ASSOCIATION OF
BREAST SURGERY

NHS
Cancer Screening Programmes

NHS BREAST SCREENING PROGRAMME

&

ASSOCIATION OF BREAST SURGERY

AN AUDIT OF SCREEN DETECTED BREAST CANCERS FOR THE YEAR OF SCREENING APRIL 2010 TO MARCH 2011

DISTRIBUTED AT THE
ASSOCIATION OF BREAST SURGERY CONFERENCE

21st MAY 2012
BOURNEMOUTH INTERNATIONAL CENTRE

West Midlands
Cancer Intelligence Unit

NHS

Cancer Screening Programmes

ABS
ASSOCIATION OF
BREAST SURGERY

West Midlands
Cancer Intelligence Unit

FOREWORDS

I am pleased to provide the foreword to this report on the NHSBSP & ABS Audit of screen-detected breast cancers. At a time of great change to the health service, the familiarity of this report in terms of detail and quality is very welcome! The report, as always, provides a description of how the NHS Breast Screening Programme is evolving. The changes in the age profile due to the latest extension of the programme and the virtually complete change from cytology to core biopsy in England are evident. This year, for the first time, 20-year survival has been calculated as well as the more usual 5-year survival. The overall 20-year relative survival for women with screen-detected invasive breast cancer who were screened in 1990/91 is 78.9%, which compares favourably with the 48% predicted 20-year average survival for women in the screening age group diagnosed in the same period (*Woods, Rachet, Cooper Coleman BJC 2007*). The audit is also evolving in terms of how data can be accessed. An interactive I-atlas tool, powered by the depth and breath of the audit's data, will be demonstrated at this year's ABS conference. This tool will enable participants to further explore how their data have changed over time and how they compare with other services. The tool will also be made available on the web so it is accessible to women invited for screening.

There are, as always, important messages for MDTs to enable them to improve their practice. Areas where practice differs significantly have been highlighted and regional QA reference centres, with their QA teams, have been tasked with investigating and understanding these differences. It is important to take every opportunity to learn from the audit in order to further develop the quality of the service delivered to every woman who attends for breast screening. 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 and his team on the 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 2010 to 31 March 2011, with adjuvant therapy data from the preceding year. There have been many changes in the audit since its inception and, by necessity, it has evolved and improved with time and with developments in breast cancer management. The analysis and presentation of the data have become increasingly sophisticated over the years, but the format of the report retains its familiar layout. In general the audit continues to demonstrate the high quality of care provided across the UK for women with screen-detected breast cancer and this should be celebrated.

There is much of interest in this report. This year we are pleased to be able to present the excellent 20-year relative survival figures for screen-detected invasive cancers treated in 1990/91, soon after the inception of the NHSBSP. Steady improvement in 5-year relative survival is also demonstrated in each of the cohorts going from 1990/91 through to 2005/06. This has mainly been in the Poor and Moderate 2 NPI groups, probably as a result of improved adjuvant therapies. These survival data are very informative in discussions of outcomes with patients.

Any audit is dependent on good quality data and this continues to get better each year. This is due to the hard work of the MDT members and the staff in screening units and QA reference centres. I am grateful to you all for your dedication and enthusiasm. Thanks are also due to the members of the screening audit steering group. Their advice in making the audit responsive to changes in practice is invaluable, as is the time that they take to critique the manuscript. This year we are sad to lose to retirement Yoon Chia, our pathology representative, she will be sorely missed. Especial thanks, as always, go to Gill Lawrence, Olive Kearins, Shan Cheung and all the team at the WMCIU for their dedication to this unique National Audit. The report can be read as a continuous tome or dipped into to obtain spicy vignettes. These are your data; however you use them I hope that they will inform, stimulate debate and lead to improvements in care for our patients.

Neil Rothnie
Chair of the NHSBSP and ABS Screening Audit Group

ACKNOWLEDGEMENTS

The 2010/11 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 Research and Information Officer, 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	Deputy Director of Breast Screening Quality Assurance, West Midlands Breast Screening QA Reference Centre
Dr Gill Lawrence	Regional Director of Breast 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
Mr Roger Watkins	Consultant Breast Surgeon, Derriford Hospital, Plymouth
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 2010/11 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.

The Screening Audit Group would also like to thank the NHSBSP National Office for its financial assistance in support of the 2010/11 audit of screen-detected breast cancers.

CONTENTS

INTRODUCTION

AIMS AND OBJECTIVES

The 2010/11 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 2010 to 31 March 2011. 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 on the Diagnosis and treatment of early and locally advanced breast cancer (February 2009)

National Mastectomy and Breast Reconstruction Audit. A national audit of provision and outcomes of mastectomy and breast reconstruction surgery for women in England. Second Annual Report (2009)

National Mastectomy and Breast Reconstruction Audit. A national audit of provision and outcomes of mastectomy and breast reconstruction surgery for women in England. Third Annual Report (2010)

The 2010/11 NHSBSP & ABS audit covers the following main topic areas:

- the number and invasive status of screen-detected breast cancers
- non-operative diagnosis, number of assessment visits, diagnostic open biopsies
- tumour characteristics, 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, and surgical treatment to the axilla
- adjuvant therapy, waiting time for radiotherapy and 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 2010/11 screening year. The cohort of women included was selected to be identical to that included in the statistical KC62 reports for 2010/11, 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 2009 to 31 March 2010 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 2009/10 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 January 1990 and 31 December 1991 (with up to 20 years follow-up) and details of the women with screen-detected breast cancer screened between 1 April 2005 and 31 March 2006 (with up to six 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 2011.

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 94 screening units were included in the 2010/11 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 small units in 2010/11 varied from 6,002 to 12,409.

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 managed by the Warwickshire, Solihull & Coventry Breast Screening Service.

In each region, 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 2010/11 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 2012.** 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

Referencing this Document

This document should be cited in the following way: *"An audit of screen-detected breast cancers for the year of screening April 2010 to March 2011", NHSBSP & ABS, May 2012*.

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 a meeting of the regional breast screening QA directors 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 2010/11 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
Dr Gill Lawrence
Director of Breast Screening Quality Assurance
West Midlands Cancer Intelligence Unit
Public Health Building
The University of Birmingham
Birmingham B15 2TT

Tel: 0121 414 7713
Fax: 0121 414 7714
E-mail: breastqarc@wmciu.nhs.uk

PROVISION OF DATA FOR THE 2010/11 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

2,221,938 women were screened by the UK NHSBSP in England, Wales, Northern Ireland and Scotland between 1 April 2010 and 31 March 2011. 17,838 cancers were detected in women of all ages; 80% were invasive, 19% non-invasive and 1% micro-invasive. The invasive status of 7 cancers was unknown.

In the UK as a whole in 2010/11, the cancer detection rates for all cancers and for small invasive cancers (<15mm in diameter) were 8.0 per 1,000 women screened and 3.3 per 1,000 women screened respectively. Eight screening units have had cancer detection rates for small (<15mm in diameter) cancers below 3.0 per 1,000 women throughout the 3-year period 2008/09-2010/11. Regional QA reference centres should carry out audits with these screening units to ascertain the reasons for these consistently low results. 63% of women with a screen-detected breast cancer were aged between 50 and 64 years when they were invited to attend the screening appointment leading to their diagnosis. 26% of screen-detected breast cancers were diagnosed in women aged 65-70 years. 7.3% of cancers were detected in women aged 70 years or more.

NON-OPERATIVE DIAGNOSIS

In 2010/11, 96% of cancers detected in the UK NHSBSP were diagnosed non-operatively. In the UK as a whole, only 54 cases had C5 cytology only diagnosis. In Northern Ireland, 37% of cancers were diagnosed non-operatively by both C5 cytology and B5 core biopsy. Five units (two in Northern Ireland, two in North East, Yorkshire & Humber and one in Scotland) had a diagnosis rate by both C5 cytology and B5 core biopsy above 40% in 2010/11. Regional QA reference centres should carry out audits with these 5 screening units to ascertain the reason(s) for this unusual clinical practice.

The UK non-operative diagnosis rate for invasive cancers was 99%. All screening units met the 90% minimum standard. Only one unit in East Midlands (at 94.8%) just failed to meet the 95% target. The non-operative diagnosis rate for non-invasive cancers was 85%. The proportion of non-invasive cancers without a non-operative diagnosis varied from 10% in Scotland to 22% in South Central. 49 units had an average non-operative diagnosis rate for non-invasive cancers of less than 85% in the 3-year period 2008/09-2010/11. 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 over this 3-year period. 4 units (in North East, Yorkshire & Humber, North West, South West and Northern Ireland) with particularly low non-operative diagnosis rates for non-invasive cancers also had low cancer detection rates for <15mm invasive cancers in the 3-year period 2008/09-2010/11. Regional QA reference centres should work with these units to determine if opportunities to detect small invasive cancers may have been missed

In 2010/11, invasive disease was found at surgery for 22% of cancers with a B5a (Non-invasive) non-operative diagnosis. Three screening units have had rates significantly higher than the UK average rate in the 3-year period 2008/09-2010/11 and, in 8 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. Regional QA reference centres should ascertain the reason that the invasive component in these cancers was not identified in the core biopsies. 84 cases 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 38 cases 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. 92% of the 51 cancers diagnosed by C5 cytology alone were found to be invasive after surgery. Regional QA reference centres should audit the 4 cases diagnosed by C5 cytology alone that were found to be non-invasive, micro-invasive or “malignant – cytology only” at surgery.

NUMBER OF ASSESSMENT VISITS

92% of women had their B5 or C5 diagnosis result at their only assessment visit. 8% required more than 1 assessment visit to achieve a cancer diagnosis. In 6 screening units (3 in the South West), over 20% of women required more than 1 assessment visit to obtain a B5/C5 non-operative diagnosis result. Regional QA reference centres should audit these cases to determine the reason for this unusual clinical practice. 455 (3%) had an additional core biopsy or cytology sample taken from the same lesion at further assessment visits. Regional QA reference centres should audit these cases. For invasive cancers, there was a 6% increase in the non-operative diagnosis rate when women attended more than one assessment visit, compared to a 16% increase for non/micro-invasive cancers. 12% of women had more than 1 assessment clinic visit recorded. Of these, only 7% required more than 1 visit to get a B5/C5 diagnosis and 5% were recalled back for other investigations and/or visited the service before a core biopsy and/or cytology assessment was performed. The proportion of extra visits varied from 38% in a unit in West Midlands to 0% in 14 units. 830 women (5%) had to visit a screening unit at least once before the visit at which they had their core biopsy and/or cytology assessment, and 237 (3%) were called back for other investigations after all the core biopsy and/or cytology assessments for the lesion of concern were performed.

DIAGNOSTIC OPEN BIOPSIES

2,242 diagnostic open biopsies were performed in 2010/11. Of these 1,532 (68%) were benign and 710 (32%) were malignant. The benign open biopsy rate was 1.73 and 0.48 per 1,000 women screened for prevalent (first) and incident (subsequent) screens respectively. Nine regions exceeded the minimum standard for prevalent (first) screens. Two screening units (one in East of England and one in North West) did not achieve the minimum standard for incident (subsequent) screens. Regional QA reference centres should investigate the reasons for their relatively high prevalent (first screen) and incident (subsequent screen) benign open biopsy rates. The malignant open biopsy rate has fallen from 2.04 per 1,000 women screened in 1996/97 to 0.32 per 1,000 women screened in 2010/11 as the non-operative diagnosis rate has increased from 63% to 96%. The UK benign open biopsy rate has fallen over 15 years from 1.50 per 1,000 women screened in 1996/97 to 0.73 per 1,000 women screened in 2010/11. There were 8 false positive core biopsies recorded in 2010/11. 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.

Twelve 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. Fifteen invasive cancers, 7 non/micro-invasive cancers and 1 case with unknown status diagnosed by open biopsy had no non-operative procedure recorded. Regional QA reference centres and regional surgical QA co-ordinators should audit these 23 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.

Since 2000/01, the proportions of invasive and non/micro-invasive cancers undergoing cytology as the only procedure prior to a diagnostic open biopsy have decreased from 31% to 3% and from 11% to 1%. 34% of invasive cancers and 31% of non/micro-invasive cancers diagnosed by malignant open biopsy following cytology or core biopsy performed during the assessment process had a C4 cytology or B4 core biopsy result indicating suspicion of malignant disease. In East of England, 51% (27 cases) of the non/micro-invasive cancers diagnosed by open biopsy had a B4 core biopsy or C4 cytology result indicating suspicion of malignancy prior to diagnostic surgery. The regional QA reference centre should review these cases. The classification by pathologists of core biopsies which are considered to represent lobular neoplasia as B3 means that, if lobular carcinoma in situ is verified in the surgical specimen, the non-operative diagnosis rate for non-invasive cancers will appear lower than it should be. Increases in C3/B3 diagnoses could also reflect better targeting of calcifications, as B3 results for non/micro-invasive cancers may be atypical intraductal epithelial proliferations resulting from partial sampling of cases of ductal carcinoma in situ. The Sloane Project will continue to collect prospective data on new cases of atypical ductal hyperplasia and lobular in situ neoplasia after the collection of new cases of ductal carcinoma in situ ends on 31 March 2012. Four screening units had C4/B4 rates for

invasive cancers significantly higher than the average rate of 36% in the 3-year period 2008/09-2010/11. Regional QA reference centres should carry out audits with these units to ascertain the reasons for the unusually high proportion of C4/B4 non-operative diagnosis results.

TUMOUR CHARACTERISTICS

Of the 148 non-invasive cancers with grade not assessable, 88% were LCIS alone. The size of 149 non-invasive cancers (4%) was not assessable. 3% of all surgically treated non-invasive cancers had incomplete cytonuclear grade or/and size data. In 9 units, data incompleteness was greater than 10%. Two of the 3 screening units in Wales 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. They should also identify which of their screening units have participated in the Sloane Project so that their good practices and procedures can be used to improve data quality in other units.

37% of the 3,404 surgically treated non-invasive cancers were less than 15mm in diameter and 14% were larger than 40mm. 59% of the surgically treated non-invasive cancers had high cytonuclear grade, 27% had intermediate cytonuclear grade and 10% had low cytonuclear grade. 14 units had significantly higher and 9 units had significantly lower proportions of non-invasive cancers with a high cytonuclear grade over the 3-year period 2008/09-2010/1. 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.

52% of surgically treated cancers had an invasive tumour diameter of less than 15mm. For only 259 cases (2%) was the invasive tumour diameter greater than 50mm. The whole tumour size was not provided for 113 (1%) surgically treated invasive cancers. 19% of the cancers without a whole tumour size were in Wales. Regional QA reference centres should ascertain why this important information was not available from their screening units.

In the UK as a whole, 99% of surgically treated invasive cancers had known nodal status. This varied from 98% in London, South East Coast, North West and Wales to 100% in Northern Ireland. Overall, 23% of invasive cancers had positive nodes; this varied from 14% to 40% 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. 12,444 invasive cancers in England, Wales and Northern Ireland had nodes examined at surgery, and 1,565 (1.3%) had one positive node at the first axillary operation. 1,433 of these had more detailed nodal information. 25 (2%) contained isolated tumour cells, 421 (29%) micro-metastases and 987 (69%) metastases. Regional QA reference centres and regional QA pathology co-ordinators should audit cases where nodes containing isolated tumour cells have been recorded as being node positive as this is not in line with the recommended guidance. The proportion of single positive nodes containing micro-metastases decreased with tumour size (from 36% for cancers with an invasive tumour diameter of less than 15mm to 18% for cancers with an invasive tumour diameter greater than 50mm), and with increasing grade (from 40% for Grade 1 cancers to 25% for Grade 3 cancers). 31% of non-invasive cancers had known nodal status. This varied from 25% in South East Coast to 37% in East Midlands. 85% of non-invasive cancers treated with mastectomy had known nodal status, compared with 10% of those treated with breast conserving surgery. Of the 1,069 non-invasive cancers with known nodal status, 6 were node positive. Three of these cases were in Scotland, where 4% of the non-invasive cancers with known nodal status were node positive.

Overall, 25% of invasive cancers were Grade 1, 53% Grade 2 and 21% Grade 3. Grade was not assessable for 33 cases and unknown for 62 cases. In the Grade 1 control chart, two units have been outliers every year during the 3-year period 2007/08-2009/10. No similar patterns are seen in the Grade 2 and Grade 3 control charts. Local variations in the interpretation of invasive grade definitions should be investigated by regional QA reference centres and regional pathology QA co-ordinators if persistent or suggestive of systemic bias. A Nottingham Prognostic Index (NPI) score could be calculated for 97% of surgically treated invasive cancers. A small number of units have been outliers in NPI control charts every year during the 3-year period 2007/08-2009/10. Regional QA reference centres and their

regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for the unusual NPI distributions and the high proportion of cases with unknown NPI group seen in 2 screening units (one in Wales and one in East of England).

ER status was unknown for 1% of 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. 91% of invasive cancers with known ER status were ER positive. PgR status was known for 66% of invasive cancers compared with 75% in 2007/08. This varied from 34% in East Midlands to 96% in North West. Of the invasive cancers with known PgR status, 75% were positive. 86% of the 1,259 invasive cancers that were known to be ER negative had known PgR status; 4% were PgR positive and 81% were PgR negative. HER-2 status data were available for 97% of invasive cancers. 22% of the invasive cancers without a HER-2 status were in London. In one unit in East of England, 16% of the 164 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, 11% were positive. In one screening unit in South West, 39% of the 231 invasive cancers were HER-2 positive. The regional QA reference centre should audit these cases. 49% of non/micro-invasive cancers had unknown ER status, and 81% of non-invasive cancers with known ER status were ER positive. The proportion of ER negative non/micro-invasive cancers varied widely between screening units. In 12 units, 20% or more of the non/micro-invasive cancers were ER negative. Three of these units were in East Midlands, 3 in North West and 2 in North East, Yorkshire & Humber. 74% of all the ER negative non/micro-invasive cancers were in these 8 units.

SURGICAL TREATMENT

70% of non-invasive cancers were treated with breast conserving surgery. 37 cancers apparently received no surgery. Mastectomy rates for non-invasive cancers varied from 23% in South East Coast and Wales to 36% in East Midlands. Regional QA reference centres and regional surgical QA co-ordinators should audit the 84 large non-invasive cancers and the 14 non-invasive cancers with unknown size that had high or unknown cytonuclear grade that had breast conserving surgery to ensure that they were not under-treated.

In the UK as a whole, 24% of invasive breast cancers had a mastectomy. Mastectomy rates in individual screening units varied between 9% and 57%. Regional QA reference centres and regional surgical QA co-ordinators should audit the 105 cancers without surgery that did not have neo-adjuvant therapy recorded and the 5 cancers with unknown surgery to ascertain why surgical treatment was not given or why the surgical treatment that was given was not recorded. 89% of invasive cancers with an invasive tumour diameter greater than 50mm were treated with mastectomy compared with 16% of small (less than 15mm diameter) invasive cancers. Only 10% of cancers with whole tumour size less than 15mm were treated with mastectomy compared with 89% of small invasive (less than 15mm diameter) cancers with whole tumour diameter greater than 50mm. These data indicate that the presence of in situ disease which extends beyond the invasive lesion accounts for a proportion of the mastectomies performed on small invasive cancers. 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 screening units which had high or low proportions of invasive cancers with whole tumour size <15mm which had a mastectomy.

IMMEDIATE RECONSTRUCTION

23% of screen-detected cancers treated with mastectomy were recorded as having immediate reconstruction in 2010/11. This is similar to the 21% immediate reconstruction rate reported in the *National Mastectomy and Breast Reconstruction Audit Third Annual Report, 2010.* The highest recorded immediate reconstruction rates for all screen-detected cancers were in South East Coast (36%), and the lowest in South Central (15%). 19% of invasive cancers treated with mastectomy were recorded as having immediate reconstruction compared with 36% of non-invasive cancers treated with mastectomy. Immediate reconstruction varied widely between screening units; from 0 cancers in 2 units to 40% of cancers in 9 units. For invasive cancers treated with mastectomy, recorded immediate reconstruction rates varied from 11% in South Central to 32% in South East Coast. For non/micro-

invasive cancers, recorded immediate reconstruction rates varied from 18% in Scotland to 45% in London, East Midlands and South East Coast. 23 screening units had low immediate reconstruction rates for invasive cancers. Of these, 2 in North East, Yorkshire & Humber, 1 in the North West and 1 in Wales also had unusually high mastectomy rates for small (<15mm) 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 clinic practice or patient choice.

NEO-ADJUVANT THERAPY

593 cancers were recorded as having received neo-adjuvant therapy. 581 were invasive and 11 non-invasive. 120 of the 225 women with invasive cancer (2%) who did not have surgery had neo-adjuvant therapy recorded. The use of neo-adjuvant endocrine therapy was highest (4%) for women aged 71 years or more, 36% (19 cases) of whom had no surgery recorded compared to none of the women aged less than 50 years. 258 breast cancers (1% of all cancers diagnosed in 2010/11) had neo-adjuvant chemotherapy recorded; 3 of these were non-invasive. Two of the invasive 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 and the three non-invasive cancers which apparently had neo-adjuvant chemotherapy were recorded correctly. 72 (28%), of the invasive cancers with neo-adjuvant chemotherapy recorded had unknown whole tumour size. 50 of these did not have surgery. 137 (54%) had a tumour size larger than 20mm on mammography. 97 of the 255 invasive cancers with neo-adjuvant chemotherapy recorded had an abnormal axillary ultrasound result. Of these, 85 (88%) had a needle core biopsy and for 69 (81%) a C5/B5 result was recorded. 23 cancers were recorded as having received neo-adjuvant Herceptin; all were HER-2 positive invasive cancers and 22 also had neo-adjuvant chemotherapy recorded. 354 cancers (2%) had neo-adjuvant endocrine therapy recorded, 341 (96%) of these were ER and/or PgR positive, 4 had unknown ER and PgR status and 9 were ER and PgR negative; 75 (21%) had no surgery. 73% of the cancers receiving neo-adjuvant endocrine therapy were aged 60 years or over and 19% were in South East Coast.

SURGICAL CASELOAD

In 2010/11, 592 consultant breast surgeons worked in the UK NHSBSP, and 91% of women were treated by a surgeon with a screening caseload of at least 20 cases. 160 surgeons treated fewer than 10 screen-detected cases in 2010/11. Combining the data submitted for the 3-year period 2008/09-2010/11, 275 surgeons (38%) had an annual average caseload of fewer than 10 cases and 10 treated an average of at least 90 cases per year. The highest proportion of surgeons with a screening caseload of fewer than 10 screening cases per year was in Scotland (57%). Surgical specialisation was highest in Wales, where 27% of surgeons treated fewer than 10 screening cases per year. Of the 275 low caseload surgeons, 26% treated more than 30 symptomatic breast cancers each year. 21 of the 73 surgeons who had a screening caseload of fewer than 10 cases because of private practice were in London. For 14 surgeons who treated a total of 36 women in the 3-year period 2008/09-2010/11, a reason other than one of the 6 listed was given. There was no information to explain the low average annual screening caseload recorded for 57 surgeons who treated a total of 592 women. 23 of these surgeons were in Scotland. 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. 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 NBSS. Currently, only the responsible consultant, and not necessarily the surgeon who actually undertakes the operation, is recorded in this audit. The caseload for some surgeons will thus include patients operated on by associate specialists or supervised trainees.

REPEAT OPERATIONS

4,386 breast cancers (25%) had more than one operation. Regional QA reference centres and regional surgical QA co-ordinators should review the data for the 44 screening units with significantly higher or lower repeat operation rates over the 3-year period 2008/09-2010/11 to ascertain the reasons for their unusual practice. 81% 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 706 surgically treated cancers (with known invasive status) without a non-operative diagnosis was 53%, repeat operations for cancers without a non-operative diagnosis formed only 9% of the total repeat operations. 32 cancers without a non-operative diagnosis, which were not LCIS, had no further surgery

despite the margins being involved or of unknown status. 25 (78%) of these were in Scotland. 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. 25% of invasive cancers and 30% of non/micro-invasive cancers with a non-operative diagnosis had a repeat operation. 19 cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery had more than three therapeutic operations in 2010/11. Six of these were in South East Coast and 5 were in a single unit within this region. Regional QA reference centres and regional surgical QA co-ordinators should audit these 19 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 39 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 2008/09-2010/11.

Invasive cancers with a C5 cytology only diagnosis had the lowest repeat operation rate (17%). 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 26%. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest repeat operation rate (57%).

20% 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 14% in Scotland to 24% in South West. 13% of all cancers with a non-operative diagnosis had repeat breast conserving surgery to clear margins. This varied between 10% in Scotland and 16% in South East Coast, London and South West. In the 3-year period 2008/09-2010/11, 16 screening units and 49 surgeons had unusually high repeat breast conserving surgery rates. 22 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. 11% 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, Scotland and South Central to 14% in London, South West and South East Coast. 26% of invasive cancers and 20% of non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had repeat therapeutic breast conserving surgery to clear margins.

6% of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery, were eventually converted to a mastectomy. 18 screening units and 34 surgeons had unusually high repeat rates and 13 screening units and 19 surgeons had unusually low rates. Regional QA reference centres and regional QA surgeons should review the data for surgeons and screening units with atypical practice. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest conversion of breast conserving surgery to mastectomy (18%). This varied from 4% in South Central and Scotland to 24% in South West, London and East of England. 19% 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. Non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had an initial mastectomy rate of 22%. This varied from 15% in East of England and Wales to 31% in East Midlands. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest initial mastectomy rate (29%). This varied from 16% in East of England to 38% in Scotland. Eight surgically treated invasive cancers diagnosed by C5 cytology only had a mastectomy as their first therapeutic operation. Four (50%) of these cancers were in North East, Yorkshire & Humber and 2 in South Central. Regional QA reference centres and regional surgical QA co-ordinators should audit these 8 cases to determine why cancers with unconfirmed invasive status had a mastectomy as an initial therapeutic operation. 21 units had an overall mastectomy rate above 30% (5 were in North West, 3 in East Midlands and 3 in East of England). Within this group, 5 small units had mastectomy conversion rates in excess of 10% and 13 units (4 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 21 units.

Of the 15,747 cases which had surgery to the breast and were found to be malignant (invasive or non/micro-invasive) at surgery, 81% 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, but only 90% had the margin distance recorded. Of the 11,704 cancers treated with breast conserving surgery, 97% were recorded as having clear margins at their final operation. Of the 4,043 cases treated with a mastectomy, 97% were recorded as having clear margins at their final operation. Regional QA reference centres should audit the 361 cases recorded as not having had clear margins at the final operation and the 137 cases where the

final margin status was recorded as unknown to ensure that they were not under-treated.

THE AXILLA

In the UK excluding Scotland, 11,482 (71%) cases had a record of an axillary ultrasound at assessment. 87% were confirmed to be invasive after surgery and 12% non-invasive. Overall, 78% of the invasive cancers and 46% of non-invasive cancers had axillary ultrasound recorded. For 10 units (4 of which were small), fewer than 50% of invasive breast cancers had an axillary ultrasound result recorded. Regional QA reference centres should work with these units to ensure that these data are recorded. Of the 1,529 invasive cancers with an axillary ultrasound result recorded, 757 were node positive at surgery, giving a positive predictive value of an abnormal ultrasound of 50%. 15% of the invasive cancers having an axillary ultrasound examination had an abnormal ultrasound result. This varied from 8% in South Central to 28% in Northern Ireland. 90% of invasive cancers with an axillary ultrasound result recorded had an axillary node sample (core biopsy or cytology). Regional QA reference centres should audit the 155 cases where an abnormal ultrasound result was apparently not followed up with a needle biopsy.

Of the 1,374 cancers with an abnormal ultrasound result which had an axillary node biopsy, 38% had a C5/B5 diagnosis; this varied from 19% in Northern Ireland to 60% in East of England. In one screening unit in North West 3 out of 5 cancers had a C4/B4 diagnosis. In 12 screening units (3 of which were in West Midlands) more than 20% of invasive cancers had C1/B1 recorded as the worst axillary biopsy result. Regional QA reference centres and regional QA radiology and pathology co-ordinators should audit the data for screening units with high proportions of invasive cancers with C1/B1 and C2/B2 to C4/B4 recorded as the worst axillary biopsy result. 96 invasive breast cancers with a normal ultrasound result had an axillary node biopsy, of these, 16 had a C5/B5 diagnosis (5 were in 1 unit in South Central), 62 had C2/B2 diagnoses (26 were in 1 unit in East of England and 8 in 1 unit in Northern Ireland), and 17 had an inadequate or normal sample (C1/B1) (6 were in 1 unit in East of England). Regional QA reference centres and regional QA radiology and pathology co-ordinators should audit the data for screening units with high proportions of invasive cancers with normal ultrasound results which had C1/B1, C2/B2 or C5/B5 diagnoses recorded as the worst axillary biopsy result. Of the 522 invasive cancers with a C5/B5 diagnosis with abnormal ultrasound and the 16 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 419 and 13 respectively had no neo-adjuvant therapy recorded and had axillary surgery. Of these, 420 were node positive at surgery (giving an overall positive predictive value of a C5/B5 of 97%. Of the 67 C5/B5 invasive cancers with a normal or abnormal ultrasound result and with neo-adjuvant therapy and axillary surgery recorded, 55 (82%) had positive nodes at surgery.

Of the 419 invasive cancers with a C5/B5 result which did not have neo-adjuvant therapy, 11 (3%) had false positive results, i.e. were node negative at surgery. Regional QA reference centres had checked that these cases were not data recording errors before they submitted the data. Axillary ultrasound failed to accurately identify positive nodes for 232 invasive breast cancers; 68 had a C1/B1 diagnosis and 164 a C2/B2 to C4/B4 diagnosis. Of the 2,645 invasive cancers without neo-adjuvant therapy recorded confirmed to be node positive on surgery, 436 (16%) had positive nodes diagnosed pre-operatively by means of needle biopsy. This is similar to the proportion of positive nodes found at surgery (19%) for the 11,972 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.

Of the 13,814 invasive cancers with axillary surgery, 76% had a SLNB. This varied from 66% in South East Coast to 85% in South West and London. The use of SLNB has increased by 9% since 2009/10. Regional QA reference centres and regional surgical QA co-ordinators should ensure that SLNB is used in all of their screening units. A SLNB procedure was recorded for 10,535 invasive cancers (76%) with axillary surgery. Of these, 72% had the full dual SLNB procedure using isotope and blue dye recorded. This varied from 37% in East of England to 91% in North East, Yorkshire & Humber. 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. Six 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 low use of SLNB in some units.

In 2010/11, the proportion of invasive breast cancers with fewer than four nodes examined increased to 49.5%. 47.4% of these involved a SLNB procedure, leaving an underlying rate of 2.1% with fewer than four nodes examined when a SLNB procedure was not used. 91% of the 3,279 invasive cancers, which

either did not have a SLNB procedure or an unknown nodal procedure, had four or more nodes taken. This varied from 71% in Wales to 98% in Northern Ireland. 20 screening units did not meet the 90% minimum standard. Three units in South West had a high proportion of cases with an unknown axillary procedure. Regional QA reference centres and regional surgical QA co-ordinators should audit all the invasive cancers without a SLNB or where the type of axillary procedure used was unknown which had fewer than four nodes reported to ensure that the axilla was not under-treated.

Of the 13,811 invasive breast cancers with known nodal status, 3,128 (23%) had positive nodes. The proportion of cases with positive nodal status (17%) was lower for cases which underwent a SLNB procedure compared with cases which did not have a SLNB procedure (42%). This could be due to the selection of patients for axillary sampling or clearance, who were thought 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. 28 invasive cancers had their positive nodal status determined on the basis of fewer than four nodes without a SLNB procedure, and 191 cancers from a SLNB procedure which had fewer than four nodes taken. 187 of the latter cancers had no subsequent axillary procedure(s) recorded. Of theses 187 cases, 26 (14%) had an invasive tumour size of 10mm or less, 51 (27%) were Grade 1, and 37 (20%) were in the Excellent or Good NPI Groups. It is possible, that a significant proportion of the node positive cancers with fewer than 4 nodes examined had micro-metastases, and that further axillary surgery may not have been appropriate. However, regional QA reference centres and regional surgical QA co-ordinators should audit all cancers which may have had insufficient nodal information to ensure that they had an adequate diagnostic work-up. Of the 171 surgically treated micro-invasive cancers, 126 (74%) had known nodal status and 4 were node positive.

Although nodal assessment is not always indicated for non-invasive cancers, 31% had known nodal status. 85% of non-invasive cancers treated with mastectomy had known nodal status, compared with 10% of those treated with breast conserving surgery. Of the 1,069 non-invasive cancers with known nodal status, 6 (1%) was node positive. 78% of non-invasive cancers treated with a mastectomy and 88% 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 units. The maximum numbers of nodes taken for non-invasive cancers treated with breast conserving surgery and mastectomy were 14 and 44 respectively. Regional QA reference centres should audit non-invasive cancers where more than 10 nodes were taken to ascertain why the axilla appears to have been over-treated.

Axillary surgery was performed for 99% of invasive cancers with a B5b (Invasive) core biopsy and 96% of invasive cancers diagnosed by C5 cytology only. 120 invasive cancers with a B5b (Invasive) core biopsy, 36 with a B5a (Non-invasive) core biopsy and 17 without a non-operative diagnosis had no axillary procedure recorded. In London, 10% of B5a (Non-invasive) cancers found to be invasive at surgery had no axillary operation 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 are correct and, if so, why the nodal status was not determined.

Although 95% of invasive cancers with a B5a (Non-invasive) diagnosis had axillary surgery, only 395 (53%) had their axillary surgery at the first operation; this varied from 40% in East of England to 83% in Scotland. Of these 395 cases, 81% had SLNB performed, compared to 75% of those with axillary assessment at later operation. During the period 2008/09-2010/11, 8 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 these 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.

43% of invasive cancers with positive nodal status had a repeat operation to the axilla. This varied from 55% in Wales to 25% in South Central, and from 0% in 2 units to over 60% in 21 units. 37% of invasive cancers with positive nodal status had a repeat operation to the axilla following a SLNB and 6% after an axillary operation which did not involve a SLNB. Overall, 86% of repeat operations on the axilla were carried out on invasive cancers with positive nodal status determined on the basis of SLNB. This varied between 80% in North East, Yorkshire & Humber and 95% in West Midlands. In a small number of units with repeat operation rates above the UK average, the majority of the invasive cancers had their positive

nodal status determined without a SLNB or using an unknown nodal procedure. Regional QA reference centres should audit these invasive cancers to ensure that the nodal operation data for these cases are recorded correctly and to ascertain why the nodal procedure type was not known.

ADJUVANT THERAPY

16,508 cases (97% of all cases) were included in the adjuvant therapy audit. Scotland had the highest proportion of eligible cases (100%). In the West Midlands 11% of cases were excluded because the women were found to have had a previous cancer which might affect the treatment of the audited breast cancer compared with only 2% of women from the other regions. This is worrying as it suggests that these previous cancers are not being correctly identified by other QA reference centres and their local cancer registries. Work is being carried out by the WMCIU Unit to gain further insight into this issue.

80% of invasive cancers, 58% of micro-invasive cancers and 44% of non-invasive cancers had radiotherapy recorded. 27% of the invasive cancers and 16 non/micro-invasive cancers had chemotherapy recorded. Regional QA reference centres should audit these 16 cases to ascertain if this is a data recording issue. Regional reference centres should audit the 107 cases which did not have surgery but had radiotherapy and/or chemotherapy recorded to ascertain whether this is a data recording issue. 87% of invasive cancers and 12% of non-invasive cancers had endocrine therapy recorded. Compared to 2008/09, there was a 7% decrease in the proportion of women with non-invasive breast cancer receiving endocrine therapy, following the publication of the *NICE Clinical Guideline 80 Early and locally advanced breast cancer: Diagnosis and treatment* (2009) which states that Tamoxifen should not be offered 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. 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 90%). 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 79% to 84%) compared with those who had breast conserving surgery.

97% of women aged 50 to 65 years with invasive breast cancer treated with breast conserving surgery received radiotherapy, and there was only 5% decrease in the use of radiotherapy for women aged 71 years and over. Overall, only 34% of women treated with mastectomy had radiotherapy, and there was a gradual decrease in the use of radiotherapy with age. For non-invasive cancer treated by breast conserving surgery, the use of radiotherapy peaked at 69% for women aged 62-64 years and then fell to 51% for those aged older than 70. Only 1% of women with non-invasive cancer treated with mastectomy had radiotherapy. Chemotherapy was the least used adjuvant therapy; being recorded for only 27% of invasive breast cancers. 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 (42% compared with 21%) 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. This may be because a higher proportion of younger women have aggressive, fast growing cancers, but may also indicate a reluctance to prescribe chemotherapy to older women where the risk/benefit balance and clinical effectiveness are less clear. Surgery, radiotherapy and endocrine therapy was the most common treatment pattern for invasive cancers treated with breast conserving surgery, with 70% receiving this treatment combination. 51% of non-invasive breast cancers treated with breast conserving surgery had surgery with radiotherapy. Surgery and endocrine therapy was the most common treatment pattern for invasive cancers treated with mastectomy, with 43% receiving this treatment combination. 89% of non-invasive cancers treated with mastectomy had surgery only.

Overall, 50% of women received radiotherapy within 60 days of their final surgery and 90% within 90 days. 44 women had not received radiotherapy 200 days after their final surgery. Only 42% of women with invasive breast cancer and 32% of women with non-invasive breast cancer had started their radiotherapy within 90 days of their first assessment visit and 221 women (3%) had not started radiotherapy after 200 days. Regional QA reference centres should review all of the cases where radiotherapy was not started within 200 days of their first assessment visit. The longest median times between final surgery and radiotherapy were in South East Coast (69 days), Northern Ireland (69 days), South West (67 days) and Wales (66 days). The median time from final surgery to radiotherapy was 1 day longer for non-invasive cancers overall. In the *Cancer Reform Strategy* published in December 2007, a new 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 units.

96% of invasive cancers treated with breast conserving surgery had radiotherapy recorded, compared to only 60% of conservatively treated non-invasive cancers. 16% of the conservatively treated invasive cancers which did not receive radiotherapy were larger than 20mm in diameter, 13% were Grade 3 and 14% were node positive. In the 3-year period 2007/08-2009/10, 16 screening units had significantly lower rates of radiotherapy for invasive cancers treated with breast conserving surgery. Four of these were in South Central and 4 in London. Further work is being done with these 16 units in order to understand the reasons for this unusual clinical practice. 161 non-invasive cancers without radiotherapy recorded were high cytonuclear grade and 17 were more than 40mm in diameter. In the 3 year period 2007/08-2009/10, 18 units had significantly lower rates of radiotherapy for non-invasive cancers treated with breast conserving surgery. Three were in South East Coast, 4 in South Central and 5 in South West. Given the benefits demonstrated in clinical trials from the provision of radiotherapy following breast conserving surgery, regional QA reference centres should audit all invasive 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. Regional QA reference centres should also ascertain each unit's policy regarding the provision of radiotherapy to non-invasive cancers treated with breast conserving surgery since there is evidence from clinical trials that this can reduce recurrence rates.

32% of node positive invasive cancers did not have chemotherapy recorded. Older women with node positive invasive cancers were less likely to have chemotherapy recorded than younger women; only 25% of women aged less than 65 with node positive invasive cancers did not have chemotherapy recorded compared with 49% of older women. 11% of the node positive invasive cancers which had no chemotherapy diagnosed in women aged less than 65 were Grade 3 and 2% were HER-2 positive; compared with 16% and 7% respectively in women aged 65 and above. Given the relatively small numbers of cancers involved, all regional QA reference centres and regional surgical QA co-ordinators should audit Grade 3 and/or HER-2 positive, node positive invasive cancers with no chemotherapy recorded to determine whether the absence of chemotherapy reflects clinical practice or a data recording error.

499 (4%) ER positive invasive cancers and 14 (32%) ER negative PgR positive invasive cancers did not have endocrine therapy recorded. 11% of the ER positive invasive cancers not treated with endocrine therapy were Grade 3, 9% were node positive and 9% were larger than 20mm in diameter. In 3 screening units, more than 20% of the ER positive cancers did not receive endocrine therapy. Regional QA reference centres and regional surgical QA co-ordinators should audit ER and PgR positive invasive cancers to determine whether the absence of endocrine therapy data is a true reflection of clinical practice or a data recording issue. Overall 90% of ER positive invasive cancers in the EPG had endocrine therapy. 15 screening units had significantly smaller numbers of EPG cancers treated with endocrine therapy in the 3-year period 2007/08-2009/10. Three of these were in East Midlands and 4 in East of England. Regional QA reference centres and regional surgical QA co-ordinators should work with these 15 units to establish the reason for this unusual clinical practice. The proportion of non/micro-invasive cancers with endocrine therapy recorded varied markedly between regions from 4% in Scotland to 25% in Northern Ireland and North West. The proportion of ER positive non/micro-invasive cancers with endocrine therapy recorded decreased overall from 37% in 2008/09 to 26% in 2009/10. Similar decreases occurred in most regions; the exception being South Central where a 13% increase was apparent. Part of the variation between regions and units may be due to trial participation. Given the potential side effects of endocrine treatment, regional QA reference centres and regional surgical QA co-ordinators should determine the reasons why endocrine therapy appears to have been given to cancers with unknown or negative ER/PgR status.

Of the 22 ER negative, node positive invasive cancers which had no chemotherapy recorded, 12 (55%) were Grade 3, and 8 (36%) were HER-2 positive. Given the relatively small numbers of cancers involved, regional QA reference centres and regional surgical QA co-ordinators should audit the ER negative node positive invasive cancers with no chemotherapy recorded to determine whether the absence of chemotherapy treatment data is a true reflection of clinical practice or a data recording issue.

39 (10%) HER-2 and node positive cancers did not have chemotherapy recorded. 23 of these were greater than 20mm in diameter and 19 were Grade 3. Regional QA reference centres and regional surgical QA co-ordinators should audit HER-2 and node positive cancers with no chemotherapy recorded to determine whether the absence of chemotherapy reflects clinical practice or a data recording issue.

SURVIVAL

Of the 8,705 cancers submitted to the survival analysis for the period 1 January 1990 to 31 December 1991, 265 were excluded because they were not registered at the cancer registries. A further 120 were excluded because they were not confirmed to be primary tumours and 55 because their invasive status was not known. Of the 15,386 cancers in the 2005/06 cohort, 112 were not registered, 324 were not first primary breast cancers and 2 had unknown invasive status. 20-year relative survival for women with screen-detected invasive breast cancer who were diagnosed in 1990/91 is 78.9%. Women with screen-detected invasive breast cancer diagnosed in South East Coast and South West have statistically significantly higher 20-year relative survival rates. 5-year relative survival for screen-detected invasive breast cancer has improved significantly from 93.7% for women screened in 1990/91 to 97.9% for women screened in 2005/06.

The 20-year relative survival of women with less than 15mm diameter invasive breast cancers is 87.3% compared 55.4% for women with tumours with a diameter greater than 50mm. 20-year survival for women with a Grade 1 invasive breast cancer is 88.2%, compared to 63.2% for those with a Grade 3 invasive breast cancer. Women with positive nodal status have a 20-year survival rate of 57.9%, compared to 85.7% for those with negative nodal status. The 20-year relative survival rates for women with cancers in the EPG, GPG and MPG1 in the 1990/91 cohort are 93.8%, 83.7% and 75.7% respectively. At 61%, the 20-year relative survival rate for the 4% of women with cancers in the MPG2 is significantly worse than that of women with cancers in the EPG, GPG and MPG1 groups. The 5-year relative survival rates for the 3% of women with cancers in the PPG is even lower at 27.1%, There are marked and statistically significant increases in the 5-year relative survival rates for GPG (2%), MPG1 (4%), MPG2 (13%) and PPG (24%) cancers between 1990/91 and 2005/06. These improvements in survival, particularly the 24% increase in the PPG cancers, are almost certainly due to the development and use of new adjuvant treatments.

TOPICS TO BE AUDITED BY REGIONAL QA REFERENCE CENTRES

Topic	Region/unit (number	Reference
<15mm invasive detection rate below 3.0 per 1000 women screened - outliers every year over the most recent 3 year period	8 screening units	Ch1 P21
High proportion of cases diagnosed with both cytology and core biopsy (more than 40%)	5 screening units	Ch2 P24
Low non-operative diagnosis rate for non-invasive cancers in 3-year rolling data - 85% minimum standard	49 screening units	Ch2 P26
Low non-operative diagnosis rate for non-invasive cancers and low <15mm invasive detection rate - in 3-year data	4 screening units	Ch2 P26
B5a cancers which become invasive after surgery - outliers in 3-year rolling data	3 screening units	Ch2 P27
At least 50% of B5a cancers (invasive after surgery) with ≥10mm invasive size in 3-year rolling data	8 screening units	Ch2 P28
C5 only diagnosis found to be not invasive at surgery	4 cases	Ch2 P29
Over 20% of patients required more than 1 assessment visit to obtain a B5/C5 non-operative diagnosis result	6 screening units	Ch2 P30
Additional core biopsy or cytology sample taken from the same lesion at further assessment visits	455 cases	Ch2 P30
Benign open biopsy rate exceeds the minimum standard (<15 per 10,000 women screened) for prevalent (first) screens	9 regions	Ch2 P32
Benign open biopsy rate exceeds the minimum standard (<10 per 10,000 women screened) for incident (subsequent) screens	2 screening units	Ch2 P32
False positive cytology and core biopsy cases	8 cases	Ch2 P33
Mastectomy as diagnostic open biopsy	12 cases	Ch2 P33

Topic	Region/unit (number	Reference
No non-operative diagnosis results	23 cases	Ch2 P34
High proportion of C4 and/or B4 cytology/core biopsy diagnosis prior to non/micro-invasive diagnosis in open biopsy	East of England (27 cases)	Ch2 P34
High proportion of C4 and/or B4 cytology/core biopsy diagnosis prior to invasive diagnosis in open biopsy - outliers in 3-year rolling data	4 screening units	Ch2 P35
Unknown size/grade for non-invasive cancers	107 cases	Ch3 P38
High/low proportion of non invasive cancers with a high cytonuclear grade - outliers in 3-year rolling data	23 screening units	Ch3 P40
Unknown invasive whole tumour size information	113 cases	Ch3 P40
Positive nodes containing isolated tumour cells	25 cases	Ch3 P42
Interpretation of invasive grade definition - outliers every year over the most recent 3 year period	2 screening units	Ch3 P44
Significant variance in proportion of cancers in NPI groups - outliers every year over the most recent 3 year period	2 screening units	Ch3 P45
High proportion of cases with unknown NPI group	2 screening units	Ch3 P45
Availability of ER status for all invasive cancers	89 cases	Ch3 P47
Availability of HER-2 data for all invasive cancers	361 cases	Ch3 P47
HER-2 positivity above 25% for invasive cancers	1 screening unit	Ch3 P47
Large non-invasive cancers treated with breast conserving surgery	84 cases	Ch4 P49
Non-invasive cancers with unknown size and high/unknown grade treated with breast conserving surgery	14 cases	Ch4 P49
No surgery for invasive cancers without/with unknown neo-adjuvant therapy	105 cases	Ch4 P50
Unknown surgery for invasive cancers	5 cases	Ch4 P50
Mastectomy rate for small invasive cancers - outliers in 3-year rolling data	15 screening units	Ch4 P52
Low proportion of mastectomy cases having immediate reconstruction - outliers in 3-year rolling data	23 screening units	Ch4 P55
Non-invasive cancers with neo-adjuvant chemotherapy recorded	3 cases	Ch4 P57
Small, grade 1 with no abnormal lymph nodes invasive cancers with neo-adjuvant chemotherapy	2 cases	Ch4 P57
Satisfactory treatment for low screening caseload surgeons - in 3-year rolling data	275 surgeons	Ch5 P60
High/low repeat operation rates by unit - outliers in 3-year rolling data	44 screening units	Ch6 P62
No repeat operation for cancers with not clear/unknown margin status at initial diagnostic BCS - LCIS cases excluded	32 cases	Ch6 P63
More than 3 operations for cases with initial therapeutic BCS	19 cases	Ch6 P63
High/low repeat operation rates by unit after initial therapeutic BCS - outliers in 3-year rolling data	39 screening units	Ch6 P63
High/low repeat operation rates by surgeon after initial therapeutic BCS - outliers in 3-year rolling data	95 surgeons	Ch6 P65
High/low repeat BCS by unit after initial therapeutic BCS - outliers in 3-year rolling data	38 screening units	Ch6 P73
High/low repeat BCS by surgeon after initial therapeutic BCS - outliers in 3-year rolling data	84 surgeons	Ch6 P74

Topic	Region/unit (number of cases affected)	Reference
High/low BCS to mastectomy by unit after initial therapeutic BCS - outliers in 3-year rolling data	31 screening units	Ch6 P76
High/low BCS to mastectomy by surgeon after initial therapeutic BCS - outliers in 3-year rolling data	53 surgeons	Ch6 P77
Initial therapeutic mastectomy carried out on C5 only invasive cancers	8 cases	Ch6 P78
Overall mastectomy rate above 30%	21 screening units	Ch6 P79
Final margin status not clear or unknown	361 cases (not clear) 137 cases (unknown)	Ch6 P81
Low proportion of invasive cancers with axillary ultrasound (less than 50%)	10 screening units	Ch7 P83
Invasive cancers with an abnormal ultrasound result and no axillary biopsy	155 cases	Ch7 P83
High proportion of invasive cancers with an abnormal ultrasound which had C1/B1 recorded as the worst axillary biopsy result (more than 20%)	12 screening units	Ch7 P84
High proportion of invasive cancers with an abnormal ultrasound which had C2/B2-C4/B4 recorded as the worst axillary biopsy result (more than 50%)	26 screening units	Ch7 P84
High proportion of invasive cancers with a normal ultrasound which had C1/B1, C2/B2 or C5/B5 recorded as the worst axillary biopsy result	3 screening units	Ch7 P84
Low proportion of cases with a SLNB (less than 50%)	15 screening units	Ch7 P86
Units not using full dual SLNB technique	All regions	Ch7 P86
Less than 4 nodes obtained without/unknown SLNB	286 cases	Ch7 P89
Positive nodal status determined by less than 4 nodes and no sentinel lymph node biopsy procedure	28 cases	Ch7 P90
>10 nodes taken for non-invasive cancers	28 cases	Ch7 P93
Invasive cancers with no surgery to the axilla	180 cases	Ch7 P95
High proportion of B5a to invasive cancers with no surgery to the axilla	London (8 cases)	Ch7 P97
B5a to invasive cancers with axillary surgery at first operation - outliers in 3-year rolling data	14 screening units	Ch7 P97
High repeat operation rates to the axilla without SLNB/unknown nodal procedure type (more than 30%)	4 screening units	Ch7 P99
Non/micro-invasive cancers with chemotherapy recorded	16 cases	Ch8 P102
Cancers with no surgery and with radiotherapy recorded	46 cases	Ch8 P102
Invasive cancers with no surgery and with chemotherapy recorded	61 cases	Ch8 P102
Radiotherapy waiting time for invasive and non-invasive cases without chemotherapy (over 200 days after first assessment visit)	260 cases	Ch8 P106
Invasive with BCS and no radiotherapy	384 cases	Ch8 P111
Ascertain each unit's policy regarding the provision of radiotherapy to non-invasive cancers treated with BCS	All screening units	Ch8 P111
No chemotherapy for Grade 3 and/or HER-2 positive, node positive invasive cancers	137 cases	Ch8 P113
Low proportion of ER positive invasive EPG cancers receiving endocrine therapy - outliers in 3-year rolling data	15 screening units	Ch8 P114
No endocrine therapy for ER negative PgR positive invasive cancers	14 cases	Ch8 P115
Endocrine therapy given to cancers with ER/PgR negative/unknown status	127 cases	Ch8 P115
ER negative, node positive invasive cancers without chemotherapy	22 cases	Ch8 P116
No chemotherapy for HER-2 positive, node positive invasive cases	39 cases	Ch8 P117
Regions 5% or more above UK average in the five adjuvant summary propositions	7 regions	Ch8 P118

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 2010/11 UK NHSBSP & ABS audit examines surgical activity undertaken for the 2,221,938 women screened in England, Wales, Northern Ireland and Scotland between 1 April 2010 and 31 March 2011. 94 screening units in the UK were included in the audit. The number of women screened varied from 6,002 in a screening unit in South Central (where 60 cancers were detected) to 64,639 in a screening unit in Scotland (where 630 cancers were detected).

In 2010/11, 17,838 cancers were detected in women of all ages, 14,219 (80%) were invasive, 3,441 (19%) were non-invasive and 171 (1%) were micro-invasive. The invasive status of 7 cancers was unknown. Figure 1 shows the number of invasive and non/micro-invasive cancers and cancers with unknown invasive status detected in each region. In the Isle of Man, a total of 39 cancers were detected. Due to the small numbers, data for the Isle of Man have only been included in Chapter 1.

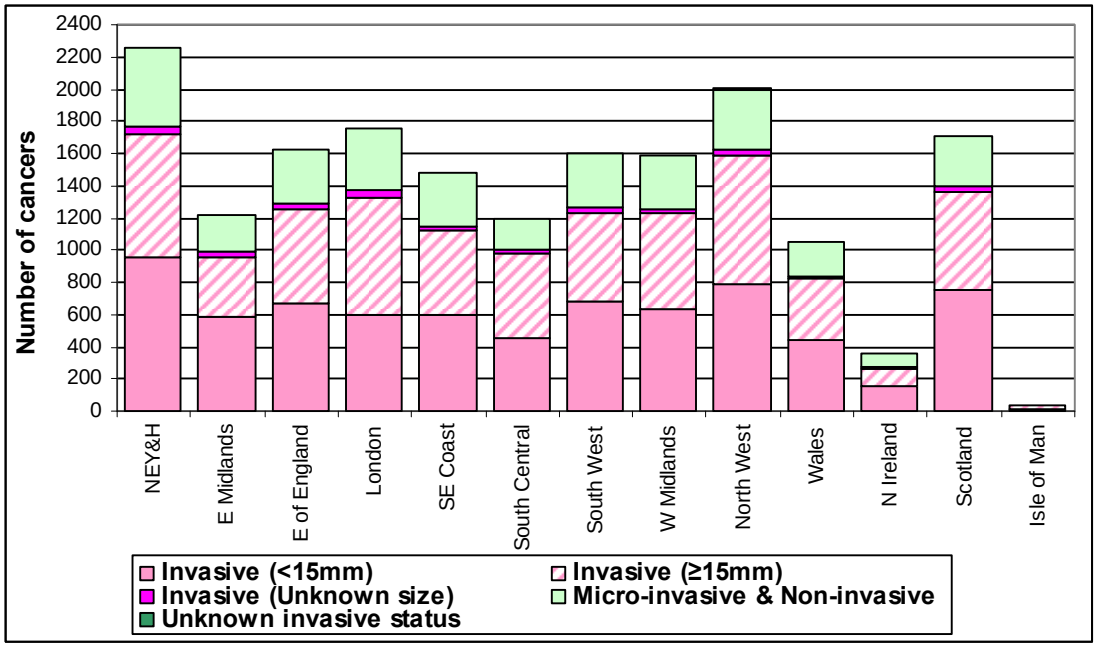

Figure 1 (Table 1): Variation in the number and invasive status of screen-detected breast cancers in each region and country contributing to the 2010/11 NHSBSP & ABS audit

The following summary table shows that total and invasive cancer detection rates increased gradually from 1996/97 to 2001/02, and then rose steeply from 2001/02 to 2003/04. The latter probably reflects the impact of the introduction of two views at incident screen. After 2003/04, the total and invasive cancer detection rates changed very little, levelling off at around 8.1 per 1,000 women screened and around 6.4 per 1,000 women screened respectively. In 2010/11, the number of women screened rose by 4% compared with 2009/10, and the number of cancers found increased by 5%. The cancer detection rate in 2010/11 for all cancers was 8.0 per 1,000 women screened. This varied from 7.5 per 1,000 women screened in East Midlands and London to 9.7 per 1,000 women screened in Wales.

15 YEAR COMPARISON: NUMBER OF CANCERS DETECTED

Year of data collection	Number of invasive cancers	Number of non/ micro-invasive cancers	Total cancers	Number of women screened	Cancer detection rates per 1,000 women screened		
					Invasive	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	2,080	10,079	1,535,019	5.2	1.4	6.6
2001/02	7,911	2,218	10,191	1,507,987	5.2	1.5	6.8
2002/03	8,931	2,416	11,593	1,579,165	5.7	1.5	7.3
2003/04	10,400	2,868	13,290	1,685,661	6.2	1.7	7.9
2004/05	11,063	2,953	14,040	1,748,997	6.3	1.7	8.0
2005/06	12,600	3,317	15,944	1,942,449	6.5	1.7	8.2
2006/07	12,491	3,337	15,856	1,955,825	6.4	1.7	8.1
2007/08	13,305	3,466	16,792	2,042,497	6.5	1.7	8.2
2008/09	13,532	3,491	17,045	2,116,588	6.4	1.6	8.1
2009/10	13,672	3,333	17,013	2,133,189	6.4	1.6	8.0
2010/11	14,219	3,612	17,838	2,221,938	6.4	1.6	8.0

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

Invasive cancer detection rates varied between 5.8 per 1,000 women screened in Northern Ireland and 7.7 per 1,000 women screened in Wales and Scotland. The UK cancer detection rate for non/ micro-invasive cancers was 1.6 per 1,000 women screened. This varied from 1.3 per 1,000 women screened in South Central to 2.0 per 1,000 women screened in Wales.

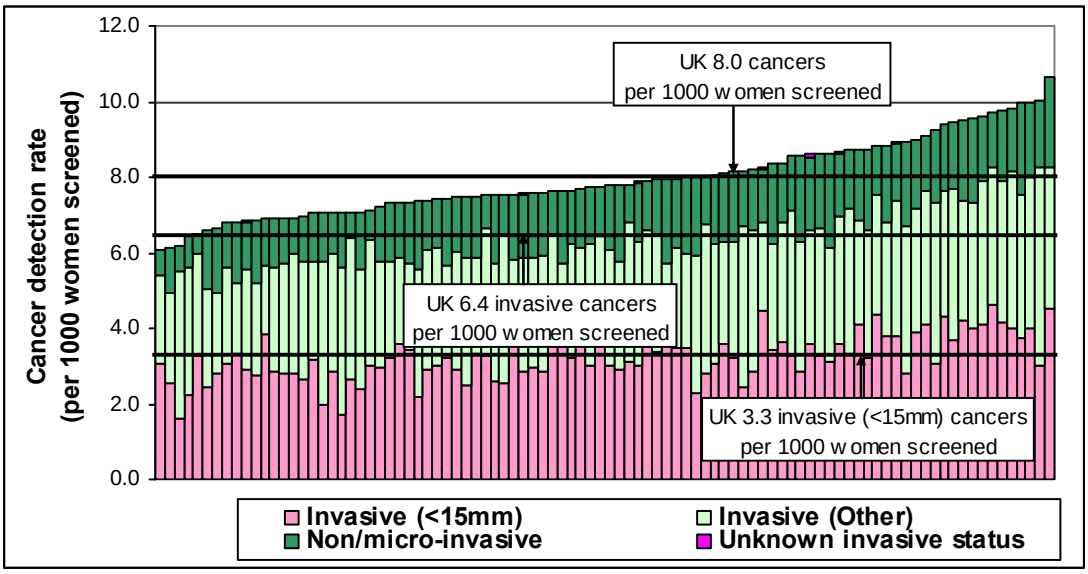

Figure 2: Variation with screening unit in cancer detection rates expressed as the number of cancers detected per 1,000 women screened

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 14,668 women to 10.6 per 1,000 women screened in a unit screening 8,376 women annually. In four 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 3.3 per 1,000 women screened; varying between 1.6 per 1,000 women screened in a screening unit in North East, Yorkshire & Humber and 4.6 per 1,000 women screened in a screening unit in Scotland. Eight

screening units (two in South Central, two in London, two in North West, one in South West and one in North East, Yorkshire & Humber) have had cancer detection rates for small (<15mm in diameter) cancers below 3.0 per 1,000 women throughout the 3-year period 2008/09-2010/11. Regional QA reference centres should carry out audits with these screening units to ascertain the reasons for these consistently low results.

1.2 Age Profile of Women with Screen-Detected Breast Cancer

The second age expansion of the NHSBSP in England to screen women aged 47 to 49 and 71 to 73 was rolled out from 2010. Only 6 screening units had expanded prior to April 2010; 5 of these were pilot sites. By the end of March 2011, 34 screening units in England had started the age expansion. The table below shows a slight increase in the proportion of women in the age groups 47 to 49 and 71 to 73 in 2010/11 compared with previous years.

AGE DISTRIBUTION OF SCREEN-DETECTED BREAST CANCERS (%)

Age	*2008/09*	*2009/10*	*2010/11*
<47	0.0	0.1	0.1
47-49	1.6	2.0	2.8
50-64	66.6	65.0	63.3
65-70	25.5	26.2	26.4
71-73	2.8	2.9	3.4
74+	3.4	3.8	3.9
Total	***100***	***100***	***100***

Figure 3 shows how the age at screening appointment varied with UK audit region. Wales, Northern Ireland and Scotland have no plans to implement the second age expansion. Figure 3 and Table 2 clearly demonstrate the relatively small proportion (2%) of cancers in Northern Ireland detected in women aged 70 and over. However, in Scotland in 2010/11, 8% of cancers were detected in these older women, which is slightly more than the UK average.

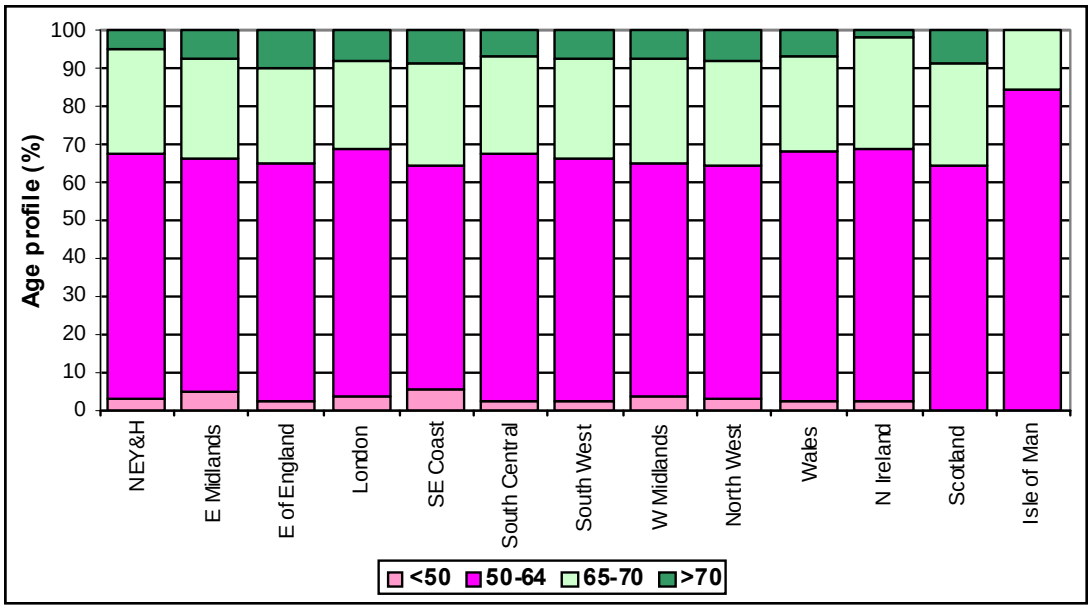

Figure 3 (Table 2): Age at screening appointment

KEY FINDINGS:

- 2,221,938 women were screened by the UK NHSBSP in England, Wales, Northern Ireland and Scotland between 1 April 2010 and 31 March 2011.
- 17,838 cancers were detected in women of all ages; 80% were invasive, 19% non-invasive and 1% micro-invasive. The invasive status of 7 cancers was unknown.
- In the UK as a whole in 2010/11, the cancer detection rates for all cancers and for small invasive cancers (<15mm in diameter) were 8.0 per 1,000 women screened and 3.3 per 1,000 women screened respectively.
- Eight screening units have had cancer detection rates for small (<15mm in diameter) cancers below 3.0 per 1,000 women throughout the 3-year period 2008/09-2010/11. Regional QA reference centres should carry out audits with these screening units to ascertain the reasons for these consistently low results.
- 63% of women with a screen-detected breast cancer were aged between 50 and 64 years when they were invited to attend the screening appointment leading to their diagnosis.
- 26% of screen-detected breast cancers were diagnosed in women aged 65-70 years. 7.3% of cancers were detected in women aged 70 years or more.

