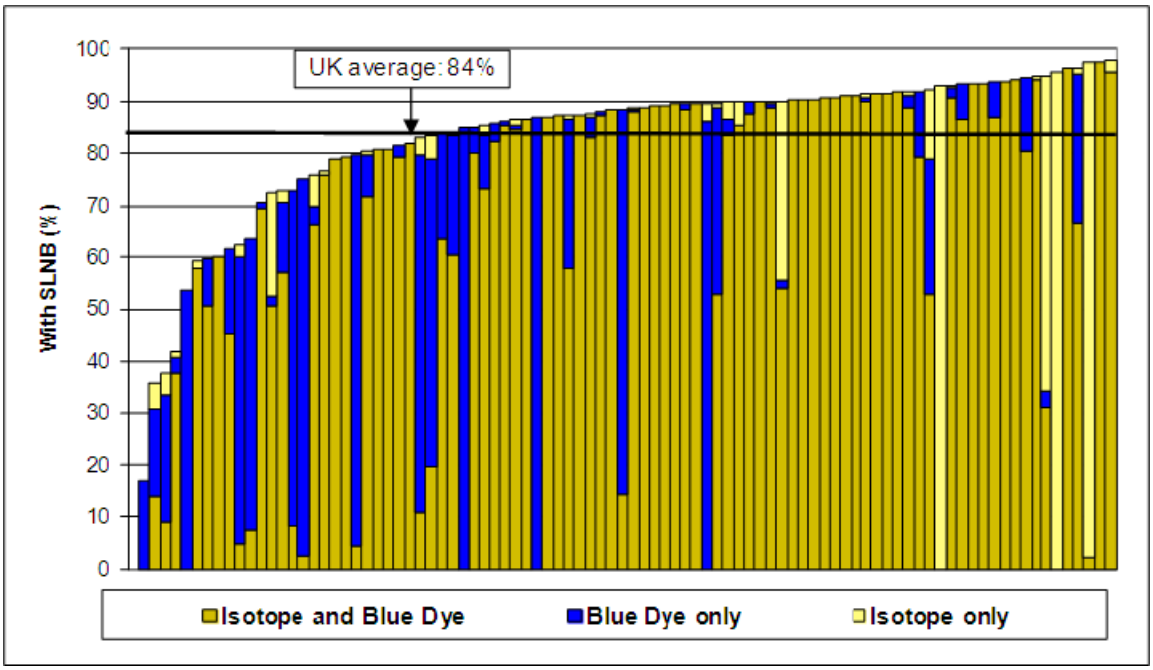

Figure 54: Variation between screening units in the use of SLNB for invasive breast cancers with axillary surgery

Figure 54 also shows how the use of SLNB for invasive breast cancers having axillary surgery varied between screening units; ranging from 0% in a unit in Scotland to 98% in 3 units in South West, South East Coast and East of England. In 35 units, over 90% of the patients with invasive cancers who had axillary surgery had a SLNB. Two units used SLNB for fewer than 20% of women with invasive cancer who had axillary surgery; 1 of these was in Scotland and 1 in East of England. This variation could in part reflect differences between screening units in the proportion of cancers where positive nodes were confirmed by pre-operative axillary core biopsy, but this is unlikely to account for the very low use of SLNB in some units.

Quality Objective	**To ensure adequate staging of the axilla in patients with invasive breast cancer**
Minimum Standard	**>90% of women treated for early invasive cancers should have an axillary staging procedure carried out if metastatic nodal metastasis is not confirmed non-operatively**
Target Standard	**100% of women treated for early invasive cancers should have an axillary staging procedure carried out if metastatic nodal metastasis is not confirmed non-operatively**

(Quality Assurance Guidelines for Surgeons in Breast Cancer Screening, NHSBSP Publication No 20, 4th Edition, March 2009)

The following summary table shows that the proportion of invasive breast cancers for which nodal status was recorded based on the examination of fewer than 4 nodes decreased from 10.6% in 1996/97 to 4.8% in 2003/04. In the most recent 6-year period, this figure has risen and eclipsed the 1996/97 figure because of the increased use of SLNB procedures, and in 2011/12 the proportion of invasive cancers with fewer than 4 nodes examined increased again to 58.6% from 49.5% in 2010/11. However, when invasive cancers which had a SLNB are excluded, there is a continuing decrease in the proportion of invasive cancers with nodal status based on the examination of fewer than 4 nodes; this figure being 1.5% in 2011/12.

16 YEAR COMPARISON:
NODAL STATUS ASSESSED ON THE BASIS OF <4 NODES

Year of data collection	*Number of invasive cancers with known nodal status*	*% with <4 nodes examined*		
		Overall	*With SLNB*	*No SLNB*
1996/97	*4,773*	*10.6*	*-*	*10.6*
1997/98	*5,585*	*9.0*	*-*	*9.0*
*1998/99**	*5,574*	*6.7*	*-*	*6.7*
1999/00	*7,126*	*5.5*	*-*	*5.5*
2000/01	*7,379*	*5.0*	*-*	*5.0*
2001/02	*7,465*	*5.1*	*-*	*5.1*
2002/03	*8,607*	*5.2*	*-*	*5.2*
2003/04	*9,811*	*4.8*	*-*	*4.8*
*2004/05**	*10,322*	*8.6*	*4.1*	*4.5*
2005/06	*12,063*	*13.4*	*8.8*	*4.6*
2006/07	*11,993*	*19.1*	*16.0*	*3.1*
2007/08	*12,850*	*27.3*	*24.0*	*3.3*
2008/09	*13,074*	*35.9*	*33.4*	*2.5*
2009/10	*13,216*	*42.3*	*40.5*	*1.8*
2010/11	*13,811*	*49.5*	*47.4*	*2.1*
2011/12	*14,438*	*58.6*	*57.1*	*1.5*

*Data from Scotland and Northern Ireland are absent in 1998/99. Data for 2 units from East of England are absent in 2004/05

In the UK in 2011/12, 91% of the 2,381 invasive breast cancers, which either did not have a SLNB procedure or where the type of nodal procedure was unknown, had 4 or more nodes taken (Table 86). This varied from 82% in East of England to 98% in East Midlands and Northern Ireland.

Figure 55 shows that 41 screening units achieved the 100% target that all their invasive cancers without a SLNB or with an unknown nodal procedure should have at least 4 nodes obtained. Twenty nine screening units did not achieve the 90% minimum standard; an increase from 20 units in 2010/11. Regional QA reference centres and regional surgical QA co-ordinators should investigate these 29 screening units. Three units (1 in South Central and 2 in Scotland) had more than 10% of cases with an unknown axillary procedure.

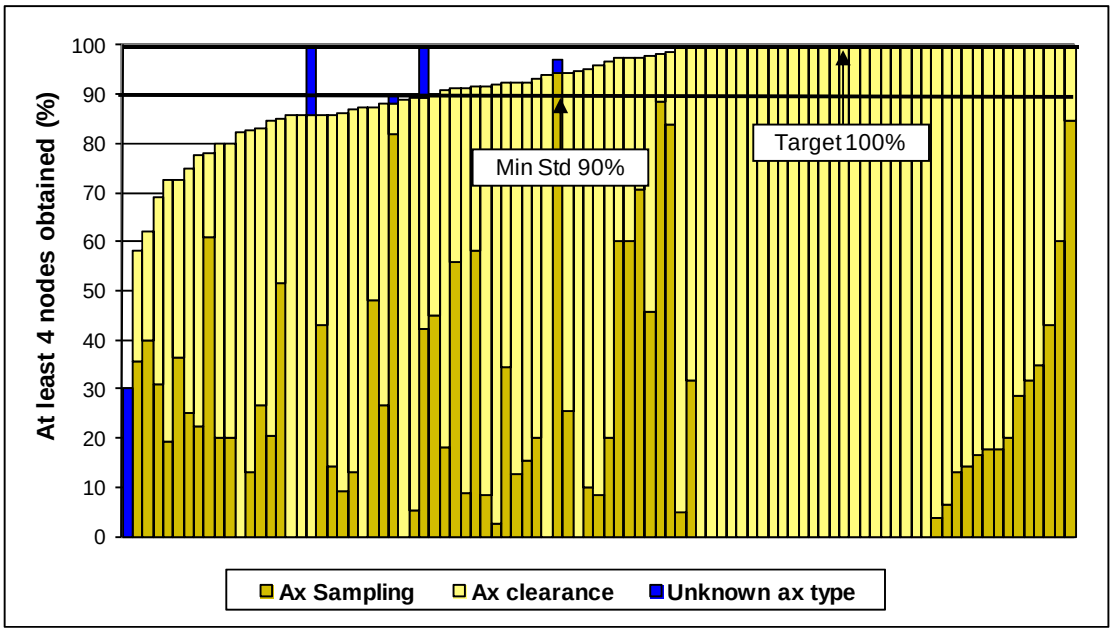

Figure 55: Invasive cancers with at least 4 nodes obtained expressed as a proportion of the invasive cancers without a sentinel node procedure

Of the 14,438 invasive breast cancers with known nodal status, 3,091 (21%) had positive nodes (Table 87). Table 88 shows that the proportion of cases with positive nodal status (16%) was lower for cases which underwent a SLNB procedure compared with cases which did not have a SLNB procedure (49%). This could be due to the selection of women for axillary sampling or clearance, who were considered to be of high risk (e.g. high grade, palpable nodes) or who had positive nodes on non-operative ultrasound guided cytology or core biopsy. Of the 1,924 invasive breast cancers which had their positive nodal status determined from a SLNB procedure, 1,147 (60%) had a subsequent axillary procedure (Table 89). A further 467 (24%) had 4 or more nodes taken in the only axillary operation, which indicates that other nodes were taken as well as the sentinel node at this time.

INVASIVE CANCERS WITH INSUFFICIENT NODAL INFORMATION

	Total invasive cancers with surgery	***Unknown nodal status*** *(Table 84)*	***Negative <4 nodes - not sentinel procedure*** *(Table 90)*	***Positive <4 nodes*** *(Table 90)*	***Insufficient nodal information***	
Region	***No.***	***No.***	***No.***	***No.***	***No.***	***%***
N East, Yorks & Humber	*1,952*	*18*	*13*	*55*	*86*	*4*
East Midlands	*1,155*	*9*	*4*	*24*	*37*	*3*
East of England	*1,287*	*18*	*39*	*26*	*83*	*6*
London	*1,315*	*34*	*8*	*25*	*67*	*5*
South East Coast	*1,230*	*30*	*17*	*26*	*73*	*6*
South Central	*1,013*	*15*	*19*	*32*	*66*	*7*
South West	*1,360*	*34*	*26*	*24*	*84*	*6*
West Midlands	*1,353*	*18*	*9*	*15*	*42*	*3*
North West	*1,621*	*19*	*45*	*22*	*86*	*5*
Wales	*623*	*5*	*5*	*10*	*20*	*3*
Northern Ireland	*341*	*4*	*1*	*1*	*6*	*2*
Scotland	*1,414*	*22*	*16*	*71*	*109*	*8*
United Kingdom	***14,664***	***226***	***202***	***331***	***759***	***5***

The preceding summary table shows that of the 14,664 surgically treated invasive breast cancers, 226 (2%) had unknown nodal status, 202 (1%) had their negative nodal status determined on the basis of 1, 2 or 3 nodes without a SLNB procedure, and 331 (2%) had their positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure. In total, 759 (5%) of the 14,664 invasive breast cancers may have had insufficient nodal information to provide a full diagnostic work-up. However, of the 331 cancers with positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure, 127 (38%) had micro-metastases and therefore further axillary surgery may not have been appropriate.

Fifty five percent of invasive breast cancers (7,926 cancers) with fewer than 4 nodes examined had their negative nodal status determined using a SLNB procedure (Table 90 and Figure 56). This varied from 48% in East Midlands and East of England to 64% in Wales. A further 202 invasive cancers (1%) had their negative nodal status determined on the basis of fewer than 4 nodes without a SLNB procedure.

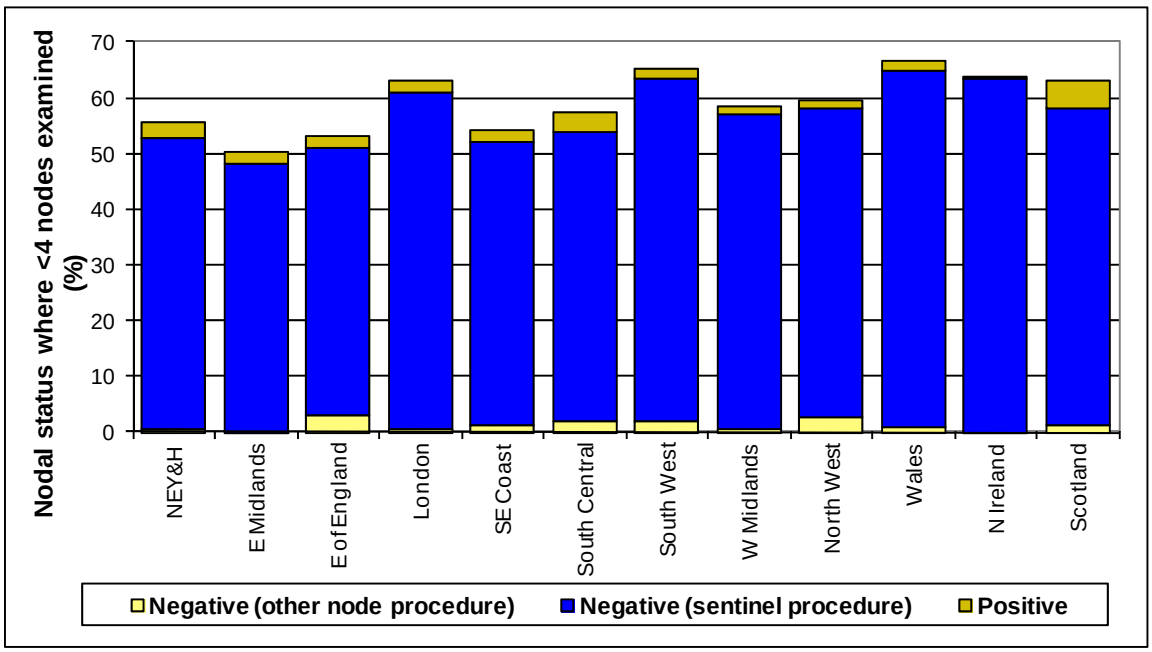

Figure 56 (Table 90): Nodal status for invasive cancers where nodal status was determined on the basis of <4 nodes, expressed as the percentage of invasive cancers with known nodal status

For 318 invasive breast cancers, the positive nodal status was determined on the basis of fewer than 4 nodes with a SLNB. This varied from 1 cancer (0.3%) in Northern Ireland to 71 (5.1%) cancers in Scotland (Table 90); 310 of these cancers had no subsequent axillary procedure(s) recorded (Table 89). Of these 310 cancers, 45 (15%) had an invasive tumour size of less than 10mm, 76 (25%) were Grade 1 and 68 (22%) were in the Excellent or Good NPI Groups. A further 13 invasive cancers had their positive nodal status determined on the basis of fewer than 4 nodes without a SLNB procedure (Table 90). Regional QA reference centres and regional surgical QA co-ordinators should audit all such cancers to ensure that the axilla has been treated appropriately.

Figure 57 shows how the proportion of invasive cancers with unknown nodal status and with negative nodal status determined on the basis of fewer than 4 nodes without a SLNB/unknown nodal procedure or positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure varied between screening units. Three hundred and eighteen of the 331 invasive cases where the positive nodal status was determined on the basis of 1, 2 or 3 nodes received a SLNB. Of these 318 cancers, 124 (39%) had micro-metastases and therefore further axillary surgery may not have been appropriate.

Since the publication of the results of the Z11 Trial and the IBSCG study, decisions on systemic therapy are increasingly being made on the basis of the available axillary staging (which may include fewer than 4 nodes), rather than subjecting women to unnecessary axillary clearance. Under these circumstances, women may have been treated with axillary radiotherapy or have been advised not to

have any further axillary intervention. Regional QA reference centres and regional surgical QA co-ordinators should, nevertheless, audit all such cancers to ensure that the axilla has been treated appropriately.

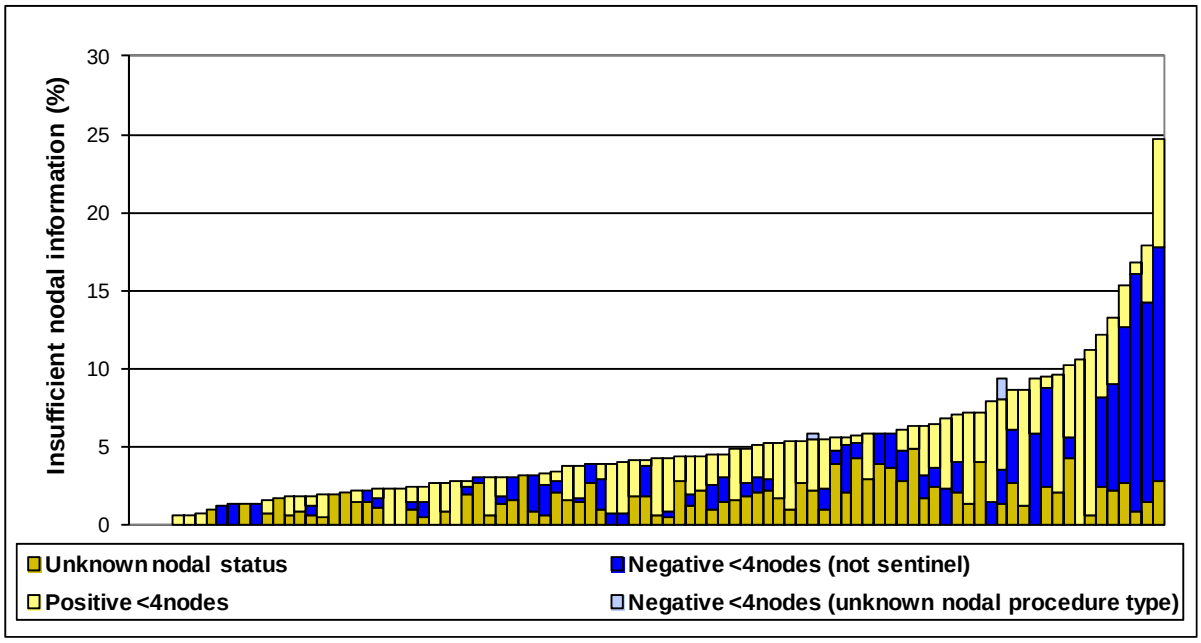

Figure 57: Variation between screening units in the proportion of invasive cancers which may have had insufficient nodal information

Of the 138 surgically treated micro-invasive cancers, 89 (64%) had known nodal status. Forty seven (82%) of the 57 micro-invasive cancers treated by mastectomy and 42 (52%) of 81 micro-invasive cancers treated with breast conserving surgery had known nodal status. One (1%) of the 89 micro-invasive cancers with known nodal status had positive nodal status recorded. This cancer was in London and had an SLNB procedure without any subsequent axillary procedures.

KEY FINDINGS

- Of the 14,449 invasive breast cancers with axillary surgery, 12,068 (84%) had a SLNB. This varied from 78% in South East Coast to 90% in Wales and London. The overall use of SLNB has increased by 7% since 2010/11. A much more variable increase is apparent in individual regions; from 13% in Scotland to 1% in South West. Regional QA reference centres and regional surgical QA co-ordinators should ensure that SLNB is available in all of their screening units.
- Of the 12,068 invasive cases with a SLNB, 79% were recorded as having had the full dual SLNB procedure using isotope and blue dye. Regional QA reference centres and regional surgical QA co-ordinators should investigate why some units appear not to be using the recommended full dual SLNB technique.
- Two units used SLNB for fewer than 20% of women with invasive cancer who had axillary surgery. This variation could in part reflect differences between screening units in the proportion of cancers where positive nodes were confirmed by pre-operative axillary core biopsy, but this is unlikely to account for the very low use of SLNB in some units.
- In 2011/12 the proportion of invasive cancers with fewer than 4 nodes examined increased again to 58.6%; this falls to 1.5% when invasive cancers with a SLNB are excluded.
- Of the 2,381 invasive breast cancers, which either did not have a SLNB procedure or where the type of nodal procedure was unknown, 91% had 4 or more nodes taken; 29 screening units did not achieve the 90% minimum standard. Three units (1 in South Central and 2 in Scotland) had more than 10% of cases with an unknown axillary procedure.
- Of the 14,438 invasive breast cancers with known nodal status, 3,091 (21%) had positive nodes. The proportion of cases with positive nodal status (16%) was lower for cases which underwent a SLNB procedure compared with cases which did not have a SLNB procedure (49%). This could be due to the selection of patients for axillary sampling or clearance, who were considered to be of high risk (e.g. high grade, palpable nodes) or who had positive nodes on non-operative ultrasound guided cytology or core biopsy.

KEY FINDINGS (cont.)

- Of the 14,664 surgically treated invasive breast cancers, 226 (2%) had unknown nodal status, 202 (1%) had their negative nodal status determined on the basis of 1, 2 or 3 nodes without a SLNB procedure.
- Of the 331 cancers with positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure, 127 (38%) had micro-metastases and therefore further axillary surgery may not have been appropriate.
- Since the publication of the results of the Z11 Trial and the IBSCG study, decisions on systemic therapy are increasingly being made on the basis of the available axillary staging (which may include fewer than 4 nodes), rather than subjecting women to unnecessary axillary clearance. Under these circumstances, women may have been treated with axillary radiotherapy or have been advised not to have any further axillary intervention. Regional QA reference centres and regional surgical QA co-ordinators should, nevertheless, audit all such cancers to ensure that the axilla has been treated appropriately.

7.3 Non-invasive Cancers – Sentinel Lymph Node Biopsy and Nodal Status

Although nodal assessment is not always indicated for non-invasive cancers, nodes are usually obtained when a mastectomy is performed, especially if the assessment process provides suspicion of invasive disease. Of the 3,608 surgically treated non-invasive cancers, 29% had known nodal status and 71% had no nodes obtained (Table 91). Eighty five percent of the non-invasive cancers treated by mastectomy and 8% of non-invasive cancers treated with breast conserving surgery had known nodal status (Table 92). Of the 1,034 non-invasive cancers with known nodal status, 13 (1%) had positive nodal status recorded (Table 93).

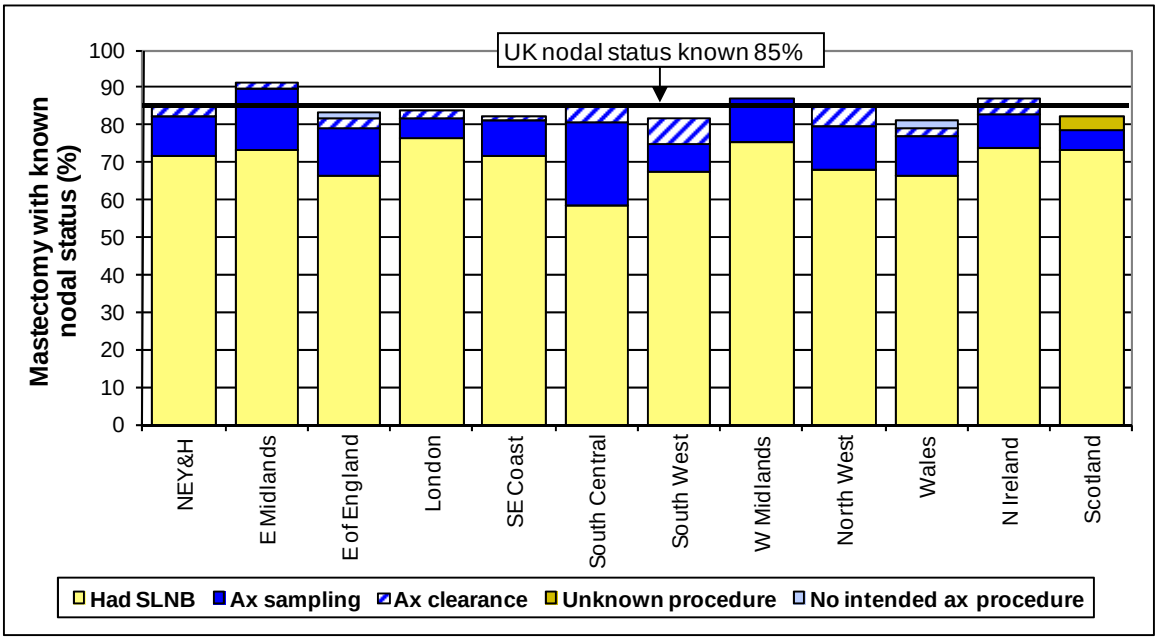

Figure 58 (Tables 94): Use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with a mastectomy

Overall, 85% of non-invasive breast cancers treated with mastectomy had known nodal status, and 83% of non-invasive breast cancers had their nodal status determined on the basis of a SLNB (Table 94); these proportions varied widely between regions (Figure 58). Figure 59 shows that there was even greater variation between screening units. For example, in 14 screening units where the nodal status was known for all cancers, the status was always determined by a SLNB, while in a 1 unit where the nodal status was known for all cancers, the status was always determined without a SLNB.

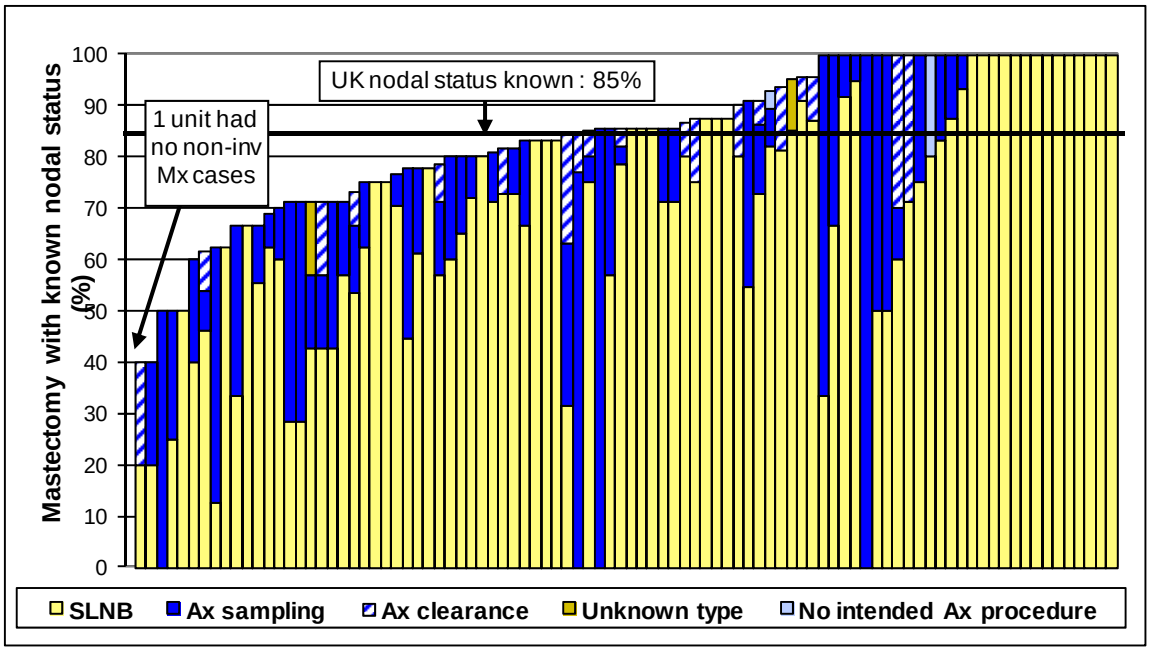

Figure 59: Variation between screening units in the use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with a mastectomy

Eight percent (209) non-invasive breast cancers treated with breast conserving surgery had known nodal status, and 87% of these had their nodal status determined on the basis of a SLNB (Tables 92 and 95). The nodal status of non-invasive cancers was thus more likely to have been determined by SLNB if the cancers were treated with breast conserving surgery than by mastectomy. Figure 60 shows the proportion of non-invasive breast cancers treated with breast conserving surgery that had known nodal status in each region. This varied from 4% in South East Coast to 14% in Wales. Figure 61 shows that, compared with non-invasive cancers treated with mastectomy, the variation in practice between screening units was less marked for non-invasive breast cancers treated with breast conserving surgery that had known nodal status; with most units determining the nodal status on the basis of a SLNB. Twenty six units had no cancers with known nodal status and 4 units did not use SLNB to determine nodal status for their non-invasive cancers.

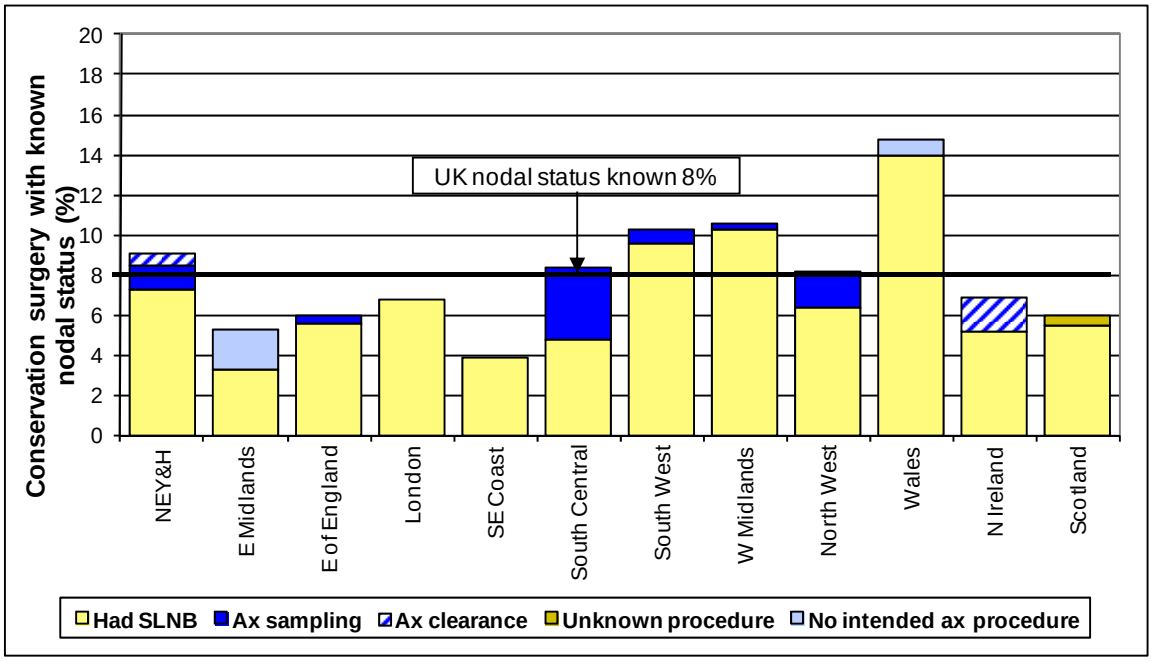

Figure 60 (Table 95): Use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with breast conserving surgery

In the UK as a whole the median numbers of nodes taken for non-invasive cancers undergoing breast conserving surgery or mastectomy were both 2 (Table 96). The maximum numbers of nodes

taken for non-invasive cancers treated with breast conserving surgery or mastectomy were 13 and 18 respectively. The maximum number of nodes taken for mastectomy cases varied from 9 in West Midlands and South Central to 18 in North East, Yorkshire & Humber and North West. Thirty four non-invasive cancers treated with mastectomy and 3 non-invasive cancers treated with breast conserving surgery had their nodal status determined on the basis of an axillary clearance. Eleven non-invasive cancers had more than 10 nodes taken. Regional QA reference centres should determine the reason that this invasive procedure was used on women with non-invasive disease.

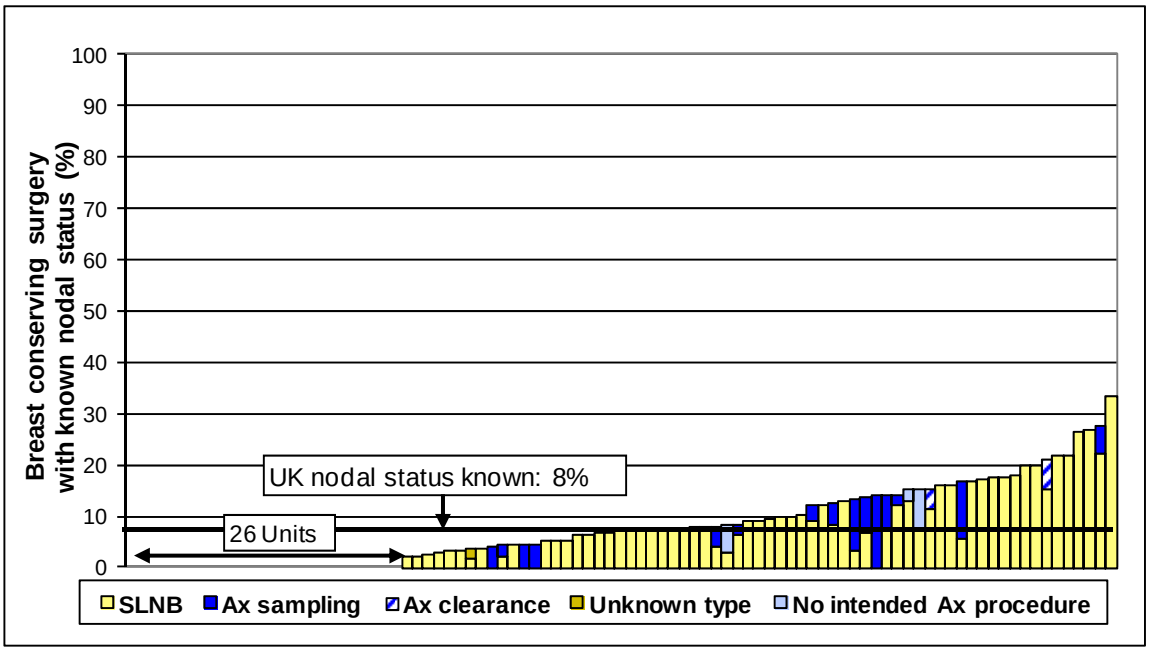

Figure 61: Variation between screening units in the use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with breast conserving surgery

Thirteen non-invasive cancers had positive nodal status recorded (Table 93). Of these, 9 had a SLNB procedure, 3 (1 each in North East, Yorkshire & Humber, North West and London) had an axillary clearance procedure and 1 in Scotland had an unknown axillary procedure. Of the 9 cancers which had their positive nodal status determined from a SLNB procedure, 4 (1 in East of England, 1 in South West and 2 in North West), had a subsequent axillary procedure.

KEY FINDINGS

- Although nodal assessment is not always indicated for non-invasive cancers, 29% of non-invasive cancers had known nodal status. 85% of non-invasive cancers treated with mastectomy had known nodal status, compared with 8% of those treated with breast conserving surgery.
- Of the 1,034 non-invasive cancers with known nodal status, 13 (1%) had positive nodal status recorded.
- Eighty three percent of non-invasive cancers treated with a mastectomy and 87% of non-invasive cancers treated with breast conserving surgery had their nodal status determined on the basis of a SLNB. The former varied widely between screening units.
- The maximum numbers of nodes taken for non-invasive cancers treated with breast conserving surgery or mastectomy were 13 and 18 respectively.
- Thirty four non-invasive cancers treated with mastectomy and 3 non-invasive cancers treated with breast conserving surgery had their nodal status determined on the basis of an axillary clearance. Regional QA reference centres should determine the reason that this invasive procedure was used on women with non-invasive disease.

7.4 Invasive Cancers with No Axillary Surgery Recorded

Of the 14,664 surgically treated invasive cancers, 225 cases did not have nodes taken at surgery (Table 84). The following summary table shows for each type of non-operative diagnosis, the

proportion of invasive breast cancers in each region with no axillary surgery recorded. One hundred and forty four invasive cancers (1%) with a B5b (Invasive) non-operative diagnosis had no axillary procedure recorded; 24 of these were in South West and 21 in London. Forty three invasive cancers (6%) with a B5a (Non-invasive) non-operative diagnosis had no surgery to the axilla recorded. In South West, 11% of B5a (Non-invasive) cancers that were found to be invasive at surgery (7 cancers) had no axillary operation recorded. In addition to these 187 cancers, 24 invasive cancers without a non-operative diagnosis had no surgery to the axilla.

INVASIVE CANCERS WITH NO AXILLARY OPERATION

Region	B5b		C5 only, no B5		B5a	
	No.	%	No.	%	No.	%
N East, Yorks & Humber	15	1	0	0	2	2
East Midlands	8	1	-	-	0	0
East of England	10	1	0	0	5	7
London	21	2	-	-	7	9
South East Coast	19	2	0	0	4	6
South Central	12	1	0	0	2	4
South West	24	2	0	0	7	11
West Midlands	11	1	-	-	3	4
North West	11	1	0	0	5	6
Wales	2	0	-	-	2	7
Northern Ireland	2	1	0	0	1	6
Scotland	9	1	-	-	5	8
United Kingdom	***144***	***1***	***0***	***0***	***43***	***6***

Shaded if 5% or more above the value for the UK as a whole and more than one cancer is included

Regional QA reference centres and regional surgical QA co-ordinators should audit all the invasive cancers with no surgery to the axilla recorded to ascertain whether the data for these cases are recorded correctly and, if so, why the nodal status was not determined. It is possible that under some circumstances, (e.g. a very small, grade 1 cancer, diagnosed after a B5a (Non-invasive) non-operative diagnosis) a further operation to assess nodal involvement may not be appropriate.

KEY FINDINGS

- 144 invasive cancers with a B5b (Invasive) core biopsy, 43 invasive cancers with a B5a (Non-invasive) core biopsy and 24 invasive cancers without a non-operative diagnosis had no axillary procedure recorded.
- Regional QA reference centres and regional surgical QA co-ordinators should audit the invasive cancers with no surgery to the axilla recorded to ascertain whether the data for these cases are recorded correctly and, if so, why the nodal status was not determined.
- It is possible that under some circumstances, (e.g. a very small, grade 1 cancer, diagnosed after a B5a (Non-invasive) non-operative diagnosis) a further operation to assess nodal involvement may not be appropriate.

7.5 Repeat Operations Involving the Axilla

Repeat therapeutic operations to the axilla may be carried out in the following scenarios:

Scenario 1 : Invasion present which was not predicted by the non-operative diagnosis and a repeat operation is undertaken to obtain axillary lymph nodes

- cancers with a B5a (Non-invasive) non-operative diagnosis found to be invasive after surgery where nodes were not taken at first operation
- cancers with a C5 diagnosis where the invasive status could not be predicted and where nodes were not taken at the first operation in line with local protocol

Scenario 2 : Additional therapeutic nodal procedure(s)

- insufficient number of nodes harvested at first operation
- therapeutic clearance of nodes when a large number of the nodes taken at the first operation are positive
- clearance of nodes following a positive sentinel lymph node biopsy procedure

The following table summarises how, in 2011/12, the proportions of invasive cancers with axillary surgery undertaken in each region at first and repeat operations varied with the non-operative diagnostic result. In the UK as a whole, axillary surgery was performed for 99% of surgically treated invasive cancers with a B5b (Invasive) core biopsy. Axillary surgery was carried out at the first operation for almost all cases, and only 14 cancers had their axillary surgery at a repeat operation. A similar picture was apparent for invasive cancers diagnosed by C5 cytology only, with only three cancers having axillary surgery at a repeat operation (Table 97).

CANCERS WITH AXILLARY SURGERY AT FIRST AND LATER OPERATIONS

Region	Invasive cancers (Table 97)									Non/micro-invasive cancers		
	B5b			C5 only, no B5			B5a			B5a		
	Total	% 1st Op	% Later Op	Total	% 1st Op	% Later Op	Total	% 1st Op	% Later Op	Total	% 1st Op	% Later Op
N East, Yorks & Humber	*1822*	*99*	*0*	*6*	*83*	*17*	*88*	*53*	*44*	*414*	*30*	*6*
East Midlands	*1090*	*99*	*0*	*0*	*-*	*-*	*41*	*56*	*44*	*201*	*29*	*4*
East of England	*1197*	*99*	*0*	*1*	*100*	*0*	*68*	*34*	*59*	*278*	*27*	*4*
London	*1212*	*98*	*0*	*0*	*-*	*-*	*78*	*50*	*41*	*318*	*25*	*6*
South East Coast	*1140*	*98*	*0*	*2*	*100*	*0*	*67*	*39*	*55*	*262*	*23*	*6*
South Central	*932*	*99*	*0*	*2*	*50*	*50*	*49*	*45*	*51*	*199*	*27*	*8*
South West	*1269*	*98*	*0*	*5*	*100*	*0*	*64*	*31*	*58*	*323*	*26*	*7*
West Midlands	*1256*	*99*	*0*	*0*	*-*	*-*	*72*	*51*	*44*	*311*	*28*	*4*
North West	*1500*	*99*	*0*	*3*	*100*	*0*	*88*	*49*	*45*	*342*	*25*	*8*
Wales	*584*	*100*	*0*	*0*	*-*	*-*	*27*	*41*	*52*	*154*	*31*	*6*
Northern Ireland	*313*	*99*	*0*	*5*	*80*	*20*	*17*	*29*	*65*	*77*	*30*	*5*
Scotland	*1335*	*99*	*0*	*0*	*-*	*-*	*64*	*69*	*23*	*266*	*33*	*1*
United Kingdom	***13650***	***99***	***0***	***24***	***88***	***13***	***723***	***47***	***47***	***3145***	***28***	***5***

A high proportion (94%) of invasive cancers with a B5a (Non-invasive) non-operative diagnosis also had axillary surgery. This varied from 89% (64 cancers) in South West to 100% (41 cancers) in East Midlands (Table 97).

7.6 Axillary Surgery for B5a (Non-invasive) Cancers Found to be Invasive at Surgery

Overall, 94% of invasive cancers with a B5a (Non-invasive) non-operative diagnosis had axillary surgery; 47% (340 cancers) at the first operation and 47% (340 cancers) at a repeat operation. The proportion having surgery at the first operation was highest in Scotland (69%) and lowest in Northern Ireland (29%). In South West, 11% of B5a (Non-invasive) cancers (7 in total) that were found to be invasive at surgery had no axillary operation recorded (Table 97). The regional QA reference centre should audit these cases to ascertain why the axilla appears to have been under-treated. Of the 340 cases with axillary assessment at first operation, 295 (87%) had SLNB performed, compared to 83% of those with axillary assessment at later operation.

The proportion of cancers with a B5a (Non-invasive) non-operative diagnosis that had axillary surgery varied from 100% in 63 units to 60% in one unit in East of England (Figure 62). The proportion of invasive

cancers with a B5a (Non-invasive) non-operative diagnosis having axillary surgery at the first and repeat operations also varied widely between screening units.

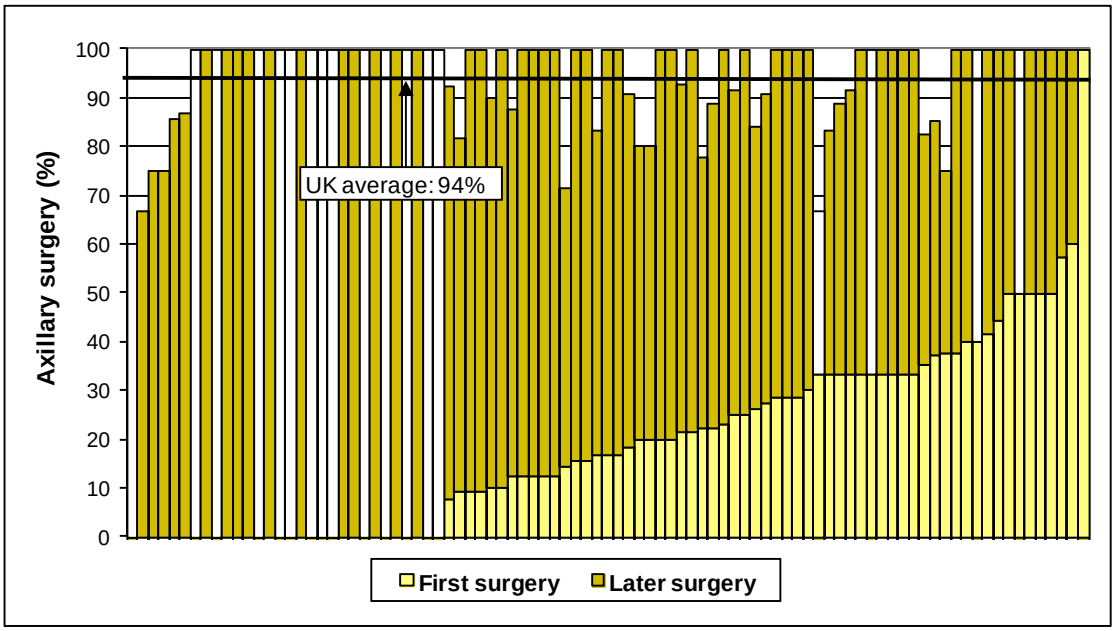

Figure 62 : Variation between screening units in the proportion of invasive cancers with a B5a (Non-invasive) non-operative diagnosis having axillary surgery at first and repeat operations - 1 unit was excluded as it had no B5a to invasive cancers (18 of the 20 smallest units are highlighted in white)

The variation between screening units in the proportion of cancers with a B5a (Non-invasive) non-operative diagnosis that had axillary surgery at the first operation in the 3-year period 2009/10-2011/12 is examined in the control chart in Figure 63 in which the dashed lines in are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate (solid line).