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 2 in 2010/11. These cancers are only included in Table 3.

In 2010/11, 96% of cancers detected in the UK NHSBSP were diagnosed non-operatively. The following summary table shows that over the last 15 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 91% in the proportion of cancers diagnosed by B5 core biopsy alone.

15 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*

*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 B5 core biopsy alone, by both C5 cytology and B5 core biopsy and by C5 cytology only, varied between regions. In Northern Ireland, 37% of cancers were diagnosed non-operatively by both C5 cytology and B5 core biopsy (132 cancers). Relatively high numbers of cancers were diagnosed by both C5

cytology and B5 core biopsy in North East, Yorkshire & Humber (337 cancers) and in Scotland (164 cancers). In Northern Ireland, the proportion of C5 cytology only cases has decreased from 9% in 2009/10 to 2% in 2010/11. In the UK as a whole, only 54 cases had a C5 cytology only diagnosis.

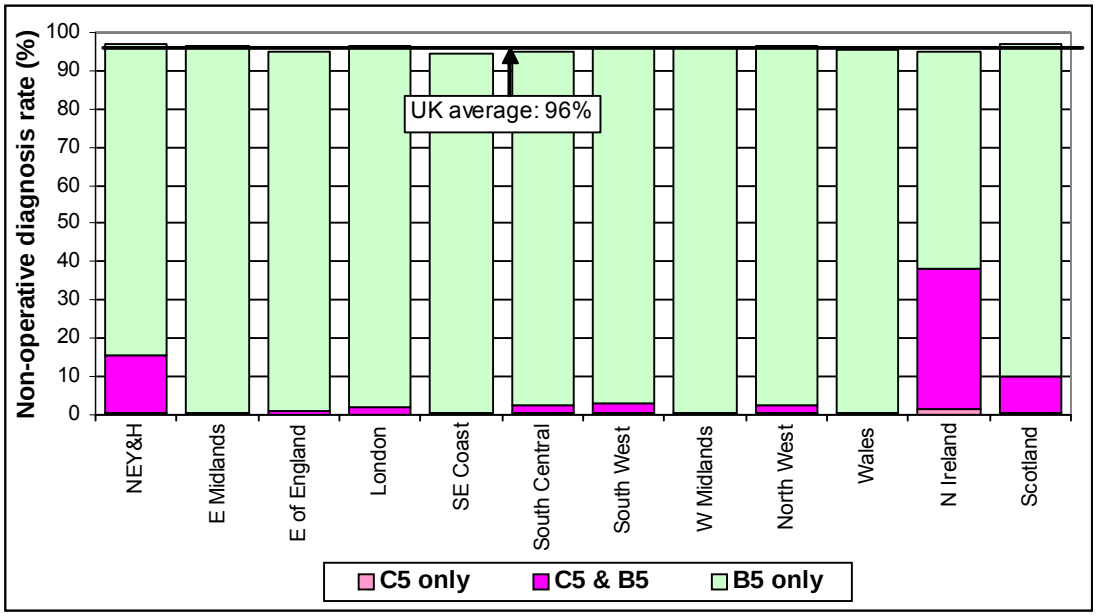

Figure 4 (Table 4): Variation in non-operative diagnosis rate and the proportion of cancers detected by cytology alone, core biopsy alone or cytology and core biopsy as a percentage of cancers detected

Figure 5 shows how the non-operative diagnosis rate and the proportion of cancers diagnosed by B5 core biopsy alone, by both C5 cytology and B5 core biopsy, and by C5 cytology only varied between screening units in 2010/11.

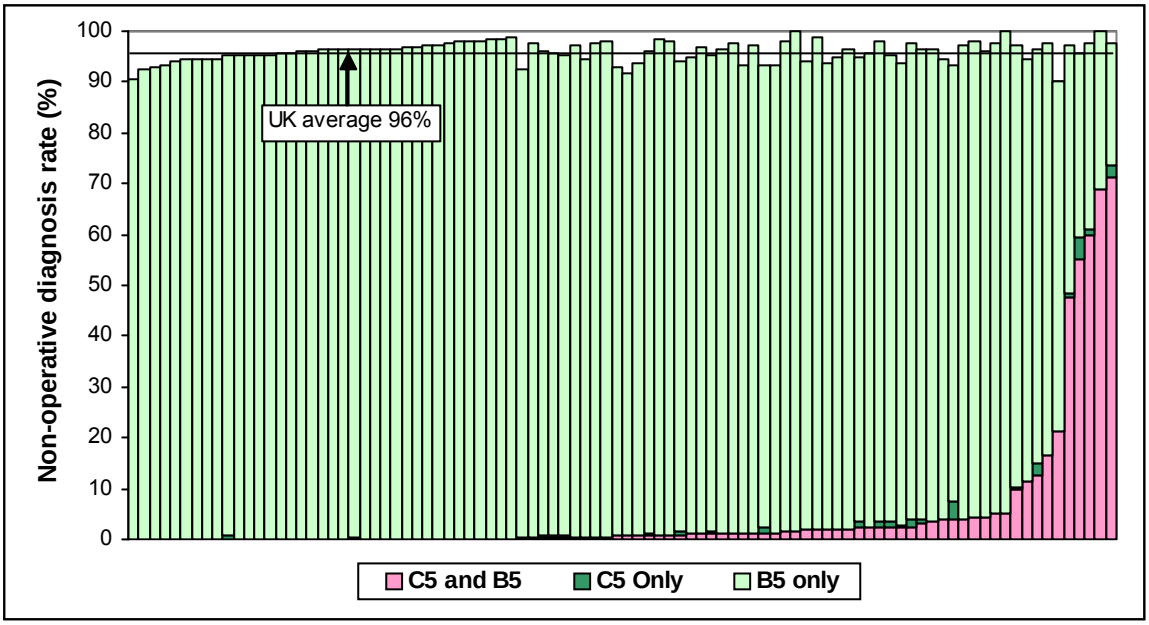

Figure 5: Variation between screening units in non-operative diagnosis rate and in the proportion of cancers detected by cytology alone, core biopsy alone or cytology and core biopsy as a percentage of cancers detected

Five units (two in Northern Ireland, two in North East, Yorkshire & Humber and one in Scotland) had a diagnosis rate by both C5 cytology and B5 core biopsy above 40% in 2010/11. For the majority (99%) of the cases in the 5 screening units, the cytology and core biopsy were carried out at the same assessment visit. Regional QA reference centres should carry out audits with these 5 screening units to ascertain the reason(s) for this unusual clinical practice. The four screening units (one in Northern Ireland and three in North West), which had C5 only diagnosis rates above 15% in 2009/10, have reduced their C5 only diagnosis rates to less than 5% in 2010/11.

KEY FINDINGS:

- In 2010/11, 96% of cancers detected in the UK NHSBSP were diagnosed non-operatively.
- In the UK as a whole, only 54 cases had C5 cytology only diagnosis. In Northern Ireland, 37% of cancers were diagnosed non-operatively by both C5 cytology and B5 core biopsy. Five units (two in Northern Ireland, two in North East, Yorkshire & Humber and one in Scotland) had a diagnosis rate by both C5 cytology and B5 core biopsy above 40% in 2010/11. Regional QA reference centres should carry out audits with these 5 screening units to ascertain the reason(s) for this unusual clinical practice.

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	**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 196 invasive cancers did not have a non-operative diagnosis (Table 5). All screening units met the 90% minimum standard. Only one unit in East Midlands (at 94.8%) just failed to meet the 95% target. In 26 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	**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 2010/11, the UK's non-operative diagnosis rate for non-invasive cancers was 85%. It is the first year that the national average has met the minimum standard. However, 503 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 Scotland to 22% in South Central. 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. Changes in the non-operative diagnosis rate for non-invasive cancers do not show a consistent trend across regions. Since 2008/09, non-operative diagnosis rates have increased in 6 regions and decreased in 5 regions. None of these changes are statistically significant.

3 YEAR SUMMARY: NON-OPERATIVE DIAGNOSIS RATES FOR NON-INVASIVE CANCERS				
Region	**2008/09**	**2009/10**	**2010/11**	**3 Year 2008-11**
N East, Yorks & Humber	*90*	*87*	*88*	*89*
East Midlands	*85*	*87*	*85*	*86*
East of England	*79*	*82*	*83*	*81*
London	*82*	*83*	*88*	*84*
South East Coast	*81*	*83*	*79*	*81*
South Central	*84*	*77*	*78*	*80*
South West	*83*	*82*	*86*	*84*
West Midlands	*84*	*87*	*87*	*86*
North West	*84*	*86*	*87*	*86*
Wales	*91*	*86*	*82*	*87*
Northern Ireland	*82*	*84*	*82*	*82*
Scotland	*87*	*82*	*90*	*86*
United Kingdom	***84***	***84***	***85***	***85***

Figure 6 shows the variation between screening units in the proportion of non-invasive cancers with a non-operative diagnosis. Only 31 screening units achieved the 90% non-operative diagnosis target for non-invasive cancers. 45 units failed to meet the 85% minimum standard. This has decreased from 51 units in 2009/10.

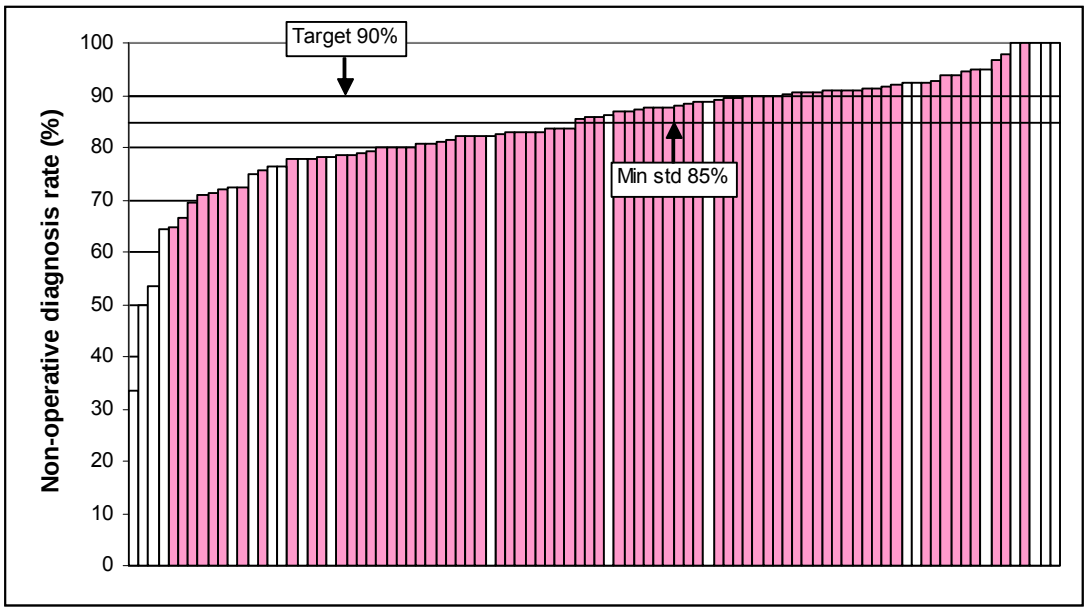

Figure 6: Variation between screening units in the proportion of non-invasive cancers with a non-operative diagnosis (The 20 smallest units are highlighted in white)

49 units had an average non-operative diagnosis rate for non-invasive cancers of less than 85% in the 3-year period 2008/09-2010/11. Eight of these units were in South Central, eight in East of England, six in North West, five in South West, four in South East Coast, four in London, three in West Midlands, three in Northern Ireland, three in North East, Yorkshire & Humber, three in East Midlands, one in Wales and one in Scotland. 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 over this 3-year period.

In general there was no obvious relationship between low non-operative diagnosis rates for non-invasive cancers and the detection rates for <15mm invasive cancers. However, 4 units (in North East, Yorkshire & Humber, North West, South West and Northern Ireland) with particularly low non-operative diagnosis rates for non-invasive cancers also had low cancer detection rates for <15mm invasive cancers in the 3-year period 2008/09-2010/11. Regional QA reference centres should work

with these units to determine if, as suggested by these data, opportunities to detect small invasive cancers may have been missed.

KEY FINDINGS:

- The UK non-operative diagnosis rate for invasive cancers was 99%. All screening units met the 90% minimum standard. Only one unit in East Midlands (at 94.8%) just failed to meet the 95% target.
- The non-operative diagnosis rate for non-invasive cancers was 85%. The proportion of non-invasive cancers without a non-operative diagnosis varied from 10% in Scotland to 22% in South Central.
- 49 units had an average non-operative diagnosis rate for non-invasive cancers of less than 85% in the 3-year period 2008/09-2010/11. 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 over this 3-year period.
- 4 units (in North East, Yorkshire & Humber, North West, South West and Northern Ireland) with particularly low non-operative diagnosis rates for non-invasive cancers also had low cancer detection rates for <15mm invasive cancers in the 3-year period 2008/09-2010/11. Regional QA reference centres should work with these units to determine if opportunities to detect small invasive cancers may have been missed.

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 17,074 cancers with a B5 diagnosis, 3,774 (22%) were B5a (Non-invasive) and 13,169 (77%) were B5b (Invasive) at core biopsy. The proportion of cancers with a B5a (Non-invasive) diagnosis varied from 17% in South Central to 26% in Northern Ireland. 131 (1%) cancers had invasive status B5c (Not Assessable or Unknown) at core biopsy (Table 7), of these, 32 were in North East, Yorkshire & Humber and 26 were in West Midlands. Some units code cases 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 currently 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. 37 of the 3,774 cancers with a B5a (Non-invasive) non-operative diagnosis had no surgery and one case 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 is currently being carried out in order to obtain information on the outcomes for women with non-invasive breast cancer who have received no treatment.

Of the remaining 3,736 cases, 2,764 (74%) had surgical confirmation of non-invasive cancer and 155 (4%) had a diagnosis of micro-invasive cancer at surgery (Table 8). For 744 (20%) cancers, invasive disease was found at surgery. This varied from 16% in North East, Yorkshire & Humber to 23% in South West and Scotland. For 69 (2%) cases, 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 a further 4 cases, the histological status after surgery was unknown.

Figure 7 shows for the 3-year period 2008/09-2010/11, 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). Three screening units (open pink 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 8 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 (green diamonds in Figure 7). Regional QA reference centres should ascertain the reason that the invasive component in these cancers was not identified in the core biopsies.

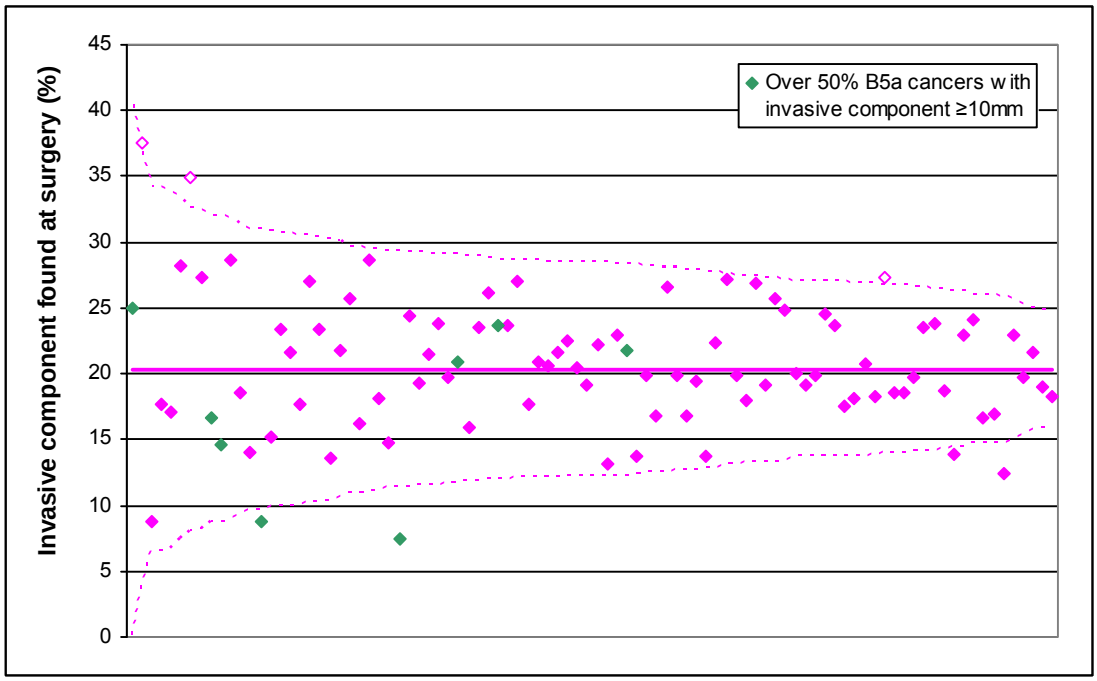

Figure 7: Variation between screening units in the proportion of cancers with a B5a (Non-invasive) non-operative diagnosis found to be invasive at surgery in the 3-year period 2008/09-2010/11 (open diamonds represent units which lie outside the upper control limits)

Of the 13,169 cancers with a B5b (Invasive) non-operative diagnosis, 221 had no surgery and 5 had unknown surgical treatment. 116 (52%) of these cancers with no surgery had neo-adjuvant therapy. In the UK as a whole, 99% (12,809 cases) of the remaining 12,943 cases had surgical confirmation of invasive cancer (Table 9). 84 cases with a B5b (Invasive) non-operative diagnosis were found to have non-invasive (67 cases) or micro-invasive cancer (17 cases) with no associated invasive disease in the surgical specimen. For 38 cases (45%), 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 cases are referred to as “invasive - biopsy only”. A further 12 cases had unknown histological status after surgery. Nine of these only had surgery to the axilla, two had a complete response to neo-adjuvant therapy and one was a private patient.

The following summary table shows that the proportion of cancers that had a B5a (Non-invasive) non-operative diagnosis but which were found to be “non-invasive - biopsy only”, micro-invasive, invasive or to have unknown invasive status after surgery has fallen by 3% points in the past 11 years (from 29% to 26%). The proportion of cases with a B5b (Invasive) core biopsy which were not confirmed to be invasive following surgery increased gradually from 0.5% in 2004/05 to 1.2% in 2009/10, and has levelled off at around 1.1%.

11 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

*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

2.1.5 Invasive Status of Cancers Diagnosed by C5 Cytology Only

In line with NHSBSP guidance issued in England in 2009 for implementation from 1 April 2010, in 2010/11 in the UK as a whole, only 54 cancers were diagnosed by C5 cytology alone, compared with 223 in 2009/10 and 568 in 2008/09. Three of these cancers had no surgery. 92% of the 51 cancers diagnosed by C5 cytology alone which received surgical treatment were invasive (Table 10). 4 cancers (8%) diagnosed by C5 cytology alone were non-invasive and none were micro-invasive. Regional QA reference centres should audit the 4 cancers diagnosed by C5 cytology alone that were found to be non-invasive, micro-invasive or "malignant – cytology only" at surgery.

KEY FINDINGS:

- In 2010/11, invasive disease was found at surgery for 22% of cancers with a B5a (Non-invasive) non-operative diagnosis. Three screening units have had rates significantly higher than the UK average rate in the 3-year period 2008/09-2010/11 and, in 8 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. Regional QA reference centres should ascertain the reason that the invasive component in these cancers was not identified in the core biopsies.
- 84 cases 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 38 cases 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.
- 92% of the 51 cancers diagnosed by C5 cytology alone were found to be invasive after surgery. Regional QA reference centres should audit the 4 cases diagnosed by C5 cytology alone that were found to be non-invasive, micro-invasive or "malignant – cytology only" at surgery.

2.2 Number of Assessment Visits

It is possible that increases in non-operative diagnosis have led to more anxiety, with women having to return to the assessment clinic for repeat diagnostic tests before receiving a definitive diagnosis. This year, the total number of assessment visits (excluding result clinics) and the core biopsy and cytology results at each visit were collected in the audit in order to track the diagnostic pathway.

2.2.1 Number of Visits to Achieve a Definitive Diagnosis

Of the 16,131 women with breast cancer in England, Wales and Northern Ireland, 15,470 had a B5/C5 non-operative diagnosis result. Of these, 92% had their B5 or C5 diagnosis result at their only assessment visit. 8% required more than 1 assessment visit to achieve a cancer diagnosis (Table 13). In 6 screening units (3 of which were in the South West), over 20% of patients required more than 1 assessment visit to obtain a B5/C5 non-operative diagnosis result. Regional QA reference centres should audit these cases to determine the reason for this unusual clinical practice.

Of the 14,206 cancers with a B5/C5 diagnosis after their first assessment visit, 455 (3%) had an additional core biopsy or cytology sample taken from the same lesion at further assessment visits. 33 of these had a C5 only cytology result from the first visit and a core biopsy at further visits. 13 cancers had a B5c result from the first visit and had a further core biopsy at further visits. A further 10 cancers had no surgery and the further core biopsy might well have been a vacuum assisted biopsy (VAB) which, by removing the whole cancer, removed the need for surgical treatment. For the majority of cancers, there is no explanation why additional core biopsy or cytology samples were taken for the same lesion at further assessment visits. Regional QA reference centres should audit these cases to determine the reason for this unusual clinical practice.

Table 14 shows that 93% of women with invasive breast cancer had a B5/C5 diagnosis result at their first assessment visit, whereas the overall non-operative diagnosis rate for invasive cancers was 99%. This implies that there was a 6% increase in the non-operative diagnosis rate when women attended more than one assessment visit. For non/micro-invasive cancers, the increase in non-operative diagnosis achieved after more than one assessment visit was higher at 16%. Figure 8 shows the increase in non-operative diagnosis rates for invasive and non/micro-invasive cancers in women having more than one assessment clinic visit in each region. The former varied between 3% in Northern Ireland and East of England to 11% in South East Coast, and the latter from 6% in Wales to 31% in South East Coast and 33% in South West.

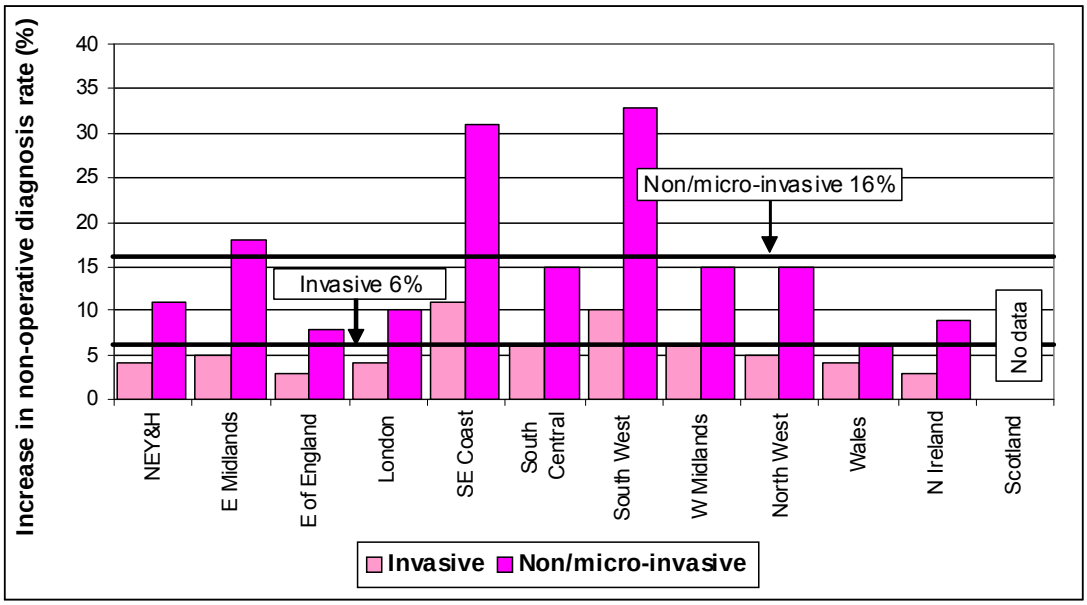

Figure 8 (Tables 14 and 15): Increase in non-operative diagnosis rate when women attend more than one assessment visit

2.2.2 Extra Assessment Clinic Visits

The majority (88%) of women had a core biopsy and/or cytology performed at one assessment clinic visit (Table 11). Although 12% of women had more than 1 visit recorded, only 7% required more than 1 visit to get a diagnostic assessment (any result - i.e. B1/C1 to B5/C5) (Table 12). Therefore, 5% of women with a diagnosis result (any result - i.e. B1/C1 to B5/C5) were either called back for other investigations or had to visit the service at least once before the visit when they had their core biopsy

and/or cytology assessment. Of the 16,131 cases in England, Wales and Northern Ireland, 830 women (5%) had to visit a screening unit at least once before the visit at which they had their core biopsy and/or cytology assessment, and 237 (3%) women were called back for other investigations after all the core biopsy and/or cytology assessments for the lesion of concern were performed (only 1 lesion per woman was recorded in the audit).

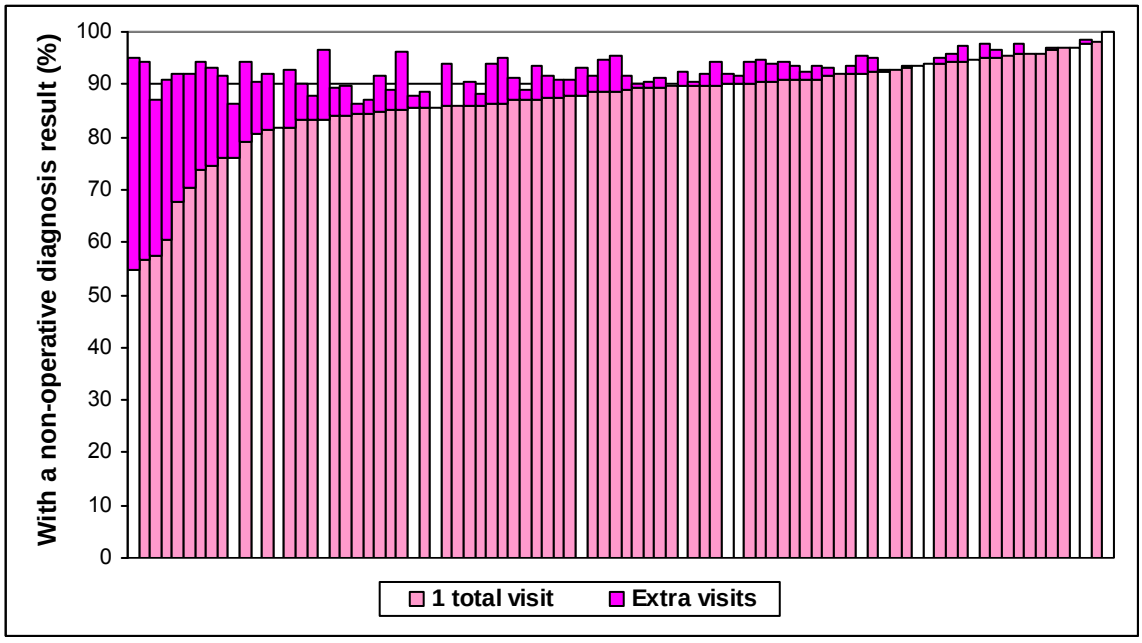

Figure 9: Variation between units in the proportion of women with a non-operative diagnosis at first assessment visit and at subsequent visits – Data for Scotland are not available (19 smallest units are highlighted in white)

Figure 9 shows the proportion of women in each screening unit who had extra visits (i.e. visits before and/or after the assessment visit at which a cytology and/or core biopsy result was obtained). This was defined as the difference between the proportion of women with 1 assessment visit and the proportion of women who had a cytology and/or core biopsy result from 1 visit. The proportion of extra visits varied from 38% in a unit in West Midlands to 0% in 14 units. These extra visits could have been for pre-operative nodal assessment, MRI, clinical assessment, core biopsy or cytology of another lesion, or when a core biopsy/cytology was attempted but a result was not obtained. The reason for each extra visit was not requested as part of the audit.

KEY FINDINGS:

- 92% of women had their B5 or C5 diagnosis result at their only assessment visit. 8% required more than 1 assessment visit to achieve a cancer diagnosis.
- In 6 screening units (3 in the South West), over 20% of patients required more than 1 assessment visit to obtain a B5/C5 non-operative diagnosis result. Regional QA reference centres should audit these cases to determine the reason for this unusual clinical practice.
- 455 (3%) had an additional core biopsy or cytology sample taken from the same lesion at further assessment visits. Regional QA reference centres should audit these cases to determine the reason for this unusual clinical practice.
- For invasive cancers, there was a 6% increase in the non-operative diagnosis rate when women attended more than one assessment visit, compared to a 16% increase for non/micro-invasive cancers.
- 12% of women had more than 1 assessment clinic visit recorded. Of these only 7% required more than 1 visit to get a B5/C5 diagnosis and 5% were recalled back for other investigations and/or visited the service before a core biopsy and/or cytology assessment was performed. The proportion of extra visits varied from 38% in a unit in West Midlands to 0% in 14 units.
- 830 women (5%) had to visit a screening unit at least once before the visit at which they had their core biopsy and/or cytology assessment, and 237 (3%) women were called back for other investigations after all the core biopsy and/or cytology assessments for the lesion of concern were performed.

2.3 Diagnostic Open Biopsies

2.3.1 Status of Diagnostic Open Biopsies

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

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

2,242 diagnostic open biopsies were performed in 2010/11. Of these 1,532 (68%) were benign and 710 (32%) were malignant. This is the first year that prevalent (first) and incident (subsequent) benign open biopsy rates for all women screened through the NHSBSP were requested separately from regional QA reference centres. The UK prevalent (first screen) benign open biopsy rate was 1.73 per 1,000 women screened (Table 16), which is higher than the 1.5 per 1,000 women screened minimum standard. Nine out of 12 regions exceeded the minimum standard for prevalent (first) screens, and only North East, Yorkshire & Humber achieved the 1.0 per 1,000 women screened target. At screening unit level, only 23 units achieved the target, and 47 units (half of the UK screening units) did not achieve the minimum standard for prevalent (first) screens (Figure 10).

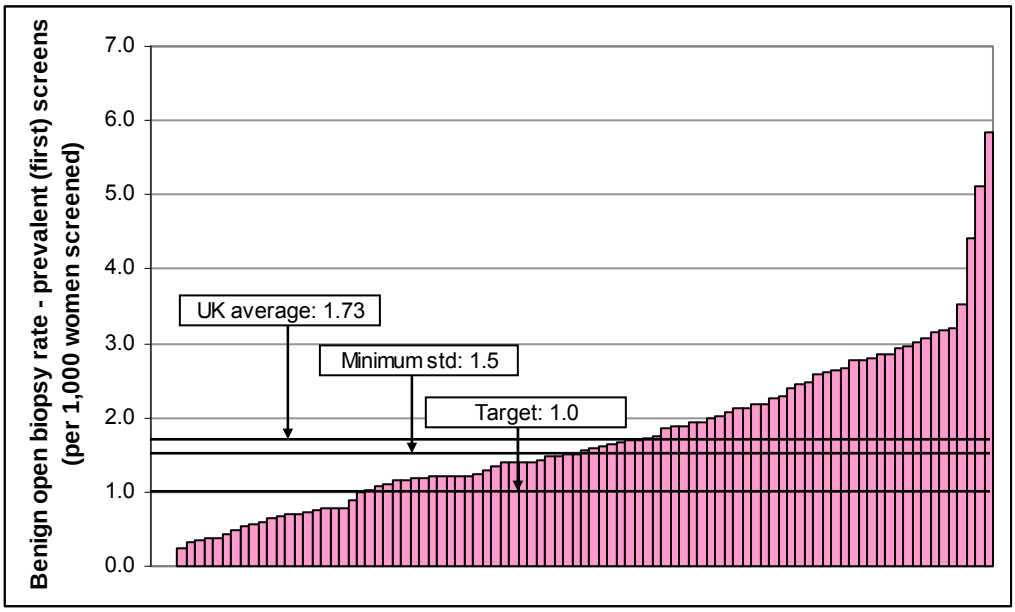

Figure 10 : Variation between screening units in benign diagnostic open biopsy rates for prevalent (first) screens expressed as the number of diagnostic open biopsies undertaken per 1,000 women screened

The UK incident (subsequent screen) benign open biopsy rate was 0.48 per 1,000 women screened (Table 16). This varied from 0.29 per 1,000 women screened in North East, Yorkshire & Humber to 0.62 per 1,000 women screened in Wales. All regions achieved the 0.75 per 1,000 women screened minimum standard. At breast screening unit level, the incident (subsequent screen) benign open biopsy rate varied from zero in 2 units to 1.9 per 1,000 women screened in a unit in East of England. Two screening units (one in East of England and one in North West) 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.

15 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

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

In the UK as a whole, 710 malignant diagnostic open biopsies were performed in 2010/11. The malignant open biopsy rate was 0.32 per 1,000 women screened; varying from 0.21 per 1,000 women screened in North East, Yorkshire & Humber to 0.45 per 1,000 women screened in Wales. The preceding summary table shows that the UK malignant open biopsy rate has fallen from 2.04 per 1,000 women screened to 0.32 per 1,000 women screened as the non-operative diagnosis rate has increased from 63% to 96%. Over the same 15-year period, the UK benign open biopsy rate has fallen from 1.50 per 1,000 women screened in 1996/97 to 0.73 per 1,000 women screened in 2010/11.

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 8 false positive core biopsy cases and no false positive cytology cases recorded. Regional QA reference centres and their pathology QA co-ordinators should review these cases to ascertain the reason(s) for the false positive 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 decreased slightly from 743 in 2009/10 to 710 in 2010/11. Of the latter, 196 (28%) were invasive, 10 (1%) micro-invasive and 503 (71%) non-invasive (Table 18). 333 (47%) of the 710 cases did not have further surgical treatment after their diagnostic open biopsy. Of these, 5 cases had no surgery to the breast, but they had axillary assessment. Three cases had diagnosis of breast cancer found by axillary node biopsy, but had no operation to the axilla or the breast. Twelve 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 women. This may be because radiological and clinical opinion was strongly supportive of the presence of malignant disease.

Tables 19 and 20 describe the non-operative history of cancers diagnosed by open biopsy. For 83% 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 94% (Table 20). Tables 19 and 20 also show that, of the 196 invasive cancers diagnosed by open biopsy, 15 (8%) had no non-operative procedure recorded and that, of the 513 non/micro-invasive cancers diagnosed by open biopsy, 7 (1%) had no non-operative procedure recorded. 1 case with a unknown invasive status did not have a non-operative procedure recorded. Regional QA reference centres and regional surgical QA co-ordinators should audit these 23 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.

The following 11-year summary table shows that, in line with the increased use of core biopsy since 2000/01, the proportion of invasive cancers undergoing cytology as the only procedure prior to a diagnostic open biopsy has decreased from 31% to 3%, while the proportion undergoing core biopsy alone has risen from 36% to 86% in 2009/10. In 2010/11 there was a 3% decrease in the proportion of cases undergoing core biopsy only. For non/micro-invasive cancers, the proportion undergoing cytology as the only procedure prior to a diagnostic open biopsy has decreased from 11% in 2000/01 to 1% in 2010/11, while the proportion undergoing core biopsy alone has risen from 65% to 94%.

11 YEAR COMPARISON :
PERCENTAGE OF CANCERS WITH MALIGNANT OPEN BIOPSY

	Invasive				***Non/Micro-invasive***			
Year of data collection	***No non-operative procedure***	***Cytology only***	***Core biopsy only***	***Both cytology and core biopsy***	***No non-operative procedure***	***Cytology only***	***Core biopsy only***	***Both cytology and core biopsy***
2000/01	*10*	*31*	*36*	*24*	*6*	*11*	*65*	*19*
2001/02	*9*	*23*	*43*	*25*	*4*	*7*	*69*	*19*
2002/03	*8*	*16*	*55*	*21*	*3*	*3*	*80*	*14*
2003/04	*6*	*14*	*65*	*15*	*4*	*1*	*82*	*13*
*2004/05**	*5*	*12*	*69*	*14*	*2*	*1*	*88*	*8*
2005/06	*6*	*11*	*70*	*13*	*2*	*1*	*90*	*7*
2006/07	*5*	*10*	*73*	*12*	*2*	*1*	*88*	*9*
2007/08	*3*	*9*	*75*	*12*	*3*	*2*	*90*	*6*
2008/09	*6*	*6*	*80*	*8*	*2*	*1*	*91*	*6*
2009/10	*7*	*5*	*86*	*3*	*2*	*1*	*90*	*7*
2010/11	*8*	*3*	*83*	*7*	*1*	*1*	*94*	*4*

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

Of the 196 invasive cancers diagnosed by open biopsy in 2010/11, 6% (12 cases) had an inadequate (C1) cytology sample or a normal (B1) core biopsy sample (Table 21). 8% had a benign result (C2/B2, 16 cases). 86 cases (44%) were lesions of uncertain malignant potential (B3) or were atypia and probably benign (C3), and a further 34% were suspicious of malignant disease (C4/B4, 67 cases).

For the 513 non/micro-invasive cancers which had a malignant open biopsy in 2010/11, 31% (158 cases) had a C4 and/or B4 cytology or biopsy result and 62% (320 cases) had a C3 and/B3 non-operative result (Table 22). In East of England, 51% (27 cases) of the non/micro-invasive cancers diagnosed by open biopsy had a B4 core biopsy or C4 cytology result indicating suspicion of malignancy prior to diagnostic surgery. The regional QA reference centre should review these cases to ascertain the reasons for these unusual results.

The following summary table shows that the proportion of invasive cancers diagnosed by malignant open biopsy which had a C1/B1 result has fallen from 22% to 6% since 2000/01. In the most recent 5-year period, the proportion of invasive cancers with a C3/B3 result has increased and has become higher than the proportion with a C4/B4 diagnosis. The proportion of non/micro-invasive cancers diagnosed by malignant open biopsy which had a C3/B3 result has also increased over the 11-year period studied, from 26% in 2000/01 to 62% in 2010/11, while the proportions with a C1/B1 result and

with a C2/B2 result have fallen sharply. The proportion of non/micro-invasive cancers with a C4/B4 result has decreased slightly in the last 7 years. As a result, the reversal in the proportions of cancers with C4/B4 and C3/B3 non-operative results seen with invasive cancers has been greater and occurred earlier for non/micro-invasive cancers.

11 YEAR COMPARISON :
PERCENTAGE OF CANCERS WITH MALIGNANT OPEN BIOPSY:
WORST CYTOLOGY AND CORE BIOPSY RESULTS

Year of data collection	Invasive				Non/Micro-invasive			
	C1/B1	C2/B2	C3/B3	C4/B4	C1/B1	C2/B2	C3/B3	C4/B4
2000/01	22	15	18	46	19	13	26	37
2001/02	16	17	20	38	14	13	31	37
2002/03	15	12	22	42	12	10	36	39
2003/04	12	14	26	42	9	8	39	40
2004/05	10	13	30	42	5	7	50	35
2005/06	10	9	34	41	3	3	57	35
2006/07	10	6	40	39	3	5	54	36
2007/08	10	14	39	34	3	5	56	34
2008/09	8	5	42	39	2	3	59	34
2009/10	8	10	42	33	4	4	59	32
2010/11	6	8	44	34	2	4	62	31

The rise in the proportion non-invasive lesions diagnosed by malignant open biopsy which had a B3 core biopsy result may 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 2010/11, a total of 406 cancers were diagnosed as B3/C3 and all had an operation. Of these, 86 were found to be invasive at surgery and 87 (27%) had only LCIS in the surgical specimen.

Increases in C3/B3 diagnoses could also reflect better targeting of calcifications, as B3 results for non/micro-invasive cancers may be atypical intraductal epithelial proliferations resulting from partial sampling of cases of ductal carcinoma in situ. The Sloane Project will continue to collect prospective data on new cases of atypical ductal hyperplasia and lobular in situ neoplasia after the collection of new cases of ductal carcinoma in situ ends on 31 March 2012.

Figure 11 shows the variation between screening units in the proportion of invasive cancers where during the 3-year period 2008/09-2010/11 the worst non-operative result was C4/B4. The dashed lines in Figure 11 are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate (solid line). Four screening units (open pink diamonds) are outside the upper control limit and have rates significantly higher than the average rate of 36%. Regional QA reference centres should carry out audits with these units to ascertain the reasons for the unusually high proportion of C4/B4 non-operative diagnosis results.

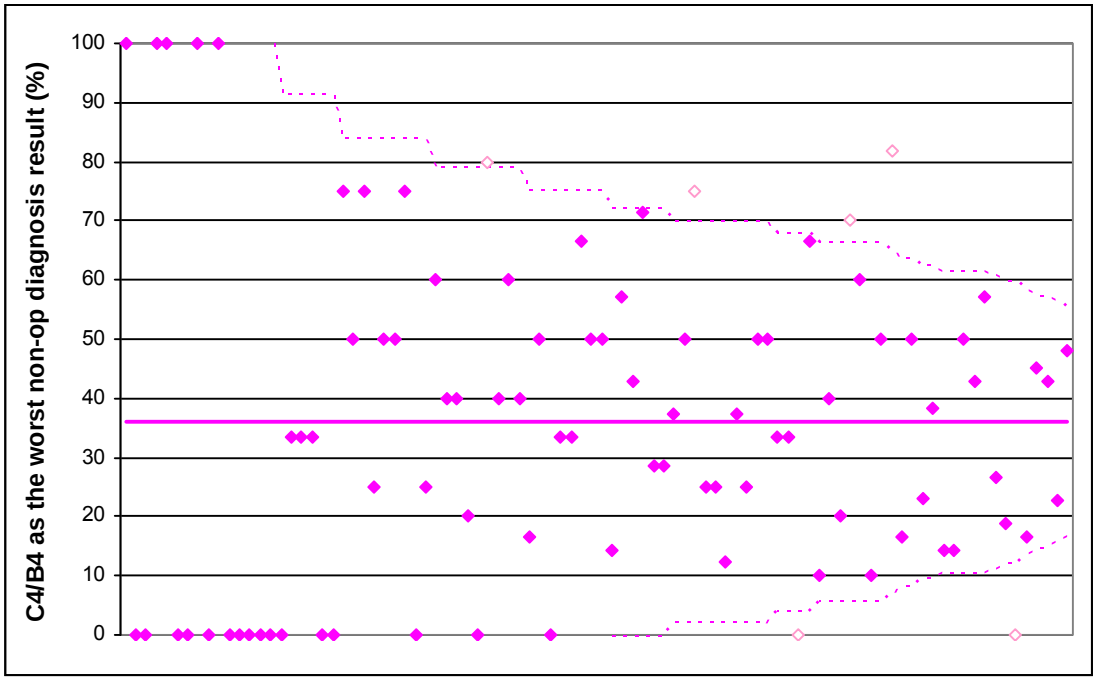

Figure 11: Variation between screening units in the proportion of invasive cancers where during the 3-year period 2008/09-2010/11 the worst non-operative result was C4/B4 (open diamonds represent units which lie outside the control limits)

KEY FINDINGS:

- 2,242 diagnostic open biopsies were performed in 2010/11. Of these 1,532 (68%) were benign and 710 (32%) were malignant.
- The benign open biopsy rate was 1.73 and 0.48 per 1,000 women screened for prevalent (first) and incident (subsequent) screens respectively. Nine regions exceeded the minimum standard for prevalent (first) screens. Two screening units (one in East of England and one in North West) did not achieve the minimum standard for incident (subsequent) screens. Regional QA reference centres should investigate the reasons for their relatively high prevalent (first screen) and incident (subsequent screen) benign open biopsy rates.
- The malignant open biopsy rate has fallen from 2.04 per 1,000 women screened in 1996/97 to 0.32 per 1,000 women screened in 2010/11 as the non-operative diagnosis rate has increased from 63% to 96%.
- The UK benign open biopsy rate has fallen over 15 years from 1.50 per 1,000 women screened in 1996/97 to 0.73 per 1,000 women screened in 2010/11
- There were 8 false positive core biopsies recorded in 2010/11. 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.
- Twelve 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.
- Fifteen invasive cancers, 7 non/micro-invasive cancers and 1 cancer with unknown status diagnosed by open biopsy had no non-operative procedure recorded. Regional QA reference centres and regional surgical QA co-ordinators should audit these 23 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.
- Since 2000/01, the proportions of invasive and non/micro-invasive cancers undergoing cytology as the only procedure prior to a diagnostic open biopsy have decreased from 31% to 3% and from 11% to 1%.
- 34% of invasive cancers and 31% of non/micro-invasive cancers diagnosed by malignant open biopsy following cytology or core biopsy performed during the assessment process had a C4 cytology or B4 core biopsy result indicating suspicion of malignant disease.

KEY FINDINGS (cont.):

- In East of England, 51% (27 cases) of the non/micro-invasive cancers diagnosed by open biopsy had a B4 core biopsy or C4 cytology result indicating suspicion of malignancy prior to diagnostic surgery. The regional QA reference centre should review these cases.
- The classification by pathologists of core biopsies which are considered to represent lobular neoplasia as B3 means that, if lobular carcinoma in situ is verified in the surgical specimen, the non-operative diagnosis rate for non-invasive cancers will appear lower than it should be.
- Increases in C3/B3 diagnoses could also reflect better targeting of calcifications, as B3 results for non/micro-invasive cancers may be atypical intraductal epithelial proliferations resulting from partial sampling of cases of ductal carcinoma in situ.
- The Sloane Project will continue to collect prospective data on new cases of atypical ductal hyperplasia and lobular in situ neoplasia after the collection of new cases of ductal carcinoma in situ ends on 31 March 2012.
- Four screening units had C4/B4 rates for invasive cancers significantly higher than the average rate of 36% in the 3 year period 2008/09 - 2010/11. Regional QA reference centres should carry out audits with these units to ascertain the reasons for the unusually high proportion of C4/B4 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 2010/11, the incompleteness of cytonuclear grade and/or size data varied from 1% in Scotland, South East Coast and North East, Yorkshire & Humber to 9% in Wales (Table 23). Of the 103 surgically treated non-invasive cancers with unknown size, 58 (56%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen (Table 23). Of the 148 non-invasive cancers with grade not assessable (Table 24), 130 (88%) were LCIS alone. The size of 149 non-invasive cancers (4%) was not assessable.

11 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*

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

Figure 12 shows for cases that were surgically treated, how the proportion of non-invasive cancers with unknown cytonuclear grade and/or size varied between screening units in 2010/11. LCIS cases have been excluded. 43 units had complete data for cytonuclear grade and size, and only 3% of all surgically treated non-invasive cancers had incomplete cytonuclear grade or/and size (107 cases). However, in 9 units, data incompleteness was greater than 10%. Two of the 3 screening units in Wales 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. They should identify which of their screening units have participated in the Sloane Project as recommended in *NICE Clinical Guideline 80 on the Diagnosis and treatment of early and locally advanced breast cancer* (2009), and in the 4th edition of *NHSBSP Publication 20, QA Guidelines for surgeons in breast cancer screening* (March 2009). The good practices and procedures used by these units can then be used to improve data quality in other units.

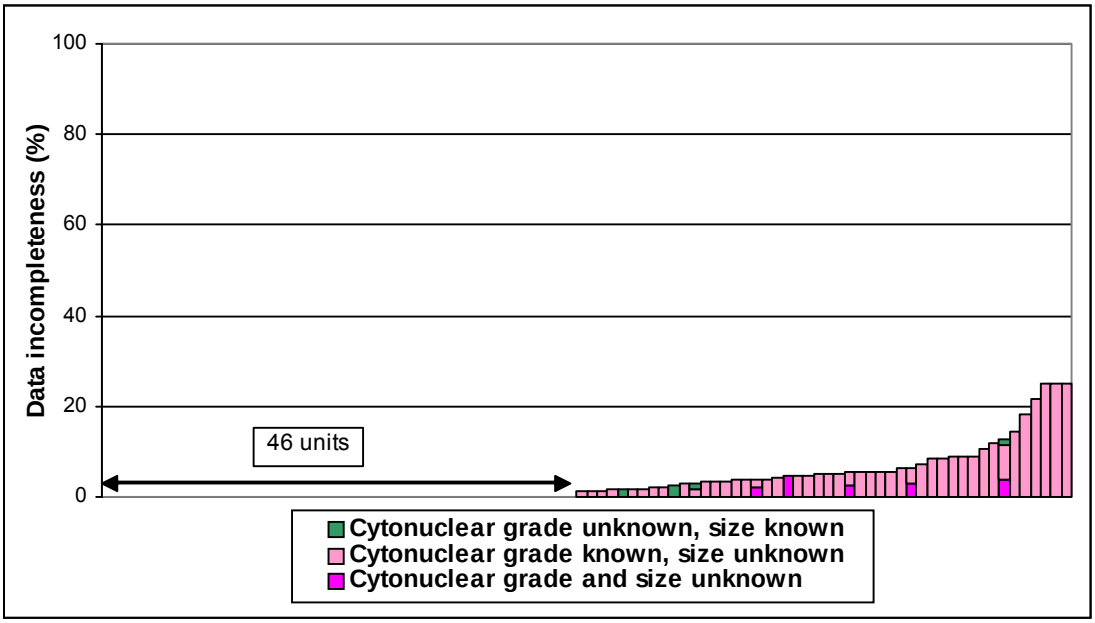

Figure 12: Variation between screening units in the incompleteness of cytonuclear grade and size data for non-invasive cancers (Cases with no surgery and LCIS cases are excluded)

3.1.2 Non-invasive Cancer Size and Cytonuclear Grade

In 2010/11, 37% of the 3,404 surgically treated non-invasive cancers were less than 15mm in diameter and 14% were larger than 40mm (Table 25). The former varied from 28% in South Central to 51% in Northern Ireland and the latter from 9% in East of England to 22% in South Central. Overall, 2,003 (59%) surgically treated non-invasive cancers had high cytonuclear grade, 909 (27%) had intermediate cytonuclear grade, and 333 (10%) had low cytonuclear grade (Table 24).

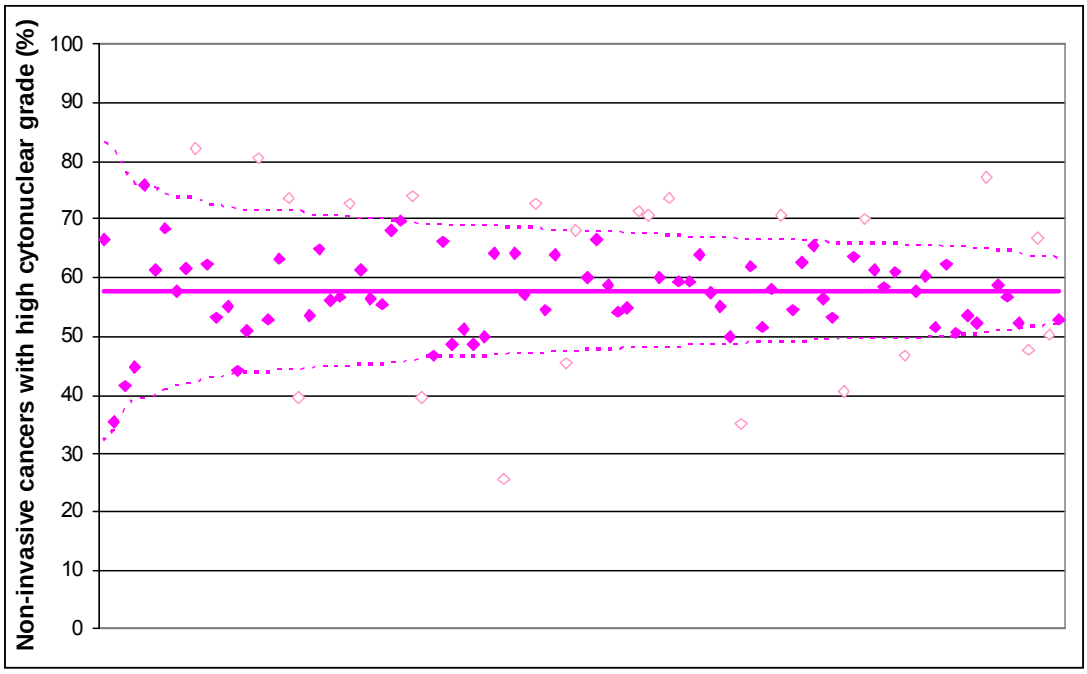

Figure 13: Variation between screening units in the proportion of non-invasive cancers with a high cytonuclear grade in (2008/09 - 2010/11) (open diamonds represent units which lie outside the control limits) (Cases with no surgery are excluded)

Figure 13 shows for each screening unit over the 3-year period 2008/09-2010/11, 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 14 lying

above the upper control limit and 9 below the lower control limit. One unit in East of England (26%) and one unit in London (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 148 non-invasive cancers with grade not assessable, 88% were LCIS alone. The size of 149 non-invasive cancers (4%) was not assessable.
- 3% of all surgically treated non-invasive cancers had incomplete cytonuclear grade or/and size data. In 9 units, data incompleteness was greater than 10%. Two of the 3 screening units in Wales 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. They should also identify which of their screening units have participated in the Sloane Project so that the good practices and procedures used by these units can then be used to improve data quality in other units.
- 37% of the 3,404 surgically treated non-invasive cancers were less than 15mm in diameter and 14% were larger than 40mm.
- 59% of the surgically treated non-invasive cancers had high cytonuclear grade, 27% had intermediate cytonuclear grade and 10% had low cytonuclear grade.
- 14 units had significantly higher and 9 units had significantly lower proportions of non-invasive cancers with a high cytonuclear grade over the 3-year period 2008/09-2010/1. 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 13,994 surgically treated invasive cancers, 3,586 (26%) had an invasive tumour diameter of less than 10mm, 3,725 (27%) had an invasive tumour diameter at least 10mm but less than 15mm, 3,299 (24%) were between 15mm and 20mm in diameter, 2,448 (17%) had an invasive tumour diameter greater than 20mm but less than or equal to 35mm and 521 (4%) had a diameter greater than 35mm but less than or equal to 50mm. Only 259 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 113 (1%) of the surgically treated invasive cancers (Table 27). 22 (19%) of the cancers without a whole tumour size were in Wales. Regional QA reference centres should ascertain why this important information was not available from their screening units.

KEY FINDINGS:

- 52% of surgically treated cancers had an invasive tumour diameter of less than 15mm. For only 259 cases (2%) was the invasive tumour diameter greater than 50mm.
- The whole tumour size was not provided for 113 (1%) surgically treated invasive cancers. 19% of the cancers without a whole tumour size were in Wales. 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. 225 invasive cancers which did not have surgery have been excluded from this section as no information was available concerning their lymph node status.

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

3.3.1 Availability of Nodal Status for Invasive Cancers

In 2010/11, nodal status was known for 99% of surgically treated invasive cancers, varying from 98% in London, South East Coast, North West and Wales to 100% in Northern Ireland (Table 87). A total of 176 invasive cancers were recorded as having no nodes obtained 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, which is a decrease from 32 units in 2009/10. All screening units met the 90% minimum standard.

3.3.2 Lymph Node Status for Invasive Cancers

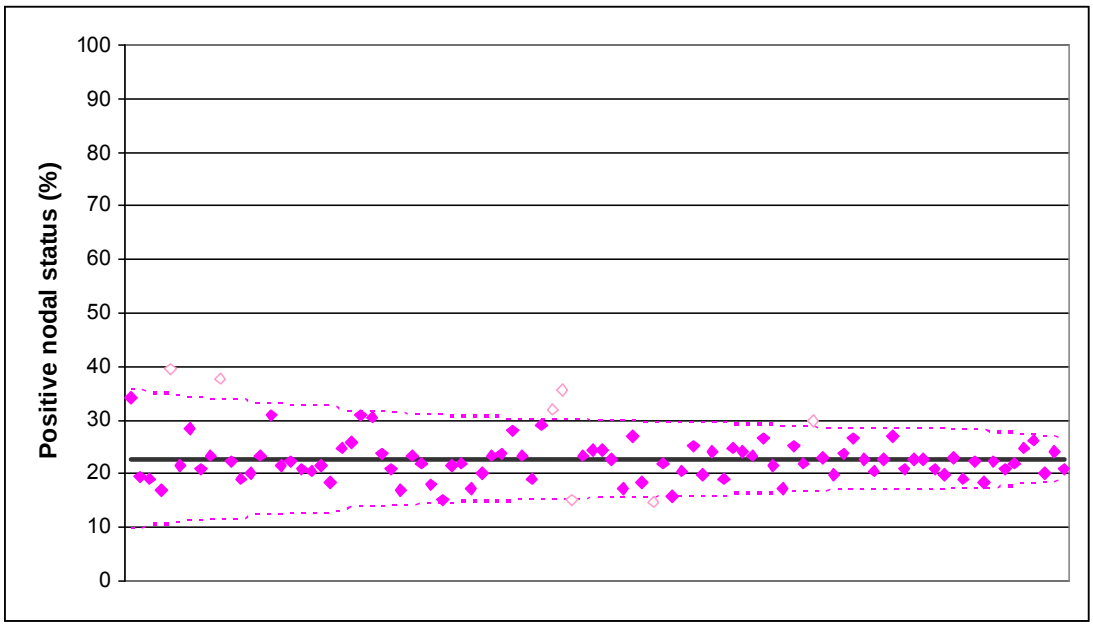

Figure 14: Variation between screening units in the proportion of invasive cancers with positive nodal status expressed as a percentage of cases with known nodal status (open diamonds represent units which lie outside the control limits)

Of the 13,811 invasive cancers with known nodal status, 3,128 (23%) had positive nodes (Table 90). There was some regional variation in lymph node status; with the proportion of node positive cancers varying from 20% in West Midlands and Wales to 26% in South Central. Figure 14 shows that there was a wider variation in nodal status in individual screening units; with seven units lying outside the control limits (5 above and 2 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.

12,444 invasive cancers in England, Wales and Northern Ireland had nodes examined at surgery, and 1,565 (1.3%) had one positive node at the first axillary operation. 1,433 of these had more detailed nodal information. 25 (2%) contained isolated tumour cells, 421 (29%) micro-metastases and 987

(69%) metastases. Regional QA reference centres and regional QA pathology co-ordinators should audit cases where nodes containing isolated tumour cells have been recorded as being node positive as this is not in line with the recommended guidance. The proportion of single positive nodes containing micro-metastases as opposed to metastases decreased with tumour size (from 36% for cancers with an invasive tumour diameter of less than 15mm to 18% for cancers with an invasive tumour diameter greater than 50mm), and with increasing grade (from 40% for Grade 1 cancers to 25% for Grade 3 cancers).

3.3.3 Availability of Nodal Status for Non-invasive Cancers

37 non-invasive cancers which did not have surgery have been excluded from this section as no data were available concerning their lymph node status. 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.

Of the 3,404 surgically treated non-invasive cancers, 31% had known nodal status. This varied from 25% in South East Coast to 37% in East Midlands (Table 94). 85% of the non-invasive cancers treated by mastectomy had known nodal status, varying from 75% in Wales to 91% in Scotland (Figure 15). In five units fewer than 60% of non-invasive cancers treated by mastectomy had known nodal status. Only 10% of non-invasive cancers treated with breast conserving surgery had known nodal status. In one unit in Northern Ireland, 36% of non-invasive cancers treated with breast conserving surgery (12 in total) had known nodal status. Of the 1,069 non-invasive cancers with known nodal status, six (1%) had positive nodal status recorded. Three of these cases were in Scotland, where 4% of the non-invasive cancers with known nodal status had a positive nodal status recorded (Table 96).

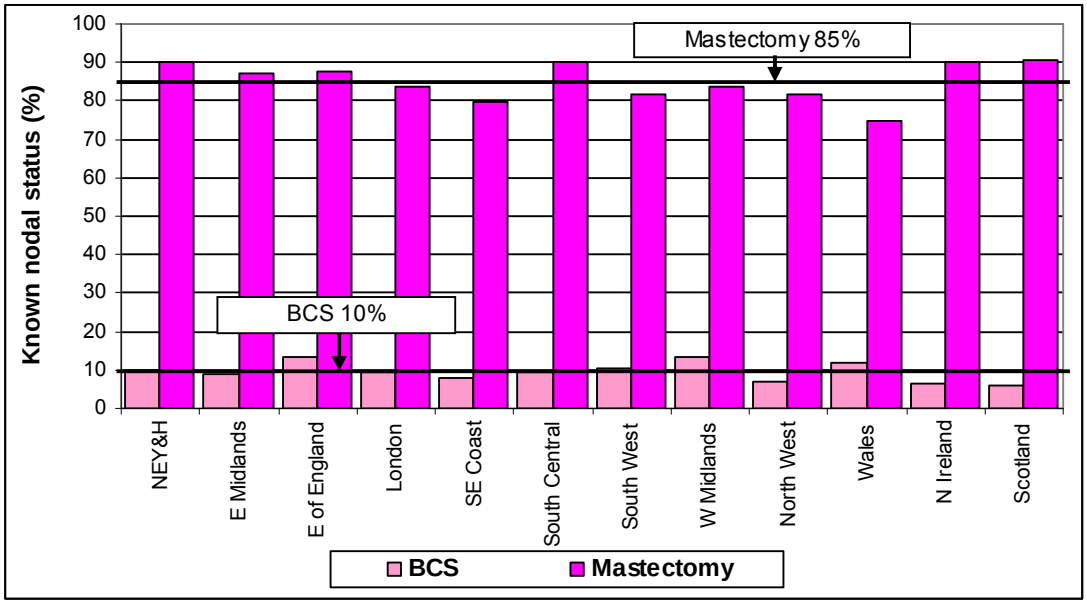

Figure 15 (Table 95): The proportion of non-invasive cancers treated with breast conserving surgery (BCS) or mastectomy with known nodal status

KEY FINDINGS:

- In the UK as a whole, 99% of surgically treated invasive cancers had known nodal status. This varied from 98% in London, South East Coast, North West and Wales to 100% in Northern Ireland.
- Overall, 23% of invasive cancers had positive nodes; this varied from 14% to 40% 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.

KEY FINDINGS (cont.):

- 12,444 invasive cancers in England, Wales and Northern Ireland had nodes examined at surgery, and 1,565 (1.3%) had one positive node at the first axillary operation. 1,433 of these had more detailed nodal information. 25 (2%) contained isolated tumour cells, 421 (29%) micro-metastases and 987 (69%) metastases. Regional QA reference centres and regional QA pathology co-ordinators should audit cases where nodes containing isolated tumour cells have been recorded as being node positive as this is not in line with the recommended guidance.
- The proportion of single positive nodes containing micro-metastases decreased with tumour size (from 36% for cancers with an invasive tumour diameter of less than 15mm to 18% for cancers with an invasive tumour diameter greater than 50mm), and with increasing grade (from 40% for Grade 1 cancers to 25% for Grade 3 cancers).
- 31% of non-invasive cancers had known nodal status. This varied from 25% in South East Coast to 37% in East Midlands.
- 85% of non-invasive cancers treated with mastectomy had known nodal status, compared with 10% of those treated with breast conserving surgery.
- Of the 1,069 non-invasive cancers with known nodal status, 6 were node positive. Three of these cases were in Scotland, where 4% of the non-invasive cancers with known nodal status were node positive.

3.4 Grade of Invasive Cancers

Of the 13,994 invasive cancers which had surgery, 3,563 (25%) were Grade 1, 7,435 (53%) were Grade 2 and 2,901 (21%) were Grade 3 (Table 29). Grade was not assessable for 33 cases over 23 units and grade was unknown for 62 cases over 33 units.