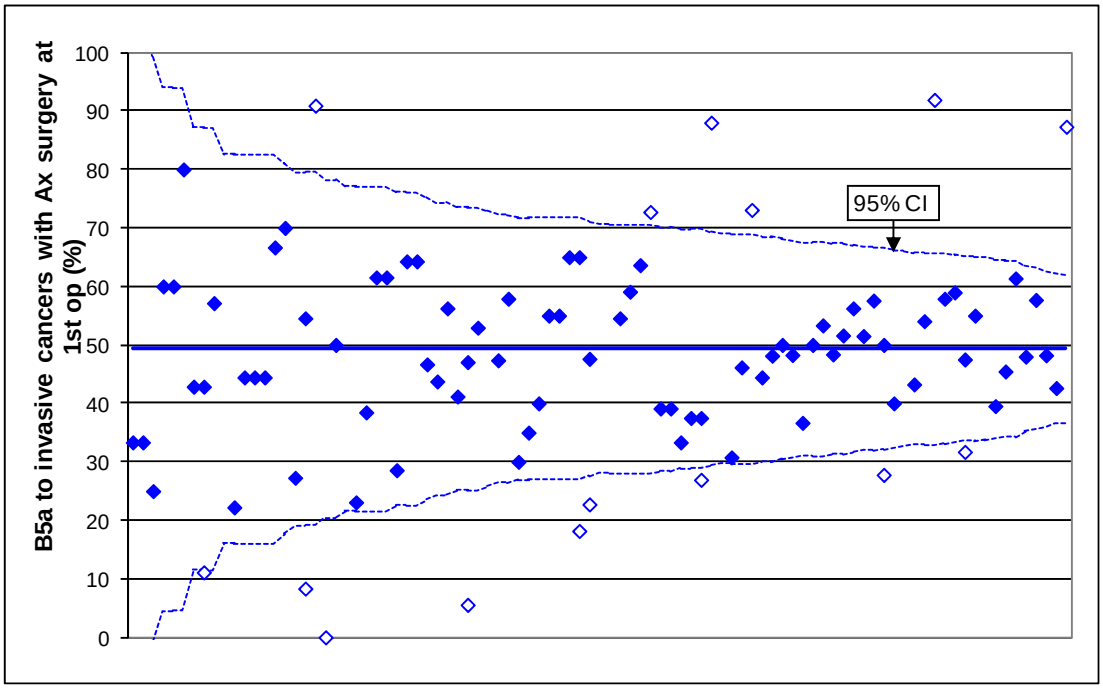

Figure 63: Variation between screening units in the proportion of invasive cancers with a B5a (Non-invasive) non-operative diagnosis having axillary surgery at first operation in the 3-year period 2009/10-2011/12 (Open diamonds represent units which lie outside the control limits)

Nine units lie below the lower control limit and have significantly lower rates of axillary surgery at first operation, and 6 units lie above the upper control limit and have significantly higher rates. Of these 15 outliers, 3 are in East of England (3 low), 3 are in Scotland (3 high), 2 are in North East, Yorkshire

& Humber (1 high and 1 low) and 2 are in South West (both low). Regional QA reference centres and regional surgical QA co-ordinators should investigate the reasons for the unusual clinical practice in the 15 outlier units. It could, for instance, be that the high outliers were using predictive models to identify cases which were more likely to have invasion so that the appropriate surgery could be carried out at a single operation. It is also possible that these units had a higher proportion of cases with mastectomy with immediate reconstruction, where limited axillary surgery would be appropriate. Of the 6 high outlier units, 1 unit in West Midlands has a significantly higher than average immediate reconstruction rate (Figure 24), and 4 units (2 in Scotland, 1 in North West and 1 in North East, Yorkshire and Humber) are low outliers for immediate reconstruction.

KEY FINDINGS

- Axillary surgery was performed for 99% of invasive breast cancers with a B5b (Invasive) core biopsy and all invasive cancers diagnosed by C5 cytology only.
- Although 94% of invasive cancers with a B5a (Non-invasive) diagnosis had axillary surgery, only 340 (47%) of these cancers had their axillary surgery at the first operation; this varied from 29% in Northern Ireland to 69% in Scotland.
- Of the 340 cases with axillary assessment at first operation, 87% had SLNB performed, compared to 83% of those with axillary assessment at later operation.
- During the period 2009/10-2011/12, 9 screening units had significantly lower rates of axillary surgery at first operation for invasive cancers with a B5a (Non-invasive) diagnosis, and 6 had significantly higher rates. Regional QA reference centres and regional surgical QA co-ordinators should investigate the reasons for the unusual clinical practice in the 15 outlier units. It could, for instance, be that the high outliers were using predictive models to identify cases which were more likely to have invasion so that the appropriate surgery could be carried out at a single operation.

7.7 Repeat Operations After a Positive SLNB

Another reason for performing repeat operations to the axilla is if the positive nodal status has been determined on the basis of a SLNB. If this is the case, the NHSBSP surgical guidelines state that further axillary treatment should be offered. However, since the publication of the results of the Z11 Trial, the use of radiotherapy to the axilla rather than further therapeutic surgery has become more common for small, grade 1 cancers with very good prognosis where the likelihood of a large number of nodes being positive is small.

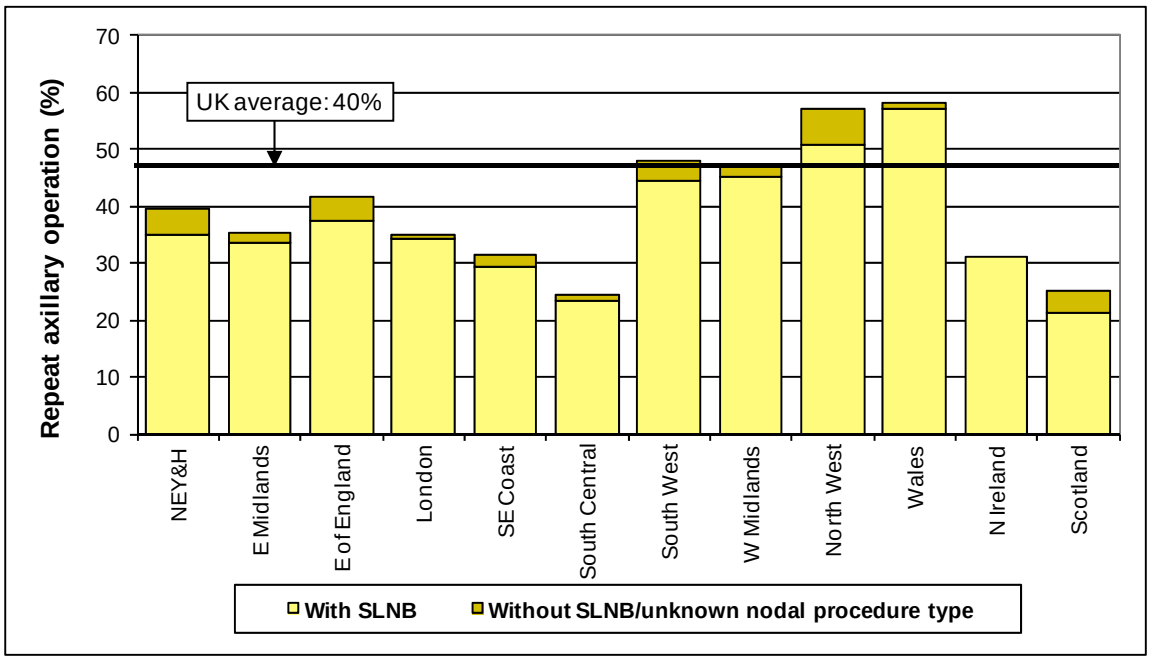

Figure 64 (Table 98): Repeat axillary operations for invasive cancers with positive nodal status

Figure 64 shows how the proportion of repeat operations to the axilla varied between regions for invasive cancers with positive nodal status. In the UK as a whole, 40% of these cancers had a repeat operation to the axilla. This varied from 58% in Wales to 24% in South Central. Thirty seven percent of invasive cancers with positive nodal status had a repeat operation to the axilla following a SLNB and 3% after an axillary operation which did not involve a SLNB. Overall in the UK, 92% of repeat operations on the axilla were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB (Table 98). This varied between 86% in Scotland and 100% in Northern Ireland.

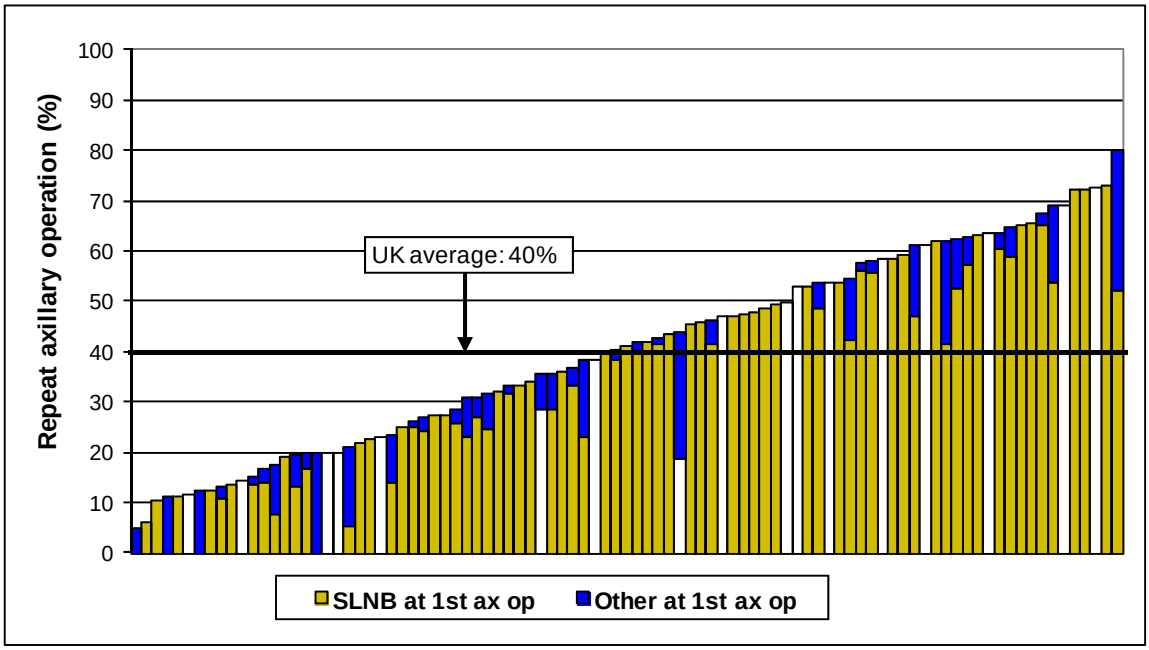

Figure 65: Variation between screening units in repeat axillary operations for invasive cancers with positive nodal status (17 of the smallest units are highlighted in white)

The proportion of repeat operations to the axilla varied widely between screening units for invasive cancers with positive nodal status Figure 65, from 5% in 1 unit in South Central to over 60% in 20 units (only 4 of which are small). In most screening units; the majority of repeat operations were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB.

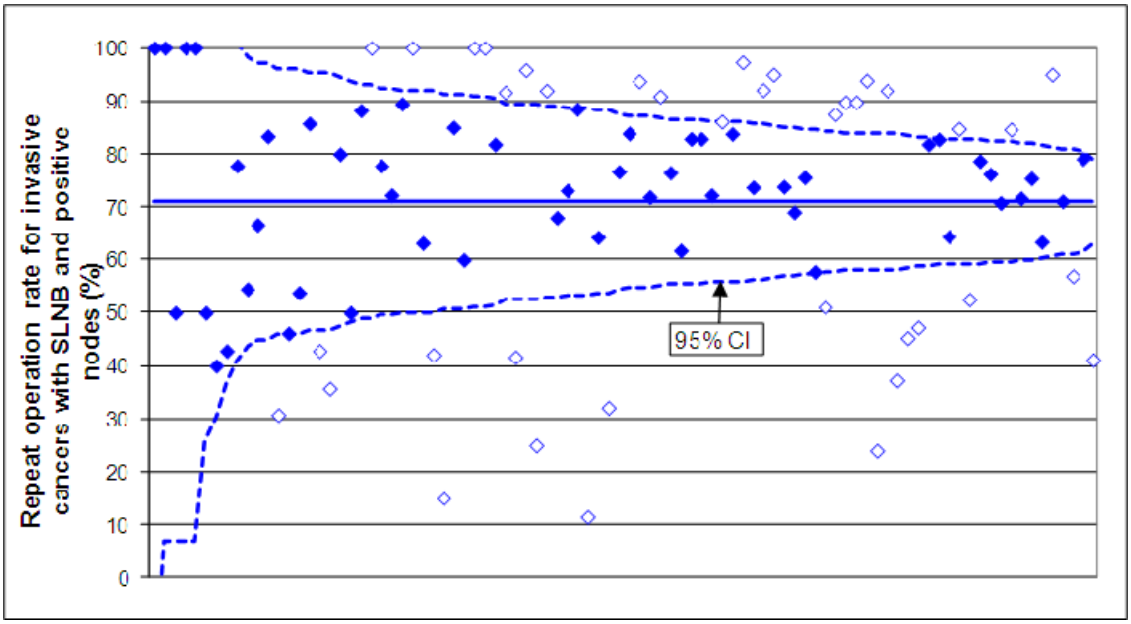

Figure 66: Variation between screening units in repeat axillary operations for invasive cancers with positive nodal status determined on the basis of a SLNB in the 3-year period 2009/10-2011/12 (Open diamonds represent units which lie outside the control limits)

The variation between screening units in the 3-year period 2009/10-2011/12 in the proportion of invasive cancers with their positive nodal status determined on the basis of a SLNB that had repeat axillary surgery is examined in the control chart in Figure 66 in which the dashed lines in are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate (solid line). Twenty one units lie above the upper control limit and have significantly higher rates of repeat axillary surgery, and 17 units lie below the lower control limit and have significantly higher rates. Of the 21 high outliers 5 are in West Midlands, 4 are in South West and 3 are in North East, Yorkshire & Humber. Of the 17 low outliers 3 are in South Central and 2 each are in East Midlands, East of England, London, North East, Yorkshire & Humber, Scotland and South West.

Bearing in mind the increased use of pre-operative ultrasound and needle biopsy to identify invasive cancers with positive nodes prior to surgery, regional QA reference centres and regional surgical QA co-ordinators should audit the 21 units with unusually high repeat axillary operation rates for cancers with positive nodes determined on the basis of a SLNB to determine the reason for this unusual clinical practice.

KEY FINDINGS

- Forty percent of invasive cancers with a positive nodal status had a repeat operation to the axilla. This varied from 58% in Wales to 24% in South Central, and from 5% in 1 unit in South Central to over 60% in 20 units (only 4 of which are small).
- Thirty seven percent of invasive cancers with positive nodal status had a repeat operation to the axilla following a SLNB and 3% after an axillary operation which did not involve a SLNB.
- Overall in the UK, 92% of repeat operations on the axilla were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB. This varied between 86% in Scotland and 100% in Northern Ireland
- In most screening units; the majority of repeat operations were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB.
- Twenty one units had significantly higher rates of repeat axillary surgery for invasive cancers where the positive nodal status was determined on the basis of a SLNB.
- Bearing in mind the increased use of pre-operative ultrasound and needle biopsy to identify invasive cancers with positive nodes prior to surgery, regional QA reference centres and regional surgical QA co-ordinators should audit the 21 units with unusually high repeat axillary operation rates for cancers with positive nodes determined on the basis of a SLNB to determine the reason for this unusual clinical practice.

CHAPTER 8
ADJUVANT THERAPY

Surgeons were asked to supply radiotherapy, chemotherapy and endocrine therapy information for cancers detected through screening between 1 April 2010 and 31 March 2011, the period covered by the previous screening audit. Oestrogen receptor (ER), progesterone receptor (PgR) and Human Epidermal Growth Factor Receptor 2 (HER-2) status were also requested. The cut off point for adjuvant therapy was 31 March 2012, allowing a minimum of 12 months follow up.

Note: Some of these analyses should be treated with caution because it is probably easier to verify that a woman did not receive a given therapy than to provide a complete start date.

This is the first year that that it has been possible to obtain detailed information on previous cancers diagnosed in women with screen-detected breast cancer. This is of importance in the interpretation of the use of adjuvant therapy both local (radiotherapy) and systemic (endocrine therapy, chemotherapy, Trastuzumab) since the previous use of these therapies will be influential in the determination of their appropriateness for the second (screen-detected) breast cancer. Women known to have had previous cancers have been excluded from this year's adjuvant audit data analysis. Interpretation of the adjuvant audit data for previous years thus needs to reflect the fact that around 10% of patients are likely to have had a history of previous malignancy of some form.

8.1 Previous Cancers

As part of the adjuvant audit, information on previous cancers, excluding non-melanoma skin cancer, was requested from cancer registries through regional QA reference centres. Previous cancers were those recorded by cancer registries at any time point prior to the breast cancer recorded in the adjuvant audit. The follow-up period depends on the date that each cancer registry started to operate, but a minimum follow up of 17 years was available for all registries. For the 17,848 women who had a first offered screening appointment between April 2010 and March 2011, 17,207 (96%) cancers were matched to the cancer registry databases and information on previous cancers (if any) was abstracted (Table 99). The majority of the 641 unmatched cancers were from the North West Cancer Intelligence Service (NWCIS). Overall, 31% of the cancers in the North West region failed to match because at the time when this year's audit data were collected, the NWCIS was migrating from their own in-house database to the new National Cancer Registration System, which caused delays in the registration of 2011 cases.

Of the 17,207 matched women, 1,665 (10%) had at least one previous cancer recorded by the cancer registries. Of the 13,739 matched women with invasive breast cancer and 3,288 matched women with non-invasive breast cancer in the 2010/11 adjuvant audit, 1,323 (10%) and 323 (10%) respectively had previous cancers recorded. Of the 1,665 women with previous cancers, 576 (35%) had previous invasive/micro-invasive breast cancers and 101 (6%) had previous non-invasive breast cancers. Together these equate to 4% of the 17,207 matched women (Table 100). The second most common previous type of invasive cancer was gynaecological cancer (1%; 212 women). In situ cervical cancer was the most common type of non-invasive cancer (280 women).

Of the women with previous breast cancers treated with adjuvant therapy, 43% had radiotherapy, 20% had chemotherapy and 69% had endocrine therapy (Table 101). For those without a previous breast cancer diagnosis (Table 104 to 106), 75% had radiotherapy, 23% had chemotherapy and 73% had endocrine therapy. The biggest difference between the two cohorts was the proportion of women who had radiotherapy (43% of those who had a previous breast cancer compared with 73% of those without a previous breast cancer). This is mainly because the surgical treatment of the two cohorts is very different, with 53% of patients (360 women) who had a previous breast cancer having a mastectomy compared to only 24% of women without a previous breast cancer. However, even

after adjusting for operation type, women with a previous breast cancer were still less likely to receive radiotherapy; and only 83% of women with a previous breast cancer who had breast conserving surgery for their subsequent cancer had radiotherapy compared to 91% in women who had not had a previous breast cancer.

KEY FINDINGS

- This is the first year that that it has been possible to obtain detailed information on previous cancers diagnosed in women with screen-detected breast cancer. Interpretation of the adjuvant audit data for previous years thus needs to reflect the fact that around 10% of women are likely to have had a history of a previous malignancy.
- Of the 1,665 women with previous cancers, 576 (35%) had previous invasive/micro-invasive breast cancers and 101 (6%) had previous non-invasive breast cancers.
- The second most common previous type of invasive cancer was gynaecological cancer (1%). In situ cervical cancer was the most common type of non-invasive cancer.
- In 2010/11, only 43% of women who had a previous breast cancer had radiotherapy for their screen-detected breast cancer compared with 73% of those without a previous breast cancer. This is mainly because the surgical treatment of the two cohorts is very different, with 53% of women who had a previous breast cancer having a mastectomy compared to only 24% of women with no previous history of breast cancer.
- However, even after adjusting for operation type, women with a previous breast cancer were still less likely to receive radiotherapy; 83% of women with a previous breast cancer who had breast conserving surgery for their subsequent cancer had radiotherapy compared to 91% in women who had not had a previous breast cancer.

8.2 Data Completeness for the Adjuvant Therapy Audit

The 2010/11 NHSBSP audit reported tumour characteristics and primary treatment data for 17,838 screen-detected breast cancers. When data for these cancers were requested for inclusion in this year's adjuvant therapy audit, 10 additional cancers which were not included in the 2010/11 main audit were identified. Thus, 17,848 breast cancers were eligible for inclusion in the adjuvant therapy audit. Of these, 2 cases were excluded due to incomplete surgery data, 166 because no adjuvant therapy data were supplied and 1,665 cases because of previous cancers.

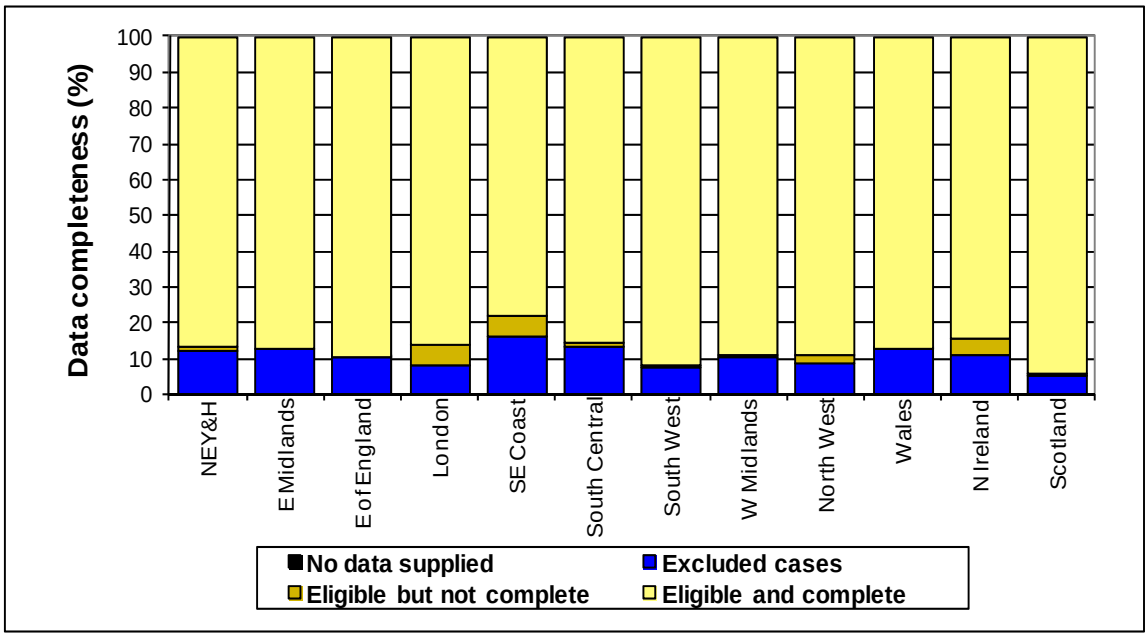

Figure 67 (Table 102): Case exclusion and data completeness

Following the exclusions described above, 16,015 breast cancers (90%) were included in the adjuvant therapy audit. In the UK as a whole, data completeness for radiotherapy, chemotherapy and endocrine therapy was 100%, 99% and 99% respectively, and 98% of cases had complete radiotherapy, chemotherapy and endocrine therapy data (Table 102 and 103). The latter is an improvement from 2009/10 when only 96% of cancers had complete radiotherapy, chemotherapy and endocrine therapy data.

The proportion of cases with complete radiotherapy, chemotherapy and endocrine therapy data varied from 93% in South East Coast to 100% in East Midlands, East of England, West Midlands, Wales and Scotland. Figure 67 shows the variation between regions in data completeness and the proportion of cases excluded. Scotland had the highest data completeness and case inclusion (94%) and South East Coast the lowest data completeness and case inclusion (78%).

8.3 Adjuvant Therapy

In general, invasive breast cancers received more adjuvant therapy than non/micro-invasive breast cancers. Of all breast cancers with known radiotherapy treatment, 11,993 (75%) had radiotherapy recorded and 3,955 were recorded as not having had radiotherapy by the audit cut off date. Eighty two percent of invasive cancers, 56% of micro-invasive cancers and 46% of non-invasive cancers had radiotherapy recorded (Table 104). Twenty nine percent of invasive cancers and 12 women with non/micro-invasive cancer (8 of which were micro-invasive) had adjuvant chemotherapy recorded (Table 105). Regional QA reference centres should audit these 12 cases to ascertain if this is a data recording issue.

Eighty seven percent of invasive breast cancers and 13% of non/micro-invasive breast cancers received endocrine therapy (Table 106). This difference reflects the relatively low proportion of non/micro-invasive cancers known to be ER positive (46% compared with 91% for invasive cancers), and differing opinions regarding the benefit of offering endocrine therapy to women with non-invasive breast cancer. Some women with non-invasive breast cancer may have received endocrine therapy as part of a clinical trial.

Twenty six (14%) of the 185 breast cancers which did not have surgery had radiotherapy recorded (Table 107), and 35 (22%) of the 159 invasive breast cancers which did not have surgery had chemotherapy recorded (Table 108). Regional QA reference centres should audit these 61 cases to ascertain whether this is a data recording issue or a true reflection of clinical practice.

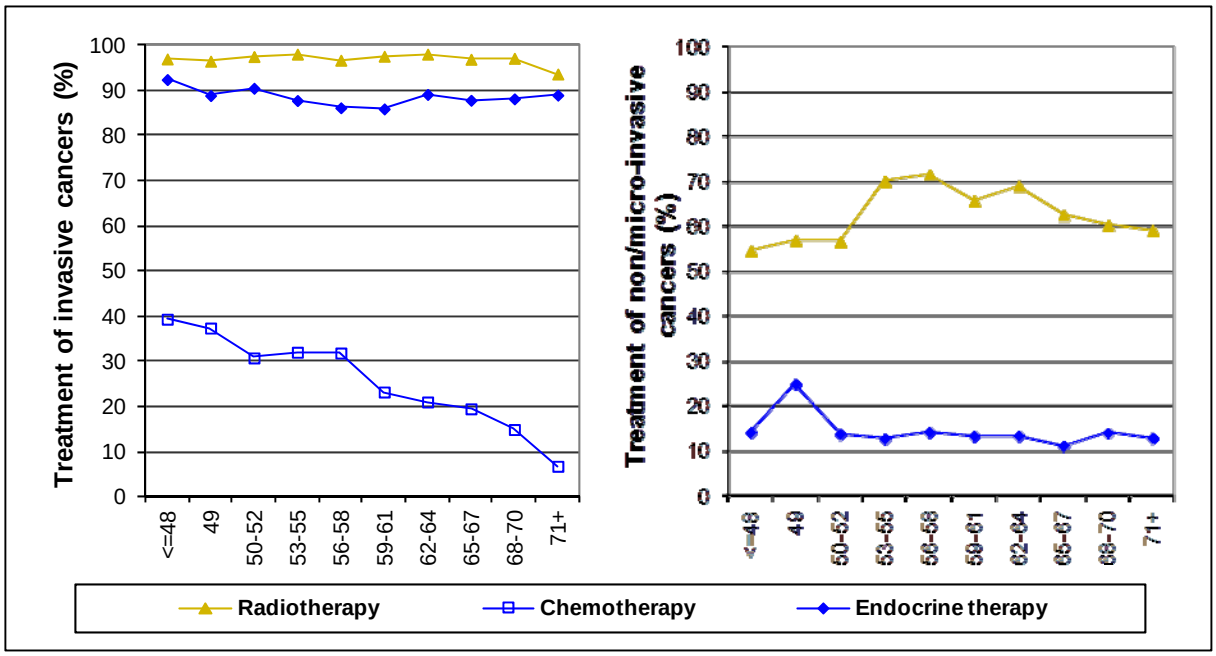

Figure 68 (Table 109) : Percentage of women in each age group treated with BCS who had radiotherapy, chemotherapy and endocrine therapy recorded, for cases with complete adjuvant data

Figures 68 and 69 show how the level of adjuvant therapy recorded for invasive and non/micro-invasive breast cancers varied with age for 11,798 women treated with breast conserving surgery and for 3,721 women treated with mastectomy. Chemotherapy recorded for non-invasive cancers has been excluded because the numbers are small (4 cases) and the accuracy of the data questionable. Overall, endocrine therapy was the main adjuvant therapy for invasive breast cancers at all ages, followed by radiotherapy. The proportion of women with invasive breast cancer treated with breast conserving surgery who received endocrine therapy varied little with age (ranging between 86% and 92%). With the exception of those aged 52 years and under, a slightly smaller proportion of women in every age group treated with mastectomy received endocrine therapy (range 81% to 86%) compared with those who had breast conserving surgery.

Ninety eight percent of women aged 50 to 65 years with invasive breast cancer treated with breast conserving surgery received radiotherapy, and there was only 4% decrease in the use of radiotherapy for women aged 71 years and over. Overall, only 36% of women with invasive breast cancer treated with mastectomy had radiotherapy, and there was a gradual decrease in the use of radiotherapy with age (from around 38% in women aged 53-55 years and below to around 30% in women aged 71 years and older) (Figure 69). The site irradiated was not recorded in the audit.

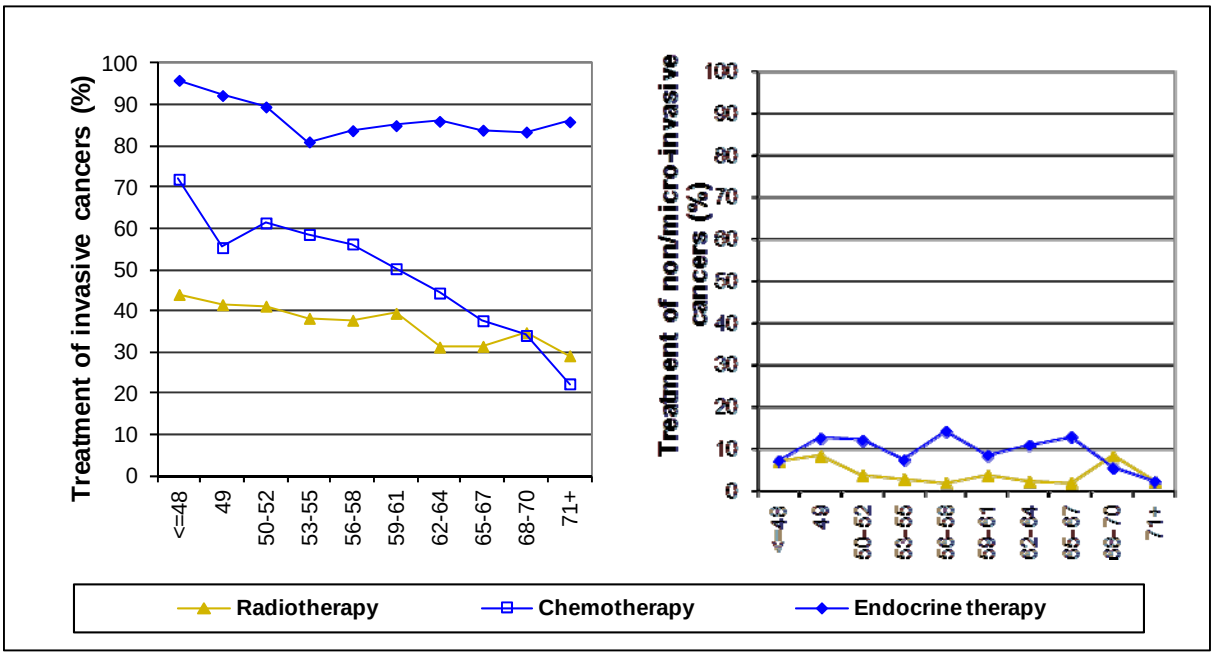

Figure 69 (Table 110): Percentage of women in each age group treated with mastectomy who had radiotherapy, chemotherapy and endocrine therapy recorded, for cases with complete adjuvant data

For women with non/micro-invasive breast cancer treated by breast conserving surgery, the use of radiotherapy peaked at 70% for women aged 53-58 years and then fell to 59% for those aged older than 70 years (Figure 68). In the latter age group, the proportion of women receiving radiotherapy varied widely between regions from 100% in Northern Ireland to 29% in South Central. Only 3% of women with non/micro-invasive breast cancer treated with mastectomy had radiotherapy.

Chemotherapy was the least used adjuvant therapy; being recorded for only 29% of women with invasive breast cancer. This is mainly a reflection of the high proportion of relatively early stage cancers detected by screening. Overall, a higher proportion of women treated with mastectomy received chemotherapy (47% compared with 23%) and this difference was evident in every age group. There was also a clear decrease in the use of chemotherapy with age in both treatment groups; with only 18% of women treated with breast conserving surgery aged 65-70 years having chemotherapy recorded compared to 32% of women aged 49-55 years, and only 36% of women treated with mastectomy aged 65-70 years having chemotherapy recorded compared to 60% of women aged 49-55 years. This may be because a higher proportion of younger women have more aggressive, fast growing cancers, but may also be indicative of a reluctance to prescribe chemotherapy to older women where the risk/benefit balance and clinical effectiveness are

perceived to be less clear. In London and Wales, a relatively higher proportion of women treated with breast conserving surgery aged over 70 years received chemotherapy (13% compared with 7% for the UK as a whole), and in West Midlands a relatively higher proportion of women treated with mastectomy aged over 70 years received chemotherapy (44% compared with 22% for the UK as a whole).

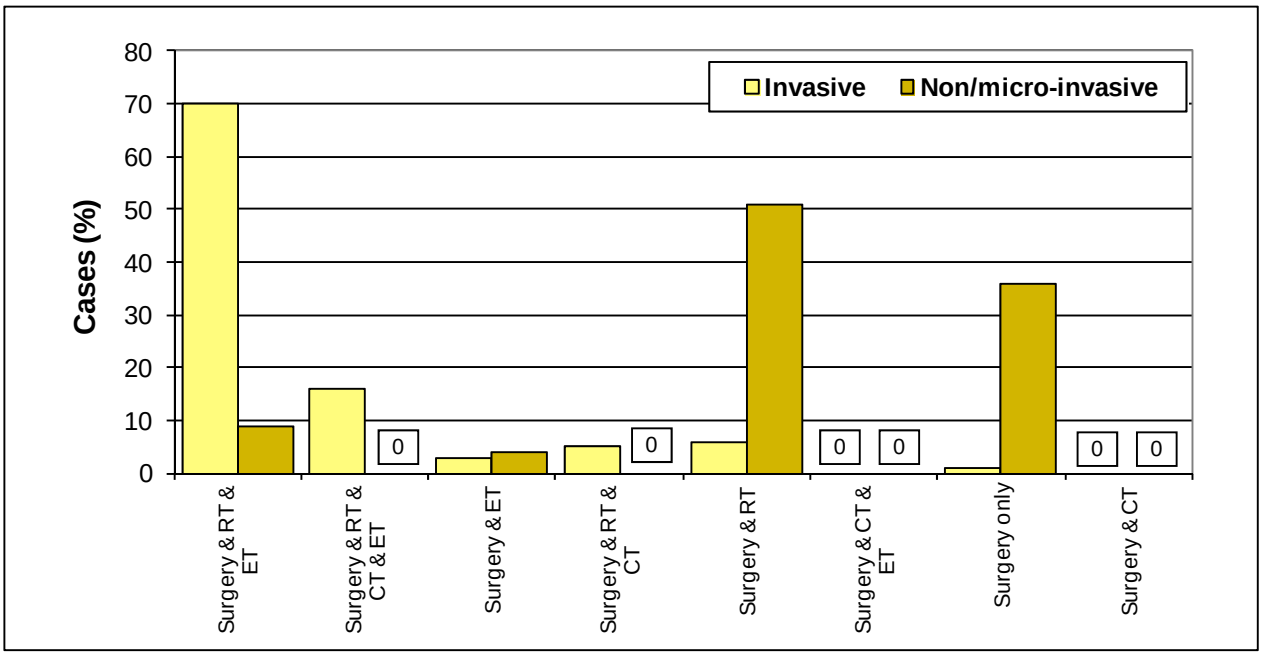

Figure 70 (Table 111): Combinations of treatment for women treated with breast conserving surgery, expressed as a percentage of cases with complete adjuvant therapy data

Surgery (ST), radiotherapy (RT) and endocrine therapy (ET) as a combination of treatment was the most common treatment pattern for invasive breast cancers treated with breast conserving surgery, with 70% (6,596 cases) receiving this treatment combination (Figure 70). 51% of non/micro-invasive breast cancers treated with breast conserving surgery had surgery with radiotherapy. The second most commonly used treatment combination, received by 36% of the women with non/micro -invasive breast cancer treated with breast conserving surgery, was surgery alone.

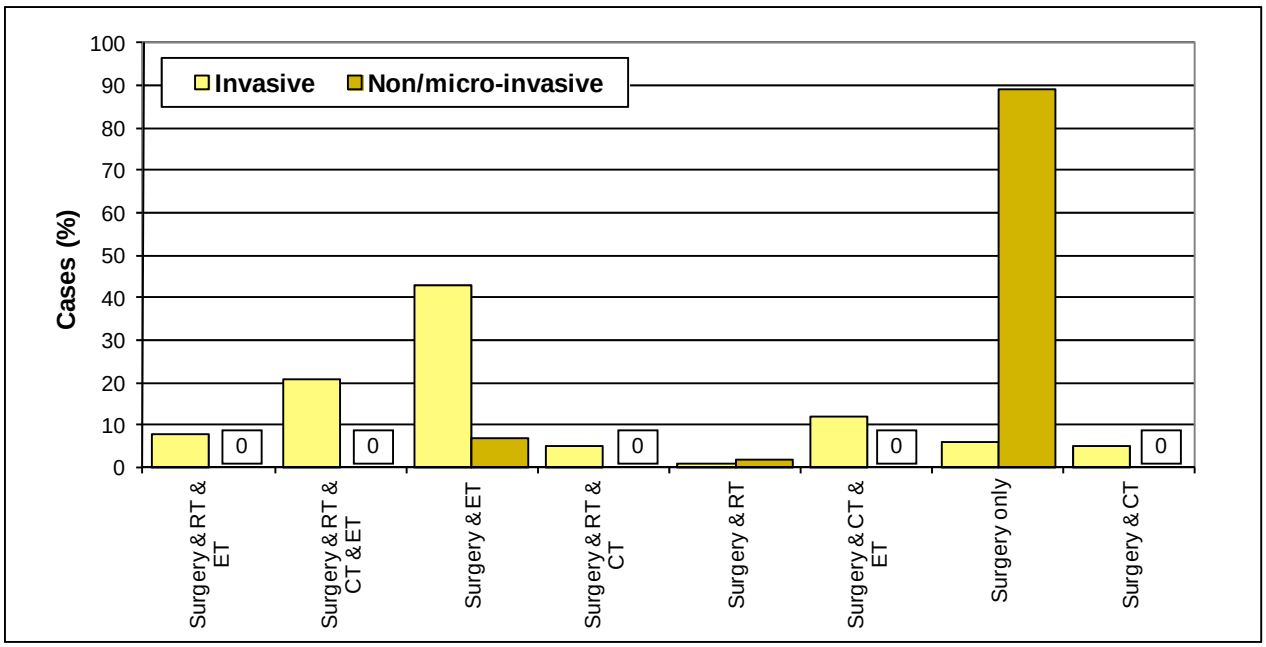

Figure 71 (Table 111): Combinations of treatment for women treated with mastectomy, expressed as a percentage of cases with complete adjuvant therapy data

Surgery (ST) and endocrine therapy (ET) was the most common treatment pattern for invasive breast cancers treated with mastectomy, with 43% (1,116 cases) receiving this treatment

combination (Figure 71). Eighty none percent of non/micro-invasive breast cancers treated with mastectomy had surgery only.

KEY FINDINGS

- 16,015 cases (90% of all cases) were included in the adjuvant therapy audit. Scotland had the highest proportion of eligible cases (94%).
- Eighty two percent of invasive cancers, 56% of micro-invasive cancers and 46% of non-invasive cancers had radiotherapy recorded 29% of the invasive cancers and 12 patients with non/micro-invasive cancer had chemotherapy recorded. Regional QA reference centres should audit these 12 cases to ascertain if this is a data recording issue.
- Eighty seven percent of invasive cancers and 13% of non/micro-invasive cancers had endocrine therapy recorded. Some women with non-invasive breast cancer may have received endocrine therapy as part of a clinical trial.
- Overall, endocrine was the second most used adjuvant therapy for invasive breast cancers at all ages. The proportion of women with invasive breast cancer treated with breast conserving surgery who received endocrine therapy varied little with age (ranging between 86% and 92%).
- With the exception of those aged 52 years and under, a slightly smaller proportion of women in every age group treated with mastectomy received endocrine therapy (range 81% to 86%) compared with those who had breast conserving surgery.
- Ninety eight percent of women aged 50 to 65 years with invasive breast cancer treated with breast conserving surgery received radiotherapy, and there was only 4% decrease in the use of radiotherapy for women aged 71 years and over. Overall, only 36% of women treated with mastectomy had radiotherapy, and there was a gradual decrease in the use of radiotherapy with age.
- For women with non/micro-invasive breast cancer treated by breast conserving surgery, the use of radiotherapy peaked at 70% for women aged 53-58 years and then fell to 59% for those aged older than 70. Only 3% of women with non-invasive breast cancer treated with mastectomy had radiotherapy.
- Chemotherapy was the least used adjuvant therapy; being recorded for only 29% of women with invasive breast cancer. Overall, a higher proportion of women treated with mastectomy received chemotherapy (47% compared with 23%) and this difference was evident in every age group. There was also a clear decrease in the use of chemotherapy with age in both treatment groups.
- Surgery, radiotherapy and endocrine therapy was the most common treatment pattern for invasive breast cancers treated with breast conserving surgery, with 70% receiving this treatment combination. 51% of non/micro-invasive breast cancers treated with breast conserving surgery had surgery with radiotherapy.
- Surgery and endocrine therapy was the most common treatment pattern for invasive breast cancers treated with mastectomy, with 43% receiving this treatment combination. Eighty nine percent of non/micro-invasive breast cancers treated with mastectomy had surgery only.

8.4 Waiting Time for Radiotherapy

Tables 112 to 115 show the regional variation in the cumulative percentages of breast cancers recorded as having various therapies within 14, 30, 60, 90, 120 and 200 days. Women who received chemotherapy before or after their operation, 5 women who had neo-adjuvant radiotherapy recorded and 25 women who had intra-operative radiotherapy have been excluded.

In Figure 72, the cumulative percentage curves for the UK as a whole are drawn as solid lines and dashed lines represent the regions with the maximum and minimum cumulative percentages at each point. The left hand graph shows the time taken from final surgery to radiotherapy, excluding surgically treated cancers recorded as having received chemotherapy. In the UK as a whole, 57% of women with breast cancer received radiotherapy within 60 days of their final surgery and 92% within 90 days. Thirty two women had not received radiotherapy within 200 days after their final surgery. Waiting times for radiotherapy have decreased slightly compared to 2009/10 when 50% of women received their radiotherapy within 60 days of their final surgery. The right hand graph in Figure 72 shows that 46% of

women with invasive breast cancer and 37% of women with non/micro-invasive breast cancer with radiotherapy recorded had started their radiotherapy within 90 days of their first assessment visit and that 153 women (2%) with invasive breast cancer and 27 women (2%) with non/micro-invasive breast cancer had not started radiotherapy even after 200 days.