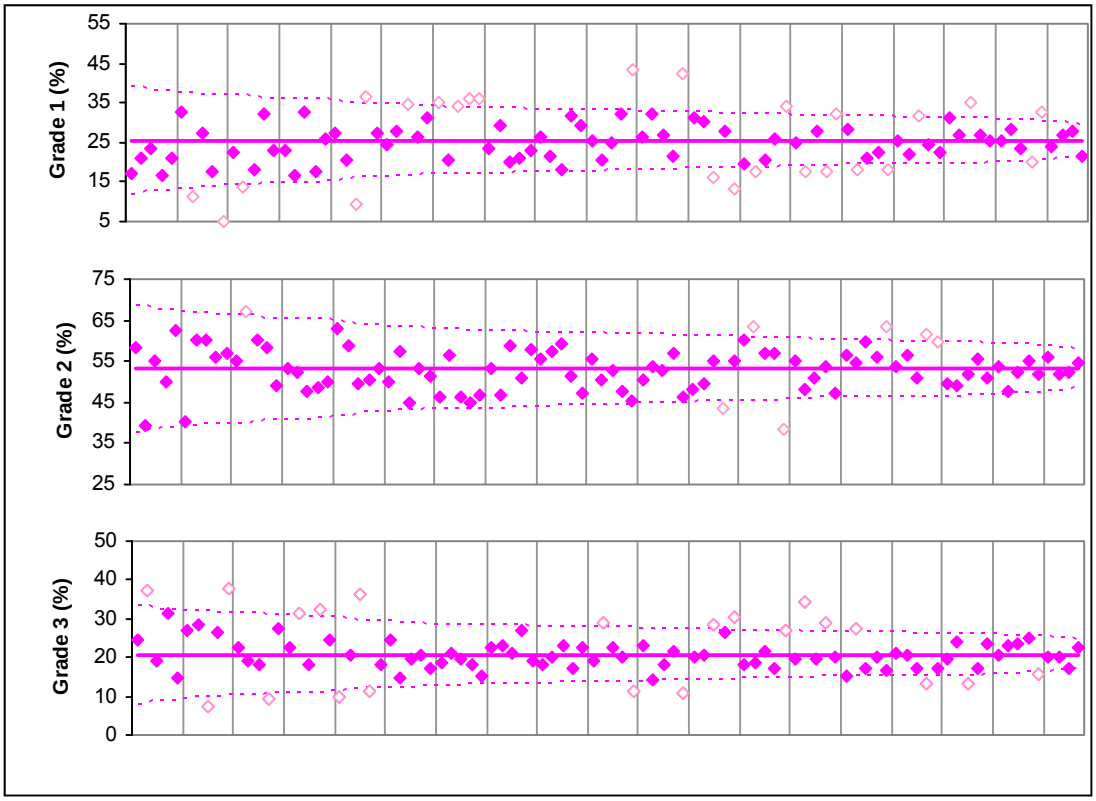

Figure 16: Variation between screening units in the grade of surgically treated invasive cancers (open diamonds represent units which lie outside the control limits)

The control charts in Figure 16 show the variation in the proportions of Grade 1, 2 and 3 cancers recorded for individual screening units. The cases 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 16 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, four of the nine units in South West are outliers in the Grade 1 control chart [3 high outliers and 1 low outlier] and, of the 11 units in North East, Yorkshire & Humber, 3 are high outliers and 2 are low outliers. In the Grade 1 control chart, two units have been outliers every year during the 3-year audit period 2008/09-2010/11 (one in East of England [low outlier] and one in North West [high outlier]). No similar patterns are seen in the Grade 2 and Grade 3 control charts.

KEY FINDINGS:

- Overall, 25% of invasive cancers were Grade 1, 53% Grade 2 and 21% Grade 3. Grade was not assessable for 33 cases and unknown for 62 cases.
- In the Grade 1 control chart, two units have been outliers every year during the 3-year period 2007/08-2009/10. No similar patterns are seen in the Grade 2 and Grade 3 control charts.
- Local variations in the interpretation of invasive grade definitions should be investigated by regional QA reference centres and regional pathology QA co-ordinators if persistent or suggestive of systemic bias.

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. It should be noted that the differences in invasive grade outlined in Figure 16 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

*Where Grade = 1, 2 or 3 according to the Bloom and Richardson Grade
**Where Nodes = 1, 2 or 3 according to whether 0, 1-3 or 4 or more nodes are positive

An NPI score cannot be calculated if size, nodal status or grade is unknown or if grade is not assessable. Overall, an NPI score could not be calculated for 362 (2.6%) of the 13,994 invasive cancers which had surgery (Table 30). Of these, 36 had no residual tumour found at surgery, with no cancer cells found in the surgical specimen. Figure 17 shows that the proportion of cancers with unknown NPI was lowest in Northern Ireland (1.5%) and highest in London (3.3%). The proportions of cancers with an unknown NPI score varied from 0 cases in 8 screening units to 7% in 2 screening units (in North West and in East of England). None of the cancers with unknown NPI score in these 2 screening units had neo-adjuvant treatment.

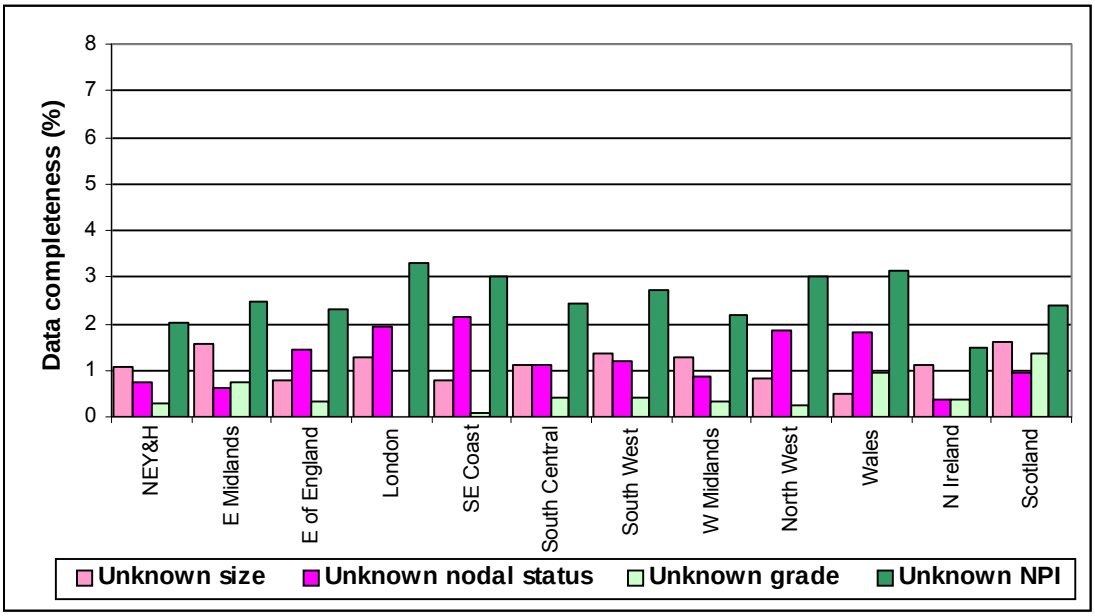

Figure 17 (Table 30): Data completeness of tumour characteristics of surgically treated invasive cancers

Of the 13,632 surgically treated invasive cancers with known NPI score, the highest proportion fell into the Good Prognostic Group (GPG) (37%), with only 6% (863 cases) in the Poor Prognostic Group (PPG) (Table 31). As expected with cancers detected by screening, in the UK as a whole, the majority (58%) of cancers fell into the two best prognostic groups, EPG (Excellent Prognostic Group) and GPG. The proportion of EPG and GPG cancers varied from 52% in South Central to 60% in East Midlands and Northern Ireland.

In Figure 18, 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 16, 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 18 shows that 17 units have a significantly higher or lower proportion of EPG and GPG cancers than the UK as a whole. The third control chart shows that 6 units have a significantly higher proportion of PPG cancers. Two units have a significantly higher proportion than the average with unknown NPI group (fourth control chart). In the EPG and GPG control chart, one unit in South Central and one unit in North East, Yorkshire & Humber have been outliers every year during the 3-year period 2008/09-2010/11. Less consistent patterns are seen for the other control charts; with only some units being outliers in 2 out of 3 audit years. Regional QA reference centres and their regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for unusual NPI distributions and for the high proportion of cases with unknown NPI group seen in two screening units (one in Wales and one in East of England).

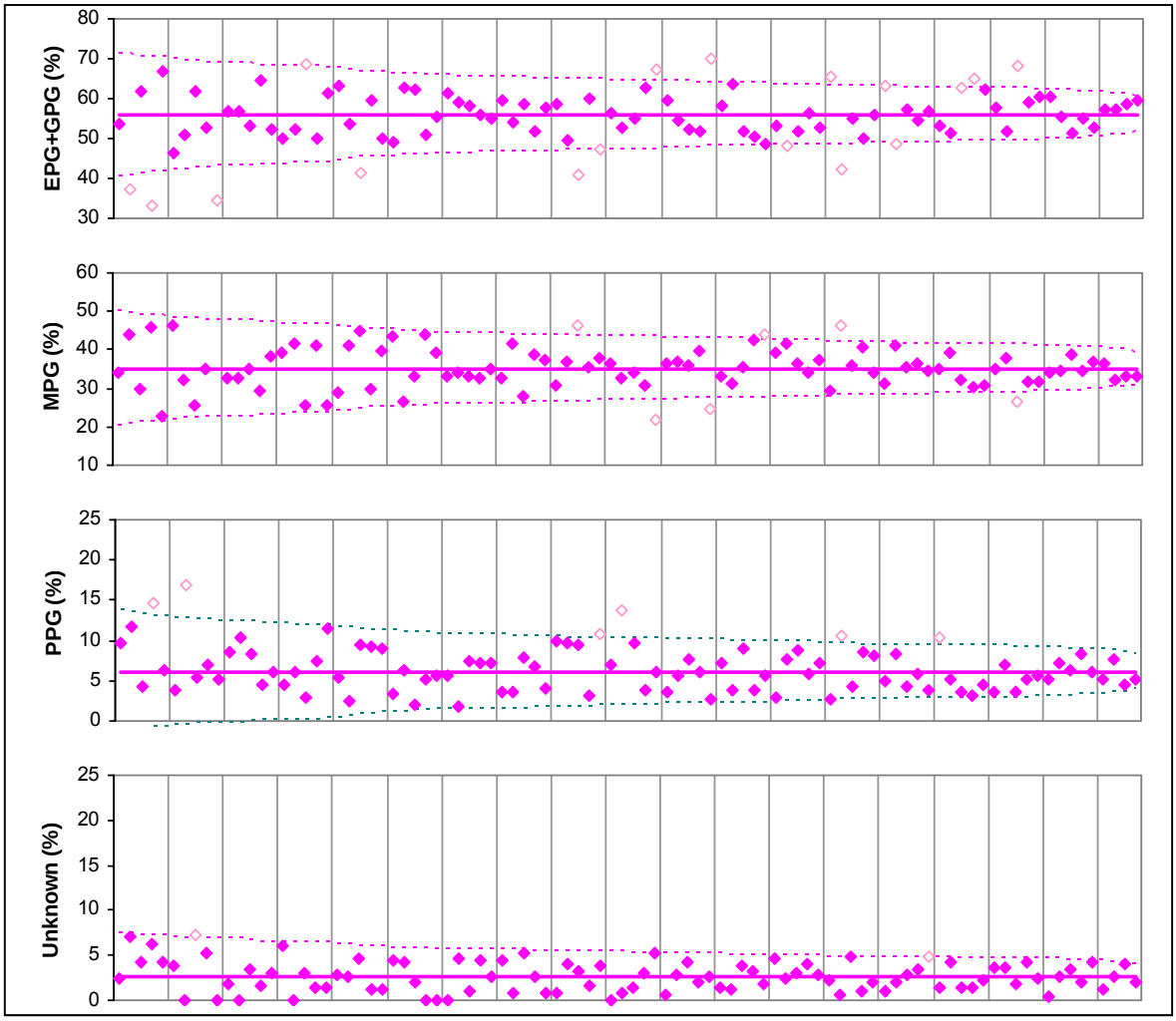

Figure 18: Variation between screening units in NPI groups for surgically treated invasive cancers (open diamonds represent units which lie outside the control limits)

KEY FINDINGS:

- A Nottingham Prognostic Index (NPI) score could be calculated for 97% of surgically treated invasive cancers.
- A small number of units have been outliers in NPI control charts every year during the 3-year period 2007/08-2009/10. Regional QA reference centres and their regional pathology QA co-ordinators and surgical QA co-ordinators should investigate the reasons for the unusual NPI distributions and the high proportion of cases with unknown NPI group seen in 2 screening units (one in Wales and one in East of England).

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 invasive cancers.

3.6.1 Invasive Cancers

In the UK as a whole, ER status was unknown for 89 (1%) of 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. 91% of invasive cancers with known ER status were ER positive.

In 2010/11, PgR status was known for 66% 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 34% in East Midlands to 96% in North West. Of the 9,332 invasive cancers with known PgR status, 75% were positive. 86% of the 1,259 invasive cancers that were known to be ER negative had known PgR status; 4% were PgR positive and 1,025 (81%) were PgR negative (Table 36).

HER-2 status data were available for 97% of the 14,219 invasive cancers included in the main audit (Table 37). This is an increase from 96% of cancers with known HER-2 status at an equivalent point in time in 2009/10. The proportion of cases with known HER-2 status was lowest in London (94%) (Figure 19). 22% of the invasive cancers without a HER-2 status were in London (80 cases) where, in one screening unit, 21% of the 270 invasive cancers had unknown HER-2 status. In one unit in East of England, 16% of the 164 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.

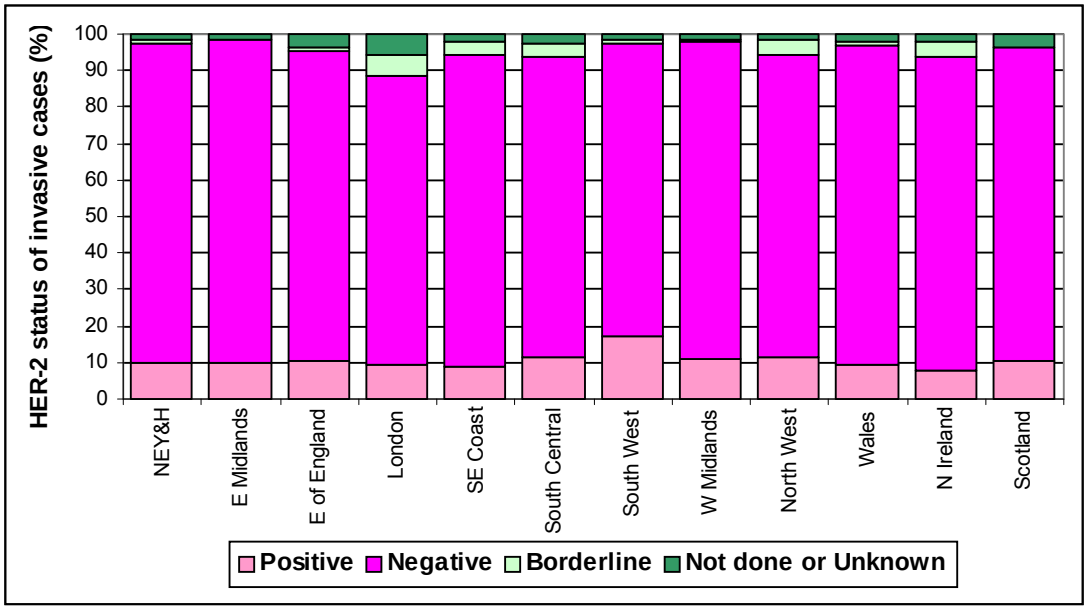

Figure 19 (Table 37): Variation in HER-2 status for invasive cancers

Of the 13,858 invasive cancers with known HER-2 status, 11% were positive, 87% were negative and 2% were borderline. HER-2 positivity for invasive cancers varied from 8% in Northern Ireland to 17% in South West where, in one screening unit, 39% of the 231 invasive cancers were HER-2 positive. The regional QA reference centre should audit these cases. Of the 361 cases without a HER-2 status, 28% had an invasive size of less than 10mm, 22% were Grade 1 and 63% had negative nodal status (Table 38).

3.6.2 Non/micro-Invasive Cancers

ER status was not known for 49% of non/micro-invasive cancers (Table 34). The proportion of non/micro-invasive cancers with unknown ER status varied from 24% in North East, Yorkshire & Humber to 75% in Wales. The variation between screening units in the proportion of non/micro-invasive cancers with known ER status was even wider (Figure 20). 81% of non/micro-invasive cancers with

known ER status were ER positive compared with 91% of invasive cancers. The proportion of ER negative non/micro-invasive cancers varied widely between screening units. 27 units had no ER negative non/micro-invasive cancers, and in 12 units, 20% or more of the non/micro-invasive cancers were ER negative. Three of these units were in East Midlands, 3 in North West and 2 in North East, Yorkshire & Humber. 74% of all the ER negative non/micro-invasive cancers were in these 8 units.

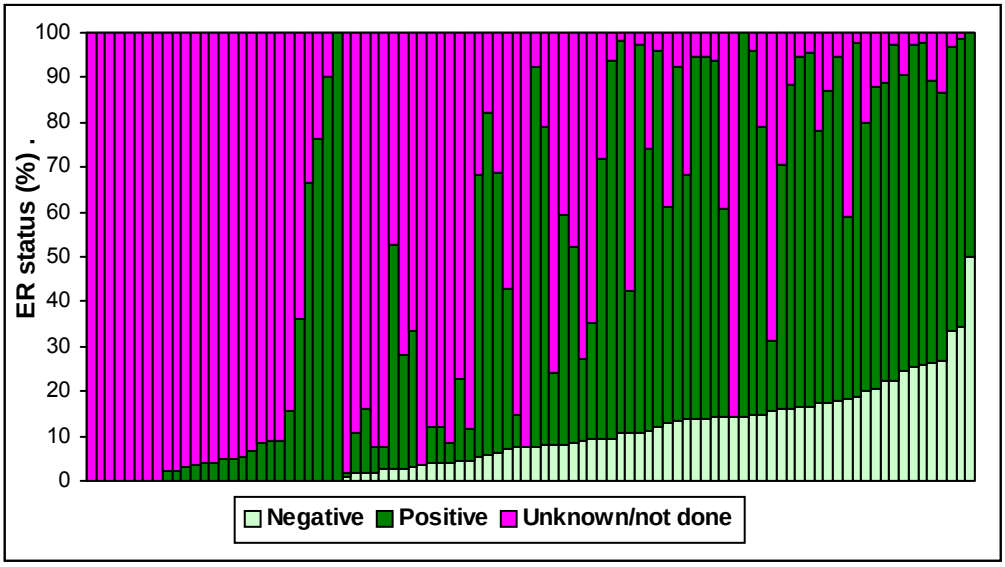

Figure 20: Variation between screening units in the ER status of non/micro-invasive cancers

In 2010/11, PgR status was known 29% of non/micro-invasive cancers. This is a marked decrease from 2007/08 when PgR status was known 40% of non-invasive cancers.

KEY FINDINGS:

- ER status was unknown for 1% of 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.
- 91% of invasive cancers with known ER status were ER positive.
- PgR status was known for 66% of invasive cancers compared with 75% in 2007/08. This varied from 34% in East Midlands to 96% in North West. Of the invasive cancers with known PgR status, 75% were positive. 86% of the 1,259 invasive cancers that were known to be ER negative had known PgR status; 4% were PgR positive and 81% were PgR negative.
- HER-2 status data were available for 97% of invasive cancers. 22% of the invasive cancers without a HER-2 status were in London. In one unit in East of England, 16% of the 164 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, 11% were positive. In one screening unit in South West, 39% of the 231 invasive cancers were HER-2 positive. The regional QA reference centre should audit these cases.
- 49% of non/micro-invasive cancers had unknown ER status, and 81% of non-invasive cancers with known ER status were ER positive.
- The proportion of ER negative non/micro-invasive cancers varied widely between screening units. In 12 units, 20% or more of the non/micro-invasive cancers were ER negative. Three of these units were in East Midlands, 3 in North West and 2 in North East, Yorkshire & Humber. 74% of all the ER negative non/micro-invasive cancers were in these 8 units.

CHAPTER 4
SURGICAL TREATMENT

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

In the UK as a whole in 2010/11, 70% of the 3,441 non-invasive cancers were treated by breast conserving surgery, 29% were treated by mastectomy, 37 cancers (1%) apparently received no surgery and for 1 cancer it was not known whether or not surgery had been performed (Table 39). The mastectomy rate varied from 23% in South East Coast and Wales to 36% in East Midlands. All 171 micro-invasive cancers received surgery, 54% had breast conserving surgery and 46% 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 2010/11, 37% of the 3,404 non-invasive cases with surgery were less than 15mm in diameter and 14% were larger than 40mm in diameter (Table 25). Of the 479 non-invasive cancers larger than 40mm in diameter, 84 (18%) had breast conserving surgery (Table 41). Sixty of these cancers were high cytonuclear grade (see the summary table below). 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 84 large non-invasive cancers and the 14 non-invasive cancers with unknown size that had 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

	>40mm		Unknown size		
Region	**High cytonuclear grade** (Table 42)	**Unknown cytonuclear grade**	**High cytonuclear grade**	**Unknown cytonuclear grade** (Table 43)	**Total***
N East, Yorks & Humber	6	0	0	0	6
East Midlands	5	0	0	0	5
East of England	2	0	0	0	2
London	2	0	2	0	4
South East Coast	7	0	0	0	7
South Central	6	0	2	1	9
South West	6	0	0	0	6
West Midlands	7	0	1	1	9
North West	2	0	1	0	3
Wales	8	0	4	1	13
Northern Ireland	1	0	0	0	1
Scotland	8	0	1	0	9
United Kingdom	**60**	**0**	**11**	**3**	**74**

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

KEY FINDINGS:

- 70% of non-invasive cancers were treated with breast conserving surgery. 37 cancers apparently received no surgery. Mastectomy rates for non-invasive cancers varied from 23% in South East Coast and Wales to 36% in East Midlands.
- Regional QA reference centres and regional surgical QA co-ordinators should audit the 84 large non-invasive cancers and the 14 non-invasive cancers with unknown size that had high or unknown cytonuclear grade that had breast conserving surgery to ensure that they were not under-treated.

4.2 Surgical Treatment for Invasive Breast Cancer

Of the 14,219 invasive breast cancers detected by the UK NHSBSP in 2010/11, 10,607 (75%) underwent breast conserving surgery and 3,382 (24%) had a mastectomy. Figure 21 shows the regional variation in invasive cancer mastectomy rates which ranged from 19% in South East Coast to 27% in North East, Yorkshire & Humber, East Midlands and Northern Ireland. Mastectomy rates in individual screening units varied between 9% (one unit in East of England) and 57% (one unit in East Midlands). 225 cancers (2%) had no surgery, and treatment information was unavailable for 5 cancers in Scotland. 120 of the cancers with no surgery and all 5 cancers with unknown treatment had neo-adjuvant therapy. Regional QA reference centres and regional surgical QA co-ordinators should audit the 105 cancers without surgery that did not have neo-adjuvant therapy recorded and the 5 cancers with unknown surgery to ascertain why surgical treatment was not given or why the surgical treatment that was given was not recorded.

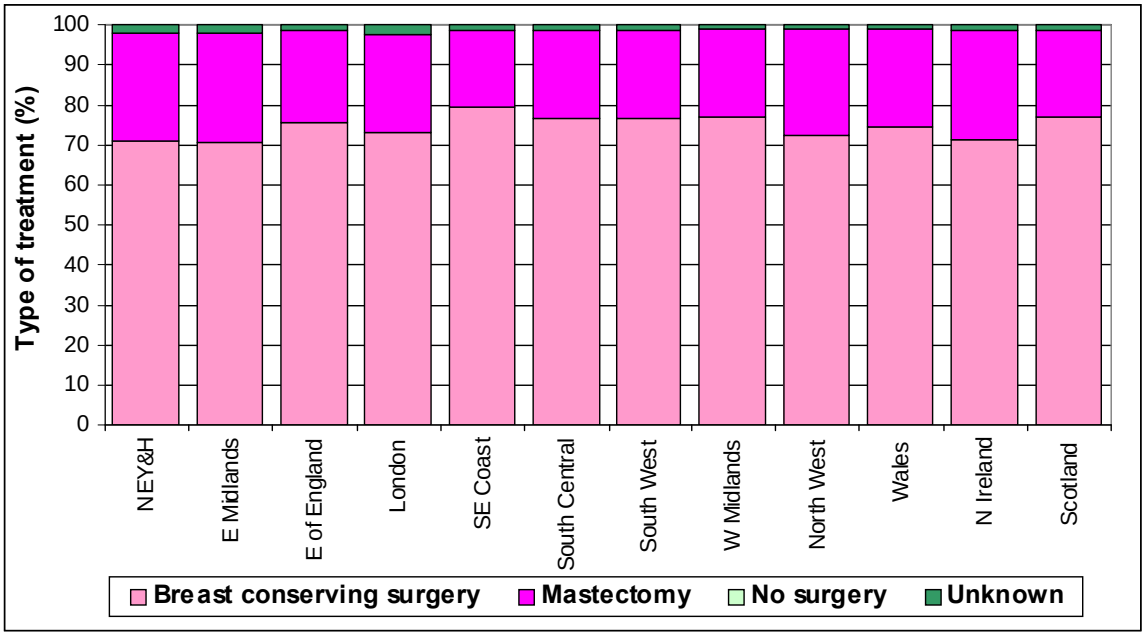

Figure 21 (Table 44): Type of treatment for invasive cancers (all sizes)

4.2.1 Surgical Treatment of Invasive Cancers According to Invasive Size

In most regions there was a clear variation in mastectomy rate with tumour size (Figure 22); the overall rates being 16%, 21%, 36%, 68% and 89% 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 East Coast, mastectomy rates for cancers with invasive tumour diameters in the two largest size categories were particularly low compared to other regions.

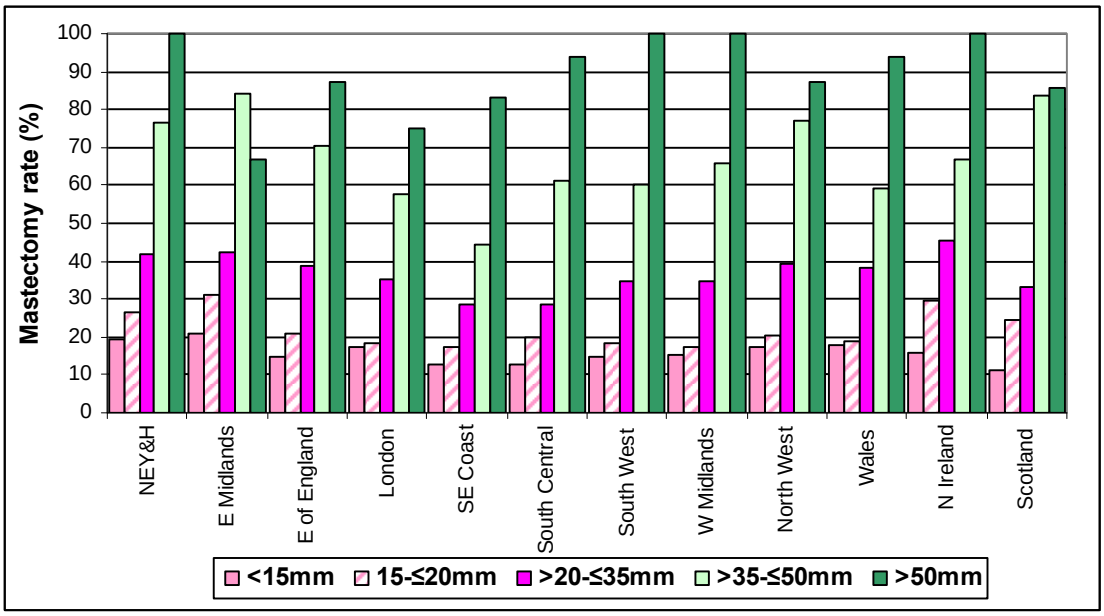

Figure 22 (Table 45): Variation in mastectomy rates with invasive tumour size

The following summary table shows that 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 16% in 2010/11. Table 45 shows that the highest mastectomy rates in 2010/11 for small (<15mm) invasive cancers were recorded in East Midlands (21%) and the lowest rates (11%) in Scotland.

15 YEAR COMPARISON:
TREATMENT FOR SMALL INVASIVE CANCERS (invasive size <15mm)

Year of data collection	*Total invasive cancers <15mm*	*Breast conserving surgery*		*Mastectomy*	
		No.	*%*	*No.*	*%*
1996/97	*3,135*	*2,449*	*78*	*601*	*19*
1997/98	*3,384*	*2,693*	*80*	*651*	*19*
*1998/99**	*3,344*	*2,697*	*81*	*618*	*18*
1999/00	*4,150*	*3,337*	*80*	*773*	*19*
2000/01	*4,189*	*3,363*	*80*	*796*	*19*
2001/02	*4,233*	*3,333*	*79*	*879*	*21*
2002/03	*4,878*	*3,950*	*81*	*918*	*19*
2003/04	*5,489*	*4,475*	*82*	*1,006*	*18*
2004/05	*5,795*	*4,723*	*82*	*1,071*	*18*
2005/06	*6,678*	*5,424*	*81*	*1,254*	*19*
2006/07	*6,567*	*5,359*	*82*	*1,208*	*18*
2007/08	*7,002*	*5,720*	*82*	*1,282*	*18*
2008/09	*7,022*	*5,809*	*83*	*1,213*	*17*
2009/10	*7,168*	*5,938*	*83*	*1,230*	*17*
2010/11	*7,311*	*6,147*	*84*	*1,164*	*16*

*Data from Scotland are absent in 1998/99

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 2010/11 varied with the size of the invasive cancer and with whole tumour size. As expected, mastectomy rates increased with invasive tumour size from 16% for small (<15mm) tumours to 89% for very large (>50mm) tumours. For small (<15mm) invasive cancers, mastectomy rates also increased as the whole tumour size increased. Thus, while only 10% of small (<15mm) cancers with whole tumour size <15mm were treated with a mastectomy, 89% 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 in situ 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 46)	
	No.	**Mastectomy Rate (%)**	**No.**	**Mastectomy Rate (%)**
<15mm	1164	16	513	10
15-≤20mm	703	21	130	15
>20-≤35mm	888	36	182	29
>35-≤50mm	356	68	154	63
>50mm	231	89	178	89

Tables 45 and 46 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 East Midlands (21% compared to 12%) and North East, Yorkshire & Humber (19% compared to 10%), and least in East of England (15% compared to 11%).

Figure 23 shows the variation between screening units in the mastectomy rate for invasive cancers with whole tumour size <15mm in the 3-year period 2008/09-2010/11. 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 (seven units) than the average rate of 10%.

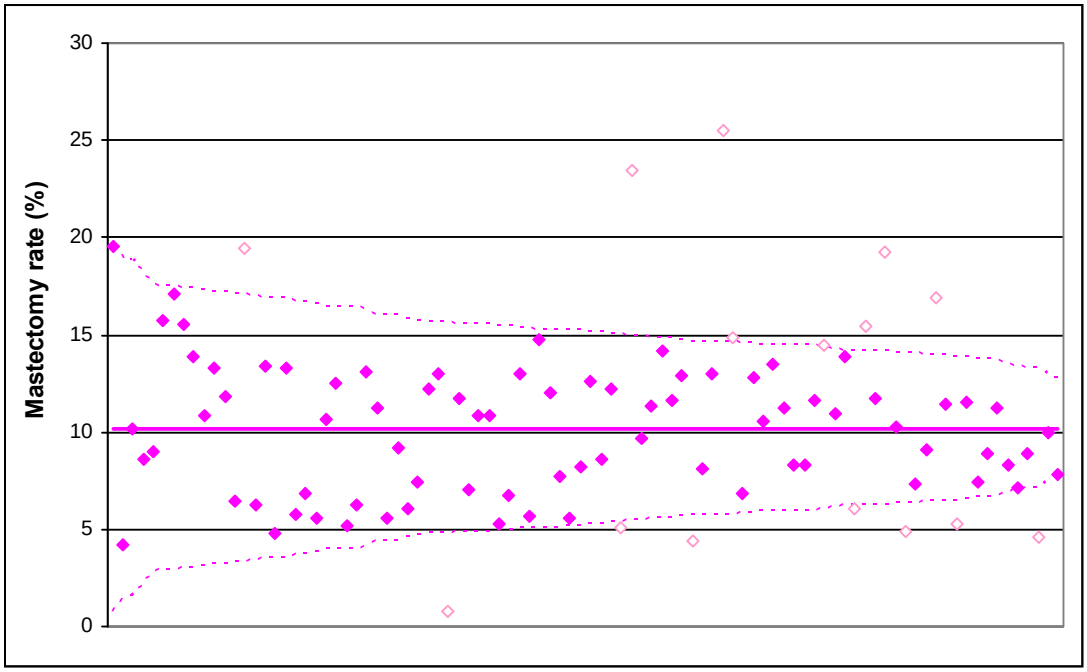

Figure 23: Variation between screening units in the mastectomy rates for invasive cancers with a whole tumour size <15mm in 2008/09-2010/11 (open diamonds represent units which lie outside the control limits)

Of the eight units with unusually high mastectomy rates, 2 were in East Midlands, 2 in North East, Yorkshire & Humber, 2 in North West, 1 in Wales and 1 in West Midlands. Three of the 7 units with unusually low mastectomy rates were in South East Coast; the remainder were in South West, West Midlands, North East, Yorkshire & Humber 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.

KEY FINDINGS:

- In the UK as a whole, 24% of invasive breast cancers had a mastectomy. Mastectomy rates in individual screening units varied between 9% and 57%.
- Regional QA reference centres and regional surgical QA co-ordinators should audit the 105 cancers without surgery that did not have neo-adjuvant therapy recorded and the 5 cancers with unknown surgery to ascertain why surgical treatment was not given or why the surgical treatment that was given was not recorded.
- 89% of invasive cancers with an invasive tumour diameter greater than 50mm were treated with mastectomy compared with 16% of small (less than 15mm diameter) invasive cancers.
- Only 10% of cancers with whole tumour size less than 15mm were treated with mastectomy compared with 89% of small invasive (less than 15mm diameter) cancers with whole tumour diameter greater than 50mm. These data indicate that the presence of in situ disease which extends beyond the invasive lesion accounts for a proportion of the mastectomies performed on small invasive cancers.
- 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 screening units lying outside (above and below) the control limits in Figure 23 which shows the inter-unit variation in the proportion of invasive cancers with whole tumour size <15mm which had a mastectomy.

4.3 Immediate Reconstruction Following Mastectomy

Overall, of the 17,838 cancers detected in 2010/11, 4,445 (25%) were treated with mastectomy. Of these, 3,358 (76%) cases had no immediate reconstruction recorded, and for 61 (1%) cases it was unknown whether or not immediate reconstruction was performed. 1,026 cancers (23%) were recorded as having immediate reconstruction. The latter is slightly higher than the rate of 21% reported in the *National Mastectomy and Breast Reconstruction Audit Third Annual Report, 2010* for all breast cancers (screen-detected and symptomatic) treated with mastectomy in the period 1 January 2008 to 31 March 2009. Table 48 shows that, of the 1,026 cancers known to have had immediate reconstruction following mastectomy, 638 (62%) were invasive, 37 (4%) were micro-invasive and 351 (34%) were non-invasive. Only 19% of the 3,382 invasive cancers treated with mastectomy (Tables 44 and 48) had immediate reconstruction recorded compared with 36% of the 984 non-invasive cancers treated with mastectomy (Tables 39 and 48). These results are similar to those reported in the *National Mastectomy and Breast Reconstruction Audit Second Annual Report, 2009* where 17% of women with invasive breast cancer had immediate reconstruction compared with 38% of women with non-invasive breast cancer.

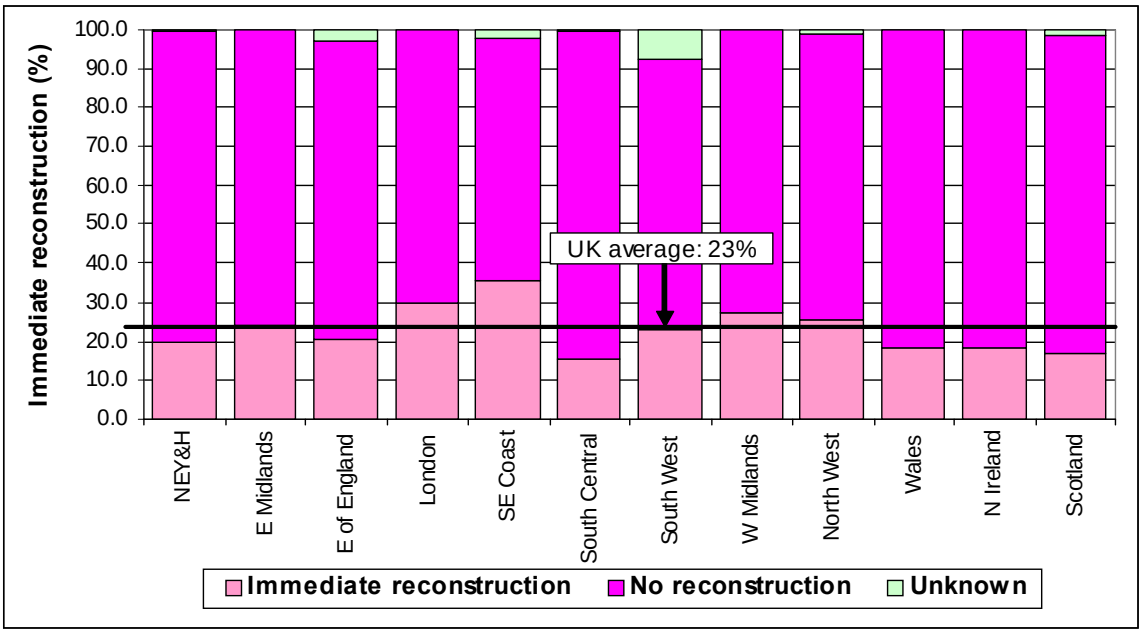

Figure 24 (Table 47): Proportion of all cancers having immediate reconstruction following mastectomy

Figure 24 shows how recorded immediate reconstruction rates for all screen-detected cancers treated with mastectomy varied between regions in 2010/11. The highest immediate reconstruction rate was in South East Coast (36%) and the lowest in South Central (15%). South West had 28 cases (7%) and East of England 12 cases (3%) where it was not known whether or not immediate reconstruction was performed.

Figure 25 demonstrates the variation between screening units in the proportion of cases having immediate reconstruction in the 3-year period 2008/09-2010/11. 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 (23 units) or lower (23 units) than the average rate of 20%.

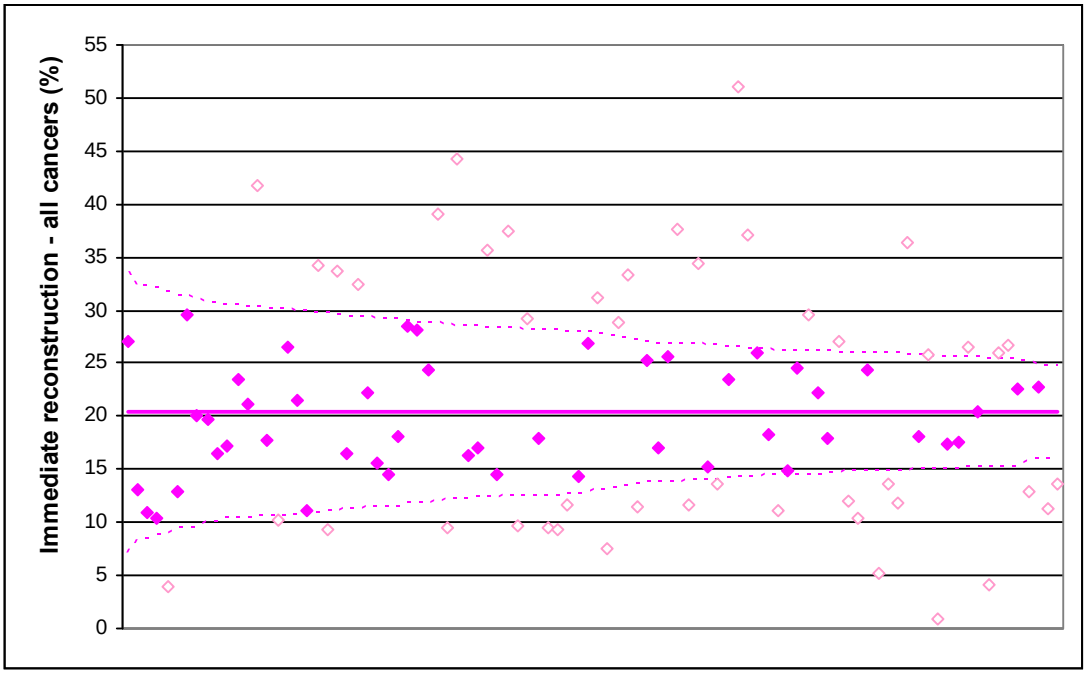

Figure 25: Variation in immediate reconstruction following mastectomy for all cancers in each screening unit in 2008/09-2010/11 (open diamonds represent units which lie outside the control limits)

Of the 23 units with high immediate reconstruction rates, 4 were in South East Coast and 3 each in East of England, London, North West and South West. Of the 23 units with low immediate reconstruction rates for all cancers, 5 were in North East, Yorkshire & Humber and 4 in North West. In 4 units (2 in North East, Yorkshire & Humber, 1 in Wales and 1 in Northern Ireland), fewer than 6% of cases had immediate reconstruction recorded. The 2 largest screening units in Scotland, which together detected 63% of all Scottish breast cancers, also had low immediate reconstruction rates.

Figure 26 shows that for invasive cancers treated with mastectomy, immediate reconstruction rates varied from 11% in South Central to 32% in South East Coast, and that for non/micro-invasive cancers treated with mastectomy, immediate reconstruction rates varied from 18% in Scotland to 45% in London, East Midlands and South East Coast.

Figure 27 shows the very wide variation in recorded immediate reconstruction between screening units in 2010/11; with rates ranging from 0 cancers in 2 screening units to over 40% of cancers in 9 units. Immediate reconstruction rates were higher for non/micro-invasive cancers in the majority of units (53 units). For invasive cancers, there was no obvious relationship between immediate reconstruction rates and whole tumour size.

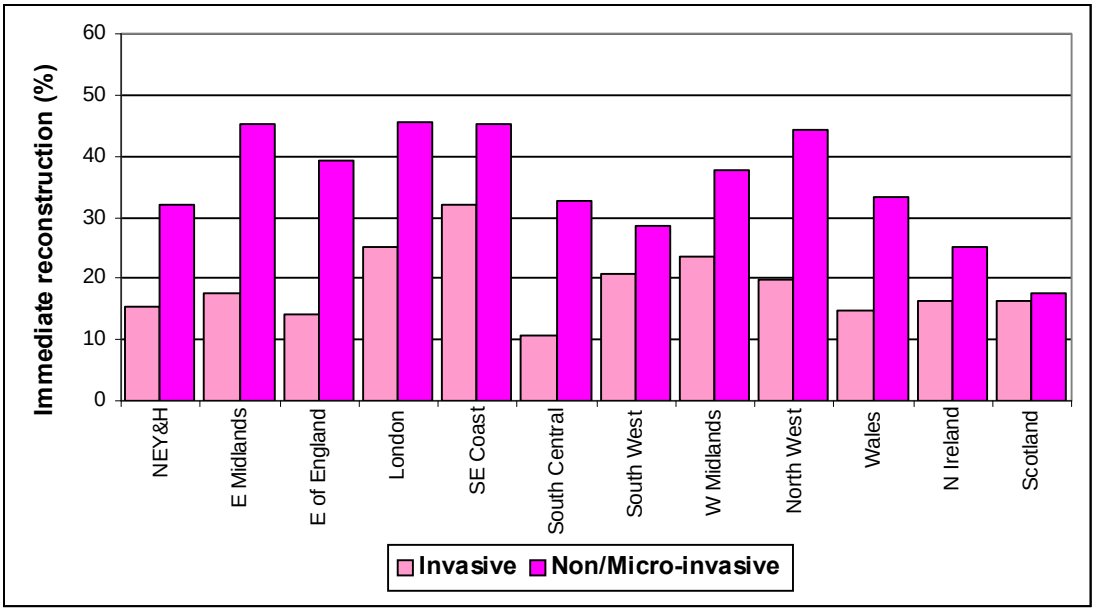

Figure 26: Variation in the proportion of invasive and non/micro-invasive cancers with immediate reconstruction

23 screening units had low immediate reconstruction rates for invasive cancers. Of these, 2 in North East, Yorkshire & Humber, 1 in the North West and 1 in Wales are also high outliers in Figure 23 and have unusually high mastectomy rates for small (<15mm) 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 clinic practice or patient choice.

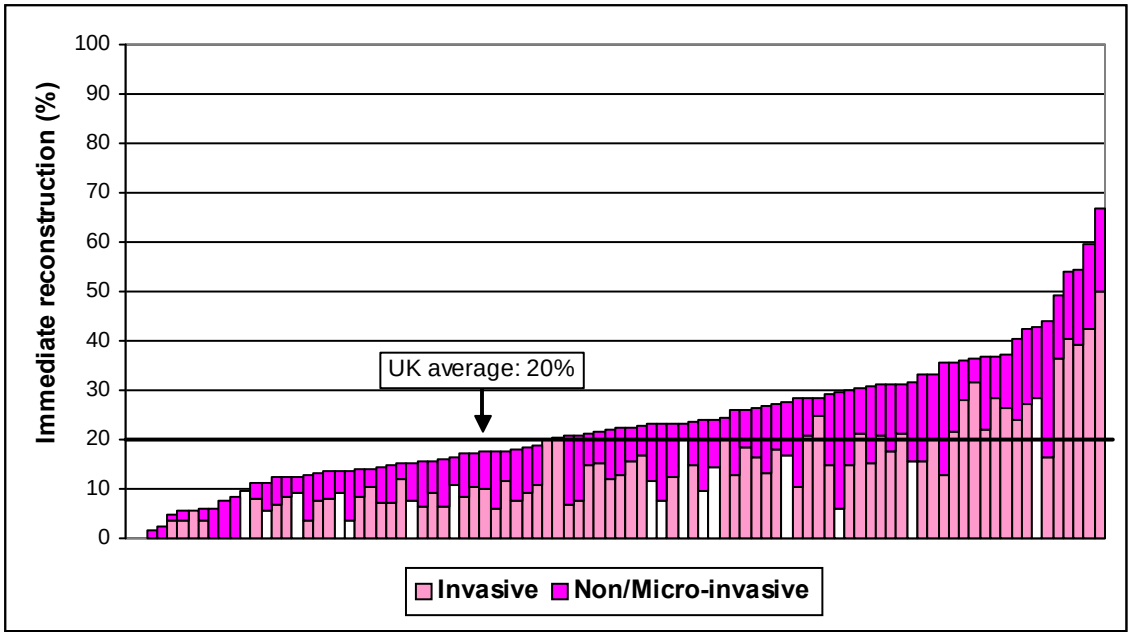

Figure 27: Variation between screening units in the proportion of invasive and non/micro-invasive cancers having immediate reconstruction
(16 of the 20 smallest units are highlighted in white)

KEY FINDINGS:

- 23% of screen-detected cancers treated with mastectomy were recorded as having immediate reconstruction in 2010/11. This is similar to the 21% immediate reconstruction rate reported in the *National Mastectomy and Breast Reconstruction Audit Third Annual Report, 2010*.
- The highest recorded immediate reconstruction rates for all screen-detected cancers were in South East Coast (36%), and the lowest in South Central (15%).
- 19% of invasive cancers treated with mastectomy were recorded as having immediate reconstruction compared with 36% of non-invasive cancers treated with mastectomy. Immediate reconstruction varied widely between screening units; from 0 cancers in 2 units to 40% of cancers in 9 units.

KEY FINDINGS (cont.):

- For invasive cancers treated with mastectomy, recorded immediate reconstruction rates varied from 11% in South Central to 32% in South East Coast. For non/micro-invasive cancers, recorded immediate reconstruction rates varied from 18% in Scotland to 45% in London, East Midlands and South East Coast.
- 23 screening units had low immediate reconstruction rates for invasive cancers. Of these, 2 in North East, Yorkshire & Humber, 1 in the North West and 1 in Wales also had unusually high mastectomy rates for small (<15mm) 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 clinic practice or patient choice.

4.4 Neo-adjuvant Therapy

A total of 593 cancer patients received neo-adjuvant therapy in 2010/11 (Table 49). This included 581 (4%) of the 14,219 patients with invasive cancer and 11 patients with non-invasive cancer. Radiological size and core biopsy grade were recorded for cases with neo-adjuvant therapies. Only five cases did not have a complete record of all three types of neo-adjuvant therapy. Four of these cases were in one unit in Scotland and one case was in another unit in Scotland. Of the 11 patients with non-invasive cancer receiving neo-adjuvant therapy, two were recorded as having had neo-adjuvant chemotherapy, eight neo-adjuvant endocrine therapy and one neo-adjuvant chemotherapy, endocrine therapy and Herceptin.

225 women with invasive breast cancer (2%) had no surgery. Of these, 120 had neo-adjuvant therapy recorded. This may be 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, or because the neo-adjuvant therapy was the only treatment received by the patient.

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; 36% (19 cases) of whom had no surgery recorded, compared to none of the women aged less than 50 years.

USE OF NEO-ADJUVANT THERAPIES

Age	*Chemotherapy*	*Herceptin*	*Endocrine therapy*
<50	*2.7%*	*0.4%*	*1.5%*
50 – 64	*1.7%*	*0.1%*	*1.6%*
65 – 70	*1.1%*	*0.1%*	*2.3%*
71+	*0.2%*	*0.0%*	*4.0%*

4.4.1 Neo-adjuvant Chemotherapy

258 breast cancers (1% of all cancers diagnosed in 2010/11) had neo-adjuvant chemotherapy recorded (Table 50). 255 cancers were invasive and 3 were non-invasive. The proportion of cancers having neo-adjuvant chemotherapy varied between regions from 0% in Northern Ireland to 3% in South Central. 72 (28%), of the invasive cancers with neo-adjuvant chemotherapy recorded had unknown whole tumour size. 50 of these did not have surgery. 137 (54%) had a tumour size larger than 20mm on mammography and 46 (18%) had a tumour size of 20mm or less on mammography. 71% of the 255 invasive cancers were Grade 2 or 3, and 13 cases were Grade 1. 97 of the 255 invasive cancers with neo-adjuvant chemotherapy recorded had an abnormal axillary ultrasound result. Of these 97 cancers, 85 (88%) had a needle core biopsy and for 69 (81%) of these a C5/B5 result was recorded. Two invasive cancers with neo-adjuvant chemotherapy recorded 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 and the three non-invasive cancers which apparently had neo-adjuvant chemotherapy were recorded correctly.

4.4.2 Neo-adjuvant Herceptin

In the UK as a whole, 23 breast cancers were recorded as having received neo-adjuvant Herceptin (Table 51). 22 of these also had neo-adjuvant chemotherapy recorded. 22 cases were invasive and one case was non-invasive, all 23 cases were HER-2 positive. Six cases were in North West, and five in South East Coast.

4.4.3 Neo-adjuvant Endocrine Therapy

354 breast cancers (2%) had neo-adjuvant endocrine therapy recorded (Table 52). 344 were invasive, nine were non-invasive and the invasive status of one cancer was unknown. The proportion of cancers receiving neo-adjuvant endocrine therapy varied between regions from 1% in Northern Ireland, East of England, Wales and East Midlands to 5% (71 cases) in South East Coast. 341 cancers (96%) with neo-adjuvant endocrine therapy recorded were ER and/or PgR positive, 1% (4 cancers) had unknown ER and PgR status and the remaining nine cancers (3%) 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 354 cancers that had neo-adjuvant endocrine therapy recorded, 75 (21%) had no surgery and 20 (6%) also had other adjuvant therapy. 73% of the cancers receiving neo-adjuvant endocrine therapy were aged 60 years or over and 19% were in South East Coast.

KEY FINDINGS:

- 593 cancers were recorded as having received neo-adjuvant therapy. 581 were invasive and 11 were non-invasive.
- 120 of the 225 women with invasive breast cancer (2%) who did not have surgery had neo-adjuvant therapy recorded.
- The use of neo-adjuvant endocrine therapy was highest (4%) for older women aged 71 years or more, 36% (19 cases) of whom had no surgery recorded compared to none of the women aged less than 50 years.
- 258 breast cancers (1% of all cancers diagnosed in 2010/11) had neo-adjuvant chemotherapy recorded; 3 of these were non-invasive. Two of the invasive 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 and the three non-invasive cancers which apparently had neo-adjuvant chemotherapy were recorded correctly.
- 72 (28%), of the invasive cancers with neo-adjuvant chemotherapy recorded had unknown whole tumour size. 50 of these did not have surgery. 137 (54%) had a tumour size larger than 20mm on mammography.
- 97 of the 255 invasive cancers with neo-adjuvant chemotherapy recorded had an abnormal axillary ultrasound result. Of these 97 cancers, 85 (88%) had a needle core biopsy and for 69 (81%) of these a C5/B5 result was recorded.
- 23 cancers were recorded as having received neo-adjuvant Herceptin; all were HER-2 positive invasive cancers. 22 of these also had neo-adjuvant chemotherapy recorded.
- 354 cancers (2%) had neo-adjuvant endocrine therapy recorded, 341 (96%) of these were ER and/or PgR positive, 4 had unknown ER and PgR status and 9 were ER and PgR negative; 75 (21%) had no surgery.
- 73% of the cancers receiving neo-adjuvant endocrine therapy were aged 60 years or over and 19% were in South East Coast.

CHAPTER 5
SURGICAL 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)

There were 592 consultant breast surgeons working in the UK NHSBSP in 2010/11. This UK figure counts only once the 69 surgeons who worked in more than one region. Throughout this section, each surgeon is credited with their total UK screening caseload. Surgeons who share cases are each credited with the case. 519 of the 592 consultant surgeons were identified by their unique GMC registration code. A code other than the GMC code was provided for a further 59 surgeons from Scotland. Data for the remaining 18 unidentified surgeons have been assumed to be for 18 individual surgeons, 14 are from Scotland and 1 from overseas. It should be noted that currently, only the responsible consultant and not necessarily the surgeon who actually undertakes the operation is recorded in the audit. This means that the caseload for some surgeons will include patients operated on by associate specialists or supervised trainees.

The following 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 91-93% from 2004/05 onwards. In 2010/11, 81% women were treated by surgeons with an annual caseload of more than 30 screen-detected cancers, and 3% (502) were treated by surgeons with an annual caseload of fewer than 10 screen-detected cancers (Table 53).

11 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*

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

Combining the data submitted for 2008/09, 2009/10 and 2010/11 NHSBSP/ABS audits, an annual average screening caseload can be calculated for 717 consultant surgeons who managed or treated patients with screen-detected cancers (Table 56). The variation in screening surgical caseload in each region in this 3-year period is shown in Figure 28. The 154 surgeons working in more than one region appear in each region's figures. 253 surgeons (35%) treated 30-89 screening cases per year, 82 (11%) treated 20-29 screening cases per year and 97 (14%) treated 10-19 screening cases per year. 275 surgeons (38%) 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 (57%). Surgical specialisation was highest in Wales, where 27% of surgeons treated fewer than 10 screening cases per year.

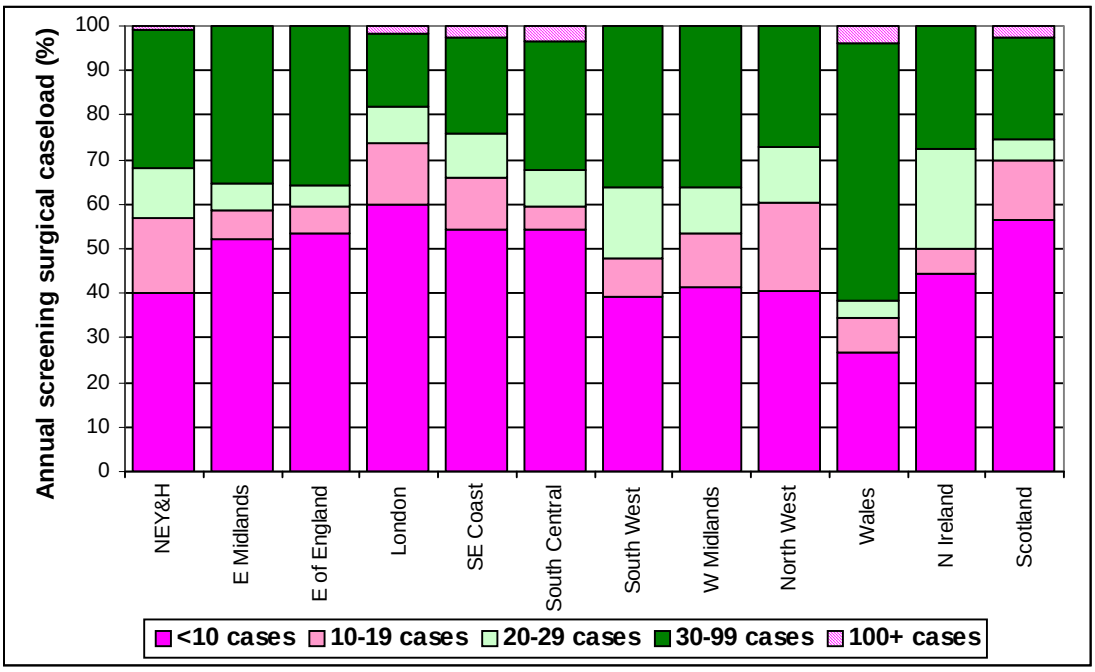

Figure 28 (Table 56): Variation in annual screening surgical caseload expressed as number of cases per surgeon (3-year data 2008/09-2010/11)

Table 60 shows the number of women treated in the 3-year period 2008/09-2010/11 by 1, 2, 3 or more surgeons and those with no referral to a consultant surgeon. Of the 51,894 screen-detected cases included in the three most recent audits, the majority (98%) were recorded under one consultant surgeon, 566 (1%) were recorded under 2 surgeons and 265 (1%) had no consultant surgeon recorded. However, 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 System (NBSS). Currently, only the responsible consultant, and not necessarily the surgeon who actually undertakes the operation, is recorded. The caseload for some surgeons will thus include patients operated on by associate specialists or supervised trainees.

Figure 29 shows the variation in the proportion of women treated by surgeons with differing average annual screening caseloads in the 3-year period 2008/09-2010/11. Of the 51,629 women who were under the care of a consultant surgeon, 3,039 (6%) were treated by 6 surgeons with an average annual screening caseload of 90 cases or more. A further 36,019 women (69%) were treated by a surgeon with an average annual screening caseload of 30-89 cases. In the UK as a whole, 2,606 women (5%) were treated by a surgeon with an average annual screening caseload of fewer than 10 cases. In Northern Ireland, 14% of women were treated by surgeons with an average annual screening caseload of fewer than 10 cases.

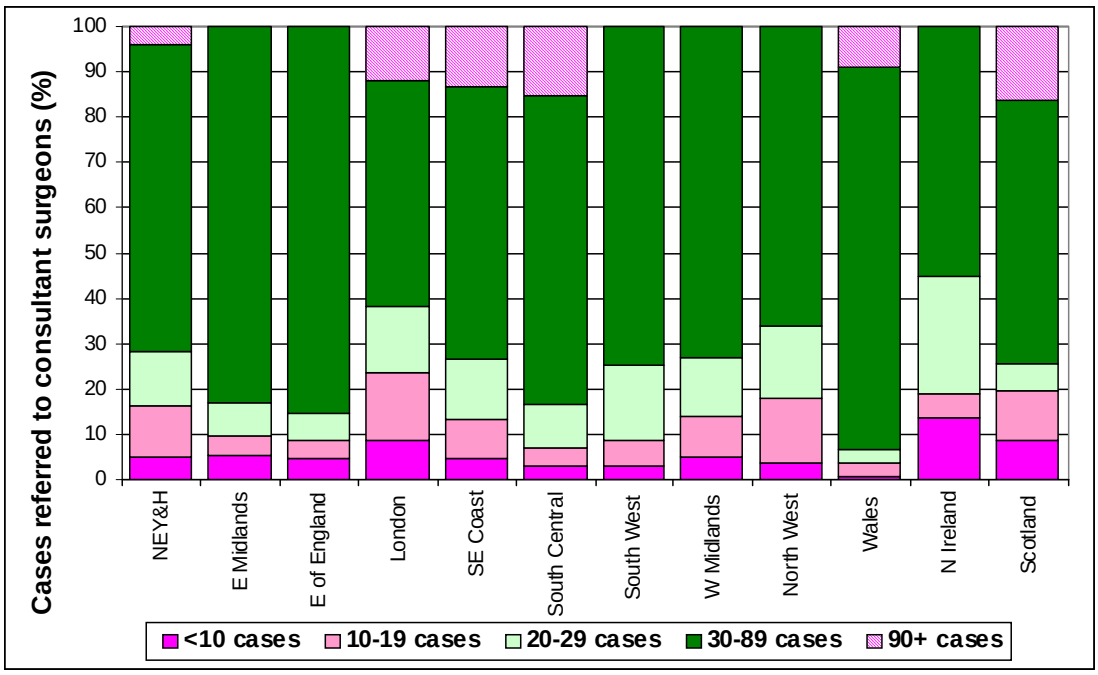

Figure 29 (Table 54): Variation in the proportion of women treated by surgeons with differing screening caseloads (3-year data 2008/09-2010/11)

A list of 6 possible reasons was provided to explain why surgeons had an average annual screening caseload of fewer than 10 cases (see Appendix B). 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 30.

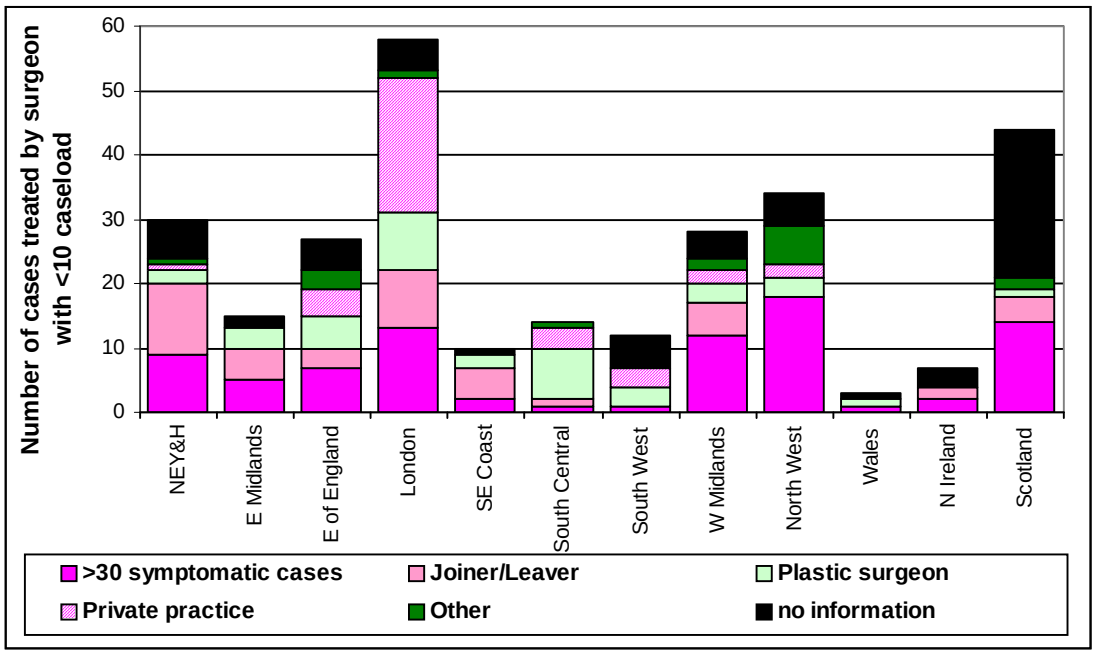

Figure 30 (Table 61): Explanations provided for surgeons treating fewer than 10 screening cases (3-year data 2008/09-2010/11)

Of the 275 surgeons in the UK with an average annual screening caseload of fewer than 10 cases in the 3-year period 2008/09-2010/11, 71 (26%) treated more than 30 symptomatic breast cancers each year during this period, and 35 (13%) either joined or left the NHSBSP during the 3 years. Other reasons (plastic surgeon, private practice, surgeons from other region) were given for 71 surgeons (26%). 21 of the 73 surgeons who had an average annual screening caseload of fewer than 10 cases were in private practice in London.