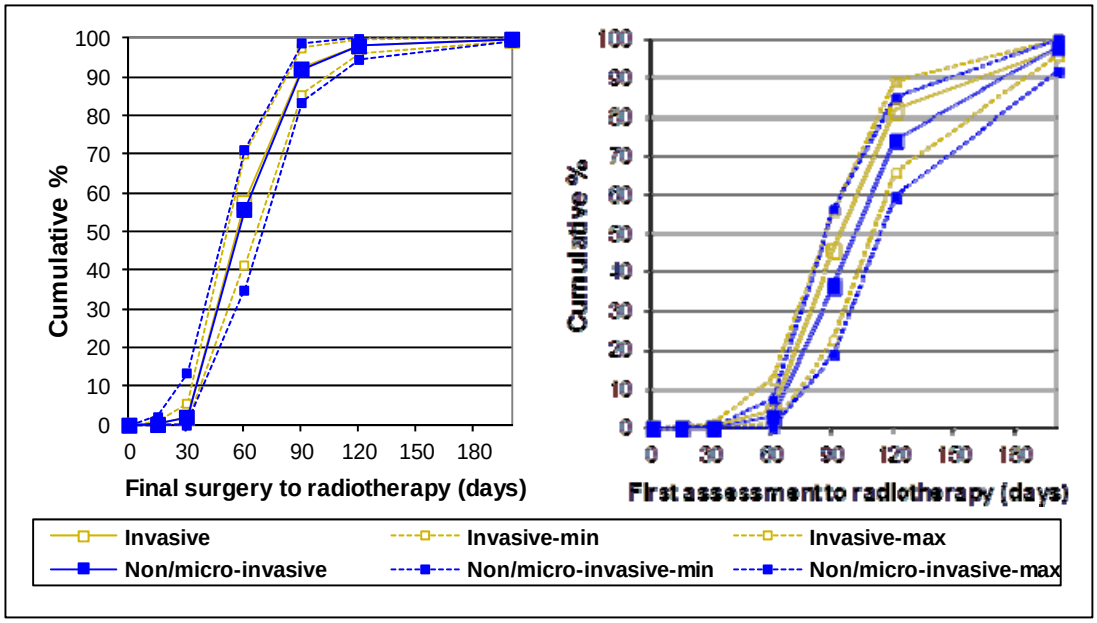

Figure 72 (Tables 112 to 115): Cumulative percentage of cancers with surgery and adjuvant radiotherapy, that had radiotherapy recorded up to 200 days after final surgery (left) and first assessment (right)

Figure 73 shows the median number of days from final surgery to radiotherapy in each region for invasive breast cancers, excluding cases with chemotherapy or radiotherapy before surgery or intra-operative radiotherapy recorded. The longest times between final surgery and radiotherapy were in Scotland (66 days), followed by South East Coast (63 days) and Wales (63 days). In the UK as a whole, the median number of days from final surgery to radiotherapy was the same for non/micro-invasive cancers and invasive cancers.

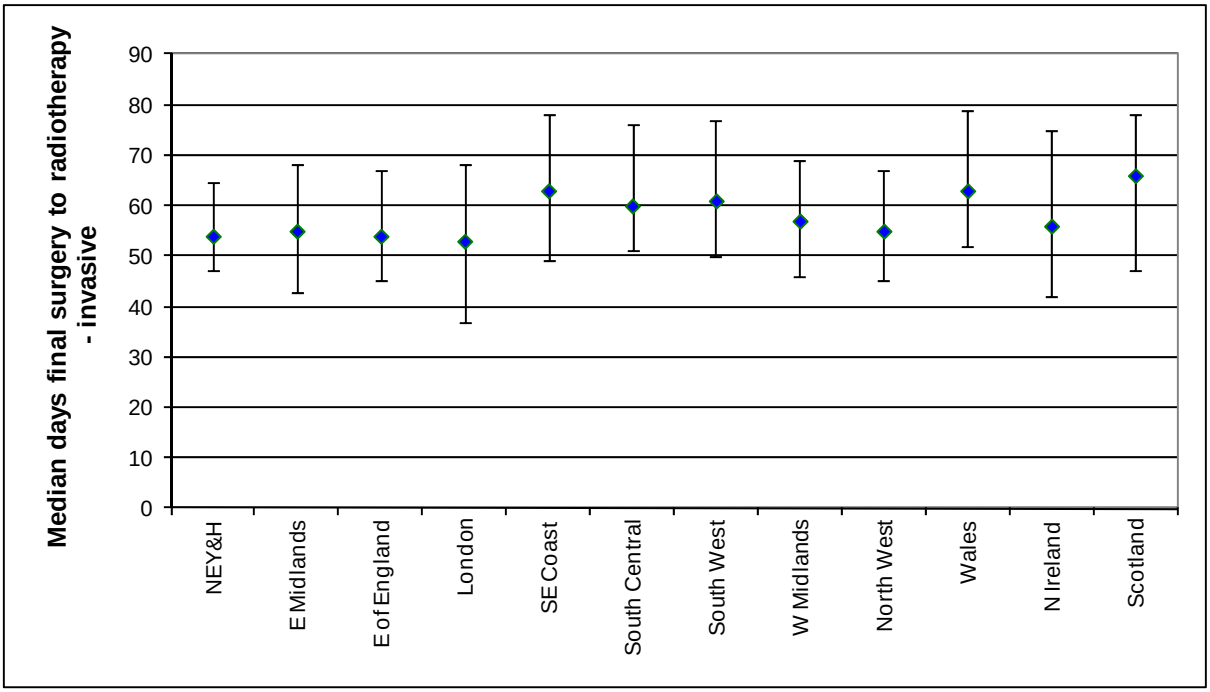

Figure 73 (Tables 116): Median days from final surgery to radiotherapy for invasive cancers - Number of days between final surgery and radiotherapy for patients with invasive breast cancer (bars indicate the inter-quartile range)

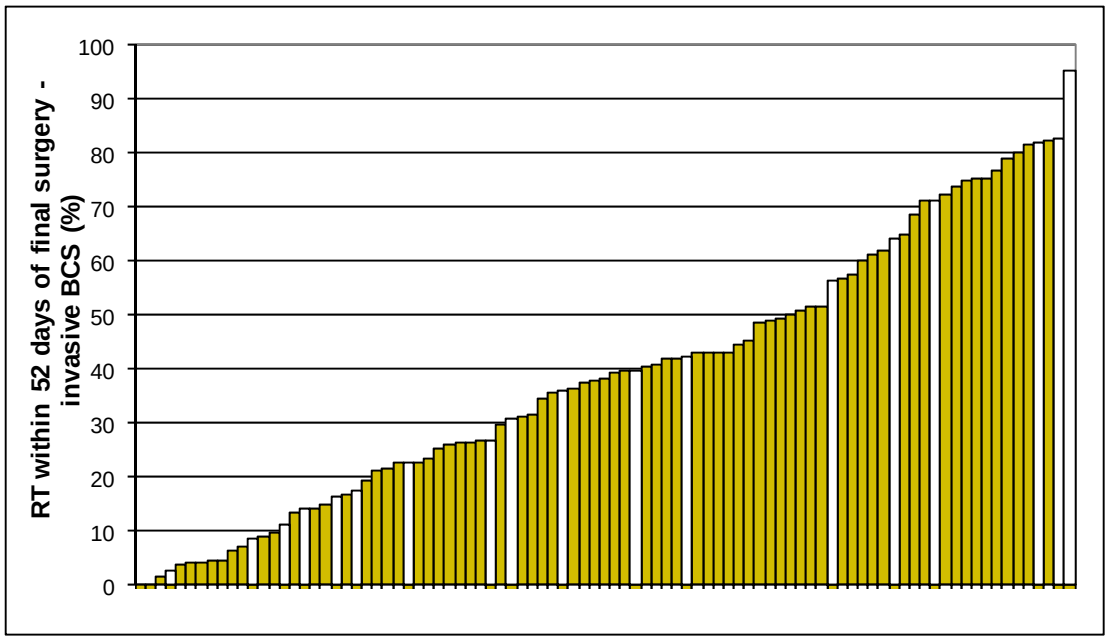

Figure 74: Variation between screening units in the proportion of women with invasive breast cancer who received radiotherapy within 52 days of their final surgery - 1 unit was excluded as it had less than 10 cases (18 of the 20 smallest units are highlighted in white)

In the *Cancer Reform Strategy* published in December 2007, a radiotherapy waiting times standard was introduced which specifies that from December 2010 the time between the date when a person is determined to be 'fit to treat' after surgery and the start of radiotherapy should be no more than 31 days. Working on the broad assumption that the 'fit to treat' date is three weeks (21 days) after final surgery, a proxy standard of 52 days from final surgery to radiotherapy can be proposed. Figure 74 shows the proportion of women with invasive breast cancer in each breast screening unit who after having breast conserving surgery received radiotherapy within 52 days of their final operation. This varied from over 90% in 1 small unit to no women in 2 units.

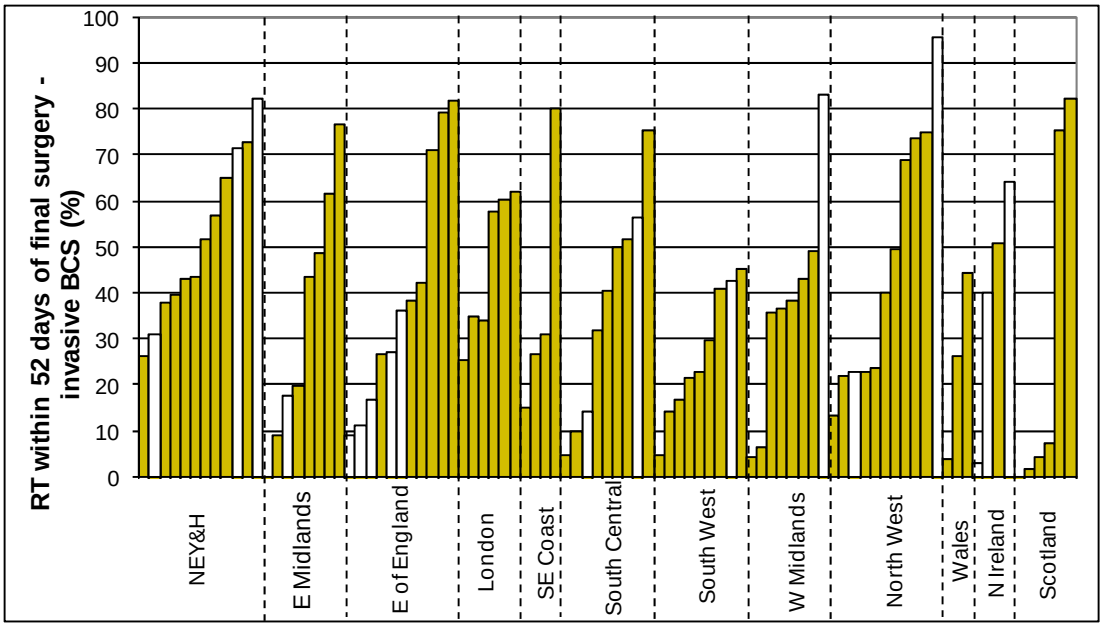

Figure 75: In-region variation between screening units in the proportion of women with invasive breast cancer who received radiotherapy within 52 days of their final surgery - 1 unit was excluded as it had less than 10 cases (18 of the 20 smallest units are highlighted in white)

Difficulties with radiotherapy waiting times appear to exist in most but not all of the screening units in all regions (Figure 75). It is important to examine the reasons for such large differences between screening units, particularly those where patients are being referred to the same radiotherapy centre.

In this case, changes to the patient pathway and the time at which referrals to radiotherapy are booked, may lead to improvements in waiting radiotherapy times. Overall, these data suggest that if the 31 day standard is to be achieved, considerable reductions in the time between final surgery and radiotherapy will be required in many screening services. Although there is little evidence available on the possible detrimental effect of radiotherapy delay on breast cancer prognosis, regional QA reference centres should review the screening units where fewer than 50% of invasive breast cancers which were not treated with chemotherapy started their radiotherapy within 52 days of the final surgery.

KEY FINDINGS

- Overall, 57% of women received radiotherapy within 60 days of their final surgery and 92% within 90 days. Thirty two women had not received radiotherapy 200 days after their final surgery.
- Only 46% of women with invasive breast cancer and 37% of women with non/micro-invasive breast cancer had started their radiotherapy within 90 days of their first assessment visit and 153 women (3%) with invasive breast cancer had not started radiotherapy after 200 days.
- In the *Cancer Reform Strategy* published in December 2007, a radiotherapy waiting times standard was introduced which specifies that the time between the date when a person is determined to be 'fit to treat' after surgery and the start of radiotherapy should be no more than 31 days. If this standard is to be achieved, considerable reductions in the time between final surgery and radiotherapy will be required in many screening services.
- Regional QA reference centres should review the screening units where less than 50% of invasive breast cancers which were not treated with chemotherapy started their radiotherapy within 52 days of the final surgery.

8.5 Combinations of Adjuvant Therapy According to Tumour Characteristics

This section examines the combinations of adjuvant therapy given to tumours with various prognostic characteristics. It is clear that different screening units follow different protocols. It is hoped that by presenting analyses for three specific propositions, informative discussions to agree best practice can take place.

8.5.1 Breast Conserving Surgery and Radiotherapy

PROPOSITION 1

Women with invasive breast cancer treated with conservation surgery should normally receive radiotherapy

Of the 15,948 breast cancers with radiotherapy data recorded, 80% were invasive, 1% were micro-invasive and 19% were non-invasive (Table 117). Seventy six percent (9,723) of the invasive cancers were treated with breast conserving surgery (Table 118). Of these, 280 (3%) did not have adjuvant radiotherapy recorded (Table 119). Thirty five percent of non/micro-invasive cancers treated with breast conserving surgery did not have radiotherapy recorded.

Figure 76 shows the variation in the proportion of invasive and non/micro-invasive breast cancers treated with breast conserving surgery that did not have adjuvant radiotherapy recorded. For invasive breast cancers, the proportions without radiotherapy recorded varied from 1% in West Midlands and Wales to 6% in East of England. For non/micro-invasive cancers the proportions without radiotherapy recorded varied from 18% in Northern Ireland to 47% in South Central and 46% in South West.

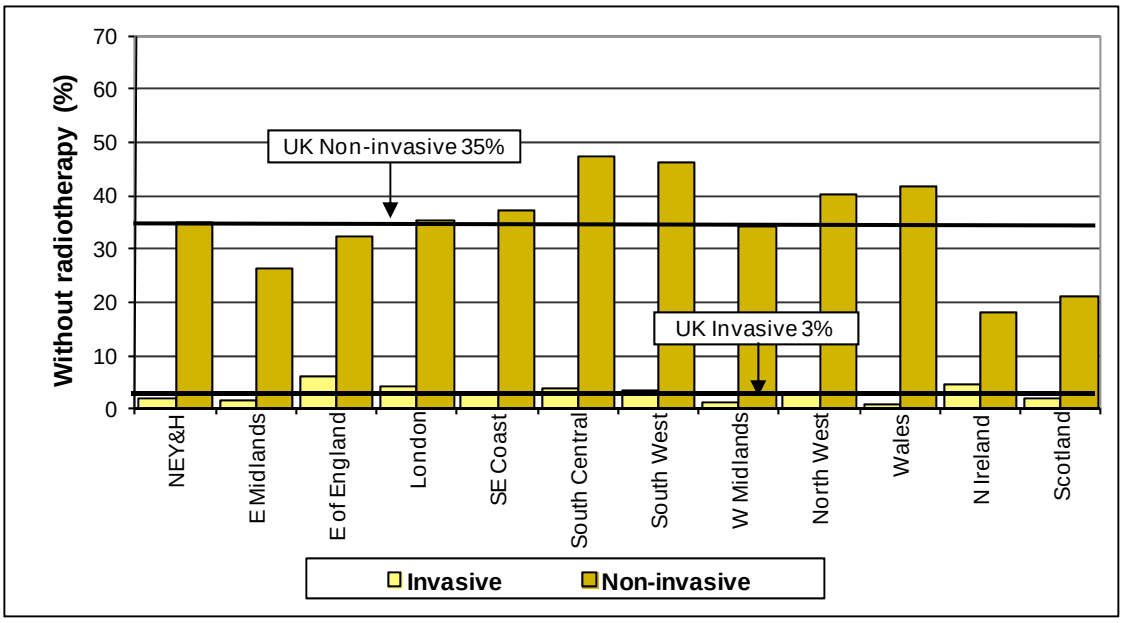

Figure 76 (Tables 119 & 121): The proportion of invasive and non/micro-invasive cancers treated with breast conserving surgery that did not have radiotherapy recorded

Surgical treatment type also affects the provision of radiotherapy. The left hand graph in Figure 77 shows that overall only 3% of invasive breast cancers treated with breast conserving surgery in each screening unit in 2010/11 did not have radiotherapy recorded. This varied from 0 cancers in 19 units to 25% of invasive cancers in a screening unit in South Central. In the UK as a whole, 4% of the invasive cancers treated with breast conserving surgery which did not receive radiotherapy were larger than 20mm in diameter, 19% were Grade 3 and 20% were node positive (Table 120). The right hand graph in Figure 77 shows that 64% of the invasive cancers treated with mastectomy did not receive radiotherapy. This varied from 16% in a unit in South West to 95% in a unit in North East, Yorkshire & Humber.

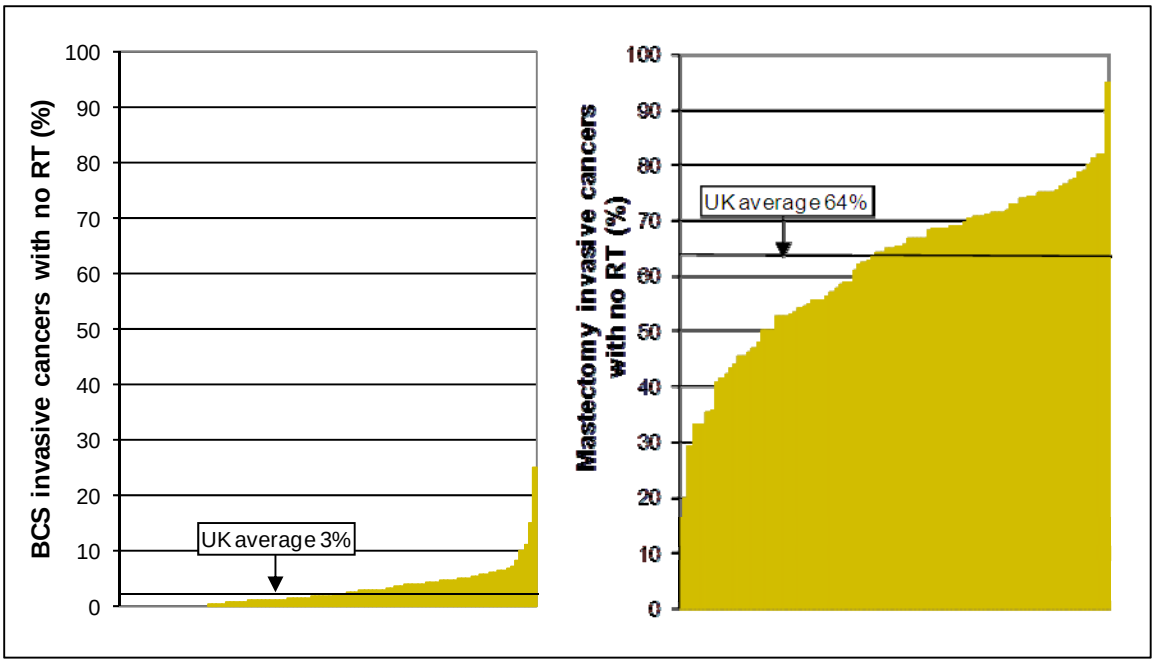

Figure 77 : Variation between screening units in the proportion of invasive cancers treated with breast conserving surgery (left) and mastectomy (right) that did not have radiotherapy recorded

Compared with invasive cancers, a higher proportion of non/micro-invasive cancers did not have radiotherapy in both the breast conserving surgery cohort and mastectomy cohort (Figure 78). Of the 2,271 non/micro-invasive cancers treated with breast conserving surgery, 804 (35%) did not have adjuvant radiotherapy recorded (Table 121). This varied from 18% in Northern Ireland to 47% in South Central. As expected and as with invasive breast cancer, women with non/micro-invasive

breast cancer who had a mastectomy were less likely to receive radiotherapy than those who had breast conserving surgery. The variation between breast screening units in the proportion of women receiving radiotherapy was most marked for invasive cancers treated with mastectomy and for non/ micro-invasive cases treated with breast conserving surgery.

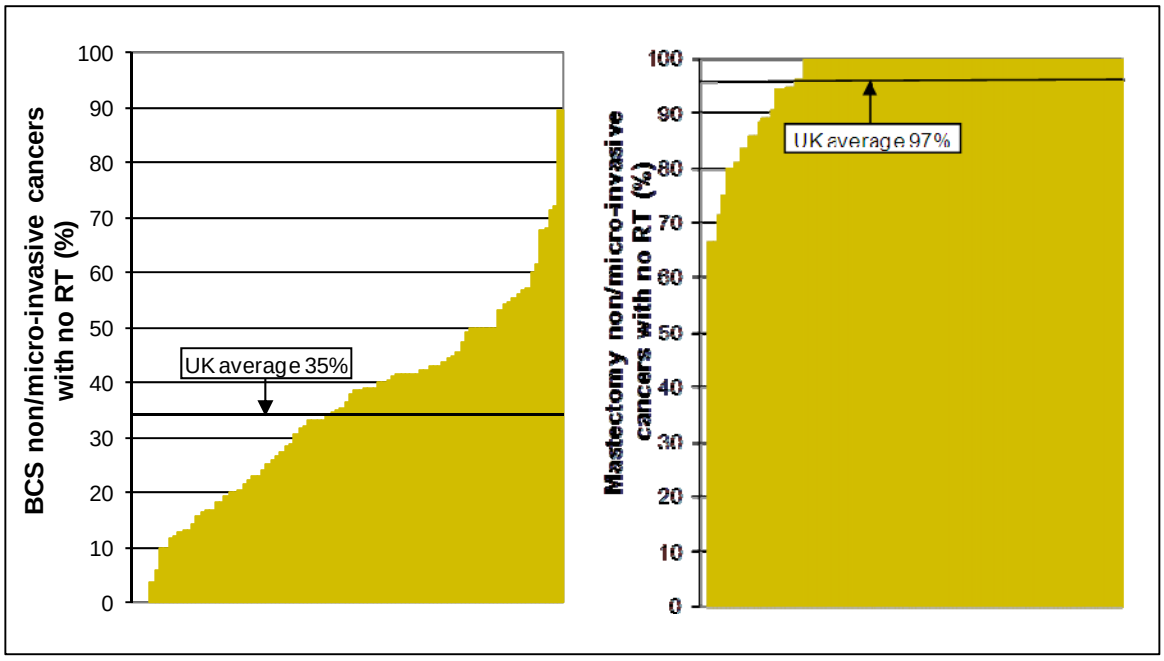

Figure 78 : Variation between screening units in the proportion of non/micro-invasive cancers treated with breast conserving surgery (left) and mastectomy (right) that did not have radiotherapy recorded

The significance of the variation between screening units in the proportion of invasive breast cancers treated with breast conserving surgery which did not have radiotherapy over the 3-year period 2008/09-2010/11 is examined in the control chart in Figure 79 in which the dashed lines in are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate (solid line). In this chart, data for 2008/09 and 2009/10 have been updated with the additional data collected by QA reference centres in the two radiotherapy audits that have been undertaken since the original data were published in the two annual audit reports. Twelve units lie above the upper control limit and had significantly lower rates of radiotherapy. Three of these units were in South Central and 3 in London. The unit with the highest proportion of cases without radiotherapy was in South Central (21%). Regional QA reference centres should audit the invasive cases treated by breast conserving surgery which did not have radiotherapy given.

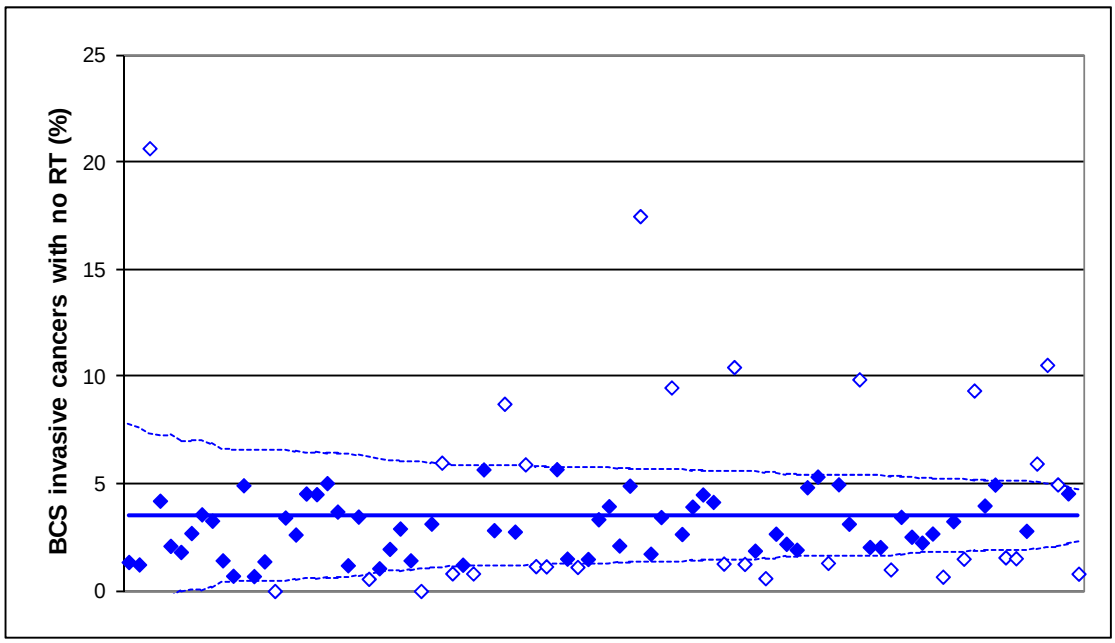

Figure 79 : Variation between screening units in the proportion of invasive cancers treated with breast conserving surgery that did not receive radiotherapy (2008/09-2010/11)
(Open diamonds represent units which lie outside the control limits)

Figure 80 shows the proportion of conservatively treated high cytonuclear grade non-invasive breast cancers and conservatively treated non-invasive breast cancers with size greater than 40mm without radiotherapy recorded. Nineteen percent (148) of these cancers were high cytonuclear grade (Table 122), and 12 (2%) were more than 40mm in diameter (Table 123).

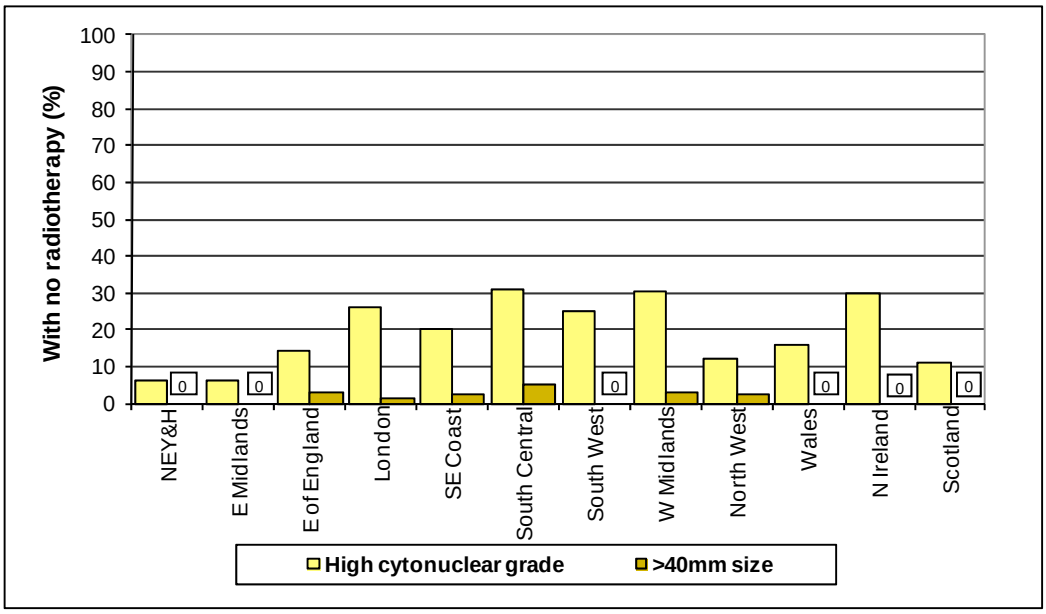

Figure 80 (Tables 122 and 123): The proportion of conservatively treated non-invasive cancers with high cytonuclear grade or size greater than 40mm without radiotherapy recorded

The significance of the variation between screening units in the proportion of non-invasive high grade breast cancers treated with breast conserving surgery which did not have radiotherapy over the 3-year period 2008/09-2010/11 is examined in the control chart in Figure 81, in which the dashed lines in are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate (solid line). Fourteen units lie above the upper control limit and had significantly lower rates of radiotherapy. Four were in South Central and 4 in South West. The unit with the highest proportion of cases without radiotherapy was in South Central (79%).

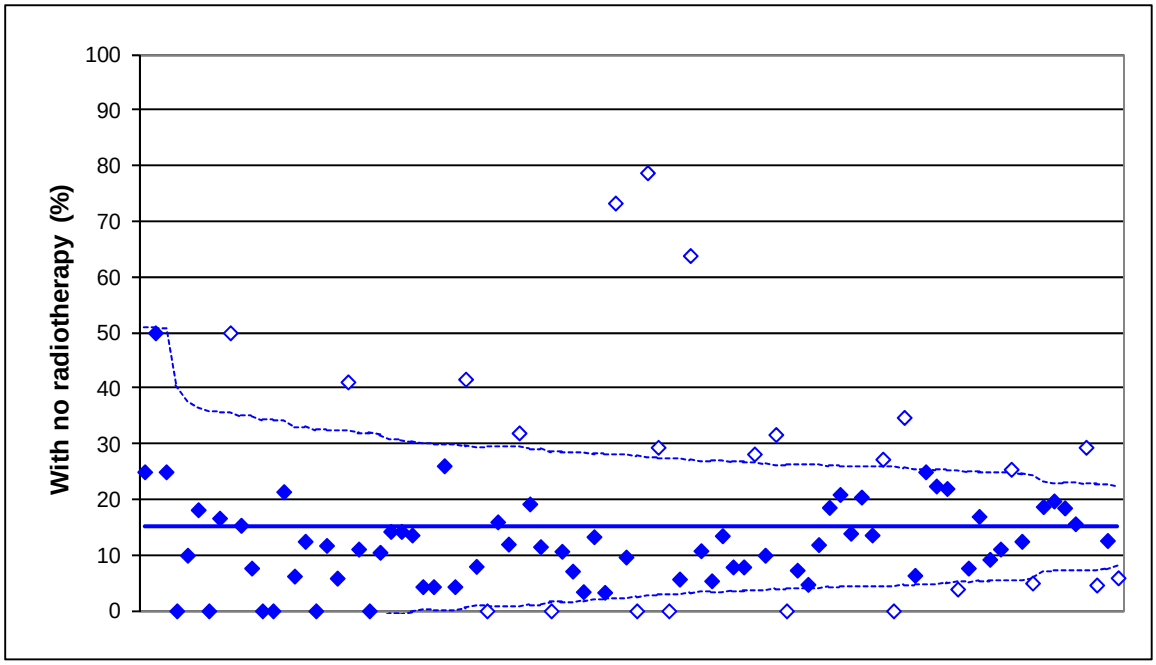

Figure 81 : Variation with screening unit in the proportion of high grade non-invasive cancers treated with breast conserving surgery that did not receive radiotherapy (2008/09-2010/11)
(Open diamonds represent units which lie outside the control limits)

Provided that the tumour margins were adequate, it may be acceptable for non-invasive breast cancers treated with breast conserving surgery not to receive radiotherapy. However, *NICE Clinical Guideline 80 Early and locally advanced breast cancer: Diagnosis and treatment* (2009) recommends that adjuvant radiotherapy should be offered to patients with DCIS following adequate breast conserving surgery and the relative risks and benefits discussed.

The following summary table shows how the number and proportion of invasive and non/micro-invasive breast cancers treated with breast conserving surgery which did not have radiotherapy recorded varied in each region over the 3-year period from 2008/09 to 2010/11. Throughout the 3-year period, in South Central and South West, more than 40% of non/micro-invasive cancers treated with breast conserving surgery do not appear to have received radiotherapy. Regional QA reference centres should ascertain each screening unit's policy regarding the provision of radiotherapy to non/micro-invasive breast cancers treated with breast conserving surgery since there is evidence from clinical trials that this can reduce recurrence rates.

The proportion of invasive breast cancers having breast conserving surgery which did not have radiotherapy recorded has decreased in the majority of regions in recent years. Nevertheless, there are still some units which remain outliers having much lower than average rates of radiotherapy utilisation. Given the benefits demonstrated in clinical trials from the provision of radiotherapy to patients with invasive breast cancer treated with breast conserving surgery, regional QA reference centres should audit all invasive breast cancers treated with breast conserving surgery which did not have radiotherapy recorded to ascertain if this is a true reflection of clinical practice or a data recording issue.

CANCERS TREATED WITH BREAST CONSERVING SURGERY WITHOUT RADIOTHERAPY RECORDED

	Invasive						***Non/micro-invasive***					
	2008/09		***2009/10***		***2010/11***		***2008/09***		***2009/10***		***2010/11***	
Region	***No.***	%	***No.***	%	***No.***	%	***No.***	%	***No.***	%	***No.***	%
N East, Yorks & Humber	*23*	*2*	*41*	*3*	*21*	*2*	*92*	*40*	*114*	*38*	*96*	*35*
East Midlands	*23*	*3*	*18*	*3*	*11*	*2*	*63*	*35*	*48*	*28*	*32*	*26*
East of England	*15*	*2*	*52*	*5*	*55*	*6*	*105*	*43*	*79*	*31*	*72*	*32*
London	*57*	*7*	*65*	*7*	*38*	*4*	*85*	*41*	*111*	*46*	*89*	*35*
South East Coast	*30*	*6*	*31*	*4*	*21*	*3*	*65*	*51*	*110*	*50*	*80*	*37*
South Central	*69*	*10*	*39*	*6*	*27*	*4*	*91*	*54*	*73*	*54*	*60*	*47*
South West	*44*	*5*	*24*	*2*	*33*	*4*	*122*	*54*	*117*	*52*	*98*	*46*
West Midlands	*23*	*3*	*22*	*3*	*11*	*1*	*65*	*36*	*51*	*30*	*66*	*34*
North West	*27*	*3*	*22*	*2*	*32*	*3*	*98*	*47*	*79*	*38*	*94*	*40*
Wales	*11*	*2*	*2*	*0*	*5*	*1*	*54*	*36*	*60*	*40*	*62*	*42*
Northern Ireland	*10*	*7*	*4*	*2*	*8*	*5*	*11*	*28*	*14*	*28*	*10*	*18*
Scotland	*40*	*4*	*20*	*2*	*18*	*2*	*52*	*28*	*43*	*24*	*45*	*21*
United Kingdom	***372***	***4***	***340***	***3***	***280***	***3***	***903***	***42***	***899***	***39***	***804***	***35***

Shaded if 5% or more above the value for the UK as a whole

KEY FINDINGS

- Ninety seven percent of women with invasive cancer treated with breast conserving surgery had radiotherapy recorded, compared to only 36% of women with invasive cancers treated with mastectomy.
- Sixty five percent of women with non/micro-invasive cancer treated with breast conserving surgery had radiotherapy recorded, compared to only 3% of women with non/micro-invasive cancers treated with mastectomy.

KEY FINDINGS (cont.)

- Four percent of the conservatively treated invasive cancers which did not receive radiotherapy were larger than 20mm in diameter, 19% were Grade 3 and 20% were node positive. In the 3-year period 2008/09-2010/11, 12 screening units had significantly lower rates of radiotherapy for invasive cancers treated with breast conserving surgery. Three of these units were in South Central and 3 in London. The unit with the highest proportion of cases without radiotherapy was in South Central (21%).
- Given the benefits demonstrated in clinical trials from the provision of radiotherapy to patients with invasive breast cancer treated with breast conserving surgery, regional QA reference centres should audit all invasive breast cancers treated with breast conserving surgery which did not have radiotherapy recorded to ascertain if this is a true reflection of clinical practice or a data recording issue.
- One hundred and forty eight non-invasive cancers without radiotherapy recorded were high cytonuclear grade and 12 were more than 40mm in diameter. In the 3-year period 2008/09-2010/11, 14 units lie above the upper control limit and had significantly lower rates of radiotherapy for the high grade non-invasive cancers. Four of these units were in South Central and 4 in South West. The unit with the highest proportion of cases without radiotherapy was in South Central (79%).
- Regional QA reference centres should ascertain each screening unit's policy regarding the provision of radiotherapy to non/micro-invasive breast cancers treated with breast conserving surgery since there is evidence from clinical trials that this can reduce recurrence rates.

8.5.2 Node Positive Invasive Cancers and Chemotherapy

PROPOSITION 2

Women with node positive invasive breast cancer should normally receive chemotherapy if they have cancers which are Grade 3, or HER-2 positive, or ER negative

In 2010/11, of the 15,828 cancers with known chemotherapy data, 2,842 (18%) were node positive invasive cancers and, of these, 830 (29%) did not have chemotherapy recorded (Table 124). This varied from 24% in East Midlands and Scotland to 42% in East of England. The following table shows how the number and proportion of node positive invasive breast cancers with no chemotherapy recorded has varied in each region in the 3-year period 2008/09-2010/11. East of England and South East Coast have consistently had higher proportions of node positive invasive cancers without chemotherapy recorded throughout the 3-year period.

NODE POSITIVE INVASIVE CANCERS WITHOUT CHEMOTHERAPY

Region	2008/09		2009/10		2010/11	
	No.	%	No.	%	No.	%
N East, Yorks & Humber	*134*	*35*	*119*	*31*	*104*	*29*
East Midlands	*42*	*21*	*51*	*29*	*45*	*24*
East of England	*94*	*39*	*103*	*36*	*106*	*42*
London	*94*	*46*	*82*	*32*	*77*	*28*
South East Coast	*57*	*40*	*93*	*39*	*82*	*35*
South Central	*58*	*30*	*47*	*22*	*64*	*28*
South West	*66*	*30*	*79*	*33*	*69*	*28*
West Midlands	*65*	*26*	*58*	*28*	*61*	*28*
North West	*106*	*35*	*96*	*32*	*90*	*28*
Wales	*46*	*33*	*47*	*34*	*38*	*25*
Northern Ireland	*15*	*30*	*21*	*30*	*21*	*38*
Scotland	*107*	*39*	*93*	*34*	*73*	*24*
United Kingdom	***884***	***34***	***889***	***32***	***830***	***29***

Shaded if 5% or more above the value for the UK as a whole

Figure 82 shows the proportion of node positive invasive breast cancers in each screening unit in 2010/11 which did not have chemotherapy recorded. This varied from 0 cancers in an East Midlands unit to 67% of invasive cancers in an East of England unit. When the significance of the variation between screening units in the proportion of conservatively treated node positive invasive breast cancers which did not have chemotherapy over the 3-year period 2008/09-2010/11 was examined in a control chart (not shown), 11 units were high outliers and 12 were low outliers. Of the 11 units with significantly higher numbers of node positive invasive breast cancers not treated with chemotherapy, 3 were in South Central and 2 in West Midlands.

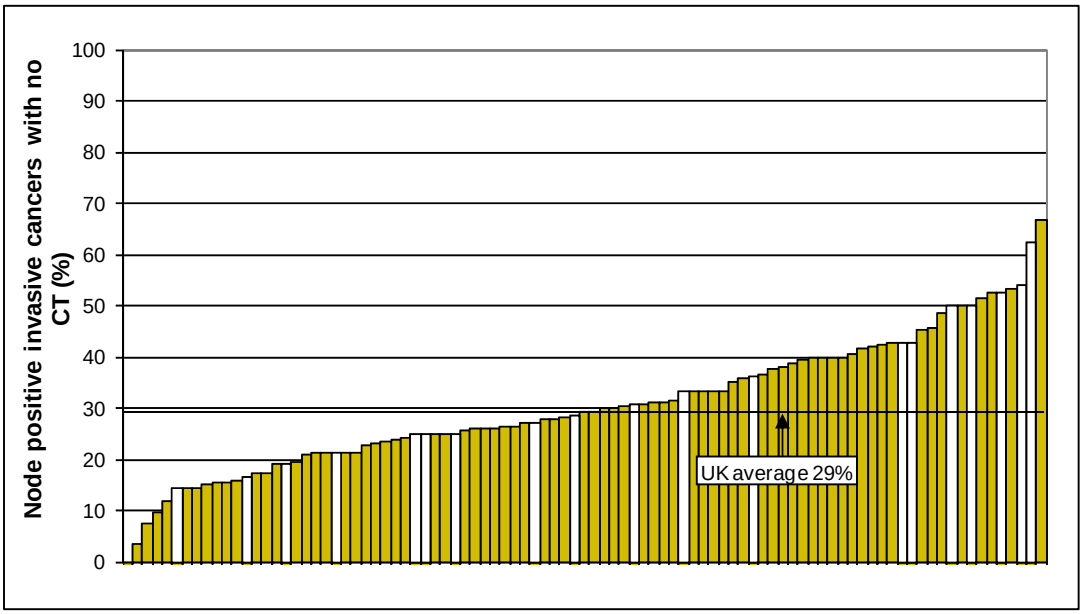

Figure 82: Variation between screening units in the proportion of node positive invasive cancers that did not have chemotherapy recorded (19 of the 20 smallest units are highlighted in white)

Of the 830 node positive invasive cancers in 2010/11 which had no chemotherapy recorded, 455 were diagnosed in women aged less than 65 years. These 455 cancers accounted for only 23% of all the node positive invasive cancers with known chemotherapy data in this age group. In contrast, in women aged 65 years and above, the 375 cases without chemotherapy recorded constituted 44% of all the node positive invasive cancers. Of the 830 node positive invasive cancers with no chemotherapy recorded, 19 (2%) were ER negative, 99 (12%) were Grade 3 and 27 (3%) were HER-2 positive (Table 125).

Decisions regarding the provision of chemotherapy to node positive invasive breast cancers should take into account the number of positive nodes, tumour size, grade, ER status and HER-2 status and comorbidity in order to make a judgement on the relative risks and benefits to an individual patient and it may be that all of the patients without chemotherapy recorded were treated appropriately. However, given the relatively small numbers of cancers involved, all regional QA reference centres and regional surgical QA co-ordinators should audit the node positive invasive cancers with ER negative, Grade 3 and/or HER-2 positive but no chemotherapy recorded , to determine whether the absence of chemotherapy data is a true reflection of clinical practice or a data recording issue.

KEY FINDINGS

- 29% of women with node positive invasive cancer did not have chemotherapy recorded.
- East of England and South East Coast have consistently had higher proportions of node positive invasive cancers without chemotherapy recorded throughout the 3-year period 2008/09-2010/11.
- In 2010/11, 11 screening units had significantly higher numbers of node positive invasive breast cancers not treated with chemotherapy. Of these, 3 were in South Central and 2 in West Midlands.

KEY FINDINGS (cont.)

- Twenty three percent of women aged less than 65 years with a node positive invasive cancer had no chemotherapy recorded, compared to 44% of the women aged 65 years and above.
- Of the 830 node positive invasive cancers with no chemotherapy recorded, 19 (2%) were ER negative, 99 (12%) were Grade 3 and 27 (3%) were HER-2 positive.
- Decisions regarding the provision of chemotherapy to node positive invasive breast cancers should take into account the number of positive nodes, tumour size, grade, ER status and HER-2 status and comorbidity in order to make a judgement on the relative risks and benefits to an individual patient and it may be that all of the patients without chemotherapy recorded were treated appropriately. However, given the relatively small numbers of cancers involved, all regional QA reference centres and regional surgical QA co-ordinators should audit ER negative, Grade 3 and/or HER-2 positive, node positive invasive cancers with no chemotherapy recorded to determine whether the absence of chemotherapy data is a true reflection of clinical practice or a data recording issue.

8.5.3 ER Status and Endocrine Therapy

PROPOSITION 3

Endocrine therapy (e.g. tamoxifen) is only beneficial to women with ER positive invasive cancers and to women with ER negative, PgR positive invasive breast cancers

Of the 15,871 breast cancers with complete endocrine therapy data included in the adjuvant therapy analysis, 12,965 (82%) were ER positive, 1,431 (9%) ER negative and for 1,475 (9%) either the ER status was not tested or the ER status was unknown (Table 126). Eighty nine percent of the ER positive cancers with known endocrine therapy data were invasive and 11% non/micro-invasive (Table 127).

In the UK as a whole, 554 (5%) ER positive invasive cancers had no endocrine therapy recorded. The proportion of ER positive invasive cancers that did not have endocrine therapy recorded varied from 1% in Northern Ireland to 10% in East Midlands and 15% in East of England (Table 128).