For 14 surgeons who treated a total of 36 women, a reason other than one of the 6 listed was given. These were: patient choice, locum surgeon, long term sick leave, surgeon from outside the UK. There was no information to explain the low average annual screening caseload recorded for 57 surgeons who treated a total of 592 women. 23 of these surgeons were in Scotland (Table 62). 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 2010/11 there were 592 consultant breast surgeons working in the UK NHSBSP, and 91% of women were treated by a surgeon with a screening caseload of at least 20 cases. 160 surgeons treated fewer than 10 screen-detected cases in 2010/11.
- Combining the data submitted for the 3-year period 2008/09-2010/11, 275 surgeons (38%) had an annual average caseload of fewer than 10 cases and 10 treated an average of at least 90 cases per year.
- The highest proportion of surgeons with a screening caseload of fewer than 10 screening cases per year was in Scotland (57%). Surgical specialisation was highest in Wales, where 27% of surgeons treated fewer than 10 screening cases per year.
- Of the 275 low caseload surgeons, 26% treated more than 30 symptomatic breast cancers each year. 21 of the 73 surgeons who had a screening caseload of fewer than 10 cases because of private practice were in London.
- For 14 surgeons who treated a total of 36 women, a reason other than one of the 6 listed was given in the 3-year period 2008/09-2010/11. There was no information to explain the low average annual screening caseload recorded for 57 surgeons who treated a total of 592 women. 23 of these surgeons were in Scotland. 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.
- 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 System (NBSS).
- Currently, only the responsible consultant, and not necessarily the surgeon who actually undertakes the operation, is recorded in this audit. The caseload for some surgeons will thus include patients operated on by associate specialists or supervised trainees.

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 C5 cytology or B5 core biopsy, 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, 4,386 (25%) of the 17,573 surgically treated breast cancers had more than one operation. 3,379 invasive cancers (24%) and 1,007 non/micro-invasive cancers (28%) had more than one operation (Table 64). Figure 31 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 (39%) and the highest repeat operation rates for invasive cancers were in East of England, London and South West (27%).

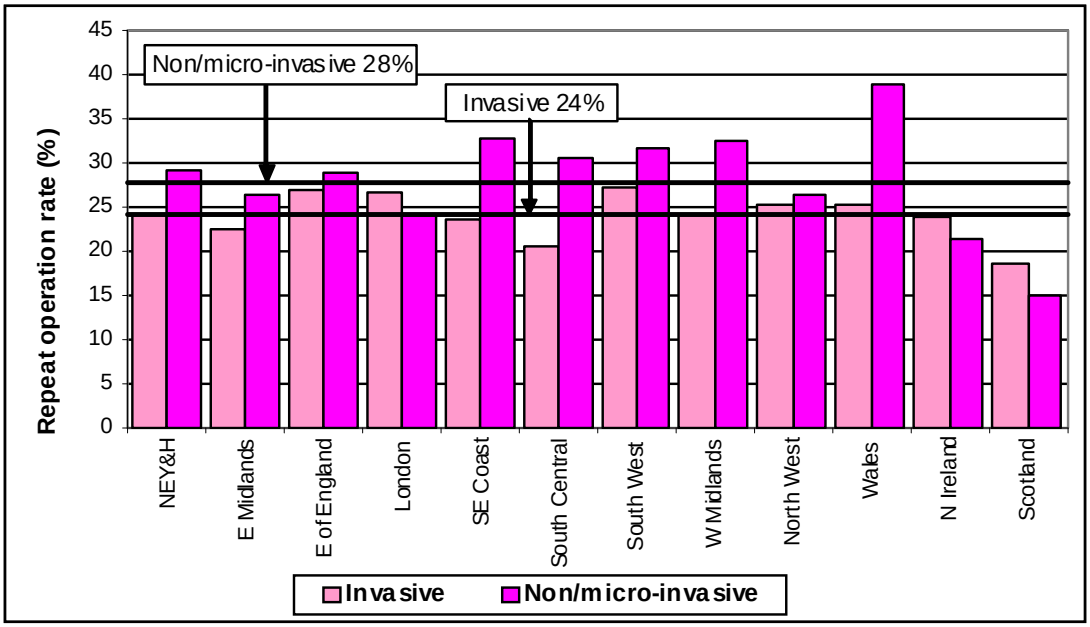

Figure 31 (Table 64): Proportions of surgically treated invasive and non/micro-invasive cancers undergoing two or more operations

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 2008/09-2010/11 was examined in a control chart (not shown), 25 units were high outliers and 19 were low outliers. Of the 25 units with significantly higher repeat operation rates, 4 were in East of England and 4 were in South West. The highest repeat operation rates (39%, 36% and 35.5%) were in two units in South West and one unit in East of England respectively. Regional QA reference centres and regional surgical QA co-ordinators should review the data for the 44 screening units with significantly higher or lower repeat operation rates over the 3-year period 2008/09-2010/11 to ascertain the reasons for their unusual practice.

Table 63 shows the repeat operation rates in each region for the 706 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 53% (374 cases), repeat operations for cancers without a non-operative diagnosis formed only 9% of the total repeat operations. Of the 193 invasive cancers without a non-operative diagnosis, 81% had a repeat operation. This varied from 56% in Scotland to 100% in East Midlands and Northern Ireland. Only 42% of the 513 non/micro-invasive cancers without a non-operative diagnosis had a repeat operation. This varied from 25% in East of England to 68% in Wales.

Of the remaining 332 surgically treated breast cancers without a non-operative diagnosis, 10 had a mastectomy and five had surgery to the axilla alone as their diagnostic/final operation (no further surgery possible). A further 317 had breast conserving surgery as their diagnostic/final surgery; 263 (83%) of these had clear margins (tumour removed no further operation), 53 (17%) had involved or unknown margin status and one had no residual tumour found at surgery. Of the 53 cancers with involved or unknown margin status, 21 (40%) had LCIS only (therefore no further surgery). 32 (60%) were not LCIS and had no further surgery despite the margins being involved or of unknown status. 25 (78%) of these cancers were in Scotland. 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.

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	**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 16,866 surgically treated breast cancers with a non-operative diagnosis, 4,012 (24%) underwent more than one therapeutic operation. This is 1% lower than the repeat operation rate for all breast cancers. 3,222 (23%) invasive breast cancers with a non-operative diagnosis and 790 (26%) non/micro-invasive breast cancers with a non-operative diagnosis underwent more than one therapeutic operation.

Of the 14,023 invasive breast cancers with a non-operative diagnosis, 11,024 were initially treated by therapeutic breast conserving surgery. Of these, 25% had repeat therapeutic operations (Figure 32). 190 cancers had three operations and 9 had more than three operations. Of the 2,280 non/micro-invasive cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery, 30% had repeat therapeutic operations. 78 had three operations and 10 had more than three operations. Six of these were in South East Coast and five were in a single unit within this region. Regional QA reference centres and regional surgical QA co-ordinators should audit the 19 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 after initial breast conserving surgery over the 3-year period 2008/09-2010/11 was examined in a control chart (not shown), 22 units were high outliers and 17 were low outliers. Of the 22 units with significantly higher repeat therapeutic operation rates, 4 were in South West. However, the highest repeat therapeutic operation rates (34%, 31% and 31%) were in units in North West, North East, Yorkshire & Humber and East Midlands respectively. Regional QA reference centres and regional surgical QA co-ordinators should review the data for the 39 screening units with significantly higher or lower repeat operation rates for cancers initially treated with therapeutic breast conserving surgery over the 3-year period 2008/09-2010/11 to ascertain the reasons for their unusual practice.

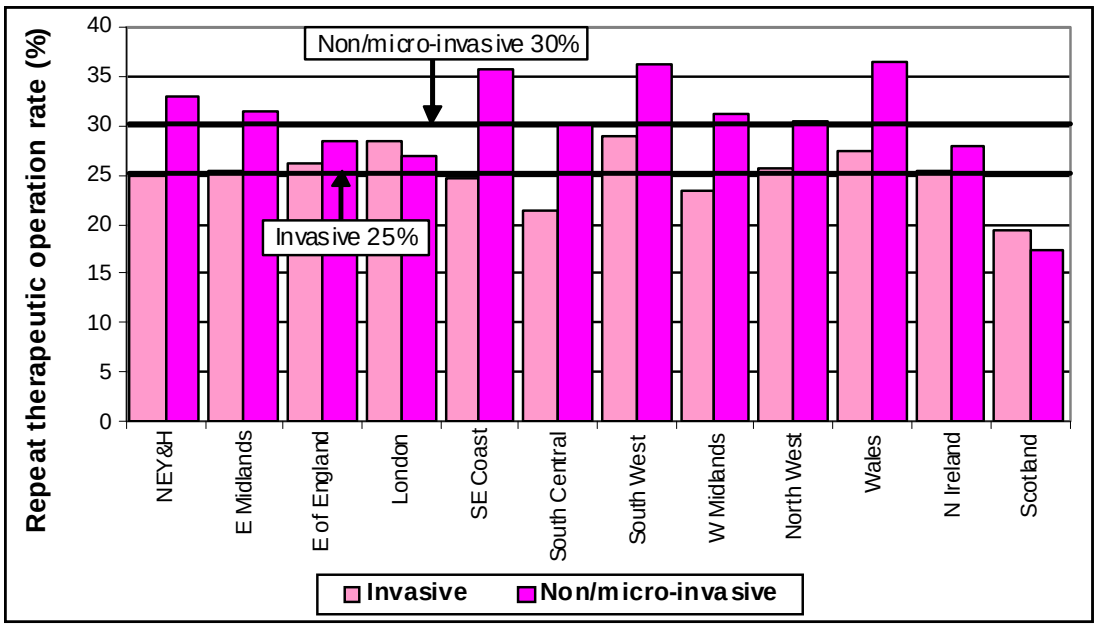

Figure 32 (Tables 65 & 66): Proportions of invasive and non/micro-invasive cancers undergoing two or more operations after initial therapeutic breast conserving surgery

Figure 33 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 2008/09-2010/11. Cancers treated by more than one surgeon have been excluded. 185 surgeons who initially treated fewer than 20 cancers with breast conserving surgery over the 3-year period are shaded.

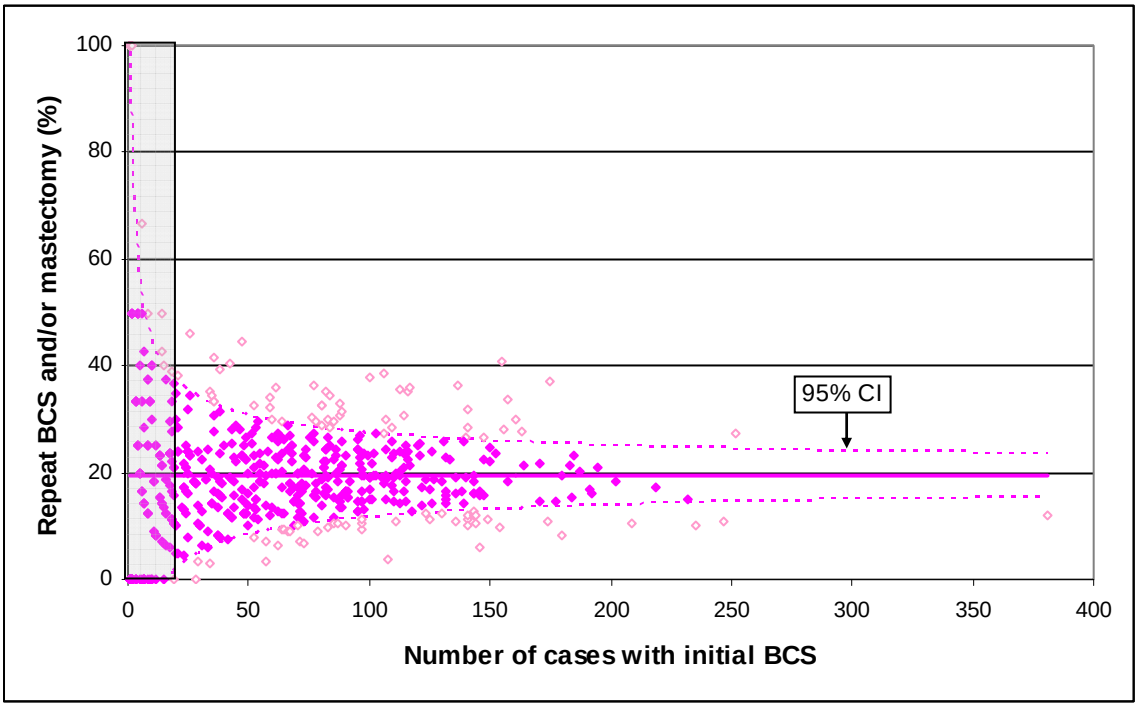

Figure 33: Variation between surgeons in the proportion of cancers initially treated with breast conserving surgery (BCS) that underwent repeat operations to the breast in the 3-year period 2008/09-2010/11 (only cancers treated by one surgeon are included) (open diamonds represent surgeons who lie outside the control limits)

440 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). 51 surgeons had a repeat therapeutic operation rate above the 95% upper control limit and 44 had a rate under the 95% lower control limit. 14 of the surgeons with

high repeat therapeutic operation rates were in units in North East, Yorkshire & Humber and 12 were in units in London. Regional QA reference centres and regional surgical QA co-ordinators should audit the work of the 95 surgeons with significantly higher or lower repeat operation rates for cancers initially treated with therapeutic breast conserving surgery over the 3-year period 2008/09-2010/11 to ascertain the reasons for this unusual practice.

KEY FINDINGS:

- 4,386 breast cancers (25%) had more than one operation. Regional QA reference centres and regional surgical QA co-ordinators should review the data for the 44 screening units with significantly higher or lower repeat operation rates over the 3-year period 2008/09-2010/11 to ascertain the reasons for their unusual practice.
- 81% 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 706 surgically treated cancers (with known invasive status) without a non-operative diagnosis was 53%, repeat operations for cancers without a non-operative diagnosis formed only 9% of the total repeat operations.
- 32 cancers without a non-operative diagnosis, which were not LCIS, had no further surgery despite the margins being involved or of unknown status. 25 (78%) of these were in Scotland. 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.
- 25% of invasive cancers and 30% of non/micro-invasive cancers with a non-operative diagnosis had a repeat operation.
- 19 cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery had more than three therapeutic operations in 2010/11. Six of these were in South East Coast and 5 were in a single unit within this region. Regional QA reference centres and regional surgical QA co-ordinators should audit these 19 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 39 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 2008/09-2010/11.

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 (conservation 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 (conservation 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 (SLNB) 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 34 shows the flow chart for cancers with a B5b (Invasive) core biopsy, Figure 35 for cancers with C5 cytology only, Figure 36 for non/micro-invasive cancers with a B5a (Non-invasive) core biopsy and Figure 37 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.

12,809 (99%) of the 12,943 cancers with a B5b (Invasive) core biopsy result proved to be invasive following therapeutic surgery (Table 9). 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 206 B5b (Invasive) cancers with a first operation involving only the axilla (Figure 34), 180 (87%) used a SLNB procedure and for 11 of the 21 cases where the only operation was to the axilla, a SLNB procedure was used. 35 of the 206 B5b (Invasive) cancers with a first operation involving only the axilla had neo-adjuvant therapy and 5 of these had no further surgery. 145 (70%) B5b (Invasive) cancers had a subsequent mastectomy and 89 (61%) had an immediate reconstruction recorded.

92% of the 47 surgically treated cancers with C5 cytology only and no B5 core biopsy proved to be invasive after surgery (Table 10). 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, 78% of the 2,919 surgically treated cancers with a B5a (Non-invasive) core biopsy result were confirmed following surgery to be non/micro-invasive and 20% were identified as having invasive disease (Table 8).

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 221 cancers with no surgery and with a B5b (Invasive) core biopsy diagnosis (see Figure 34), and the 111 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 36).

REPEAT THERAPEUTIC OPERATION RATES

	Invasive cancers						Non/micro-invasive cancers	
	B5b (Table 67)		C5 only, no B5 (Table 68)		B5a (Table 69)		B5a (Table 70)	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	365	22	3	33	44	58	118	29
East Midlands	175	19	-	-	29	62	41	22
East of England	270	23	1	100	43	69	78	29
London	292	24	0	0	52	63	78	24
South East Coast	218	21	0	0	35	56	79	30
South Central	166	18	0	0	17	44	39	25
South West	271	24	2	40	55	67	79	28
West Midlands	247	21	0	0	32	60	74	28
North West	328	22	1	9	54	57	78	24
Wales	173	23	0	0	25	52	57	33
Northern Ireland	56	23	0	0	6	32	12	18
Scotland	215	17	1	25	29	36	35	13
United Kingdom	**2776**	**21**	**8**	**17**	**421**	**57**	**768**	**26**

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

Invasive cancers with a C5 cytology only diagnosis had the lowest proportion of repeat operations (17%). Of the 8 invasive cancers with a C5 cytology only and repeat operations, 3 (38%) were in North East, Yorkshire & Humber. Invasive cancers with a B5b core biopsy had a repeat operation rate of 21%. This varied from 17% in Scotland to 24% in South West and London. Non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had a repeat operation rate of 26%. This varied from 13% in Scotland to 33% in Wales. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest repeat operation rate (57%). This varied from 32% in Northern Ireland to 69% in East of England. Repeat operation rates in 2010/11 for invasive cancers with B5a (Non-invasive) or C5 cytology only were 2% lower than those in 2009/10, 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 stable.

KEY FINDINGS:

- Invasive cancers with a C5 cytology only diagnosis had the lowest repeat operation rate (17%).
- 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 26%.
- Invasive cancers with a B5a (Non-invasive) core biopsy had the highest repeat operation rate (57%).

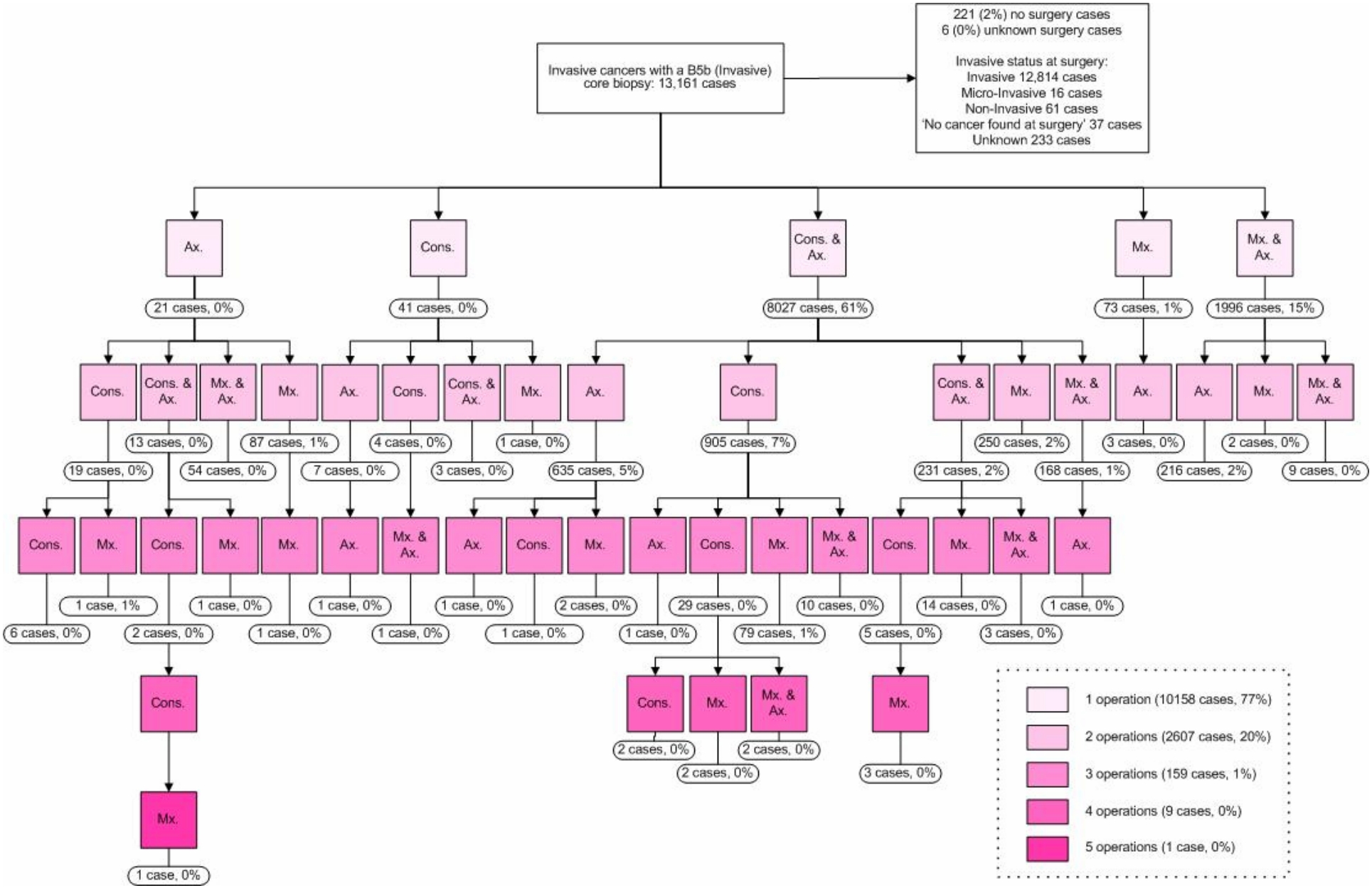

Figure 34 : Sequence of operation for invasive cancers with a B5b (invasive) core biopsy

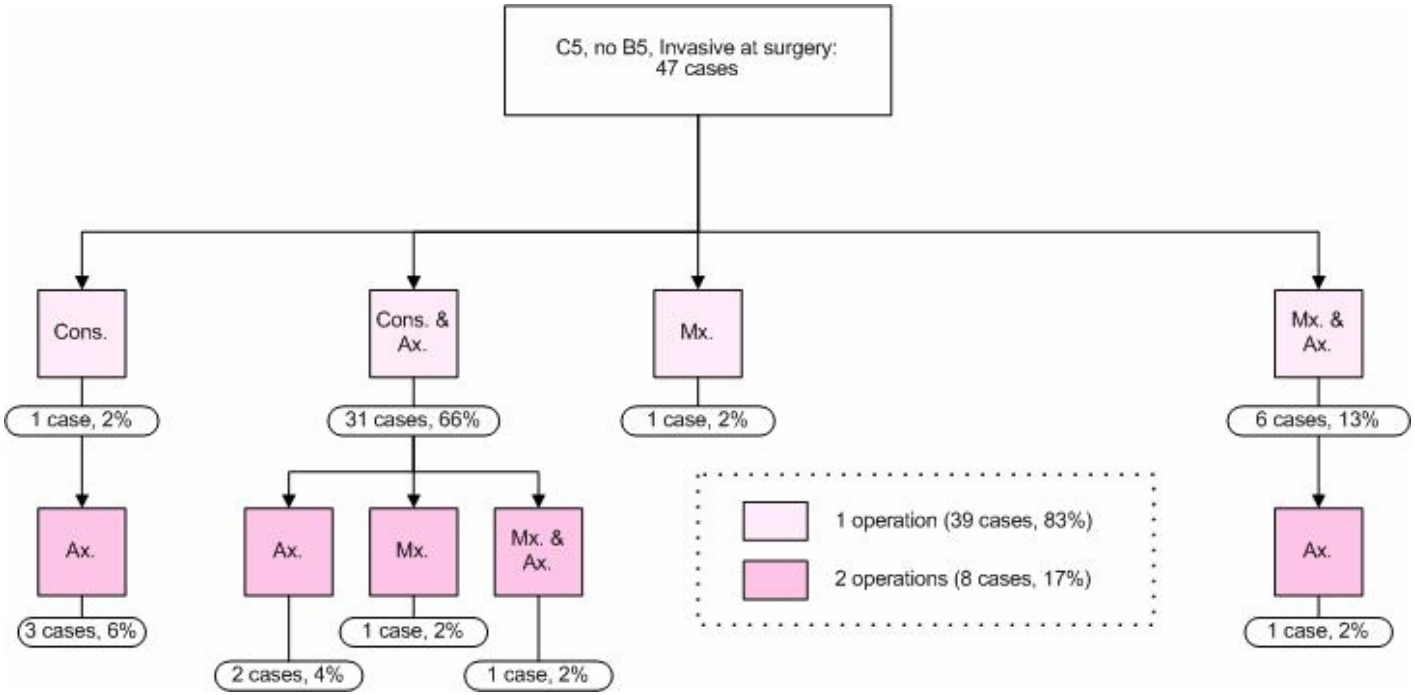

Figure 35 : Sequence of operation for invasive cancers with a C5 cytology only, no B5 core biopsy

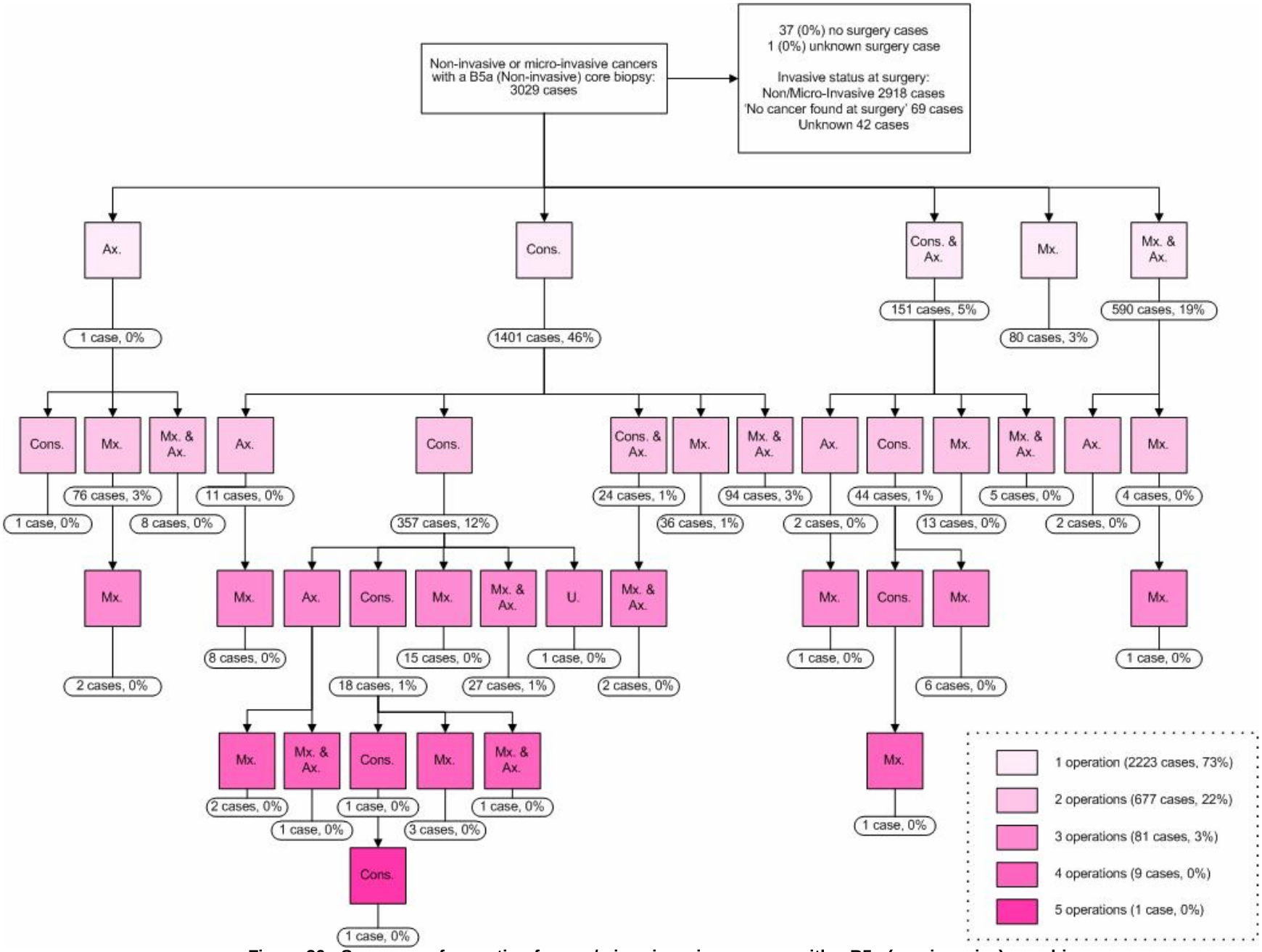

Figure 36 : Sequence of operation for non/micro-invasive cancers with a B5a (non-invasive) core biopsy

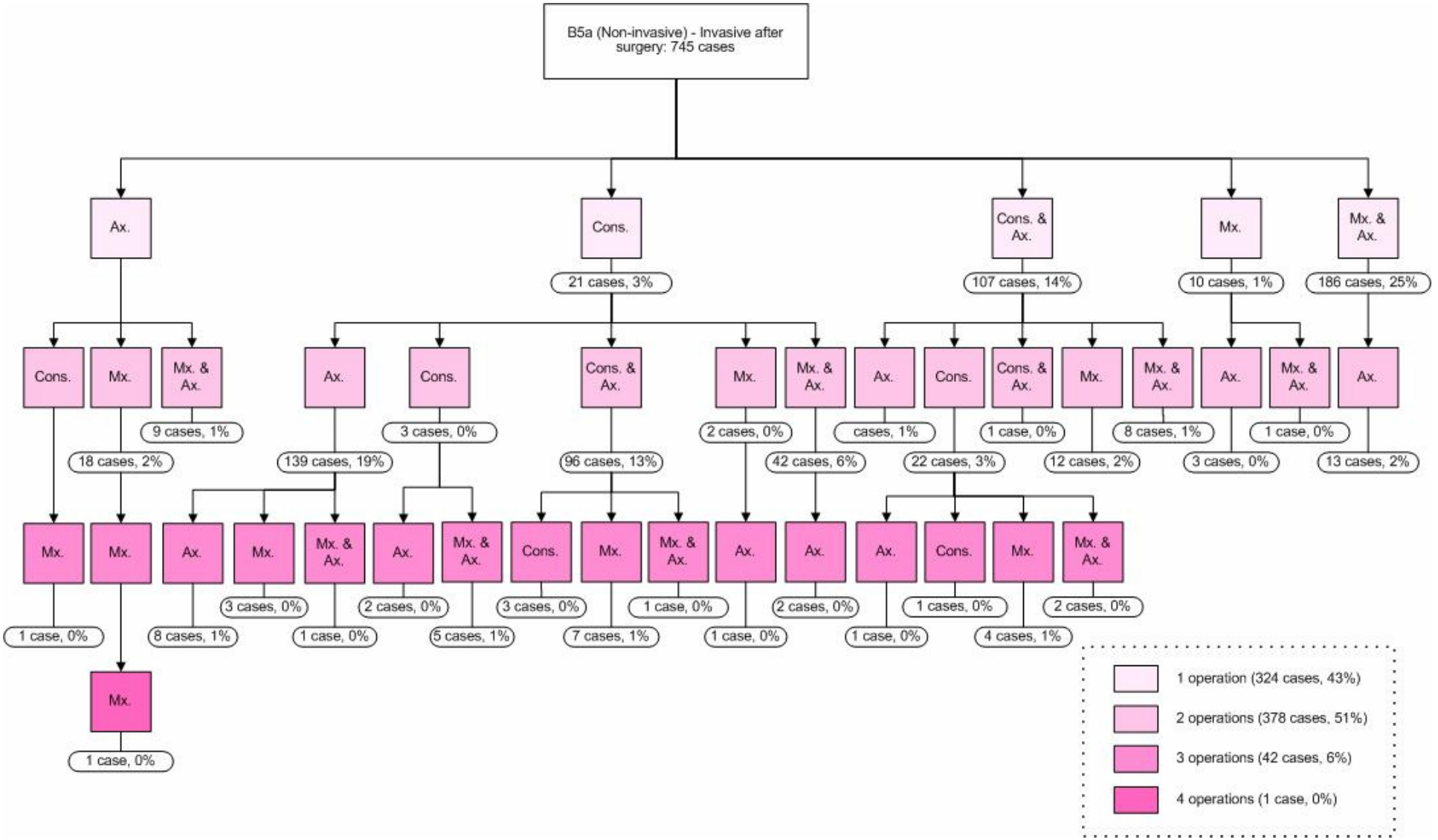

Figure 37 : Sequence of operation for cancers with a B5a (non-invasive) core biopsy determined to be invasive after surgery

6.4 Repeat Breast Conserving Surgery to Clear Margins

In the UK as a whole, 20% 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 14% in Scotland to 24% in South West. Figure 38 (Table 71) 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 10% in Scotland and 16% in South East Coast, London and South West.

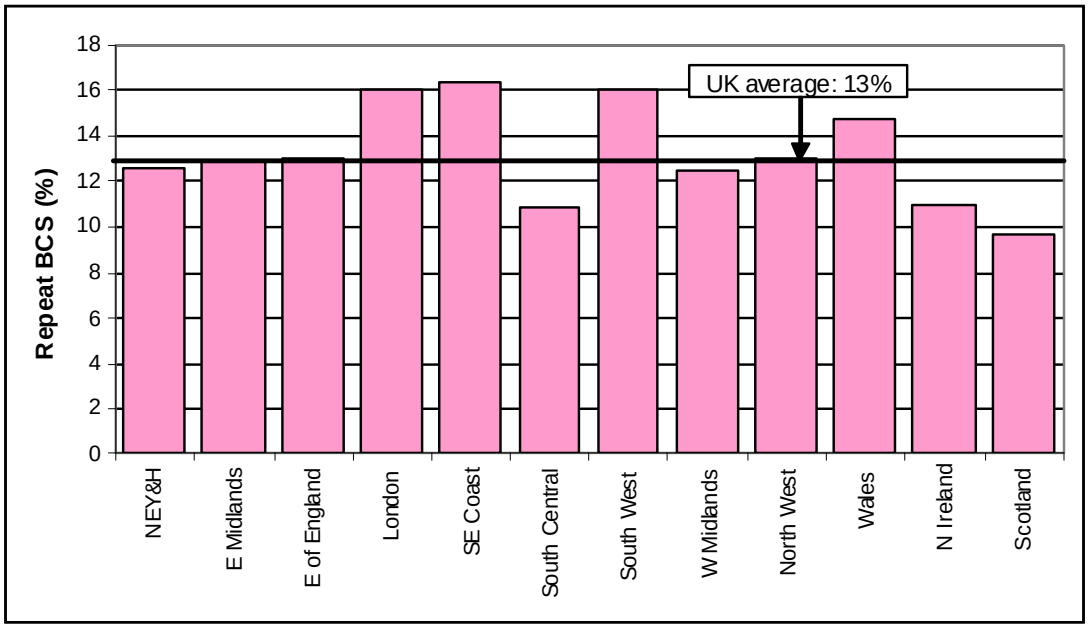

Figure 38 (Table 71): Proportion of cancers which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins

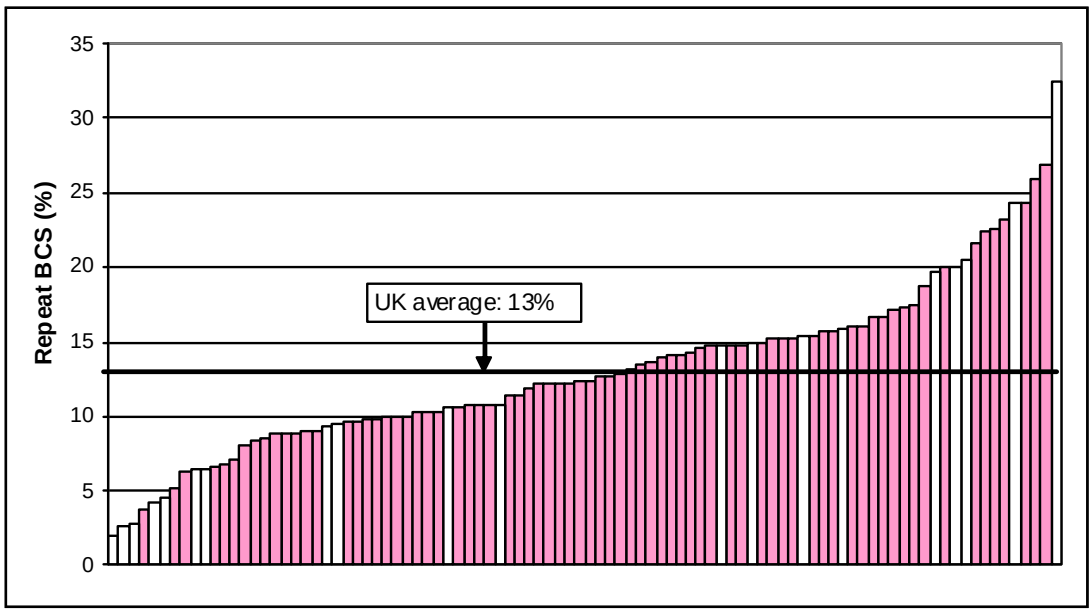

Figure 39: Proportion of cancers in each screening unit which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins (The 20 smallest units are highlighted in white)

Figure 39 shows the wide variation in 2010/11 between screening units in the proportion of cancers initially treated with breast conserving surgery that had repeat breast conserving surgery to clear margins. 10 units (3 of which were small) had repeat rates in excess of 20% and for 6 units (5 of which were small) the rate was below 5%.

Figure 40 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 2008/09-2010/11. 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 13.2% (solid line). 16 units had repeat rates above the upper control limit; four of these were in South West and three in London. 22 units had rates below the lower control limit; 4 of these were in North West and 3 were in South Central, West Midlands and Scotland.

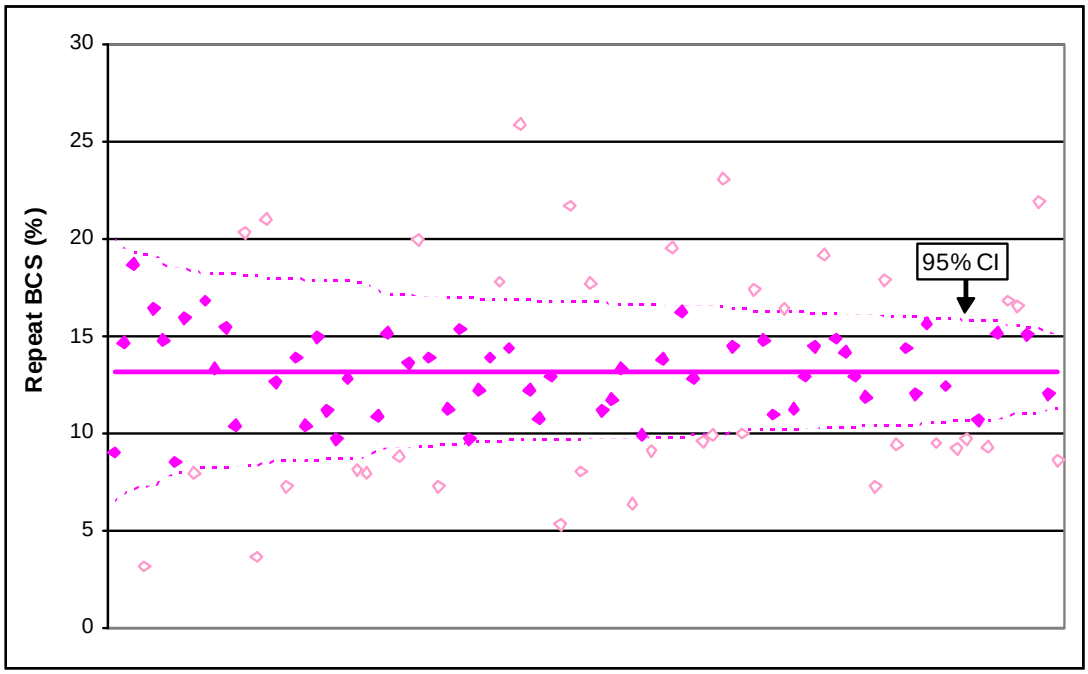

Figure 40: Variation between screening units in the proportion of cancers which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins in 2008/09-2010/11 (open diamonds represent units which lie outside the control limits)

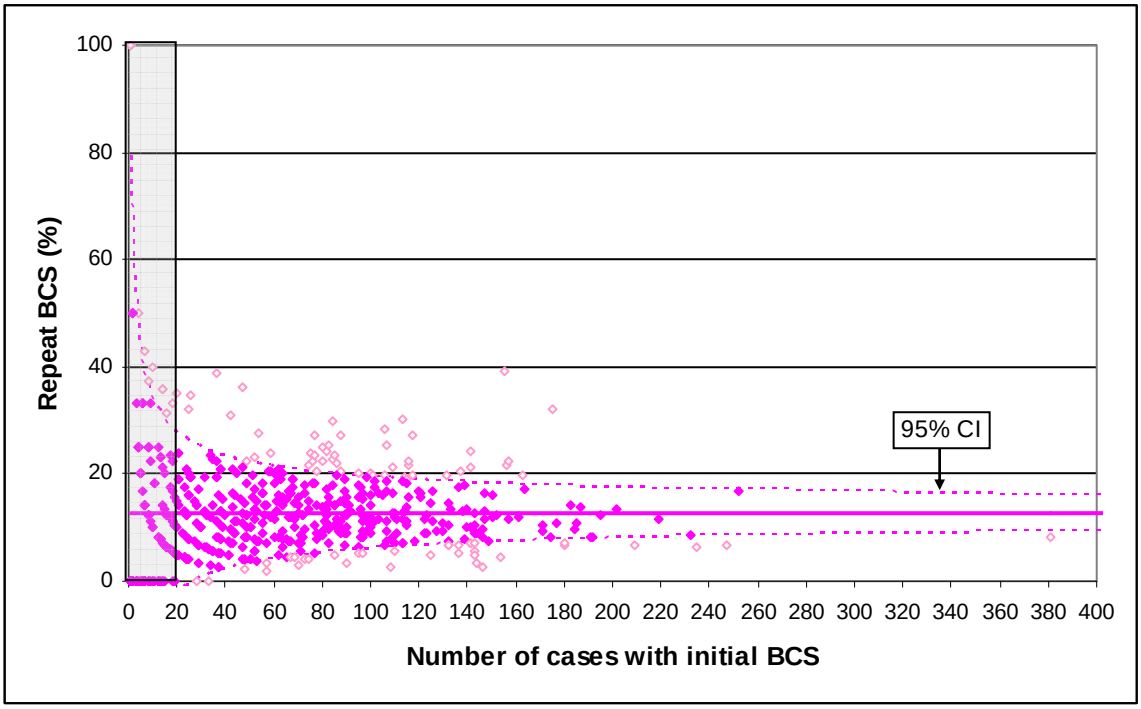

Figure 41: Variation between surgeons in the proportion of cancers which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins in 2008/09-2010/11 (open diamonds represent surgeons who lie outside the control limits)

Figure 41 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 2008/09-2010/11. The dashed lines in Figure 41 are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate of 12.8% (solid line). Surgeons who initially treated fewer than 20 cases with breast conserving surgery over the 3-year period are shaded. Of the 625 surgeons, 440 had 20 or more cases with initial breast conserving surgery and, of these, 49 had repeat rates above the upper control limit and 35 had rates below the lower control limit. Regional QA reference centres and regional QA surgeons should review the data for screening units and individual surgeons lying outside (above and below) the control limits in Figure 40 and Figure 41 to ascertain the reasons for their unusual practice.

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	*125*	*10*	*0*	*0*	*13*	*27*	*63*	*22*
East Midlands	*76*	*11*	*-*	*-*	*12*	*40*	*22*	*17*
East of England	*110*	*11*	*0*	*0*	*10*	*20*	*33*	*16*
London	*134*	*14*	*0*	*0*	*22*	*37*	*49*	*19*
South East Coast	*121*	*14*	*0*	*0*	*8*	*20*	*58*	*28*
South Central	*69*	*9*	*0*	*0*	*6*	*24*	*22*	*20*
South West	*136*	*14*	*0*	*0*	*14*	*23*	*47*	*22*
West Midlands	*100*	*10*	*0*	*0*	*8*	*22*	*40*	*21*
North West	*130*	*11*	*0*	*0*	*16*	*27*	*43*	*18*
Wales	*69*	*11*	*0*	*0*	*10*	*32*	*38*	*27*
Northern Ireland	*17*	*9*	*0*	*0*	*2*	*15*	*8*	*17*
Scotland	*94*	*9*	*0*	*0*	*8*	*16*	*22*	*11*
United Kingdom	***1181***	***11***	***0***	***0***	***129***	***26***	***445***	***20***

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

The preceding 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, 11% 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, Scotland and South Central to 14% in London, South West and South East Coast. There were no 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.

20% 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 11% in Scotland to 28% 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 (26%). This varied from 15% in Northern Ireland to 40% in East Midlands.

KEY FINDINGS:

- 20% 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 14% in Scotland to 24% in South West.
- 13% of all cancers with a non-operative diagnosis had repeat breast conserving surgery to clear margins. This varied between 10% in Scotland and 16% in South East Coast, London and South West.

KEY FINDINGS (cont.):

- In the 3-year period 2008/09-2010/11, 16 screening units and 49 surgeons had unusually high repeat breast conserving surgery rates. 22 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.
- 11% 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, Scotland and South Central to 14% in London, South West and South East Coast
- 26% of invasive cancers and 20% of non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had repeat therapeutic breast conserving surgery to clear margins.

6.5 Breast Conserving Surgery Converted to Mastectomy

Figure 42 (Table 72) 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 9.5% in Northern Ireland.

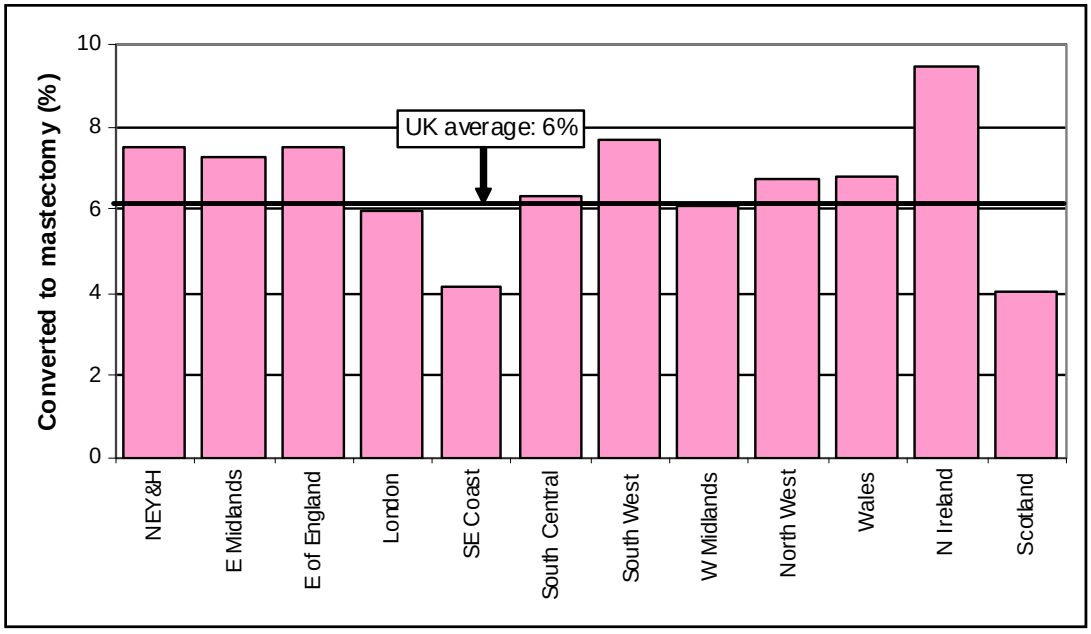

Figure 42 (Table 72): Proportion of cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy

Figure 43 shows the variation in 2010/11 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 6 units, the conversion rate to mastectomy was in excess of 15%. All of these were small units with small numbers of cases. In the unit with the highest rate, 12 cases were converted to mastectomies after receiving initial therapeutic breast conserving surgery.

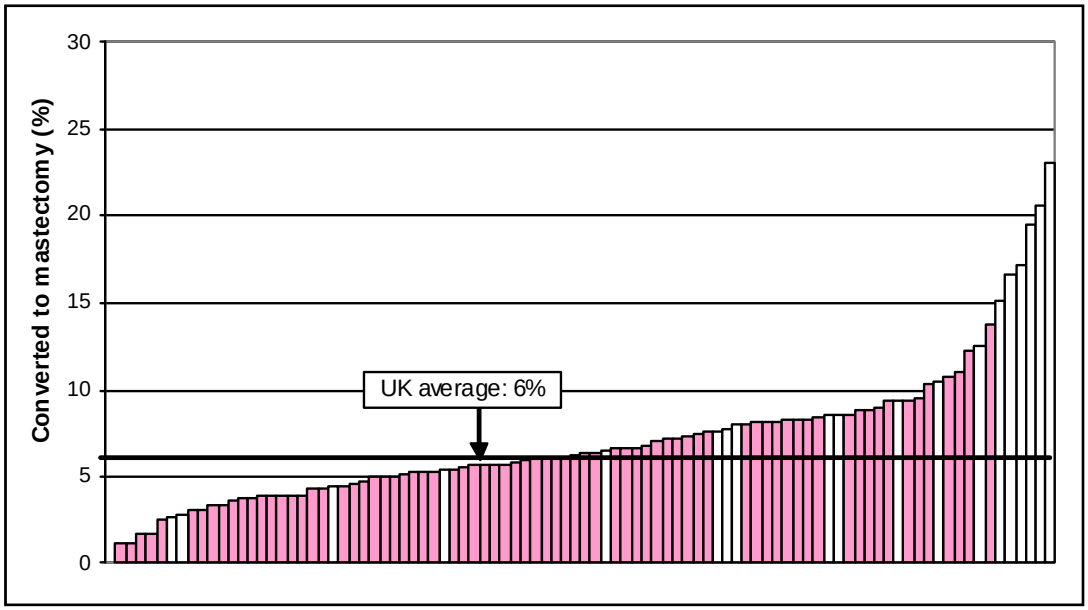

Figure 43: Variation between screening units in the proportion of cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy (19 of the 20 smallest units are highlighted in white)

Figure 44 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 2008/09-2010/11. The dashed lines are the upper and lower control limits which approximate to the 95% confidence intervals of the average rate of 7% (solid line). 18 units had repeat rates above the upper control limit; four of these were in North East, Yorkshire & Humber. Of the 13 units below the lower control limit; four were in South East Coast and three in North East, Yorkshire & Humber.

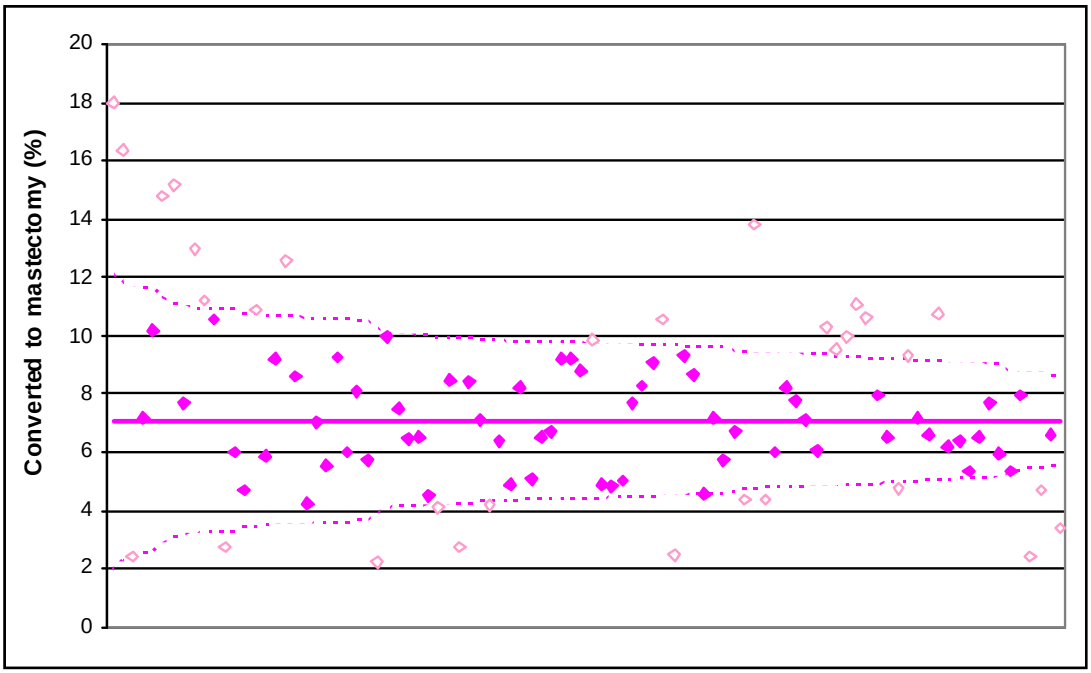

Figure 44: Variation between screening units in the proportion of cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy in 2008/09-2010/11 (open diamonds represent units which lie outside the control limits)

Figure 45 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 2008/09-2010/11. The dashed lines in Figure 45 are the upper and lower control limits which approximate to the 95% confidence intervals of the

average rate of 6.7% (solid line). Surgeons who initially treated fewer than 20 cases with breast conserving surgery over the 3-year period are shaded.

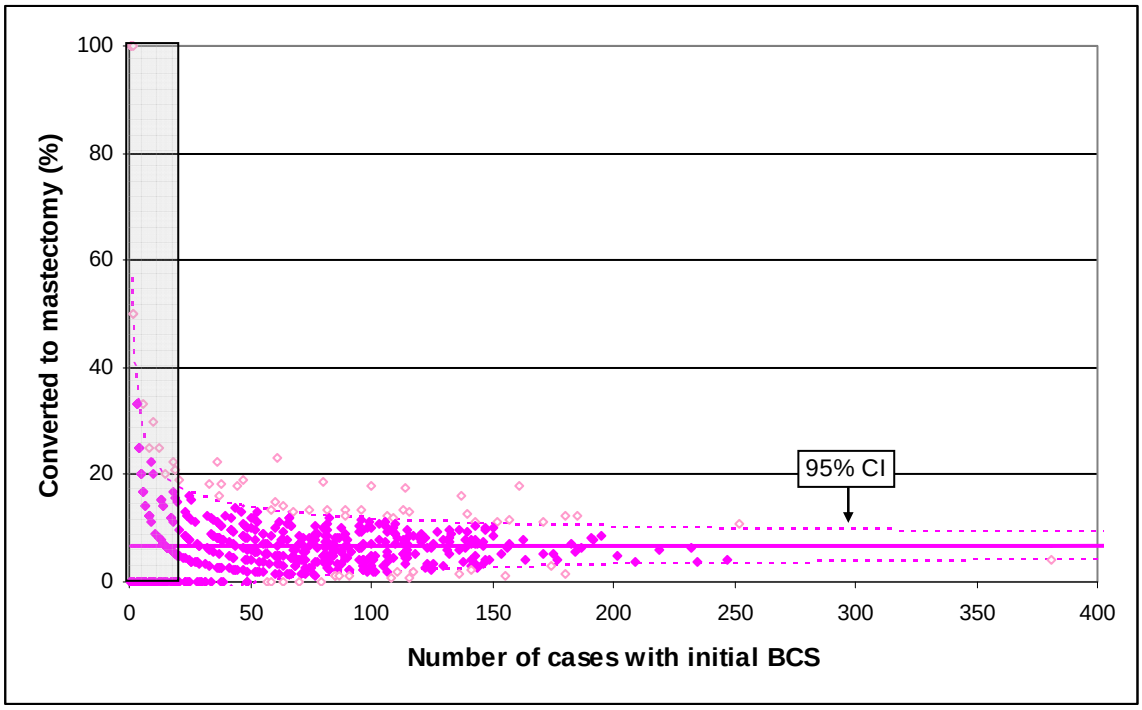

Figure 45: Variation between surgeons in the proportion of cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy in 2008/09-2010/11 (open diamonds represent surgeons who lie outside the control limits)

Of the 625 surgeons, 440 had 20 or more cases with initial breast conserving surgery and, of these, 34 had conversion to mastectomy rates above the upper control limit and 19 had rates below the lower control limit. Regional QA reference centres and regional QA surgeons should review the data for screening units and individual surgeons lying outside (above and below) the control limits in Figure 44 and Figure 45 to ascertain the reasons for their unusual clinical practice.

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	*79*	*6*	*1*	*20*	*9*	*19*	*30*	*11*
East Midlands	*42*	*6*	*-*	*-*	*5*	*17*	*16*	*13*
East of England	*57*	*6*	*0*	*0*	*12*	*24*	*23*	*11*
London	*44*	*5*	*0*	*0*	*14*	*24*	*19*	*7*
South East Coast	*26*	*3*	*0*	*0*	*7*	*18*	*13*	*6*
South Central	*47*	*6*	*0*	*0*	*1*	*4*	*10*	*9*
South West	*48*	*5*	*1*	*20*	*15*	*24*	*29*	*14*
West Midlands	*44*	*5*	*0*	*0*	*6*	*16*	*19*	*10*
North West	*57*	*5*	*0*	*0*	*11*	*19*	*28*	*12*
Wales	*35*	*6*	*0*	*0*	*5*	*16*	*14*	*10*
Northern Ireland	*18*	*9*	*0*	*0*	*3*	*23*	*4*	*8*
Scotland	*39*	*4*	*0*	*0*	*2*	*4*	*10*	*5*
United Kingdom	***536***	***5***	***2***	***5***	***90***	***18***	***215***	***10***

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. Two (5%) of the 39 surgically treated invasive cancers diagnosed by C5 cytology only, which were initially treated with breast conserving surgery, went on to have a mastectomy. 10% 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 5% in Scotland to 14% in South West. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest conversion of breast conserving surgery to mastectomy (18%). This varied from 4% in South Central and Scotland to 24% in South West, London and East of England.

MASTECTOMY AS FIRST THERAPEUTIC OPERATION

	Invasive cancers						***Non/micro-invasive cancers***	
	B5b		***C5 only, no B5***		***B5a***		***B5a***	
Region	***No.***	***%***	***No.***	***%***	***No.***	***%***	***No.***	***%***
N East, Yorks & Humber	*322*	*19*	*4*	*44*	*23*	*30*	*101*	*25*
East Midlands	*201*	*22*	*-*	*-*	*17*	*36*	*58*	*31*
East of England	*177*	*15*	*0*	*0*	*10*	*16*	*41*	*15*
London	*234*	*18*	*0*	*0*	*18*	*22*	*65*	*19*
South East Coast	*155*	*15*	*1*	*33*	*19*	*31*	*54*	*20*
South Central	*144*	*16*	*2*	*50*	*14*	*36*	*36*	*23*
South West	*178*	*15*	*0*	*0*	*16*	*20*	*65*	*23*
West Midlands	*179*	*15*	*0*	*0*	*12*	*23*	*56*	*21*
North West	*303*	*20*	*1*	*9*	*31*	*33*	*89*	*27*
Wales	*139*	*18*	*0*	*0*	*16*	*33*	*27*	*15*
Northern Ireland	*47*	*19*	*0*	*0*	*6*	*32*	*20*	*29*
Scotland	*220*	*17*	*0*	*0*	*31*	*38*	*65*	*24*
United Kingdom	***2299***	***17***	***8***	***17***	***213***	***29***	***677***	***22***

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

In the UK as a whole, 19% of all cancers with a non-operative diagnosis had an initial therapeutic mastectomy at the first operation (Figure 46 & Table 73). The preceding 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 15% in South West, West Midlands, South East Coast and East of England to 22% in East Midlands. Eight (17%) of the 48 surgically treated invasive cancers diagnosed by C5 cytology only had a mastectomy as their first therapeutic operation. Four (50%) of these cancers were in North East, Yorkshire & Humber and 2 (25%) in South Central. Regional QA reference centres and regional surgical QA co-ordinators should audit these 8 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 22%. This varied from 15% in East of England and Wales to 31% in East Midlands. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest initial mastectomy rate (29%). This varied from 16% in East of England to 38% in Scotland.

The proportion of all cancers with a non-operative diagnosis having an initial therapeutic mastectomy varied from 15% in East of England to 24% in East Midlands (Figure 46 & Table 73). Figure 46 (Table 73) also shows that 5% of all cancers (856 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 (262 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 South East Coast and Scotland to 7% in Northern Ireland and the latter from 0% in East Midlands, Northern Ireland and Scotland to 4% in East of England.

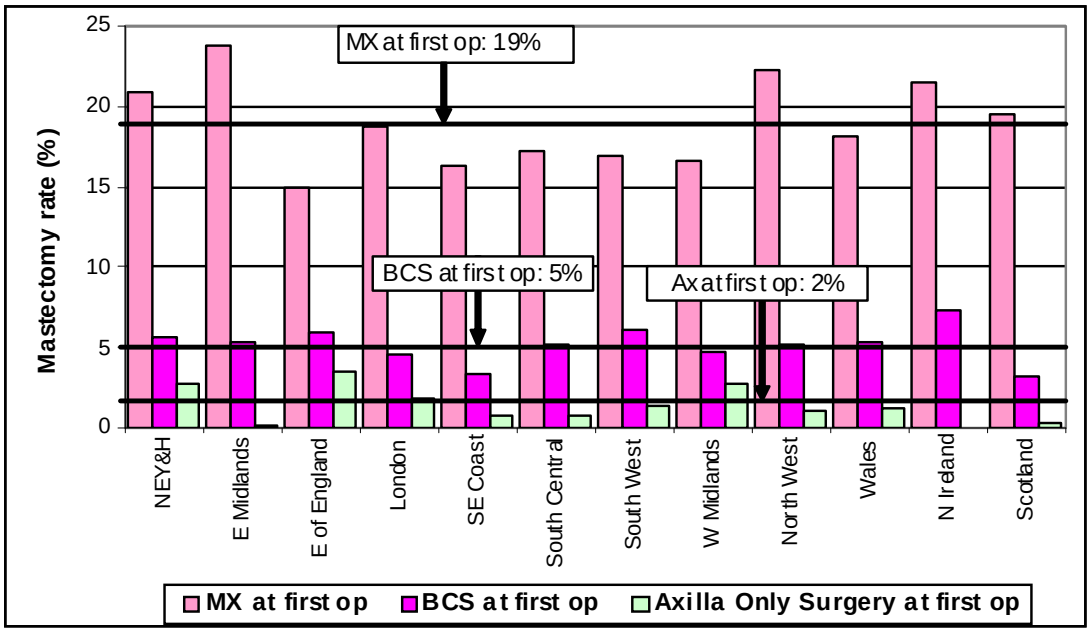

Figure 46 (Table 73): Proportions of all cancers with a non-operative diagnosis undergoing a mastectomy at first operation and at subsequence operations after BCS or surgery to the axilla

Figure 47 shows the wide variation in 2010/11 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. 21 units had an overall mastectomy rate above 30% (5 of these units were in North West, 3 in East Midlands and 3 in East of England). Within this group, 5 small units had mastectomy conversion rates in excess of 10% and 13 units (4 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 21 units.