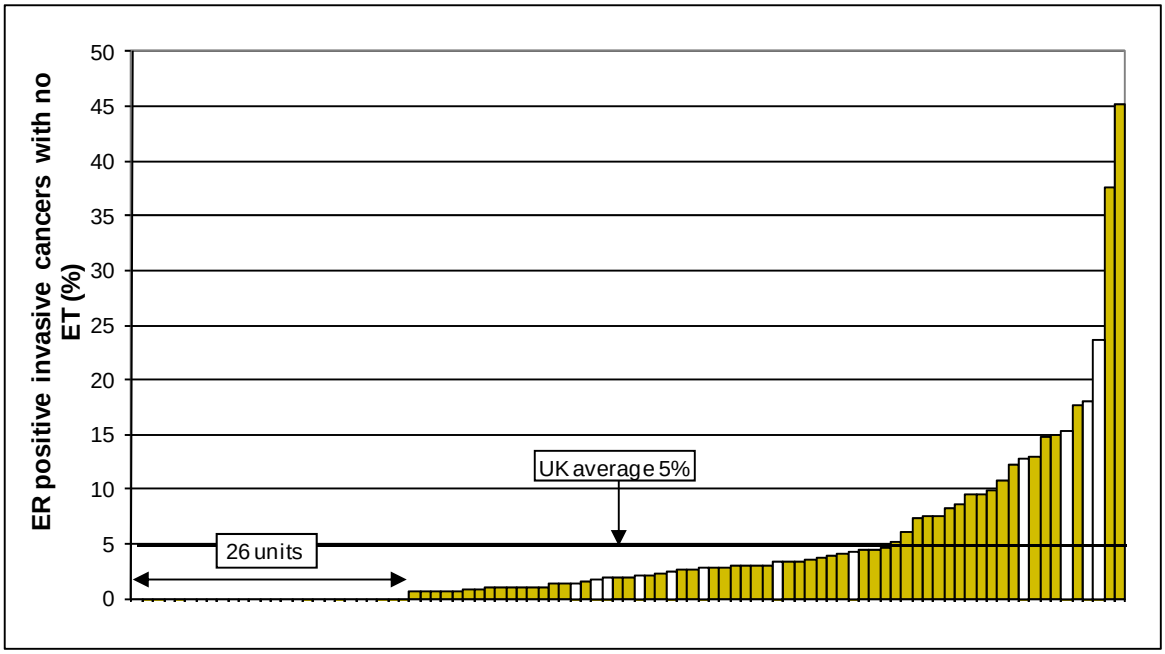

Figure 83 : Variation between screening units in the proportion of ER positive, invasive cancers that did not have endocrine therapy recorded (12 of the 20 smallest units are highlighted in white)

Figure 83 shows the proportion of ER positive invasive breast cancers in each screening unit in 2010/11 which did not have endocrine therapy recorded. This varied from 0 cancers in 26 units to more than 20% of invasive cancers in 3 screening units, 2 of which were in East Midlands and 1 in East of England. In the UK as a whole, 82 (15%) of the ER positive invasive cancers that did not have endocrine therapy recorded were Grade 3, 78 (14%) were node positive and 20 (4%) were larger than 20mm in diameter (Table 129). East Midlands had very small numbers of cancers with these characteristics in the cohort not given endocrine therapy; whereas in East of England, 21% of cancers that did not receive endocrine therapy were Grade 3 and 23% were node positive.

Figure 84 shows how the proportion of ER positive cancers in the Excellent Prognostic Group (EPG) treated with endocrine therapy varied between screening units. When the significance of the variation between screening units in the proportion of ER positive invasive breast cancers in the EPG which did not have endocrine therapy over the 3-year period 2008/09-2010/11 was examined in a control chart (not shown), 15 units were low outliers. Of the 15 units with significantly lower numbers of ER positive invasive EPG breast cancers treated with endocrine therapy, 3 were in East Midlands and 4 in East of England.

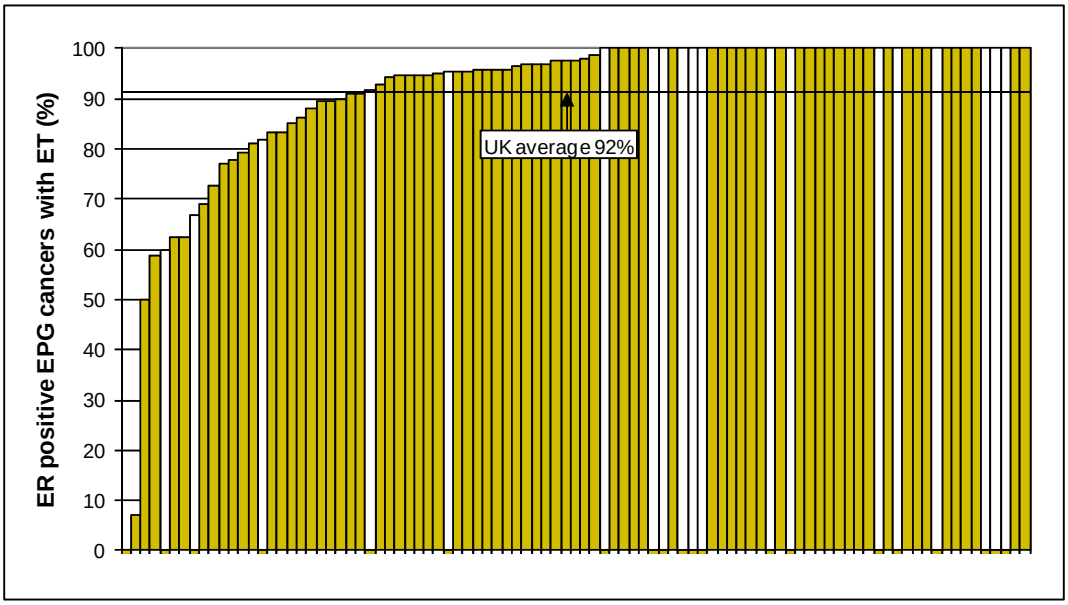

Figure 84 : Variation between screening units in the proportion of ER positive, EPG cancers that had endocrine therapy (ET) recorded (19 of the 20 smallest units are highlighted in white)

The following summary table shows for the 3-year period 2008/09-2010/11, the proportion of ER positive invasive cancers in each region without endocrine therapy recorded. In East Midlands this has remained relatively high throughout the 3-year period, and in East of England this decreased in 2009/10 but increased markedly in 2010/11 to a level above that seen in 2008/09. *NICE Clinical Guideline 80 Early and locally advanced breast cancer: Diagnosis and treatment* (2009) states: "The benefit from endocrine therapy with tamoxifen or an aromatase inhibitor in low-risk breast cancer (for example small tumours < 2 cm, grade 1, lymph node-negative) is very small and needs to be weighed with the effects on quality of life (and indeed whether the patient reliably takes the medication)". In the East Midlands, one unit discusses endocrine therapy but does not recommend it if a woman is in the excellent prognostic group and 2 units do not offer endocrine treatment to women with an NPI <3.0. This policy is consistent with the East Midlands having very few Grade 3 or node positive cancers in the cohort not given endocrine therapy (Table 129). This is not the case in all other regions. Regional QA reference centres and regional surgical QA co-ordinators should review the treatment of women with ER positive invasive cancers, with Grade 3 and/or positive nodes, who did not have endocrine therapy recorded to determine whether the absence of endocrine therapy data is a true reflection of clinical practice or a data recording issue.

In the UK as a whole, 16 (36%) ER negative, PgR positive invasive cancers did not have endocrine therapy recorded (Table 130) and 92 ER negative cancers (6%) did have endocrine therapy recorded (Table 131). Twenty nine (32%) of the latter were PgR positive invasive cancers (Table

130). Regional QA reference centres and regional surgical QA co-ordinators should determine the reasons why, given the potential side effects, endocrine therapy does appear to have been given to ER/PgR negative invasive cancers.

ER POSITIVE INVASIVE CANCERS WITHOUT ENDOCRINE THERAPY RECORDED

	2008/09		2009/10		2010/11	
Region	**No.**	%	**No.**	%	**No.**	%
N East, Yorks & Humber	*81*	*5*	*38*	*2*	*56*	*4*
East Midlands	*96*	*10*	*118*	*13*	*80*	*10*
East of England	*124*	*12*	*46*	*4*	*163*	*15*
London	*105*	*11*	*73*	*7*	*61*	*5*
South East Coast	*10*	*2*	*34*	*4*	*20*	*2*
South Central	*55*	*7*	*18*	*2*	*15*	*2*
South West	*66*	*7*	*43*	*4*	*31*	*3*
West Midlands	*26*	*3*	*28*	*3*	*21*	*2*
North West	*86*	*7*	*48*	*4*	*55*	*4*
Wales	*20*	*3*	*20*	*3*	*26*	*4*
Northern Ireland	*3*	*2*	*6*	*2*	*2*	*1*
Scotland	*17*	*2*	*27*	*3*	*24*	*2*
United Kingdom	***689***	***6***	***499***	***4***	***554***	***5***

Shaded if 5% or more above the value of the UK as a whole

NICE Clinical Guideline 80 Early and locally advanced breast cancer: Diagnosis and treatment (2009) states that Tamoxifen should not be offered to women with non-invasive breast cancer. In the UK as a whole in 2010/11, 13% of non/micro-invasive cancers had endocrine therapy and 27% of ER positive non/micro-invasive cancers had endocrine therapy (Table 132). The use of endocrine therapy for ER positive non/micro-invasive cancers varied widely between regions from 8% in West Midlands and 9% in Scotland to 44% in London, 45% in North West and 46% in South Central. Regional QA reference centres should determine the reason for this wide variation between regions.

KEY FINDINGS

- The decision to give endocrine therapy did appear to depend to a large extent on ER and PgR status. However, 554 (5%) ER positive invasive cancers and 16 (32%) ER negative PgR positive invasive cancers did not have endocrine therapy recorded. The proportion of ER positive invasive cancers that did not have endocrine therapy recorded varied from 1% in Northern Ireland to 10% in East Midlands and 15% in East of England.
- Over the 3-year period 2008/09-2010/11, 15 units had significantly lower numbers of ER positive invasive EPG breast cancers treated with endocrine therapy.
- Fifteen percent of the ER positive invasive cancers not treated with endocrine therapy were Grade 3 and 14% were node positive. In East of England, 21% of cancers that did not receive endocrine therapy were Grade 3 and 23% were node positive.
- Regional QA reference centres and regional surgical QA co-ordinators should review the treatment of women with Grade 3 or node positive ER positive invasive cancers who did not have endocrine therapy recorded to determine whether the absence of endocrine therapy data is a true reflection of clinical practice or a data recording issue.
- Regional QA reference centres and regional surgical QA co-ordinators should determine the reasons why endocrine therapy was not given to ER negative invasive cancers which were PgR positive, and why endocrine therapy does appear to have been given to ER/PgR negative invasive cancers.
- In the UK as a whole in 2010/11, 13% of non/micro-invasive cancers had endocrine therapy and 27% of ER positive non/micro-invasive cancers had endocrine therapy. The latter varied widely between regions from 8% in West Midlands and 9% in Scotland to 44% in London, 45% in North West and 46% in South Central. Regional QA reference centres should determine the reason for this wide variation between regions.

CHAPTER 9
SURVIVAL ANALYSIS

UK NHS Breast Screening Programme data for women with breast cancers detected by screening from 1 April 2006 to 31 March 2007 were combined with data recorded by regional cancer registries to analyse breast cancer survival. All cases were followed up to the study end date of 31 March 2012, enabling survival for periods of up to five years from the date of diagnosis to be calculated. Age at diagnosis, invasive grade, invasive tumour size and nodal status were requested from the screening services. Date of death and underlying cause of death were obtained from cancer registries and the Office for National Statistics (ONS).

9.1 Survival Analysis Methods

Relative survival is defined as the observed survival in the patient group divided by the expected survival of the general population, matched by age and sex. The cumulative relative survival is interpreted as the proportion surviving a given interval after diagnosis in the hypothetical situation that breast cancer is the only possible cause of death. A population without breast cancer would have a relative survival rate of 100%.

Cumulative relative survival probabilities for women in the general UK population were calculated using the Ederer II method with probability of life tables supplied by the Government's Actuary Department. Individual life tables for England, Wales, Northern Ireland and Scotland were obtained in addition to UK life tables to allow calculation of adjusted survival estimates which account for differences in life expectancy in the four countries. For each relative survival rate, 95% confidence intervals were approximated as twice the standard error. Relative survival curves were tested for statistically significant differences using likelihood ratio tests for inequality. Relative survival was calculated, using the statistical package STATA.

9.2 Eligibility and Data Completeness of Cases Included in the Survival Analysis

Details of 15,567 breast cancers detected by screening between 1 April 2006 and 31 March 2007 were submitted to the survival audit. Of the 15,567 cancers submitted, 462 cancers (3%) were excluded for one of the following reasons:

- Unknown invasive status (21 cases)
- Case not registered at the regional cancer registry or registered with an unknown diagnosis date (67 cases)
- Screen-detected cancer not confirmed to be the first primary breast cancer (374 cases)

Details of the number of cases excluded in each region for the last two reasons are provided in the summary table on the following page.

The diagnosis date recorded at the cancer registry was taken for the survival analysis, unless it was incomplete or later than the screening surgery date, in which case the screening surgery date was used (477 cases). This can occur where the cancer registry has incomplete data for the cancer, for example a registration based on the second operation instead of the first operation. In total, 939 cases (6% of those originally submitted) were excluded, leaving 15,105 cases that were eligible for analysis.

DATA COMPLETENESS FOR THE 2006/07 SURVIVAL AUDIT							
	Not registered		Cases not confirmed to be primary breast cancers		Eligible cases		Total number of cases
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	17	1	43	2	1,755	96	1,819
East Midlands	1	0	48	4	1,145	96	1,194
East of England	12	1	18	1	1,537	98	1,572
London	3	0	49	3	1,393	96	1,457
South East Coast	0	0	38	3	1,178	97	1,216
South Central	1	0	41	4	1,097	96	1,139
South West	5	0	17	1	1,612	99	1,634
West Midlands	0	0	17	1	1,372	99	1,389
North West	11	1	42	3	1,614	97	1,667
Wales	2	0	25	3	805	97	832
Northern Ireland	0	0	2	1	231	99	233
Scotland	15	1	34	2	1,366	97	1,415
United Kingdom	67	0.4	374	2	15,105	97	15,567

9.3 Cause of Death

The main advantage of calculating relative rather than cause-specific survival is that knowledge of the cause of death is not required. However, the underlying cause of death was requested from the cancer registries and the ONS.

Up to 31 March 2012, deaths were recorded for 871 (7%) of the 11,794 women with invasive breast cancer. Forty eight percent of the deaths were recorded as being due to breast cancer, 23% were due to another type of cancer and 27% were due to non-cancer related causes. Death cause was unknown for 16 women (2%). There were variations in the proportions of women with invasive cancer recorded as dying from each cause of death in each region (Table 133); with the proportion of breast cancer deaths varying from 39% in South Central to 63% in Northern Ireland.

There were 6 deaths (3%) recorded amongst the 180 women with micro-invasive breast cancer detected by screening in 2006/07 (Table 134). One was from breast cancer, 3 from another cancer and 2 were non-cancer deaths. Of the 105 deaths (3%) in the 3,131 women with non-invasive breast cancer, 13 (12%) were recorded as being due to breast cancer, 45 (43%) were from a cancer other than breast cancer and 45 (43%) were non-cancer deaths (Table 135).

9.4 Regional and Screening Unit Variation in 5-year Relative Survival Rates

For women with invasive breast cancer diagnosed by screening in 2006/07, the overall 5-year relative survival rate is 98%. Figure 85 shows the variation in 5-year survival between UK regions. Women with screen-detected invasive breast cancer diagnosed in East Midlands and Northern Ireland have statistically significantly lower survival rates (94.9% and 94.4% respectively) compared to the UK average 5-year relative survival rate; whereas South Central and South West have relatively higher survival rates (100% and 99.9%). These differences are still apparent after adjusting for regional variation in the life tables of the local population (Table 136).

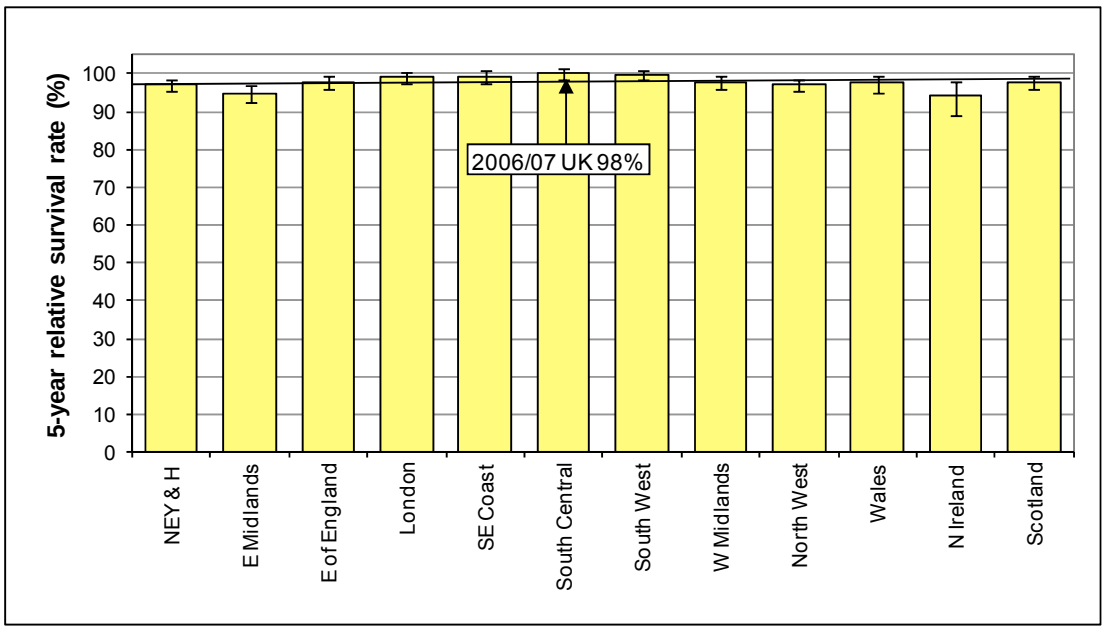

Figure 85 (Table 146): Regional variation in 5-year relative survival for women with invasive breast cancer who were screened in 2006/07

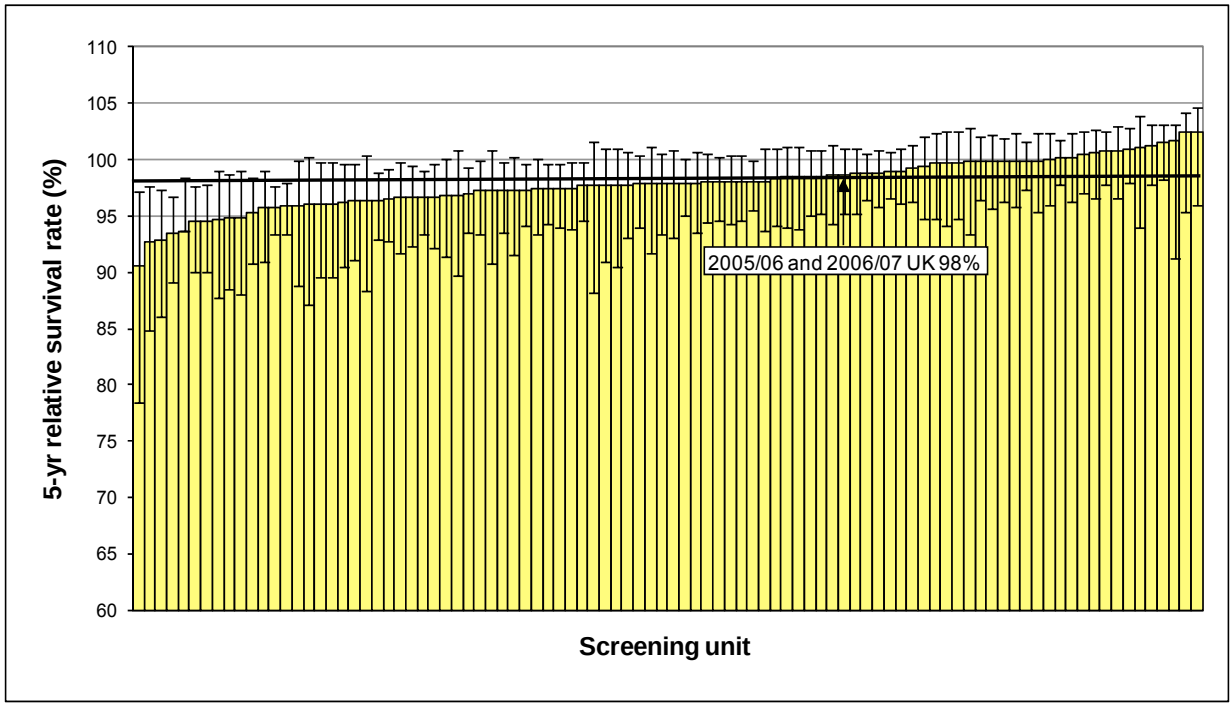

Figure 86: Screening unit variation in 5-year relative survival for women with invasive breast cancer who were screened in 2005/06 and 2006/07

Figure 86 shows how 5-year relative survival varies between screening units for screen-detected breast cancers diagnosed in 2005/06 and 2006/07. The number of eligible invasive cancers in each screening unit in the 2-year period ranged from 57 to 767. The 5-year survival rate varies from 90.5% in a unit in East of England to 102.5% in a unit in South Central. Although the 5-year relative survival rates for some units have large confidence intervals, which is a reflection of small numbers, for 8 units where the upper confidence interval does not reach the line representing the UK average, 5-year relative survival rates are statistically significantly lower than the national average of 98%. No individual screening units have a 5-year relative survival significantly greater than the national average.

9.5 Variation in 5-year Relative Survival with Tumour Characteristics

Parameter		Cancers included in each analysis group	
		Number	%
Invasive status	Invasive	11,794	78
	Non-invasive	3,131	21
	Micro-invasive	180	1
	Total	15,105	100
Age group (invasive cancers only)	<50	113	1
	50-52	1,429	12
	53-55	1,147	10
	56-58	1,481	13
	59-61	1,798	15
	62-64	1,755	15
	65-67	1,603	14
	68-70	1,736	15
	71+	732	6
	Total	11,794	100
Invasive cancer size	<15mm	6,302	53
	15-≤20mm	2,806	24
	>20-≤35mm	1,980	17
	>35-≤50mm	405	3
	>50mm	174	1
	Unknown	127	1
	Total	11,794	100
Invasive grade	Grade 1	3,183	27
	Grade 2	5,911	50
	Grade 3	2,529	21
	Not assessable	67	1
	Unknown	104	1
	Total	11,794	100
Nodal status (invasive cancers only)	Negative	8,759	74
	Positive	2,713	23
	Unknown	322	3
	Total	11,794	100
NPI group (invasive cancers only)	EPG	2,535	21
	GPG	3,979	34
	MPG1	2,774	24
	MPG2	1,286	11
	PPG	764	6
	Unknown	456	4
	Total	11,794	100

The preceding table shows the characteristics of the 11,794 screen-detected invasive breast cancers in the 2006/07 cohort. Seventy eight percent were invasive, and 93% of the invasive breast cancers were diagnosed in women aged 50-70 years. Ninety seven percent of the invasive breast cancers had complete invasive size, grade and/or nodal status data. Seventy eight percent were less than or equal to 20mm in diameter, 78% were Grade 1 or Grade 2, 76% were node negative, 57% were in the Excellent (EPG) and Good (GPG) Prognostic Groups and only 7% were in the Poor Prognostic Group (PPG). Four percent had unknown NPI group. These proportions are similar to those recorded in last year's audit of screen-detected cancers diagnosed in 2005/06.

9.5.1 Variation in Relative Survival with Invasive Status

The overall 5-year relative survival rate for women with breast cancer screened in 2006/07 is 98.7%. For women with invasive breast cancer, the 5-year relative survival rate is 98.0%, and for those with non -invasive breast cancer it is significantly higher at 101.2% with a lower confidence interval which is greater than 100%. This implies that non-invasive breast cancer patients have better survival than the

female population as a whole. This may be because women who attend breast screening tend to be more affluent and more health aware and, thus have longer life expectancy than the general population in the same age group. The 5-year relative survival rate for women with micro-invasive breast cancer is also over 100% but this is not significantly different to the rate for women with invasive breast cancer because of the wide confidence intervals caused by the very small numbers of micro-invasive cancers.

Invasive status	*5-year relative survival*
Invasive	*98.0 (97.6,98.5)*
Micro-invasive	*101.9 (98.0,103.7)*
Non-invasive	*101.2 (100.5,101.7)*
Overall	*98.0 (97.6,98.5)*

The following table shows that the 5-year relative survival rate for women with screen-detected invasive breast cancer has increased from 93.7% for those screened in 1990/91 to 98.0% for those screened in 2006/07. This increase is statistically significant.

12 YEAR SUMMARY OF 5-YEAR RELATIVE SURVIVAL RATES INVASIVE BREAST CANCER		
Audit year	***Number of cases***	***5-year relative survival rate***
Jan 1990 – Apr 1991	*8,705*	*93.7 (92.9,94.4)*
Mar 1992 – Apr 1993	*6,706*	*93.5 (92.6,94.3)*
Mar 1996 – Apr 1997	*5,445*	*95.4 (94.6,96.2)*
Mar 1997 – Apr 1998	*5,313*	*95.7 (94.9,96.5)*
Mar 1998 – Apr 1999	*6,898*	*95.8 (95.1,96.5)*
Mar 1999 – Apr 2000	*6,761*	*96.5 (95.8,97.2)*
Mar 2000 – Apr 2001	*7,007*	*96.4 (95.8,97.1)*
Mar 2001 – Apr 2002	*8,943*	*97.2 (96.6,97.8)*
Mar 2002 – Apr 2003	*8,131*	*97.1 (96.5,97.7)*
Mar 2005 – Apr 2006	*15,386*	*97.9 (97.4,98.4)*
Mar 2006 – Apr 2007	*15,105*	*98.0 (97.6,98.5)*

9.5.2 Variation in Relative Survival with Age for Invasive Breast Cancers

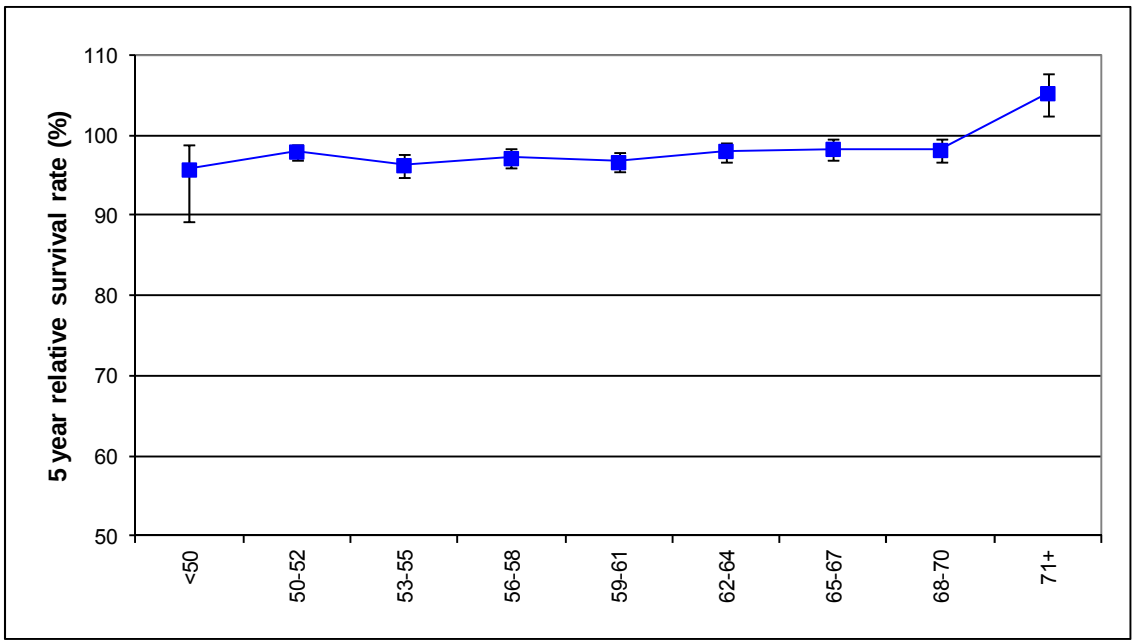

Figure 87 (Table 147): Variation in relative survival with age at diagnosis for women with invasive breast cancer who were screened in 2006/07

Figure 87 shows the variation with age at diagnosis in the 5-year relative survival rates for invasive breast cancers diagnosed in 2006/07. Women with invasive cancer in the screening age range (50 to 70 years) have survival rates ranging from 96% to 98%. The 5-year relative survival rate for women aged over 70 years is 105.3%, which is significantly higher than that for women in all the other age groups examined. In 2006/07, all patients aged over 70 years were self-referrals to the NHSBSP. The comparatively high relative survival of these women may be due to a number of factors. Firstly, it is possible that routine follow-up appointments for breast cancer result in the earlier identification of other health problems in women diagnosed with early stage breast cancer than would normally be the case for women of the same age in the general population. Secondly, self-referral women may be from a more affluent socio-economic group and therefore have better overall health than the general population as a whole.

9.5.3 Variation in Relative Survival with Invasive Tumour Size, Grade and Nodal Status

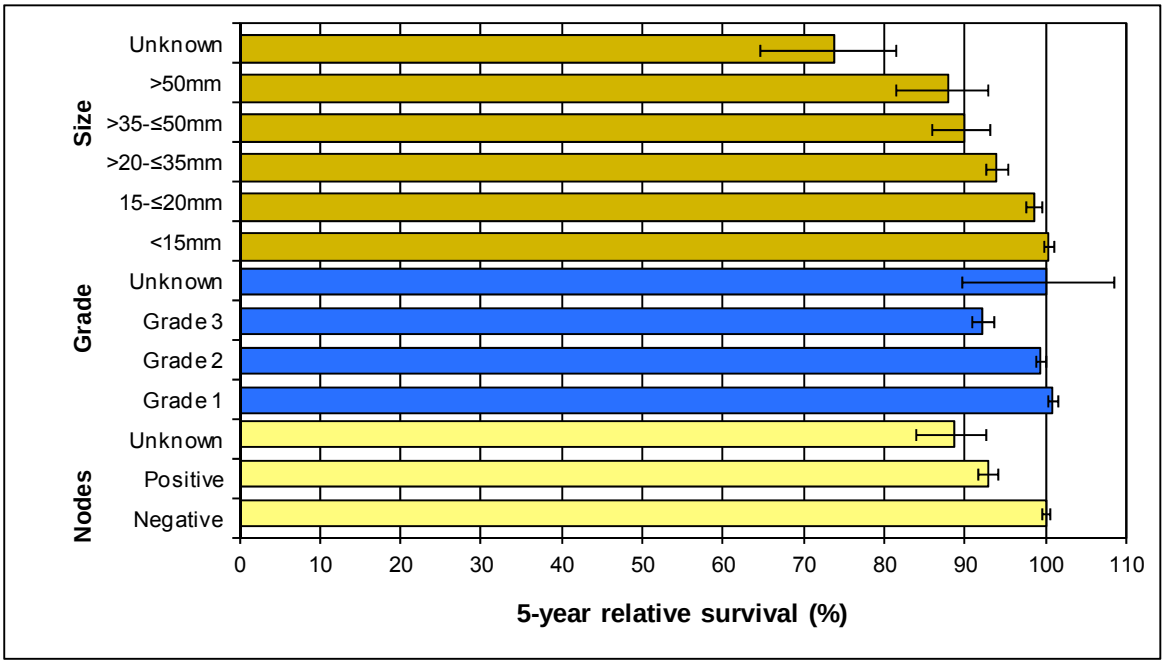

Figure 88 (Tables 148 to 150): Variation in 5-year relative survival rates with invasive tumour size, invasive grade and nodal status for women with invasive breast cancer who were screened in 2006/07

Although 5-year survival is relatively good for all women with screen-detected breast cancer, it is dependent on the characteristics of the tumour detected. Thus, the 5-year relative survival rate for women with a small invasive breast cancer (<15mm diameter) is 100.4% (Table 138 and Figure 88), while for women with a large invasive breast cancer (>50mm diameter) the 5-year relative survival rate is only 87.9%. Similarly, the 5-year survival rate for women with a Grade 1 invasive breast cancer is 100.9% but only 92.2% for women with a Grade 3 invasive breast cancer (Table 139). Finally, while the 5-year relative survival rate for women with positive nodal status is 92.9%, it is 100.0% for women with negative nodal status (Table 140).

9.5.4 Variation in Relative Survival of Invasive Cancers with NPI Group

The 5-year relative survival rates for women with invasive breast cancers in the Excellent Prognostic Group (EPG), Good Prognostic Group (GPG) are 101.3% and 100.9% respectively (Table 141 and Figure 89), which are no worse than for the general population as a whole. Although excellent, at 98.8%, the 5-year relative survival rate for women with breast cancers in the Moderate Prognostic Group 1 (MPG1) is significantly worse than that of women with cancers in the EPG and GPG groups. The 5-year relative survival rate for the women with cancers in the Moderate Prognostic Group 2 (MPG2) and the Poor Prognostic Group (PPG) are lower at 93.8% and 81.3% respectively. These are significantly lower than those for all of the other prognostic groups.

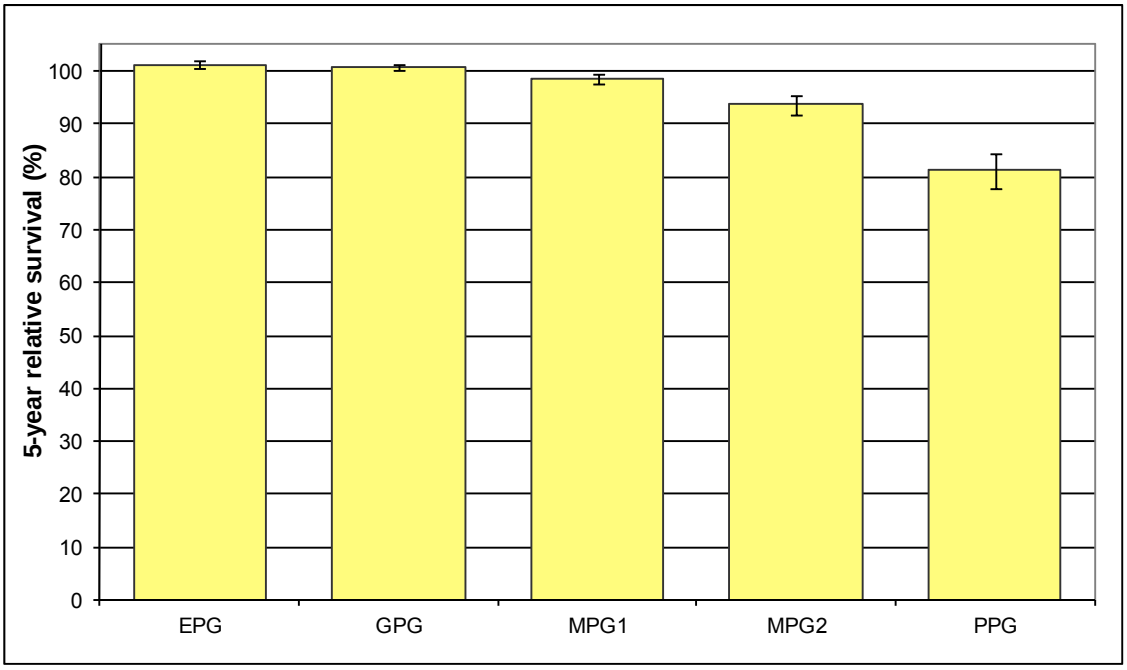

Figure 89 (Table 141): Variation in 5-year relative survival rates with NPI group for women with invasive breast cancer who were screened in 2006/07

KEY FINDINGS

- Of the 15.567 cancers submitted to the survival analysis for the period 1 April 2006 to 31 March 2007, 67 were excluded because they were not registered at the cancer registries. A further 374 cancers were excluded because they were not confirmed to be primary tumours and 21 because their invasive status was not known.
- The 5-year relative survival for women with screen-detected invasive breast cancer who were screened in 2006/07 is 98.0%. Five-year relative survival has improved significantly from 93.7% in 1990/91.
- The unit level 5-year relative survival for women screened in 2005/06 and 2006/07 varies from 90.5% in a unit in East of England to 102.5% in a unit in South Central. For 8 units, 5-year relative survival rates are statistically significantly lower than the national average of 98.0%.
- The 5-year relative survival of women with a less than 15mm diameter invasive breast cancer is 100.4% compared with a 5-year relative survival rate of 87.9% for women with tumours with a diameter greater than 50mm.
- The 5-year survival rate for women with a Grade 1 invasive breast cancer is 100.9%, compared to 92.2% for those with a Grade 3 invasive breast cancer.
- Women with positive nodal status have a 5-year survival rate of 92.9%, compared to 100.0% for those with negative nodal status.
- The 5-year relative survival rates for women with invasive breast cancers in the Excellent Prognostic Group (EPG), Good Prognostic Group (GPG) are 101.3% and 100.9% respectively.
- At 98.8%, the 5-year relative survival rate for the 11% of women with cancers in the Moderate Prognostic Group 1 (MPG1) is significantly worse than that of women with cancers in the EPG and GPG groups.
- The 5-year relative survival rates for the women with cancers in Moderate Prognostic Group 2 (MPG2) and the Poor Prognostic Group (PPG) are even lower at 93.8% and 81.3% respectively.

APPENDIX A: TIMETABLE OF EVENTS

NHSBSP and ABS AUDIT OF SCREEN-DETECTED BREAST CANCERS FOR THE YEAR OF SCREENING 1 APRIL 2011 - 31 MARCH 2012

AUDIT TIMETABLE	
Date	**Event**
22 May 2012	Audit group meet to plan the 2011/12 audit.
21 June 2012	Draft timetable and new data item list emailed to Audit Group, QA Reference Centres (QARCs) and Cancer Registries for comments. Email QA Reference Centres regarding the plan to run adjuvant and survival crystal reports.
21 – 28 June	QA Co-ordinators discuss draft timetable and new data item list with their QA Surgeon, QA Director and QA Data Managers. Return comments to the West Midlands QA Reference Centre by 26 June.
16 July 2012	Audit documents sent to QA Surgeons, QA Directors and QA Co-ordinators. QA Co-ordinators liaise with lead surgeons, data managers and screening office managers on methods used to collect data. Survival and adjuvant audit data collection can begin immediately. Main audit data can be collected as soon as the screening office computer system is ready to provide a KC62 return for 2011/12.
3 August 2012	Suggested deadline for QARCs to request survival audit data from Cancer Registries.
31 August 2012	Suggested deadline for Cancer Registries to provide data to the QARCs for the survival audit.
13 Sept 2012	Deadline for 2010/11 follow-up report to Julietta Patnick and Neil Rothnie
20 Sept 2012	Data Quality day for training QARC staff
Wednesday 26 Sept 2012	**Deadline for receipt of survival data from QARCs at the WMCIU.**
26 – 5 Nov 2012	All QARCs to ensure that an appropriate member of staff is available to respond to any queries from the WMCIU regarding the survival audit.
9 Nov 2012	Suggested deadline for main and adjuvant audit data to be provided to QARCs with the signature of the lead breast surgeon to confirm that the data are correct. *An earlier deadline may be set by the QARC due to local issues, eg. QA Team requirements.*
12 Nov 2012– 7 Jan 2013	QARCs validate audit data and collate into the main and adjuvant spreadsheets provided. QARCs ensure that all cases are coded correctly, that all internal data checks are resolved and that there are no anomalies in the data.
Tuesday 8 Jan 2013	**Deadline for receipt of main and adjuvant audit data from QARCs at the West Midlands QA Reference Centre.**
9 – 18 Jan 2013	All QARCs to ensure that an appropriate member of staff is available to respond to queries from the West Midlands QA Reference Centre. The West Midlands QA Reference Centre liaises with QARCs to ensure data are complete, correct and surgically confirmed. It will not be possible to incorporate new or late data after this stage.
11 Feb 2013	First draft audit booklet emailed to Audit group for comments
22 Feb 2013	Audit booklet tables (first draft) emailed to QA Reference Centres for information. *All draft data will be marked "Not for circulation" to avoid unpublished data getting into the public domain.*
15 April 2013	Deadline for receipt of the audit booklet at the printers.
21 – 22 May 2013	2012 ABS conference (Manchester)
22 May 2013	Wash-up meeting (Manchester)

APPENDIX B: BREAST AUDIT QUESTIONNAIRE WITH GUIDANCE NOTES

NHSBSP & ABS AUDIT OF WOMEN WITH SCREEN-DETECTED BREAST CANCERS DETECTED FOLLOWING INVITATION BETWEEN 1 APRIL 2011 AND 31 MARCH 2012

PLEASE SUPPLY DATA FOR WOMEN OF ALL AGES WITH SCREEN-DETECTED BREAST CANCERS WITH FIRST OFFERED APPOINTMENT FROM 1 APRIL 2011 - 31 MARCH 2012 INCLUSIVE ACCORDING TO THE REGIONAL BOUNDARIES EXTANT AT 1 APRIL 2012

This document accompanies the MS Excel spreadsheet designed to record NHSBSP & ABS breast screening audit main surgical data and screening surgical caseload data which has been prepared by the West Midlands Breast Screening QA Reference Centre (WMQARC).

It is the responsibility of the QA co-ordinator to organise data collection at unit level, on paper and/or using copies of the spreadsheet. Regional data should be sent to WMQARC in electronic format using the spreadsheet containing the check programme. Although there is an explanation column for special cases that contain errors in this spreadsheet, it is only for regional recording use and the WMQARC does not need to know details of individual cases. However, we would ask for an indication that those cases were being checked. **All data sent to WMQARC should be password protected and sent via nhs.net email accounts.**

Named breast screening unit data, for selected data items, will be available in an e-atlas format on the WMCIU website.

Each surgeon should be identified by their GMC code in order to audit screening caseload accurately. The unique identifying number known as the "Sx" number is required for data validation and matching purposes.

The deadline for submission of regional data by the regional QA co-ordinator to the WMQARC is 8 January 2013

****

UNIT:

REGION:

****

SURGICAL CONFIRMATION

I confirm that these data are an accurate record for the above unit

Signed (Lead Surgeon):

Print name:

Date:

DEFINITIONS AND GUIDANCE NOTES

Bilateral and multiple cancers*:* The KC62 report only counts one cancer per woman. Cancers included in the NHSBSP & ABS breast audit should be counted in the same way so that the total number of cancers in the breast screening audit equals the total number of cancers counted on the KC62 report for 2011/12. If bilateral or multiple cancers have been detected, the KC62 software selects the worst prognosis cancer. The same rules should be applied for the audit. All data for bilateral cases should be taken from the cancer included in the KC62.

Diagnosis on radiological and/or clinical grounds only: Cancers diagnosed with neither C5 nor B5 nor malignant diagnostic open biopsy should not be included in the audit. Enter the total number of such cancers in the preliminary data table.

Non-operative diagnosis for cancers: NHSBSP policy defines non-operative diagnosis as diagnosis by B5 core biopsy result with or without C5. These cancers appear in KC62 C18 L24.

Malignant diagnostic open biopsies: Cancers diagnosed by neither B5 nor C5 will have had a diagnostic open biopsy with an outcome of cancer. These cancers appear in KC62 C24 L24, which includes some cancers with operations which were both diagnostic and therapeutic. If the diagnostic open biopsy was treatment, and was the only operation, then the total number of therapeutic operations is zero.

Cytology and core biopsy: Codes used on the NHSBSP pathology reporting forms. If core biopsy was carried out at the visit please indicate the highest (worst) core biopsy result in the "worst core biopsy" column. If no core biopsy was carried out enter NONE. If a B5 result was obtained but the malignancy type (B5a or B5b) is micro-invasive, unknown or not assessable enter B5c in the "worst core biopsy" column. If cytology was carried out at the visit please indicate the highest (worst) cytology result in the "worst cytology" for the visit. If no cytology was carried out at that visit enter NONE. <u>The number of visits to an assessment clinic (excluding results clinics) should be recorded.</u>

Axillary Ultrasound: To determine if ultrasound was used to assess the axilla. Data should be inputted in the spreadsheet as N=Normal, A=Abnormal, NP=Not performed and U=Unknown.

Pre-operative lymph node biopsy: To determine if a biopsy was performed on suspicious nodes at assessment. The worst lymph node biopsy result at assessment should be recorded as C1,C2,C3,C4,C5,B1,B2,B3,B4.B5A,B5B,B5U, NP=not performed, U=unknown. For cases with a C5 and B5 result, the core biopsy result should be recorded because it is the most accurate result.

Neo-adjuvant treatment: Neo-adjuvant chemotherapy, neo-adjuvant Herceptin and neo-adjuvant hormone therapy should be recorded as yes, no or unknown. If neo-adjuvant treatment is regularly recorded on NBSS then assume all cases with no neo-adjuvant information are recorded as no.

Hormone receptor status: ER and PgR status should be recorded as P=positive, N=negative and U=unknown. HER2 status should be recorded as P=positive, N=negative, B=Borderline and U=Unknown. These data should come from surgical specimen information. If the patient has no surgery or the results are not recorded under surgery, then the core biopsy or wide bore needle (WBN) results may be used. For patients with bilateral cancers then the result from the worst prognosis cancer is used.

Invasive status:
<u>Invasive status of the surgical specimen</u>*:* the worst invasive status diagnosed at surgery.
<u>Final invasive status</u>*:* this takes into account the non-operative diagnosis, invasive status of surgical specimen and the final decision of the MDT (in some cases).

For example:
A case with B5b (Invasive) non-operative diagnosis but with a non-invasive surgical specimen diagnosis will have 'N' in the invasive status of the surgical specimen column and 'I' in the final invasive status column.

A case with the invasive component taken out at mammotome and with a benign surgical specimen diagnosis will have 'B' in the invasive status of the surgical specimen column and 'I' (if MDT agree) in the final invasive status column.

Note that a cancer with no surgery has the final invasive status taken from the core biopsy (B5a non-invasive, B5b invasive) and the invasive status of the surgical specimen would be 'U'.

Invasive status coding rules:

<u>B5b diagnosis but non-invasive at surgery</u>
Final invasive status: invasive
Invasive size: unknown
Whole size: non-invasive size at surgery
Invasive grade: core biopsy invasive grade

<u>B5b diagnosis but micro-invasive at surgery</u>
Final invasive status: invasive
Invasive size: unknown
Whole size: non-invasive and micro-invasive size at surgery
Inv grade: core biopsy invasive grade

<u>B5 (a or b or c) diagnosis but benign surgery</u>
If the case is proven to be a cancer case (i.e. not false positive)
Final invasive status: according to the core biopsy result
All sizes: unknown
Grade: core biopsy grade

<u>No surgery or unknown surgery</u>
All sizes: unknown
Grade: unknown
(because we do not need the information for this audit)

Lobular in situ neoplasia (LISN): All women with non-invasive cancer, including those with LISN, should be included in Part C of the audit. It is accepted that for LISN the grade and size are not assessable.

Micro-invasive cancer: Non-invasive cancer with possible micro-invasion should be included in Part A and Part C of the audit. Cancers which are definitely micro-invasive should only appear in Part A.

Screening surgical caseload: The caseload spreadsheet is referred to consultant surgeon column, not treating surgeon column. To each cancer in Part A assign the GMC code of the <u>consultant surgeon</u>. Women with no GMC code assigned (e.g. because the woman refused treatment) should be recorded as having no surgical referral in the surgical caseload audit.

Reasons for low caseload: An explanation is required for consultant surgeons who have screening caseload <10 in 2011/12. Explanations given at unit level may become redundant when caseloads are collated at regional and then at national level.

First surgery date: The first surgery date given should be the first overall, whether this surgery was diagnostic or therapeutic.

Reconstruction surgery: Surgery which is only for the purpose of reconstruction should be excluded when calculating the date of final surgery. For women undergoing mastectomy, the surgeon should indicate whether there was immediate reconstruction.

Surgery for benign conditions: Surgery for benign conditions should be excluded when calculating the total number of therapeutic operations.

Type of operation/treatment: An operation is a visit to theatre, at which one or more procedures are intended to be carried out. For this audit, code each diagnostic or therapeutic operation to the primary tumour (up to a maximum of 5) according to whether conservation surgery or mastectomy was carried out, with or without an axillary procedure. Exclude reconstruction alone. Conservation surgery can be wide local excision, repeat excision, localisation biopsy etc. If a case had only 2 operations, code the 3rd, 4th and 5th operation as no surgery (NS).

Diagnostic and therapeutic operations: The number of operations will be calculated by the WMQARC. A woman with screen-detected breast cancer who did not have a non-operative diagnosis (C5 or B5) must have had a diagnostic open biopsy to be included in this audit. All other operations (including axillary procedures), are considered to be therapeutic for this audit. If the diagnostic open biopsy was treatment, and was the only operation, then the total number of therapeutic operations is zero.

Nodal status: Nodal status refers to **axillary lymph nodes only.** The number of nodes obtained at each operation (visit to theatre) and the number of nodes which are found to be positive is requested. The number of nodes obtained will be 0 in many cases. In instances where an axillary procedure has been undertaken but no nodes obtained, the number of nodes obtained should be recorded as zero. It is recommended that these cases are reviewed by the QARC and the classification confirmed with the responsible surgeon. Incidental nodes may be obtained at operations where no axillary procedure is recorded. These should be recorded in the nodal columns but all such anomalies should be checked before submission. If a case had only 2 operations, code the nodal columns for the 3rd, 4th and 5th operation as no surgery (NS). If a positive node is found at surgery, the node needs to be recorded as micrometastasis, macrometastasis or metastasis.

Axilla assessment type:
You are required to input a series of lymph node procedures for each case. This information is included in the BASOX download.

Axilla assessment type *(SD,SI,SX,AY,AC,AX,NL,U):*
SD=Sentinel biopsy with blue dye
SI=Sentinel biopsy with radioisotope
SX=Sentinel biopsy with blue dye and isotope
AY=4 node sampling with blue dye
AC=Axillary clearance
AX=Axillary sampling
NL=No axillary treatment
U=No info about axillary assessment

Margins: The excision distance field is the closest margin in mm. If the margin is reached and no distance is given on the pathology report, input 0 in the margin distance field.

For cases where the margin is not clear in the final operation the cases should be checked by examining the pathology report. For breast conserving cases, the closest radial margin should be recorded in the audit spreadsheet. For mastectomy cases, the deep margin should be recorded in the audit spreadsheet. If the closest margin is involved, an explanation for why a further operation to clear margins was not undertaken should be provided in the comments column. This process may result in the identification of additional operations that have been undertaken to clear involved margins. In which case, the additional operation should be added to the table in Part A. If the first

operation is an axillary only operation, the margin fields should be recorded as 'A'. The previous margin and margin distance should be recorded for any further axillary only operations. For surgery with a benign outcome, the margin should be recorded as 'B'.

Example 1: The 2nd op is a breast conserving surgery and margin is clear with 5mm distance. The 3rd operation which is an axillary only operation would have 'C' in the Excision margin field and 5 in the Margin distance field.

Example 2: the first op is a mastectomy, closest deep margin is reached. The first operation margin should be 'C' and distance is 0. Surgeon did a cavity shave at the second operation and no cancer was found in this specimen. The second operation margin is 'B' and distance is 'B'.

DATA CHECKS

The Regional QA Co-ordinator should work with screening office managers on data quality issues. A number of data checks have been incorporated into the spreadsheet. Please consult the user guide for the data check programme. References to the KC62 Table T column and line numbers are given for information.

Case Check The total number of cancers should equal KC62 C25 L36 and be equal to the number of invasive cancers (KC62 C35 L36) plus the number of micro-invasive cancers (KC62 C28 L36) plus the number of non-invasive cancers (KC62 C27 L36) plus the number of cancers with invasive status unknown (KC62 C26 L36).

Caseload Check In the screening surgical caseload audit, the total number of cancers should equal the total caseload plus the total number of women with no surgical referral minus the total number of women treated by two surgeons. This formula is different if any woman is treated by more than 2 surgeons.

The Regional QA Co-ordinator must ensure that all records are cleared of errors, except special cases with explanations.

Queries

Any queries about the NHSBSP and ABS screening audit should be directed to:

Ms Shan Cheung
Breast Screening QA Senior Information Analyst
West Midlands QA Reference Centre
West Midlands Cancer Intelligence Unit
Public Health Building
The University of Birmingham
Birmingham
B15 2TT

Tel: 0121 415 8189
Fax: 0121 414 7714

shan.cheung@WMQARC.nhs.uk

NHSBSP & ABS BREAST SCREENING AUDIT 2011/12

PRELIMINARY DATA SHEET

Unit Name	Number of women screened (all ages) (KC62 C3 L12)	Number of women with radiological/clinical diagnosis only (all ages) (KC62 C13 L24)	Benign diagnostic open biopsies rate at prevalent screen (all ages) (KC62 Table A & B)	Benign diagnostic open biopsies rate at incident screen (all ages) (KC62 Table C1 & C2)	Number of cytology false positive cases (CQA report)	Number of core biopsy false positive cases (BQA report)

PART A1: TO BE COMPLETED FOR ALL CANCERS (KC62 C25 L36)

Col. H – Consultant surgeon GMC Code (enter GMC code of the consultant surgeon or NoRef=No consultant surgeon. Cases with no surgery (NS) still usually are assigned to a consultant surgeon.
Col I – Surgeon GMC code - If the woman was treated by more than one surgeon enter surgeons' GMC code separated by ';'.

Dates - Enter dates in dd/mm/yyyy format. EC=Early Recall. U=Unknown

{C}	*{H}*	*{I}*	*{J}*	*{K}*	*{L}*	*{M}*	*{N}*	*{O}*	**1st Assessment Visit**		**2nd Assessment Visit**	
Sx Number	**Consultant surgeon GMC Code (1 surgeon)** *(Code, NoRef)*	**Treating surgeon GMC Code** *(Code, NoRef)*	**Date of birth** *(dd/mm /yyyy)*	**Date of first offered appt** *(dd/mm/yyyy)*	**Screen date** *(dd/mm/yyyy, EC,U)*	**Date of last read** *(dd/mm/yyyy, EC,U)*	**First assessment date** *(dd/mm/yyyy,U)*	**Side (left or right)** *(L,R)*	*{P}* **Worst cytology** *(C5,C4,C3, C2,C1 or NONE)*	*{Q}* **Worst core biopsy** *(B5A,B5B, B5C,B4,B3, B2,B1 or NONE)*	*{R}* **Worst cytology** *(C5,C4,C3,C2, C1 or NONE)*	*{S}* **Worst core biopsy** *(B5A,B5B, B5C,B4,B3, B2,B1 or NONE)*

Col. X - Number of visit refers to FNA Date and Core Date in the crystal report. If biopsy/cyt performed on the same date, count as 1 visit.
Col. Z – Worst lymph node biopsy result takes into account the cytology and core biopsy results. If a patient has a C5 and B5, record the core biopsy result.

{C} **Sx Number**	**3rd Assessment Visit**		**4th Assessment Visit**		*{X}* **Total number of assessment visits** *(exclude results clinic)* *(U,0,1,2,.)*	*{Y}* **Axillary Ultrasound** *(N,A,NP,U)*	*{Z}* **Worst lymph node biopsy result at assessment** *(C1,C2,C3,C4,C5,B1, B2,B3,B4,B5a,B5b,B5c, NP,U) (see above)*	*{AA}* **Neo-adjuvant chemo therapy** *(Y,N,U)*	*{AB}* **Neo-adjuvant herceptin** *(Y,N,U)*	*{AC}* **Neo-adjuvant hormone therapy** *(Y,N,U)*
	{T} **Worst cytology** *(C5,C4,C3,C2, C1 or NONE)*	*{U}* **Worst core biopsy** *(B5A,B5B, B5C,B4,B3,B 2,B1 or NONE)*	*{V}* **Worst cytology** *(C5,C4,C3,C2 ,C1 or NONE)*	*{W}* **Worst core biopsy** *(B5A,B5B, B5C,B4,B3,B2, B1 or NONE)*						

Col. AD - Type of treatment refers to the final concluded treatment type of all treatment involved (C=Conservation surgery, M=Mastectomy, NS=No surgery, U=Unknown)
Col. AE - Immediate Reconstruction - to be completed by the surgeon for mastectomies only. Enter X if type of treatment not M.
Col. AF - Invasive status of the surgical specimen refers to the worst invasive status at surgery/surgeries. I = invasive, M = micro-invasive, N = non-invasive, B = benign histology, U = unknown/no information/no surgery.
Col. AG - Invasive status of the cancer; taking into account the non-operative diagnosis, surgery and MDT decisions.

{C} **Sx Number**	*{AD}* **Type of surgical Treatment** *(C,M,NS,U)*	*{AE}* **Immediate reconstruction** *(only for M =Mastectomy) (Y,N,U,X)*	*{AF}* **Invasive status of the surgical specimen** *(I,M,N,B,U)*	*{AG}* **Final Invasive status** *(I,M,N,U)*	*{AH}* **LCIS only** *(Y/N)*	*{AI}* **ER status** *(P,N,U)*	*{AJ}* **PgR status** *(P,N,U)*	*{AK}* **HER2 status** *(P,N,U)*

PART A2: TO BE COMPLETED FOR ALL CANCERS (KC62 C25 L36)

For each operation (visit to theatre) – intended surgery, ignoring reconstruction, enter the most appropriate from the following list (C=Conservation surgery, M=Mastectomy, AX=Axillary procedure, C+AX, M+AX, NS=No surgery, U=Unknown)
Conservation surgery can be wide local excision (WLE), repeat excision, localisation biopsy etc
(e.g. a diagnostic open biopsy on one day followed at a later date by a mastectomy where axillary surgery was done. It should be coded 1st=C, 2nd=M+AX, 3rd=NS, 4th=NS, 5th=NS)

{C} **Sx Number**	*{AL}* **First surgery date** *(diag or therapeutic)* *(dd/mm/yyyy,NS,U)*	*{AM}* **Final surgery date** *(excl reconstruction only)* *(dd/mm/yyyy,NS,U)*	*{AN}* **First operation type** *(diag or therapeutic)* *(C,M,AX, C+AX,M+AX, NS,U)*	*{AO}* **Second operation type** *(C,M,AX, C+AX,M+AX, NS,U)*	*{AP}* **Third operation type** *(C,M,AX, C+AX,M+AX, NS,U)*	*{AQ}* **Fourth operation type** *(C,M,AX, C+AX,M+AX, NS,U)*	*{AR}* **Fifth operation type** *(C,M,AX, C+AX,M+AX, NS,U)*

PART A3: TO BE COMPLETED FOR ALL CANCERS (KC62 C25 L36)

Coding: NS, U, 0,1,2,…The number of nodes obtained at each operation (visit to theatre) is requested. This will be 0 in many cases, even if an axillary procedure is recorded as part of the operation type. Incidental nodes may be obtained at operations where no axillary procedure is recorded. These should be recorded in the nodal columns but all such anomalies should be checked and flagged before the spreadsheet is submitted. If a case had only 2 operations, code the nodal columns for the 3rd, 4th and 5th operation as no surgery (NS). For cases where one positive node is found at surgery, the node must be recorded micrometastasis, macrometastasis or metastasis.

Axilla assessment type *(SD,SI,SX,SB,AY,O,NL,U):* This field would be a series of lymph node procedure for each operation. *SD=Sentinel biopsy with blue dye, SI=Sentinel biopsy with radioisotope, SX=Sentinel biopsy with blue dye and isotope, SB=Unknown type of sentinel biopsy, AY=4 node sampling with blue dye, AC=axillary clearance, AX = axillary sampling, NL= No axillary treatment, U=No info about axillary assessment*

{C}	**1st operation (diagnostic or therapeutic)**			**2nd operation**			**3rd operation**			**4th operation**			**5th operation**			*{BH}*
Sx Number	*{AS}* **Total nodes obtained** *(NS,U, 0,1,2,..)*	*{AT}* **Number nodes positive** *(NS,U, 0,1,2,..)*	*{AU}* **Single node type (0/1 +ve node only)** *(NS,X,U, MET, MIM, ITC)*	*{AV}* **Total nodes obtained** *(NS,U, 0,1,2,..)*	*{AW}* **Number nodes positive** *(NS,U, 0,1,2,..)*	*{AX}* **Single node type (0/1 +ve node only)** *(NS,X,U, MET, MIM, ITC)*	*{AY}* **Total nodes obtained** *(NS,U, 0,1,2,..)*	*{AZ}* **Number nodes positive** *(NS,U, 0,1,2,..)*	*{BA}* **Single node type (0/1 +ve node only)** *(NS,X,U, MET, MIM, ITC)*	*{BB}* **Total nodes obtained** *(NS,U, 0,1,2,..)*	*{BC}* **Number nodes positive** *(NS,U, 0,1,2,..)*	*{BD}* **Single node type (0/1 +ve node only)** *(NS,X,U, MET, MIM, ITC)*	*{BE}* **Total nodes obtained** *(NS,U, 0,1,2,..)*	*{BF}* **Number nodes positive** *(NS,U, 0,1,2,..)*	*{BG}* **Single node type (0/1 +ve node only)** *(NS,X,U, MET, MIM, ITC)*	**Axilla assess-ment type** *(SD,SI,SX, AY,AC, AX,NL,U)*

PART A4: TO BE COMPLETED FOR ALL CANCERS (KC62 C25 L36)

Excision margins (N=Not to margin, R=Reaches radial margin, A=Axillary op only for first operation, B=benign lesion, U=Uncertain/Not Specified, NS = No surgery)
Excision distance (enter distance to excision margin in millimeters, A=Axillary op only for first operation, B=benign lesion, U=Unknown, NS = No surgery)

	1st operation (diagnostic or therapeutic)		**2nd operation**		**3rd operation**		**4th operation**		**5th operation**	
{C} **Sx Number**	*{BI}* **Excision margins** *(C,R,A,B,U, NS)*	*{BJ}* **Excision distance** *(distance in mm,A,B, U, NS)*	*{BK}* **Excision margins** *(C,R,B,U,NS)*	*{BL}* **Excision distance** *(distance in mm,B,U,NS)*	*{BM}* **Excision margins** *(C,R,B,U,NS)*	*{BN}* **Excision distance** *(distance in mm,B,U,NS)*	*{BO}* **Excision margins** *(C,R,B,U,NS)*	*{BP}* **Excision distance** *(distance in mm,B,U,NS)*	*{BQ}* **Excision margins** *(C,R,B,U,NS)*	*{BR}* **Excision distance** *(distance in mmB,,U,NS)*

PART B: TO BE COMPLETED FOR <u>INVASIVE CANCERS ONLY</u> (KC62 C35 L36)

Col. BU - Invasive size of tumour (enter size in millimetres, U = Unknown)
Col. BV - Whole size of tumour (enter size in millimetres, U = Unknown). Whole tumour size includes any surrounding DCIS
Col. BW - Invasive grade – Bloom & Richardson (I, II, III, NA=Not assessable or U=Unknown. Enter X if not invasive)

{C} **Sx Number**	*{BU}* **Invasive size of tumour**	*{BV}* **Whole size of tumour** *(including surrounding DCIS)*	*{BW}* **Invasive grade** *(I,II,III, NA,U)*

PART C: TO BE COMPLETED FOR <u>NON-INVASIVE CANCERS ONLY</u> (KC62 C27 L36)

Col. BZ – Cytonuclear grade (H = High grade, I = Intermediate grade, L = Low grade, NA = Not assessable, U = Unknown)
Col. CA - Pathological size (enter size in millimetres, NA = Not assessable, U = Unknown)

{C} **Sx Number**	*-Non Invasive-* *{BZ}* **Cytonuclear grade** *(H,I,L,NA,U)*	*{CA* **Pathological size** *(size (mm), NA,U)*

SCREENING SURGICAL CASELOAD AUDIT

Please fill in Part A first.

Screening surgical caseload should be calculated by summing the number of times each Consultant GMC code appears in Part A.
In rare cases where there is no consultant surgeon, the GMC code for the case should be coded as “NoRef” in Part A, and counted on the top line.
If the consultant surgeon is from outside region, please input Y in Surgeon from other region field and provide region name in Other reason field

Consultant GMC Code	Screening caseload (from Part A)	If caseload <10 was this because: (write Y in the first applicable reason)							
		Other breast caseload > 30 per year	Joined NHSBSP 2011/12	Left NHSBSP 2011/12	Surgeon is a plastic surgeon	Surgeon operated in private practice	Surgeon from other region	No information available for surgeon	Other reason (text)
NoRef									

APPENDIX C: ADJUVANT THERAPY AUDIT DATA FORM WITH GUIDANCE NOTES

NHSBSP & ABS ADJUVANT AUDIT FOR WOMEN WITH SCREEN-DETECTED BREAST CANCERS DETECTED BETWEEN 1 APRIL 2010 AND 31 MARCH 2011

PLEASE SUPPLY DATA FOR WOMEN OF ALL AGES WITH SCREEN-DETECTED BREAST CANCER WITH FIRST OFFERED SCREENING APPOINTMENT FROM 1 APRIL 2010 TO 31 MARCH 2011 INCLUSIVE ACCORDING TO THE REGIONAL BOUNDARIES EXTANT FROM 1 APRIL 2012

This document accompanies the MS Excel spreadsheet designed to record NHSBSP & ABS breast audit adjuvant therapy data which has been prepared by the West Midlands QA Reference Centre. The spreadsheet contains data validation checks.

The NHSBSP & ABS Screening Audit Steering Group expects each consultant surgeon to collect adjuvant therapy data for the list of cases supplied by the screening office or regional QA reference centre. The QA Co-ordinator will organise collation of these data. A box is provided for the signature of the surgeon to verify that these data are correct.

Data will be presented by region and breast screening unit. The unique identifying number known as the "Sx" number is required for data validation and matching purposes.

The deadline for submission of regional data by the regional QA Co-ordinator to the West Midlands QA Reference Centre is 8 January 2013

DEFINITIONS AND GUIDANCE NOTES

Audit cut-off date: If a woman has not received radiotherapy or chemotherapy or hormonal therapy before 31 March 2012 then it should be assumed for the purposes of this audit that she has not had this treatment. This cut off date allows at least 1 year follow up for all cases.

Bilateral and multiple cancers*:* The KC62 report only counts one cancer per woman. Cancers included in the NHSBSP & ABS screening audit should be counted in the same way so that the number of cancers in the audit equals the number counted on the KC62 report. If bilateral or multiple cancers have been detected, the KC62 selects the worst prognosis cancer. If a non-invasive and an invasive tumour have been detected, the KC62 report counts the invasive tumour only. The same rules should be applied for the audit.

Diagnosis on radiological and/or clinical grounds only: Cancers diagnosed with neither C5 nor B5 nor malignant diagnostic open biopsy should not be included in the audit.

First surgery date: The first surgery date given should be for the first operation, whether this surgery was diagnostic or therapeutic.

Reconstruction surgery: Surgery which is only for the purpose of reconstruction should be excluded when calculating the date of final surgery.

Surgery for benign conditions: Surgery for benign conditions should be excluded when calculating the dates of first and final surgery.

Nodal status: If the number of positive nodes is more than 0, then the nodal status is positive and if the number of positive nodes is 0, then the nodal status is negative. If no nodes are taken than the nodal status is unknown.

MATCHING TO TUMOUR DATA

The 2010/11 screen-detected cancers in each region need to be downloaded using the adjuvant audit crystal reports. The downloaded data should be matched with the main data submitted to the West Midlands QA Reference Centre last year to check for any extra cases. If there are any extra cases, the main data for these cases should be provided so that the West Midlands QA Reference Centre can conduct a complete analysis on all the adjuvant cases provided.

Your spreadsheet should include all cases for which the date of first offered screening appointment is from 1 April 2010 to 31 March 2011. Cases with no data supplied should have 'NDS' on any column of the cases.

The West Midlands QA Reference Centre should be advised of any changes in the region or unit code assigned to each screening unit's cases.

DATA CHECKS

Checks in the adjuvant spreadsheet have changed to adopt checks on the 5 propositions in the audit report. The following checks are included in the Excel spreadsheet

Check 1 (Final Surgery to RT)	If the number of days is negative; the radiotherapy start date entered is before the final surgery date. All such cases should be checked to ascertain if it is neo-adjuvant radiotherapy or radiotherapy for a previous cancer.
Check 2 (Proposition 1)	Women with invasive breast cancer treated with conservation surgery should normally receive radiotherapy. All cases flagged should be checked for data errors.
Check 3 (Proposition 2)	Chemotherapy should be considered for invasive cancers with positive nodal status. All cases flagged should be checked for data errors.
Checks 4-5 (Proposition 3)	Endocrine therapy is only beneficial to women with ER positive invasive cancers and to women with ER negative, PgR positive invasive cancers. All cases flagged should be checked for data errors.
Check 6 (Proposition 4)	Chemotherapy should be considered as a treatment for ER negative invasive cancers. All cases flagged should be checked for data errors.
Check 7 (Proposition 5)	Chemotherapy should be considered as a treatment for HER-2 positive invasive cancers. All cases flagged should be checked for data errors.
Check 8 (Non-invasive cancers with CT)	Patients with non-invasive cancer should not receive chemotherapy. All cases flagged should be checked for data errors.

Previous cancers

To complete this sheet, QARC will need to liaises with cancer registries in the region to

1. Match 2010/11 screening audit cancer cases to the cancer registry (CR) database. The screen-detected cancer should be matched to the cancer and the patient in CR (for screen-detected recurrences it is acknowledged that some cancer registries may not have recorded this cancer and therefore it is necessary to attempt the match at tumour and patient level).
2. Draw out all the cancers (except non-melanoma skin cancers) which were diagnosed previously in the matched patients.
3. Record the requested data for all relevant cases starting at the most recent and working backwards in time.

Queries

Any queries about the adjuvant audit should be directed to:

Ms Shan Cheung
Breast Screening QA Senior Information Analyst
West Midlands Cancer Intelligence Unit
Public Health Building
The University of Birmingham
Birmingham
B15 2TT

Tel: 0121 415 8189
Fax: 0121 414 7714

shan.cheung@wmciu.nhs.uk
shan.cheung@nhs.net

NHSBSP & ABS ADJUVANT THERAPY AUDIT - TO BE COMPLETED FOR ALL CANCERS WITH DATE OF FIRST OFFERED APPOINTMENT FROM 1 APRIL 2010 TO 31 MARCH 2011 INCLUSIVE

UNIT:

{D} **Sx Number**	*{E}* **Date of First Offered Appointment** (dd/mm/yyyy)	*{F}* **First Assessment Date** (dd/mm/yyyy,U)	*{G}* **First Surgery Date** *(diagnostic or therapeutic)* (dd/mm/yyyy,NS,U)	*{H}* **Final Surgery Date** *(excl reconstruction only)* (dd/mm/yyyy,NS,U)	*{I}* **Date of Birth** (dd/mm/yyyy)	*{J}* **Consultant Surgeon**

ADJUVANT THERAPY AUDIT - TO BE COMPLETED FOR ALL CANCERS WITH DATE OF FIRST OFFERED APPOINTMENT FROM 1 APRIL 2010 TO 31 MARCH 2011 INCLUSIVE

	To aid data collection by the consultant surgeon. Do <u>not</u> send to West Midlands QA Reference Centre			*Data from 2010/11 Main Audit*					
{D} **Sx Number**	*{K}* **Name**	*{L}* **NHS Number**	*{M}* **Hospital Number**	*{N}* **Final invasive status** (I,M,N,U)	*{O}* **Overall surgical treatment** (C,M,NS,U)	*{P}* **Nodal status** *(P,N,U)*	*{Q}* **Invasive size in mm** *(1,2.., U,X)*	*{R}* **Invasive grade** *(I, II, III, NA, U, X)*	*{S}* **Leterality** *(L,R)*

ADJUVANT THERAPY AUDIT - TO BE COMPLETED FOR ALL CANCERS WITH DATE OF FIRST OFFERED APPOINTMENT FROM 1 APRIL 2010 TO 31 MARCH 2011 INCLUSIVE

Enter dates in dd/mm/yyyy format (e.g. 01/04/2010) or U=Unknown, NS=No surgery, NRT=No radiotherapy,
Chemotherapy & Endocrine therapy: Y = therapy given before 31/03/12, N = No therapy given before 31/03/12, U=Unknown
ER Status, PgR Status, Cerb-B2/HER-2 (P = Positive, N = Negative, B=Borderline, U = Unknown) to be completed according to local definitions.
(Cerb-B2/HER-2 positive if immunohistochemistry 3+ or FISH +)

{D} **Sx Number**	*{T}* **RT Start Date** (dd/mm/yyyy, Y-Date unknown NRT,U)	*{U}* **CT (e.g. Herceptin)** (Y,N,U)	*{V}* **ET (eg. Tamoxifen)** *(Y,N,U)*	*{W}* **ER Status** *(P,N,U)*	*{X}* **PgR Status** *(P,N,U)*	*{Y}* **Cerb-B2/ HER-2** *(P,N,B,U)*	*{Z}* **Notes**

I confirm the data above are correct and as complete as possible

Signature (Surgeon):
Print Name:
Date:

ADJUVANT THERAPY AUDIT - TO BE COMPLETED FOR ALL CANCERS WITH DATE OF FIRST OFFERED APPOINTMENT FROM 1 APRIL 2010 TO 31 MARCH 2011 INCLUSIVE

Previous cancers (except non-melanoma skin cancers)

Censor date: 01/01/1950
Date of diagnosis (0) – date of diagnosis of the current cancer (cancer recorded in the adjuvant audit) if matched
Laterality – for breast cancers only
A maximum of 5 previous cancers can be recorded in the spreadsheet

Sx number	To be inputted by cancer registries - please put cancers in reverse chronological order (most recent first)													
	Cancer registry	Match patient (Y/N)	Match tumour (Y/N)	Current cancer		Previous cancer 1			Previous cancer 2			Previous cancer 3		
				ICD10 (0)	Date of diagnosis (0)	ICD10 (1)	Date of diagnosis (1)	Laterality (1)	ICD10 (2)	Date of diagnosis (2)	Laterality (2)	ICD10 (3)	Date of diagnosis (3)	Laterality (3)

APPENDIX D: SURVIVAL AUDIT DATA COLLECTION SHEET WITH GUIDANCE NOTES

NHSBSP & ABS SURVIVAL AUDIT FOR SCREEN-DETECTED BREAST CANCER PATIENTS WHO WERE SCREENED BETWEEN 1 APRIL 2006 AND 31 MARCH 2007

The completed spreadsheets should be submitted by the Breast Screening QA Reference Centre to the West Midlands QA Reference Centre by 26 September 2012.

Aim:

To combine data recorded by regional cancer registries with NHS Breast Screening Programme (NHSBSP) data, recorded from 1 April 2006 to 31 March 2007, for women with breast cancers detected by screening to enable post-diagnosis analysis of breast cancer for five years. Where tumour size, grade and nodal status are available the survival profiles according to prognostic characteristics will be examined. The audit will continue to demonstrate effective information exchange between the NHSBSP and regional cancer registries.

Study population:

All women with breast cancers detected by the NHSBSP and screened between 1 April 2006 and 31 March 2007 should be included in the audit for the five year survival study.

Core patient and tumour data should be extracted from the screening service computer systems.

Both sets of data should then be matched with records held by regional cancer registries. Cancer registries should indicate if the cancers are not recorded in the cancer registry database (see additional guidance attached). Cancer registries should also identify deaths in these women and confirm that death data are complete to 31 March 2012. If the latter is not the case, an alternative date to which survival can be calculated should be provided.

Data collection:

A MS Excel spreadsheet to record survival audit data has been designed by the West Midlands QA Reference Centre and provided to each breast screening quality assurance reference centre. The workbook includes separate sheets to record the five year survival studies. QA reference centres should liaise with cancer registries to complete the audit spreadsheets:

A paper representation of the format used in the spreadsheets is provided and may be used as the basis for a data collection form. Crystal reports designed by Mrs Margot Wheaton may be used to collect data from screening offices that use the NBSS computer system.

Overall responsibility for regional data collection remains with the QA Co-ordinator.

DATA TO BE COLLECTED FROM SCREENING SERVICES AND COLLATED BY BREAST SCREENING QUALITY ASSURANCE REFERENCE CENTRES

For cancers detected by screening between 1 April 2006 and 31 March 2007, the following data should be extracted from breast screening computer systems:

- Forename — for use within region only
- Surname — for use within region only
- Address — for use within region only
- Postcode — for use within region only
- NHS number — New NHS number
- Date of birth — (dd/mm/yyyy) necessary for age calculations
- Sx No. (Screening Office Number) — for checking data and matching queries
- Date of first surgery — (dd/mm/yyyy, NS, U) a proxy for date of diagnosis, to help match cases at the cancer registry and to identify possible recurrences and/or multiple primary breast cancers
- Invasive status — Invasive/Micro-invasive/Non-invasive/Unknown

For invasive cancers only (enter X if the case is not invasive):

- Tumour size — invasive size in mm, 'U' for unknown
- Tumour grade — Bloom & Richardson I, II, III, NA or 'U' for unknown
- Total number of lymph nodes — total number, 0 if no nodes obtained, 'U' if unknown
- Number of positive lymph nodes — total number, 0 if node negative, 'U' if unknown

The name of the region, breast screening unit and cancer registry should be added to each case.

DATA TO BE COLLECTED FROM REGIONAL CANCER REGISTRIES

Regional cancer registries will be asked by the QA reference centers to match breast cancers detected following screening from 1 April 2006 to 31 March 2007 with data held on the cancer registration systems using name, NHS number, address, postcode, date of birth, and date of first surgery (as a proxy for date of diagnosis).

Cancer registries have been asked to supply the earliest date of diagnosis for any invasive breast cancer diagnosed for the screening patient in the date of diagnosis column. If the screening case is non-invasive or micro-invasive and no other invasive cancer has been diagnosed before 2006, then the date of diagnosis of this non-invasive/micro-invasive screening case will be recorded. Please refer to additional guidance on Page 8 for more examples.

All cases thought to be 'alive' should be submitted by cancer registries to Demographics Batch Service (DBS) to obtain any date of death not recorded at the cancer registry.

The following data items are required from the cancer registry for all breast cancers detected following screening from 1 April 2006 to 31 March 2007.

- Registration number — the unique registration number for the breast cancer should be added.
- Not registered — For tumours not registered indicate NR in the appropriate column. Please note that this field refers to tumours, not patients
- Date of diagnosis — dd/mm/yyyy of the specific tumour (U if unknown)
- Date of death — dd/mm/yyyy of the patient (leave blank if alive)

The censor date for the survival audit has been set at **31 March 2012**. The cancer registry should confirm to the QA reference centre that death data are complete to **31 March 2012**, or provide an

alternative date to which survival time can be calculated.

DATA VALIDATION

A number of data checks have been incorporated into the spreadsheet.

Check 1 (Age at Diagnosis)	If the age at diagnosis cannot be calculated, #VALUE! will appear. If the age at diagnosis is negative, the date of diagnosis has been entered as before the date of birth. All such cases should be checked.
Check 2 (Dates)	All the date columns (Date of Birth, Date of first surgery, Date of diagnosis and Date of death, as the order of flags) should be input in a date format, which is dd/mm/yyyy. In some QA reference centres and cancer registries, dates are downloaded from other databases and the dates are in a text format, although it looks like a date format. This check reveals this format difference which the human eye cannot see. If the input is incorrect or is in the wrong format, the check result will show 'Check'.
Check 3 (Nodes)	If the total number of nodes and/or the number of positive nodes is incorrect or not in numerical format, the check will flag up as 'Wrong data type'. This also checks if the total number of nodes is less than the number of positive nodes.
Check 4 (Invasive size)	If the invasive size is incorrect or not in numerical format, the check will flag up as 'Size-Wrong data type'
Check 5 (Invasive Status)	If invasive status is blank or incorrect codes are used, this check will flag up as 'Enter invasive status'

QUERIES

Any queries about the survival audit should be directed to:

Ms Shan Cheung
Breast Screening QA Senior Information Analyst
West Midlands Cancer Intelligence Unit
Public Health Building
The University of Birmingham
Birmingham
B15 2TT

Tel: 0121 415 8189
Fax: 0121 414 7714
shan.cheung@wmciu.nhs.uk

SURVIVAL AUDIT: SCREENING OFFICE DATA FOR PATIENT SCREENED IN 2006/07

Region:
Screening Unit:
Cancer Registry:

Date of first surgery (dd/mm/yyyy, NS = No surgery, U = Unknown)
Invasive status (I = Invasive, M = Micro-invasive, N = Non-invasive, U = Unknown)
Invasive Size (size in mm, U = unknown. Enter X if not invasive)
Invasive grade – Bloom & Richardson (I, II, III, NA = Not assessable or U = Unknown. Enter X if not invasive)
Total number of axillary nodes obtained (total number, zero if no nodes obtained, U = Unknown. Enter X if not invasive)
Number of positive axillary nodes (number positive, zero if node negative, U = Unknown. Enter X if not invasive)

												Invasive Cancers Only			
{C} **Sx No.**	*{D}* **Fore-name**	*{E}* **Sur-name**	*{F}* **Address Line1**	*{G}* **Address Line2**	*{H}* **Address Line3**	*{I}* **Address Line4**	*{J}* **Post Code**	*{K}* **NHS Number**	*{L}* **Date of Birth** dd/mm/yyyy	*{M}* **Date of First Surgery** (dd/mm/yyyy, NS, U)	{N} **Invasive Status** (I,M,N,U)	{O} **Invasive Size** (size (mm), U,X)	{P} **Invasive Grade** (I,II,III, NA,U,X)	{Q} **Total Nodes Obtained** (0, 1, 2, .., U,X)	{R} **Number Positive Nodes** (0, 1, 2, .., U,X)

SURVIVAL AUDIT: CANCER REGISTRY DATA FOR PATIENT SCREENED IN 2006/07

Region:
Screening Unit:
Cancer Registry: **Data complete to: 31/03/2012**

{C} **Sx No. (Screening Office Number)**	[S] **Cancer Registry**	{T} **Cancer Registration Number**	{U} **Not Registered** (NR)	{V} **Date of Diagnosis** (dd/mm/yyyy)	{W} **Date of Death** (dd/mm/yyyy)

ADDITIONAL GUIDANCE

Non-registered cases

A case should be recorded as a non-registered case (NR) if

1. the patient is not registered on the cancer registry database
2. the patient is registered, but the screen-detected breast cancer is not registered.

Date of diagnosis

Cancer registries have been asked to fill in the date of diagnosis column with the earliest date of diagnosis for any invasive breast cancer diagnosed for the screening patient. If the screening case is non-invasive or micro-invasive and no other invasive cancer has been diagnosed before 2006 for the five year survival study, then the date of diagnosis of the screening case will be recorded.

Examples show below are based on screening between 1 January 1990 and 31 December 1991 (20 year survival)

Example 1:
The patient (with an invasive breast cancer diagnosed in the audit period) in the survival spreadsheet is recorded in the cancer registry database. The earliest invasive breast cancer for that patient was diagnosed in 1988, and there was also an invasive breast cancer diagnosed in 1990/91 which matches the characteristics of the cancer on the spreadsheet.
For this case:
Not registered (NR) column: is blank
Date of diagnosis: the invasive cancer diagnosed in 1988.

Example 2:
The patient (with an invasive breast cancer diagnosed in the audit period) in the survival spreadsheet is recorded in the cancer registry database. The earliest breast cancer for that patient was diagnosed in 1986, and this was a non-invasive breast cancer. The patient also had an invasive breast cancer diagnosed in 1990/91 which matches the characteristics of the one on the spreadsheet.
For this case:
Not registered (NR) column: is blank
Date of diagnosis: the invasive cancer diagnosed in 1990/91.

Example 3:
The patient (with a non-invasive breast cancer diagnosed in the audit period) in the survival spreadsheet is recorded in the cancer registry database. In the CR database, she had a non-invasive breast cancer diagnosed in 1990/91 and there have been no other previous breast cancers recorded for this patient.
For this case:
Not registered (NR) column: is blank
Date of diagnosis: the non-invasive breast cancer in 1990/91.

Example 4:
The patient (with a non-invasive breast cancer diagnosed in the audit period) in the survival spreadsheet is recorded in the cancer registry database, but this specific cancer is not found in the cancer registry records. From the records, this patient had an invasive breast cancer in 1983.
For this case:
Not registered (NR) column: Not registered
Date of diagnosis: the invasive cancer diagnosed in 1983.