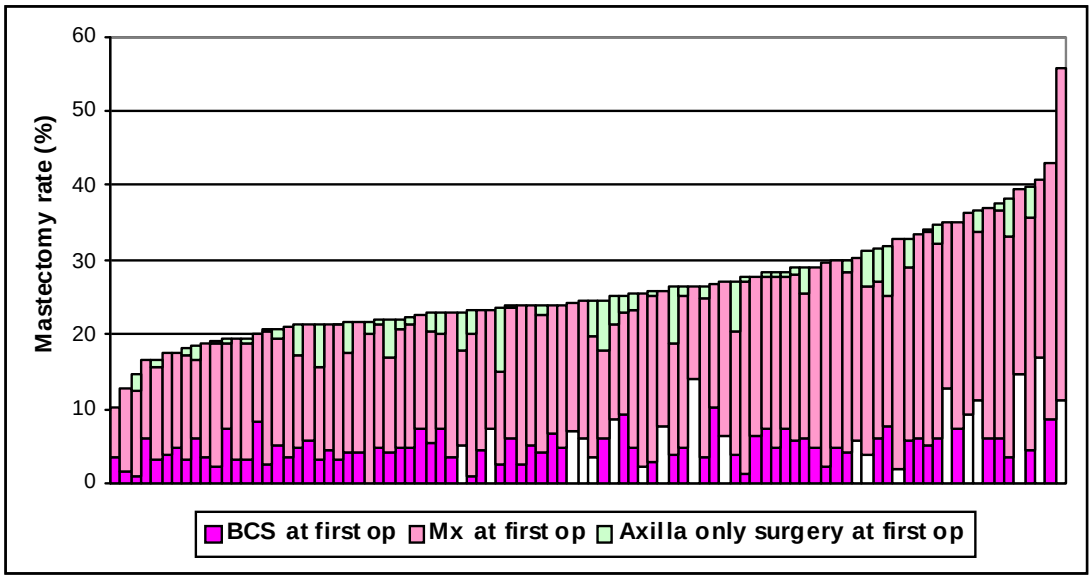

Figure 47: Variation between screening units in the proportions of all cancers with a non-operative diagnosis undergoing a mastectomy at first operation and at subsequence operations after BCS or surgery to the axilla (19 of the 20 smallest units are highlighted in white)

KEY FINDINGS:

- 6% of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery, were eventually converted to a mastectomy. 18 screening units and 34 surgeons had unusually high repeat rates and 13 screening units and 19 surgeons had unusually low rates. Regional QA reference centres and regional QA surgeons should review the data for surgeons and screening units with atypical practice.
- Invasive cancers with a B5a (Non-invasive) core biopsy had the highest conversion of breast conserving surgery to mastectomy (18%). This varied from 4% in South Central and Scotland to 24% in South West, London and East of England.
- 19% 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.
- Non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had an initial mastectomy rate of 22%. This varied from 15% in East of England and Wales to 31% in East Midlands.
- Invasive cancers with a B5a (Non-invasive) core biopsy had the highest initial mastectomy rate (29%). This varied from 16% in East of England to 38% in Scotland.
- Eight surgically treated invasive cancers diagnosed by C5 cytology only had a mastectomy as their first therapeutic operation. Four (50%) of these cancers were in North East, Yorkshire & Humber and 2 in South Central. Regional QA reference centres and regional surgical QA co-ordinators should audit these 8 cases to determine why cancers with unconfirmed invasive status had a mastectomy as an initial therapeutic operation.
- 21 units had an overall mastectomy rate above 30% (5 of these units were in North West, 3 in East Midlands and 3 in East of England). Within this group, 5 small units had mastectomy conversion rates in excess of 10% and 13 units (4 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 21 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.

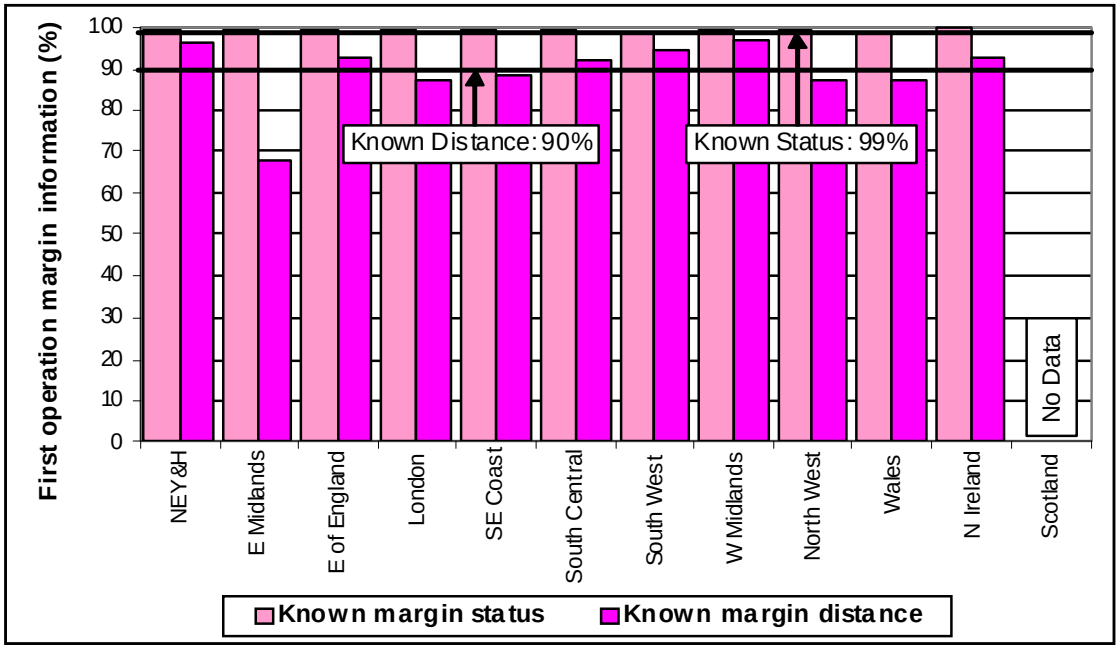

Figure 48 (Table 75): Data completeness for margins at first operation

Of the 16,131 cancers diagnosed in England, Wales and Northern Ireland in 2010/11, 15,747 had surgery to the breast and were found to be malignant (invasive or non/micro-invasive) at surgery. Of these, 81% had complete margin data for all operations (Table 74). For the first operation, 99% of cases had information on whether or not the radial margin was clear, but only 90% of the cases had the margin distance recorded. The completeness of the margin status data varied from 98% in Wales to 100% in Northern Ireland, North East, Yorkshire & Humber, West Midlands and East Midlands. The completeness of the margin distance data varied from 68% in East Midlands to 97% in West Midlands (Figure 48). Figure 49 shows how the completeness of margin status and margin distance varied between screening units. Excluding Scottish units for which no data were provided, 8 units had fewer than 75% of cases with known margin status and distance.

Figure 49: 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 15,747 cases with surgery to the breast which were invasive or non/micro-invasive at surgery, 11,704 were treated with breast conserving surgery. Of these, 97% (11,343 cases) were recorded as having clear margins at their final operation. The final margin status was recorded as unknown for a further 72 cases (1%). 289 cases (2%) were recorded as not having had clear margins at the final operation (Table 76). This varied between 1% in Wales, West Midlands and North East, Yorkshire & Humber to 6% in South East Coast.

Of the 4,043 cases treated with a mastectomy (Table 77), 3,906 (97%) had clear margins recorded at their final operation, 65 (2%) had their final margin status recorded as unknown and 72 (2%) were recorded as not having had clear margins at the final operation. In South East Coast and Northern Ireland, 5% 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 361 cases recorded as not having had clear margins at the final operation and the 137 cases where the final margin status was recorded as unknown to ensure that these cancers were not under-treated.

KEY FINDINGS:

- Of the 15,747 cases which had surgery to the breast and were found to be malignant (invasive or non/micro-invasive) at surgery, 81% 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, but only 90% of the cases had the margin distance recorded.
- Of the 11,704 cancers treated with breast conserving surgery, 97% were recorded as having clear margins at their final operation. Of the 4,043 cases treated with a mastectomy, 97% were recorded as having clear margins at their final operation.
- Regional QA reference centres should audit the 361 cases recorded as not having had clear margins at the final operation and the 137 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 information on the increasing use of pre-operative assessment and Sentinel Lymph Node Biopsy (SLNB) to determine axillary nodal status, and data on repeat operations to the axilla which were distributed in other chapters in previous NHSBSP and ABS audits. Overall, of the 13,994 surgically treated invasive breast cancers included in the audit, 13,811 (99%) had known nodal status (Table 87), and of these 3,128 (23%) were node positive (Table 90).

7.1 Pre-operative Assessment of the Axilla

Scotland was not able to provide information on axillary ultrasound examinations. Data from England, Wales and Northern Ireland for a total of 16,131 breast cancers (12,821 invasive cancers, 165 micro-invasive and 3,138 non-invasive cancers) are included in this section. 11,482 (71%) cancers had a record of an axillary ultrasound at assessment, compared to only 58% in 2009/10. Of these, 9,964 (87%) were confirmed after surgery to have an invasive breast cancer and 1,429 (12%) a non-invasive breast cancer. Thus, 78% of patients with invasive cancer and 46% with non-invasive cancer had axillary ultrasound recorded.

Of the 1,529 invasive breast cancers with an abnormal axillary ultrasound result recorded, 757 were node positive at surgery giving a positive predictive value of an abnormal ultrasound of 50%. Of the 8,227 invasive cancers with a normal axillary ultrasound result recorded which had axillary assessment during surgery, 1,478 (18%) had positive nodes found after surgery.

7.1.1 Diagnosis of Axillary Metastases in Invasive Cancers

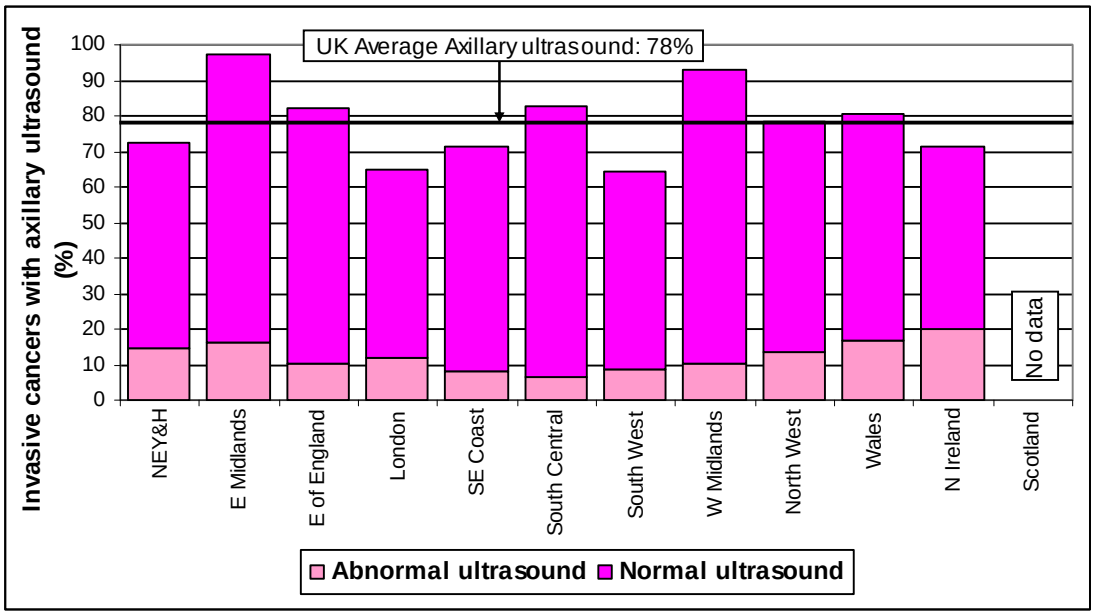

Figure 50 (Tables 78 and 79): Variation between regions in the proportion of invasive cancers with abnormal and normal axillary ultrasound results

Although 78% of invasive cancers had an axillary ultrasound result recorded overall, this varied widely between regions, from 65% in London and South West to 97% in East Midlands (Table 78). Overall, 15% of invasive cancers had an abnormal axillary ultrasound result (Table 79); this varied

from 8% in South Central to 28% in Northern Ireland. Even greater variations in the proportions of cancers with an axillary result recorded, and with an abnormal ultrasound result were apparent in individual screening units (Figure 51). For 10 units (4 of which were small), fewer than 50% of invasive breast cancers had an axillary ultrasound result recorded. Regional QA reference centres should work with these units to ensure that these data are recorded.

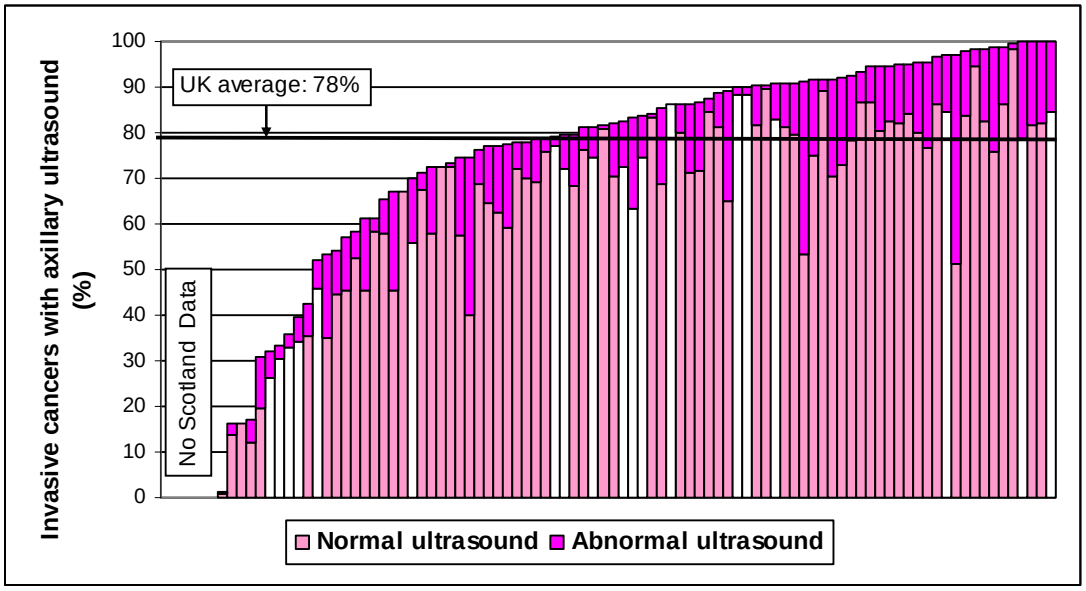

Figure 51: Variation between screening units in the proportion of invasive cancers with abnormal and normal axillary ultrasound results – Data for Scotland are not available (19 of the 20 smallest units are highlighted in white)

1,554 (12%) of the 12,821 invasive breast cancers had an axillary biopsy at assessment. 96 of these had a normal ultrasound result. Of the 1,529 invasive breast cancers with an abnormal ultrasound result, 1,374 (90%) had an axillary node sample (core biopsy or cytology) taken at assessment (Table 80). Regional QA reference centres should audit the 155 cases where an abnormal ultrasound result was apparently not followed up with a needle biopsy.

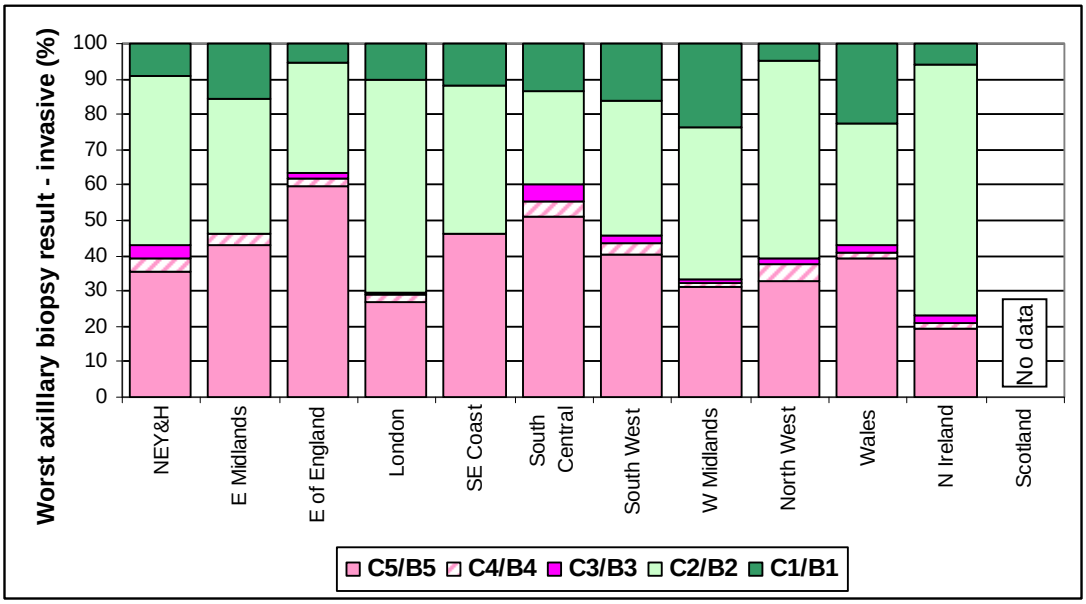

Figure 52 (Table 81): The worst axillary biopsy result for invasive cancers with an abnormal axillary ultrasound result

Of the 1,374 invasive breast cancers with an abnormal ultrasound result which had an axillary node biopsy, 522 (38%) had a C5/B5 diagnosis, 686 (50%) had C2/B2 to C4/B4 diagnoses, and 166 (12%) had an inadequate or normal sample (C1/B1) (Table 81). The proportion of invasive

cancers with a C5/B5 diagnosis varied between 19% in Northern Ireland and 60% in East of England (Figure 52). 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 53). In one screening unit in North West 3 out of 5 cancers had a C4/B4 diagnosis. In 12 screening units (3 of which were in West Midlands) more than 20% of invasive cancers had C1/B1 recorded as the worst axillary biopsy result. Regional QA reference centres and regional QA radiology and pathology co-ordinators should audit the data for screening units with high proportions of invasive cancers with C1/B1 and C2/B2 to C4/B4 recorded as the worst axillary biopsy result.

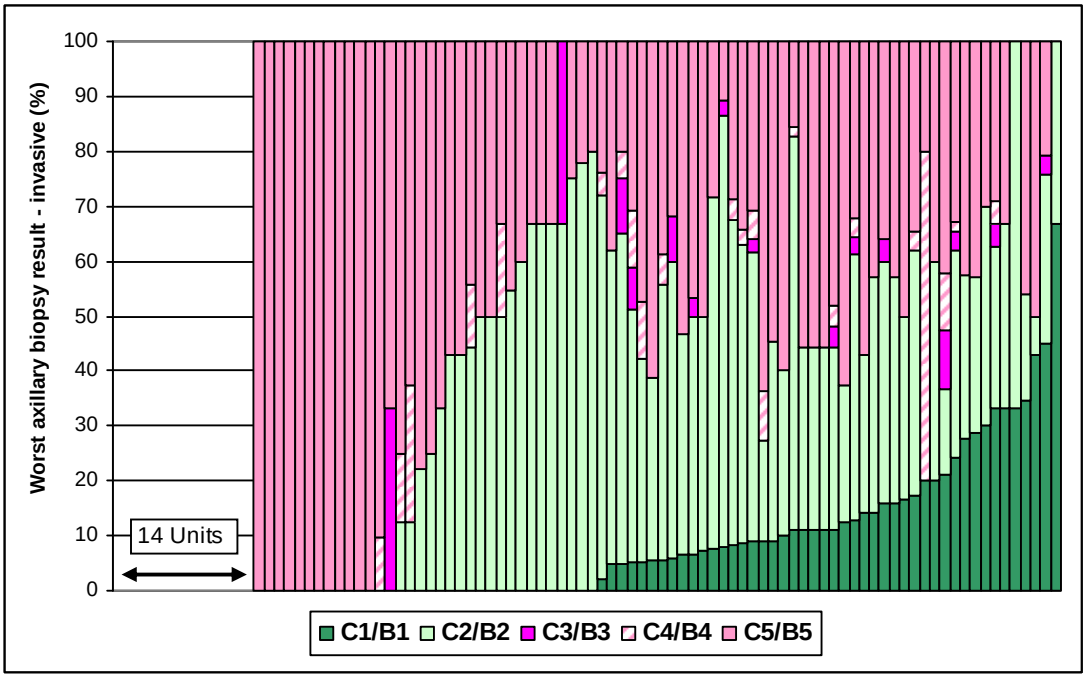

Figure 53: Variation between screening units in the worst axillary biopsy result for invasive cancers with an abnormal axillary ultrasound result – Data for Scotland are not available

Of the 96 invasive breast cancers with a normal ultrasound result which had an axillary node biopsy (Table 82), 16 (17%) had a C5/B5 diagnosis (5 were in 1 unit in South Central), 62 (65%) had C2/B2 diagnoses (26 were in 1 unit in East of England and 8 in 1 unit in Northern Ireland), and 17 (18%) had an inadequate or normal sample (C1/B1) (6 were in 1 unit in East of England). Regional QA reference centres and regional QA radiology and pathology co-ordinators should audit the data for screening units with high proportions of invasive cancers with normal ultrasound results which had C1/B1, C2/B2 or C5/B5 diagnoses recorded as the worst axillary biopsy result.

Of the 522 invasive cancers with a C5/B5 diagnosis with abnormal ultrasound and the 16 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 419 and 13 respectively had no neo-adjuvant therapy recorded and had axillary surgery. Of these, 420 were node positive at surgery (giving an overall positive predictive value of a C5/B5 of 97% (Table 84). Of the 67 C5/B5 invasive cancers with a normal or abnormal ultrasound result and with neo-adjuvant therapy and axillary surgery recorded, 55 (82%) had positive nodes at surgery.

Of the 419 invasive cancers with a C5/B5 result and abnormal ultrasound and the 13 invasive cancers with a C5/B5 results and normal ultrasound which had no neo-adjuvant therapy recorded and had axillary surgery, 12 (3%) had false positive results, i.e. were found to be node negative at surgery. Regional QA reference centres had checked that these cases were not data recording errors before they submitted the data. 709 invasive cancers with a normal or abnormal ultrasound result and with a C2/B2 to C4/B4 diagnosis did not have neo-adjuvant therapy recorded and had axillary assessment at surgery. Of these, 164 (23%) had positive nodes at surgery. 68 (39%) of the 174 cancers with a C1/B1 diagnosis which did not have neo-adjuvant therapy had positive nodes at surgery. Axillary ultrasound thus failed to accurately identify positive nodes for 232 invasive breast cancers.

In the UK excluding Scotland, of the 2,645 invasive breast cancers without neo-adjuvant therapy recorded that were confirmed to be node positive on surgery, 436 (16%) had positive nodes diagnosed pre-operatively by means of needle biopsy. This varied from 9% in South Central to 27% in Wales and 26% in East of England (Table 85). This is similar to the proportion of positive nodes found at surgery (19%) for the 11,972 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 86). This varied from 14% in Wales to 22% in South Central.

KEY FINDINGS:

- In the UK excluding Scotland, 11,482 (71%) cases had a record of an axillary ultrasound at assessment. 87% were confirmed to be invasive after surgery and 12% non-invasive. Overall, 78% of the invasive cancers and 46% of non-invasive cancers had axillary ultrasound recorded.
- For 10 units (4 of which were small), fewer than 50% of invasive breast cancers had an axillary ultrasound result recorded. Regional QA reference centres should work with these units to ensure that these data are recorded.
- Of the 1,529 invasive cancers with an axillary ultrasound result recorded, 757 were node positive at surgery, giving a positive predictive value of an abnormal ultrasound of 50%.
- 15% of the invasive cancers having an axillary ultrasound examination had an abnormal ultrasound result. This varied from 8% in South Central to 28% in Northern Ireland.
- 90% of invasive cancers with an axillary ultrasound result recorded had an axillary node sample (core biopsy or cytology). Regional QA reference centres should audit the 155 cases where an abnormal ultrasound result was apparently not followed up with a needle biopsy.
- Of the 1,374 cancers with an abnormal ultrasound result which had an axillary node biopsy, 38% had a C5/B5 diagnosis; this varied from 19% in Northern Ireland to 60% in East of England. In one screening unit in North West 3 out of 5 cancers had a C4/B4 diagnosis. In 12 screening units (3 of which were in West Midlands) more than 20% of invasive cancers had C1/B1 recorded as the worst axillary biopsy result. Regional QA reference centres and regional QA radiology and pathology co-ordinators should audit the data for screening units with high proportions of invasive cancers with C1/B1 and C2/B2 to C4/B4 recorded as the worst axillary biopsy result
- 96 invasive breast cancers with a normal ultrasound result had an axillary node biopsy, of these, 16 had a C5/B5 diagnosis (5 were in 1 unit in South Central), 62 had C2/B2 diagnoses (26 were in 1 unit in East of England and 8 in 1 unit in Northern Ireland), and 17 had an inadequate or normal sample (C1/B1) (6 were in 1 unit in East of England). Regional QA reference centres and regional QA radiology and pathology co-ordinators should audit the data for screening units with high proportions of invasive cancers with normal ultrasound results which had C1/B1, C2/B2 or C5/B5 diagnoses recorded as the worst axillary biopsy result.
- Of the 522 invasive cancers with a C5/B5 diagnosis with abnormal ultrasound and the 16 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 419 and 13 respectively had no neo-adjuvant therapy recorded and had axillary surgery. Of these, 420 were node positive at surgery (giving an overall positive predictive value of a C5/B5 of 97%.
- Of the 67 C5/B5 invasive cancers with a normal or abnormal ultrasound result and with neo-adjuvant therapy and axillary surgery recorded, 55 (82%) had positive nodes at surgery.
- Of the 419 invasive cancers with a C5/B5 result which did not have neo-adjuvant therapy, 11 (3%) had false positive results, i.e. were found to be node negative at surgery. Regional QA reference centres had checked that these cases were not data recording errors before they submitted the data.
- Axillary ultrasound failed to accurately identify positive nodes for 232 invasive breast cancers; 68 had a C1/B1 diagnosis and 164 had a C2/B2 to C4/B4 diagnosis.
- Of the 2,645 invasive cancers without neo-adjuvant therapy recorded that were confirmed to be node positive on surgery, 436 (16%) had positive nodes diagnosed pre-operatively by means of needle biopsy. This is similar to the proportion of positive nodes found at surgery (19%) for the 11,972 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.

7.2 Sentinel Lymph Node Biopsy

In 2010/11, of the 13,814 invasive breast cancers with axillary surgery, 10,535 (76%) had a SLNB (Table 88). This varied from 66% in South East Coast to 85% in South West and London. The overall use of SLNB has increased by 9% since 2009/10. A much more variable increase is apparent in individual regions; from 30% in Scotland (41% in 2009/10) to 1% in South Central (71% in 2009/10) and a 2% decrease in Wales (83% in 2009/10). Regional QA reference centres and regional surgical QA co-ordinators should ensure that SLNB is available in all of their screening units.

SENTINEL LYMPH NODE BIOPSY (Invasive Cases with Axillary Surgery)

Region	% cases with SLNB	TECHNIQUE USED (%)			
		Isotope and blue dye	Blue dye only	Isotope only	SLNB unknown type
N East, Yorks & Humber	*74*	*91*	*8*	*1*	*0*
East Midlands	*73*	*85*	*11*	*2*	*2*
East of England	*76*	*37*	*36*	*27*	*0*
London	*85*	*52*	*47*	*1*	*0*
South East Coast	*66*	*55*	*44*	*0*	*0*
South Central	*72*	*78*	*11*	*3*	*8*
South West	*85*	*77*	*22*	*0*	*1*
West Midlands	*81*	*90*	*10*	*0*	*0*
North West	*75*	*78*	*21*	*1*	*0*
Wales	*81*	*51*	*36*	*5*	*8*
Northern Ireland	*81*	*61*	*39*	*0*	*0*
Scotland	*71*	*90*	*9*	*0*	*1*
United Kingdom	***76***	***72***	***23***	***3***	***1***

The preceding table shows for invasive breast cancers which had a SLNB, how the SLNB technique recorded as having been used varied between regions in 2010/11. Of the 10,535 invasive cases with a SLNB, 72% were recorded as having had the full dual SLNB procedure using isotope and blue dye. In North East, Yorkshire & Humber 91% of cases had the recommended dual procedure recorded, but in East of England for only 37% of cases was the recommended dual procedure recorded as having been used. For 1% of cancers in the UK, the SLNB technique used was not specified. The highest proportions of cancers with unknown SLNB technique were in Wales and South Central (both 8%). One unit in South Central had 45% of cases with unknown SLNB technique.

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. 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.

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 North West to 100% in a unit in South West. In 26 units, over 90% of the patients with invasive cancers who had axillary surgery had a SLNB. Six units used SLNB for fewer than 20% of women with invasive cancer who had axillary surgery; 2 of these were in East of England, 2 in North West, 1 in Scotland and 1 in North East, Yorkshire & Humber. 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.

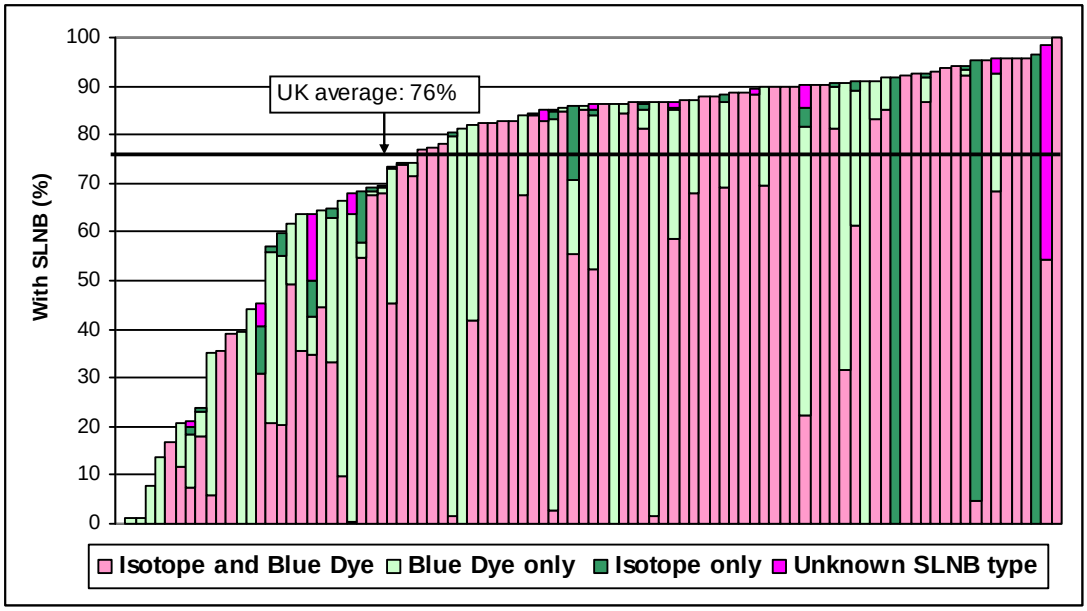

Figure 54: Variation between screening units in the use of SLNB for invasive breast cancers with axillary surgery

KEY FINDINGS:

- Of the 13,814 invasive breast cancers with axillary surgery, 76% had a SLNB. This varied from 66% in South East Coast to 85% in South West and London. The use of SLNB has increased by 9% since 2009/10. Regional QA reference centres and regional surgical QA co-ordinators should ensure that SLNB is used in all of their screening units.
- A SLNB procedure was recorded for 10,535 invasive cancers (76%) with axillary surgery. Of these, 72% had the full dual SLNB procedure using isotope and blue dye recorded. This varied from 37% in East of England to 91% in North East, Yorkshire & Humber. 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.
- Six units used SLNB for fewer than 20% of women with invasive cancer who had axillary surgery; 2 were in East of England, 2 in North West, 1 in Scotland and 1 in North East, Yorkshire & Humber. 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 low use of SLNB in some units.

7.3 Number of Nodes Examined

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 2010/11 the proportion of invasive cancers with fewer than 4 nodes examined increased again to 49.5% from 42.3% 2009/10. 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 2.1% in 2010/11.

15 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

*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 2010/11, 91% of the 3,279 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 89). This varied from 71% in Wales to 98% in Northern Ireland.

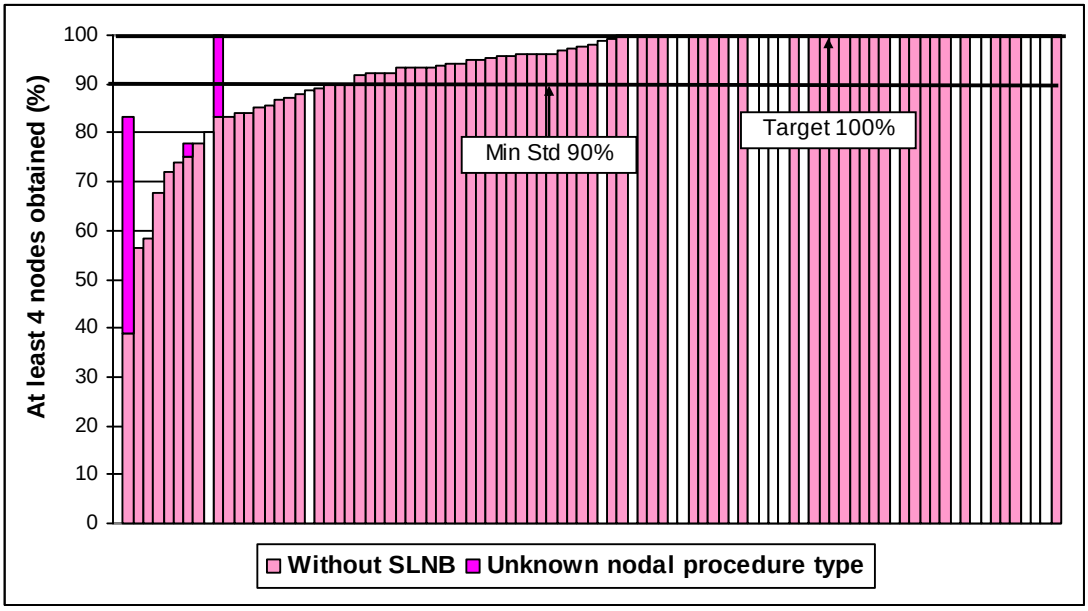

Figure 55: Invasive cancers with at least 4 nodes obtained expressed as a proportion of the invasive cancers without a sentinel node procedure or with unknown nodal procedure type (19 of the 20 smallest units are highlighted in white)

Figure 55 shows that 45 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. 20 screening units did not achieve the 90% minimum standard. Three units in South West had a high proportion of cases with an unknown axillary procedure. Regional QA reference centres and regional surgical QA co-ordinators should audit all the invasive cancers without a SLNB or with an unknown nodal procedure type which had fewer than 4 nodes reported to ensure that the axilla was not been under-treated.

7.4 Lymph Node Status - Invasive and Micro-invasive Cancers

Of the 13,811 invasive breast cancers with known nodal status, 3,128 (23%) had positive nodes (Table 90). Table 91 shows that the proportion of cases with positive nodal status (17%) was lower for cases which underwent a SLNB procedure compared with cases which did not have a SLNB procedure (42%). 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 1,769 invasive breast cancers which had their positive nodal status determined from a SLNB procedure, 1,150 (65%) had a subsequent axillary procedure (Table 92). A further 432 (24%) had four 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.

The following summary table shows that of the 13,994 surgically treated invasive breast cancers, 183 (1%) had unknown nodal status, 258 (2%) had their negative nodal status determined on the basis of 1, 2 or 3 nodes with no known SLNB procedure, and 219 (2%) had their positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure. 660 (5%) of the 13,994 invasive breast cancers therefore may have insufficient nodal information to provide a satisfactory diagnostic work-up. It is possible, however, that a significant proportion of the cancers with fewer than 4 nodes examined had micro-metastases (see Section 3.3.2), and that further axillary surgery may not have been appropriate.

INVASIVE CANCERS WITH INSUFFICIENT NODAL INFORMATION

	Total invasive cancers with surgery	***Unknown nodal status*** *(Table 87)*	***Negative <4 nodes - not sentinel procedure*** *(Table 93)*	***Positive <4 nodes*** *(Table 93)*	***Insufficient nodal information***	
Region	***No.***	***No.***	***No.***	***No.***	***No.***	***%***
N East, Yorks & Humber	*1,739*	*13*	*15*	*27*	*55*	*3*
East Midlands	*968*	*6*	*12*	*20*	*38*	*4*
East of England	*1,265*	*18*	*23*	*5*	*46*	*4*
London	*1,338*	*26*	*10*	*34*	*70*	*5*
South East Coast	*1,129*	*24*	*41*	*20*	*85*	*8*
South Central	*986*	*11*	*7*	*19*	*37*	*4*
South West	*1,250*	*15*	*19*	*15*	*49*	*4*
West Midlands	*1,245*	*11*	*17*	*15*	*43*	*3*
North West	*1,599*	*30*	*51*	*25*	*106*	*7*
Wales	*826*	*15*	*42*	*8*	*65*	*8*
Northern Ireland	*269*	*1*	*1*	*2*	*4*	*1*
Scotland	*1,380*	*13*	*20*	*29*	*62*	*4*
United Kingdom	***13,994***	***183***	***258***	***219***	***660***	***5***

6,353 invasive breast cancers with fewer than four nodes examined (46%) had their negative nodal status determined using a SLNB procedure (Table 93 and Figure 56). This varied from 39% in Scotland to 58% in Wales. 258 (2%) invasive cancers had their negative nodal status determined on the basis of fewer than 4 nodes without a SLNB procedure. This varied from 1 cancer (0.4%) in Northern Ireland to 42 cancers (5.2%) in Wales.

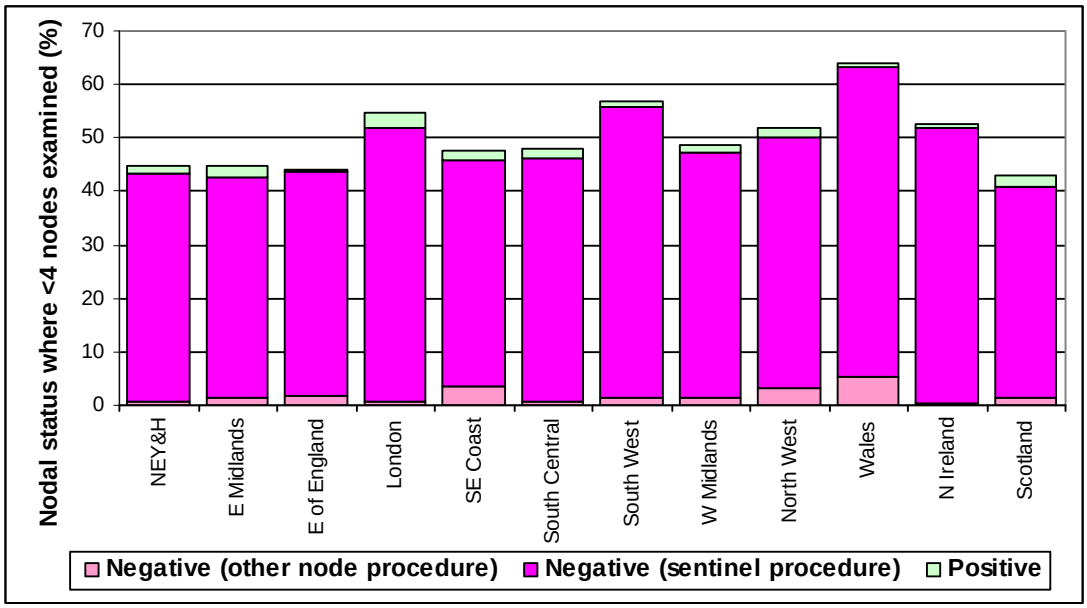

Figure 56 (Table 93): Nodal status for invasive cancers where nodal status was determined on the basis of <4 nodes, expressed as the percentage of invasive cancers with known nodal status

For 191 invasive breast cancers, the positive nodal status was determined on the basis of fewer than 4 nodes with a SLNB. This varied from 2 cancers (0.7%) in Northern Ireland to 32 cancers (2.4%) in London. 187 of these cancers had no subsequent axillary procedure(s) recorded (Table 92). 26 (14%) of the 187 cancers with no subsequent axillary procedure had an invasive tumour size of less than 10mm, 51 (27%) were Grade 1 and 37 (20%) were in the Excellent or Good NPI Groups. A further 28 invasive cancers (0.2%) had their positive nodal status determined on the basis of fewer than 4 nodes without a SLNB procedure.

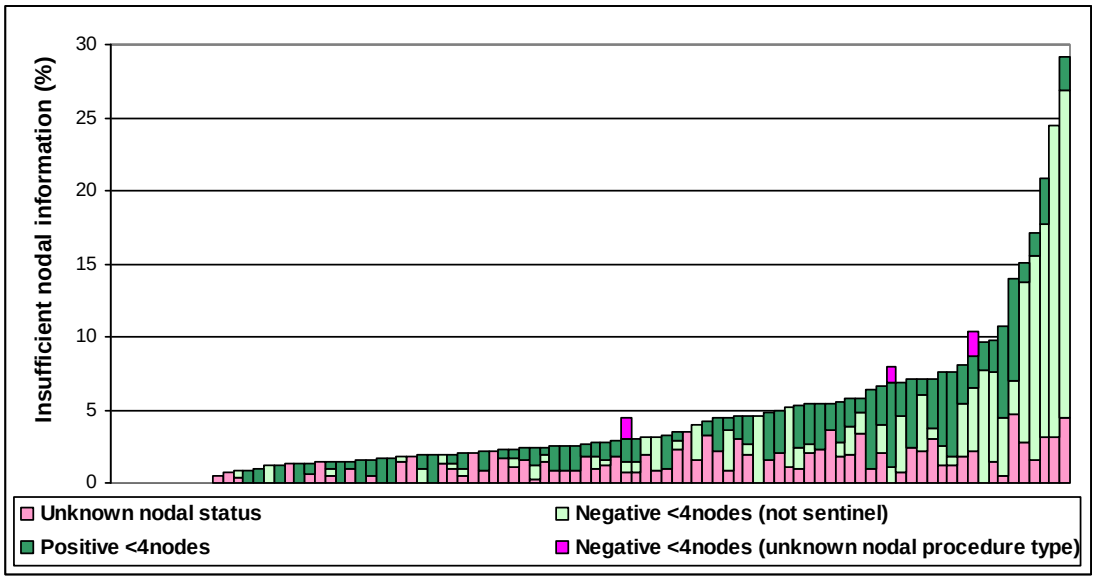

Figure 57: Variation between screening units in the proportion of invasive cancers which may have had insufficient nodal information

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 or positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure varied

between screening units. 59 (31%) of the 191 cases where the positive nodal status was determined on the basis of fewer than 4 nodes with a SLNB were in six screening units (2 in London and 1 each in North East, Yorkshire & Humber, East Midlands, Scotland and South East Coast). It is possible, that a significant proportion of these cancers had micro-metastases (see Section 3.3.2), and that further axillary surgery may not have been appropriate. However, regional QA reference centres and regional surgical QA co-ordinators should audit all cancers which may have had insufficient nodal information to ensure that they had an adequate diagnostic work-up.

Of the 171 surgically treated micro-invasive cancers, 126 (74%) had known nodal status. 71 (91%) of the 78 micro-invasive cancers treated by mastectomy and 55 (59%) of 93 micro-invasive cancers treated with breast conserving surgery had known nodal status. Four (3%) of the 126 micro-invasive cancers with known nodal status had positive nodal status recorded. Of these, 2 had a SLNB procedure and 2 (1 in South West and 1 in South Central) another axillary procedure. Of the 2 cancers which had their positive nodal status determined from a SLNB procedure, 1 in East of England had a subsequent axillary procedure and 1 in South Central had no further axillary surgery.

KEY FINDINGS:

- In 2010/11, the proportion of invasive breast cancers with fewer than four nodes examined increased to 49.5%. 47.4% of these involved a SLNB procedure, leaving an underlying rate of 2.1% with fewer than four nodes examined when a SLNB procedure was not used.
- 91% of the 3,279 invasive cancers, which either did not have a SLNB procedure or with an unknown nodal procedure, had four or more nodes taken. This varied from 71% in Wales to 98% in Northern Ireland. 20 screening units did not meet the 90% minimum standard. Three units in South West had a high proportion of cases with an unknown axillary procedure. Regional QA reference centres and regional surgical QA co-ordinators should audit all the invasive cancers without a SLNB or where the type of axillary procedure used was unknown which had fewer than four nodes reported to ensure that the axilla was not under-treated.
- Of the 13,811 invasive breast cancers with known nodal status, 3,128 (23%) had positive nodes. The proportion of cases with positive nodal status (17%) was lower for cases which underwent a SLNB procedure compared with cases which did not have a SLNB procedure (42%). This could be due to the selection of patients for axillary sampling or clearance, who were thought 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.
- 28 invasive cancers had their positive nodal status determined on the basis of fewer than four nodes without a SLNB procedure, and 191 cancers had their positive nodal status determined from a SLNB procedure which had fewer than four nodes taken. 187 of the latter cancers had no subsequent axillary procedure(s) recorded. Of the 187 cases with no subsequent axillary procedure, 26 (14%) had an invasive tumour size of 10mm or less, 51 (27%) were Grade 1, and 37 (20%) were in the Excellent or Good NPI Groups.
- It is possible, that a significant proportion of the node positive cancers with fewer than 4 nodes examined had micro-metastases, and that further axillary surgery may not have been appropriate. However, regional QA reference centres and regional surgical QA co-ordinators should audit all cancers which may have had insufficient nodal information to ensure that they had an adequate diagnostic work-up.
- Of the 171 surgically treated micro-invasive cancers, 126 (74%) had known nodal status and 4 were node positive.

7.5 Lymph Node Status - Non-invasive Cancers

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 3,404 surgically treated non-invasive cancers, 31% had known nodal status and 69% had no nodes obtained (Table 94). 85% of the non-invasive cancers treated by mastectomy and 10% of non-invasive cancers treated with breast conserving surgery had known nodal status (Table 95). Of the 1,069 non-invasive cancers with known nodal status, 6 (1%) had positive nodal status recorded (Table 96).

Overall, 85% of non-invasive breast cancers treated with mastectomy had known nodal status, and 78% of non-invasive breast cancers had their nodal status determined on the basis of a SLNB (Table 98); these proportions varied widely between regions (Figure 58).

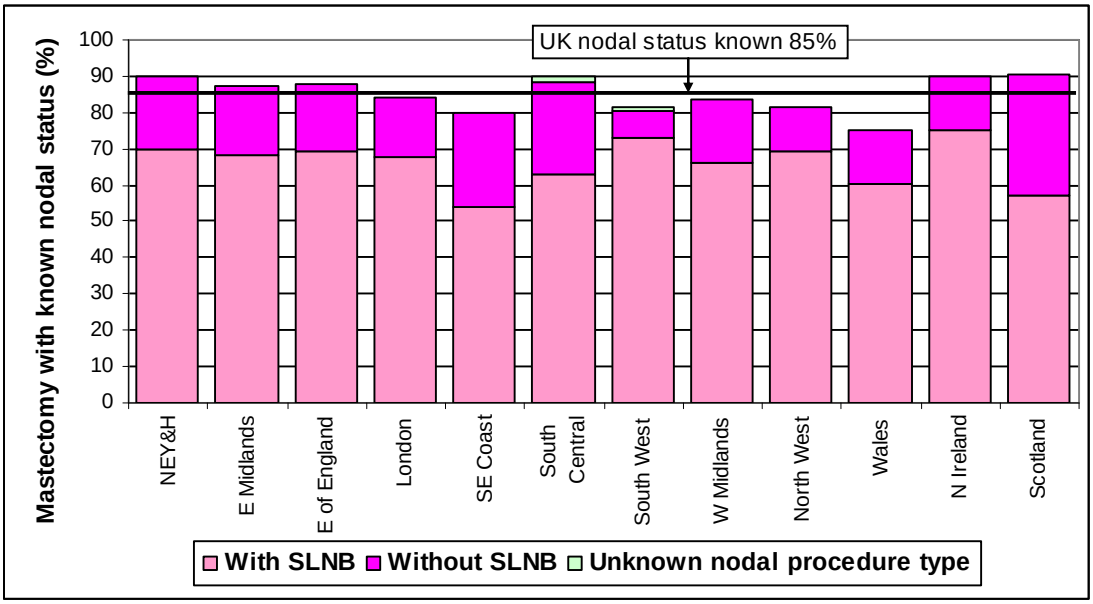

Figure 58 (Tables 95 and 98): Use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with a mastectomy

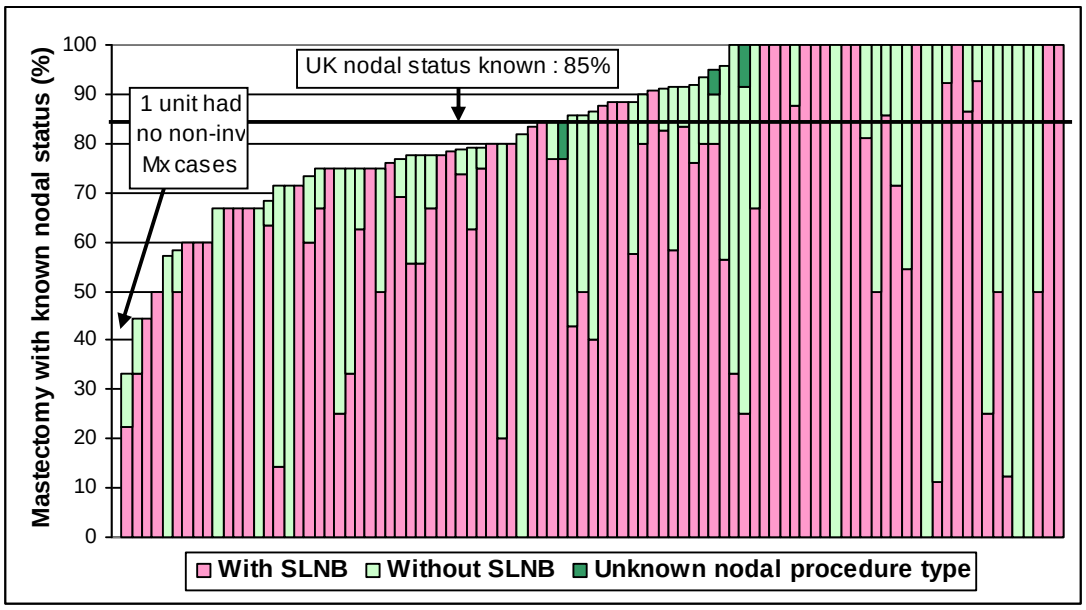

Figure 59: Variation between screening units in the use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with a mastectomy

Figure 59 shows that there was even greater variation between screening units. For example, in 12 screening units where the nodal status was known for all cancers, the status was always determined by a SLNB, while in a further four units where the nodal status was known for all cancers, the status was always determined without a SLNB. 232 (10%) non-invasive breast cancers treated with breast conserving surgery had known nodal status, and 88% of these had their nodal status determined on the basis of a SLNB (Tables 95 and 99). 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.

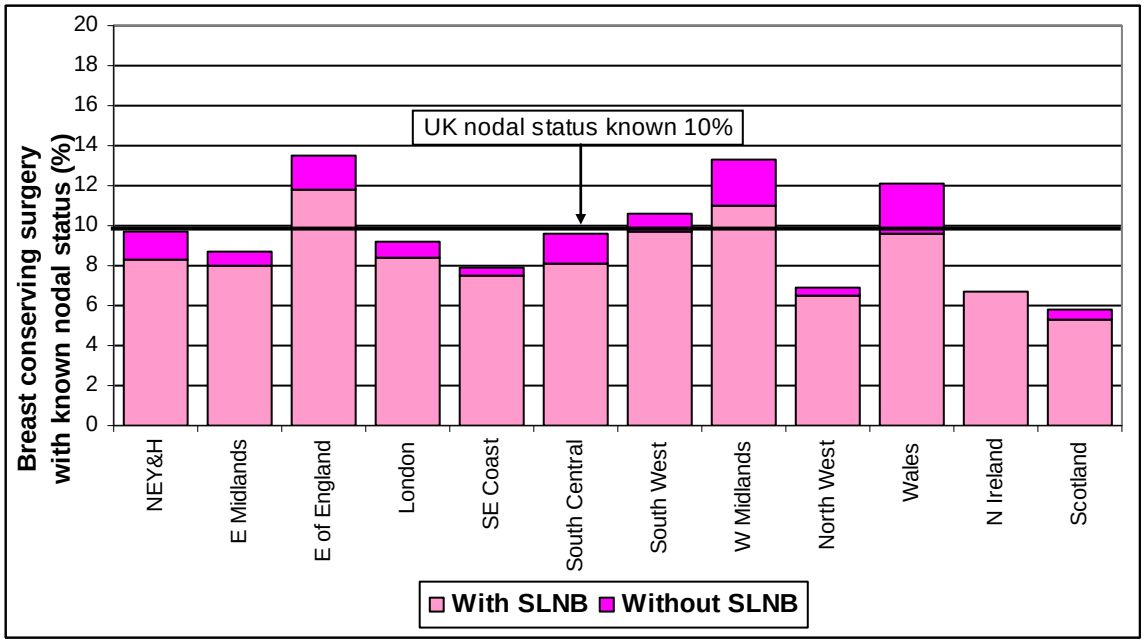

Figure 60 (Table 95 and Table 99): Use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with breast conserving surgery

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 6% in Scotland to 14% in East of England.

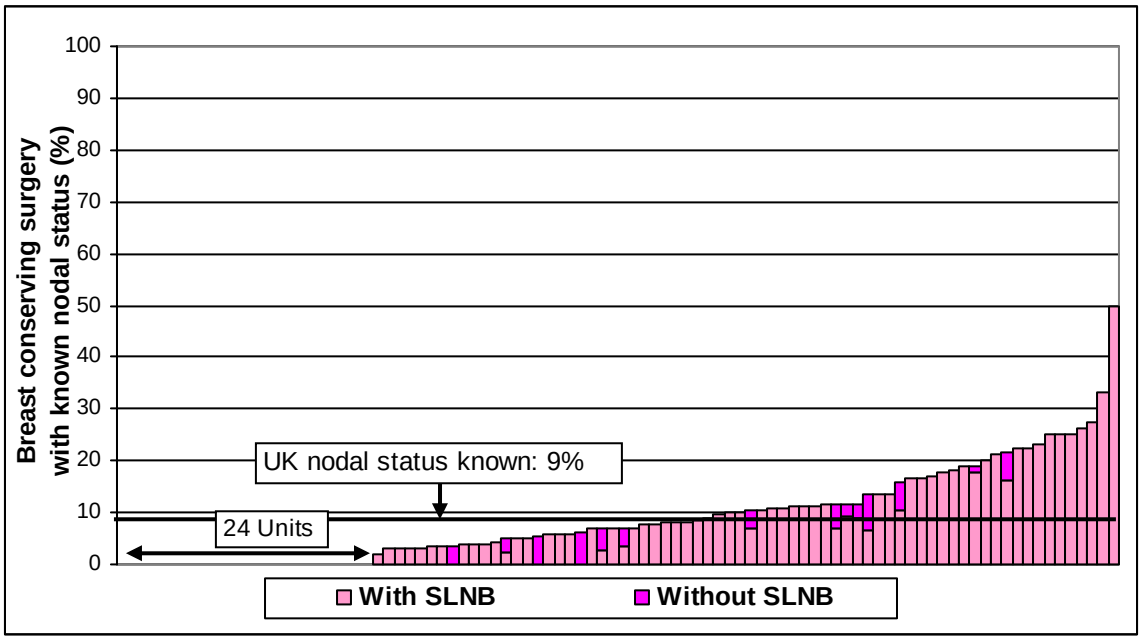

Figure 61: Variation between screening units in the use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with breast conserving surgery

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. 24 units had no cancers with known nodal status and 3 units did not use SLNB to determine nodal status.

In the UK as a whole the median numbers of nodes taken for non-invasive cancers undergoing breast conserving surgery and mastectomy were 2 and 3 respectively (Table 97). The maximum numbers of nodes taken for non-invasive cancers treated with breast conserving surgery and mastectomy were 14 and 44 respectively. The maximum number of nodes taken for mastectomy cases varied from 8 in Northern Ireland to 44 in London. Regional QA reference centres should

audit non-invasive cancers where more than 10 nodes were taken to ascertain why the axilla appears to have been over-treated.

Six non-invasive cancers had positive nodal status recorded. Of these, 2 had a SLNB procedure and 4 (1 in London and 3 in Scotland) another axillary procedure. Of the 2 cancers which had their positive nodal status determined from a SLNB procedure (1 in North East, Yorkshire & Humber and 1 in North West), both had a subsequent axillary procedure.

KEY FINDINGS:

- Although nodal assessment is not always indicated for non-invasive cancers, 31% of non-invasive cancers had known nodal status. 85% of non-invasive cancers treated with mastectomy had known nodal status, compared with 10% of those treated with breast conserving surgery.
- Of the 1,069 non-invasive cancers with known nodal status, 6 (1%) had positive nodal status recorded.
- 78% of non-invasive cancers treated with a mastectomy and 88% 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 and mastectomy were 14 and 44 respectively. Regional QA reference centres should audit non-invasive cancers where more than 10 nodes were taken to ascertain why the axilla appears to have been over-treated.

7.6 Invasive Cancers With No Axillary Surgery Recorded

INVASIVE CANCERS WITH NO AXILLARY OPERATION

	B5b		C5 only, no B5		B5a	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	*7*	*0*	*1*	*11*	*3*	*4*
East Midlands	*6*	*1*	*-*	*-*	*0*	*0*
East of England	*13*	*1*	*0*	*0*	*4*	*6*
London	*12*	*1*	*0*	*0*	*8*	*10*
South East Coast	*19*	*2*	*0*	*0*	*3*	*5*
South Central	*6*	*1*	*0*	*0*	*1*	*3*
South West	*13*	*1*	*0*	*0*	*4*	*5*
West Midlands	*8*	*1*	*0*	*0*	*3*	*6*
North West	*21*	*1*	*0*	*0*	*7*	*7*
Wales	*9*	*1*	*0*	*0*	*3*	*6*
Northern Ireland	*1*	*0*	*0*	*0*	*0*	*0*
Scotland	*5*	*0*	*1*	*25*	*0*	*0*
United Kingdom	***120***	***1***	***2***	***4***	***36***	***5***

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

The preceding summary table shows for each type of non-operative diagnosis, the proportion of invasive breast cancers in each region with no axillary surgery recorded. 120 invasive cancers (1%) with a B5b (Invasive) non-operative diagnosis had no axillary procedure recorded. 21 of these were in North West and 19 in South East Coast. Two (4%) invasive cancers diagnosed by C5 cytology

only had no axillary procedure recorded. 36 invasive cancers (5%) with a B5a (Non-invasive) non-operative diagnosis had no surgery to the axilla recorded. In addition to these 158 cancers, 17 invasive cancers without a non-operative diagnosis had no surgery to the axilla.

The following summary table shows how the number and proportion of invasive cancers with a B5a (Non-invasive) core biopsy which had no axillary operation recorded has varied in each region over the period 2006/07-2010/11. 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.

INVASIVE CANCERS WITH A B5A NON-OPERATIVE DIAGNOSIS WITH NO AXILLARY OPERATION

	2006/07		2007/08		2008/09		2009/10		2010/11	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	11	11	4	4	4	4	2	3	3	4
East Midlands	1	2	6	10	5	7	0	0	0	0
East of England	7	11	6	8	3	4	6	8	4	6
London	6	11	7	10	10	15	6	9	8	10
South East Coast	11	18	9	11	7	10	6	9	3	5
South Central	8	15	3	7	4	10	7	15	1	3
South West	8	12	3	4	7	8	5	8	4	5
West Midlands	3	5	2	3	2	3	4	6	3	6
North West	13	15	6	7	5	6	4	5	7	7
Wales	2	4	3	5	3	12	4	10	3	6
Northern Ireland	6	50	9	43	0	0	1	5	0	0
Scotland	1	2	2	3	3	5	1	3	0	0
United Kingdom	**77**	**11**	**60**	**8**	**53**	**7**	**46**	**7**	**36**	**5**

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

KEY FINDINGS:

- Axillary surgery was performed for 99% of invasive breast cancers with a B5b (Invasive) core biopsy and 96% of invasive cancers diagnosed by C5 cytology only.
- 120 invasive cancers with a B5b (Invasive) core biopsy, 36 invasive cancers with a B5a (Non-invasive) core biopsy and 17 invasive cancers without a non-operative diagnosis had no axillary procedure recorded. In London, 10% of B5a (Non-invasive) cancers that were found to be invasive at surgery had no axillary operation 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.

7.7 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 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 2010/11, 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 15 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. In Scotland and North East, Yorkshire & Humber, one invasive cancer diagnosed by C5 cytology only did not have axillary surgery.

CANCERS WITH AXILLARY SURGERY AT FIRST AND LATER OPERATIONS

	Invasive cancers *(Table 100)*									***Non/micro-invasive cancers***		
	B5b			***C5 only, no B5***			***B5a***			***B5a***		
Region	***Total***	***% 1st Op***	***% Later Op***	***Total***	***% 1st Op***	***% Later Op***	***Total***	***% 1st Op***	***% Later Op***	***Total***	***% 1st Op***	***% Later Op***
N East, Yorks & Humber	*1,632*	*100*	*0*	*9*	*78*	*11*	*76*	*49*	*47*	*404*	*35*	*6*
East Midlands	*908*	*99*	*0*	*0*	*-*	*-*	*47*	*47*	*53*	*187*	*34*	*7*
East of England	*1,168*	*99*	*0*	*1*	*0*	*100*	*62*	*40*	*53*	*272*	*32*	*6*
London	*1,233*	*99*	*0*	*2*	*100*	*0*	*82*	*41*	*49*	*330*	*29*	*5*
South East Coast	*1,048*	*98*	*0*	*3*	*100*	*0*	*62*	*52*	*44*	*265*	*23*	*8*
South Central	*912*	*99*	*0*	*3*	*100*	*0*	*39*	*54*	*44*	*153*	*32*	*7*
South West	*1,142*	*99*	*0*	*5*	*80*	*20*	*82*	*44*	*51*	*279*	*29*	*8*
West Midlands	*1,158*	*99*	*0*	*3*	*100*	*0*	*53*	*55*	*40*	*263*	*33*	*5*
North West	*1,462*	*98*	*0*	*11*	*100*	*0*	*94*	*51*	*41*	*330*	*31*	*7*
Wales	*765*	*99*	*0*	*1*	*100*	*0*	*48*	*65*	*29*	*174*	*26*	*3*
Northern Ireland	*243*	*99*	*0*	*5*	*100*	*0*	*19*	*68*	*32*	*68*	*32*	*4*
Scotland	*1,264*	*100*	*0*	*4*	*75*	*0*	*81*	*83*	*17*	*266*	*29*	*2*
United Kingdom	***12,935***	***99***	***0***	***47***	***89***	***6***	***745***	***53***	***42***	***2,991***	***30***	***6***

A high proportion (95%) of invasive cancers with a B5a (Non-invasive) non-operative diagnosis also had axillary surgery. This varied from 90% in London (74 cancers) to 100% in East Midlands, Northern Ireland and Scotland.

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

Overall, 95% of invasive cancers with a B5a (Non-invasive) non-operative diagnosis had axillary surgery; 53% (395 cancers) at the first operation and 42% at a repeat operation. The proportion having surgery at the first operation was highest in Scotland (83%) and lowest in East of England (40%). In London, 10% of B5a (Non-invasive) cancers (8 in total) that were found to be invasive at surgery had no axillary operation recorded. The regional QA reference centre should audit these cases to ascertain why the axilla appears to have been under-treated. Of the 395 cases with axillary assessment at first operation, 319 (81%) had SLNB performed, compared to 75% 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 67 units to 67% in one unit in North West (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.