APPENDIX E: MAIN AUDIT DATA TABLES (1 - 98)

DATA FROM THE 2011/12 AUDIT OF SCREEN-DETECTED BREAST CANCERS IN WOMEN ALL AGES FOR THE PERIOD 1 APRIL 2011 – 31 MARCH 2012

Table 1 : Number and invasive status of screen-detected breast cancers and total women screened

Region	Invasive		Invasive (<15mm)		Micro-invasive		Non-invasive		Status unknown		Total		Total women screened	Micro/ Non-invasive cancer rate	Invasive cancer rate	Invasive <15mm rate
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%				
N East, Yorks & Humber	1978	80	1076	43	20	1	478	19	1	0	2477	100	320250	1.6	6.2	3.4
East Midlands	1181	84	669	47	10	1	223	16	0	0	1414	100	179913	1.3	6.6	3.7
East of England	1310	78	688	41	26	2	338	20	0	0	1674	100	213680	1.7	6.1	3.2
London	1351	78	631	36	13	1	371	21	1	0	1736	100	216233	1.8	6.2	2.9
South East Coast	1250	79	671	43	9	1	316	20	1	0	1576	100	181017	1.8	6.9	3.7
South Central	1029	81	480	38	8	1	237	19	0	0	1274	100	154840	1.6	6.6	3.1
South West	1385	78	731	41	16	1	386	22	0	0	1787	100	217473	1.8	6.4	3.4
West Midlands	1366	78	706	40	9	1	380	22	0	0	1755	100	214472	1.8	6.4	3.3
North West	1650	80	773	38	13	1	386	19	3	0	2052	100	242834	1.6	6.8	3.2
Wales	637	78	345	42	5	1	174	21	0	0	816	100	82855	2.2	7.7	4.2
Northern Ireland	347	80	189	44	4	1	81	19	0	0	432	100	58742	1.4	5.9	3.2
Scotland	1427	81	805	46	5	0	302	17	18	1	1752	100	179633	1.7	7.9	4.5
United Kingdom	**14911**	**80**	**7764**	**41**	**138**	**1**	**3672**	**20**	**24**	**0**	**18745**	**100**	**2261942**	**1.7**	**6.6**	**3.4**
Isle of Man	16	76	7	33	0	0	5	24	0	0	21	100	4647	1.1	3.4	1.5

Table 2 : Age at first offered screening appointment

Region	<50		50-64		65-70		71-75		76+		Total	>70	
	No.	%	No.	%	No.	%	No.	%	No.	%		No.	%
N East, Yorks & Humber	159	6	1499	61	623	25	145	6	51	2	2477	196	8
East Midlands	96	7	813	57	376	27	92	7	37	3	1414	129	9
East of England	79	5	957	57	493	29	84	5	61	4	1674	145	9
London	81	5	1116	64	427	25	77	4	35	2	1736	112	6
South East Coast	94	6	911	58	423	27	116	7	32	2	1576	148	9
South Central	50	4	763	60	344	27	76	6	41	3	1274	117	9
South West	88	5	1086	61	458	26	112	6	43	2	1787	155	9
West Midlands	97	6	1051	60	477	27	99	6	31	2	1755	130	7
North West	99	5	1242	61	556	27	104	5	51	2	2052	155	8
Wales	8	1	521	64	206	25	47	6	34	4	816	81	10
Northern Ireland	13	3	296	69	116	27	5	1	2	0	432	7	2
Scotland	0	0	1079	62	529	30	80	5	64	4	1752	144	8
United Kingdom	**864**	**5**	**11334**	**60**	**5028**	**27**	**1037**	**6**	**482**	**3**	**18745**	**1519**	**8**
Isle of Man	0	0	13	62	7	33	0	0	1	5	21	1	5

Table 3 : Cancers diagnosed on radiological/clinical grounds only

Region	Total cancers including radiological/clinical cancers	Cancers diagnosed on radiological/clinical grounds only	
		No.	%
N East, Yorks & Humber	2477	0	0.00
East Midlands	1414	0	0.00
East of England	1674	1	0.06
London	1736	1	0.06
South East Coast	1576	1	0.06
South Central	1274	0	0.00
South West	1787	1	0.06
West Midlands	1755	0	0.00
North West	2052	0	0.00
Wales	816	0	0.00
Northern Ireland	432	0	0.00
Scotland	1752	0	0.00
United Kingdom	**18745**	**4**	**0.02**

Table 4 : Non-operative diagnosis rate											
	Total	C5 only		C5 & B5		B5 only		Non-operative diagnosis		No non-operative diagnosis	
Region	cancers	No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	2477	7	0	177	7	2214	89	2398	97	79	3
East Midlands	1414	0	0	11	1	1358	96	1369	97	45	3
East of England	1674	1	0	5	0	1576	94	1582	95	92	5
London	1736	0	0	16	1	1649	95	1665	96	71	4
South East Coast	1576	2	0	5	0	1503	95	1510	96	66	4
South Central	1274	2	0	9	1	1200	94	1211	95	63	5
South West	1787	7	0	19	1	1679	94	1705	95	82	5
West Midlands	1755	0	0	2	0	1675	95	1677	96	78	4
North West	2052	3	0	22	1	1956	95	1981	97	71	3
Wales	816	0	0	0	0	784	96	784	96	32	4
Northern Ireland	432	5	1	243	56	170	39	418	97	14	3
Scotland	1752	0	0	165	9	1536	88	1701	97	51	3
United Kingdom	**18745**	**27**	**0**	**674**	**4**	**17300**	**92**	**18001**	**96**	**744**	**4**

Table 5 : Non-operative diagnosis rate (invasive cancers)											
	Total	C5 only		C5 & B5		B5 only		Non-operative diagnosis		No non-operative diagnosis	
Region	cancers	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1978	6	0	169	9	1778	90	1953	99	25	1
East Midlands	1181	0	0	11	1	1154	98	1165	99	16	1
East of England	1310	1	0	5	0	1286	98	1292	99	18	1
London	1351	0	0	16	1	1316	97	1332	99	19	1
South East Coast	1250	2	0	4	0	1230	98	1236	99	14	1
South Central	1029	2	0	8	1	995	97	1005	98	24	2
South West	1385	6	0	19	1	1341	97	1366	99	19	1
West Midlands	1366	0	0	1	0	1346	99	1347	99	19	1
North West	1650	3	0	21	1	1600	97	1624	98	26	2
Wales	637	0	0	0	0	626	98	626	98	11	2
Northern Ireland	347	5	1	227	65	109	31	341	98	6	2
Scotland	1427	0	0	163	11	1251	88	1414	99	13	1
United Kingdom	**14911**	**25**	**0**	**644**	**4**	**14032**	**94**	**14701**	**99**	**210**	**1**

Table 6 : Non-operative diagnosis rate (non-invasive cancers)											
	Total	C5 only		C5 & B5		B5 only		Non-operative diagnosis		No non-operative diagnosis	
Region	cancers	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	478	0	0	8	2	417	87	425	89	53	11
East Midlands	223	0	0	0	0	195	87	195	87	28	13
East of England	338	0	0	0	0	265	78	265	78	73	22
London	371	0	0	0	0	319	86	319	86	52	14
South East Coast	316	0	0	1	0	264	84	265	84	51	16
South Central	237	0	0	1	0	197	83	198	84	39	16
South West	386	1	0	0	0	323	84	324	84	62	16
West Midlands	380	0	0	1	0	321	84	322	85	58	15
North West	386	0	0	0	0	341	88	341	88	45	12
Wales	174	0	0	0	0	153	88	153	88	21	12
Northern Ireland	81	0	0	13	16	60	74	73	90	8	10
Scotland	302	0	0	2	1	263	87	265	88	37	12
United Kingdom	**3672**	**1**	**0**	**26**	**1**	**3118**	**85**	**3145**	**86**	**527**	**14**

Table 7 : Invasive status of the diagnostic core biopsy								
	Total Cancers with B5	B5a (Non-invasive)		B5b (Invasive)		B5c (Micro-invasive, Not Assessable or Unknown)	
Region		No.	%	No.	%	No.	%
N East, Yorks & Humber	2391	510	21	1848	77	33	1
East Midlands	1369	244	18	1116	82	9	1
East of England	1581	353	22	1220	77	8	1
London	1665	408	25	1252	75	5	0
South East Coast	1508	337	22	1160	77	11	1
South Central	1209	250	21	948	78	11	1
South West	1698	397	23	1294	76	7	0
West Midlands	1677	386	23	1269	76	22	1
North West	1978	438	22	1529	77	11	1
Wales	784	185	24	598	76	1	0
Northern Ireland	413	94	23	319	77	0	0
Scotland	1701	333	20	1366	80	2	0
United Kingdom	**17974**	**3935**	**22**	**13919**	**77**	**120**	**1**

Table 8 : B5a (Non-invasive) core biopsy: histological status after surgery												
	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	88	18	16	3	377	75	21	4	0	0	502	100
East Midlands	41	17	8	3	187	77	6	2	0	0	242	100
East of England	68	20	24	7	251	73	3	1	0	0	346	100
London	78	20	13	3	284	72	21	5	0	0	396	100
South East Coast	67	20	8	2	245	74	9	3	0	0	329	100
South Central	49	20	8	3	188	76	2	1	1	0	248	100
South West	64	17	13	3	290	75	20	5	0	0	387	100
West Midlands	72	19	7	2	296	77	8	2	0	0	383	100
North West	88	20	13	3	316	73	13	3	0	0	430	100
Wales	27	15	5	3	147	81	2	1	0	0	181	100
Northern Ireland	17	18	4	4	67	71	6	6	0	0	94	100
Scotland	59	18	5	2	266	81	0	0	0	0	330	100
United Kingdom	**718**	**19**	**124**	**3**	**2914**	**75**	**111**	**3**	**1**	**0**	**3868**	**100**

Benign cases have non-invasive disease reported in the non-operative core biopsy but no malignant disease found in the surgical specimen

Table 9 : B5b (Invasive) core biopsy: histological status after surgery												
	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1802	99	1	0	5	0	13	1	1	0	1822	100
East Midlands	1079	99	2	0	2	0	7	1	0	0	1090	100
East of England	1178	98	3	0	7	1	8	1	1	0	1197	100
London	1180	97	1	0	12	1	15	1	4	0	1212	100
South East Coast	1127	99	1	0	5	0	6	1	1	0	1140	100
South Central	924	99	0	0	4	0	2	0	2	0	932	100
South West	1246	98	4	0	11	1	9	1	0	0	1270	100
West Midlands	1237	98	2	0	9	1	8	1	0	0	1256	100
North West	1478	99	0	0	15	1	7	0	0	0	1500	100
Wales	572	98	0	0	6	1	6	1	0	0	584	100
Northern Ireland	313	100	0	0	0	0	0	0	0	0	313	100
Scotland	1327	99	1	0	6	0	2	0	5	0	1341	100
United Kingdom	**13463**	**99**	**15**	**0**	**82**	**1**	**83**	**1**	**14**	**0**	**13657**	**100**

Benign cases have invasive disease reported in the non-operative core biopsy but no malignant disease found in the surgical specimen

Table 10 : C5 cytology only: histological status after surgery												
	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	6	100	0	0	0	0	0	0	0	0	6	100
East Midlands	-	-	-	-	-	-	-	-	-	-	-	-
East of England	1	100	0	0	0	0	0	0	0	0	1	100
London	-	-	-	-	-	-	-	-	-	-	-	-
South East Coast	2	100	0	0	0	0	0	0	0	0	2	100
South Central	2	100	0	0	0	0	0	0	0	0	2	100
South West	5	83	0	0	1	17	0	0	0	0	6	100
West Midlands	-	-	-	-	-	-	-	-	-	-	-	-
North West	3	100	0	0	0	0	0	0	0	0	3	100
Wales	-	-	-	-	-	-	-	-	-	-	-	-
Northern Ireland	5	100	0	0	0	0	0	0	0	0	5	100
Scotland	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**24**	**96**	**0**	**0**	**1**	**4**	**0**	**0**	**0**	**0**	**25**	**100**

Benign cases have non-invasive disease reported in the non-operative core biopsy but no malignant disease found in the surgical specimen

Table 11 : Number of assessment visits for each patient														
	0		1		2		3+		Unknown		Total		Repeat (2+) visit	
Region	No	%	No	%	No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	0	0	2147	87	307	12	23	1	0	0	2477	100	330	13
East Midlands	0	0	1228	87	169	12	17	1	0	0	1414	100	186	13
East of England	0	0	1534	92	135	8	5	0	0	0	1674	100	140	8
London	0	0	1470	85	234	13	32	2	0	0	1736	100	266	15
South East Coast	0	0	1236	78	316	20	24	2	0	0	1576	100	340	22
South Central	0	0	1091	86	170	13	13	1	0	0	1274	100	183	14
South West	0	0	1395	78	349	20	43	2	0	0	1787	100	392	22
West Midlands	0	0	1490	85	245	14	20	1	0	0	1755	100	265	15
North West	0	0	1755	86	266	13	31	2	0	0	2052	100	297	14
Wales	0	0	754	92	58	7	4	0	0	0	816	100	62	8
Northern Ireland	0	0	404	94	27	6	1	0	0	0	432	100	28	6
Scotland	3	0	1654	94	91	5	3	0	1	0	1752	100	94	5
United Kingdom	**3**	**0**	**16158**	**86**	**2367**	**13**	**216**	**1**	**1**	**0**	**18745**	**100**	**2583**	**14**

Table 12 : The assessment visit with the earliest core/cytology result										
	1		2		3+		Total		First core/cyt at 2+ visit	
Region	No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	2411	98	58	2	0	0	2469	100	58	2
East Midlands	1357	96	56	4	0	0	1413	100	56	4
East of England	1626	97	47	3	0	0	1673	100	47	3
London	1672	97	58	3	2	0	1732	100	60	3
South East Coast	1367	87	204	13	2	0	1573	100	206	13
South Central	1218	96	52	4	0	0	1270	100	52	4
South West	1546	87	235	13	3	0	1784	100	238	13
West Midlands	1687	96	66	4	0	0	1753	100	66	4
North West	1971	96	77	4	1	0	2049	100	78	4
Wales	801	98	15	2	0	0	816	100	15	2
Northern Ireland	424	98	8	2	0	0	432	100	8	2
Scotland	-	-	-	-	-	-	-	-	-	-
United Kingdom	**16080**	**95**	**876**	**5**	**8**	**0**	**16964**	**100**	**884**	**5**

*Excluded cases from Scotland

Table 13 : Number of visits with a core biopsy/cytology outcome for cases with a non-operative diagnosis at the end															
	Invasive					Non-Invasive					Overall				
	1		2+			1		2+			1		2+		
Region	No	%	No	%	Total	No	%	No	%	Total	No	%	No	%	Total
N East, Yorks & Humber	1873	96	80	4	1953	374	88	51	12	425	2265	94	133	6	2398
East Midlands	1103	95	62	5	1165	160	82	35	18	195	1271	93	98	7	1369
East of England	1251	97	41	3	1292	245	92	20	8	265	1520	96	62	4	1582
London	1264	95	68	5	1332	258	81	61	19	319	1535	92	130	8	1665
South East Coast	1194	97	42	3	1236	236	89	29	11	265	1438	95	72	5	1510
South Central	946	94	59	6	1005	180	91	18	9	198	1134	94	77	6	1211
South West	1298	95	68	5	1366	278	86	46	14	324	1587	93	118	7	1705
West Midlands	1281	95	66	5	1347	277	86	45	14	322	1566	93	111	7	1677
North West	1522	94	102	6	1624	301	88	40	12	341	1838	93	143	7	1981
Wales	600	96	26	4	626	146	95	7	5	153	749	96	35	4	784
Northern Ireland	332	97	9	3	341	68	93	5	7	73	403	96	15	4	418
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**12664**	**95**	**623**	**5**	**13287**	**2523**	**88**	**357**	**12**	**2880**	**15306**	**94**	**994**	**6**	**16300**

*Excluded cases from Scotland

Table 14 : Worst core/cytology biopsy results of the first non-operative biopsy visit for non-invasive cancers with a non-operative diagnosis at the end												
	C5, B5 or both		C4, B4 or both		C3, B3 or both		C2, B2 or both		C1, B1 or both		Total	
Region	No	%	No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	387	91	17	4	9	2	4	1	8	2	425	97
East Midlands	166	85	12	6	5	3	5	3	7	4	195	94
East of England	248	94	4	2	5	2	4	2	4	2	265	97
London	284	89	6	2	17	5	7	2	5	2	319	96
South East Coast	243	92	2	1	14	5	1	0	5	2	265	98
South Central	186	94	3	2	4	2	2	1	3	2	198	97
South West	293	90	13	4	9	3	4	1	5	2	324	97
West Midlands	297	92	9	3	5	2	5	2	6	2	322	97
North West	313	92	10	3	11	3	3	1	4	1	341	98
Wales	146	95	2	1	2	1	0	0	3	2	153	98
Northern Ireland	70	96	0	0	2	3	0	0	1	1	73	99
Scotland	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**2633**	**91**	**78**	**3**	**83**	**3**	**35**	**1**	**51**	**2**	**2880**	**97**

*Excluded cases from Scotland

Table 15 : Any further visits after core/cytology biopsy result															
	Invasive					Non-Invasive					Overall				
	Further visit		No further visit			Further visit		No further visit			Further visit		No further visit		
Region	No	%	No	%	Total	No	%	No	%	Total	No	%	No	%	Total
N East, Yorks & Humber	94	5	1877	95	1971	21	4	456	96	477	117	5	2352	95	2469
East Midlands	21	2	1159	98	1180	8	4	215	96	223	29	2	1384	98	1413
East of England	16	1	1293	99	1309	5	1	333	99	338	22	1	1651	99	1673
London	62	5	1287	95	1349	11	3	358	97	369	73	4	1659	96	1732
South East Coast	58	5	1190	95	1248	12	4	303	96	315	70	4	1503	96	1573
South Central	40	4	985	96	1025	4	2	233	98	237	44	3	1226	97	1270
South West	43	3	1340	97	1383	13	3	372	97	385	56	3	1728	97	1784
West Midlands	63	5	1301	95	1364	16	4	364	96	380	79	5	1674	95	1753
North West	58	4	1590	96	1648	9	2	376	98	385	67	3	1982	97	2049
Wales	7	1	630	99	637	0	0	174	100	174	7	1	809	99	816
Northern Ireland	7	2	340	98	347	0	0	81	100	81	7	2	425	98	432
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**469**	**3**	**12992**	**97**	**13461**	**99**	**3**	**3265**	**97**	**3364**	**571**	**3**	**16393**	**97**	**16964**

*Excluded cases from Scotland

Table 16 : Status of diagnostic open biopsies			
	Benign biopsy rate		Malignant biopsy rate
Region	Prevalent	Incident	
N East, Yorks & Humber	1.09	0.34	0.25
East Midlands	1.34	0.40	0.25
East of England	2.24	0.61	0.43
London	1.46	0.44	0.33
South East Coast	2.02	0.62	0.36
South Central	2.40	0.53	0.41
South West	1.94	0.52	0.38
West Midlands	2.09	0.45	0.36
North West	1.63	0.53	0.29
Wales	2.60	0.66	0.39
Northern Ireland	1.24	0.59	0.24
Scotland	1.80	0.69	0.28
United Kingdom	**1.74**	**0.51**	**0.33**

Table 17 : Number of clients with proven false positive C5 or B5 non-operative diagnosis				
	False positive C5 (CQA Report)		False positive B5 (BQA Report)	
Region	No.	Per 100,000 screened	No.	Per 100,000 screened
N East, Yorks & Humber	0	0.00	1	0.31
East Midlands	0	0.00	0	0.00
East of England	0	0.00	1	0.47
London	0	0.00	0	0.00
South East Coast	0	0.00	0	2.21
South Central	0	0.00	0	0.00
South West	0	0.00	0	0.00
West Midlands	0	0.00	0	0.00
North West	0	0.00	0	0.00
Wales	0	0.00	0	0.00
Northern Ireland	0	0.00	0	0.00
Scotland	0	0.00	0	0.00
United Kingdom	**0**	**0.00**	**2**	**0.27**

Table 18 : Invasive status of malignant diagnostic open biopsies									
	Total malignant open biopsies	Invasive		Micro-invasive		Non-invasive		Status unknown	
Region		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	79	25	32	1	1	53	67	0	0
East Midlands	45	16	36	1	2	28	62	0	0
East of England	92	18	20	1	1	73	79	0	0
London	71	19	27	0	0	52	73	0	0
South East Coast	66	14	21	0	0	51	77	1	2
South Central	63	24	38	0	0	39	62	0	0
South West	82	19	23	1	1	62	76	0	0
West Midlands	78	19	24	1	1	58	74	0	0
North West	71	26	37	0	0	45	63	0	0
Wales	32	11	34	0	0	21	66	0	0
Northern Ireland	14	6	43	0	0	8	57	0	0
Scotland	51	13	25	0	0	37	73	1	2
United Kingdom	**744**	**210**	**28**	**5**	**1**	**527**	**71**	**2**	**0**

Table 19 : Non-operative history for invasive cancers with malignant open biopsy									
Region	Total malignant open biopsies	No non-operative procedures		Cytology only		Core biopsy only		Both cytology and core biopsy	
		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	25	7	28	0	0	17	68	1	4
East Midlands	16	1	6	0	0	15	94	0	0
East of England	18	1	6	0	0	17	94	0	0
London	19	2	11	0	0	16	84	1	5
South East Coast	14	2	14	1	7	11	79	0	0
South Central	24	4	17	2	8	17	71	1	4
South West	19	2	11	1	5	15	79	1	5
West Midlands	19	2	11	0	0	17	89	0	0
North West	26	2	8	0	0	22	85	2	8
Wales	11	0	0	1	9	10	91	0	0
Northern Ireland	6	0	0	1	17	2	33	3	50
Scotland	13	1	8	0	0	11	85	1	8
United Kingdom	**210**	**24**	**11**	**6**	**3**	**170**	**81**	**10**	**5**

Table 20 : Non-operative history for micro/non-invasive cancers with malignant open biopsy									
Region	Total malignant open biopsies	No non-operative procedures		Cytology only		Core biopsy only		Both cytology and core biopsy	
		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	54	1	2	0	0	46	85	7	13
East Midlands	29	0	0	0	0	29	100	0	0
East of England	74	0	0	0	0	74	100	0	0
London	52	2	4	0	0	50	96	0	0
South East Coast	51	1	2	0	0	50	98	0	0
South Central	39	0	0	0	0	39	100	0	0
South West	63	1	2	1	2	60	95	1	2
West Midlands	59	0	0	0	0	58	98	1	2
North West	45	1	2	0	0	43	96	1	2
Wales	21	0	0	0	0	21	100	0	0
Northern Ireland	8	0	0	0	0	7	88	1	13
Scotland	37	1	3	0	0	32	86	4	11
United Kingdom	**532**	**7**	**1**	**1**	**0**	**509**	**96**	**15**	**3**

Table 21 : Highest cytology and core biopsy result prior to malignant diagnostic open biopsies (invasive cancers)											
Region	Total malignant open biopsies	No non-operative procedures		C4, B4 or both		C3, B3 or both		C2, B2 or both		C1, B1 or both	
		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	25	7	28	9	36	6	24	2	8	1	4
East Midlands	16	1	6	3	19	11	69	0	0	1	6
East of England	18	1	6	6	33	10	56	0	0	1	6
London	19	2	11	3	16	14	74	0	0	0	0
South East Coast	14	2	14	0	0	10	71	1	7	1	7
South Central	24	4	17	7	29	9	38	2	8	2	8
South West	19	2	11	10	53	5	26	2	11	0	0
West Midlands	19	2	11	3	16	13	68	1	5	0	0
North West	26	2	8	11	42	11	42	0	0	2	8
Wales	11	0	0	2	18	9	82	0	0	0	0
Northern Ireland	6	0	0	1	17	5	83	0	0	0	0
Scotland	13	1	8	4	31	7	54	0	0	1	8
United Kingdom	**210**	**24**	**11**	**59**	**28**	**110**	**52**	**8**	**4**	**9**	**4**

Table 22 : Highest cytology and core biopsy result prior to malignant diagnostic open biopsies (micro/non-invasive cancers)											
	Total malignant open biopsies	No non-operative procedures		C4, B4 or both		C3, B3 or both		C2, B2 or both		C1, B1 or both	
Region		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	54	1	2	15	28	35	65	1	2	2	4
East Midlands	29	0	0	9	31	17	59	1	3	2	7
East of England	74	0	0	19	26	48	65	4	5	3	4
London	52	2	4	4	8	45	87	1	2	0	0
South East Coast	51	1	2	11	22	38	75	1	2	0	0
South Central	39	0	0	17	44	21	54	0	0	1	3
South West	63	1	2	26	41	34	54	2	3	0	0
West Midlands	59	0	0	17	29	42	71	0	0	0	0
North West	45	1	2	11	24	31	69	2	4	0	0
Wales	21	0	0	6	29	13	62	1	5	1	5
Northern Ireland	8	0	0	2	25	6	75	0	0	0	0
Scotland	37	1	3	10	27	24	65	0	0	2	5
United Kingdom	**532**	**7**	**1**	**147**	**28**	**354**	**67**	**13**	**2**	**11**	**2**

Table 23 : Data completeness for surgically treated non-invasive cancers							
	Unknown cytonuclear grade		Unknown size		Unknown cytonuclear grade and/or size		Total with surgery
Region	No.	%	No.	%	No.	%	No.
N East, Yorks & Humber	4	1	22	5	22	5	470
East Midlands	0	0	7	3	7	3	221
East of England	0	0	6	2	6	2	331
London	9	2	18	5	18	5	362
South East Coast	0	0	12	4	12	4	308
South Central	0	0	4	2	4	2	235
South West	1	0	25	7	25	7	376
West Midlands	0	0	9	2	9	2	377
North West	4	1	16	4	17	4	378
Wales	0	0	9	5	9	5	170
Northern Ireland	0	0	6	7	6	7	81
Scotland	1	0	9	3	9	3	299
United Kingdom	**19**	**1**	**143**	**4**	**144**	**4**	**3608**

Table 24 : Cytonuclear grade of surgically treated non-invasive cancers												
	High		Intermediate		Low		Not assessable		Unknown		Total non-invasive with surgery	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	266	57	146	31	33	7	21	4	4	1	470	100
East Midlands	142	64	55	25	16	7	8	4	0	0	221	100
East of England	189	57	91	27	30	9	21	6	0	0	331	100
London	171	47	99	27	51	14	32	9	9	2	362	100
South East Coast	174	56	86	28	32	10	16	5	0	0	308	100
South Central	135	57	67	29	25	11	8	3	0	0	235	100
South West	211	56	100	27	49	13	15	4	1	0	376	100
West Midlands	215	57	109	29	27	7	26	7	0	0	377	100
North West	225	60	108	29	34	9	7	2	4	1	378	100
Wales	103	61	46	27	18	11	3	2	0	0	170	100
Northern Ireland	43	53	17	21	17	21	4	5	0	0	81	100
Scotland	200	67	72	24	6	2	20	7	1	0	299	100
United Kingdom	**2074**	**57**	**996**	**28**	**338**	**9**	**181**	**5**	**19**	**1**	**3608**	**100**

Table 25 : Size of surgically treated non-invasive cancers												
	<15mm		15-≤40mm		>40 mm		Size not assessable		Size unknown		Total non-invasive with surgery	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	166	35	175	37	86	18	21	4	22	5	470	100
East Midlands	81	37	82	37	43	19	8	4	7	3	221	100
East of England	144	44	126	38	34	10	21	6	6	2	331	100
London	124	34	137	38	50	14	33	9	18	5	362	100
South East Coast	120	39	117	38	43	14	16	5	12	4	308	100
South Central	70	30	108	46	46	20	7	3	4	2	235	100
South West	149	40	140	37	46	12	16	4	25	7	376	100
West Midlands	139	37	156	41	46	12	27	7	9	2	377	100
North West	149	39	153	40	52	14	8	2	16	4	378	100
Wales	59	35	73	43	26	15	3	2	9	5	170	100
Northern Ireland	26	32	31	38	14	17	4	5	6	7	81	100
Scotland	93	31	127	42	50	17	20	7	9	3	299	100
United Kingdom	**1320**	**37**	**1425**	**39**	**536**	**15**	**184**	**5**	**143**	**4**	**3608**	**100**

Table 26 : Invasive size of surgically treated invasive breast cancers																
	<10mm		10-<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	527	27	549	28	418	21	347	18	62	3	28	1	21	1	1952	100
East Midlands	331	29	338	29	283	25	150	13	32	3	14	1	7	1	1155	100
East of England	320	25	368	29	296	23	214	17	49	4	20	2	20	2	1287	100
London	292	22	339	26	303	23	238	18	55	4	51	4	37	3	1315	100
South East Coast	317	26	354	29	264	21	217	18	49	4	17	1	12	1	1230	100
South Central	243	24	237	23	265	26	190	19	47	5	22	2	9	1	1013	100
South West	372	27	359	26	301	22	251	18	40	3	14	1	23	2	1360	100
West Midlands	356	26	350	26	335	25	233	17	42	3	24	2	13	1	1353	100
North West	390	24	383	24	426	26	289	18	72	4	36	2	25	2	1621	100
Wales	179	29	166	27	150	24	86	14	20	3	8	1	14	2	623	100
Northern Ireland	89	26	100	29	84	25	53	16	8	2	7	2	0	0	341	100
Scotland	375	27	430	30	304	21	229	16	45	3	19	1	12	1	1414	100
United Kingdom	**3791**	**26**	**3973**	**27**	**3429**	**23**	**2497**	**17**	**521**	**4**	**260**	**2**	**193**	**1**	**14664**	**100**

Table 27 : Whole size of surgically treated invasive breast cancers																
	<10mm		10-<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	310	16	482	25	448	23	435	22	147	8	108	6	22	1	1952	100
East Midlands	203	18	292	25	291	25	247	21	52	5	44	4	26	2	1155	100
East of England	183	14	315	24	329	26	318	25	88	7	43	3	11	1	1287	100
London	202	15	278	21	304	23	309	23	94	7	86	7	42	3	1315	100
South East Coast	196	16	302	25	293	24	276	22	99	8	47	4	17	1	1230	100
South Central	148	15	197	19	267	26	270	27	69	7	52	5	10	1	1013	100
South West	228	17	299	22	353	26	337	25	88	6	41	3	14	1	1360	100
West Midlands	223	16	300	22	337	25	318	24	94	7	65	5	16	1	1353	100
North West	255	16	351	22	442	27	367	23	117	7	73	5	16	1	1621	100
Wales	107	17	155	25	160	26	126	20	25	4	24	4	26	4	623	100
Northern Ireland	52	15	83	24	98	29	81	24	16	5	11	3	0	0	341	100
Scotland	244	17	384	27	333	24	322	23	74	5	48	3	9	1	1414	100
United Kingdom	**2351**	**16**	**3438**	**23**	**3655**	**25**	**3406**	**23**	**963**	**7**	**642**	**4**	**209**	**1**	**14664**	**100**

Table 28 : Whole size of surgically treated invasive cancers with invasive size <15mm														
	Whole size <15mm		Whole size 15-≤20mm		Whole size >20-≤35mm		Whole size >35-≤50mm		Whole size >50mm		Whole size unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	788	73	116	11	83	8	45	4	42	4	2	0	1076	100
East Midlands	493	74	74	11	65	10	18	3	17	3	2	0	669	100
East of England	496	72	83	12	79	11	15	2	15	2	0	0	688	100
London	475	75	65	10	52	8	18	3	15	2	6	1	631	100
South East Coast	498	74	87	13	49	7	23	3	14	2	0	0	671	100
South Central	344	72	63	13	45	9	12	3	14	3	2	0	480	100
South West	522	71	111	15	66	9	22	3	10	1	0	0	731	100
West Midlands	520	74	79	11	61	9	21	3	24	3	1	0	706	100
North West	598	77	84	11	49	6	23	3	19	2	0	0	773	100
Wales	259	75	37	11	30	9	3	1	7	2	9	3	345	100
Northern Ireland	135	71	31	16	17	9	5	3	1	1	0	0	189	100
Scotland	626	78	81	10	70	9	14	2	14	2	0	0	805	100
United Kingdom	**5754**	**74**	**911**	**12**	**666**	**9**	**219**	**3**	**192**	**2**	**22**	**0**	**7764**	**100**

Table 29 : Grade of surgically treated invasive cancers												
	Grade 1		Grade 2		Grade 3		Not assessable		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	495	25	1027	53	422	22	4	0	4	0	1952	100
East Midlands	346	30	603	52	203	18	0	0	3	0	1155	100
East of England	278	22	673	52	323	25	9	1	4	0	1287	100
London	332	25	743	57	222	17	7	1	11	1	1315	100
South East Coast	283	23	696	57	240	20	11	1	0	0	1230	100
South Central	246	24	534	53	227	22	2	0	4	0	1013	100
South West	342	25	736	54	265	19	2	0	15	1	1360	100
West Midlands	319	24	738	55	293	22	3	0	0	0	1353	100
North West	517	32	827	51	267	16	7	0	3	0	1621	100
Wales	169	27	349	56	104	17	0	0	1	0	623	100
Northern Ireland	63	18	200	59	77	23	0	0	1	0	341	100
Scotland	304	21	804	57	292	21	7	0	7	0	1414	100
United Kingdom	**3694**	**25**	**7930**	**54**	**2935**	**20**	**52**	**0**	**53**	**0**	**14664**	**100**

Table 30 : Data completeness for surgically treated invasive cancers (excluding cases with neo-adjuvant therapy)									
	Unknown invasive size		Unknown nodal status		Unknown grade		Unknown NPI*		Total invasive
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
N East, Yorks & Humber	16	0.8	16	0.8	4	0.2	34	1.8	1904
East Midlands	6	0.5	6	0.5	1	0.1	12	1.1	1122
East of England	13	1.1	18	1.5	4	0.3	38	3.1	1231
London	27	2.1	33	2.6	9	0.7	58	4.6	1273
South East Coast	9	0.9	27	2.6	0	0.0	43	4.2	1032
South Central	3	0.3	15	1.5	3	0.3	19	1.9	979
South West	20	1.5	33	2.5	13	1.0	53	4.1	1303
West Midlands	10	0.8	17	1.3	0	0.0	28	2.2	1286
North West	20	1.3	18	1.1	2	0.1	45	2.9	1574
Wales	11	1.8	5	0.8	1	0.2	16	2.6	614
Northern Ireland	0	0.0	4	1.2	1	0.3	5	1.5	338
Scotland	10	0.7	22	1.6	5	0.4	36	2.6	1383
United Kingdom	**145**	**1.0**	**214**	**1.5**	**43**	**0.3**	**387**	**2.8**	**14039**

* NPI is unknown if size, grade or nodal status are unknown or grade if not assessable

Table 31 : NPI Group of surgically treated invasive cancers (with known NPI excluding cases with neo-adjuvant therapy)												
	EPG		GPG		MPG1		MPG2		PPG		Total with known NPI	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	395	21	691	37	470	25	200	11	114	6	1870	100
East Midlands	281	25	449	40	251	23	89	8	40	4	1110	100
East of England	204	17	479	40	302	25	134	11	74	6	1193	100
London	235	19	484	40	282	23	137	11	77	6	1215	100
South East Coast	183	19	412	42	226	23	112	11	56	6	989	100
South Central	192	20	339	35	265	28	100	10	64	7	960	100
South West	275	22	462	37	310	25	148	12	55	4	1250	100
West Midlands	238	19	515	41	304	24	125	10	76	6	1258	100
North West	398	26	554	36	324	21	166	11	87	6	1529	100
Wales	145	24	240	40	131	22	57	10	25	4	598	100
Northern Ireland	52	16	143	43	88	26	27	8	23	7	333	100
Scotland	251	19	563	42	317	24	156	12	60	4	1347	100
United Kingdom	**2849**	**21**	**5331**	**39**	**3270**	**24**	**1451**	**11**	**751**	**6**	**13652**	**100**

Table 32 : ER status							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	2002	81	255	10	220	9	2477
East Midlands	1172	83	126	9	116	8	1414
East of England	1295	77	110	7	269	16	1674
London	1355	78	130	7	251	14	1736
South East Coast	1282	81	123	8	171	11	1576
South Central	1008	79	106	8	160	13	1274
South West	1480	83	125	7	182	10	1787
West Midlands	1350	77	145	8	260	15	1755
North West	1739	85	203	10	110	5	2052
Wales	622	76	54	7	140	17	816
Northern Ireland	370	86	34	8	28	6	432
Scotland	1422	81	117	7	213	12	1752
United Kingdom	**15097**	**81**	**1528**	**8**	**2120**	**11**	**18745**

Table 33 : ER status (invasive cancers)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1776	90	197	10	5	0	1978
East Midlands	1073	91	105	9	3	0	1181
East of England	1208	92	96	7	6	0	1310
London	1239	92	95	7	17	1	1351
South East Coast	1144	92	101	8	5	0	1250
South Central	939	91	85	8	5	0	1029
South West	1289	93	92	7	4	0	1385
West Midlands	1246	91	115	8	5	0	1366
North West	1502	91	144	9	4	0	1650
Wales	584	92	51	8	2	0	637
Northern Ireland	320	92	26	7	1	0	347
Scotland	1316	92	102	7	9	1	1427
United Kingdom	**13636**	**91**	**1209**	**8**	**66**	**0**	**14911**

Table 34 : ER status (micro/non-invasive cancers)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	226	45	58	12	214	43	498
East Midlands	99	42	21	9	113	48	233
East of England	87	24	14	4	263	72	364
London	116	30	35	9	233	61	384
South East Coast	138	42	22	7	165	51	325
South Central	69	28	21	9	155	63	245
South West	191	48	33	8	178	44	402
West Midlands	104	27	30	8	255	66	389
North West	237	59	59	15	103	26	399
Wales	38	21	3	2	138	77	179
Northern Ireland	50	59	8	9	27	32	85
Scotland	105	34	15	5	187	61	307
United Kingdom	**1460**	**38**	**319**	**8**	**2031**	**53**	**3810**

Table 35 : PgR status (invasive)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	421	21	214	11	1343	68	1978
East Midlands	252	21	145	12	784	66	1181
East of England	296	23	134	10	880	67	1310
London	1012	75	276	20	63	5	1351
South East Coast	706	56	158	13	386	31	1250
South Central	584	57	160	16	285	28	1029
South West	504	36	163	12	718	52	1385
West Midlands	499	37	177	13	690	51	1366
North West	1259	76	334	20	57	3	1650
Wales	267	42	122	19	248	39	637
Northern Ireland	231	67	53	15	63	18	347
Scotland	792	56	197	14	438	31	1427
United Kingdom	**6823**	**46**	**2133**	**14**	**5955**	**40**	**14911**

Table 36 : PgR status of invasive cancers with negative ER status							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	10	5	143	73	44	22	197
East Midlands	3	3	65	62	37	35	105
East of England	5	5	68	71	23	24	96
London	7	7	86	91	2	2	95
South East Coast	8	8	77	76	16	16	101
South Central	10	12	70	82	5	6	85
South West	1	1	59	64	32	35	92
West Midlands	7	6	89	77	19	17	115
North West	4	3	140	97	0	0	144
Wales	0	0	47	92	4	8	51
Northern Ireland	3	12	22	85	1	4	26
Scotland	8	8	79	77	15	15	102
United Kingdom	**66**	**5**	**945**	**78**	**198**	**16**	**1209**

Table 37 : HER-2 status for invasive cancers									
	Positive		Negative		Borderline		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	193	10	1705	86	26	1	54	3	1978
East Midlands	103	9	1070	91	0	0	8	1	1181
East of England	145	11	1107	85	13	1	45	3	1310
London	121	9	1091	81	81	6	58	4	1351
South East Coast	108	9	1092	87	28	2	22	2	1250
South Central	110	11	857	83	49	5	13	1	1029
South West	138	10	1218	88	14	1	15	1	1385
West Midlands	152	11	1175	86	8	1	31	2	1366
North West	157	10	1396	85	81	5	16	1	1650
Wales	52	8	576	90	1	0	8	1	637
Northern Ireland	18	5	305	88	18	5	6	2	347
Scotland	154	11	1264	89	0	0	9	1	1427
United Kingdom	**1451**	**10**	**12856**	**86**	**319**	**2**	**285**	**2**	**14911**

Table 38 : Size, grade and nodal status for invasive cancers with HER2 testing not done or unknown								
	Total HER2 unknown/not done	<10mm invasive size		Grade 1		Negative nodal status	
Region		No	%	No	%	No	%
N East, Yorks & Humber	54	18	33	20	37	37	69
East Midlands	8	4	50	1	13	7	88
East of England	45	16	36	10	22	32	71
London	58	11	19	7	12	34	59
South East Coast	22	6	27	6	27	12	55
South Central	13	4	31	1	8	8	62
South West	15	5	33	6	40	8	53
West Midlands	31	21	68	9	29	25	81
North West	16	8	50	5	31	9	56
Wales	8	5	63	3	38	8	100
Northern Ireland	6	1	17	0	0	1	17
Scotland	9	2	22	2	22	6	67
United Kingdom	**285**	**101**	**35**	**70**	**25**	**187**	**66**

Table 39 : Treatment for non-invasive breast cancers										
	Conservation surgery		Mastectomy		No surgery		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	319	67	151	32	8	2	0	0	478	100
East Midlands	153	69	68	30	2	1	0	0	223	100
East of England	254	75	77	23	7	2	0	0	338	100
London	265	71	94	25	9	2	3	1	371	100
South East Coast	234	74	74	23	8	3	0	0	316	100
South Central	168	71	67	28	2	1	0	0	237	100
South West	284	74	92	24	10	3	0	0	386	100
West Midlands	284	75	93	24	3	1	0	0	380	100
North West	269	70	109	28	8	2	0	0	386	100
Wales	122	70	48	28	4	2	0	0	174	100
Northern Ireland	58	72	23	28	0	0	0	0	81	100
Scotland	220	73	79	26	3	1	0	0	302	100
United Kingdom	**2630**	**72**	**975**	**27**	**64**	**2**	**3**	**0**	**3672**	**100**

Table 40 : Treatment for micro-invasive breast cancers										
	Conservation surgery		Mastectomy		No surgery		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	9	45	11	55	0	0	0	0	20	100
East Midlands	5	50	5	50	0	0	0	0	10	100
East of England	17	65	9	35	0	0	0	0	26	100
London	8	62	5	38	0	0	0	0	13	100
South East Coast	6	67	3	33	0	0	0	0	9	100
South Central	6	75	2	25	0	0	0	0	8	100
South West	11	69	5	31	0	0	0	0	16	100
West Midlands	5	56	4	44	0	0	0	0	9	100
North West	5	38	8	62	0	0	0	0	13	100
Wales	4	80	1	20	0	0	0	0	5	100
Northern Ireland	3	75	1	25	0	0	0	0	4	100
Scotland	2	40	3	60	0	0	0	0	5	100
United Kingdom	**81**	**59**	**57**	**41**	**0**	**0**	**0**	**0**	**138**	**100**

Table 41 : Treatment for non-invasive breast cancers size >40mm								
	Conservation surgery		Mastectomy		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	13	15	73	85	0	0	86	100
East Midlands	7	16	36	84	0	0	43	100
East of England	11	32	23	68	0	0	34	100
London	6	12	44	88	0	0	50	100
South East Coast	14	33	29	67	0	0	43	100
South Central	10	22	36	78	0	0	46	100
South West	11	24	35	76	0	0	46	100
West Midlands	6	13	40	87	0	0	46	100
North West	7	13	45	87	0	0	52	100
Wales	4	15	22	85	0	0	26	100
Northern Ireland	5	36	9	64	0	0	14	100
Scotland	12	24	38	76	0	0	50	100
United Kingdom	**106**	**20**	**430**	**80**	**0**	**0**	**536**	**100**

Table 42 : Treatment of high cytonuclear grade non-invasive cancers (>40mm)								
	Conservation surgery		Mastectomy		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	9	14	56	86	0	0	65	100
East Midlands	5	15	29	85	0	0	34	100
East of England	6	25	18	75	0	0	24	100
London	5	16	27	84	0	0	32	100
South East Coast	11	30	26	70	0	0	37	100
South Central	6	19	26	81	0	0	32	100
South West	8	23	27	77	0	0	35	100
West Midlands	2	6	32	94	0	0	34	100
North West	5	14	32	86	0	0	37	100
Wales	4	22	14	78	0	0	18	100
Northern Ireland	4	40	6	60	0	0	10	100
Scotland	10	22	36	78	0	0	46	100
United Kingdom	**75**	**19**	**329**	**81**	**0**	**0**	**404**	**100**

Table 43 : Treatment of non-invasive cancers with unknown cytonuclear grade and unknown size (benign surgery cases excluded)								
	Conservation surgery		Mastectomy		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	-	-	-	-	-	-	-	-
East Midlands	-	-	-	-	-	-	-	-
East of England	-	-	-	-	-	-	-	-
London	1	100	0	0	0	0	1	100
South East Coast	-	-	-	-	-	-	-	-
South Central	-	-	-	-	-	-	-	-
South West	-	-	-	-	-	-	-	-
West Midlands	-	-	-	-	-	-	-	-
North West	-	-	-	-	-	-	-	-
Wales	-	-	-	-	-	-	-	-
Northern Ireland	-	-	-	-	-	-	-	-
Scotland	1	100	0	0	0	0	1	100
United Kingdom	**2**	**100**	**0**	**0**	**0**	**0**	**2**	**100**

Benign cases have non-invasive disease reported in the non-operative core biopsy but no malignant disease found in the surgical specimen

Table 44 : Treatment for invasive breast cancers										
	Conservation surgery		Mastectomy		No Surgery		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1437	73	515	26	26	1	0	0	1978	100
East Midlands	862	73	293	25	26	2	0	0	1181	100
East of England	992	76	295	23	23	2	0	0	1310	100
London	1024	76	287	21	36	3	4	0	1351	100
South East Coast	969	78	261	21	20	2	0	0	1250	100
South Central	796	77	217	21	16	2	0	0	1029	100
South West	1079	78	281	20	25	2	0	0	1385	100
West Midlands	1034	76	319	23	13	1	0	0	1366	100
North West	1219	74	402	24	29	2	0	0	1650	100
Wales	495	78	128	20	14	2	0	0	637	100
Northern Ireland	259	75	82	24	6	2	0	0	347	100
Scotland	1116	78	298	21	13	1	0	0	1427	100
United Kingdom	**11282**	**76**	**3378**	**23**	**247**	**2**	**4**	**0**	**14911**	**100**

Table 45 : Mastectomy rate with invasive tumour size										
	<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	211	20	93	22	139	40	45	73	25	89
East Midlands	114	17	74	26	61	41	26	81	14	100
East of England	102	15	58	20	70	33	41	84	17	85
London	82	13	50	17	81	34	31	56	39	76
South East Coast	96	14	53	20	61	28	33	67	14	82
South Central	67	14	40	15	60	32	31	66	16	73
South West	94	13	56	19	94	37	22	55	11	79
West Midlands	108	15	67	20	82	35	35	83	22	92
North West	118	15	87	20	112	39	46	64	32	89
Wales	52	15	23	15	27	31	13	65	8	100
Northern Ireland	34	18	17	20	19	36	5	63	7	100
Scotland	104	13	59	19	87	38	31	69	14	74
United Kingdom	**1182**	**15**	**677**	**20**	**893**	**36**	**359**	**69**	**219**	**84**

Table 46 : Mastectomy rate with whole tumour size										
	<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	90	11	77	17	150	34	96	65	98	91
East Midlands	51	10	56	19	97	39	35	67	40	91
East of England	49	10	54	16	90	28	63	72	36	84
London	39	8	38	13	84	27	51	54	67	78
South East Coast	49	10	44	15	65	24	59	60	40	85
South Central	29	8	31	12	70	26	43	62	41	79
South West	51	10	45	13	109	32	45	51	29	71
West Midlands	42	8	52	15	97	31	58	62	61	94
North West	56	9	67	15	124	34	82	70	67	92
Wales	26	10	24	15	36	29	13	52	19	79
Northern Ireland	13	10	16	16	32	40	11	69	10	91
Scotland	52	8	52	16	101	31	53	72	39	81
United Kingdom	**547**	**9**	**556**	**15**	**1055**	**31**	**609**	**63**	**547**	**85**

Table 47 : Mastectomy rate for <15mm invasive cancers by whole tumour size										
	Whole Size <15mm		Whole size 15-≤20mm		Whole size >20-≤35mm		Whole size >35-≤50mm		Whole size >50mm	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	90	11	25	22	26	31	30	67	40	95
East Midlands	50	10	8	11	26	40	13	72	15	88
East of England	48	10	14	17	20	25	8	53	12	80
London	38	8	9	14	14	27	7	39	13	87
South East Coast	49	10	10	11	11	22	13	57	13	93
South Central	29	8	7	11	13	29	7	58	11	79
South West	51	10	8	7	17	26	11	50	7	70
West Midlands	42	8	15	19	18	30	10	48	22	92
North West	56	9	9	11	16	33	18	78	19	100
Wales	26	10	4	11	11	37	1	33	7	100
Northern Ireland	13	10	9	29	8	47	3	60	1	100
Scotland	51	8	11	14	21	30	9	64	12	86
United Kingdom	**543**	**9**	**129**	**14**	**201**	**30**	**130**	**59**	**172**	**90**

Table 48 : Immediate reconstruction with mastectomy (all cancers)								
	Immediate reconstruction		No immediate reconstruction		Unknown		Total mastectomies	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	204	30	467	69	6	1	677	100
East Midlands	101	28	265	72	0	0	366	100
East of England	101	27	279	73	1	0	381	100
London	142	37	243	63	1	0	386	100
South East Coast	83	25	198	59	57	17	338	100
South Central	52	18	232	81	2	1	286	100
South West	87	23	291	77	0	0	378	100
West Midlands	137	33	277	67	2	0	416	100
North West	161	31	357	69	1	0	519	100
Wales	38	21	139	79	0	0	177	100
Northern Ireland	19	18	87	82	0	0	106	100
Scotland	87	23	286	75	9	2	382	100
United Kingdom	**1212**	**27**	**3121**	**71**	**79**	**2**	**4412**	**100**

Table 49 : Invasive status of cancers which had immediate reconstruction with mastectomy										
	Invasive		Micro-invasive		Non-invasive		Unknown		Immediate Reconstruction	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	122	60	5	2	77	38	0	0	204	100
East Midlands	64	63	2	2	35	35	0	0	101	100
East of England	66	65	5	5	30	30	0	0	101	100
London	104	73	1	1	37	26	0	0	142	100
South East Coast	57	69	0	0	26	31	0	0	83	100
South Central	33	63	0	0	19	37	0	0	52	100
South West	51	59	3	3	33	38	0	0	87	100
West Midlands	90	66	1	1	46	34	0	0	137	100
North West	97	60	4	2	60	37	0	0	161	100
Wales	20	53	1	3	17	45	0	0	38	100
Northern Ireland	11	58	0	0	8	42	0	0	19	100
Scotland	62	71	1	1	24	28	0	0	87	100
United Kingdom	**777**	**64**	**23**	**2**	**412**	**34**	**0**	**0**	**1212**	**100**

Table 50 : Any neo-adjuvant therapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	61	2	2416	98	0	0	2477
East Midlands	40	3	1374	97	0	0	1414
East of England	69	4	1605	96	0	0	1674
London	61	4	1675	96	0	0	1736
South East Coast	65	4	1511	96	0	0	1576
South Central	45	4	1229	96	0	0	1274
South West	73	4	1714	96	0	0	1787
West Midlands	75	4	1680	96	0	0	1755
North West	70	3	1982	97	0	0	2052
Wales	24	3	792	97	0	0	816
Northern Ireland	3	1	429	99	0	0	432
Scotland	39	2	1698	97	15	1	1752
United Kingdom	**625**	**3**	**18105**	**97**	**15**	**0**	**18745**

Table 51 : Neo-adjuvant endocrine therapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	38	2	2439	98	0	0	2477
East Midlands	16	1	1398	99	0	0	1414
East of England	32	2	1642	98	0	0	1674
London	29	2	1707	98	0	0	1736
South East Coast	45	3	1531	97	0	0	1576
South Central	18	1	1256	99	0	0	1274
South West	34	2	1753	98	0	0	1787
West Midlands	42	2	1713	98	0	0	1755
North West	44	2	2008	98	0	0	2052
Wales	17	2	799	98	0	0	816
Northern Ireland	2	0	430	100	0	0	432
Scotland	23	1	1711	98	18	1	1752
United Kingdom	**340**	**2**	**18387**	**98**	**18**	**0**	**18745**

Table 52 : Neo-adjuvant chemotherapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	26	1	2451	99	0	0	2477
East Midlands	25	2	1389	98	0	0	1414
East of England	37	2	1637	98	0	0	1674
London	32	2	1704	98	0	0	1736
South East Coast	20	1	1556	99	0	0	1576
South Central	30	2	1244	98	0	0	1274
South West	41	2	1746	98	0	0	1787
West Midlands	33	2	1722	98	0	0	1755
North West	28	1	2024	99	0	0	2052
Wales	6	1	810	99	0	0	816
Northern Ireland	1	0	431	100	0	0	432
Scotland	19	1	1718	98	15	1	1752
United Kingdom	**298**	**2**	**18432**	**98**	**15**	**0**	**18745**

Table 53 : Neo-adjuvant Traztuzumab							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	2	0	2475	100	0	0	2477
East Midlands	0	0	1414	100	0	0	1414
East of England	2	0	1672	100	0	0	1674
London	3	0	1733	100	0	0	1736
South East Coast	3	0	1573	100	0	0	1576
South Central	1	0	1273	100	0	0	1274
South West	0	0	1787	100	0	0	1787
West Midlands	5	0	1750	100	0	0	1755
North West	4	0	2048	100	0	0	2052
Wales	1	0	815	100	0	0	816
Northern Ireland	0	0	432	100	0	0	432
Scotland	3	0	1731	99	18	1	1752
United Kingdom	**24**	**0**	**18703**	**100**	**18**	**0**	**18745**

Table 54 : Annual screening surgical caseload per surgeon (2011/12)												
	Total	<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases		
Region	surgeons	No.	%	No.	%	No.	%	No.	%	No.	%	Median
N East, Yorks & Humber	76	18	24	9	12	9	12	39	51	1	1	30
East Midlands	39	8	21	3	8	4	10	24	62	0	0	38
East of England	47	6	13	5	11	8	17	28	60	0	0	33
London	77	35	45	10	13	9	12	20	26	3	4	15
South East Coast	43	9	21	4	9	5	12	23	53	2	5	36
South Central	31	5	16	2	6	6	19	18	58	0	0	39
South West	50	9	18	6	12	6	12	29	58	0	0	34
West Midlands	54	11	20	5	9	10	19	27	50	1	2	30
North West	64	15	23	5	8	11	17	33	52	0	0	30
Wales	19	1	5	1	5	4	21	13	68	0	0	46
Northern Ireland	16	2	13	6	38	1	6	7	44	0	0	19.5
Scotland	64	23	36	9	14	4	6	27	42	1	2	17
United Kingdom	**580**	**142**	**24**	**65**	**11**	**77**	**13**	**288**	**50**	**8**	**1**	**30**

The surgeons in each region are credited with their total UK screening caseload.

Table 55 : Proportion of women referred to consultant surgeons according to annual caseload of surgeon (2011/12)											
Region	Total (referred)	<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases	
		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2456	72	3	131	5	226	9	1870	76	157	6
East Midlands	1413	30	2	41	3	86	6	1256	89	0	0
East of England	1674	26	2	73	4	193	12	1382	83	0	0
London	1717	108	6	155	9	219	13	916	53	319	19
South East Coast	1561	15	1	62	4	139	9	1128	72	217	14
South Central	1256	8	1	38	3	142	11	1068	85	0	0
South West	1777	28	2	82	5	157	9	1510	85	0	0
West Midlands	1745	25	1	71	4	254	15	1277	73	118	7
North West	2037	39	2	74	4	271	13	1653	81	0	0
Wales	816	1	0	17	2	96	12	702	86	0	0
Northern Ireland	432	17	4	91	21	21	5	303	70	0	0
Scotland	1740	50	3	103	6	105	6	1359	78	123	7
United Kingdom	**18624**	**419**	**2**	**938**	**5**	**1909**	**10**	**14424**	**77**	**934**	**5**

Table 56 : Annual screening surgical caseload per surgeon (2009/10-2011/12)												
Region	Total surgeons	<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases		Median
		No.	%	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	91	29	32	14	15	15	16	32	35	1	1	63
East Midlands	46	12	26	7	15	5	11	22	48	0	0	79
East of England	63	21	33	9	14	5	8	28	44	0	0	69
London	98	51	52	15	15	10	10	19	19	3	3	23
South East Coast	54	21	39	4	7	3	6	25	46	1	2	74
South Central	43	17	40	1	2	4	9	21	49	0	0	75
South West	63	23	37	6	10	4	6	30	48	0	0	84
West Midlands	65	21	32	6	9	12	18	26	40	0	0	72
North West	90	36	40	12	13	11	12	31	34	0	0	53
Wales	21	3	14	1	5	1	5	16	76	0	0	147
Northern Ireland	17	5	29	3	18	5	29	4	24	0	0	60
Scotland	91	49	54	9	10	10	11	22	24	1	1	23
United Kingdom	**742**	**288**	**39**	**87**	**12**	**85**	**11**	**276**	**37**	**6**	**1**	**57**

The surgeons in each region are credited with their total UK screening caseload.

Table 57 : Proportion of women referred to consultant surgeons according to annual caseload of surgeon (2009/10-2011/12)											
Region	Total (referred)	<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases	
		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	6854	255	4	678	10	1105	16	4511	66	305	4
East Midlands	4031	112	3	306	8	341	8	3272	81	0	0
East of England	4943	184	4	354	7	363	7	4042	82	0	0
London	5138	303	6	608	12	764	15	2527	49	936	18
South East Coast	4462	185	4	122	3	222	5	3626	81	307	7
South Central	3628	61	2	58	2	286	8	3222	89	1	0
South West	5052	168	3	304	6	303	6	4277	85	0	0
West Midlands	4821	137	3	283	6	878	18	3523	73	0	0
North West	5842	248	4	509	9	806	14	4278	73	1	0
Wales	2856	13	0	64	2	89	3	2690	94	0	0
Northern Ireland	1189	86	7	140	12	372	31	591	50	0	0
Scotland	4845	267	6	426	9	714	15	3100	64	338	7
United Kingdom	**53661**	**2019**	**4**	**3852**	**7**	**6243**	**12**	**39659**	**74**	**1888**	**4**

Table 58 : Explanations for surgeons treating less than 10 screening cases (2011/12)								
Region	**Number surgeons with caseload <10**	**Other caseload >30 year**	**Joined NHSBSP**	**Left NHSBSP**	**Plastic surgeon**	**Private practice**	**No information**	**Other**
N East, Yorks & Humber	18	4	3	5	0	1	0	5
East Midlands	8	2	2	0	0	0	4	0
East of England	6	1	1	1	0	0	0	3
London	35	11	2	0	6	7	6	3
South East Coast	9	1	0	0	2	0	4	2
South Central	5	0	1	0	0	0	2	2
South West	9	5	0	0	1	0	2	1
West Midlands	11	5	1	1	0	0	3	1
North West	15	8	2	1	1	3	0	0
Wales	1	1	0	0	0	0	0	0
Northern Ireland	2	2	0	0	0	0	0	0
Scotland	23	6	2	2	0	0	12	1
United Kingdom	**142**	**46**	**14**	**10**	**10**	**11**	**33**	**18**

Table 59 : Explanations for surgeons treating less than 10 screening cases annually (2009/10-2011/12)								
Region	**Number surgeons with caseload <10**	**Other caseload >30 year**	**Joined NHSBSP**	**Left NHSBSP**	**Plastic surgeon**	**Private practice**	**No information**	**Other**
N East, Yorks & Humber	29	6	4	5	2	1	9	2
East Midlands	12	2	1	1	2	0	6	0
East of England	21	4	2	1	1	3	7	3
London	51	13	2	1	10	13	9	3
South East Coast	21	1	1	1	2	1	12	3
South Central	17	0	1	0	6	1	6	3
South West	23	5	0	0	3	1	13	1
West Midlands	21	8	1	3	2	0	6	1
North West	36	13	2	4	3	5	5	4
Wales	3	1	0	0	1	0	1	0
Northern Ireland	5	1	0	0	0	0	4	0
Scotland	49	9	2	3	1	1	33	0
United Kingdom	**288**	**63**	**16**	**19**	**33**	**26**	**111**	**20**

Table 60 : Repeat operations of surgically treated invasive and non/micro-invasive cancers						
	Invasive			**Non/micro-invasive**		
Region	**Total**	**Re-op**	**%**	**Total**	**Re-op**	**%**
N East, Yorks & Humber	1952	444	23	490	130	27
East Midlands	1155	228	20	231	45	19
East of England	1287	339	26	357	102	29
London	1315	330	25	375	89	24
South East Coast	1230	282	23	317	93	29
South Central	1013	210	21	243	62	26
South West	1360	384	28	392	118	30
West Midlands	1353	363	27	386	121	31
North West	1621	421	26	391	124	32
Wales	623	174	28	175	57	33
Northern Ireland	341	78	23	85	21	25
Scotland	1414	240	17	304	51	17
United Kingdom	**14664**	**3493**	**24**	**3746**	**1013**	**27**

Table 61 : Repeat operations of surgically treated invasive and non/micro-invasive cancers without a non-op diagnosis						
	Invasive			Non/micro-invasive		
Region	**Total**	**Re-op**	**%**	**Total**	**Re-op**	**%**
N East, Yorks & Humber	25	20	80	54	24	44
East Midlands	16	15	94	29	14	48
East of England	18	14	78	74	29	39
London	19	16	84	52	16	31
South East Coast	14	10	71	51	14	27
South Central	24	18	75	39	19	49
South West	19	15	79	63	26	41
West Midlands	19	16	84	59	27	46
North West	26	18	69	45	27	60
Wales	11	11	100	21	13	62
Northern Ireland	6	5	83	8	3	38
Scotland	13	7	54	37	9	24
United Kingdom	**210**	**165**	**79**	**532**	**221**	**42**

Table 62 : Number of therapeutic operations (invasive cancers) with initial BCS and a non-operative diagnosis														
	1		2		3		4+		Unknown		Total cancers		Repeat 2+ ops	
Region	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
N East, Yorks & Humber	1152	77	319	21	30	2	0	0	0	0	1501	100	349	23
East Midlands	700	79	166	19	16	2	1	0	0	0	883	100	183	21
East of England	775	75	240	23	14	1	1	0	0	0	1030	100	255	25
London	784	76	232	22	19	2	3	0	0	0	1038	100	254	24
South East Coast	747	75	218	22	26	3	4	0	0	0	995	100	248	25
South Central	623	78	161	20	16	2	1	0	0	0	801	100	178	22
South West	796	71	284	25	34	3	3	0	0	0	1117	100	321	29
West Midlands	806	74	254	23	30	3	3	0	0	0	1093	100	287	26
North West	931	74	306	24	21	2	1	0	0	0	1259	100	328	26
Wales	367	72	135	26	7	1	2	0	0	0	511	100	144	28
Northern Ireland	204	74	67	24	4	1	0	0	0	0	275	100	71	26
Scotland	929	82	186	16	18	2	1	0	1	0	1135	100	205	18
United Kingdom	**8814**	**76**	**2568**	**22**	**235**	**2**	**20**	**0**	**1**	**0**	**11638**	**100**	**2823**	**24**

Table 63 : Number of therapeutic operations (non/micro-invasive cancers) with initial BCS and a non-operative diagnosis														
	1		2		3		4+		Unknown		Total cancers		Repeat 2+ ops	
Region	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
N East, Yorks & Humber	229	73	67	21	15	5	1	0	0	0	312	100	83	27
East Midlands	114	79	30	21	1	1	0	0	0	0	145	100	31	21
East of England	161	73	51	23	8	4	0	0	0	0	220	100	59	27
London	184	73	61	24	6	2	0	0	1	0	252	100	67	27
South East Coast	134	64	59	28	13	6	3	1	0	0	209	100	75	36
South Central	111	73	35	23	5	3	2	1	0	0	153	100	42	27
South West	182	69	60	23	20	8	0	0	0	0	262	100	80	31
West Midlands	188	73	58	23	11	4	0	0	0	0	257	100	69	27
North West	177	67	78	29	11	4	0	0	0	0	266	100	89	33
Wales	78	66	31	26	10	8	0	0	0	0	119	100	41	34
Northern Ireland	45	71	16	25	2	3	0	0	0	0	63	100	18	29
Scotland	158	79	35	18	5	3	1	1	0	0	199	100	41	21
United Kingdom	**1761**	**72**	**581**	**24**	**107**	**4**	**7**	**0**	**1**	**0**	**2457**	**100**	**695**	**28**

Table 64 : Number of therapeutic operations for invasive cancers with B5b (invasive) core biopsy result												
	1		2		3+		Unknown		Total		Repeat (2+) rate	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	1456	80	339	19	27	1	0	0	1822	100	366	20
East Midlands	903	83	172	16	15	1	0	0	1090	100	187	17
East of England	919	77	267	22	11	1	0	0	1197	100	278	23
London	940	77	254	21	18	1	4	0	1216	100	272	22
South East Coast	917	80	201	18	22	2	0	0	1140	100	223	20
South Central	775	83	146	16	11	1	0	0	932	100	157	17
South West	949	75	287	23	33	3	0	0	1269	100	320	25
West Midlands	957	76	271	22	28	2	0	0	1256	100	299	24
North West	1149	77	331	22	20	1	0	0	1500	100	351	23
Wales	437	75	138	24	9	2	0	0	584	100	147	25
Northern Ireland	255	81	56	18	2	1	0	0	313	100	58	19
Scotland	1133	85	188	14	14	1	0	0	1335	100	202	15
United Kingdom	**10790**	**79**	**2650**	**19**	**210**	**2**	**4**	**0**	**13654**	**100**	**2860**	**21**

Table 65 : Number of therapeutic operations for invasive cancers with C5 (no B5) cytology result												
	1		2		3+		Unknown		Total		Repeat (2+) rate	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	5	83	1	17	0	0	0	0	6	100	1	17
East Midlands	-	-	-	-	-	-	-	-	-	-	-	-
East of England	1	100	0	0	0	0	0	0	1	100	0	0
London	-	-	-	-	-	-	-	-	-	-	-	-
South East Coast	2	100	0	0	0	0	0	0	2	100	0	0
South Central	0	0	2	100	0	0	0	0	2	100	2	100
South West	3	60	1	20	1	20	0	0	5	100	2	40
West Midlands	-	-	-	-	-	-	-	-	-	-	-	-
North West	3	100	0	0	0	0	0	0	3	100	0	0
Wales	-	-	-	-	-	-	-	-	-	-	-	-
Northern Ireland	4	80	1	20	0	0	0	0	5	100	1	20
Scotland	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**18**	**75**	**5**	**21**	**1**	**4**	**0**	**0**	**24**	**100**	**6**	**25**

Table 66 : Number of therapeutic operations for invasive cancers with B5a (non-invasive) core biopsy result												
	1		2		3+		Unknown		Total		Repeat (2+) rate	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	34	39	50	57	4	5	0	0	88	100	54	61
East Midlands	19	46	20	49	2	5	0	0	41	100	22	54
East of England	21	31	41	60	6	9	0	0	68	100	47	69
London	37	47	38	49	3	4	0	0	78	100	41	53
South East Coast	21	31	38	57	8	12	0	0	67	100	46	69
South Central	19	39	24	49	6	12	0	0	49	100	30	61
South West	17	27	41	64	6	9	0	0	64	100	47	73
West Midlands	26	36	39	54	7	10	0	0	72	100	46	64
North West	37	42	48	55	3	3	0	0	88	100	51	58
Wales	11	41	16	59	0	0	0	0	27	100	16	59
Northern Ireland	3	18	12	71	2	12	0	0	17	100	14	82
Scotland	33	52	25	39	5	8	1	2	64	100	30	47
United Kingdom	**278**	**38**	**392**	**54**	**52**	**7**	**1**	**0**	**723**	**100**	**444**	**61**

Table 67 : Number of therapeutic operations for non-invasive or micro-invasive cancers with B5a (non-invasive) core biopsy result												
	1		2		3+		Unknown		Total		Repeat (2+) rate	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	314	76	84	20	16	4	0	0	414	100	100	24
East Midlands	170	85	30	15	1	0	0	0	201	100	31	15
East of England	206	74	64	23	8	3	0	0	278	100	72	26
London	245	76	67	21	6	2	3	1	321	100	73	23
South East Coast	184	70	61	23	17	6	0	0	262	100	78	30
South Central	158	79	35	18	6	3	0	0	199	100	41	21
South West	232	72	71	22	20	6	0	0	323	100	91	28
West Midlands	220	71	80	26	11	4	0	0	311	100	91	29
North West	246	72	85	25	11	3	0	0	342	100	96	28
Wales	110	71	34	22	10	6	0	0	154	100	44	29
Northern Ireland	59	77	16	21	2	3	0	0	77	100	18	23
Scotland	224	84	36	14	6	2	0	0	266	100	42	16
United Kingdom	**2368**	**75**	**663**	**21**	**114**	**4**	**3**	**0**	**3148**	**100**	**777**	**25**

Table 68 : Repeat BCS (all cancers) with initial BCS and a non-operative diagnosis			
	All cancers with initial BCS (with non-op diagnosis)	Repeat BCS	
Region		**No**	**%**
N East, Yorks & Humber	1813	212	12
East Midlands	1028	121	12
East of England	1250	159	13
London	1290	192	15
South East Coast	1204	193	16
South Central	954	128	13
South West	1379	231	17
West Midlands	1350	181	13
North West	1526	187	12
Wales	630	106	17
Northern Ireland	338	37	11
Scotland	1336	141	11
United Kingdom	**14098**	**1888**	**13**

Table 69 : Converted to mastectomy (all cancers) with initial BCS and a non-operative diagnosis			
	All cancers with initial BCS (with non-op diagnosis)	Converted to Mx	
Region		**No**	**%**
N East, Yorks & Humber	1813	119	7
East Midlands	1028	47	5
East of England	1250	76	6
London	1290	69	5
South East Coast	1204	59	5
South Central	954	45	5
South West	1379	84	6
West Midlands	1350	97	7
North West	1526	99	6
Wales	630	41	7
Northern Ireland	338	31	9
Scotland	1336	53	4
United Kingdom	**14098**	**820**	**6**

Table 70 : Mastectomy at first operation and at subsequence operations after BCS or surgery to the Axilla (all cancers with a non-operative diagnosis)							
	All cancers (with non-op diagnosis)	Mx at 1st op		BCS at 1st op		Ax only at 1st op	
Region		No	%	No	%	No	%
N East, Yorks & Humber	2398	495	21	119	5	47	2
East Midlands	1369	307	22	47	3	1	0
East of England	1582	241	15	76	5	55	3
London	1665	268	16	69	4	42	3
South East Coast	1510	265	18	59	4	11	1
South Central	1211	224	18	45	4	8	1
South West	1705	252	15	84	5	33	2
West Midlands	1677	247	15	97	6	62	4
North West	1981	384	19	99	5	27	1
Wales	784	127	16	41	5	7	1
Northern Ireland	418	73	17	31	7	0	0
Scotland	1701	323	19	53	3	5	0
United Kingdom	**18001**	**3206**	**18**	**820**	**5**	**298**	**2**

Table 71 : Data completeness of margin information				
Region	Total cases with surgery to the breast	Complete margin data	% complete margin data	Not complete margin data
N East, Yorks & Humber	2404	2290	95	114
East Midlands	1373	1004	73	369
East of England	1632	1386	85	246
London	1643	1515	92	128
South East Coast	1531	1245	81	286
South Central	1245	1112	89	133
South West	1723	1456	85	267
West Midlands	1722	1652	96	70
North West	1991	1790	90	201
Wales	788	699	89	89
Northern Ireland	420	415	99	5
Scotland	-	-	-	-
United Kingdom	**16472**	**14564**	**88**	**1908**

*Excluded cases from Scotland

Table 72 : Number of cases with known margin information for first operation					
	Total cases with surgery to the breast	Known margin		Known distance	
Region		No.	%	No.	%
N East, Yorks & Humber	2404	2389	99	2323	97
East Midlands	1373	1368	100	1062	77
East of England	1632	1627	100	1457	89
London	1643	1635	100	1551	94
South East Coast	1531	1514	99	1274	83
South Central	1245	1241	100	1166	94
South West	1723	1710	99	1539	89
West Midlands	1722	1710	99	1682	98
North West	1991	1965	99	1834	92
Wales	788	772	98	722	92
Northern Ireland	420	420	100	417	99
Scotland	-	-	-	-	-
United Kingdom	**16472**	**16351**	**99**	**15027**	**91**

*Excluded cases from Scotland

Table 73 : Margin information of final operations for cases treated by breast conserving surgery (BCS)							
	Total cases with	Margin clear		Margin not clear		Margin unknown	
Region	surgery	No.	%	No.	%	No.	%
N East, Yorks & Humber	1730	1705	99	14	1	11	1
East Midlands	1010	1004	99	5	0	1	0
East of England	1253	1239	99	14	1	0	0
London	1258	1189	95	66	5	3	0
South East Coast	1195	1160	97	34	3	1	0
South Central	960	943	98	14	1	3	0
South West	1346	1317	98	22	2	7	1
West Midlands	1312	1291	98	16	1	5	0
North West	1477	1458	99	9	1	10	1
Wales	613	597	97	11	2	5	1
Northern Ireland	315	314	100	1	0	0	0
Scotland	-	-	-	-	-	-	-
United Kingdom	**12469**	**12217**	**98**	**206**	**2**	**46**	**0**

*Excluded cases from Scotland

Table 74 : Margin information of final operations for cases treated by mastectomy							
	Total cases with	Margin clear		Margin not clear		Margin unknown	
Region	surgery	No.	%	No.	%	No.	%
N East, Yorks & Humber	674	657	97	8	1	9	1
East Midlands	363	358	99	5	1	0	0
East of England	379	370	98	6	2	3	1
London	384	378	98	5	1	1	0
South East Coast	336	312	93	13	4	11	3
South Central	285	276	97	6	2	3	1
South West	377	366	97	8	2	3	1
West Midlands	410	393	96	8	2	9	2
North West	514	497	97	12	2	5	1
Wales	175	171	98	2	1	2	1
Northern Ireland	105	104	99	1	1	0	0
Scotland	-	-	-	-	-	-	-
United Kingdom	**4002**	**3882**	**97**	**74**	**2**	**46**	**1**

*Excluded cases from Scotland

Table 75 : Axillary ultrasound record for invasive cancers							
	Had axillary ultrasound		Did not have axillary ultrasound		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1682	85	281	14	15	1	1978
East Midlands	1158	98	23	2	0	0	1181
East of England	1103	84	186	14	21	2	1310
London	1006	74	312	23	33	2	1351
South East Coast	882	71	332	27	36	3	1250
South Central	806	78	206	20	17	2	1029
South West	1128	81	236	17	21	2	1385
West Midlands	1253	92	91	7	22	2	1366
North West	1393	84	209	13	48	3	1650
Wales	549	86	86	14	2	0	637
Northern Ireland	292	84	44	13	11	3	347
Scotland*	-	-	-	-	-	-	-
United Kingdom	**11252**	**83**	**2006**	**15**	**226**	**2**	**13484**

*Scotland did not supply any axillary ultrasound information

Table 76 : Axillary ultrasound result for invasive cancers					
	Normal		Abnormal		Total
Region	No.	%	No.	%	
N East, Yorks & Humber	1283	76	399	24	1682
East Midlands	979	85	179	15	1158
East of England	933	85	170	15	1103
London	839	83	167	17	1006
South East Coast	750	85	132	15	882
South Central	709	88	97	12	806
South West	985	87	143	13	1128
West Midlands	1075	86	178	14	1253
North West	1141	82	252	18	1393
Wales	437	80	112	20	549
Northern Ireland	223	76	69	24	292
Scotland*	-	-	-	-	-
United Kingdom	**9354**	**83**	**1898**	**17**	**11252**

*Excluded cases from Scotland

Table 77 : Axillary biopsy for invasive cancers with an abnormal axillary ultrasound result							
	Had axillary biopsy		Did not have axillary biopsy		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	387	97	7	2	5	1	399
East Midlands	177	99	2	1	0	0	179
East of England	136	80	34	20	0	0	170
London	158	95	9	5	0	0	167
South East Coast	127	96	5	4	0	0	132
South Central	69	71	27	28	1	1	97
South West	105	73	38	27	0	0	143
West Midlands	154	87	24	13	0	0	178
North West	226	90	26	10	0	0	252
Wales	109	97	3	3	0	0	112
Northern Ireland	67	97	2	3	0	0	69
Scotland*	-	-	-	-	-	-	-
United Kingdom	**1715**	**90**	**177**	**9**	**6**	**0**	**1898**

*Excluded cases from Scotland

Table 78 : Worst axillary biopsy result for invasive cancer cases with an abnormal axillary ultrasound result											
	C1/B1		C2/B2		C3/B3		C4/B4		C5/B5		Total
Region	No.	%	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	50	13	190	49	14	4	13	3	120	31	387
East Midlands	8	5	83	47	0	0	3	2	83	47	177
East of England	10	7	75	55	1	1	0	0	50	37	136
London	21	13	61	39	3	2	1	1	72	46	158
South East Coast	18	14	52	41	3	2	6	5	48	38	127
South Central	14	20	13	19	2	3	6	9	34	49	69
South West	11	10	46	44	2	2	1	1	45	43	105
West Midlands	33	21	64	42	1	1	1	1	55	36	154
North West	28	12	120	53	2	1	4	2	72	32	226
Wales	18	17	60	55	0	0	2	2	29	27	109
Northern Ireland	4	6	39	58	0	0	2	3	22	33	67
Scotland*	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**215**	**13**	**803**	**47**	**28**	**2**	**39**	**2**	**630**	**37**	**1715**

*Excluded cases from Scotland

Table 79 : Worst axillary biopsy result for invasive cancer cases with a normal axillary ultrasound result											
Region	**C1/B1**		**C2/B2**		**C3/B3**		**C4/B4**		**C5/B5**		**Total**
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
N East, Yorks & Humber	-	-	-	-	-	-	-	-	-	-	-
East Midlands	-	-	-	-	-	-	-	-	-	-	-
East of England	-	-	-	-	-	-	-	-	-	-	-
London	1	8	10	83	0	0	0	0	1	8	12
South East Coast	1	11	6	67	0	0	1	11	1	11	9
South Central	3	38	4	50	1	13	0	0	0	0	8
South West	0	0	0	0	0	0	0	0	2	100	2
West Midlands	0	0	1	100	0	0	0	0	0	0	1
North West	2	18	6	55	0	0	0	0	3	27	11
Wales	0	0	1	100	0	0	0	0	0	0	1
Northern Ireland	3	12	19	76	0	0	0	0	3	12	25
Scotland*	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**10**	**14**	**47**	**68**	**1**	**1**	**1**	**1**	**10**	**14**	**69**

*Excluded cases from Scotland

Table 80 : Positive predictive value of the axillary biopsy results for invasive cancers with an abnormal or normal axillary ultrasound result										
Region	**C1/B1**		**C2/B2**		**C3/B3**		**C4/B4**		**C5/B5**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	22	45	23	13	5	36	8	67	98	99
East Midlands	2	29	11	14	-	-	1	33	66	96
East of England	1	11	16	23	0	0	-	-	33	100
London	5	28	13	21	2	67	1	100	53	96
South East Coast	9	60	11	26	0	0	1	50	28	97
South Central	4	24	7	44	1	33	4	80	22	96
South West	3	33	15	33	0	0	-	-	35	95
West Midlands	8	26	16	27	0	0	1	100	42	98
North West	11	38	25	20	0	0	3	75	62	98
Wales	3	19	11	18	-	-	0	0	24	100
Northern Ireland	1	14	4	7	-	-	0	0	23	96
Scotland*	-	-	-	-	-	-	-	-	-	-
United Kingdom	**69**	**33**	**152**	**19**	**8**	**28**	**19**	**59**	**486**	**97**

*Excluded cases from Scotland
*Excluded cases with neo-adjuvant therapy

Table 81 : Positive predictivity for invasive cancers with positive nodal status*			
Region	**Total with positive nodal status**	**Had positive pre-op ax assessment**	
		No	**%**
N East, Yorks & Humber	404	98	24
East Midlands	203	66	33
East of England	255	33	13
London	272	58	21
South East Coast	209	31	15
South Central	223	25	11
South West	255	42	16
West Midlands	254	42	17
North West	336	62	18
Wales	113	25	22
Northern Ireland	62	23	37
Scotland	-	-	-
United Kingdom	**2586**	**505**	**20**

*Excluded cases from Scotland
*Excluded cases with neo-adjuvant therapy

Table 82 : Nodal positivity for invasive cancers without neo-adjuvant therapy and without/with unknown pre-op axillary assessment			
Region	Total without/unknown pre-op ax	Positive nodal status	
		No	%
N East, Yorks & Humber	1533	248	16
East Midlands	959	123	13
East of England	1099	205	19
London	1090	193	18
South East Coast	901	154	17
South Central	892	179	20
South West	1161	194	17
West Midlands	1132	186	16
North West	1329	233	18
Wales	505	72	14
Northern Ireland	245	34	14
Scotland	1366	259	19
United Kingdom	**12212**	**2080**	**17**

*Excluded cases with neo-adjuvant therapy

Table 83 : Axillary biopsy results for invasive cancers with positive nodal status										
Region	C1/B1		C2/B2		C3/B3		C4/B4		C5/B5	
	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	22	13	24	15	5	3	8	5	106	64
East Midlands	3	3	11	13	0	0	1	1	73	83
East of England	2	3	17	27	0	0	0	0	45	70
London	7	7	16	17	2	2	1	1	68	72
South East Coast	10	13	15	19	1	1	4	5	50	63
South Central	5	10	8	16	2	4	4	8	30	61
South West	4	6	15	23	0	0	0	0	46	71
West Midlands	10	13	17	22	0	0	1	1	50	64
North West	12	11	25	23	0	0	4	4	66	62
Wales	4	9	12	27	0	0	0	0	28	64
Northern Ireland	1	3	4	14	0	0	0	0	24	83
Scotland*	-	-	-	-	-	-	-	-	-	-
United Kingdom	**80**	**9**	**164**	**19**	**10**	**1**	**23**	**3**	**586**	**68**

*Excluded cases from Scotland

Table 84 : Availability of lymph node status for invasive cancers									
Region	Total invasive cancers with surgery	Nodal status known		Nodes obtained but status unknown		No nodes obtained		Unknown if nodes obtained	
		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1952	1934	99	0	0	18	1	0	0
East Midlands	1155	1146	99	0	0	9	1	0	0
East of England	1287	1269	99	0	0	18	1	0	0
London	1315	1281	97	0	0	30	2	4	0
South East Coast	1230	1200	98	0	0	30	2	0	0
South Central	1013	998	99	0	0	15	1	0	0
South West	1360	1326	98	0	0	34	3	0	0
West Midlands	1353	1335	99	0	0	18	1	0	0
North West	1621	1602	99	0	0	19	1	0	0
Wales	623	618	99	0	0	5	1	0	0
Northern Ireland	341	337	99	0	0	4	1	0	0
Scotland	1414	1392	98	1	0	18	1	3	0
United Kingdom	**14664**	**14438**	**98**	**1**	**0**	**218**	**1**	**7**	**0**

Table 85 : Sentinel lymph node procedure for invasive cancers with axillary surgery								
	With SLNB		Without SLNB		Unknown nodal procedure type		Total	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1612	83	322	17	0	0	1934	100
East Midlands	916	80	231	20	0	0	1147	100
East of England	1030	81	239	19	0	0	1269	100
London	1147	90	134	10	0	0	1281	100
South East Coast	936	78	268	22	0	0	1204	100
South Central	804	81	194	19	0	0	998	100
South West	1143	86	184	14	0	0	1327	100
West Midlands	1121	84	213	16	0	0	1334	100
North West	1337	83	265	17	0	0	1602	100
Wales	556	90	63	10	0	0	619	100
Northern Ireland	292	87	45	13	0	0	337	100
Scotland	1174	84	223	16	0	0	1397	100
United Kingdom	**12068**	**84**	**2381**	**16**	**0**	**0**	**14449**	**100**

Table 86 : Number of nodes taken for invasive cases without SLNB/ with unknown nodal procedure type									
	Total with axillary surgery	0 node obtained		1,2,3 nodes obtained		≥4nodes obtained		Unknown	
Region		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	322	0	0	15	5	307	95	0	0
East Midlands	231	1	0	4	2	226	98	0	0
East of England	239	0	0	43	18	196	82	0	0
London	134	0	0	8	6	126	94	0	0
South East Coast	268	3	1	20	7	245	91	0	0
South Central	194	0	0	20	10	174	90	0	0
South West	184	0	0	27	15	157	85	0	0
West Midlands	213	0	0	8	4	205	96	0	0
North West	265	0	0	45	17	220	83	0	0
Wales	63	1	2	5	8	57	90	0	0
Northern Ireland	45	0	0	1	2	44	98	0	0
Scotland	223	0	0	16	7	204	91	3	1
United Kingdom	**2381**	**5**	**0**	**212**	**9**	**2161**	**91**	**3**	**0**

Table 87 : Nodal status of invasive cancers with known status					
	Total known nodal status	Positive		Negative	
Region		No.	%	No.	%
N East, Yorks & Humber	1934	421	22	1513	78
East Midlands	1146	217	19	929	81
East of England	1269	283	22	986	78
London	1281	290	23	991	77
South East Coast	1200	275	23	925	77
South Central	998	241	24	757	76
South West	1326	275	21	1051	79
West Midlands	1335	280	21	1055	79
North West	1602	353	22	1249	78
Wales	618	117	19	501	81
Northern Ireland	337	64	19	273	81
Scotland	1392	275	20	1117	80
United Kingdom	**14438**	**3091**	**21**	**11347**	**79**

Table 88 : Nodal status of invasive cancers with/without SLNB								
	With SLNB				Without SLNB			
	Positive		Negative		Positive		Negative	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	249	15	1363	85	172	53	150	47
East Midlands	121	13	794	87	96	42	135	58
East of England	179	17	850	83	104	44	136	57
London	181	16	966	84	109	81	25	19
South East Coast	154	16	781	83	121	45	144	54
South Central	166	21	638	79	75	39	119	61
South West	169	15	973	85	106	58	78	42
West Midlands	184	16	937	84	96	45	118	55
North West	224	17	1113	83	129	49	136	51
Wales	80	14	476	86	37	59	25	40
Northern Ireland	35	12	257	88	29	64	16	36
Scotland	182	16	990	84	93	42	127	57
United Kingdom	**1924**	**16**	**10138**	**84**	**1167**	**49**	**1209**	**51**

Table 89 : Number of nodes obtained for invasive cancers with positive nodal status determined from SLNB										
	1-<4 nodes obtained					4+ nodes obtained				
	1 Ax op		2+ Ax ops		Total	1 Ax op		2+ Ax ops		Total
Region	No.	%	No.	%		No.	%	No.	%	
N East, Yorks & Humber	53	100	0	0	53	44	22	152	78	196
East Midlands	23	100	0	0	23	25	26	73	74	98
East of England	21	100	0	0	21	52	33	106	67	158
London	25	100	0	0	25	57	37	99	63	156
South East Coast	22	96	1	4	23	51	39	80	61	131
South Central	31	100	0	0	31	78	58	57	42	135
South West	21	91	2	9	23	26	18	120	82	146
West Midlands	13	87	2	13	15	44	26	125	74	169
North West	20	91	2	9	22	20	10	182	90	202
Wales	10	100	0	0	10	3	4	67	96	70
Northern Ireland	1	100	0	0	1	14	41	20	59	34
Scotland	70	99	1	1	71	53	48	58	52	111
United Kingdom	**310**	**97**	**8**	**3**	**318**	**467**	**29**	**1139**	**71**	**1606**

Table 90 : Status of invasive cases with <4 nodes obtained													
	Total with nodes obtained	Nodal status determined on basis of <4 nodes		Positive sentinel procedure(s)		Positive (Other)		Negative sentinel procedure(s)		Negative (Other)		Unknown status	
Region		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1934	1077	55.7	53	2.7	2	0.1	1009	52.2	13	0.7	0	0
East Midlands	1146	576	50.3	23	2.0	1	0.1	548	47.8	4	0.3	0	0
East of England	1269	674	53.1	21	1.7	5	0.4	609	48.0	39	3.1	0	0
London	1281	807	63.0	25	2.0	0	0.0	774	60.4	8	0.6	0	0
South East Coast	1200	651	54.3	23	1.9	3	0.3	608	50.7	17	1.4	0	0
South Central	998	571	57.2	31	3.1	1	0.1	520	52.1	19	1.9	0	0
South West	1326	866	65.3	23	1.7	1	0.1	816	61.5	26	2.0	0	0
West Midlands	1335	778	58.3	15	1.1	0	0.0	754	56.5	9	0.7	0	0
North West	1602	954	59.6	22	1.4	0	0.0	887	55.4	45	2.8	0	0
Wales	618	411	66.5	10	1.6	0	0.0	396	64.1	5	0.8	0	0
Northern Ireland	337	215	63.8	1	0.3	0	0.0	213	63.2	1	0.3	0	0
Scotland	1393	880	63.2	71	5.1	0	0.0	792	56.9	16	1.1	1	0
United Kingdom	**14439**	**8460**	**58.6**	**318**	**2.2**	**13**	**0.1**	**7926**	**54.9**	**202**	**1.4**	**1**	**0**

Table 91 : Availability of lymph node status for non-invasive cancers									
Region	Total non-invasive cancers	Nodal status known		Nodes obtained but status unknown		No nodes obtained		Unknown if nodes obtained	
		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	470	158	34	0	0	312	66	0	0
East Midlands	221	70	32	0	0	151	68	0	0
East of England	331	79	24	0	0	252	76	0	0
London	362	97	27	0	0	262	72	3	1
South East Coast	308	70	23	0	0	238	77	0	0
South Central	235	71	30	0	0	164	70	0	0
South West	376	104	28	0	0	272	72	0	0
West Midlands	377	111	29	0	0	266	71	0	0
North West	378	115	30	0	0	263	70	0	0
Wales	170	57	34	0	0	113	66	0	0
Northern Ireland	81	24	30	0	0	57	70	0	0
Scotland	299	78	26	0	0	209	70	12	4
United Kingdom	**3608**	**1034**	**29**	**0**	**0**	**2559**	**71**	**15**	**0**

Table 92 : Treatment for non-invasive cancers with known nodal status						
Region	Conservation with known nodal status		Total Conservation	Mastectomy with known nodal status		Total mastectomy
	No.	%		No.	%	
N East, Yorks & Humber	29	9	319	129	85	151
East Midlands	8	5	153	62	91	68
East of England	15	6	254	64	83	77
London	18	7	265	79	84	94
South East Coast	9	4	234	61	82	74
South Central	14	8	168	57	85	67
South West	29	10	284	75	82	92
West Midlands	30	11	284	81	87	93
North West	22	8	269	93	85	109
Wales	18	15	122	39	81	48
Northern Ireland	4	7	58	20	87	23
Scotland	13	6	220	65	82	79
United Kingdom	**209**	**8**	**2630**	**825**	**85**	**975**

Table 93 : Nodal status of non-invasive cancers					
Region	Total known nodal status	Positive		Negative	
		No.	%	No.	%
N East, Yorks & Humber	158	1	1	157	99
East Midlands	70	0	0	70	100
East of England	79	1	1	78	99
London	97	1	1	96	99
South East Coast	70	1	1	69	99
South Central	71	2	3	69	97
South West	104	2	2	102	98
West Midlands	111	1	1	110	99
North West	115	3	3	112	97
Wales	57	0	0	57	100
Northern Ireland	24	0	0	24	100
Scotland	78	1	1	77	99
United Kingdom	**1034**	**13**	**1**	**1021**	**99**

Table 94 : Sentinel lymph node procedure for non-invasive cancers with a mastectomy and known nodal status													
	With SLNB		Without SLNB								Total with mastectomy	Total known nodal status	% determined on basis of SLNB
			Ax sampling		Ax clearance		Unknown procedure		No intended Ax procedure				
Region	No.	%	No.	%	No.	%	No.	%	No.	%			
N East, Yorks & Humber	108	72	16	11	5	3.3	0	0.0	0	0.0	151	129	84
East Midlands	50	74	11	16	1	1.5	0	0.0	0	0.0	68	62	81
East of England	51	66	10	13	2	2.6	0	0.0	1	1.3	77	64	80
London	72	77	5	5	2	2.1	0	0.0	0	0.0	94	79	91
South East Coast	53	72	7	9	1	1.4	0	0.0	0	0.0	74	61	87
South Central	39	58	15	22	3	4.5	0	0.0	0	0.0	67	57	68
South West	62	67	7	8	6	6.5	0	0.0	0	0.0	92	75	83
West Midlands	70	75	11	12	0	0.0	0	0.0	0	0.0	93	81	86
North West	74	68	13	12	6	5.5	0	0.0	0	0.0	109	93	80
Wales	32	67	5	10	1	2.1	0	0.0	1	2.1	48	39	82
Northern Ireland	17	74	2	9	1	4.3	0	0.0	0	0.0	23	20	85
Scotland	58	73	4	5	0	0.0	3	3.8	0	0.0	79	65	89
United Kingdom	**686**	**70**	**106**	**11**	**28**	**2.9**	**3**	**0.3**	**2**	**0.2**	**975**	**825**	**83**

Table 95 : Sentinel lymph node procedure for non-invasive cancers with BCS and known nodal status													
	With SLNB		Without SLNB								Total with mastectomy	Total known nodal status	% determined on basis of SLNB
			Ax sampling		Ax clearance		Unknown procedure		No intended Ax procedure				
Region	No.	%	No.	%	No.	%	No.	%	No.	%			
N East, Yorks & Humber	23	7	4	1	2	0.6	0	0.0	0	0.0	319	29	79
East Midlands	5	3	0	0	0	0.0	0	0.0	3	2.0	153	8	63
East of England	14	6	1	0	0	0.0	0	0.0	0	0.0	254	15	93
London	18	7	0	0	0	0.0	0	0.0	0	0.0	265	18	100
South East Coast	9	4	0	0	0	0.0	0	0.0	0	0.0	234	9	100
South Central	8	5	6	4	0	0.0	0	0.0	0	0.0	168	14	57
South West	27	10	2	1	0	0.0	0	0.0	0	0.0	284	29	93
West Midlands	29	10	1	0	0	0.0	0	0.0	0	0.0	284	30	97
North West	17	6	5	2	0	0.0	0	0.0	0	0.0	269	22	77
Wales	17	14	0	0	0	0.0	0	0.0	1	0.8	122	18	94
Northern Ireland	3	5	0	0	1	1.7	0	0.0	0	0.0	58	4	75
Scotland	12	5	0	0	0	0.0	1	0.5	0	0.0	220	13	92
United Kingdom	**182**	**7**	**19**	**1**	**3**	**0.1**	**1**	**0.0**	**4**	**0.2**	**2630**	**209**	**87**