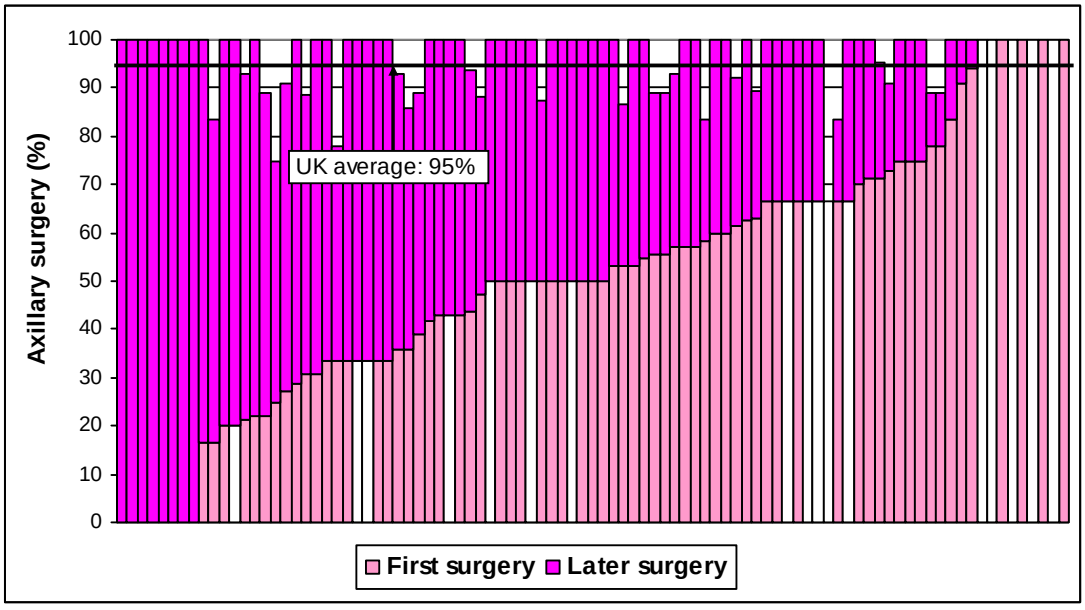

Figure 62 : Variation between screening units in the proportion of invasive cancers with a B5a (Non-invasive) non-operative diagnosis having axillary surgery at first and repeat operations - 1 unit was excluded as it had no B5a to invasive cancers (17 of the 20 smallest units are highlighted in white)

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 2008/09-2010/11 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). Eight 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 14 outliers, 3 are in East of England (one high and two low), 2 are in Northern Ireland (1 high and 1 low), 2 are in Scotland (both high) and 2 are in West Midlands (1 high and 1 low). Regional QA reference centres and their regional surgical QA co-ordinators should investigate the reasons for the unusual clinical practice in the 14 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.

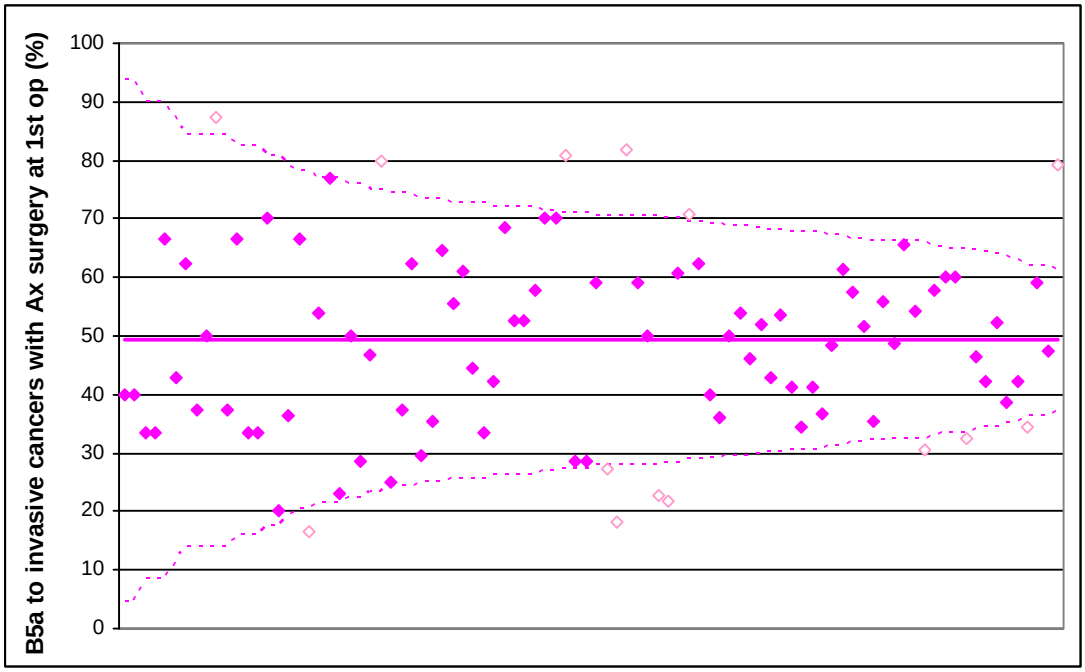

Figure 63: Variation between screening units in the proportion of invasive cancers with a B5a (Non-invasive) non-operative diagnosis having axillary surgery at first operation in the 3-year period 2008/09-2010/11 (open diamonds represent units which lie outside the control limits)

KEY FINDINGS:

- Although 95% of invasive cancers with a B5a (Non-invasive) diagnosis had axillary surgery, only 395 (53%) of these cancers had their axillary surgery at the first operation; this varied from 40% in East of England to 83% in Scotland.
- In London, 10% of B5a (Non-invasive) cancers that were found to be invasive at surgery had no axillary operation recorded. The regional QA reference centre should audit these cases to ascertain why the axilla appears to have been under-treated.
- Of the 395 cases with axillary assessment at first operation, 81% had SLNB performed, compared to 75% of those with axillary assessment at later operation.
- During the period 2008/09-2010/11, 8 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 their regional surgical QA co-ordinators should investigate the reasons for the unusual clinical practice these 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.

7.9 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. 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, 43% of these cancers had a repeat operation to the axilla. This varied from 55% in Wales to 25% in South Central. 37% of invasive cancers with positive nodal status had a repeat operation to the axilla following a SLNB and 6% after an axillary operation which did not involve a SLNB. Overall in the UK, 86% of repeat operations on the axilla were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB (Table 101). This varied between 80% in North East, Yorkshire & Humber and 95% in West Midlands.

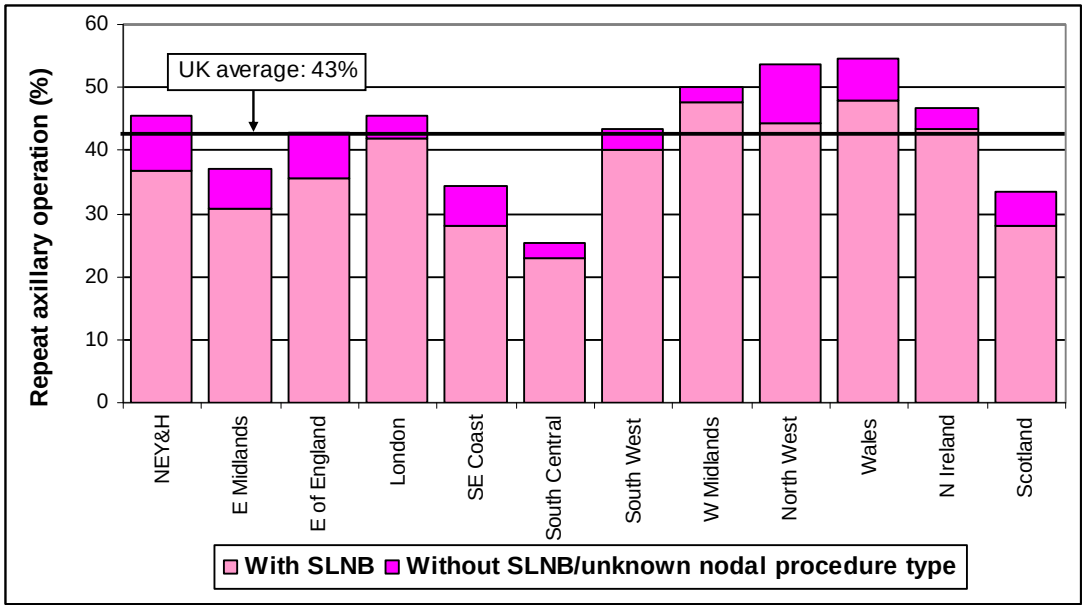

Figure 64 (Table 101): Repeat axillary operations for invasive cancers with positive nodal status

Figure 65 shows that the proportion of repeat operations to the axilla varied between screening units for invasive cancers with positive nodal status, from 0 cases in 2 units to over 60% in 21 units (only 3 of which are small). It is again clear from this figure that, 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. There were a small number of units with repeat operation rates above the UK average where the majority of the invasive cancers had their positive nodal status determined without a SLNB or where the nodal procedure was not known. Regional QA reference centres and regional surgical QA co-ordinators should audit these invasive cancers to ensure that the nodal operation data are recorded correctly and to ascertain why the nodal procedure type was not known.

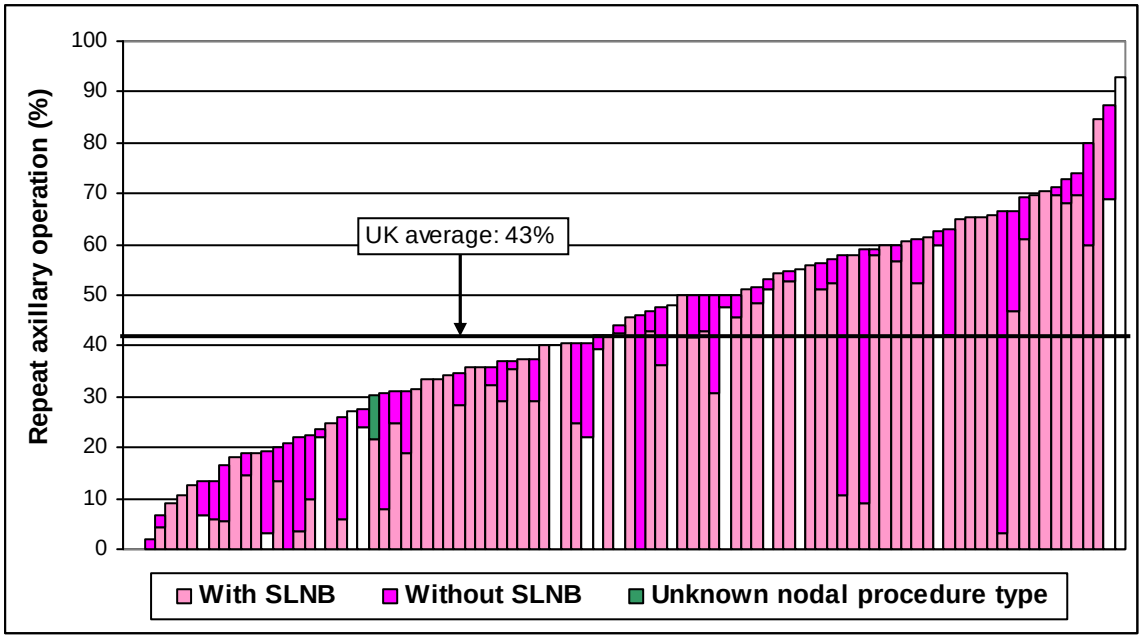

Figure 65: Variation between screening units in repeat axillary operations for invasive cancers with positive nodal status (14 of the smallest units are highlighted in white)

KEY FINDINGS:

- 43% of invasive cancers with a positive nodal status had a repeat operation to the axilla. This varied from 55% in Wales to 25% in South Central, and from 0% in 2 screening units to over 60% in 21 units.
- 37% of invasive cancers with positive nodal status had a repeat operation to the axilla following a SLNB and 6% after an axillary operation which did not involve a SLNB.
- Overall in the UK, 86% of repeat operations on the axilla were carried out on invasive cancers with positive nodal status determined on the basis of SLNB. This varied between 80% in North East, Yorkshire & Humber and 95% in West Midlands.
- In a small number of units with repeat operation rates above the UK average, the majority of the invasive cancers had their positive nodal status determined without a SLNB or using an unknown nodal procedure. Regional QA reference centres should audit these invasive cancers to ensure that the nodal operation data for these cases are recorded correctly and to ascertain why the nodal procedure type was not known.

CHAPTER 8
ADJUVANT THERAPY

Surgeons were asked to supply radiotherapy, chemotherapy and hormonal therapy information for cancers detected through screening between 1 April 2009 and 31 March 2010, 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 2011, 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.

8.1 Data Completeness for the Adjuvant Therapy Audit

The 2009/10 NHSBSP audit reported tumour characteristics and primary treatment data for 17,013 screen-detected breast cancers. When data for these cancers were requested for inclusion in this year's adjuvant therapy audit, 9 additional cancers which were not included in the 2009/10 main audit were identified. A further 4 cancers were excluded from the adjuvant therapy audit because they were found not to be breast cancers. 27 cases from London were excluded because surgical consent was not given to include the data in the audit. Thus, 17,018 breast cancers were eligible for inclusion in the adjuvant therapy audit. Of these, 9 cases were excluded due to incomplete surgery data and 113 because no adjuvant therapy data were supplied.

A further 364 cases (2%) were excluded from the audit because the woman had had a previous cancer. In West Midlands, 11% of women were found to have had a previous cancer which might affect the treatment of the audited breast cancer compared with only 2% of women from the other regions. This suggests that these previous cancers are not being correctly identified by other QA reference centres. Work is being carried out by the West Midlands Cancer Intelligence Unit to gain further insight into this issue.

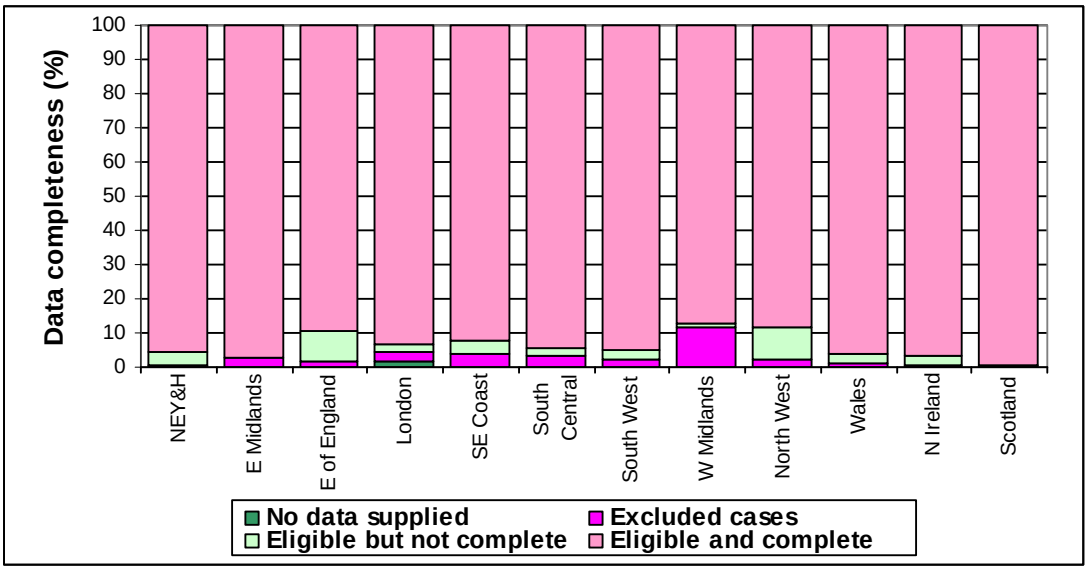

Figure 66 (Table 102): Case exclusion and data completeness

Following the exclusions described above, 16,508 breast cancers (97%) were included in the adjuvant therapy audit. In the UK as a whole, data completeness for radiotherapy, chemotherapy and endocrine therapy was 99%, 98% and 98% respectively, and 96% of cases had complete radiotherapy, chemotherapy and endocrine therapy data (Table 102). The latter is an improvement

from 2008/09 when only 94% of cancers had complete radiotherapy, chemotherapy and endocrine therapy data. The proportion of cancers with radiotherapy, chemotherapy and endocrine therapy data varied from 90% in North West (where one unit had incomplete data for 73% of cases) to 100% in East Midlands and Scotland.

Figure 66 shows the variation in data completeness and the proportion of cases excluded between regions. Scotland had the highest data completeness and case inclusion (100%) and West Midlands the lowest data completeness and case inclusion (89%). The latter is due to the exclusion of a much higher proportion of women who had had a previous cancer diagnosis (Table 102).

8.2 Adjuvant Therapy

In general, invasive breast cancers received more adjuvant therapy than non-invasive breast cancers. Of all breast cancers with known radiotherapy treatment, 12,000 (73%) had radiotherapy recorded and 4,366 were recorded as not having had radiotherapy by the audit cut off date. 80% of invasive cancers, 58% of micro-invasive cancers and 44% of non-invasive cancers had radiotherapy recorded (Table 104). 3,461 invasive cancers (27%), 16 women with non/micro-invasive cancer (2 of which were micro-invasive) had adjuvant chemotherapy recorded (Table 105). Regional QA reference centres should audit these 16 cases to ascertain if this is a data recording issue.

87% of invasive breast cancers and 12% 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 (44% compared with 90% for invasive cancers), and differing opinions regarding the benefit of offering endocrine therapy to women with non-invasive breast cancer. Compared to 2008/09, there was a 7% decrease in the proportion of women with non-invasive breast cancer receiving endocrine therapy, following the publication of the *NICE Clinical Guideline 80 Early and locally advanced breast cancer: Diagnosis and treatment* (2009) which states that Tamoxifen should not be offered 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.

46 (19%) of the 246 breast cancers which did not have surgery had radiotherapy recorded (Table 107), and 61 (29%) of the 213 invasive breast cancers which did not have surgery had chemotherapy recorded (Table 108). Regional QA reference centres should audit these 107 cases to ascertain whether this is a data recording issue or a true reflection of clinical practice.

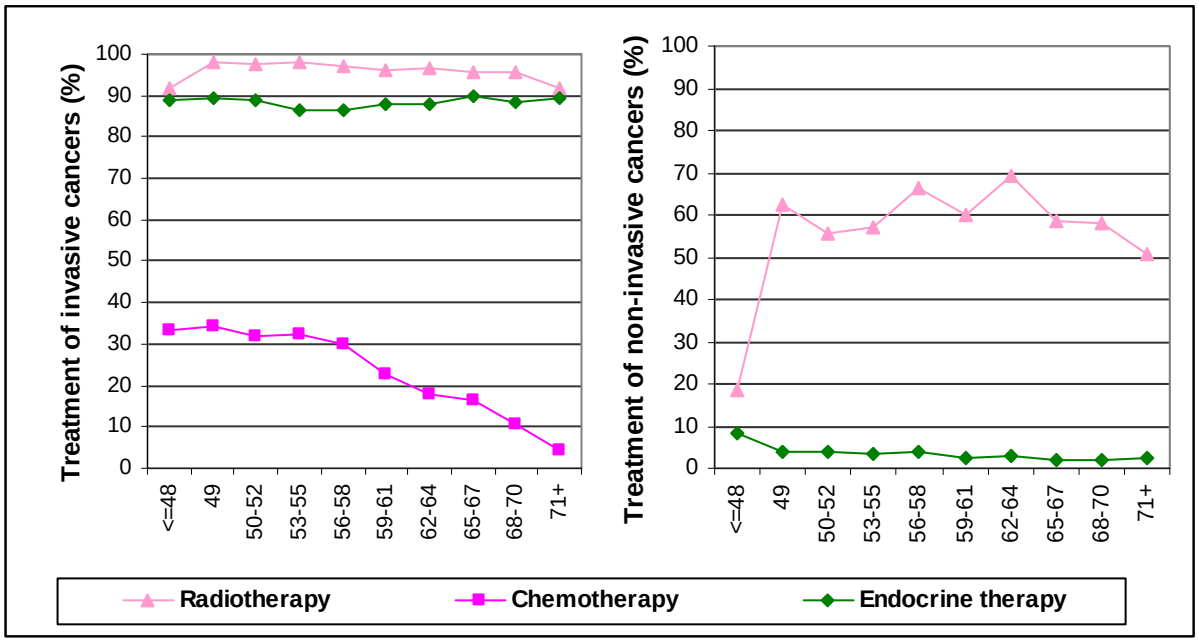

Figure 67 (Table 111) : Percentage of women in each age group treated with BCS who had radiotherapy, chemotherapy and endocrine therapy recorded, for cases with complete adjuvant data

Figures 67 and 68 show how the level of adjuvant therapy recorded for invasive and non-invasive breast cancers varied with age for 11,699 women treated with breast conserving surgery and for 3,866 women treated with mastectomy. Chemotherapy recorded for non-invasive cancers has been excluded because the numbers are small (12 cases) and the accuracy of the data questionable. 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 90%). 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 79% to 84%) compared with those who had breast conserving surgery.

97% of women aged 50 to 65 years with invasive breast cancer treated with breast conserving surgery received radiotherapy, and there was only 5% decrease in the use of radiotherapy for women aged 71 years and over. Overall, only 34% of invasive cancer women treated with mastectomy had radiotherapy, and there was a gradual decrease in the use of radiotherapy with age (from around 40% in women aged 53-55 years and below to around 30% in women aged 68 years and older) (Figure 68). The site irradiated was not recorded in the audit.

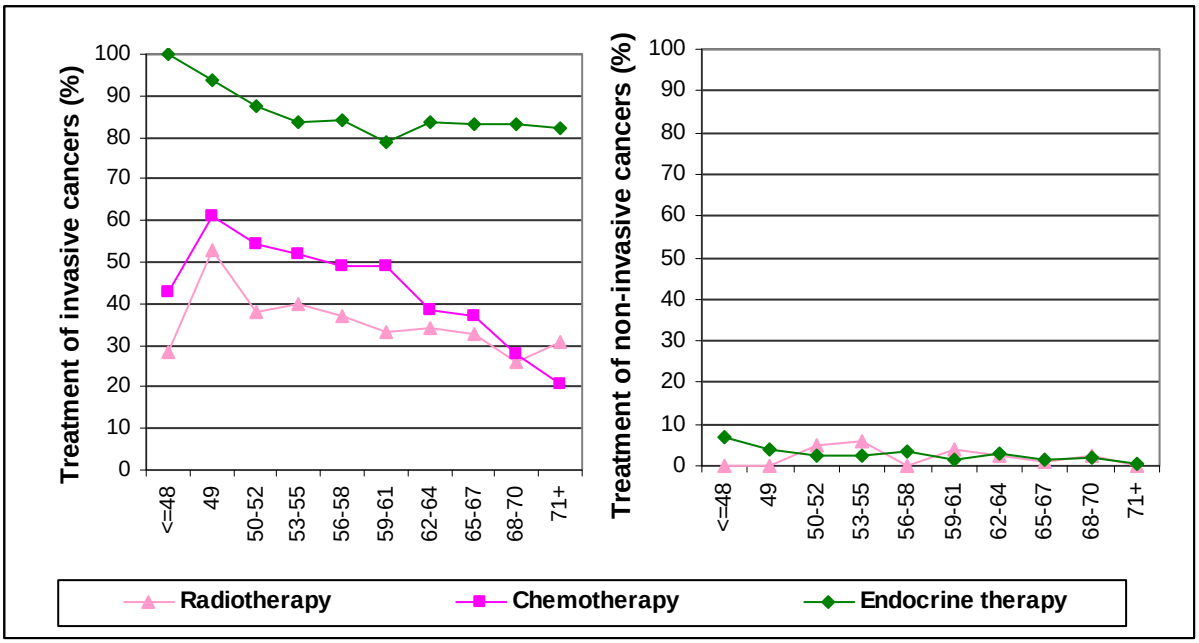

Figure 68 (Table 112): Percentage of women in each age group treated with mastectomy who had radiotherapy, chemotherapy and endocrine therapy recorded, for cases with complete adjuvant data

For women with non-invasive breast cancer treated by breast conserving surgery, the use of radiotherapy peaked at 69% for women aged 62-64 years and then fell to 51% for those aged older than 70 (Figure 67). In the latter age group, the proportion of women receiving radiotherapy varied widely between regions from 90% in East Midlands and 91% in Scotland to 20% in South Central. Only 1% of women with non-invasive breast cancer treated with mastectomy had radiotherapy.

Chemotherapy was the least used adjuvant therapy; being recorded for only 27% 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 (42% compared with 21%) 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 14% 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 33% of women treated with mastectomy aged 65-70 years having chemotherapy recorded compared to 54% of women aged 49-55 years. This may be because a higher proportion of younger women have 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 less clear. In North East, Yorkshire & Humber, a relatively higher proportion of women treated with breast

conserving surgery aged over 70 year received chemotherapy (13% compared with 5% for the UK as a whole), and in Scotland a relatively higher proportion of women treated with mastectomy aged over 70 years received chemotherapy (44% compared with 21% for the UK as a whole).

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% (6,659 cases) receiving this treatment combination (Figure 69). 51% of non-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-invasive breast cancer treated with breast conserving surgery, was surgery alone.

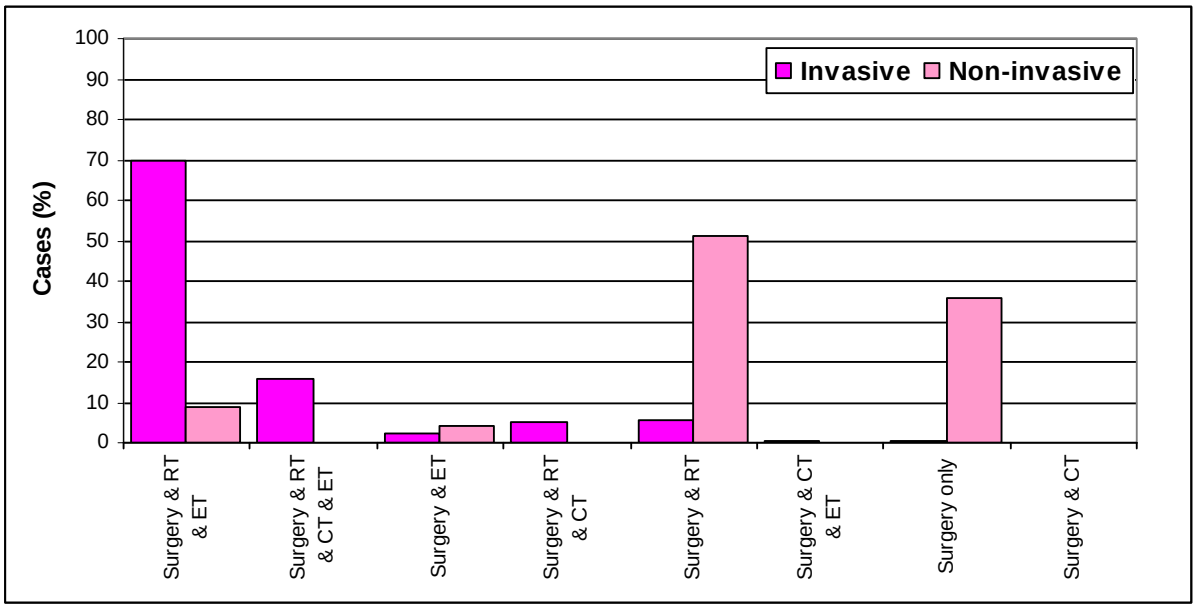

Figure 69 (Tables 113): Combinations of treatment for women treated with breast conserving surgery, expressed as a percentage of cases with complete adjuvant therapy data

Surgery (ST) and endocrine therapy (ET) as a combination of treatment was the most common treatment pattern for invasive breast cancers treated with mastectomy, with 43% (1,316 cases) receiving this treatment combination (Figure 70). 89% of non-invasive breast cancers treated with mastectomy had surgery only.

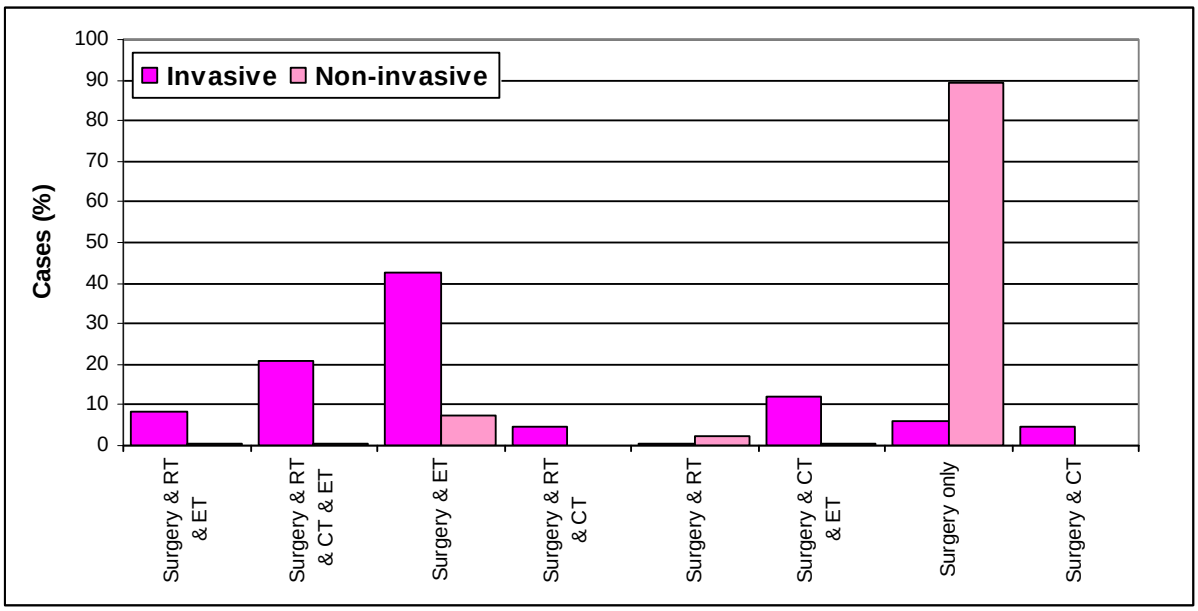

Figure 70 (Tables 113): Combinations of treatment for women treated with mastectomy, expressed as a percentage of cases with complete adjuvant therapy data

KEY FINDINGS:

- 16,508 cases (97% of all cases) were included in the adjuvant therapy audit. Scotland had the highest proportion of eligible cases (100%).
- In the West Midlands 11% of cases were excluded because the women were found to have had a previous cancer which might affect the treatment of the audited breast cancer compared with only 2% of women from the other regions. This suggests that these previous cancers are not being correctly identified by other QA reference centres. Work is being carried out by the West Midlands Cancer Intelligence Unit to gain further insight into this issue.
- 80% of invasive cancers, 58% of micro-invasive cancers and 44% of non-invasive cancers had radiotherapy recorded. 27% of the invasive cancers and 16 women with non/micro-invasive cancer had chemotherapy recorded. Regional QA reference centres should audit these 16 cases to ascertain if this is a data recording issue.
- Regional reference centres should audit the 107 cases which did not have surgery but had radiotherapy and/or chemotherapy recorded to ascertain whether this is a data recording issue.
- 87% of invasive cancers and 12% of non-invasive cancers had endocrine therapy recorded. Compared to 2008/09, there was a 7% decrease in the proportion of women with non-invasive breast cancer receiving endocrine therapy, following the publication of the *NICE Clinical Guideline 80 Early and locally advanced breast cancer: Diagnosis and treatment* (2009) which states that Tamoxifen should not be offered 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.
- 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 90%). 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 79% to 84%) compared with those who had breast conserving surgery.
- 97% of women aged 50 to 65 years with invasive breast cancer treated with breast conserving surgery received radiotherapy, and there was only 5% decrease in the use of radiotherapy for women aged 71 years and over. Overall, only 34% of women treated with mastectomy had radiotherapy, and there was a gradual decrease in the use of radiotherapy with age.
- For women with non-invasive breast cancer treated by breast conserving surgery, the use of radiotherapy peaked at 69% for women aged 62-64 years and then fell to 51% for those aged older than 70. Only 1% of women with non-invasive breast cancer treated with mastectomy had radiotherapy.
- Chemotherapy was the least used adjuvant therapy; being recorded for only 27% 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 (42% compared with 21%) 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. This may be because a higher proportion of younger women have aggressive, fast growing cancers, but may also indicate a reluctance to prescribe chemotherapy to older women where the risk/benefit balance and clinical effectiveness are less clear.
- Surgery, radiotherapy and endocrine therapy as a combination of treatment was the most common treatment pattern for invasive breast cancers treated with breast conserving surgery, with 70% receiving this treatment combination. 51% of non-invasive breast cancers treated with breast conserving surgery had surgery with radiotherapy.
- Surgery and endocrine therapy as a combination of treatment was the most common treatment pattern for invasive breast cancers treated with mastectomy, with 43% receiving this treatment combination. 89% of non-invasive breast cancers treated with mastectomy had surgery only.

8.3 Waiting Time for Radiotherapy

Tables 114 to 117 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, 4 women who had neo-adjuvant radiotherapy recorded and 27 women who had intra-operative radiotherapy have been excluded from this section.

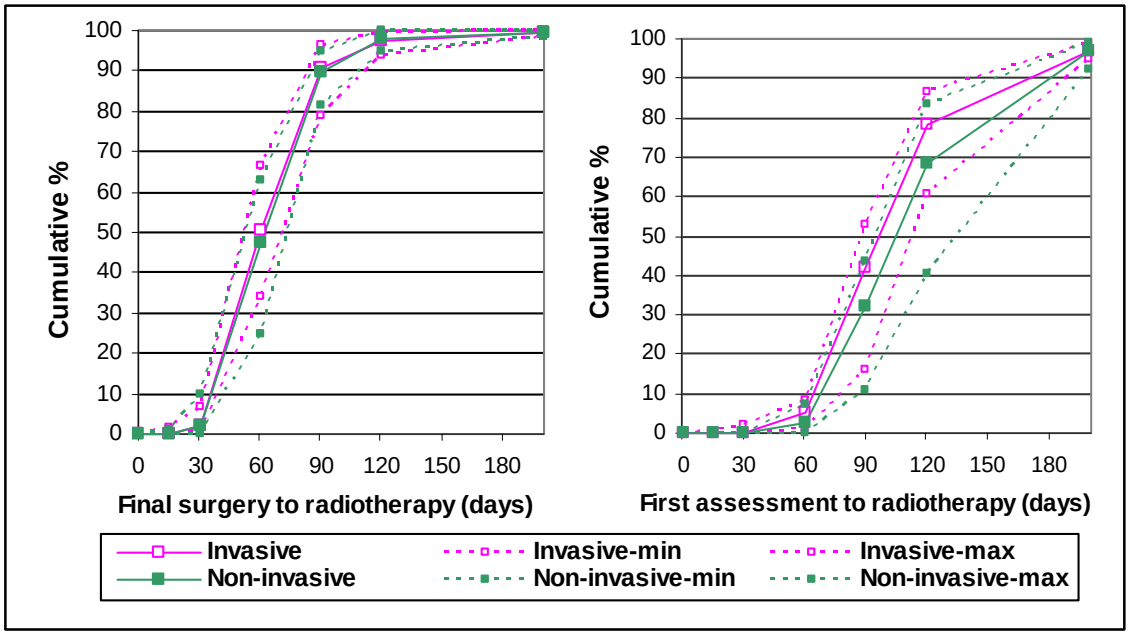

Figure 71 (Tables 114 to 117): Cumulative percentage of cases with surgery and adjuvant radiotherapy, that had radiotherapy recorded up to 200 days after final surgery (left) and first assessment (right)

In Figure 71, 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, 50% of women with breast cancer received radiotherapy within 60 days of their final surgery and 90% within 90 days. 44 women had not received radiotherapy within 200 days after their final surgery. Waiting times for radiotherapy have increased slightly compared to 2008/09 when 54% of women received their radiotherapy within 60 days of their final surgery. The right hand graph in Figure 71 shows that 42% of women with invasive breast cancer and 32% of women with non-invasive breast cancer with radiotherapy recorded had started their radiotherapy within 90 days of their first assessment visit and that 221 women (3%) with invasive breast cancer and 39 women (3%) with non-invasive breast cancer had not started radiotherapy even after 200 days. Regional QA reference centres should review the 260 breast cancers (invasive and non-invasive) which were not treated with chemotherapy and where radiotherapy was not started within 200 days of the first assessment visit.

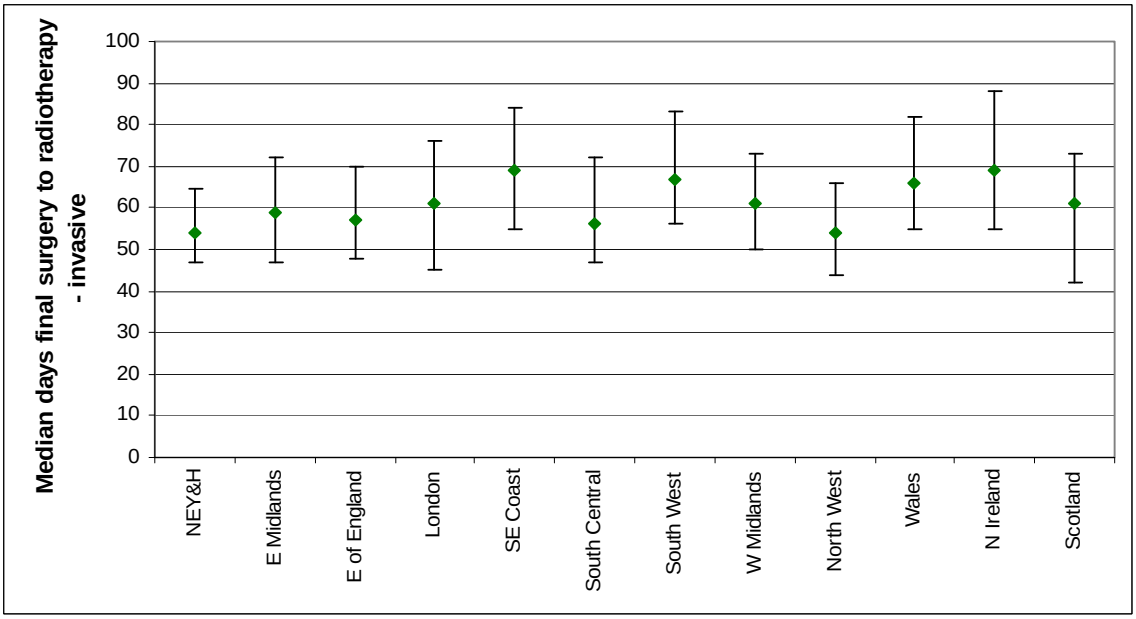

Figure 72 (Tables 118): Median days from final surgery to radiotherapy for invasive cancers - bars indicate the inter-quartile range

Figure 72 shows the median number of days from final surgery to radiotherapy in each region for invasive breast cancers, excluding cases with chemotherapy and neo-radiotherapy or intra-operative radiotherapy. The longest times between final surgery and radiotherapy were in South East Coast (69 days), Northern Ireland (69 days), South West (67 days) and Wales (66 days). In the UK as a whole, the median number of days from final surgery to radiotherapy was 1 day longer for non-invasive cancers than for invasive cancers. This varied between regions from 2 days less in South Central and North West, to 6 days longer in London and 3.5 days longer in Wales.

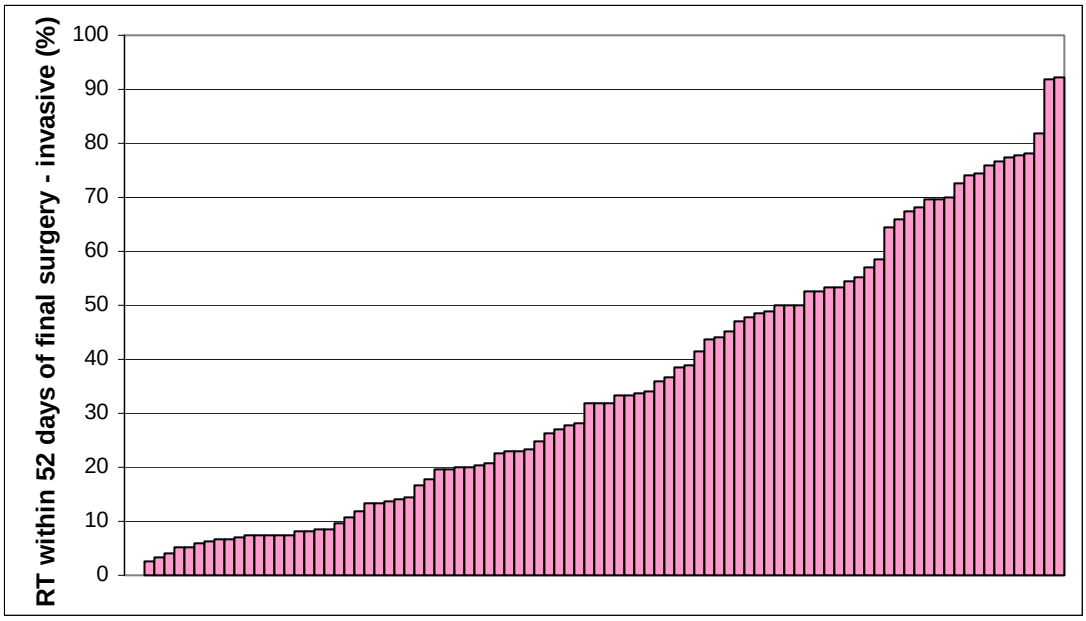

Figure 73: Variation between screening units in the proportion of women with invasive breast cancer who received radiotherapy within 52 days of their final surgery

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 73 shows the proportion of women with invasive breast cancer in each breast screening unit who received radiotherapy within 52 days of their final operation. This varied from over 90% in two units to no women in two units. 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.

KEY FINDINGS:

- Overall, 50% of women received radiotherapy within 60 days of their final surgery and 90% within 90 days. 44 women had not received radiotherapy 200 days after their final surgery.
- Only 42% of women with invasive breast cancer and 32% of women with non-invasive breast cancer had started their radiotherapy within 90 days of their first assessment visit and 221 women (3%) with invasive breast cancer had not started radiotherapy after 200 days. Regional QA reference centres should review all of the cases where radiotherapy was not started within 200 days of their first assessment visit.
- The longest median times between final surgery and radiotherapy were in South East Coast (69 days), Northern Ireland (69 days), South West (67 days) and Wales (66 days). The median time from final surgery to radiotherapy was 1 day longer for non-invasive cancers overall.
- In the *Cancer Reform Strategy* published in December 2007, a new 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.

8.4 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 five specific propositions, informative discussions to agree best practice can take place.

8.4.1 Conservation Surgery and Radiotherapy

PROPOSITION 1
Women with breast cancer treated with breast conserving surgery should normally receive radiotherapy

Of the 16,366 breast cancers with radiotherapy data recorded, 81% were invasive and 19% were non-invasive (Table 119). 9,829 (75%) of the invasive cancers were treated with breast conserving surgery (Table 120). Of these, 384 (4%) did not have adjuvant radiotherapy recorded (Table 121).

Figure 74 shows the variation in the proportion of invasive and non-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 2% in Scotland to 7% in London.

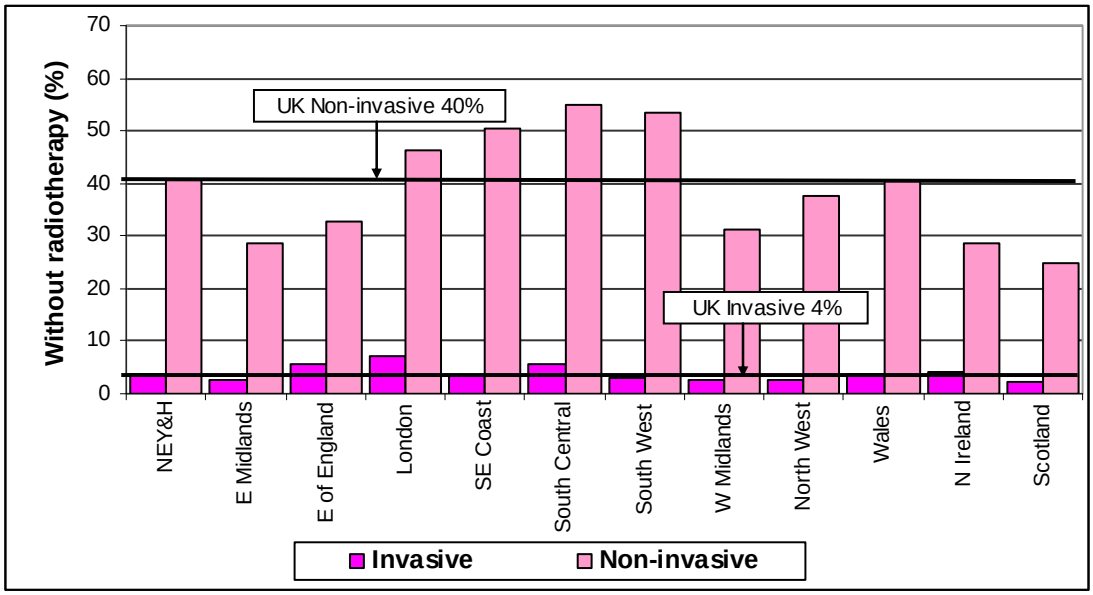

Figure 74 (Tables 121 & 123): The proportion of invasive and non-invasive cancers treated with breast conserving surgery that did not have radiotherapy recorded

Figure 75 shows the proportion of invasive breast cancers treated with breast conserving surgery in each screening unit in 2009/10 which did not have radiotherapy recorded. This varied from 0 cancers in 15 units to more than 21% of invasive cancers in a screening unit in London. In the UK as a whole, 16% of the invasive cancers treated with breast conserving surgery which did not receive radiotherapy were larger than 20mm in diameter, 13% were Grade 3 and 14% were node positive (Table 122).

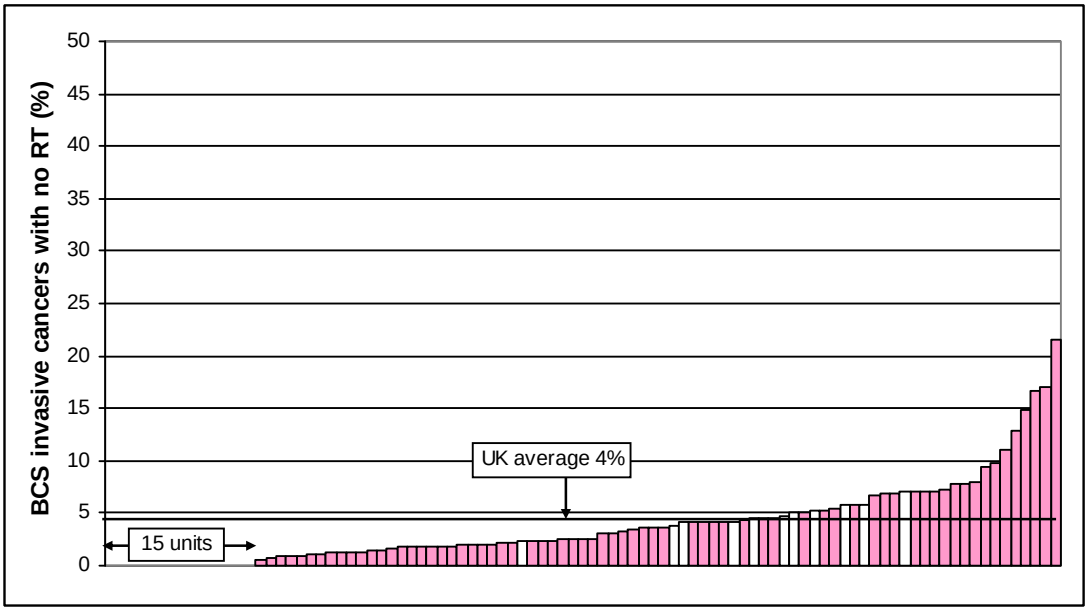

Figure 75 : Variation between screening units in the proportion of invasive cancers treated with breast conserving surgery that did not have radiotherapy recorded (15 of the 20 smallest units are highlighted in white)

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 2007/08-2009/10 is examined in the control chart in Figure 76 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). 16 units lie above the upper control limit and had significantly lower rates of radiotherapy. Four of these units were in South Central and 4 in London. The unit with the highest proportion of cases without radiotherapy was in South Central (21%). Further work is being done with these 16 units in order to understand the reasons for this unusual clinical practice.

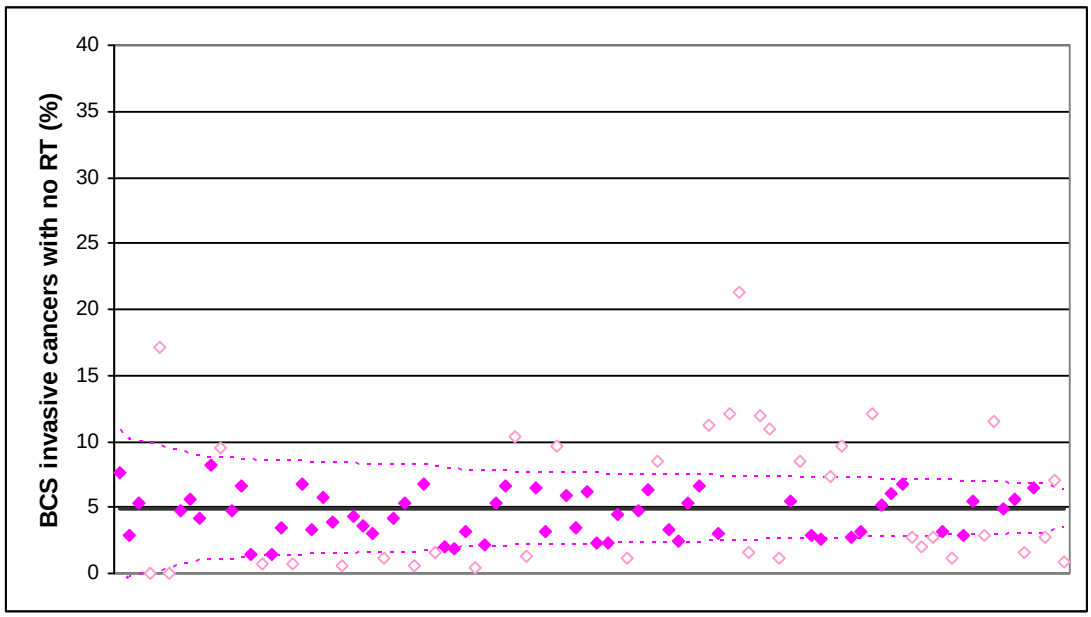

Figure 76 : Variation between screening units in the proportion of invasive cancers treated with breast conserving surgery that did not receive radiotherapy (2007/08-2009/10) (open diamonds represent units which lie outside the control limits)

Of the 2,220 non-invasive cancers treated with breast conserving surgery, 892 (40%) did not have adjuvant radiotherapy recorded (Table 123). This varied from 25% in Scotland to 55% in South Central. Figure 77 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. 18% (161) of these cancers were high cytonuclear grade (Table 124), and 17 were more than 40mm in diameter (Table 125).

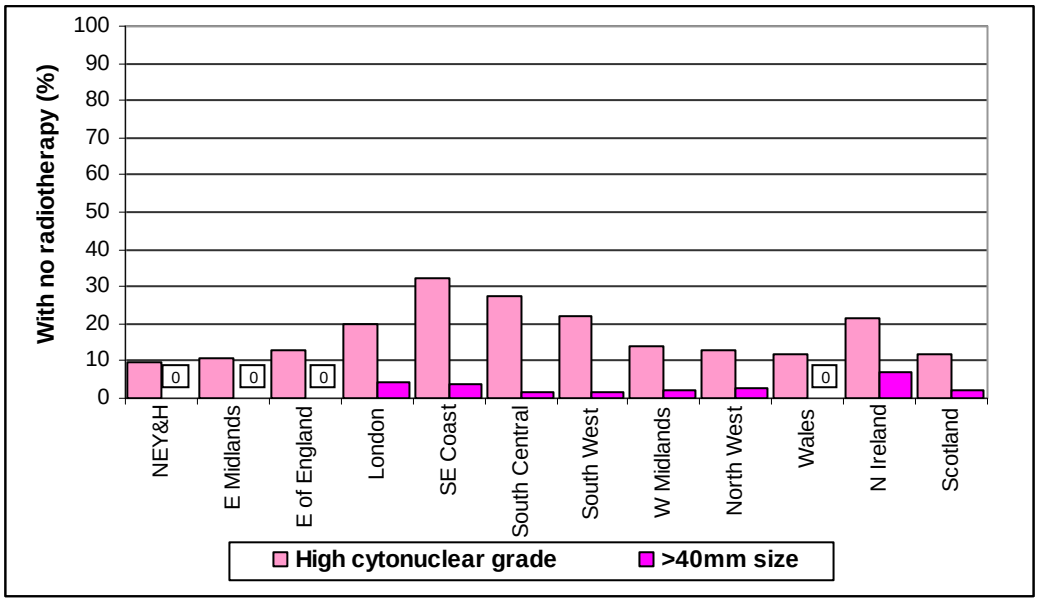

Figure 77 (Tables 124 & 125): The proportion of conservatively treated non-invasive cancers with high cytonuclear grade or size greater than 40mm without radiotherapy recorded

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 2007/08-2009/10 is examined in the control chart in Figure 78, 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). 18 units lie above the upper control limit and had significantly lower rates of radiotherapy. Three of these units were in South East Coast, 4 in South Central and 5 in South West. The unit with the highest proportion of cases without radiotherapy was in South Central (84%), one of the other 3 outliers with 70% or less of these cancers treated with radiotherapy was also in South Central, the other two were in South West

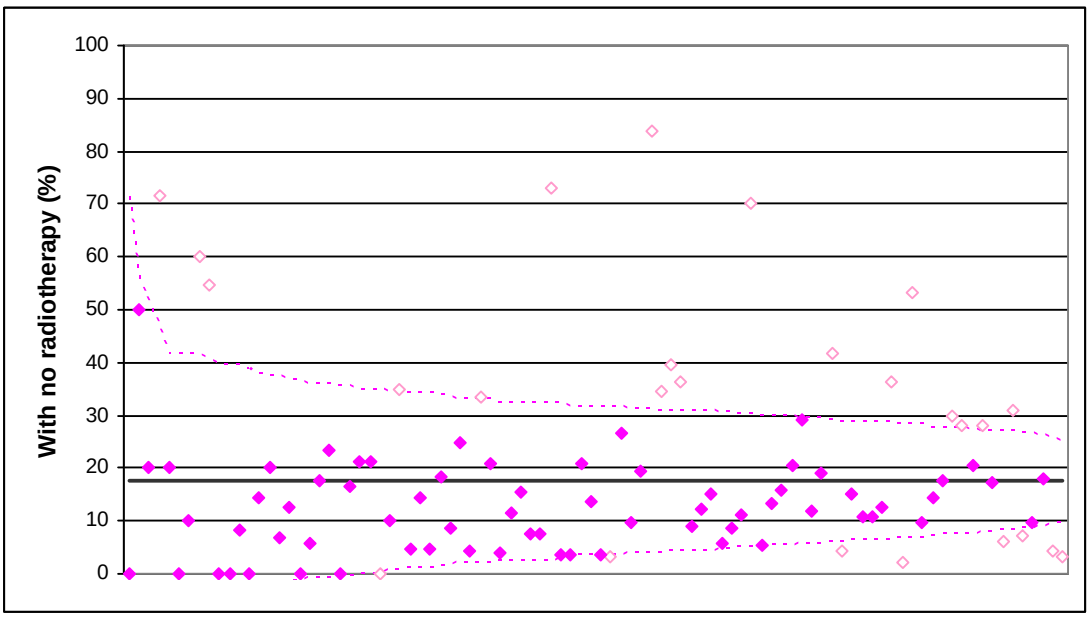

Figure 78 : Variation with screening unit in the proportion of high grade non- invasive cancers treated with breast conserving surgery that did not receive radiotherapy (2007/08-2009/10)
(open diamonds represent units which lie outside the control limits)

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-invasive breast cancers treated with breast conserving surgery which did not have radiotherapy recorded varied in each region over the 3-year period from 2007/08 to 2009/10. Throughout the 3-year period, in South East Coast, South Central and South West, more than 50% of non-invasive cancers treated with breast conserving surgery do not appear to have received radiotherapy. Given the benefits demonstrated in clinical trials from the provision of radiotherapy to patients 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. Regional QA reference centres should also ascertain each screening unit's policy regarding the provision of radiotherapy to non-invasive breast cancers treated with breast conserving surgery since there is evidence from clinical trials that this can reduce recurrence rates.

CANCERS TREATED WITH BREAST CONSERVING SURGERY WITHOUT RADIOTHERAPY RECORDED

	Invasive						*Non-invasive*					
	2007/08		*2008/09*		*2009/10*		*2007/08*		*2008/09*		*2009/10*	
Region	***No.***	%	***No.***	%	***No.***	%	***No.***	%	***No.***	%	***No.***	%
N East, Yorks & Humber	*57*	*6*	*32*	*3*	*43*	*4*	*115*	*42*	*89*	*42*	*113*	*41*
East Midlands	*14*	*2*	*23*	*3*	*18*	*3*	*49*	*32*	*61*	*36*	*47*	*28*
East of England	*92*	*12*	*97*	*11*	*56*	*6*	*95*	*48*	*104*	*44*	*79*	*33*
London	*58*	*8*	*60*	*8*	*66*	*7*	*82*	*45*	*84*	*42*	*110*	*46*
South East Coast	*26*	*16*	*39*	*8*	*28*	*4*	*29*	*51*	*64*	*52*	*108*	*50*
South Central	*83*	*13*	*84*	*13*	*39*	*6*	*90*	*64*	*89*	*55*	*73*	*55*
South West	*56*	*6*	*50*	*6*	*31*	*3*	*136*	*59*	*122*	*56*	*117*	*53*
West Midlands	*25*	*3*	*22*	*3*	*22*	*3*	*49*	*34*	*64*	*37*	*50*	*31*
North West	*56*	*6*	*55*	*6*	*28*	*3*	*83*	*43*	*99*	*48*	*79*	*38*
Wales	*7*	*1*	*14*	*2*	*22*	*4*	*53*	*41*	*54*	*37*	*60*	*41*
Northern Ireland	*12*	*8*	*12*	*8*	*10*	*4*	*16*	*41*	*11*	*28*	*14*	*29*
Scotland	*62*	*8*	*50*	*6*	*21*	*2*	*45*	*27*	*52*	*29*	*42*	*25*
United Kingdom	***548***	***7***	***538***	***6***	***384***	***4***	***842***	***44***	***893***	***43***	***892***	***40***

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

KEY FINDINGS:

- 96% of women with invasive cancer treated with breast conserving surgery had radiotherapy recorded, compared to only 60% of women with non-invasive cancers treated with breast conserving surgery.
- 16% of the invasive cancers treated with breast conserving surgery which did not receive radiotherapy were larger than 20mm in diameter, 13% were Grade 3 and 14% were node positive. In the 3-year period 2007/08-2009/10, 16 screening units had significantly lower rates of radiotherapy for invasive cancers treated with breast conserving surgery. Four of these units were in South Central and 4 in London. Further work is being done with 16 units in order to understand the reasons for this unusual clinical practice.
- 161 non-invasive cancers treated with breast conserving surgery without radiotherapy recorded were high cytonuclear grade and 17 were more than 40mm in diameter. In the 3 year period 2007/08-2009/10, 18 units had significantly lower rates of radiotherapy for non-invasive cancers treated with breast conserving surgery. Three of these units were in South East Coast, 4 in South Central and 5 in South West.
- Given the benefits demonstrated in clinical trials from the provision of radiotherapy to patients 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. Regional QA reference centres should also ascertain each screening unit's policy regarding the provision of radiotherapy to non-invasive breast cancers treated with breast conserving surgery since there is evidence from clinical trials that this can reduce recurrence rates.

8.4.2 Node Positive Invasive Cancers and Chemotherapy

PROPOSITION 2
Women with node positive invasive breast cancers should normally receive chemotherapy

The following table shows how the number and proportion of node positive invasive cancers with no chemotherapy treatment recorded has varied in each region in the 3-year period 2007/08-2009/10. East of England and South East Coast had consistently higher proportions of node positive invasive cancers without chemotherapy recorded.

NODE POSITIVE INVASIVE CANCERS WITHOUT CHEMOTHERAPY

	2007/08		***2008/09***		***2009/10***	
Region	***No.***	%	***No.***	%	***No.***	%
N East, Yorks & Humber	*125*	*37*	*134*	*35*	*119*	*31*
East Midlands	*51*	*28*	*42*	*21*	*51*	*29*
East of England	*113*	*47*	*94*	*39*	*103*	*36*
London	*86*	*33*	*94*	*46*	*82*	*32*
South East Coast	*63*	*40*	*57*	*40*	*93*	*39*
South Central	*60*	*30*	*58*	*30*	*47*	*22*
South West	*87*	*36*	*66*	*30*	*79*	*33*
West Midlands	*63*	*30*	*65*	*26*	*58*	*28*
North West	*118*	*41*	*106*	*35*	*96*	*32*
Wales	*54*	*35*	*46*	*33*	*47*	*34*
Northern Ireland	*8*	*27*	*15*	*30*	*21*	*30*
Scotland	*69*	*28*	*107*	*39*	*93*	*34*
United Kingdom	***897***	***35***	***884***	***34***	***889***	***32***

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

In 2009/10, of the 16,216 cancers with known chemotherapy data, 2,774 (17%) were node positive invasive cancers and, of these, 889 (32%) did not have chemotherapy recorded (Table 126). This varied from 22% in South Central to 39% in South East Coast.

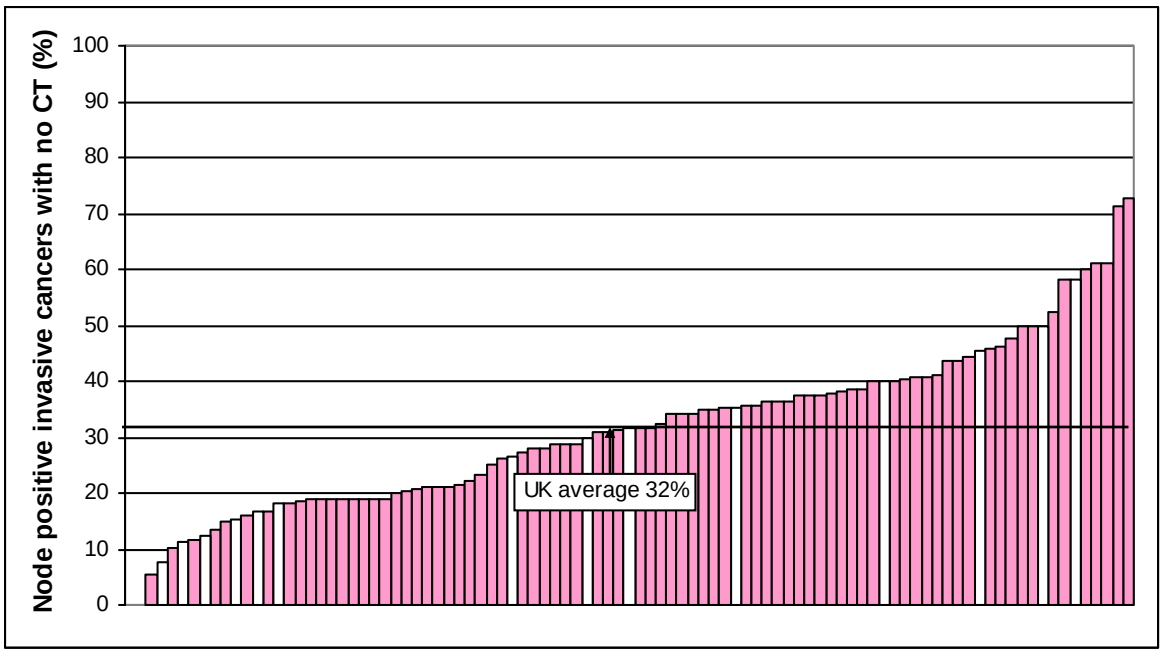

Figure 79: Variation between screening units in the proportion of node positive invasive cancers that did not have chemotherapy recorded

Figure 79 shows the proportion of node positive invasive breast cancers in each screening unit in 2009/10 which did not have chemotherapy recorded. This varied from 0 cancers in 2 East Midlands units to more than 70% of invasive cancers in two screening units in South Central and West Midlands. 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 2007/08-2009/10 was examined in a control chart (not shown), 14 units were high outliers and 18 were low outliers. Of the 14 units with significantly higher numbers of node positive invasive breast cancers not treated with chemotherapy, 5 were in East of England, 3 in North East, Yorkshire & Humber and 3 in North West.

Of the 889 cancers in 2009/10 which had no chemotherapy recorded, 473 were diagnosed in women aged less than 65 years; 50 (11%) of these cancers were Grade 3 and 11 (2%) were HER-2 positive. These 473 cancers accounted for only 25% of all node positive invasive cancers with known chemotherapy data in this age group. In contrast, in women aged 65 years and above, the 416 cases without chemotherapy recorded constituted 49% of all the node positive invasive cancers, and 67 (16%) were Grade 3 and 28 (7%) 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 in order to make a judgement on the relative risks and benefits to an individual patient. However, given the relatively small numbers of cancers involved, all regional QA reference centres and regional surgical QA co-ordinators should audit 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.