Table 96 : Mean, median & maximum number of nodes obtained (non-invasive cancers)							
	Total known nodal status	Conservation			Mastectomy		
Region		Mean	Median	Maximum	Mean	Median	Maximum
N East, Yorks & Humber	158	3	3	9	3	2	18
East Midlands	70	2	1	4	3	2	15
East of England	79	2	2	7	3	2	10
London	97	2	1	5	3	2	14
South East Coast	70	3	2	7	3	2	11
South Central	71	3	2.5	7	3	2	9
South West	104	2	2	8	3	2	10
West Midlands	111	2	2	4	3	3	9
North West	115	3	3	7	3	2	18
Wales	57	2	2	3	3	2	11
Northern Ireland	24	5	2	13	3	2	11
Scotland	78	3	2	7	3	2	10
United Kingdom	**1034**	**3**	**2**	**13**	**3**	**2**	**18**

Table 97 : Proportion of invasive cancers with axillary surgery at the first and later operation (excluding no surgery/unknown surgery cases)																		
	B5b						C5 only						B5a					
	Total B5b	% had Ax	Ax in 1st op		Ax in later op		Total C5	% had Ax	Ax in 1st op		Ax in later op		Total B5a	% had Ax	Ax in 1st op		Ax in later op	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	1822	99	1806	99	1	0	6	100	5	83	1	17	88	98	47	53	39	44
East Midlands	1090	99	1082	99	0	0	-	-	-	-	-	-	41	100	23	56	18	44
East of England	1197	99	1186	99	1	0	1	100	1	100	0	0	68	93	23	34	40	59
London	1212	98	1188	98	3	0	-	-	-	-	-	-	78	91	39	50	32	41
South East Coast	1140	98	1120	98	1	0	2	100	2	100	0	0	67	94	26	39	37	55
South Central	932	99	920	99	0	0	2	100	1	50	1	50	49	96	22	45	25	51
South West	1269	98	1244	98	1	0	5	100	5	100	0	0	64	89	20	31	37	58
West Midlands	1256	99	1245	99	0	0	-	-	-	-	-	-	72	96	37	51	32	44
North West	1500	99	1485	99	4	0	3	100	3	100	0	0	88	94	43	49	40	45
Wales	584	100	582	100	0	0	-	-	-	-	-	-	27	93	11	41	14	52
Northern Ireland	313	99	310	99	1	0	5	100	4	80	1	20	17	94	5	29	11	65
Scotland	1335	99	1324	99	2	0	-	-	-	-	-	-	64	92	44	69	15	23
United Kingdom	**13650**	**99**	**13492**	**99**	**14**	**0**	**24**	**100**	**21**	**88**	**3**	**13**	**723**	**94**	**340**	**47**	**340**	**47**

Table 98 : First axillary operation type for invasive cancers with positive nodal status and repeat axillary operations							
	SLNB at 1st Ax op		No SLNB at 1st Ax op		Total node positive invasive	Total with repeat Ax op	% repeat Ax op after SLNB
Region	**No**	**%**	**No**	**%**			
N East, Yorks & Humber	147	35	20	5	421	167	88
East Midlands	73	34	4	2	217	77	95
East of England	106	37	12	4	283	118	90
London	99	34	2	1	290	101	98
South East Coast	81	29	6	2	275	87	93
South Central	56	23	3	1	241	59	95
South West	122	44	10	4	275	132	92
West Midlands	127	45	5	2	280	132	96
North West	180	51	22	6	353	202	89
Wales	67	57	1	1	117	68	99
Northern Ireland	20	31	0	0	64	20	100
Scotland	59	21	10	4	275	69	86
United Kingdom	**1137**	**37**	**95**	**3**	**3091**	**1232**	**92**

APPENDIX F: ADJUVANT THERAPY DATA TABLES (99 – 132)

ADJUVANT THERAPY AUDIT WITH TUMOUR DATA FROM THE 2010/11 AUDIT OF SCREEN-DETECTED BREAST CANCERS

Table 99: Number of cases with previous cancers

Region	Total cases	Total matched	% matched	Had previous cancers		No previous cancers	
				No.	%	No.	%
NEYH	2313	2310	100	244	11	2066	89
East Midlands	1215	1213	100	152	13	1061	87
East of England	1622	1622	100	165	10	1457	90
London	1757	1735	99	111	6	1624	94
South East Coast	1485	1480	100	164	11	1316	89
South Central	1200	1200	100	151	13	1049	87
South West	1606	1605	100	109	7	1496	93
West Midlands	1584	1579	100	163	10	1416	90
North West	1948	1349	69	152	11	1197	89
WALES	1051	1051	100	130	12	921	88
Northern Ireland	358	358	100	32	9	326	91
Scotland	1709	1705	100	92	5	1613	95
United Kingdom	**17848**	**17207**	**96**	**1665**	**10**	**15542**	**90**

Table 100: Type of previous cancers

Region	Total matched	Total previous cancers	Invasive/micro-invasive					Non-invasive	
			Breast	Gynae-cological	Bowel	Haema-tological	Other	Breast	Other
N East, Yorks & Humber	2310	244	84	26	13	9	28	17	84
East Midlands	1213	152	67	18	1	10	21	6	29
East of England	1622	165	59	18	7	3	25	12	31
London	1735	111	18	17	16	10	17	5	37
South East Coast	1480	164	70	14	9	12	24	14	31
South Central	1200	151	53	23	5	6	17	15	45
South West	1605	109	52	20	5	8	32	2	
West Midlands	1579	163	56	16	7	8	22	7	50
North West	1349	152	48	19	4	7	28	11	46
Wales	1051	130	47	22	11	3	15	7	35
Northern Ireland	358	32	7	4	2	2	4	3	11
Scotland	1705	92	15	15	14	7	15	2	30
United Kingdom	**17207**	**1665**	**576**	**212**	**94**	**85**	**248**	**101**	**429**
% of previous cancers	**-**	**100%**	**35%**	**13%**	**6%**	**5%**	**15%**	**6%**	**26%**
% of matched	**100%**	**9.7%**	**3.3%**	**1.2%**	**0.5%**	**0.5%**	**1.4%**	**0.6%**	**2.5%**

Table 101: Adjuvant treatment of cases with previous breast cancers

Region	Cases with previous breast cancers	Had RT		Had CT		Had ET	
		No.	%	No.	%	No.	%
N East, Yorks & Humber	101	42	42	21	21	71	70
East Midlands	73	24	33	11	15	48	66
East of England	71	36	51	14	20	48	68
London	23	12	52	5	22	14	61
South East Coast	82	38	46	12	15	58	71
South Central	68	40	59	19	28	51	75
South West	54	24	44	10	19	38	70
West Midlands	63	19	30	17	27	44	70
North West	58	25	43	12	21	41	71
Wales	54	15	28	9	17	37	69
Northern Ireland	10	7	70	3	30	6	60
Scotland	17	8	47	3	18	11	65
United Kingdom	**674**	**290**	**43**	**136**	**20**	**467**	**69**

Table 102 : 2010/11 cases supplied to the NHSBSP adjuvant audit									
Region	Total Cancers	No data supplied		Excluded cases		Total Eligible		Complete data*	
		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2313	0	0	272	12	2041	88	2004	87
East Midlands	1215	0	0	152	13	1063	87	1063	87
East of England	1622	0	0	166	10	1456	90	1455	90
London	1757	0	0	136	8	1621	92	1519	86
South East Coast	1485	0	0	241	16	1244	84	1159	78
South Central	1200	0	0	159	13	1041	87	1029	86
South West	1606	0	0	117	7	1489	93	1480	92
West Midlands	1584	0	0	165	10	1419	90	1416	89
North West	1948	0	0	162	8	1786	92	1738	89
Wales	1051	0	0	132	13	919	87	916	87
Northern Ireland	358	0	0	39	11	319	89	303	85
Scotland	1709	0	0	92	5	1617	95	1615	94
United Kingdom	**17848**	**0**	**0**	**1833**	**10**	**16015**	**90**	**15697**	**88**

* cases which are eligible and with complete RT, CT and HT data

Table 103 : Data completeness for adjuvant therapy									
Region	Total Eligible	Complete RT		Complete CT		Complete ET		Complete RT, CT & ET	
		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2041	2028	99	2019	99	2030	99	2004	98
East Midlands	1063	1063	100	1063	100	1063	100	1063	100
East of England	1456	1455	100	1456	100	1456	100	1455	100
London	1621	1595	98	1580	97	1553	96	1519	94
South East Coast	1244	1226	99	1178	95	1235	99	1159	93
South Central	1041	1039	100	1033	99	1037	100	1029	99
South West	1489	1488	100	1484	100	1483	100	1480	99
West Midlands	1419	1419	100	1417	100	1417	100	1416	100
North West	1786	1785	100	1758	98	1756	98	1738	97
Wales	919	916	100	918	100	919	100	916	100
Northern Ireland	319	318	100	305	96	306	96	303	95
Scotland	1617	1616	100	1617	100	1616	100	1615	100
United Kingdom	**16015**	**15948**	**100**	**15828**	**99**	**15871**	**99**	**15697**	**98**

Table 104 : Radiotherapy															
Region	Invasive					Non-invasive					Overall				
	RT		No RT		Invasive total	RT		No RT		Non-invasive total	RT		No RT		Overall total
	No.	%	No.	%		No.	%	No.	%		No.	%	No.	%	
N East, Yorks & Humber	1296	80	320	20	1616	172	45	211	55	383	1484	73	544	27	2028
East Midlands	708	82	159	18	867	87	46	103	54	190	797	75	266	25	1063
East of England	920	80	231	20	1151	139	49	144	51	283	1070	74	385	26	1455
London	968	78	276	22	1244	151	46	180	54	331	1134	71	461	29	1595
South East Coast	837	88	114	12	951	132	51	125	49	257	980	80	246	20	1226
South Central	733	85	133	15	866	63	39	100	61	163	801	77	238	23	1039
South West	993	84	192	16	1185	108	38	180	63	288	1111	75	377	25	1488
West Midlands	987	87	148	13	1135	124	45	151	55	275	1117	79	302	21	1419
North West	1153	80	282	20	1435	137	41	200	59	337	1296	73	489	27	1785
Wales	602	83	127	17	729	85	47	97	53	182	690	75	226	25	916
Northern Ireland	198	81	45	19	243	45	64	25	36	70	244	77	74	23	318
Scotland	1098	82	233	18	1331	168	60	110	40	278	1269	79	347	21	1616
United Kingdom	**10493**	**82**	**2260**	**18**	**12753**	**1411**	**46**	**1626**	**54**	**3037**	**11993**	**75**	**3955**	**25**	**15948**

Table 105 : Chemotherapy															
	Invasive					Non/micro-invasive					Overall				
	CT		No CT		Invasive total	CT		No CT		Non-invasive total	CT		No CT		Overall total
Region	No.	%	No.	%		No.	%	No.	%		No.	%	No.	%	
N East, Yorks & Humber	484	30	1125	70	1609	2	0	406	100	408	487	24	1532	76	2019
East Midlands	217	25	650	75	867	0	0	196	100	196	217	20	846	80	1063
East of England	266	23	886	77	1152	1	0	303	100	304	267	18	1189	82	1456
London	414	33	824	67	1238	3	1	339	99	342	417	26	1163	74	1580
South East Coast	276	31	627	69	903	2	1	273	99	275	278	24	900	76	1178
South Central	285	33	576	67	861	0	0	172	100	172	285	28	748	72	1033
South West	331	28	851	72	1182	2	1	300	99	302	333	22	1151	78	1484
West Midlands	317	28	816	72	1133	0	0	284	100	284	317	22	1100	78	1417
North West	406	29	1006	71	1412	1	0	345	100	346	407	23	1351	77	1758
Wales	209	29	522	71	731	0	0	187	100	187	209	23	709	77	918
Northern Ireland	61	26	178	74	239	0	0	65	100	65	62	20	243	80	305
Scotland	376	28	956	72	1332	1	0	284	100	285	377	23	1240	77	1617
United Kingdom	**3642**	**29**	**9017**	**71**	**12659**	**12**	**0**	**3154**	**100**	**3166**	**3656**	**23**	**12172**	**77**	**15828**

Table 106 : Endocrine therapy															
	Invasive					Non/micro-invasive					Overall				
	ET		No ET		Invasive total	ET		No ET		Non-invasive total	ET		No ET		Overall total
Region	No.	%	No.	%		No.	%	No.	%		No.	%	No.	%	
N East, Yorks & Humber	1413	87	208	13	1621	44	11	363	89	407	1458	72	572	28	2030
East Midlands	713	82	154	18	867	27	14	169	86	196	740	70	323	30	1063
East of England	902	78	250	22	1152	12	4	292	96	304	914	63	542	37	1456
London	1072	87	164	13	1236	49	15	268	85	317	1121	72	432	28	1553
South East Coast	873	91	87	9	960	57	21	218	79	275	930	75	305	25	1235
South Central	785	91	81	9	866	25	15	146	85	171	810	78	227	22	1037
South West	1054	89	128	11	1182	44	15	257	85	301	1098	74	385	26	1483
West Midlands	1021	90	112	10	1133	8	3	276	97	284	1029	73	388	27	1417
North West	1230	87	187	13	1417	96	28	243	72	339	1326	76	430	24	1756
Wales	638	87	94	13	732	13	7	174	93	187	651	71	268	29	919
Northern Ireland	222	92	19	8	241	16	25	48	75	64	239	78	67	22	306
Scotland	1210	91	122	9	1332	10	4	274	96	284	1220	75	396	25	1616
United Kingdom	**11133**	**87**	**1606**	**13**	**12739**	**401**	**13**	**2728**	**87**	**3129**	**11536**	**73**	**4335**	**27**	**15871**

Table 107 : Radiotherapy by number of operations									
	RT (no surgery)		Total No Surgery	RT with 1 op		Total 1 op	RT with >1 op		Total Re-op
Region	No.	%		No.	%		No.	%	
N East, Yorks & Humber	6	21	29	1136	76	1488	342	65	524
East Midlands	2	22	9	614	76	804	181	72	250
East of England	2	13	16	819	78	1054	249	65	386
London	2	6	32	839	72	1172	293	70	417
South East Coast	0	0	10	725	79	920	255	81	314
South Central	3	23	13	632	79	800	166	73	228
South West	2	13	16	806	77	1049	303	71	424
West Midlands	0	0	13	869	84	1039	248	68	367
North West	4	33	12	965	73	1313	327	71	461
Wales	3	25	12	502	78	641	185	70	266
Northern Ireland	1	50	2	188	79	237	55	69	80
Scotland	1	5	21	1037	80	1298	235	77	304
United Kingdom	**26**	**14**	**185**	**9132**	**77**	**11815**	**2839**	**71**	**4021**

Table 108 : Chemotherapy by number of operations for invasive cancers									
	CT (no surgery)		Total No Surgery	CT with 1 op		Total 1 op	CT with >1 op		Total Re-op
Region	No.	%		No.	%		No.	%	
N East, Yorks & Humber	7	28	25	306	25	1211	171	44	391
East Midlands	2	22	9	136	21	658	79	40	200
East of England	2	14	14	167	20	837	97	32	301
London	5	19	26	265	29	906	144	43	332
South East Coast	4	44	9	185	25	731	87	38	229
South Central	4	33	12	202	30	678	79	44	178
South West	3	21	14	200	24	843	128	39	328
West Midlands	0	0	10	192	23	849	125	45	276
North West	2	20	10	238	23	1054	166	45	372
Wales	4	44	9	117	22	530	88	46	193
Northern Ireland	1	50	2	32	18	179	28	45	62
Scotland	1	5	19	258	24	1057	118	45	262
United Kingdom	**35**	**22**	**159**	**2298**	**24**	**9533**	**1310**	**42**	**3124**

Table 109 : Women in each age group treated with conservation surgery who had adjuvant therapy recorded							
	Invasive				Non/micro-invasive		
	Radiotherapy	Chemotherapy	Endocrine Therapy	Number of	Radiotherapy	Endocrine Therapy	Number of
Age group	%	%	%	cancers	%	%	cancers
<=48	97	39	92	66	55	14	42
49	96	37	89	171	57	25	56
50-52	98	31	90	1168	57	14	389
53-55	98	32	88	876	70	13	242
56-58	97	32	86	1028	72	14	265
59-61	98	23	86	1317	66	13	252
62-64	98	21	89	1638	69	14	370
65-67	97	20	88	1488	63	11	276
68-70	97	15	88	1182	60	14	205
71+	94	7	89	644	59	13	123
Total	**97**	**23**	**88**	**9578**	**64**	**14**	**2220**

* with completed data only

Table 110 : Women in each age group treated with mastectomy who had adjuvant therapy recorded							
	Invasive				Non/micro-invasive		
	Radiotherapy	Chemotherapy	Endocrine Therapy	Number of	Radiotherapy	Endocrine Therapy	Number of
Age group	%	%	%	cancers	%	%	cancers
<=48	44	72	96	25	7	7	14
49	42	55	92	65	8	13	24
50-52	41	61	90	430	4	12	158
53-55	38	59	81	285	3	7	108
56-58	38	56	84	302	2	14	106
59-61	39	50	85	360	4	8	107
62-64	31	44	86	480	2	11	138
65-67	32	38	84	387	2	13	101
68-70	35	34	83	309	8	5	73
71+	29	22	86	206	2	2	46
Total	**36**	**47**	**85**	**2846**	**3**	**10**	**875**

* with completed data only

Table 111 : Combinations of adjuvant therapy for invasive and non/micro-invasive cancers with complete data								
	Conservation Surgery				Mastectomy			
	Invasive		Non/micro-invasive		Invasive		Non/micro-invasive	
Treatment	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Surgery & RT & ET	6596	70	226	9	230	8	6	0
Surgery & RT & CT & ET	1670	16	3	0	647	21	0	0
Surgery & ET	148	3	74	4	1116	43	79	7
Surgery & RT & CT	501	5	2	0	123	5	1	0
Surgery & RT	536	6	1197	51	18	1	23	2
Surgery & CT & ET	23	0	0	0	436	12	3	0
Surgery only	74	1	718	36	137	6	762	89
Surgery & CT	28	0	0	0	139	5	1	0
Total	**9576**	**100**	**2220**	**100**	**2846**	**100**	**875**	**100**

Table 112 : Time from final surgery to radiotherapy (excluding neo-adjuvant and intra-operative RT cases and cases with chemotherapy) - invasive													
	≤ 14 days		≤ 30 days		≤ 60 days		≤ 90 days		≤ 120 days		≤ 200 days		Median
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
N East, Yorks & Humber	0	0	5	1	637	70	886	98	903	99	908	100	54
East Midlands	1	0	19	4	363	68	516	98	528	100	529	100	55
East of England	5	1	10	1	454	65	662	95	687	99	692	100	54
London	6	1	34	6	379	63	558	93	585	97	596	99	53
South East Coast	1	1	10	6	82	45	162	90	179	99	181	100	63
South Central	3	1	14	3	235	50	415	88	462	98	468	99	60
South West	0	0	5	1	332	49	616	92	661	98	672	100	61
West Midlands	1	0	13	2	405	57	641	91	697	99	702	99	57
North West	1	0	15	2	474	64	684	92	717	96	740	99	55
Wales	0	0	2	0	187	44	365	85	413	97	426	100	63
Northern Ireland	0	0	3	2	82	55	139	93	148	99	149	100	56
Scotland	0	0	2	0	321	41	685	88	752	97	770	99	66
United Kingdom	**18**	**0**	**132**	**2**	**3950**	**58**	**6329**	**92**	**6732**	**98**	**6833**	**100**	**57**

Table 113 : Time from final surgery to radiotherapy (excluding neo-adjuvant and intra-operative RT cases and cases with chemotherapy) – non/micro-invasive													
	≤ 14 days		≤ 30 days		≤ 60 days		≤ 90 days		≤ 120 days		≤ 200 days		Median
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
N East, Yorks & Humber	0	0	3	2	129	71	172	95	179	99	181	100	51
East Midlands	0	0	2	2	59	66	88	99	88	99	89	100	54
East of England	0	0	1	1	88	60	140	95	146	99	147	100	56
London	1	1	9	6	100	68	134	91	140	95	147	100	51
South East Coast	0	0	5	14	16	43	31	84	35	95	37	100	65
South Central	0	0	1	1	33	49	63	94	67	100	67	100	61
South West	0	0	0	0	48	45	99	93	105	99	105	99	62.5
West Midlands	0	0	0	0	62	48	118	91	126	97	130	100	61.5
North West	0	0	2	2	78	66	113	95	117	98	118	99	55
Wales	0	0	0	0	42	48	77	88	87	99	88	100	61.5
Northern Ireland	1	2	1	2	26	57	45	98	45	98	46	100	55
Scotland	0	0	3	2	59	35	141	83	166	98	169	100	71
United Kingdom	**2**	**0**	**27**	**2**	**740**	**56**	**1221**	**92**	**1301**	**98**	**1324**	**100**	**57**

Table 114 : Time from assessment to radiotherapy (excluding cases with chemotherapy) - invasive													
	≤ 14 days		≤ 30 days		≤ 60 days		≤ 90 days		≤ 120 days		≤ 200 days		Median
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
N East, Yorks & Humber	0	0	0	0	40	4	510	56	807	89	895	98	87
East Midlands	0	0	0	0	31	6	286	54	467	88	513	97	89
East of England	0	0	2	0	33	5	385	55	608	87	689	99	86
London	0	0	4	1	36	6	263	43	467	77	585	96	94
South East Coast	0	0	0	0	5	3	41	23	119	66	178	98	110
South Central	1	0	4	1	27	6	190	40	369	78	467	98	98
South West	0	0	0	0	7	1	218	32	512	76	660	98	99
West Midlands	0	0	0	0	24	3	346	49	592	84	695	98	91
North West	0	0	1	0	38	5	359	48	615	82	726	97	91
Wales	0	0	0	0	11	3	169	39	330	77	421	98	97
Northern Ireland	0	0	0	0	19	13	80	54	133	89	149	100	86
Scotland	0	0	5	1	38	5	312	39	631	80	770	97	97
United Kingdom	**1**	**0**	**16**	**0**	**309**	**4**	**3159**	**46**	**5650**	**82**	**6748**	**98**	**92**

Table 115 : Time from assessment to radiotherapy (excluding cases with chemotherapy) – non/micro-invasive													
	≤ 14 days		≤ 30 days		≤ 60 days		≤ 90 days		≤ 120 days		≤ 200 days		Median
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
N East, Yorks & Humber	0	0	0	0	3	2	70	39	134	74	177	98	98
East Midlands	0	0	0	0	6	7	41	46	74	83	89	100	92
East of England	0	0	0	0	11	7	76	52	125	85	147	100	90
London	0	0	0	0	4	3	52	35	102	69	142	97	105
South East Coast	0	0	0	0	2	5	10	27	22	59	34	92	114
South Central	0	0	0	0	2	3	14	21	44	66	64	96	113
South West	0	0	0	0	0	0	20	19	65	61	102	96	112
West Midlands	0	0	0	0	4	3	44	34	104	80	127	98	101
North West	0	0	0	0	2	2	51	43	97	81	117	98	93
Wales	0	0	0	0	2	2	31	35	59	67	88	100	104
Northern Ireland	0	0	0	0	0	0	26	57	37	80	45	98	85.5
Scotland	0	0	0	0	2	1	51	30	120	71	168	99	104
United Kingdom	**0**	**0**	**0**	**0**	**38**	**3**	**486**	**37**	**983**	**74**	**1300**	**98**	**101**

Table 116: Median days from final surgery to radiotherapy for women with invasive breast cancer			
Region	**Median**	**First quartile**	**Third quartile**
N East, Yorks & Humber	54	47	62
East Midlands	55	47	63
East of England	54	46	65
London	53	43	66
South East Coast	63	49	77
South Central	60	48	77
South West	61	52	71
West Midlands	57	49	71
North West	55	45	65
Wales	63	54	81
Northern Ireland	56	47	71
Scotland	66	43	78
United Kingdom	**57**	**47**	**70**

Table 117 : Invasive status of cancers with known radiotherapy data										
	Invasive		Micro-invasive		Non-invasive		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1616	80	27	1	383	19	2	0	2028	100
East Midlands	867	82	6	1	190	18	0	0	1063	100
East of England	1151	79	21	1	283	19	0	0	1455	100
London	1244	78	20	1	331	21	0	0	1595	100
South East Coast	951	78	18	1	257	21	0	0	1226	100
South Central	866	83	10	1	163	16	0	0	1039	100
South West	1185	80	15	1	288	19	0	0	1488	100
West Midlands	1135	80	9	1	275	19	0	0	1419	100
North West	1435	80	13	1	337	19	0	0	1785	100
Wales	729	80	5	1	182	20	0	0	916	100
Northern Ireland	243	76	4	1	70	22	1	0	318	100
Scotland	1331	82	7	0	278	17	0	0	1616	100
United Kingdom	**12753**	**80**	**155**	**1**	**3037**	**19**	**3**	**0**	**15948**	**100**

Table 118 : Treatment of invasive cancers with known radiotherapy data										
	Conservation surgery		Mastectomy		No Surgery		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1180	73	412	25	24	1	0	0	1616	100
East Midlands	639	74	219	25	9	1	0	0	867	100
East of England	884	77	253	22	14	1	0	0	1151	100
London	920	74	299	24	25	2	0	0	1244	100
South East Coast	792	83	151	16	8	1	0	0	951	100
South Central	679	78	175	20	12	1	0	0	866	100
South West	922	78	249	21	14	1	0	0	1185	100
West Midlands	893	79	232	20	10	1	0	0	1135	100
North West	1060	74	365	25	10	1	0	0	1435	100
Wales	561	77	159	22	9	1	0	0	729	100
Northern Ireland	174	72	67	28	2	1	0	0	243	100
Scotland	1019	77	292	22	19	1	1	0	1331	100
United Kingdom	**9723**	**76**	**2873**	**23**	**156**	**1**	**1**	**0**	**12753**	**100**

Table 119 : Radiotherapy for invasive cancers treated by conservation surgery						
	Radiotherapy		No radiotherapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	1159	98	21	2	1180	100
East Midlands	628	98	11	2	639	100
East of England	829	94	55	6	884	100
London	882	96	38	4	920	100
South East Coast	771	97	21	3	792	100
South Central	652	96	27	4	679	100
South West	889	96	33	4	922	100
West Midlands	882	99	11	1	893	100
North West	1028	97	32	3	1060	100
Wales	556	99	5	1	561	100
Northern Ireland	166	95	8	5	174	100
Scotland	1001	98	18	2	1019	100
United Kingdom	**9443**	**97**	**280**	**3**	**9723**	**100**

Table 120 : Invasive cancers treated by conservation surgery without radiotherapy							
		>20mm		Grade 3		Nodal status positive	
Region	Total	No	%	No	%	No	%
North, Yorks & Humber	21	0	0	3	14	2	10
East Midlands	11	0	0	2	18	2	18
East of England	55	3	5	14	25	17	31
London	38	2	5	6	16	6	16
South East Coast	21	2	10	9	43	6	29
South Central	27	0	0	1	4	7	26
South West	33	1	3	3	9	4	12
West Midlands	11	0	0	3	27	3	27
North West	32	0	0	4	13	4	13
Wales	5	0	0	2	40	1	20
Northern Ireland	8	0	0	1	13	2	25
Scotland	18	2	11	4	22	2	11
United Kingdom	**280**	**10**	**4**	**52**	**19**	**56**	**20**

Table 121 : Radiotherapy for non/micro-invasive cancers treated by conservation surgery						
	Radiotherapy		No radiotherapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	180	65	96	35	276	100
East Midlands	89	74	32	26	121	100
East of England	150	68	72	32	222	100
London	163	65	89	35	252	100
South East Coast	136	63	80	37	216	100
South Central	67	53	60	47	127	100
South West	114	54	98	46	212	100
West Midlands	127	66	66	34	193	100
North West	140	60	94	40	234	100
Wales	87	58	62	42	149	100
Northern Ireland	45	82	10	18	55	100
Scotland	169	79	45	21	214	100
United Kingdom	**1467**	**65**	**804**	**35**	**2271**	**100**

Table 122 : Cytonuclear grade of non/micro-invasive cancers treated by conservation surgery without radiotherapy												
	High		Intermediate		Low		Not assessable		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	6	6	51	53	24	25	14	15	1	1	96	100
East Midlands	2	6	21	66	4	13	5	16	0	0	32	100
East of England	10	14	26	37	20	28	15	21	0	0	71	100
London	23	26	32	36	22	25	11	12	1	1	89	100
South East Coast	16	20	31	39	19	24	13	16	0	0	79	100
South Central	18	31	23	40	12	21	4	7	1	2	58	100
South West	24	25	38	39	25	26	9	9	1	1	97	100
West Midlands	20	30	25	38	15	23	5	8	1	2	66	100
North West	11	12	47	51	23	25	11	12	0	0	92	100
Wales	10	16	17	27	28	45	6	10	1	2	62	100
Northern Ireland	3	30	2	20	4	40	1	10	0	0	10	100
Scotland	5	11	22	49	7	16	10	22	1	2	45	100
United Kingdom	**148**	**19**	**335**	**42**	**203**	**25**	**104**	**13**	**7**	**1**	**797**	**100**

Table 123 : Size of non-invasive cancers treated by conservation surgery without radiotherapy												
	<15mm		15-≤40mm		>40mm		Not assessable		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	55	57	27	28	0	0	13	14	1	1	96	100
East Midlands	21	66	5	16	0	0	5	16	1	3	32	100
East of England	41	58	9	13	2	3	15	21	4	6	71	100
London	44	49	22	25	1	1	12	13	10	11	89	100
South East Coast	56	71	7	9	2	3	13	16	1	1	79	100
South Central	30	52	18	31	3	5	4	7	3	5	58	100
South West	67	69	14	14	0	0	10	10	6	6	97	100
West Midlands	38	58	19	29	2	3	5	8	2	3	66	100
North West	44	48	26	28	2	2	11	12	9	10	92	100
Wales	30	48	19	31	0	0	6	10	7	11	62	100
Northern Ireland	7	70	0	0	0	0	1	10	2	20	10	100
Scotland	22	49	15	33	0	0	6	13	2	4	45	100
United Kingdom	**455**	**57**	**181**	**23**	**12**	**2**	**101**	**13**	**48**	**6**	**797**	**100**

Table 124 : Chemotherapy for node positive invasive cancers						
	Chemotherapy		No chemotherapy		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	259	71	104	29	363	100
East Midlands	141	76	45	24	186	100
East of England	147	58	106	42	253	100
London	200	72	77	28	277	100
South East Coast	152	65	82	35	234	100
South Central	161	72	64	28	225	100
South West	181	72	69	28	250	100
West Midlands	159	72	61	28	220	100
North West	232	72	90	28	322	100
Wales	116	75	38	25	154	100
Northern Ireland	34	62	21	38	55	100
Scotland	230	76	73	24	303	100
United Kingdom	**2012**	**71**	**830**	**29**	**2842**	**100**

Table 125 : Node positive invasive cancers without chemotherapy								
		ER negative		Grade 3		HER-2 positive	
Region	**Total**	**No**	**%**	**No**	**%**	**No**	**%**
North, Yorks & Humber	104	3	3	11	11	5	5
East Midlands	45	0	0	4	9	2	4
East of England	106	4	4	20	19	5	5
London	77	3	4	10	13	2	3
South East Coast	82	0	0	8	10	0	0
South Central	64	1	2	8	13	1	2
South West	69	2	3	4	6	1	1
West Midlands	61	1	2	5	8	2	3
North West	90	3	3	10	11	4	4
Wales	38	1	3	6	16	1	3
Northern Ireland	21	0	0	4	19	0	0
Scotland	73	1	1	9	12	4	5
United Kingdom	**830**	**19**	**2**	**99**	**12**	**27**	**3**

Table 126 : ER status of all cases with complete endocrine therapy data								
	ER Positive		ER Negative		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1695	83	237	12	98	5	2030	100
East Midlands	876	82	110	10	77	7	1063	100
East of England	1135	78	110	8	211	14	1456	100
London	1222	79	136	9	195	13	1553	100
South East Coast	1019	83	100	8	116	9	1235	100
South Central	840	81	90	9	107	10	1037	100
South West	1259	85	135	9	89	6	1483	100
West Midlands	1134	80	114	8	169	12	1417	100
North West	1479	84	171	10	106	6	1756	100
Wales	708	77	76	8	135	15	919	100
Northern Ireland	261	85	24	8	21	7	306	100
Scotland	1337	83	128	8	151	9	1616	100
United Kingdom	**12965**	**82**	**1431**	**9**	**1475**	**9**	**15871**	**100**

Table 127 : Invasive status of ER positive cases with known endocrine therapy data										
	Invasive		Micro-invasive		Non-invasive		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1447	85	11	1	235	14	2	0	1695	100
East Midlands	791	90	1	0	84	10	0	0	876	100
East of England	1054	93	7	1	74	7	0	0	1135	100
London	1113	91	10	1	99	8	0	0	1222	100
South East Coast	886	87	8	1	125	12	0	0	1019	100
South Central	786	94	6	1	48	6	0	0	840	100
South West	1079	86	9	1	171	14	0	0	1259	100
West Midlands	1038	92	4	0	92	8	0	0	1134	100
North West	1280	87	9	1	190	13	0	0	1479	100
Wales	662	94	0	0	46	6	0	0	708	100
Northern Ireland	221	85	1	0	38	15	1	0	261	100
Scotland	1227	92	5	0	105	8	0	0	1337	100
United Kingdom	**11584**	**89**	**71**	**1**	**1307**	**10**	**3**	**0**	**12965**	**100**

Table 128 : Endocrine therapy for ER positive invasive cancers						
	Endocrine therapy		No endocrine therapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	1391	96	56	4	1447	100
East Midlands	711	90	80	10	791	100
East of England	891	85	163	15	1054	100
London	1052	95	61	5	1113	100
South East Coast	866	98	20	2	886	100
South Central	771	98	15	2	786	100
South West	1048	97	31	3	1079	100
West Midlands	1017	98	21	2	1038	100
North West	1225	96	55	4	1280	100
Wales	636	96	26	4	662	100
Northern Ireland	219	99	2	1	221	100
Scotland	1203	98	24	2	1227	100
United Kingdom	**11030**	**95**	**554**	**5**	**11584**	**100**

Table 129 : ER positive invasive cancers without endocrine therapy							
	Total	>20mm		Grade 3		Nodal status positive	
Region	cases	No.	%	No.	%	No.	%
N East, Yorks & Humber	56	6	11	10	18	9	16
East Midlands	80	0	0	2	3	1	1
East of England	163	4	2	35	21	37	23
London	61	4	7	9	15	10	16
South East Coast	20	2	10	6	30	5	25
South Central	15	0	0	3	20	2	13
South West	31	0	0	2	6	0	0
West Midlands	21	1	5	2	10	1	5
North West	55	2	4	6	11	7	13
Wales	26	0	0	3	12	3	12
Northern Ireland	2	0	0	0	0	0	0
Scotland	24	1	4	4	17	3	13
United Kingdom	**554**	**20**	**4**	**82**	**15**	**78**	**14**

Table 130 : Endocrine therapy for ER negative, PgR positive invasive cancers						
	Endocrine therapy		No endocrine therapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	6	75	2	25	8	100
East Midlands	-	-	-	-	-	-
East of England	2	100	0	0	2	100
London	5	56	4	44	9	100
South East Coast	3	100	0	0	3	100
South Central	3	60	2	40	5	100
South West	1	33	2	67	3	100
West Midlands	3	75	1	25	4	100
North West	2	40	3	60	5	100
Wales	-	-	-	-	-	-
Northern Ireland	-	-	-	-	-	-
Scotland	4	67	2	33	6	100
United Kingdom	**29**	**64**	**16**	**36**	**45**	**100**

Table 131 : Endocrine therapy for all ER negative cancers						
	Endocrine therapy		No endocrine therapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	23	10	214	90	237	100
East Midlands	1	1	109	99	110	100
East of England	8	7	102	93	110	100
London	17	13	119	88	136	100
South East Coast	7	7	93	93	100	100
South Central	13	14	77	86	90	100
South West	6	4	129	96	135	100
West Midlands	4	4	110	96	114	100
North West	4	2	167	98	171	100
Wales	1	1	75	99	76	100
Northern Ireland	3	13	21	88	24	100
Scotland	5	4	123	96	128	100
United Kingdom	**92**	**6**	**1339**	**94**	**1431**	**100**

Table 132 : Endocrine therapy for ER positive non/micro-invasive cancers						
	Endocrine therapy		No endocrine therapy		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	38	15	208	85	246	100
East Midlands	24	28	61	72	85	100
East of England	12	15	69	85	81	100
London	48	44	61	56	109	100
South East Coast	50	38	83	62	133	100
South Central	25	46	29	54	54	100
South West	43	24	137	76	180	100
West Midlands	8	8	88	92	96	100
North West	89	45	110	55	199	100
Wales	12	26	34	74	46	100
Northern Ireland	14	36	25	64	39	100
Scotland	10	9	100	91	110	100
United Kingdom	**373**	**27**	**1005**	**73**	**1378**	**100**

APPENDIX G: SURVIVAL ANALYSIS DATA TABLES (133-141)

DATA OBTAINED FROM THE SURVIVAL AUDIT OF SCREEN-DETECTED BREAST CANCERS FOR CANCER PATIENTS SCREENED BETWEEN 1 JANUARY 2006 AND 31 DECEMBER 2007

Table 133 : Cause of death of eligible invasive cancers with death before 31/03/2012											
	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	No.	%	No.	%	No.	%	No.	%	No.	%	Total
N East, Yorks & Humber	49	48	25	25	28	27	0	0	102	8	1286
East Midlands	38	41	25	27	30	32	0	0	93	10	925
East of England	45	49	21	23	23	25	2	2	91	8	1182
London	32	50	15	23	16	25	1	2	64	6	1048
South East Coast	36	58	13	21	13	21	0	0	62	7	883
South Central	20	39	10	20	21	41	0	0	51	6	887
South West	38	54	16	23	16	23	0	0	70	6	1255
West Midlands	43	54	12	15	21	27	3	4	79	7	1093
North West	42	41	29	28	31	30	0	0	102	8	1291
Wales	24	49	14	29	11	22	0	0	49	8	644
Northern Ireland	10	63	3	19	2	13	1	6	16	9	187
Scotland	42	46	17	18	24	26	9	10	92	8	1113
United Kingdom	**419**	**48**	**200**	**23**	**236**	**27**	**16**	**2**	**871**	**7**	**11794**

Table 134 : Cause of death of eligible micro-invasive cancers with death before 31/03/2012											
	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	No.	%	No.	%	No.	%	No.	%	No.	%	Total
N East, Yorks & Humber	0	-	0	-	0	-	0	-	0	0	20
East Midlands	0	0	1	100	0	0	0	0	1	7	15
East of England	1	50	1	50	0	0	0	0	2	11	18
London	0	-	0	-	0	-	0	-	0	0	10
South East Coast	0	-	0	-	0	-	0	-	0	0	2
South Central	0	0	0	0	1	100	0	0	1	2	48
South West	0	-	0	-	0	-	0	-	0	0	29
West Midlands	0	-	0	-	0	-	0	-	0	0	11
North West	0	-	0	-	0	-	0	-	0	0	14
Wales	0	-	0	-	0	-	0	-	0	0	4
Northern Ireland	0	-	0	-	0	-	0	-	0	0	1
Scotland	0	0	1	50	1	50	0	0	2	25	8
United Kingdom	**1**	**17**	**3**	**50**	**2**	**33**	**0**	**0**	**6**	**3**	**180**

Table 135 : Cause of death of eligible non-invasive cancers with death before 31/03/2012											
	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	No.	%	No.	%	No.	%	No.	%	No.	%	Total
N East, Yorks & Humber	3	16	4	21	12	63	0	0	19	4	449
East Midlands	1	11	5	56	3	33	0	0	9	4	205
East of England	3	25	6	50	3	25	0	0	12	4	337
London	0	0	4	44	5	56	0	0	9	3	335
South East Coast	1	13	5	63	2	25	0	0	8	3	293
South Central	0	0	1	50	1	50	0	0	2	1	162
South West	2	22	5	56	2	22	0	0	9	3	328
West Midlands	1	20	1	20	3	60	0	0	5	2	268
North West	2	13	2	13	11	73	0	0	15	5	309
Wales	0	0	6	100	0	0	0	0	6	4	157
Northern Ireland	0	-	0	-	0	-	0	-	0	0	43
Scotland	0	0	6	55	3	27	2	18	11	4	245
United Kingdom	**13**	**12**	**45**	**43**	**45**	**43**	**2**	**2**	**105**	**3**	**3131**

Table 136 : 5-year relative survival by region – primary invasive cancers only		
Region	**Un-adjusted**	**Adjusted**
N East, Yorks & Humber	97.2 (95.6,98.6)	97.1 (95.4,98.4)
East Midlands	94.9 (92.7,96.7)	94.8 (92.6,96.6)
East of England	97.8 (96.1,99.2)	97.6 (95.9,99.0)
London	99.2 (97.6,100.5)	99.1 (97.4,100.3)
South East Coast	99.3 (97.5,100.7)	99.2 (97.3,100.6)
South Central	100.0 (98.3,101.4)	99.9 (98.1,101.2)
South West	99.9 (98.4,101.0)	99.7 (98.3,100.8)
West Midlands	97.9 (96.2,99.3)	97.8 (96.0,99.2)
North West	97.3 (95.7,98.7)	97.2 (95.5,98.5)
Wales	97.5 (95.1,99.4)	97.8 (95.4,99.7)
Northern Ireland	94.4 (89.1,97.8)	94.6 (89.3,98.0)
Scotland	97.9 (96.2,99.3)	99.2 (97.4,100.6)
United Kingdom	**98.0 (97.6,98.5)**	**98.0 (97.6,98.5)**

Table 137 : 5-year relative survival by age for primary invasive cancers		
Age	**Un-adjusted**	**Adjusted**
<50	95.8 (89.4,98.8)	95.7 (89.4,98.8)
50-52	98.0 (96.9,98.9)	98.0 (96.9,98.9)
53-55	96.3 (94.8,97.5)	96.3 (94.8,97.6)
56-58	97.2 (95.9,98.3)	97.2 (95.9,98.3)
59-61	96.7 (95.4,97.8)	96.7 (95.4,97.8)
62-64	98.1 (96.8,99.2)	98.1 (96.8,99.2)
65-67	98.4 (96.9,99.6)	98.4 (96.9,99.6)
68-70	98.2 (96.6,99.6)	98.3 (96.6,99.7)
71+	105.3 (102.4,107.6)	105.4 (102.5,107.7)
All invasive cancers	**98.0 (97.6,98.5)**	**98.0 (97.6,98.5)**

Table 138 : 5-year relative survival by invasive tumor size for primary invasive cancers		
Size	**Un-adjusted**	**Adjusted**
<15mm	100.4 (99.8,100.9)	100.4 (99.8,100.9)
15-≤20mm	98.6 (97.6,99.5)	98.6 (97.6,99.5)
>20-≤35mm	93.9 (92.4,95.3)	93.9 (92.4,95.3)
>35-≤50mm	89.8 (85.8,93.1)	89.8 (85.8,93.1)
>50mm	87.9 (81.3,92.7)	87.9 (81.3,92.7)
Unknown	73.9 (64.6,81.4)	73.9 (64.7,81.5)
All invasive cancers	**98.0 (97.6,98.5)**	**98.0 (97.6,98.5)**

Table 139 : 5-year relative survival by invasive grade for primary invasive cancers		
Grade	**Un-adjusted**	**Adjusted**
Grade 1	100.9 (100.1,101.6)	100.9 (100.1,101.5)
Grade 2	99.4 (98.8,100.0)	99.4 (98.8,100.0)
Grade 3	92.2 (90.8,93.4)	92.2 (90.8,93.5)
Not assessable	100.1 (90.9,103.2)	100.1 (90.9,103.3)
Unknown	72.5 (62.0,81.0)	72.6 (62.1,81.1)
All invasive cancers	**98.0 (97.6,98.5)**	**98.0 (97.6,98.5)**

Table 140 : 5-year relative survival by nodal status for primary invasive cancers		
Nodal status	**Un-adjusted**	**Adjusted**
Positive	92.9 (91.6,94.1)	92.9 (91.6,94.1)
Negative	100.0 (99.5,100.4)	100.0 (99.5,100.5)
Unknown	88.6 (83.8,92.5)	88.5 (83.7,92.4)
All invasive cancers	**98.0 (97.6,98.5)**	**98.0 (97.6,98.5)**

Table 141 : 5-year relative survival by NPI prognostic group for primary invasive cancers		
NPI group	**Un-adjusted**	**Adjusted**
EPG	101.3 (100.4,102.0)	101.3 (100.4,102.0)
GPG	100.9 (100.2,101.5)	100.9 (100.2,101.5)
MPG1	98.8 (97.8,99.6)	98.8 (97.8,99.6)
MPG2	93.8 (91.9,95.4)	93.8 (91.9,95.4)
PPG	81.3 (78.1,84.3)	81.4 (78.1,84.3)
Unknown	91.1 (87.3,94.1)	91.0 (87.3,94.1)
All invasive cancers	**98.0 (97.6,98.5)**	**98.0 (97.6,98.5)**

Produced by the West Midlands NHS Breast Screening Quality Assurance Reference Centre