KEY FINDINGS:

- 32% of women with node positive invasive cancer did not have chemotherapy recorded.
- Older women with node positive invasive cancers were less likely to have chemotherapy recorded than younger women; only 25% of women aged less than 65 with node positive invasive cancers did not have chemotherapy recorded compared with 49% of older women.
- 11% of the node positive invasive cancers which had no chemotherapy diagnosed in women aged less than 65 were Grade 3 and 2% were HER-2 positive; compared with 16% and 7% respectively in women aged 65 and above. Given the relatively small numbers of cancers involved, all regional QA reference centres and regional surgical QA co-ordinators should audit Grade 3 and/or HER-2 positive, node positive invasive cancers with no chemotherapy recorded to determine whether the absence of chemotherapy treatment data is a true reflection of clinical practice or a data recording issue.

8.4.3 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 16,187 breast cancers with complete endocrine therapy data included in the adjuvant therapy analysis, 13,052 (81%) were ER positive, 1,555 (10%) ER negative and for 1,580 (10%) either the ER status were not tested or the ER status was unknown (Table 128). 90% of the ER positive cancers with known endocrine therapy data were invasive and 10% non-invasive (Table 129).

In the UK as a whole, 499 (4%) 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 2% in North East, Yorkshire & Humber, South Central, and Northern Ireland to 13% in East Midlands. 56 (11%) of the ER positive invasive cancers that did not have endocrine therapy recorded were Grade 3, 45 (9%) were node positive and 47 (9%) were larger than 20mm in diameter (Table 131).

Figure 80 shows the proportion of ER positive invasive breast cancers in each screening unit in 2009/10 which did not have endocrine therapy recorded. This varied from 0 cancers in 22 units to more than 20% of invasive cancers in 3 screening units, 2 of which were in East Midlands and 1 in South West.

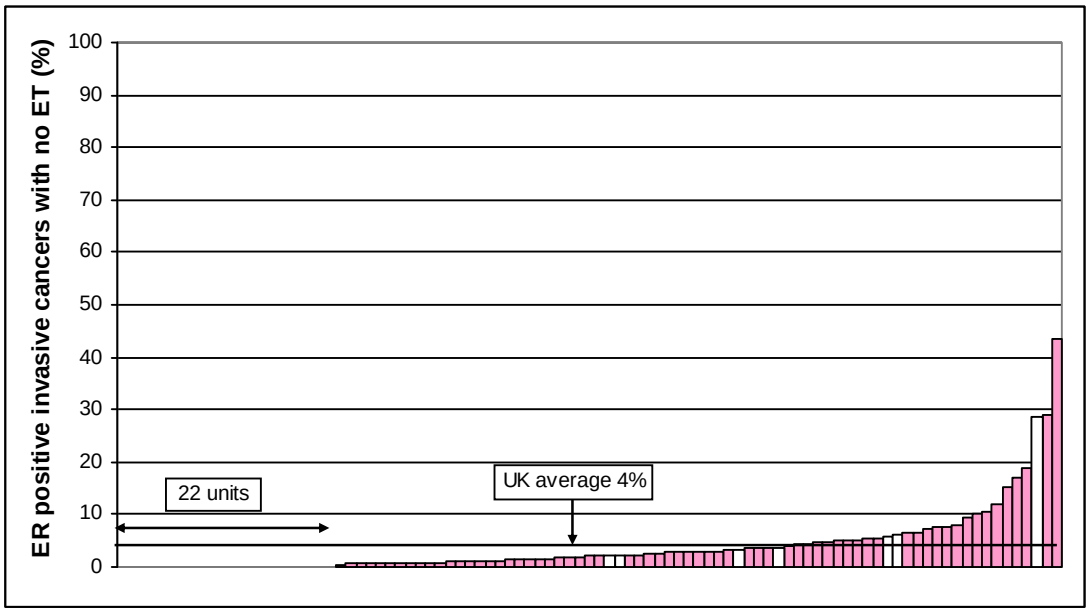

Figure 80 : Variation between screening units in the proportion of ER positive, invasive cancers that did not have endocrine therapy recorded

Figure 81 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 2007/08-2009/10 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. Regional QA reference centres and regional surgical QA co-ordinators should work with these 15 units to establish the reason for this unusual clinical practice.

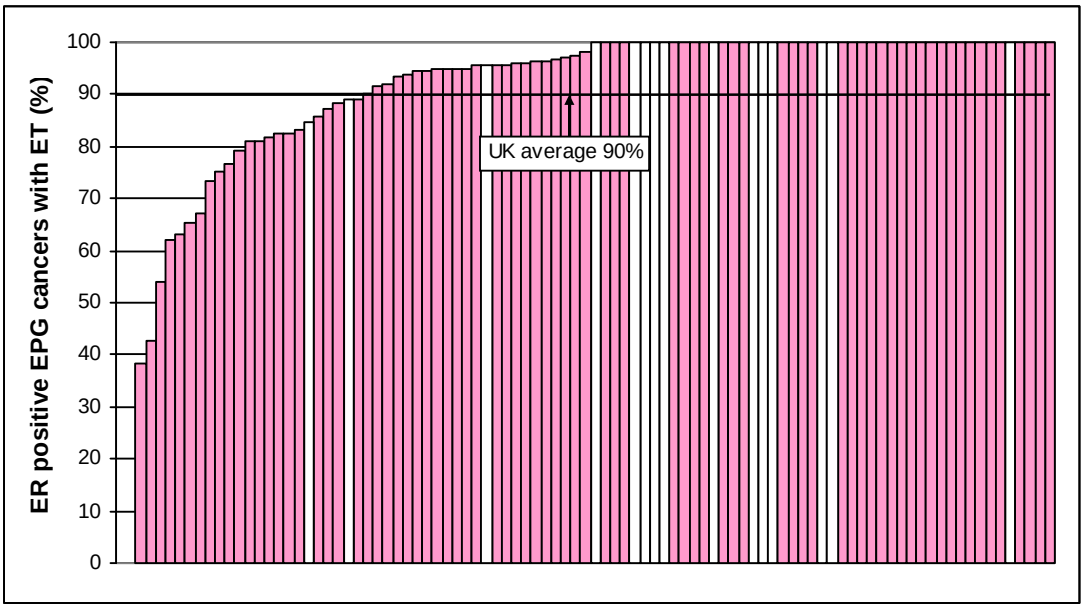

Figure 81 : Variation between screening units in the proportion of ER positive, EPG cancers that had endocrine therapy (ET) recorded (the 20 smallest units are highlighted in white)

The following summary table shows in the 3-year period 2007/08-2009/10, the proportion of ER positive invasive cancers in each region without endocrine therapy recorded. In East of England and

London this has decreased markedly. In East Midlands, it has remained relatively high. Regional QA reference centres and regional surgical QA co-ordinators where the proportion of ER positive invasive cancers without endocrine therapy recorded is 5% or more in excess of the UK average should audit their cases to determine whether the absence of endocrine therapy data is a true reflection of clinical practice or a data recording issue.

ER POSITIVE INVASIVE CANCERS WITHOUT ENDOCRINE THERAPY RECORDED

	2007/08		2008/09		2009/10	
Region	**No.**	%	**No.**	%	**No.**	%
N East, Yorks & Humber	32	2	81	5	38	2
East Midlands	66	8	96	10	118	13
East of England	128	14	124	12	46	4
London	73	8	105	11	73	7
South East Coast	33	6	10	2	34	4
South Central	45	6	55	7	18	2
South West	29	3	66	7	43	4
West Midlands	8	1	26	3	28	3
North West	85	7	86	7	48	4
Wales	19	3	20	3	20	3
Northern Ireland	1	1	3	2	6	2
Scotland	9	1	17	2	27	3
United Kingdom	**528**	**5**	**689**	**6**	**499**	**4**

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

In the UK as a whole, 14 (32%) ER negative, PgR positive invasive cancers did not have endocrine therapy recorded (Table 132) and 86 ER negative cancers (6%) did have endocrine therapy recorded (Table 133). 30 (35%) of the latter were PgR positive invasive cancers (Table 132). Regional QA reference centres and regional surgical QA co-ordinators should determine the reasons why endocrine therapy was not given to ER negative cancers which were PgR positive, and why endocrine therapy does appear to have been given to ER/PgR negative cancers.

The proportion of non/micro-invasive cancers with endocrine therapy recorded varied markedly between regions in 2009/10 from 4% in Scotland to 25% in Northern Ireland and North West (Table 134). Of the 383 non/micro-invasive cancers with known ER status with endocrine therapy recorded, 340 were ER positive and 5 were ER negative. A further 38 non-invasive cancers with unknown ER status also had endocrine therapy recorded.

In line with *NICE Clinical Guideline 80 Early and locally advanced breast cancer: diagnosis and treatment* (2009) which states that Tamoxifen should not be offered to women with non-invasive breast cancer, in the UK as a whole, the proportion of ER positive non/micro-invasive cancers with endocrine therapy recorded decreased from 37% in 2008/09 to 26% in 2009/10 (Table 135). Similar decreases occurred in most regions; the exception being South Central where a 13% increase was apparent. Part of the variation between regions and units may be due to trial participation. Given the potential side effects of endocrine treatment, regional QA reference centres and regional surgical QA co-ordinators should determine the reasons why endocrine therapy appears to have been given to cancers with unknown or negative ER/PgR status.

KEY FINDINGS:

- 499 (4%) ER positive invasive cancers and 14 (32%) ER negative PgR positive invasive cancers did not have endocrine therapy recorded.
- 11% of the ER positive invasive cancers not treated with endocrine therapy were Grade 3, 9% were node positive and 9% were larger than 20mm in diameter. In 3 screening units, more than 20% of the ER positive cancers did not receive endocrine therapy. Regional QA reference centres and regional surgical QA co-ordinators should audit ER and PgR positive invasive cancers to determine whether the absence of endocrine therapy data is a true reflection of clinical practice or a data recording issue.

KEY FINDINGS (cont.):

- Overall 90% of ER positive invasive cancers in the EPG had endocrine therapy. 15 screening units had significantly smaller numbers of EPG cancers treated with endocrine therapy in the 3-year period 2007/08-2009/10. Three of these were in East Midlands and 4 in East of England. Regional QA reference centres and regional surgical QA co-ordinators should work with these 15 units to establish the reason for this unusual clinical practice.
- The proportion of non/micro-invasive cancers with endocrine therapy recorded varied markedly between regions from 4% in Scotland to 25% in Northern Ireland and North West.
- The proportion of ER positive non/micro-invasive cancers with endocrine therapy recorded decreased overall from 37% in 2008/09 to 26% in 2009/10. Similar decreases occurred in most regions; the exception being South Central where a 13% increase was apparent. Part of the variation between regions and units may be due to trial participation.
- Given the potential side effects of endocrine treatment, regional QA reference centres and regional surgical QA co-ordinators should determine the reasons why endocrine therapy appears to have been given to cancers with unknown or negative ER/PgR status.

8.4.4 ER Negative Invasive Cancers and Chemotherapy

PROPOSITION 4
Chemotherapy should be considered for ER negative, node positive invasive breast cancers

Chemotherapy should be considered for ER negative node positive invasive breast cancers, but its use represents a balance between toxicity and benefit. Of the 16,216 cancers with known chemotherapy data, 284 (2%) were recorded as ER negative, node positive invasive cancers (Table 136). Of the 284 ER negative node positive invasive cancers, 22 (8%) did not receive chemotherapy (Table 138). Of these, 12 (55%) were Grade 3, and 8 (36%) were HER-2 positive.

ER NEGATIVE NODE POSITIVE INVASIVE CANCERS WITHOUT CHEMOTHERAPY RECORDED

Region	2007/08		2008/09		2009/10	
	No.	%	No.	%	No.	%
N East, Yorks & Humber	3	8	5	11	2	4
East Midlands	1	5	1	4	2	11
East of England	4	19	3	13	2	7
London	0	0	8	28	3	16
South East Coast	3	18	0	0	3	11
South Central	3	19	2	8	1	5
South West	5	19	9	33	3	13
West Midlands	6	15	2	6	2	8
North West	2	7	9	22	2	9
Wales	3	13	0	0	2	18
Northern Ireland	1	25	0	0	0	0
Scotland	2	8	4	15	0	0
United Kingdom	**33**	**12**	**43**	**15**	**22**	**8**

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

The preceding summary table shows how the number and proportion of ER negative, node positive invasive cancers with no chemotherapy recorded varied in each region in the 3-year period 2007/08-2009/10. Given the relatively small numbers of cancers involved, all regional QA reference centres and regional surgical QA co-ordinators should audit these cases to determine whether the absence of chemotherapy treatment data is a true reflection of clinical practice or a data recording issue.

KEY FINDINGS:

- Of the 22 ER negative, node positive invasive cancers which had no chemotherapy recorded, 12 (55%) were Grade 3, and 8 (36%) were HER-2 positive.
- Given the relatively small numbers of cancers involved, all regional QA reference centres and regional surgical QA co-ordinators should audit the ER negative node positive invasive cancers with no chemotherapy recorded to determine whether the absence of chemotherapy treatment data is a true reflection of clinical practice or a data recording issue.

8.4.5 HER-2 Status and Chemotherapy

PROPOSITION 5
Chemotherapy should be considered for HER-2 positive, node positive invasive cancers

NICE Clinical Guideline 80 Early and locally advanced breast cancer: diagnosis and treatment (2009) states that, given the poor prognosis associated with HER-2 positivity, patients with HER-2 positive tumours who have satisfactory cardiac function should be offered Trastuzumab (Herceptin) after their surgery, chemotherapy and radiotherapy treatment has been completed. This proposition is therefore designed to examine the proportion of node positive patients who may not be eligible to have Trastuzumab (Herceptin) because they have not had chemotherapy as a first line adjuvant therapy.

In the UK as a whole, HER-2 status was known for 12,703 (96%) invasive cancers. Of these, 381 were HER-2 and node positive and had chemotherapy data available. For 39 (10%) of these cancers, no chemotherapy was recorded (Table 140). This varied between 0 cancers in Northern Ireland and 7 cancers in East of England. In the UK as a whole, 23 (59%) of the 39 HER-2 and node positive cancers with no chemotherapy recorded were greater than 20mm in diameter and 19 (49%) were Grade 3 (Tables 141).

Older women were less likely to receive chemotherapy; 96% of the women aged less than 65 years with HER-2 and node positive invasive cancers received chemotherapy, compared to 71% of women aged 65 years and over. Regional QA reference centres and regional surgical QA co-ordinators should audit HER-2 and node positive cases with no chemotherapy recorded to determine whether the absence of chemotherapy is a true reflection of clinical practice or a data recording issue.

KEY FINDINGS:

- 39 (10%) HER-2 and node positive cancers did not have chemotherapy recorded. In the UK as a whole, 23 of these cancers were greater than 20mm in diameter and 19 were Grade 3.
- Regional QA reference centres and regional surgical QA co-ordinators should audit HER-2 and node positive cancers with no chemotherapy recorded to determine whether the absence of chemotherapy is a true reflection of clinical practice or a data recording issue.

8.4.6 Summary

The following table provides a summary of the proportion of cancers in each region which did not appear to receive treatment consistent with propositions 1 to 5 presented in this chapter. Regions where the proportions of cancers that appear to have been treated in a manner inconsistent with each proposition were 5% or more in excess of the UK average are shaded. Regional QA reference centres and regional surgical QA co-ordinators should determine firstly whether these inconsistencies are apparent for all or a small number of their screening units, and secondly whether the results are a true reflection of clinical practice or whether they are due to data recording issues.

If the latter is the case, more robust data collection and validation processes should be implemented by the affected screening units, and improved data checking procedures implemented by the regional QA reference centre. If the inconsistencies are due to clinical practice which is not consistent with national guidance, the reasons that surgeons and their multi-disciplinary teams are not following the guidance should be investigated and changes in practice implemented where necessary.

SUMMARY OF PROPOSITIONS 1, 2, 3, 4 and 5

	Proposition 1		Proposition 2		Proposition 3		Proposition 4	Proposition 5
	Invasive breast conserving surgery no radiotherapy (Table 121)	Non-invasive breast conserving surgery no radiotherapy (Table 123)	Node positive invasive no chemotherapy (Table 126)	ER positive invasive no endocrine therapy (Table 130)	ER negative PgR positive invasive no endocrine therapy (Table 132)	ER negative with endocrine therapy (Table 133)	ER negative, node positive invasive no chemotherapy (Table 138)	HER-2 positive, node positive invasive no chemotherapy (Table 140)
Region	%	%	%	%	%	%	%	%
NEY&H	4	41	31	2	0	6	4	8
East Midlands	3	28	29	13	0	2	11	4
E of England	6	33	36	4	0	8	7	15
London	7	46	32	7	50	13	16	13
SE Coast	4	50	39	4	0	8	11	12
South Central	6	55	22	2	50	9	5	7
South West	3	53	33	4	0	3	13	18
West Midlands	3	31	28	3	100	1	8	4
North West	3	38	32	4	60	5	9	14
Wales	4	41	34	3	100	2	18	25
N Ireland	4	29	30	2	0	4	0	0
Scotland	2	25	34	3	50	3	0	3
UK (%)	**4**	**40**	**32**	**4**	**32**	**6**	**8**	**10**
Total cancers	**384**	**892**	**889**	**499**	**14**	**86**	**22**	**39**

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

CHAPTER 9
SURVIVAL ANALYSIS

UK NHS Breast Screening Programme data for women with breast cancers detected by screening from 1 January 1990 to 31 December 1991 and from 1 April 2005 to 31 March 2006 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 2011, enabling survival for periods of up to 20 years and six years from the date of diagnosis to be calculated for the 1990/91 cohort and 2005/06 cohort respectively. 20-year relative survival and 5-year relative survival have been calculated for this report.

Age at diagnosis, invasive grade, invasive tumour size and nodal status were requested from the screening services for both cohorts. Date of death and cause of death were requested from cancer registries for 1990/91 cohort. Date of death and underlying cause of death were obtained from cancer registries and the Office for National Statistics (ONS). Tumour characteristics and death information for earlier years were collected in previous audits.

All regions participated in the 2005/06 cohort survival analysis. Scotland and Northern Ireland did not participate in the 1990/91 cohort survival analysis because their cancer registries had not started to collect or had just started to register cancer cases in 1990.

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. Life tables split by England, Wales, Northern Ireland and Scotland were also obtained for calculation of adjusted survival estimates which account for differences in life expectancy in the four countries. 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. 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 8,705 breast cancers detected by screening between 1 January 1990 and 31 December 1991 were submitted to the survival audit. Of the 8,705 cancers submitted, 440 cancers (5%) were excluded for one of the following reasons:

- Unknown invasive status (55 cases)
- Case not registered at the regional cancer registry or registered with an unknown diagnosis date (265 cases)
- Screen-detected cancer not confirmed to be the first primary breast cancer (120 cases)

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. 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. This occurred for 1,165 cases and 618 cases in the 1990/91 and 2005/06 survival cohorts respectively.

The following summary table shows that the proportion of cases that were eligible for inclusion in the survival analysis varied between 90% in North East, Yorkshire & Humber and 99% in East of England. The highest proportion of unregistered cases was in North East, Yorkshire & Humber (126 cases).

DATA COMPLETENESS FOR THE 1990/91 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	*126*	*9*	*4*	*0*	*1257*	*90*	*1398*
East Midlands	*47*	*7*	*1*	*0*	*651*	*92*	*706*
East of England	*0*	*0*	*5*	*0*	*1129*	*99*	*1143*
London	*11*	*1*	*21*	*2*	*980*	*95*	*1028*
South East Coast	*16*	*2*	*32*	*4*	*865*	*95*	*914*
South Central	*1*	*0*	*13*	*2*	*801*	*98*	*815*
South West	*47*	*5*	*15*	*2*	*881*	*93*	*943*
West Midlands	*1*	*0*	*16*	*2*	*906*	*98*	*927*
North West	*10*	*1*	*13*	*1*	*950*	*97*	*977*
Wales	*6*	*2*	*0*	*0*	*285*	*97*	*294*
United Kingdom	*265*	*3*	*120*	*1*	*8705*	*95*	*9145*

For the 2005/06 cohort, 438 (3%) of the 15,386 submitted UK cases were excluded from the analysis. These included 324 cases that were not first primary breast cancers, 112 (<1%) cases that were not registered and 2 cases with unknown invasive status. 15,386 cases were eligible for analysis after exclusion.

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 for the two cohorts.

Up to 31 March 2011, deaths were recorded for 45% (3,223) of the 7,102 women with invasive breast cancer in the 1990/91 cohort. 40% of the deaths were recorded as being due to breast cancer, 16% were due to another type of cancer and 31% were due to non-cancer related causes. Death cause was unknown for 419 women (13%). There were variations in the proportions of women with invasive cancer recorded as dying from each cause of death in each region (Table 142); with the proportion of breast cancer deaths varying from 22% in South West to 48% in South East Coast and West Midlands.

Table 144 shows that there were 54 deaths (27%) recorded amongst the 201 women with micro-invasive breast cancer detected by screening in 1990/91. Eight were from breast cancer, 7 from another cancer and 23 were non-cancer deaths. Of the 439 deaths (31%) in the 1,402 women with non-invasive breast cancer, 108 (25%) were recorded as being due to breast cancer, 107 (24%) were from a cancer other than breast cancer and 161 (37%) were non-cancer deaths (Table 146). The proportion of patients with non-invasive breast cancer recorded as having died from breast cancer varied from 34% in London to 18% in West Midlands.

For 2005/06 cohort, deaths were recorded for 7% of women with invasive breast cancer, 7% of women with micro-invasive breast cancer and 3% of women with non-invasive breast cancer. 49% of the 898 deaths in women who had invasive cancers were due to breast cancer, 23% were due to

other cancers and 24% were due to non-cancer related causes (Table 143). For women with non-invasive breast cancer, 21 (20%) of the 106 deaths were due to breast cancer, 34 (32%) were due to other cancers and 45 (45%) were due to non-cancer related causes (Table 147).

9.4 Regional Variation in 20-year and 5-year Relative Survival Rates

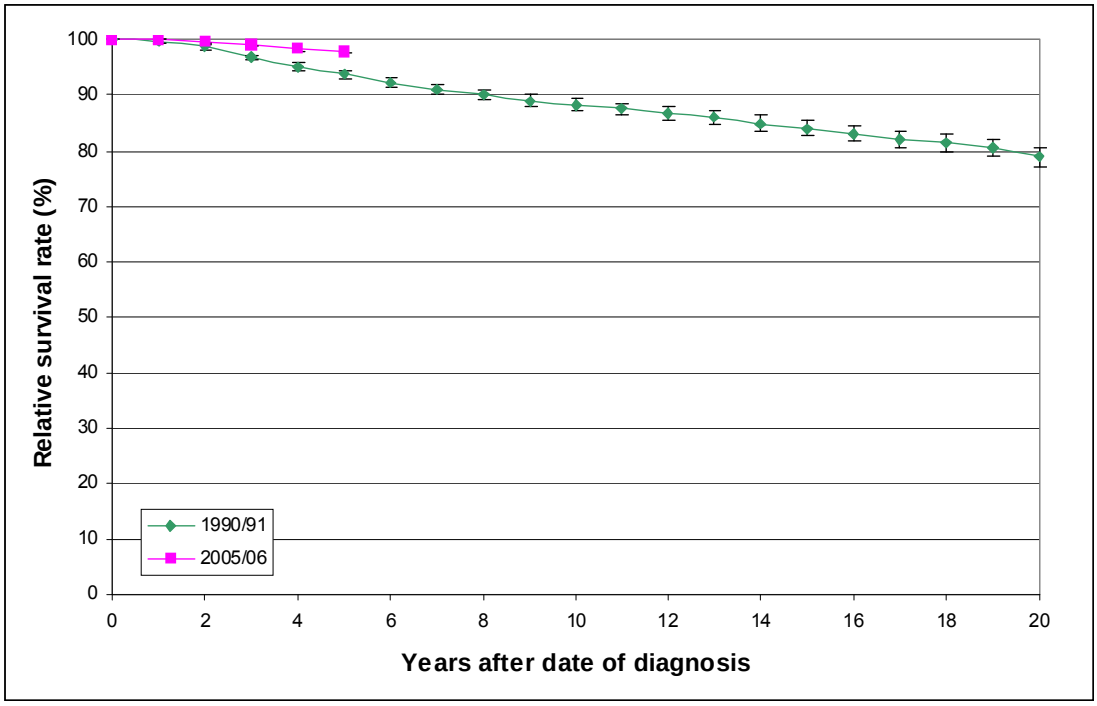

Figure 82: Relative survival of women with invasive breast cancer screened in 1990/91 and 2005/06

For women with invasive breast cancer diagnosed by screening, the 20-year relative survival rate is 78.9%. Figure 82 shows that the relative survival rate decreases at a constant rate over the 20-year period studied. This implies the relative risk of death after having a breast cancer is constant in the 20 follow-up years. Relative survival rates 2, 3, 4 and 5 years after diagnosis are significantly better for women in the 2005/06 cohort than for those in the 1990/91 cohort.

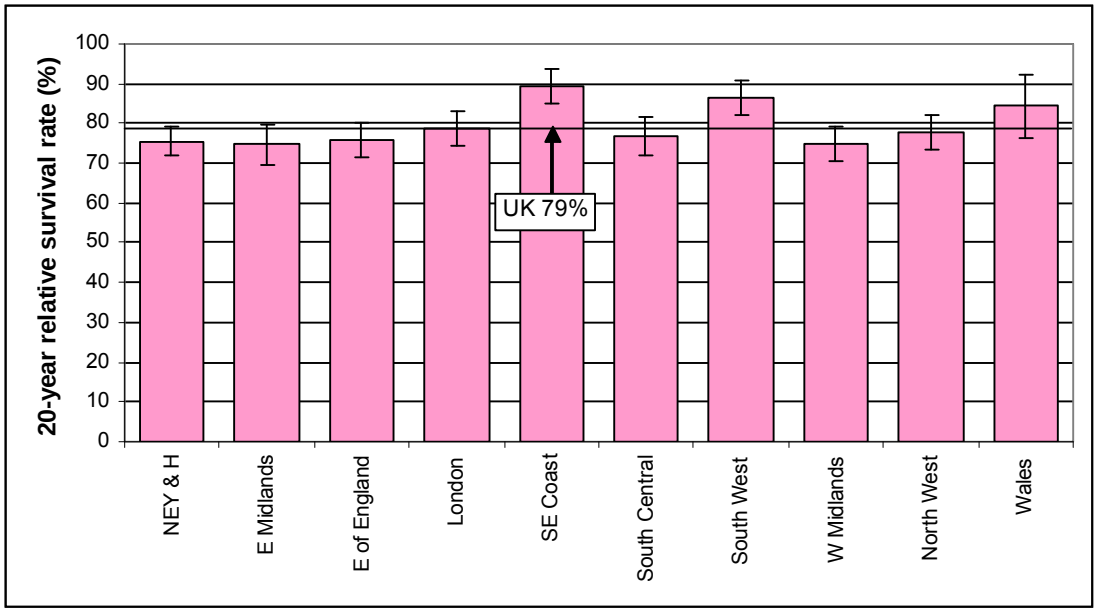

Figure 83 (Table 148): Regional variation in 20-year relative survival for women with invasive breast cancer screened in 1990/91

Figure 83 shows the variation between UK regions in 20-year relative survival rates for women diagnosed with invasive breast cancer who were screened in 1990/91. Women with screen-detected invasive breast cancer diagnosed in South East Coast and South West have statistically significantly higher 20-year relative survival rates (89.4% and 86.7% respectively) compared to the 20-year relative survival rate for all women diagnosed with screen-detected invasive breast cancer in England and Wales (78.9%).

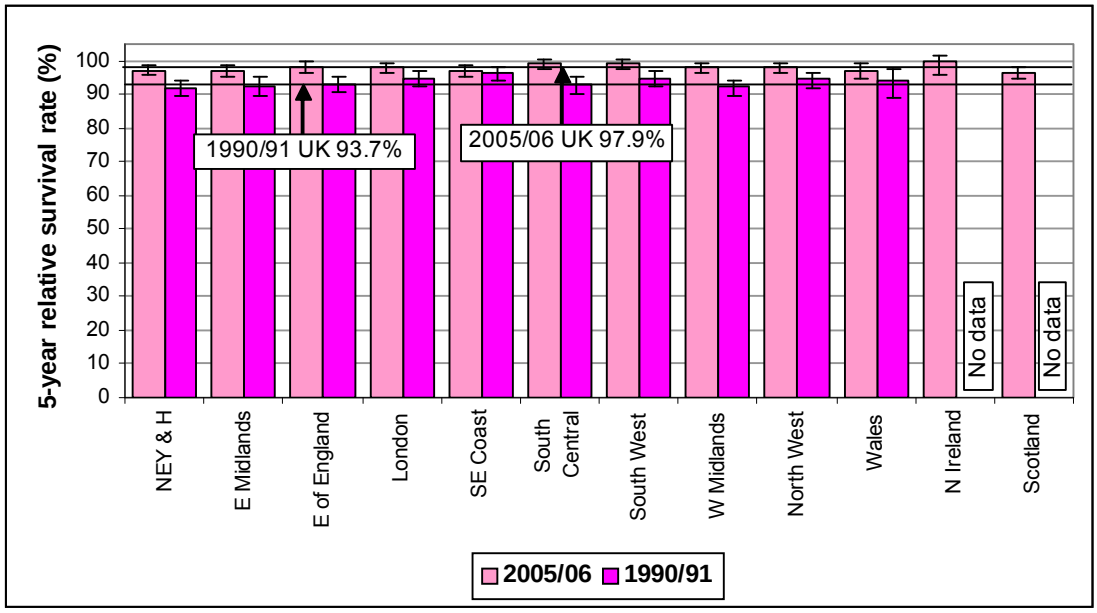

Figure 84 (Table 148 and Table 149): 5-year relative survival rates for women with invasive breast cancer who were screened in 1990/91 and 2005/06

Figure 84 shows that, in all but three regions (London, South East Coast and Wales), 5-year relative survival rates in the two cohorts of women with invasive screen-detected breast cancer are statistically significantly different. This indicates that there was an improvement in 5-year relative survival in most regions between 1990/91 and 2005/06. For the 2005/06 cohort, the 5-year relative survival rate in South West (99.4%) is again significantly higher than the UK average of 97.9% (Table 149). Women with invasive breast cancer in Scotland who were screened in 2005/06 have the lowest 5-year relative survival rate (96.5%) of the UK regions. However, if the differences in underlying mortality rates in the different countries are taken into account and adjusted relative survival rates are calculated (Table 149), the 5-year relative survival rate in Scotland is no longer the lowest in the UK (97.7% compared to UK average of 97.9). 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 97.9% for those screened in 2005/06. This increase is statistically significant.

11 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)*

9.5 Variation in 20-year and 5-year Relative Survival with Tumour Characteristics

The following table shows the characteristics of the 8,705 screen-detected breast cancers in the 1990/91 cohort compared with the 15,386 screen-detected breast cancers in the 2005/06 cohort. In the 1990/91 survival cohort, 18% of breast cancers were non/micro-invasive compared with 21% in the 2005/06 cohort and 94% of invasive breast cancers were diagnosed in women aged 50-64 years, compared to 66% in the 2005/06 cohort when the first age expansion to 70 years had occurred.

In the 1990/91 survival cohort, 54% of the invasive breast cancers had incomplete invasive size, grade and/or nodal status data (3% in the 2005/06 cohort). 72% were less than or equal to 20mm in diameter (78% in the 2005/06 cohort), 55% were Grade 1 or Grade 2 (79% in the 2005/06 cohort) but 28% had unknown grade (1% in the 2005/06 cohort), 33% were node negative (75% in the 2005/06 cohort) but 51% had unknown nodal status (3% in the 2005/06 cohort), 19% were in the Excellent (EPG) and Good (GPG) Prognostic Groups (58% in the 2005/06 cohort) and only 3% in the Poor Prognostic Group (PPG) (6% in the 2005/06 cohort) but 66% had unknown NPI group (4% in the 2005/06 cohort).

Parameter		Cancers included in each analysis group 1990/91		Cancers included in each analysis group 2005/06	
		Number	%	Number	%
Invasive status	Invasive	7,102	82	12,181	79
	Non-invasive	1,402	16	3,073	20
	Micro-invasive	201	2	132	1
	Total	**8,705**	**100**	**15,386**	**100**
Age group (invasive cancers only)	<50	54	1	127	1
	50-52	876	12	1,374	11
	53-55	1,031	15	1,257	10
	56-58	1,337	19	1,738	14
	59-61	1,666	23	1,878	15
	62-64	1,730	24	1,710	14
	65+	408	6	4,097	34
	Total	**7,102**	**100**	**12,181**	**100**
Invasive cancer size	<15mm	3,114	44	6,528	54
	15-≤20mm	2,019	28	2,972	24
	>20-≤35mm	1,102	16	2,055	17
	>35-≤50mm	176	2	358	3
	>50mm	92	1	150	1
	Unknown	599	8	118	1
	Total	**7,102**	**100**	**12,181**	**100**
Invasive grade	Grade 1	1,670	24	3,510	29
	Grade 2	2,207	31	6,127	50
	Grade 3	836	12	2,372	19
	Not assessable	380	5	80	1
	Unknown	2,009	28	92	1
	Total	**7,102**	**100**	**12,181**	**100**
Nodal status (invasive cancers only)	Negative	2,376	33	9,165	75
	Positive	1,117	16	2,683	22
	Unknown	3,609	51	333	3
	Total	**7,102**	**100**	**12,181**	**100**
NPI group (invasive cancers only)	EPG	548	8	2,729	22
	GPG	759	11	4,298	35
	MPG1	595	8	2,706	22
	MPG2	299	4	1,252	10
	PPG	180	3	721	6
	Unknown	4721	66	475	4
	Total	**7,102**	**100**	**12,181**	**100**

9.5.1 Variation in Relative Survival with Invasive Status

The overall 20-year relative survival rate for women with breast cancer screened in 1990/91 is 82.4%. For women with invasive breast cancer, the 20-year relative survival rate is 78.9%, and for those with non-invasive breast cancer it is 97.2%. The data for women with micro-invasive breast cancers have very wide confidence intervals due to the very small numbers.

	5 year	*10 year*	*15 year*	*20 year*
Invasive	*93.7 (92.9,94.4)*	*88.3 (87.2,89.4)*	*84.0 (82.7,85.4)*	*78.9 (77.2,80.6)*
Micro-invasive	*99.8 (95.6,102.0)*	*99.1 (93.3,103.1)*	*100.2 (92.8,105.8)*	*102.0 (92.5,109.9)*
Non-invasive	*99.9 (98.6,100.9)*	*98.8 (96.8,100.6)*	*96.9 (94.2,99.5)*	*97.2 (93.6,100.6)*
Overall	***94.8 (94.1,95.4)***	***90.3 (89.3,91.2)***	***86.5 (85.3,87.7)***	***82.4 (80.9,84.0)***

9.5.2 Variation in Relative Survival with Age for Invasive Breast Cancers

Figure 85 shows the variation with age at diagnosis in the 5-year relative survival rates for invasive breast cancers included in the 2005/06 survival cohort, and 5-year, 10-year, 15-year and 20-year relative survival rates for invasive breast cancers included in the 1990/91 cohort. 5-year relative survival rates for women aged 50-52, 53-55 and 56-58 years in 2005/06 survival cohort are statistically significantly higher than the 5-year relative survival rates for women in the equivalent age groups in the 1990/91 cohort.

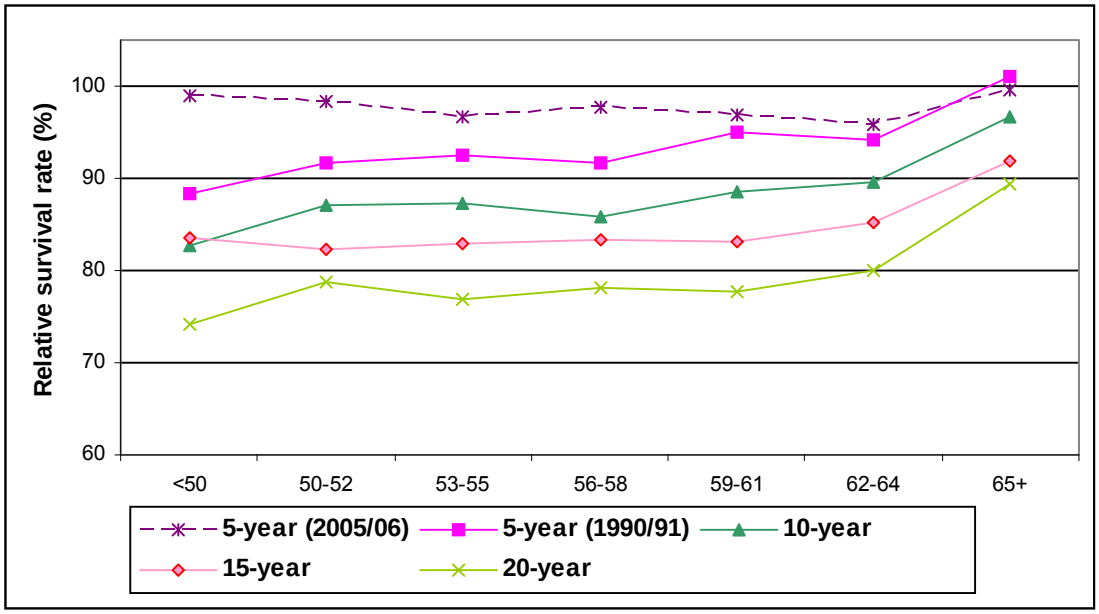

Figure 85 (Table 150 and 151): Variation in relative survival with age at diagnosis for women with invasive breast cancer who were screened in 1990/91 and 2005/06

The comparatively high relative survival of women aged 65 years and over, is similar to that seen in previous audits for invasive cancers diagnosed via screening and may be due to a number of factors. Firstly, it is possible that routine follow-up appointments result in the earlier identification of other health problems in women diagnosed with early stage breast cancer than in women of the same age in the general population. Secondly, women aged above the screening age range (65 years and older in 1990/91 and 71 years and older in 2005/06) 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

In the 1990/91 cohort, the 20-year relative survival rate for women with a small invasive breast cancer (<15mm) is 87.3% (Table 152). For those with a large invasive breast cancer (>50mm), the 20-year relative survival rate is 55.4%. 20-year survival rate for women with a Grade 1 invasive breast cancer is 88.2%, compared to 63.2% for those with a Grade 3 invasive breast cancer (Table 154). Women

with positive nodal status have a 20-year survival rate of 57.9%, compared to 85.7% for those with negative nodal status (Table 156).

Figure 86 shows how the 5-year relative survival rates for women with an invasive breast cancer screened in 1990/91 and 2005/06 vary with tumour characteristics. The major differences between the two cohorts are found in women with cancers with a poor prognosis. For example, the 1990/91 cohort the women with a positive nodal status have a 5-year relative survival rate of 80.7% compared to 92.5% in 2005/06 cohort. Similarly, women with Grade 3 invasive breast cancers in the 1990/91 cohort have a 5-year relative survival rate of 80.1% compared to 90.2% in 2005/06 cohort.

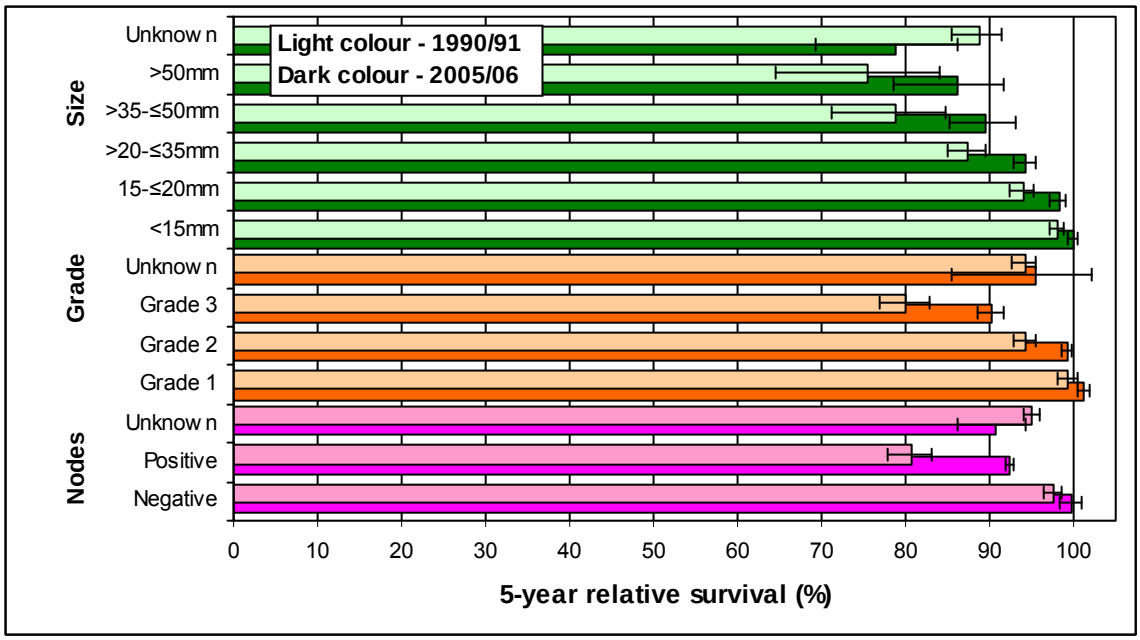

Figure 86 (Tables 152 to 157): Variation in 5-year relative survival rates with invasive tumour size, invasive grade and nodal status for women with invasive breast cancer who were screened in 1990/91 and 2005/06

9.5.4 Variation in Relative Survival of Invasive Cancers with NPI Group

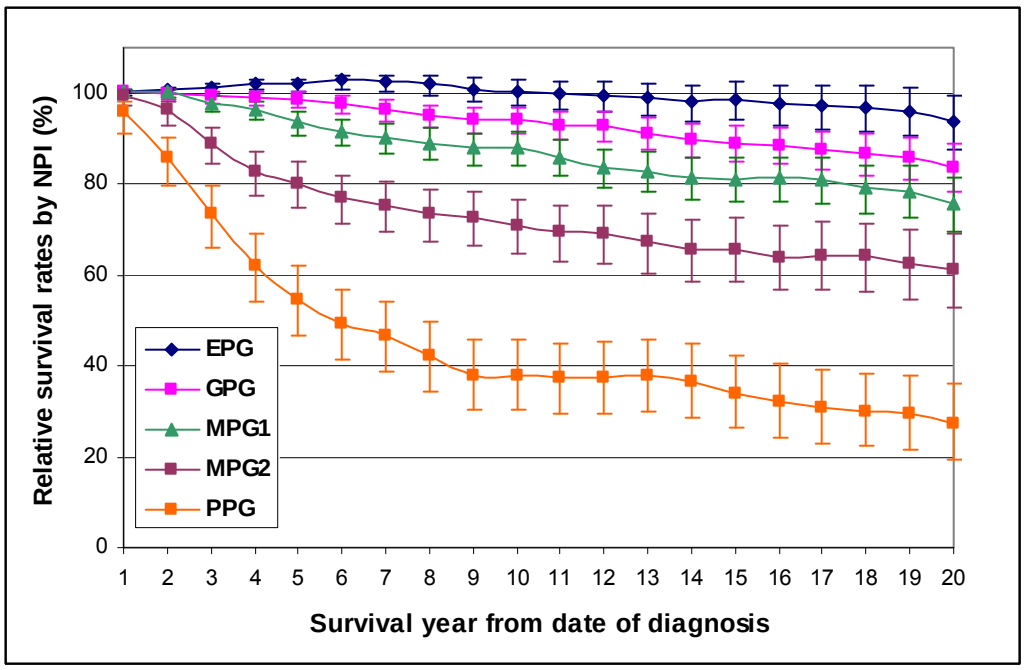

Figure 87: Variation in relative survival rates with NPI group for invasive breast cancers diagnosed in women who were screened in 1990/91

The 20-year relative survival rates for women with cancers in the Excellent Prognostic Group (EPG), Good Prognostic Group (GPG) and Moderate Prognostic Group 1 (MPG1) in 1990/91 cohort are

93.8%, 83.7% and 75.7% respectively (Table 158 and Figure 87). At 61%, the 20-year relative survival rate for the 4% of women with cancers in the Moderate Prognostic Group 2 (MPG2) is significantly worse than that of women with cancers in the EPG, GPG and MPG1 groups. The 5-year relative survival rate for the 3% of women with cancers in the Poor Prognostic Group (PPG) is even lower at 27.1%, and is significantly worse than that for all of the other prognostic groups.

Figure 88 shows how 5-year relative survival rates for diagnosed with invasive breast cancer who were screened in 1990/91 and 2005/06 vary with NPI score at diagnosis. These data should be interpreted with some caution as only 4% of the 2005/06 cases have an unknown NPI compared with 66% of the 1990/91 cases. This is mainly due to missing nodal status data; in part because nodes were not routinely assessed in 1990/91 (51% had unknown nodal status). Comparing the tumour characteristics between the two cohorts, a slightly higher proportion of women in the 1990/91 cohort had worse prognosis cancers.

PROPORTION OF PATIENTS IN EACH NPI GROUP (EXCLUDED UNKNOWNS)		
	1990/91	***2005/06***
EPG	*23%*	*23%*
GPG	*32%*	*37%*
MPG1	*25%*	*23%*
MPG2	*13%*	*11%*
PPG	*8%*	*6%*

Figure 9.10 shows that there has been no significant change in the 5-year relative survival rate for women with EPG cancers in the 15 years between 1990/91 and 2005/06; the main reason for the good survival of these cancers being their early stage at diagnosis. There are, however, marked and statistically significant increases in the 5-year relative survival rates for GPG (2% increase), MPG1 (4% increase), MPG2 (13% increase) and PPG (24% increase) cancers between the two cohorts. These improvements in survival, particularly the 24% increase in the PPG cancers are almost certainly due to the development and use of new adjuvant treatments.

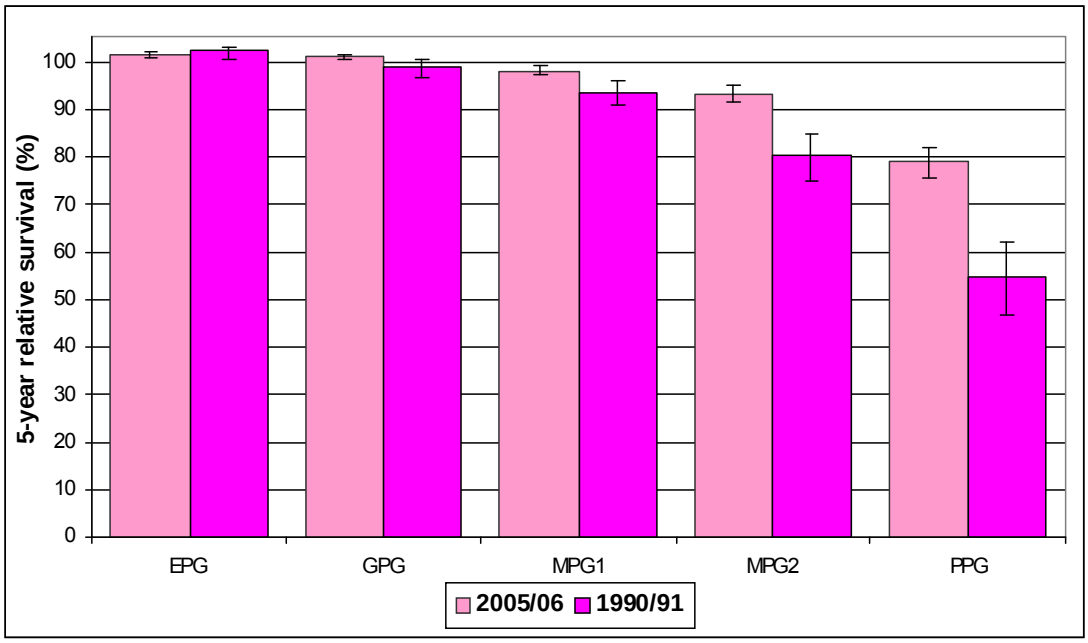

Figure 88 (Table 158 and 159): Variation in 5-year relative survival rates with NPI group for women with invasive breast cancer who were screened in 1990/91 and 2005/06

Figure 89 shows how the relative survival of women with PPG cancers varies with time from diagnosis in the 1990/91 and 2005/06 cohorts. The marked improvement in 5-year relative survival seen in the more recent cohort, suggests that the longer term survival of this group of women with poor prognostic cancers will also be better.

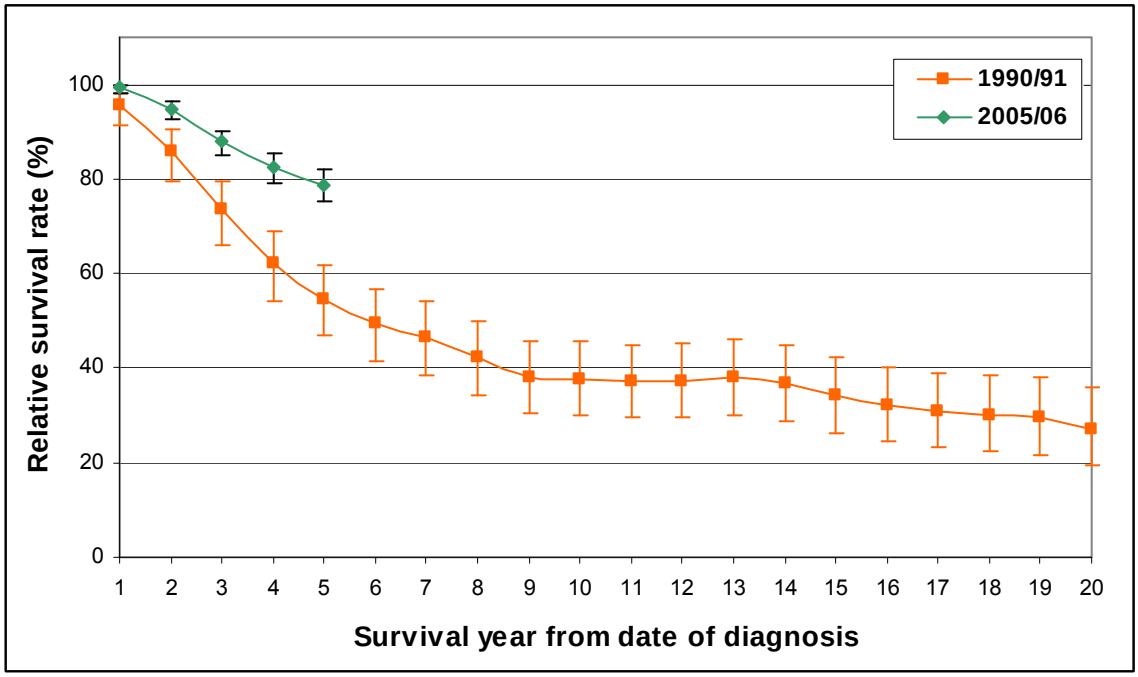

Figure 89: Relative survival rates for invasive cancers in the poor prognostic group for women who were screened in 1990/91 and 2005/06

KEY FINDINGS:

- Of the 8,705 cancers submitted to the survival analysis for the period 1 January 1990 to 31 December 1991, 265 were excluded because they were not registered at the cancer registries. A further 120 cancers were excluded because they were not confirmed to be primary tumours and 55 because their invasive status was not known. For the 15,386 cases in the 2005/06 cohort, 324 cases were not first primary breast cancers, 112 cases were not registered and 2 cases with unknown invasive status.
- The 20-year relative survival for women with screen-detected invasive breast cancer who were screened in 1990/91 is 78.9%. Women with screen-detected invasive breast cancer South East Coast and South West have statistically significantly higher 20-year relative survival rates.
- 5-year relative survival for women with screen-detected invasive breast cancer has improved significantly from 93.7% for women screened in 1990/91 to 97.9% for women screened in 2005/06.
- The 20-year relative survival of women with less than 15mm diameter invasive breast cancers is 87.3% compared with a 20-year relative survival rate of 55.4% for women with tumours with a diameter greater than 50mm.
- The 20-year survival rate for women with a Grade 1 invasive breast cancer is 88.2%, compared to 63.2% for those with a Grade 3 invasive breast cancer.
- Women with positive nodal status have a 20-year survival rate of 57.9%, compared to 85.7% for those with negative nodal status.
- The 20-year relative survival rates for women with cancers in the Excellent Prognostic Group (EPG), Good Prognostic Group (GPG) and Moderate Prognostic Group 1 (MPG1) in 1990/91 cohort are 93.8%, 83.7% and 75.7% respectively.
- At 61%, the 20-year relative survival rate for the 4% of women with cancers in the Moderate Prognostic Group 2 (MPG2) is significantly worse than that of women with cancers in the EPG, GPG and MPG1 groups.
- The 5-year relative survival rates for the 3% of women with cancers in the Poor Prognostic Group (PPG) is even lower at 27.1%,
- There are marked and statistically significant increases in the 5-year relative survival rates for GPG (2%), MPG1 (4%), MPG2 (13%) and PPG (24%) cancers between 1990/91 and 2005/06. These improvements in survival, particularly the 24% increase in the PPG cancers, are almost certainly due to the development and use of new adjuvant treatments.

APPENDIX A: TIMETABLE OF EVENTS

NHSBSP and ABS AUDIT OF SCREEN-DETECTED BREAST CANCERS FOR THE YEAR OF SCREENING 1 APRIL 2010 - 31 MARCH 2011

AUDIT TIMETABLE	
Date	**Event**
17 May 2011	Audit group meet to plan the 2010/11 audit.
8 June 2011	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.
9 – 16 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 17 June.
30 June 2011	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 2010/11.
29 July 2011	Suggested deadline for QARCs to request survival audit data from Cancer Registries.
26 August	Suggested deadline for Cancer Registries to provide data to the QARCs for the survival audit.
20 Sept 2011	Deadline for follow-up report to Julietta Patnick and Neil Rothnie
21 Sept 2011	**Deadline for receipt of survival data from QARCs at the WMCIU.**
22 – 30 Sept 2011	All QARCs to ensure that an appropriate member of staff is available to respond to any queries from the WMCIU regarding the survival audit.
26 Sept 2011	Data Quality day for training QARC staff
11 Nov 2011	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.*
14 Nov 11– 8 Jan 12	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.
9 Jan 2012	**Deadline for receipt of main and adjuvant audit data from QARCs at the West Midlands QA Reference Centre.**
10 – 20 Jan 2012	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.
3 Feb 2012	First draft audit booklet emailed to Audit group for comments
23 Feb 2012	Audit booklet tables (first draft) emailed QA Reference Centres for information.
16 April 2012	Deadline for receipt of the audit booklet at the printers.
21 – 22 May 2012	2012 ABS conference (Bournemouth)
22 May 2012	Wash-up meeting (Bournemouth)

APPENDIX B: BREAST AUDIT QUESTIONNAIRE WITH GUIDANCE NOTES

NHSBSP & ABS AUDIT OF WOMEN WITH SCREEN-DETECTED BREAST CANCERS DETECTED FOLLOWING INVITATION BETWEEN 1 APRIL 2010 AND 31 MARCH 2011

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

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 will be available in Excel format on the NBSS website. The 20 smallest screening units according to the number of women screened will be highlighted.

Each surgeon should be identified by their GMC code in order to audit screening caseload accurately. Only the consultant surgeon's GMC code should be inputted for each case. 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 9 January 2012

****

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 2010/11. 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. The number of visits to an assessment clinic (excluding results clinics) in order to undergo core biopsy or cytology procedures should be recorded.

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, PgR and HER2 status are now recorded in the main audit. 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 surgery 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:
Invasive status of the surgical specimen*:* the worst invasive status diagnosed at surgery.
Final invasive status*:* this takes into account the non-operative diagnosis 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 info 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: To each cancer in Part A assign the GMC code of the consultant surgeon. 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. If the woman was under the care of more than one consultant surgeon for her diagnostic and therapeutic surgery, enter GMC codes for each of the surgeons in Part A (separated by semicolons) and count the woman in the caseload for each surgeon in the surgical caseload audit. By assigning a GMC code to each cancer in Part A, each consultant surgeon can be credited with their total UK NHSBSP screening caseload.

Reasons for low caseload: An explanation is required for surgeons who have screening caseload <10 in 2010/11. 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.

Sentinel lymph nodes:
You are required to input the specific type of sentinel node biopsy procedure should be inputted for each case. This information is included in the main crystal report. You should only record the type of procedure for the first axillary operation.

Example 1: A patient had C at the 1st operation, then C+AX at the 2nd operation. Her first axillary operation is a sentinel biopsy with blue dye only. For this case, the sentinel procedure type should be 'SD'

Example 2: A patient had C+AX at the 1st operation, then M+AX at the 2nd operation. Her first axillary operation is a sentinel biopsy with isotope only and 2nd axillary is a level 1 clearance. For this case, the Sentinel procedure type should be 'SI'.

Sentinel procedure type *(SD,SI,SX,SB,AY,O,NL,U):*
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,
O=Other axillary procedures
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. If the closest margin is not the radial margin, the data on NBSS should be updated to 'not involved'. If the closest margin is the radial margin and it 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 radial 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 or has a benign outcome, the margins should be recorded as 'A' and 'B' respectively. The previous margin and margin distance should be recorded for any further axillary only operations. Excision margins should be recorded as 'not involved for any further operation with a benign outcome.

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 'N' in the Excision margin field and 5 in the Margin distance field.

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 2010/11

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 - GMC Code (enter GMC code of the consultant surgeon or NoRef=No consultant surgeon. If the woman was treated by more than one consultant surgeon enter the consultant who the woman assigned to for first operation. Cases with no surgery (NS) still usually are assigned to a consultant surgeon.

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

{C}	*{H}*	*{I}*	*{J}*	*{K}*	*{L}*	*{M}*	*{N}*	**1st Assessment Visit**		**2nd Assessment Visit**	
Sx Number	**Consultant surgeon GMC Code** *(No shared cases) (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)*	*{O}* **Worst cytology** *(C5,C4,C3, C2,C1 or NONE)*	*{P}* **Worst core biopsy** *(B5A,B5B, B5C,B4,B3, B2,B1 or NONE)*	*{Q}* **Worst cytology** *(C5,C4,C3,C2,C 1 or NONE)*	*{R}* **Worst core biopsy** *(B5A,B5B, B5C,B4,B3, B2,B1 or NONE)*

Col. W - 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. Y – Worst lymph node biopsy result takes into account the cytology and core biopsy results. If a patient has a C5 and B5 the record the core biopsy result.

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

Col. AC - 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. AD - Immediate Reconstruction - to be completed by the surgeon for mastectomies only. Enter X if type of treatment not M.
Col. AE - 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. AF - Invasive status of the cancer; taking into account the non-operative diagnosis, surgery and MDT decisions.

{C} **Sx Number**	*{AC}* **Type of surgical Treatment** *(C,M,NS,U)*	*{AD}* **Immediate reconstruction** *(only for M =Mastectomy) (Y,N,U,X)*	*{AE}* **Invasive status of the surgical specimen** *(I,M,N,B,U)*	*{AF}* **Final Invasive status** *(I,M,N,U)*	*{AG}* **LCIS only** *(Y/N)*	*{AH}* **ER status** *(P,N,U)*	*{AI}* **PgR status** *(P,N,U)*	*{AJ}* **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**	*{AK}* **First surgery date** *(diag or therapeutic)* *(dd/mm/yyyy,NS,U)*	*{AL}* **Final surgery date** *(excl reconstruction only)* *(dd/mm/yyyy,NS,U)*	*{AM}* **First operation type** *(diag or therapeutic)* *(C,M,AX, C+AX,M+AX, NS,U)*	*{AN}* **Second operation type** *(C,M,AX, C+AX,M+AX, NS,U)*	*{AO}* **Third operation type** *(C,M,AX, C+AX,M+AX, NS,U)*	*{AP}* **Fourth operation type** *(C,M,AX, C+AX,M+AX, NS,U)*	*{AQ}* **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.

Sentinel procedure type *(SD,SI,SX,SB,AY,O,NL,U): 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, O=Other axillary procedures, NL= No axillary treatment, U=No info about axillary assessment*

{C}	**1st operation (diagnostic or therapeutic)**			**2nd operation**			**3rd operation**			**4th operation**			**5th operation**			*{BG}*
Sx Number	*{AR}* **Total nodes obtained** *(NS,U, 0,1,2,..)*	*{AS}* **Number nodes positive** *(NS,U, 0,1,2,..)*	*{AT}* **Single node type (1 positive node only)** *(NS,X,U, MIM,MET, ITC)*	*{AU}* **Total nodes obtained** *(NS,U, 0,1,2,..)*	*{AV}* **Number nodes positive** *(NS,U, 0,1,2,..)*	*{AW}* **Single node type (1 positive node only)** *(NS,X,U, MIM,MET, ITC)*	*{AX}* **Total nodes obtained** *(NS,U, 0,1,2,..)*	*{AY}* **Number nodes positive** *(NS,U, 0,1,2,..)*	*{AZ}* **Single node type (1 positive node only)** *(NS,X,U, MIM,MET, ITC)*	*{BA}* **Total nodes obtained** *(NS,U, 0,1,2,..)*	*{BB}* **Number nodes positive** *(NS,U, 0,1,2,..)*	*{BC}* **Single node type (1 positive node only)** *(NS,X,U, MIM,MET, ITC)*	*{BD}* **Total nodes obtained** *(NS,U, 0,1,2,..)*	*{BE}* **Number nodes positive** *(NS,U, 0,1,2,..)*	*{BF}* **Single node type (1 positive node only)** *(NS,X,U, MIM,MET, ITC)*	**Sentinel Procedure Type** *(SD,SI,SX, SB,AY,O,NL ,U)*

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

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

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

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

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

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

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

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

{C} **Sx Number**	*-Non Invasive-* *{BY}* **Cytonuclear grade** *(H,I,L,NA,U)*	*{BZ}* **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 GMC code appears in Part A.
In rare cases where there is no surgeon, the GMC code for the case should be coded as "NoRef" in Part A, and counted on the top line.
Cases treated by more than one surgeon should be counted in each surgeon's Shared Cases field. For example if Surgeon A & B shared 1 case, input '1' in both fields of Surgeon A and B.
If the surgeon is from outside region, please input Y in Surgeon from other region field and provide region name in Other reason field

GMC Code	Screening caseload (from Part A)	Shared Cases	If caseload <10 was this because: (write Y in the first applicable reason)							
			Other breast caseload > 30 per year	Joined NHSBSP 2010/11	Left NHSBSP 2010/11	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 2009 AND 31 MARCH 2010

PLEASE SUPPLY DATA FOR WOMEN OF ALL AGES WITH SCREEN-DETECTED BREAST CANCER WITH FIRST OFFERED SCREENING APPOINTMENT FROM 1 APRIL 2009 TO 31 MARCH 2010 INCLUSIVE ACCORDING TO THE REGIONAL BOUNDARIES EXTANT FROM 1 APRIL 2011

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 9 January 2012

DEFINITIONS AND GUIDANCE NOTES

Audit cut-off date: If a woman has not received radiotherapy or chemotherapy or hormonal therapy before 31 March 2011 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 2009/10 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 2009 to 31 March 2010. 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.

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 2009 TO 31 MARCH 2010 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 2009 TO 31 MARCH 2010 INCLUSIVE

	To aid data collection by the consultant surgeon. Do <u>not</u> send to West Midlands QA Reference Centre			*Data from 2009/10 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)*

ADJUVANT THERAPY AUDIT - TO BE COMPLETED FOR ALL CANCERS WITH DATE OF FIRST OFFERED APPOINTMENT FROM 1 APRIL 2009 TO 31 MARCH 2010 INCLUSIVE

Enter dates in dd/mm/yyyy format (e.g. 01/04/2008) or U=Unknown, NS=No surgery, NRT=No radiotherapy,
Chemotherapy & Endocrine therapy: Y = therapy given before 31/03/10, N = No therapy given before 31/03/10, 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 +)
Previous cancer? : Y if the patient has a previous cancer affecting adjuvant treatment decisions (eg. already on CT for another cancer)

	See above for coding – to be completed according to local definitions							
{D} **Sx Number**	*{S}* **RT Start Date** (dd/mm/yyyy, Y-Date unknown NRT,U)	*{T}* **CT (e.g. Herceptin)** (Y,N,U)	*{U}* **ET (eg. Tamoxifen)** *(Y,N,U)*	*{V}* **ER Status** *(P,N,U)*	*{W}* **PgR Status** *(P,N,U)*	*{X}* **Cerb-B2/ HER-2** *(P,N,B,U)*	*{Y}* **Previous Cancer?** *(Y)*	*{Z}* **Notes**

I confirm the data above are correct and as complete as possible	**Signature (Surgeon):** **Print Name:** **Date:**

APPENDIX D: SURVIVAL AUDIT DATA COLLECTION SHEET WITH GUIDANCE NOTES

NHSBSP & ABS SURVIVAL AUDIT FOR WOMEN WITH SCREEN-DETECTED BREAST CANCER DETECTED BETWEEN 1 JANUARY 1990 AND 31 DECEMBER 1991 (20 YEAR SURVIVAL) & BETWEEN 1 APRIL 2005 AND 31 MARCH 2006 (5 YEAR SURVIVAL)

The completed spreadsheets should be submitted by the Breast Screening QA Reference Centre to the West Midlands QA Reference Centre by 21 September 2011.

Aim:

To combine data recorded by regional cancer registries with NHS Breast Screening Programme (NHSBSP) data, recorded from 1 January 1990 to 31 December 1991 and from 1 April 2005 to 31 March 2006, for women with breast cancers detected by screening to enable post-diagnosis analysis of breast cancer in two separate survival studies for periods of up to 20 years and five years respectively. 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 January 1990 and 31 December 1991 should be included in the audit for the 20 year survival study.

Previously submitted core patient and tumour data will be sent to QARCs via nhs.net account

All women with breast cancers detected by the NHSBSP and screened between 1 April 2005 and 31 March 2006 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 2011. 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 both the 20 year and 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 2005 and 31 March 2006, 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 January 1990 to 31 December 1991 and from 1 April 2005 to 31 March 2006 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 1990 for the 20 year survival study or 2005 for the five year survival study, 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 January 1990 to 31 December 1991 and from 1 April 2005 to 31 March 2006.

• 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 following data item is required from the cancer registry for all breast cancers detected following screening between 1 January 1990 and 31 December 1991.

- Cause of death — B (Breast Cancer), C (Other Cancer), O (Other cause of death), U (Unknown) – Please refer to Page 9 for guide on cause of death coding

The censor date for the survival audit has been set at **31 March 2011**. The cancer registry should confirm to the QA reference centre that death data are complete to **31 March 2011**, 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 CASES DETECTED IN 1990/91

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 CASES DETECTED IN 1990/91

Region:
Screening Unit:
Cancer Registry: **Data complete to: 31/03/2011**

{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)	{X} **Cause of Death** (B,C,O,U)

SURVIVAL AUDIT: SCREENING OFFICE DATA FOR CASES DETECTED IN 2005/06

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 CASES DETECTED IN 2005/06

Region:
Screening Unit:
Cancer Registry: **Data complete to: 31/03/2011**

{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 1990 for the 20 year survival study or 2005 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.

Cause of Death Coding

Clarification of the rules for coding the cause of death from death certificates for all breast cancers detected following screening between 1 January 1990 and 31 December 1991.

B = death by breast cancer
Breast cancer appears in any section of part 1 of the death certificate (1a, 1b or 1c). There are certain exceptions to this rule (see below).

C = death by other cancer (not breast cancer)
One, or more, cancers of any site other than breast appear in any section of part 1 of the death certificate (1a, 1b or 1c). Breast cancer may appear in part 2 or not appear on the death certificate at all. There are certain exceptions to this rule (see below).

N = death by non-cancer cause
A non-cancer cause appears in any section of part 1 of the death certificate (1a, 1b or 1c). Breast cancer may appear in part 2 or not appear on the death certificate at all. There are certain exceptions to this rule (see below).

U = death by unknown cause
Two, or more, distinct cancers, one of which is breast cancer, appear in any section of part 1 of the death certificate (1a, 1b or 1c). i.e. cause of death is multiple independent primary sites so a single site cannot be assigned as the cause of death. If **two distinct breast cancers appear in any section of part 1 of the death certificate** (1a, 1b or 1c) record as B = death by breast cancer, as the breast cancer with the worst prognosis is the one used for the audit of screen detected breast cancer. There are several exceptions to this rule (see below).

X = death cause not collected

Exceptions covered by ICD-10 rules and guidelines for mortality and morbidity coding

B and C – If, in part 1 of the death certificate, all the sites are qualified as metastatic or appear on the list of common sites of metastases (see list below) and breast cancer is mentioned in part 2, and is not qualified as metastatic, then this should be recorded as B – death by breast cancer. The sites must all have the same morphology for this to be true. i.e. all carcinomas not a mixture of sarcoma and carcinoma or transitional cell carcinoma and breast cancer.

e.g. 1 (a) Metastatic carcinoma of stomach
(b) Metastatic carcinoma of lung
2 Carcinoma of breast
= B – death by breast cancer (because both stomach and lung are designated as metastases)

e.g. 1(a) Carcinoma of lung
(b) Carcinoma of liver
2 Carcinoma of breast
= B – death by breast cancer (because liver and lung are common sites for metastases)

e.g. 1(a) Peritoneal cancer
2 Breast cancer
= B – death by breast cancer (because peritoneum is a common site for metastases)

B – If breast cancer is not mentioned in part 1 or part 2 of the death certificate but carcinomatosis, or one of the sites which is on the list of common sites for metastases appears and there are no other cancers known of for the patient, then the cause of death should be recorded as
B – death by breast cancer.

e.g 1(a) Carcinomatosis

= B – death by breast cancer (if no other cancer known)

N – If, in part 1 of the death certificate (1a, 1b or 1c), the non-cancer cause of death is a direct consequence of the cancer of the breast (e.g. surgery), then the cause should be recorded as B – death by breast cancer.

e.g. 1(a) mastectomy
2 Breast cancer
= B – death by breast cancer (because the mastectomy was performed for the breast cancer)

U – If, in part 1 of the death certificate (1a, 1b or 1c), all the cancers, other than the breast cancer, are qualified as metastatic or appear on the list of common sites of metastases (see list below), then the cause of death should be recorded as
B – death by breast cancer.

e.g. 1(a) Cancer of breast
(b) Cancer of liver
=B – death by breast cancer (because liver is on the list of common sites for metastases)

e.g. 1(a) Cancer of stomach
(b) Cancer of breast
= U – death by unknown cause (because neither of these are common sites for metastases)

e.g. 1(a) Metastatic carcinoma of breast
(b) Metastatic carcinoma of stomach
(c) Metastatic carcinoma of lung
= U – death by unknown cause (because neither breast nor stomach are common sites for metastases)

List of common sites of metastases for all cancers, including breast cancer

Bone
Brain
Diaphragm
Heart
Liver
Lung (bronchus and bronchogenic cancer is not included with the generic term of lung)
Lymph nodes
Ill defined sites (sites classifiable to C76)
Mediastinum
Meninges
Peritoneum
Pleura
Retroperitoneum
Spinal cord

APPENDIX E: MAIN AUDIT DATA TABLES (1 - 101)

DATA FROM THE 2010/11 AUDIT OF SCREEN-DETECTED BREAST CANCERS IN WOMEN ALL AGES FOR THE PERIOD 1 APRIL 2010 – 31 MARCH 2011

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

Region	Invasive		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.	%				
N East, Yorks & Humber	1770	78	29	1	455	20	3	0	2257	100	294545	1.6	6.0	3.2
East Midlands	989	81	7	1	219	18	0	0	1215	100	161765	1.4	6.1	3.6
East of England	1286	79	23	1	312	19	0	0	1621	100	205955	1.6	6.2	3.2
London	1370	78	21	1	364	21	0	0	1755	100	232570	1.7	5.9	2.6
South East Coast	1147	77	20	1	317	21	1	0	1485	100	185737	1.8	6.2	3.2
South Central	1002	84	11	1	187	16	0	0	1200	100	148149	1.3	6.8	3.1
South West	1271	79	16	1	317	20	1	0	1605	100	204080	1.6	6.2	3.3
West Midlands	1259	80	12	1	312	20	0	0	1583	100	204956	1.6	6.1	3.1
North West	1618	81	15	1	367	18	1	0	2001	100	246609	1.5	6.6	3.2
Wales	836	80	6	1	209	20	0	0	1051	100	108881	2.0	7.7	4.1
Northern Ireland	273	76	5	1	79	22	1	0	358	100	46843	1.8	5.8	3.4
Scotland	1398	82	6	0	303	18	0	0	1707	100	181848	1.7	7.7	4.1
United Kingdom	**14219**	**80**	**171**	**1**	**3441**	**19**	**7**	**0**	**17838**	**100**	**2221938**	**1.6**	**6.4**	**3.3**
Isle of Man	34	87	0	0	5	13	0	0	39	100	4352	1.1	7.8	3.7

Table 2 : Age at first offered screening appointment

Region	<50		50-64		65-70		71-75		76+		Total	>65	
	No.	%	No.	%	No.	%	No.	%	No.	%		No.	%
N East, Yorks & Humber	72	3	1462	65	607	27	78	3	38	2	2257	723	32
East Midlands	54	4	753	62	314	26	59	5	35	3	1215	408	34
East of England	32	2	1021	63	417	26	92	6	59	4	1621	568	35
London	63	4	1147	65	403	23	104	6	38	2	1755	545	31
South East Coast	85	6	869	59	407	27	82	6	42	3	1485	531	36
South Central	27	2	789	66	305	25	46	4	33	3	1200	384	32
South West	43	3	1018	63	426	27	76	5	42	3	1605	544	34
West Midlands	52	3	972	61	448	28	79	5	32	2	1583	559	35
North West	61	3	1225	61	559	28	106	5	50	2	2001	715	36
Wales	26	2	690	66	264	25	45	4	26	2	1051	335	32
Northern Ireland	7	2	240	67	105	29	3	1	3	1	358	111	31
Scotland	0	0	1102	65	460	27	110	6	35	2	1707	605	35
United Kingdom	**522**	**3**	**11288**	**63**	**4715**	**26**	**880**	**5**	**433**	**2**	**17838**	**6028**	**34**
Isle of Man	0	0	33	85	6	15	0	0	0	0	39	**6**	**15**

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	2257	0	0.00
East Midlands	1215	0	0.00
East of England	1621	0	0.00
London	1755	0	0.00
South East Coast	1485	1	0.07
South Central	1200	0	0.00
South West	1605	0	0.00
West Midlands	1583	0	0.00
North West	2001	1	0.05
Wales	1051	0	0.00
Northern Ireland	358	0	0.00
Scotland	1707	0	0.00
United Kingdom	**17838**	**2**	**0.01**

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	2257	13	1	337	15	1844	82	2194	97	63	3
East Midlands	1215	0	0	7	1	1163	96	1170	96	45	4
East of England	1621	1	0	19	1	1520	94	1540	95	81	5
London	1755	2	0	37	2	1653	94	1692	96	63	4
South East Coast	1485	3	0	8	1	1393	94	1404	95	81	5
South Central	1200	4	0	25	2	1110	93	1139	95	61	5
South West	1605	5	0	47	3	1486	93	1538	96	67	4
West Midlands	1583	3	0	7	0	1512	96	1522	96	61	4
North West	2001	11	1	44	2	1873	94	1928	96	73	4
Wales	1051	1	0	3	0	998	95	1002	95	49	5
Northern Ireland	358	6	2	132	37	203	57	341	95	17	5
Scotland	1707	5	0	164	10	1489	87	1658	97	49	3
United Kingdom	**17838**	**54**	**0**	**830**	**5**	**16244**	**91**	**17128**	**96**	**710**	**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	1770	9	1	304	17	1448	82	1761	99	9	1
East Midlands	989	0	0	7	1	970	98	977	99	12	1
East of England	1286	1	0	18	1	1239	96	1258	98	28	2
London	1370	2	0	37	3	1314	96	1353	99	17	1
South East Coast	1147	3	0	8	1	1121	98	1132	99	15	1
South Central	1002	4	0	22	2	957	96	983	98	19	2
South West	1271	5	0	46	4	1199	94	1250	98	21	2
West Midlands	1259	3	0	7	1	1230	98	1240	98	19	2
North West	1618	11	1	42	3	1541	95	1594	99	24	1
Wales	836	1	0	3	0	820	98	824	99	12	1
Northern Ireland	273	5	2	129	47	137	50	271	99	2	1
Scotland	1398	4	0	156	11	1220	87	1380	99	18	1
United Kingdom	**14219**	**48**	**0**	**779**	**5**	**13196**	**93**	**14023**	**99**	**196**	**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	455	2	0	29	6	371	82	402	88	53	12
East Midlands	219	0	0	0	0	186	85	186	85	33	15
East of England	312	0	0	1	0	258	83	259	83	53	17
London	364	0	0	0	0	322	88	322	88	42	12
South East Coast	317	0	0	0	0	252	79	252	79	65	21
South Central	187	0	0	3	2	143	76	146	78	41	22
South West	317	0	0	1	0	272	86	273	86	44	14
West Midlands	312	0	0	0	0	270	87	270	87	42	13
North West	367	0	0	2	1	317	86	319	87	48	13
Wales	209	0	0	0	0	172	82	172	82	37	18
Northern Ireland	79	1	1	2	3	62	78	65	82	14	18
Scotland	303	1	0	8	3	263	87	272	90	31	10
United Kingdom	**3441**	**4**	**0**	**46**	**1**	**2888**	**84**	**2938**	**85**	**503**	**15**

Table 7 : Invasive status of the diagnostic core biopsy								
Region	Total Cancers with B5	B5a (Non-invasive)		B5b (Invasive)		B5c (Micro-invasive, Not Assessable or Unknown)	
		No.	%	No.	%	No.	%
N East, Yorks & Humber	2181	486	22	1663	76	32	1
East Midlands	1170	236	20	929	79	5	0
East of England	1539	336	22	1188	77	15	1
London	1690	421	25	1265	75	4	0
South East Coast	1401	329	23	1066	76	6	0
South Central	1135	193	17	927	82	15	1
South West	1533	364	24	1164	76	5	0
West Midlands	1519	321	21	1172	77	26	2
North West	1917	426	22	1481	77	10	1
Wales	1001	226	23	775	77	0	0
Northern Ireland	335	87	26	247	74	1	0
Scotland	1653	349	21	1292	78	12	1
United Kingdom	**17074**	**3774**	**22**	**13169**	**77**	**131**	**1**

Table 8 : B5a (Non-invasive) core biopsy: histological status after surgery												
Region	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	76	16	24	5	368	77	12	3	0	0	480	100
East Midlands	47	20	7	3	176	75	4	2	0	0	234	100
East of England	62	19	21	6	244	73	7	2	0	0	334	100
London	82	20	17	4	297	72	13	3	3	1	412	100
South East Coast	62	19	17	5	244	75	4	1	0	0	327	100
South Central	39	20	10	5	141	73	1	1	1	1	192	100
South West	82	23	12	3	259	72	8	2	0	0	361	100
West Midlands	53	17	10	3	247	78	6	2	0	0	316	100
North West	94	22	14	3	309	73	7	2	0	0	424	100
Wales	48	22	6	3	164	74	4	2	0	0	222	100
Northern Ireland	19	22	5	6	60	69	3	3	0	0	87	100
Scotland	80	23	12	3	255	73	0	0	0	0	347	100
United Kingdom	**744**	**20**	**155**	**4**	**2764**	**74**	**69**	**2**	**4**	**0**	**3736**	**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												
Region	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1611	99	2	0	9	1	9	1	1	0	1632	100
East Midlands	894	98	1	0	6	1	4	0	3	0	908	100
East of England	1161	99	1	0	4	0	2	0	0	0	1168	100
London	1216	99	2	0	5	0	6	0	4	0	1233	100
South East Coast	1039	99	0	0	8	1	1	0	0	0	1048	100
South Central	902	99	2	0	6	1	0	0	2	0	912	100
South West	1127	98	1	0	8	1	8	1	1	0	1145	100
West Midlands	1146	99	1	0	7	1	4	0	0	0	1158	100
North West	1450	99	5	0	4	0	3	0	0	0	1462	100
Wales	762	100	1	0	1	0	1	0	0	0	765	100
Northern Ireland	240	99	1	0	2	1	0	0	0	0	243	100
Scotland	1261	99	0	0	7	1	0	0	1	0	1269	100
United Kingdom	**12809**	**99**	**17**	**0**	**67**	**1**	**38**	**0**	**12**	**0**	**12943**	**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	9	82	0	0	2	18	0	0	0	0	11	100
East Midlands	0	-	0	-	0	-	0	-	0	-	0	-
East of England	1	100	0	0	0	0	0	0	0	0	1	100
London	2	100	0	0	0	0	0	0	0	0	2	100
South East Coast	3	100	0	0	0	0	0	0	0	0	3	100
South Central	3	100	0	0	0	0	0	0	0	0	3	100
South West	5	100	0	0	0	0	0	0	0	0	5	100
West Midlands	3	100	0	0	0	0	0	0	0	0	3	100
North West	11	100	0	0	0	0	0	0	0	0	11	100
Wales	1	100	0	0	0	0	0	0	0	0	1	100
Northern Ireland	5	83	0	0	1	17	0	0	0	0	6	100
Scotland	4	80	0	0	1	20	0	0	0	0	5	100
United Kingdom	**47**	**92**	**0**	**0**	**4**	**8**	**0**	**0**	**0**	**0**	**51**	**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+		Total		Repeat (2+) visit	
Region	No	%	No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	0	0	2033	90	208	9	16	1	2257	100	224	10
East Midlands	0	0	1079	89	129	11	7	1	1215	100	136	11
East of England	3	0	1496	92	119	7	3	0	1621	100	122	8
London	1	0	1540	88	205	12	9	1	1755	100	214	12
South East Coast	0	0	1162	78	296	20	27	2	1485	100	323	22
South Central	0	0	1049	87	140	12	11	1	1200	100	151	13
South West	0	0	1267	79	298	19	40	2	1605	100	338	21
West Midlands	0	0	1350	85	224	14	9	1	1583	100	233	15
North West	0	0	1720	86	247	12	34	2	2001	100	281	14
Wales	1	0	971	92	76	7	3	0	1051	100	79	8
Northern Ireland	0	0	324	91	32	9	2	1	358	100	34	9
Scotland	0	0	1625	95	80	5	2	0	1707	100	82	5
United Kingdom	**5**	**0**	**15616**	**88**	**2054**	**12**	**163**	**1**	**17838**	**100**	**2217**	**12**

Table 12 : Number of visits with a core biopsy/cytology outcome												
	0		1		2		3+		Total		Repeat (2+) visit	
Region	No	%	No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	0	0	2081	92	168	7	8	0	2257	100	176	8
East Midlands	0	0	1123	92	90	7	2	0	1215	100	92	8
East of England	6	0	1532	95	81	5	2	0	1621	100	83	5
London	1	0	1577	90	171	10	6	0	1755	100	177	10
South East Coast	1	0	1396	94	85	6	3	0	1485	100	88	6
South Central	3	0	1095	91	99	8	3	0	1200	100	102	9
South West	6	0	1472	92	121	8	6	0	1605	100	127	8
West Midlands	3	0	1473	93	104	7	3	0	1583	100	107	7
North West	1	0	1863	93	132	7	5	0	2001	100	137	7
Wales	1	0	988	94	60	6	2	0	1051	100	62	6
Northern Ireland	1	0	328	92	27	8	2	1	358	100	29	8
Scotland	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**23**	**0**	**14928**	**93**	**1138**	**7**	**42**	**0**	**16131**	**90**	**1180**	**7**

Table 13 : Number of assessment visits to achieve the first B5/C5 non-operative diagnosis										
	1		2		3+		Total		Repeat (2+) visit	
Region	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
N East, Yorks & Humber	2062	94	126	6	6	0	2194	100	132	6
East Midlands	1082	92	85	7	3	0	1170	100	88	8
East of England	1472	96	67	4	1	0	1540	100	68	4
London	1605	95	83	5	4	0	1692	100	87	5
South East Coast	1171	83	226	16	7	0	1404	100	233	17
South Central	1048	92	87	8	4	0	1139	100	91	8
South West	1301	85	218	14	19	1	1538	100	237	15
West Midlands	1401	92	119	8	2	0	1522	100	121	8
North West	1784	93	135	7	9	0	1928	100	144	7
Wales	956	95	44	4	2	0	1002	100	46	5
Northern Ireland	324	95	17	5	0	0	341	100	17	5
Scotland	-	-	-	-	-	-	-	-	-	-
United Kingdom	**14206**	**92**	**1207**	**8**	**57**	**0**	**15470**	**100**	**1264**	**8**

Table 14 : C5 and/or B5 at first visit versus overall non-operative rate (invasive cancers)					
	1 C5/B5		Overall non-operative diagnosis rate		% difference between 1 visit and overall
Region	**No.**	**%**	**No.**	**%**	
N East, Yorks & Humber	1684	95	1761	99	4
East Midlands	930	94	977	99	5
East of England	1217	95	1258	98	3
London	1305	95	1353	99	4
South East Coast	1003	87	1132	99	11
South Central	921	92	983	98	6
South West	1124	88	1250	98	10
West Midlands	1166	93	1240	98	6
North West	1506	93	1594	99	5
Wales	790	94	824	99	4
Northern Ireland	262	96	271	99	3
Scotland	-	-	-	-	-
United Kingdom	**11908**	**93**	**12643**	**99**	**6**

Table 15 : C5 and/or B5 at first visit versus overall non-operative rate (non/micro invasive cancers)					
	1 C5/B5		Overall non-operative diagnosis rate		% difference between 1 visit and overall
Region	**No.**	**%**	**No.**	**%**	
N East, Yorks & Humber	376	78	430	89	11
East Midlands	152	67	193	85	18
East of England	255	76	282	84	8
London	300	78	339	88	10
South East Coast	168	50	271	80	31
South Central	127	64	156	79	15
South West	176	53	287	86	33
West Midlands	235	73	282	87	15
North West	277	73	333	87	15
Wales	166	77	178	83	6
Northern Ireland	62	74	70	83	10
Scotland	-	-	-	-	-
United Kingdom	**2294**	**69**	**2821**	**85**	**16**

Table 16 : Status of diagnostic open biopsies			
	Benign biopsy rate		Malignant biopsy rate
Region	Prevalent	Incident	
N East, Yorks & Humber	0.90	0.29	0.21
East Midlands	1.59	0.32	0.28
East of England	2.18	0.57	0.39
London	1.19	0.43	0.27
South East Coast	2.42	0.47	0.44
South Central	1.80	0.60	0.41
South West	2.48	0.49	0.33
West Midlands	1.85	0.52	0.30
North West	1.73	0.53	0.30
Wales	2.63	0.62	0.45
Northern Ireland	1.39	0.47	0.36
Scotland	1.52	0.60	0.27
United Kingdom	**1.73**	**0.48**	**0.32**

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	0.34
East Midlands	0	0.00	2	1.24
East of England	0	0.00	0	0.00
London	0	0.00	0	0.00
South East Coast	0	0.00	2	1.08
South Central	0	0.00	1	0.67
South West	0	0.00	1	0.49
West Midlands	0	0.00	0	0.00
North West	0	0.00	1	0.41
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**	**8**	**0.36**

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	63	9	14	1	2	53	84	0	0
East Midlands	45	12	27	0	0	33	73	0	0
East of England	81	28	35	0	0	53	65	0	0
London	63	17	27	4	6	42	67	0	0
South East Coast	81	15	19	1	1	65	80	0	0
South Central	61	19	31	1	2	41	67	0	0
South West	67	21	31	2	3	44	66	0	0
West Midlands	61	19	31	0	0	42	69	0	0
North West	73	24	33	1	1	48	66	0	0
Wales	49	12	24	0	0	37	76	0	0
Northern Ireland	17	2	12	0	0	14	82	1	6
Scotland	49	18	37	0	0	31	63	0	0
United Kingdom	**710**	**196**	**28**	**10**	**1**	**503**	**71**	**1**	**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	9	0	0	0	0	7	78	2	22
East Midlands	12	0	0	0	0	12	100	0	0
East of England	28	5	18	1	4	22	79	0	0
London	17	0	0	1	6	15	88	1	6
South East Coast	15	0	0	0	0	13	87	2	13
South Central	19	1	5	0	0	17	89	1	5
South West	21	5	24	1	5	13	62	2	10
West Midlands	19	3	16	0	0	16	84	0	0
North West	24	1	4	0	0	20	83	3	13
Wales	12	0	0	0	0	11	92	1	8
Northern Ireland	2	0	0	1	50	0	0	1	50
Scotland	18	0	0	1	6	17	94	0	0
United Kingdom	**196**	**15**	**8**	**5**	**3**	**163**	**83**	**13**	**7**

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	0	0	1	2	45	83	8	15
East Midlands	33	0	0	0	0	33	100	0	0
East of England	53	1	2	0	0	51	96	1	2
London	46	1	2	0	0	43	93	2	4
South East Coast	66	1	2	0	0	65	98	0	0
South Central	42	2	5	0	0	39	93	1	2
South West	46	1	2	0	0	44	96	1	2
West Midlands	42	0	0	0	0	42	100	0	0
North West	49	0	0	1	2	46	94	2	4
Wales	37	1	3	0	0	36	97	0	0
Northern Ireland	14	0	0	1	7	12	86	1	7
Scotland	31	0	0	0	0	28	90	3	10
United Kingdom	**513**	**7**	**1**	**3**	**1**	**484**	**94**	**19**	**4**

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	9	0	0	7	78	0	0	1	11	1	11
East Midlands	12	0	0	3	25	7	58	0	0	2	17
East of England	28	5	18	11	39	10	36	1	4	1	4
London	17	0	0	3	18	10	59	3	18	1	6
South East Coast	15	0	0	9	60	5	33	1	7	0	0
South Central	19	1	5	4	21	12	63	2	11	0	0
South West	21	5	24	5	24	9	43	1	5	1	5
West Midlands	19	3	16	9	47	6	32	1	5	0	0
North West	24	1	4	9	38	12	50	1	4	1	4
Wales	12	0	0	3	25	8	67	0	0	1	8
Northern Ireland	2	0	0	1	50	1	50	0	0	0	0
Scotland	18	0	0	3	17	6	33	5	28	4	22
United Kingdom	**196**	**15**	**8**	**67**	**34**	**86**	**44**	**16**	**8**	**12**	**6**

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	0	0	19	35	31	57	3	6	1	2
East Midlands	33	0	0	12	36	17	52	3	9	1	3
East of England	53	1	2	27	51	22	42	2	4	1	2
London	46	1	2	9	20	34	74	1	2	1	2
South East Coast	66	1	2	18	27	44	67	3	5	0	0
South Central	42	2	5	11	26	25	60	2	5	2	5
South West	46	1	2	20	43	25	54	0	0	0	0
West Midlands	42	0	0	9	21	31	74	1	2	1	2
North West	49	0	0	12	24	35	71	2	4	0	0
Wales	37	1	3	7	19	27	73	1	3	1	3
Northern Ireland	14	0	0	5	36	8	57	0	0	1	7
Scotland	31	0	0	9	29	21	68	1	3	0	0
United Kingdom	**513**	**7**	**1**	**158**	**31**	**320**	**62**	**19**	**4**	**9**	**2**

Table 23 : Data completeness for non-invasive cancers (cases with surgery only)							
	Unknown cytonuclear grade		Unknown size		Unknown cytonuclear grade and/or size		Total with surgery
Region	No.	%	No.	%	No.	%	No.
N East, Yorks & Humber	1	0	4	1	5	1	449
East Midlands	1	0	5	2	6	3	217
East of England	0	0	7	2	7	2	310
London	0	0	18	5	18	5	356
South East Coast	0	0	4	1	4	1	315
South Central	1	1	4	2	4	2	186
South West	1	0	12	4	12	4	314
West Midlands	1	0	10	3	10	3	307
North West	1	0	17	5	17	5	365
Wales	4	2	17	8	18	9	205
Northern Ireland	0	0	3	4	3	4	79
Scotland	1	0	2	1	3	1	301
United Kingdom	**11**	**0**	**103**	**3**	**107**	**3**	**3404**

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	253	56	133	30	42	9	20	4	1	0	449	100
East Midlands	138	64	58	27	13	6	7	3	1	0	217	100
East of England	178	57	82	26	32	10	18	6	0	0	310	100
London	190	53	111	31	39	11	16	4	0	0	356	100
South East Coast	181	57	79	25	32	10	23	7	0	0	315	100
South Central	112	60	47	25	20	11	6	3	1	1	186	100
South West	183	58	84	27	34	11	12	4	1	0	314	100
West Midlands	197	64	75	24	27	9	7	2	1	0	307	100
North West	217	59	104	28	30	8	13	4	1	0	365	100
Wales	110	54	43	21	40	20	8	4	4	2	205	100
Northern Ireland	37	46	25	31	11	14	6	8	0	0	79	100
Scotland	207	69	68	23	13	4	12	4	1	0	301	100
United Kingdom	**2003**	**59**	**909**	**27**	**333**	**10**	**148**	**4**	**11**	**0**	**3404**	**100**

Table 25 : Size of 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	153	34	196	44	77	17	19	4	4	1	449	100
East Midlands	83	38	82	38	40	18	7	3	5	2	217	100
East of England	131	42	125	40	29	9	18	6	7	2	310	100
London	126	35	150	42	43	12	19	5	18	5	356	100
South East Coast	117	37	134	43	37	12	23	7	4	1	315	100
South Central	53	28	82	44	41	22	6	3	4	2	186	100
South West	128	41	113	36	47	15	14	4	12	4	314	100
West Midlands	114	37	135	44	41	13	7	2	10	3	307	100
North West	119	33	168	46	48	13	13	4	17	5	365	100
Wales	82	40	72	35	26	13	8	4	17	8	205	100
Northern Ireland	40	51	23	29	8	10	5	6	3	4	79	100
Scotland	112	37	135	45	42	14	10	3	2	1	301	100
United Kingdom	**1258**	**37**	**1415**	**42**	**479**	**14**	**149**	**4**	**103**	**3**	**3404**	**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	477	27	476	27	404	23	283	16	60	3	20	1	19	1	1739	100
East Midlands	292	30	296	31	197	20	137	14	25	3	6	1	15	2	968	100
East of England	322	25	344	27	318	25	211	17	44	3	16	1	10	1	1265	100
London	280	21	316	24	333	25	288	22	64	5	40	3	17	1	1338	100
South East Coast	311	28	290	26	264	23	204	18	27	2	24	2	9	1	1129	100
South Central	209	21	249	25	263	27	186	19	36	4	32	3	11	1	986	100
South West	344	28	335	27	270	22	207	17	55	4	22	2	17	1	1250	100
West Midlands	308	25	328	26	332	27	191	15	47	4	23	2	16	1	1245	100
North West	392	25	394	25	376	24	314	20	78	5	32	2	13	1	1599	100
Wales	229	28	215	26	183	22	152	18	27	3	16	2	4	0	826	100
Northern Ireland	73	27	84	31	47	17	46	17	9	3	7	3	3	1	269	100
Scotland	349	25	398	29	312	23	229	17	49	4	21	2	22	2	1380	100
United Kingdom	**3586**	**26**	**3725**	**27**	**3299**	**24**	**2448**	**17**	**521**	**4**	**259**	**2**	**156**	**1**	**13994**	**100**

Table 27 : Whole size of 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	274	16	390	22	422	24	423	24	140	8	84	5	6	0	1739	100
East Midlands	177	18	264	27	200	21	235	24	51	5	33	3	8	1	968	100
East of England	199	16	305	24	345	27	290	23	80	6	41	3	5	0	1265	100
London	168	13	275	21	330	25	349	26	114	9	91	7	11	1	1338	100
South East Coast	186	16	269	24	277	25	279	25	68	6	49	4	1	0	1129	100
South Central	128	13	197	20	281	28	237	24	73	7	65	7	5	1	986	100
South West	192	15	282	23	294	24	313	25	98	8	55	4	16	1	1250	100
West Midlands	189	15	279	22	345	28	266	21	92	7	62	5	12	1	1245	100
North West	247	15	361	23	414	26	376	24	121	8	72	5	8	1	1599	100
Wales	150	18	194	23	179	22	178	22	73	9	30	4	22	3	826	100
Northern Ireland	48	18	72	27	61	23	57	21	19	7	12	4	0	0	269	100
Scotland	216	16	369	27	312	23	318	23	91	7	55	4	19	1	1380	100
United Kingdom	**2174**	**16**	**3257**	**23**	**3460**	**25**	**3321**	**24**	**1020**	**7**	**649**	**5**	**113**	**1**	**13994**	**100**

Table 28 : Whole size of 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	655	69	112	12	102	11	47	5	34	4	3	0	953	100
East Midlands	437	74	46	8	68	12	19	3	18	3	0	0	588	100
East of England	502	75	82	12	55	8	15	2	12	2	0	0	666	100
London	439	74	61	10	49	8	24	4	22	4	1	0	596	100
South East Coast	451	75	70	12	50	8	19	3	11	2	0	0	601	100
South Central	322	70	75	16	33	7	13	3	14	3	1	0	458	100
South West	469	69	97	14	70	10	24	4	18	3	1	0	679	100
West Midlands	465	73	75	12	49	8	30	5	16	3	1	0	636	100
North West	606	77	93	12	50	6	9	1	28	4	0	0	786	100
Wales	343	77	34	8	32	7	15	3	9	2	11	2	444	100
Northern Ireland	118	75	23	15	9	6	5	3	2	1	0	0	157	100
Scotland	584	78	72	10	53	7	23	3	15	2	0	0	747	100
United Kingdom	**5391**	**74**	**840**	**11**	**620**	**8**	**243**	**3**	**199**	**3**	**18**	**0**	**7311**	**100**

Table 29 : Grade of invasive cancers												
	Grade 1		Grade 2		Grade 3		Not assessable		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	449	26	929	53	353	20	3	0	5	0	1739	100
East Midlands	278	29	486	50	194	20	3	0	7	1	968	100
East of England	288	23	658	52	311	25	4	0	4	0	1265	100
London	341	25	725	54	268	20	4	0	0	0	1338	100
South East Coast	260	23	630	56	236	21	2	0	1	0	1129	100
South Central	229	23	515	52	235	24	3	0	4	0	986	100
South West	337	27	674	54	231	18	3	0	5	0	1250	100
West Midlands	322	26	673	54	244	20	2	0	4	0	1245	100
North West	430	27	846	53	314	20	5	0	4	0	1599	100
Wales	208	25	442	54	168	20	0	0	8	1	826	100
Northern Ireland	72	27	138	51	58	22	0	0	1	0	269	100
Scotland	349	25	719	52	289	21	4	0	19	1	1380	100
United Kingdom	**3563**	**25**	**7435**	**53**	**2901**	**21**	**33**	**0**	**62**	**0**	**13994**	**100**

Table 30 : Data completeness for invasive cancers (with surgery)									
	Unknown invasive size		Unknown nodal status		Unknown grade		Unknown NPI*		Total invasive
Region	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	19	1.1	13	0.7	5	0.3	35	2.0	1739
East Midlands	15	1.5	6	0.6	7	0.7	24	2.5	968
East of England	10	0.8	18	1.4	4	0.3	29	2.3	1265
London	17	1.3	26	1.9	0	0.0	44	3.3	1338
South East Coast	9	0.8	24	2.1	1	0.1	34	3.0	1129
South Central	11	1.1	11	1.1	4	0.4	24	2.4	986
South West	17	1.4	15	1.2	5	0.4	34	2.7	1250
West Midlands	16	1.3	11	0.9	4	0.3	27	2.2	1245
North West	13	0.8	30	1.9	4	0.3	48	3.0	1599
Wales	4	0.5	15	1.8	8	1.0	26	3.1	826
Northern Ireland	3	1.1	1	0.4	1	0.4	4	1.5	269
Scotland	22	1.6	13	0.9	19	1.4	33	2.4	1380
United Kingdom	**156**	**1.1**	**183**	**1.3**	**62**	**0.4**	**362**	**2.6**	**13994**

* NPI is unknown if size, grade or nodal status are unknown or grade if not assessable

Table 31 : NPI Group of invasive cancers												
	EPG		GPG		MPG1		MPG2		PPG		Total with known NPI	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	360	21	639	38	417	24	190	11	98	6	1704	100
East Midlands	240	25	331	35	232	25	92	10	49	5	944	100
East of England	245	20	432	35	332	27	146	12	81	7	1236	100
London	223	17	488	38	342	26	158	12	83	6	1294	100
South East Coast	200	18	423	39	267	24	142	13	63	6	1095	100
South Central	187	19	314	33	261	27	122	13	78	8	962	100
South West	278	23	441	36	301	25	122	10	74	6	1216	100
West Midlands	254	21	468	38	319	26	118	10	59	5	1218	100
North West	333	21	568	37	368	24	168	11	114	7	1551	100
Wales	174	22	294	37	198	25	80	10	54	7	800	100
Northern Ireland	54	20	104	39	64	24	20	8	23	9	265	100
Scotland	283	21	511	38	321	24	145	11	87	6	1347	100
United Kingdom	**2831**	**21**	**5013**	**37**	**3422**	**25**	**1503**	**11**	**863**	**6**	**13632**	**100**

Table 32 : ER status							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1882	83	253	11	122	5	2257
East Midlands	995	82	128	11	92	8	1215
East of England	1257	78	117	7	247	15	1621
London	1352	77	159	9	244	14	1755
South East Coast	1208	81	122	8	155	10	1485
South Central	959	80	103	9	138	12	1200
South West	1318	82	140	9	147	9	1605
West Midlands	1253	79	127	8	203	13	1583
North West	1659	83	212	11	130	6	2001
Wales	803	76	85	8	163	16	1051
Northern Ireland	297	83	28	8	33	9	358
Scotland	1394	82	136	8	177	10	1707
United Kingdom	**14377**	**81**	**1610**	**9**	**1851**	**10**	**17838**

Table 33 : ER status (invasive cancers)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1590	90	176	10	4	0	1770
East Midlands	897	91	91	9	1	0	989
East of England	1178	92	102	8	6	0	1286
London	1218	89	134	10	18	1	1370
South East Coast	1050	92	90	8	7	1	1147
South Central	906	90	91	9	5	0	1002
South West	1157	91	105	8	9	1	1271
West Midlands	1152	92	104	8	3	0	1259
North West	1443	89	162	10	13	1	1618
Wales	756	90	78	9	2	0	836
Northern Ireland	251	92	21	8	1	0	273
Scotland	1273	91	105	8	20	1	1398
United Kingdom	**12871**	**91**	**1259**	**9**	**89**	**1**	**14219**

Table 34 : ER status (micro/non-invasive cancers)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	290	60	77	16	117	24	484
East Midlands	98	43	37	16	91	40	226
East of England	79	24	15	4	241	72	335
London	134	35	25	6	226	59	385
South East Coast	157	47	32	9	148	44	337
South Central	53	27	12	6	133	67	198
South West	160	48	35	11	138	41	333
West Midlands	101	31	23	7	200	62	324
North West	216	57	50	13	116	30	382
Wales	47	22	7	3	161	75	215
Northern Ireland	45	54	7	8	32	38	84
Scotland	121	39	31	10	157	51	309
United Kingdom	**1501**	**42**	**351**	**10**	**1760**	**49**	**3612**

Table 35 : PgR status (invasive)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	541	31	269	15	960	54	1770
East Midlands	238	24	97	10	654	66	989
East of England	351	27	155	12	780	61	1286
London	1005	73	259	19	106	8	1370
South East Coast	663	58	163	14	321	28	1147
South Central	631	63	188	19	183	18	1002
South West	610	48	218	17	443	35	1271
West Midlands	492	39	178	14	589	47	1259
North West	1223	76	336	21	59	4	1618
Wales	302	36	178	21	356	43	836
Northern Ireland	159	58	49	18	65	24	273
Scotland	828	59	199	14	371	27	1398
United Kingdom	**7043**	**50**	**2289**	**16**	**4887**	**34**	**14219**

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	8	5	125	71	43	24	176
East Midlands	0	0	51	56	40	44	91
East of England	2	2	73	72	27	26	102
London	8	6	121	90	5	4	134
South East Coast	2	2	72	80	16	18	90
South Central	11	12	80	88	0	0	91
South West	5	5	87	83	13	12	105
West Midlands	5	5	94	90	5	5	104
North West	5	3	153	94	4	2	162
Wales	0	0	63	81	15	19	78
Northern Ireland	0	0	20	95	1	5	21
Scotland	8	8	86	82	11	10	105
United Kingdom	**54**	**4**	**1025**	**81**	**180**	**14**	**1259**

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	177	10	1547	87	19	1	27	2	1770
East Midlands	100	10	871	88	0	0	18	2	989
East of England	131	10	1092	85	14	1	49	4	1286
London	127	9	1086	79	77	6	80	6	1370
South East Coast	101	9	983	86	41	4	22	2	1147
South Central	113	11	824	82	41	4	24	2	1002
South West	220	17	1019	80	10	1	22	2	1271
West Midlands	139	11	1092	87	6	0	22	2	1259
North West	185	11	1339	83	69	4	25	2	1618
Wales	80	10	732	88	7	1	17	2	836
Northern Ireland	22	8	234	86	12	4	5	2	273
Scotland	144	10	1204	86	0	0	50	4	1398
United Kingdom	**1539**	**11**	**12023**	**85**	**296**	**2**	**361**	**3**	**14219**

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	27	10	37	1	4	17	63
East Midlands	18	14	78	8	44	18	100
East of England	49	14	29	12	24	33	67
London	80	9	11	19	24	42	53
South East Coast	22	6	27	2	9	15	68
South Central	24	8	33	7	29	17	71
South West	22	6	27	9	41	13	59
West Midlands	22	9	41	4	18	16	73
North West	25	6	24	3	12	15	60
Wales	17	12	71	6	35	15	88
Northern Ireland	5	2	40	0	0	3	60
Scotland	50	6	12	8	16	22	44
United Kingdom	**361**	**102**	**28**	**79**	**22**	**226**	**63**

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	300	66	149	33	6	1	0	0	455	100
East Midlands	138	63	79	36	2	1	0	0	219	100
East of England	229	73	81	26	2	1	0	0	312	100
London	262	72	93	26	8	2	1	0	364	100
South East Coast	241	76	74	23	2	1	0	0	317	100
South Central	135	72	51	27	1	1	0	0	187	100
South West	217	68	97	31	3	1	0	0	317	100
West Midlands	210	67	97	31	5	2	0	0	312	100
North West	245	67	120	33	2	1	0	0	367	100
Wales	157	75	48	23	4	2	0	0	209	100
Northern Ireland	59	75	20	25	0	0	0	0	79	100
Scotland	226	75	75	25	2	1	0	0	303	100
United Kingdom	**2419**	**70**	**984**	**29**	**37**	**1**	**1**	**0**	**3441**	**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	12	41	17	59	0	0	0	0	29	100
East Midlands	2	29	5	71	0	0	0	0	7	100
East of England	12	52	11	48	0	0	0	0	23	100
London	15	71	6	29	0	0	0	0	21	100
South East Coast	10	50	10	50	0	0	0	0	20	100
South Central	7	64	4	36	0	0	0	0	11	100
South West	12	75	4	25	0	0	0	0	16	100
West Midlands	8	67	4	33	0	0	0	0	12	100
North West	9	60	6	40	0	0	0	0	15	100
Wales	3	50	3	50	0	0	0	0	6	100
Northern Ireland	1	20	4	80	0	0	0	0	5	100
Scotland	2	33	4	67	0	0	0	0	6	100
United Kingdom	**93**	**54**	**78**	**46**	**0**	**0**	**0**	**0**	**171**	**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	8	10	69	90	0	0	77	100
East Midlands	6	15	34	85	0	0	40	100
East of England	4	14	25	86	0	0	29	100
London	6	14	37	86	0	0	43	100
South East Coast	9	24	28	76	0	0	37	100
South Central	10	24	31	76	0	0	41	100
South West	8	17	39	83	0	0	47	100
West Midlands	9	22	32	78	0	0	41	100
North West	4	8	44	92	0	0	48	100
Wales	9	35	17	65	0	0	26	100
Northern Ireland	2	25	6	75	0	0	8	100
Scotland	9	21	33	79	0	0	42	100
United Kingdom	**84**	**18**	**395**	**82**	**0**	**0**	**479**	**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	6	10	55	90	0	0	61	100
East Midlands	5	15	29	85	0	0	34	100
East of England	2	8	23	92	0	0	25	100
London	2	7	25	93	0	0	27	100
South East Coast	7	23	24	77	0	0	31	100
South Central	6	18	27	82	0	0	33	100
South West	6	18	27	82	0	0	33	100
West Midlands	7	21	26	79	0	0	33	100
North West	2	5	37	95	0	0	39	100
Wales	8	40	12	60	0	0	20	100
Northern Ireland	1	17	5	83	0	0	6	100
Scotland	8	21	30	79	0	0	38	100
United Kingdom	**60**	**16**	**320**	**84**	**0**	**0**	**380**	**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	0	-	0	-	0	-	0	-
East Midlands	0	-	0	-	0	-	0	-
East of England	0	-	0	-	0	-	0	-
London	0	-	0	-	0	-	0	-
South East Coast	0	-	0	-	0	-	0	-
South Central	1	100	0	0	0	0	1	100
South West	0	-	0	-	0	-	0	-
West Midlands	1	100	0	0	0	0	1	100
North West	0	-	0	-	0	-	0	-
Wales	1	33	2	67	0	0	3	100
Northern Ireland	0	-	0	-	0	-	0	-
Scotland	0	-	0	-	0	-	0	-
United Kingdom	**3**	**60**	**2**	**40**	**0**	**0**	**5**	**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	1256	71	483	27	31	2	0	0	1770	100
East Midlands	699	71	269	27	21	2	0	0	989	100
East of England	969	75	296	23	21	2	0	0	1286	100
London	1000	73	338	25	32	2	0	0	1370	100
South East Coast	913	80	216	19	18	2	0	0	1147	100
South Central	768	77	218	22	16	2	0	0	1002	100
South West	971	76	279	22	21	2	0	0	1271	100
West Midlands	969	77	276	22	14	1	0	0	1259	100
North West	1172	72	427	26	19	1	0	0	1618	100
Wales	622	74	204	24	10	1	0	0	836	100
Northern Ireland	195	71	74	27	4	1	0	0	273	100
Scotland	1073	77	302	22	18	1	5	0	1398	100
United Kingdom	**10607**	**75**	**3382**	**24**	**225**	**2**	**5**	**0**	**14219**	**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	185	19	107	26	119	42	46	77	20	100
East Midlands	122	21	61	31	58	42	21	84	4	67
East of England	97	15	67	21	82	39	31	70	14	88
London	103	17	62	19	102	35	37	58	30	75
South East Coast	77	13	46	17	58	28	12	44	20	83
South Central	59	13	52	20	53	28	22	61	30	94
South West	102	15	49	18	72	35	33	60	22	100
West Midlands	96	15	57	17	66	35	31	66	23	100
North West	135	17	76	20	123	39	60	77	28	88
Wales	79	18	35	19	58	38	16	59	15	94
Northern Ireland	25	16	14	30	21	46	6	67	7	100
Scotland	84	11	77	25	76	33	41	84	18	86
United Kingdom	**1164**	**16**	**703**	**21**	**888**	**36**	**356**	**68**	**231**	**89**

Table 46 : 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	66	10	21	19	30	29	35	74	32	94
East Midlands	51	12	12	26	27	40	16	84	16	89
East of England	56	11	10	12	11	20	10	67	10	83
London	40	9	11	18	15	31	16	67	20	91
South East Coast	32	7	9	13	15	30	11	58	10	91
South Central	25	8	9	12	6	18	6	46	13	93
South West	43	9	13	13	20	29	11	46	14	78
West Midlands	41	9	9	12	12	24	17	57	16	100
North West	68	11	18	19	18	36	5	56	26	93
Wales	46	13	6	18	7	22	9	60	8	89
Northern Ireland	11	9	4	17	5	56	3	60	2	100
Scotland	34	6	8	11	16	30	15	65	11	73
United Kingdom	**513**	**10**	**130**	**15**	**182**	**29**	**154**	**63**	**178**	**89**

Table 47 : Immediate reconstruction with mastectomy (all cancers)								
	Immediate reconstruction		No immediate reconstruction		Unknown		Total mastectomies	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	127	20	520	80	2	0	649	100
East Midlands	85	24	268	76	0	0	353	100
East of England	78	20	298	77	12	3	388	100
London	130	30	306	70	1	0	437	100
South East Coast	107	36	187	62	6	2	300	100
South Central	41	15	231	85	1	0	273	100
South West	87	23	265	70	28	7	380	100
West Midlands	103	27	274	73	0	0	377	100
North West	140	25	408	74	5	1	553	100
Wales	47	18	208	82	0	0	255	100
Northern Ireland	18	18	81	82	0	0	99	100
Scotland	63	17	312	82	6	2	381	100
United Kingdom	**1026**	**23**	**3358**	**76**	**61**	**1**	**4445**	**100**

Table 48 : 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	74	58	7	6	46	36	0	0	127	100
East Midlands	47	55	3	4	35	41	0	0	85	100
East of England	42	54	3	4	33	42	0	0	78	100
London	85	65	4	3	41	32	0	0	130	100
South East Coast	69	64	4	4	34	32	0	0	107	100
South Central	23	56	2	5	16	39	0	0	41	100
South West	58	67	1	1	28	32	0	0	87	100
West Midlands	65	63	1	1	37	36	0	0	103	100
North West	84	60	5	4	51	36	0	0	140	100
Wales	30	64	3	6	14	30	0	0	47	100
Northern Ireland	12	67	2	11	4	22	0	0	18	100
Scotland	49	78	2	3	12	19	0	0	63	100
United Kingdom	**638**	**62**	**37**	**4**	**351**	**34**	**0**	**0**	**1026**	**100**

Table 49 : Any neo-adjuvant therapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	74	3	2183	97	0	0	2257
East Midlands	35	3	1180	97	0	0	1215
East of England	38	2	1583	98	0	0	1621
London	65	4	1690	96	0	0	1755
South East Coast	89	6	1396	94	0	0	1485
South Central	46	4	1154	96	0	0	1200
South West	56	3	1549	97	0	0	1605
West Midlands	59	4	1524	96	0	0	1583
North West	55	3	1946	97	0	0	2001
Wales	21	2	1030	98	0	0	1051
Northern Ireland	5	1	353	99	0	0	358
Scotland	50	3	1652	97	5	0	1707
United Kingdom	**593**	**3**	**17240**	**97**	**5**	**0**	**17838**

Table 50 : Neo-adjuvant chemotherapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	33	1	2224	99	0	0	2257
East Midlands	28	2	1187	98	0	0	1215
East of England	17	1	1604	99	0	0	1621
London	37	2	1718	98	0	0	1755
South East Coast	27	2	1458	98	0	0	1485
South Central	30	3	1170	98	0	0	1200
South West	24	1	1581	99	0	0	1605
West Midlands	15	1	1568	99	0	0	1583
North West	21	1	1980	99	0	0	2001
Wales	8	1	1043	99	0	0	1051
Northern Ireland	0	0	358	100	0	0	358
Scotland	18	1	1684	99	5	0	1707
United Kingdom	**258**	**1**	**17575**	**99**	**5**	**0**	**17838**

Table 51 : Neo-adjuvant herceptin							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	2	0	2255	100	0	0	2257
East Midlands	0	0	1215	100	0	0	1215
East of England	1	0	1620	100	0	0	1621
London	3	0	1752	100	0	0	1755
South East Coast	5	0	1480	100	0	0	1485
South Central	1	0	1199	100	0	0	1200
South West	2	0	1603	100	0	0	1605
West Midlands	2	0	1581	100	0	0	1583
North West	6	0	1995	100	0	0	2001
Wales	0	0	1051	100	0	0	1051
Northern Ireland	0	0	358	100	0	0	358
Scotland	1	0	1701	100	5	0	1707
United Kingdom	**23**	**0**	**17810**	**100**	**5**	**0**	**17838**

Table 52 : Neo-adjuvant endocrine therapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	42	2	2215	98	0	0	2257
East Midlands	7	1	1208	99	0	0	1215
East of England	22	1	1599	99	0	0	1621
London	29	2	1726	98	0	0	1755
South East Coast	71	5	1414	95	0	0	1485
South Central	18	2	1182	99	0	0	1200
South West	33	2	1572	98	0	0	1605
West Midlands	44	3	1539	97	0	0	1583
North West	33	2	1968	98	0	0	2001
Wales	14	1	1037	99	0	0	1051
Northern Ireland	5	1	353	99	0	0	358
Scotland	36	2	1666	98	5	0	1707
United Kingdom	**354**	**2**	**17479**	**98**	**5**	**0**	**17838**

Table 53 : Proportion of women referred to consultant surgeons according to annual caseload of surgeon (2010/11)											
	Total (referred)	<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases	
Region		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2254	68	3	173	8	338	15	1570	70	105	5
East Midlands	1215	33	3	64	5	89	7	1107	86	0	0
East of England	1616	57	4	95	6	137	8	1239	76	100	6
London	1720	118	7	175	10	312	18	912	52	240	14
South East Coast	1483	52	3	156	10	102	7	985	65	211	14
South Central	1194	16	1	16	1	151	12	805	66	226	19
South West	1597	42	3	69	4	43	3	1495	91	0	0
West Midlands	1574	40	3	105	7	410	26	1019	65	0	0
North West	1989	85	4	128	6	246	12	1556	77	0	0
Wales	1051	16	2	0	0	0	0	1035	98	0	0
Northern Ireland	358	18	5	66	18	66	18	208	58	0	0
Scotland	1705	74	4	130	8	186	11	1173	69	142	8
United Kingdom	**17756**	**502**	**3**	**1063**	**6**	**1935**	**11**	**13477**	**75**	**1027**	**6**

Table 54 : Proportion of women referred to consultant surgeons according to annual caseload of surgeon (2008/09-2010/11)											
	Total (referred)	<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases	
Region		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	6685	320	5	749	11	806	12	4523	68	287	4
East Midlands	3841	223	6	169	4	304	8	3353	83	0	0
East of England	4954	222	4	210	4	289	6	4280	86	0	0
London	4818	433	9	719	15	720	15	2439	50	600	12
South East Coast	4252	193	5	375	9	574	13	2565	60	568	13
South Central	3509	98	3	151	4	351	10	2420	68	552	15
South West	4658	132	3	273	6	802	17	3530	75	0	0
West Midlands	4548	179	4	458	10	585	13	3326	73	0	0
North West	5597	222	4	788	14	909	16	3740	66	0	0
Wales	3032	26	1	88	3	87	3	2556	84	275	9
Northern Ireland	1114	154	14	59	5	291	26	619	55	0	0
Scotland	4622	404	9	500	11	292	6	2669	58	757	16
United Kingdom	**51630**	**2606**	**5**	**4539**	**9**	**6010**	**12**	**36020**	**69**	**3039**	**6**

Table 55 : Annual screening surgical caseload per surgeon (2010/11)												
		<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases		
Region	Total surgeons	No.	%	No.	%	No.	%	No.	%	No.	%	Median
N East, Yorks & Humber	79	21	27	11	14	14	18	32	41	1	1	25
East Midlands	48	17	35	5	10	4	8	22	46	0	0	22
East of England	58	19	33	7	12	6	10	25	43	1	2	23
London	83	37	45	12	14	12	14	20	24	2	2	14
South East Coast	56	21	38	10	18	4	7	19	34	2	4	19
South Central	37	11	30	1	3	6	16	17	46	2	5	30.0
South West	54	16	30	5	9	2	4	31	57	0	0	33.5
West Midlands	61	16	26	7	11	16	26	22	36	0	0	25
North West	76	26	34	9	12	10	13	31	41	0	0	23
Wales	22	4	18	0	0	0	0	18	82	0	0	49
Northern Ireland	14	2	14	4	29	3	21	5	36	0	0	21
Scotland	73	32	44	8	11	8	11	24	33	1	1	18
United Kingdom	**592**	**160**	**27**	**71**	**12**	**79**	**13**	**273**	**46**	**9**	**2**	**28**

The surgeons in each region are credited with their total UK screening caseload.
Surgeons working in more than one region appear in each of these regions' figures.

Table 56 : Annual screening surgical caseload per surgeon (2008/09-2010/11)												
		<10 cases		10-<20 cases		20-<30 cases		30-<90 cases		90+ cases		
Region	Total surgeons	No.	%	No.	%	No.	%	No.	%	No.	%	Median
N East, Yorks & Humber	97	39	40	16	16	11	11	30	31	1	1	17
East Midlands	65	34	52	4	6	4	6	23	35	0	0	10
East of England	84	45	54	5	6	4	5	30	36	0	0	6
London	122	73	60	17	14	10	8	20	16	2	2	5
South East Coast	79	43	54	9	11	8	10	17	22	2	3	6
South Central	59	32	54	3	5	5	8	17	29	2	3	3
South West	69	27	39	6	9	11	16	25	36	0	0	21
West Midlands	73	28	38	10	14	8	11	27	37	0	0	19
North West	96	39	41	19	20	12	13	26	27	0	0	13
Wales	26	7	27	2	8	1	4	15	58	1	4	44
Northern Ireland	18	8	44	1	6	4	22	5	28	0	0	21
Scotland	83	47	57	11	13	4	5	19	23	2	2	8
United Kingdom	**717**	**275**	**38**	**97**	**14**	**82**	**11**	**253**	**35**	**10**	**1**	**19**

Table 57 : Annual screening surgical caseload per surgeon (2008/09 – 2010/11)											
		<10 cases		10-19 cases		20-29 cases		30-89 cases		90+ cases	
Region	Total surgeons	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	97	39	40	16	16	11	11	30	31	1	1
East Midlands	65	34	52	4	6	4	6	23	35	0	0
East of England	84	45	54	5	6	4	5	30	36	0	0
London	122	73	60	17	14	10	8	20	16	2	2
South East Coast	79	43	54	9	11	8	10	17	22	2	3
South Central	59	32	54	3	5	5	8	17	29	2	3
South West	69	27	39	6	9	11	16	25	36	0	0
West Midlands	73	28	38	10	14	8	11	27	37	0	0
North West	96	39	41	19	20	12	13	26	27	0	0
Wales	26	7	27	2	8	1	4	15	58	1	4
Northern Ireland	18	8	44	1	6	4	22	5	28	0	0
Scotland	83	47	57	11	13	4	5	19	23	2	2
United Kingdom	**717**	**275**	**38**	**97**	**14**	**82**	**11**	**253**	**35**	**10**	**1**

Table 58 : Screening cases per surgeon (2010/11)					
Region	**Total surgeons**	**Mean**	**Minimum**	**Median**	**Maximum**
N East, Yorks & Humber	79	29	1	25	105
East Midlands	48	27	1	22	75
East of England	58	28	1	23	100
London	83	21	1	14	124
South East Coast	56	27	1	19	106
South Central	37	33	1	30.0	119
South West	54	31	1	33.5	72
West Midlands	61	26	1	25	84
North West	76	27	1	23	98
Wales	22	48	1	49	94
Northern Ireland	14	26	9	21	61
Scotland	73	23	1	18	142
United Kingdom	**592**	**30**	**1**	**28**	**142**

Table 59 : Number of surgeons treating each woman (2010/11)									
	Total cancers	**Number of women treated by…**							
		No referral		**1 surgeon**		**2 surgeons**		**3+ surgeons**	
Region		**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	2257	3	0	2254	100	0	0	0	0
East Midlands	1215	0	0	1138	94	76	6	1	0
East of England	1621	5	0	1604	99	12	1	0	0
London	1755	35	2	1683	96	37	2	0	0
South East Coast	1485	2	0	1460	98	23	2	0	0
South Central	1200	6	1	1175	98	18	2	1	0
South West	1605	8	0	1545	96	52	3	0	0
West Midlands	1583	9	1	1574	99	0	0	0	0
North West	2001	12	1	1963	98	26	1	0	0
Wales	1051	0	0	1051	100	0	0	0	0
Northern Ireland	358	0	0	358	100	0	0	0	0
Scotland	1707	2	0	1705	100	0	0	0	0
United Kingdom	**17838**	**82**	**0**	**17510**	**98**	**244**	**1**	**2**	**0**

Table 60 : Number of surgeons treating each woman (2008/09 – 2010/11)									
	Total cancers	**Number of women treated by…**							
		No referral		**1 surgeon**		**2 surgeons**		**3+ surgeons**	
Region		**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	6709	24	0	6685	100	0	0	0	0
East Midlands	3841	0	0	3637	95	200	5	4	0
East of England	4974	20	0	4908	99	45	1	1	0
London	4914	96	2	4725	96	93	2	0	0
South East Coast	4260	8	0	4229	99	23	1	0	0
South Central	3535	26	1	3448	98	59	2	2	0
South West	4676	18	0	4580	98	77	2	1	0
West Midlands	4575	27	1	4548	99	0	0	0	0
North West	5641	44	1	5536	98	60	1	1	0
Wales	3032	0	0	3032	100	0	0	0	0
Northern Ireland	1116	2	0	1105	99	9	1	0	0
Scotland	4622	0	0	4622	100	0	0	0	0
United Kingdom	**51895**	**265**	**1**	**51055**	**98**	**566**	**1**	**9**	**0**

Table 61 : Explanations for surgeons treating less than 10 screening cases (2010/11)									
Region	**Number surgeons with caseload <10**	**Other caseload >30 year**	**Joined NHSBSP**	**Left NHSBSP**	**Plastic surgeon**	**Private practice**	**No infor-mation**	**Other**	**Surgeon from other region**
N East, Yorks & Humber	21	6	5	3	2	0	0	2	3
East Midlands	17	1	2	1	2	0	0	0	11
East of England	19	4	2	1	1	3	1	0	7
London	37	8	2	2	5	10	4	1	5
South East Coast	21	1	3	1	1	1	0	0	14
South Central	11	0	1	0	5	1	0	0	4
South West	16	1	0	0	2	0	5	0	8
West Midlands	16	4	0	3	1	3	0	0	5
North West	26	12	0	4	2	2	1	4	1
Wales	4	1	0	1	1	0	0	0	1
Northern Ireland	2	2	0	0	0	0	0	0	0
Scotland	32	7	0	4	1	1	14	0	5
United Kingdom	**160**	**47**	**12**	**17**	**23**	**14**	**25**	**6**	**16**

Table 62 : Explanations for surgeons treating less than 10 screening cases (2008/09 – 2010/11)									
Region	**Number surgeons with caseload <10**	**Other caseload >30 year**	**Joined NHSBSP**	**Left NHSBSP**	**Plastic surgeon**	**Private practice**	**Surgeon from other region**	**No inform ation**	**Other**
N East, Yorks & Humber	39	9	9	2	2	1	9	6	1
East Midlands	34	5	4	1	3	0	19	2	0
East of England	45	7	2	1	5	4	18	5	3
London	73	13	4	5	9	21	15	5	1
South East Coast	43	2	3	2	2	0	33	1	0
South Central	32	1	1	0	8	3	18	0	1
South West	27	1	0	0	3	3	15	5	0
West Midlands	28	11	1	4	3	2	3	2	2
North West	39	18	0	0	3	2	5	5	6
Wales	7	1	0	0	1	0	4	1	0
Northern Ireland	8	2	2	0	0	0	1	3	0
Scotland	47	14	1	3	1	0	3	23	2
United Kingdom	**275**	**71**	**22**	**13**	**38**	**19**	**41**	**57**	**14**

Table 63 : 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	9	6	67	54	17	31
East Midlands	12	12	100	33	17	52
East of England	27	23	85	53	13	25
London	17	12	71	46	13	28
South East Coast	15	12	80	66	29	44
South Central	19	18	95	42	21	50
South West	19	14	74	46	24	52
West Midlands	19	18	95	42	24	57
North West	24	19	79	49	22	45
Wales	12	11	92	37	25	68
Northern Ireland	2	2	100	14	4	29
Scotland	18	10	56	31	8	26
United Kingdom	**193**	**157**	**81**	**513**	**217**	**42**

Table 64 : 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	1739	421	24	478	139	29
East Midlands	968	216	22	224	59	26
East of England	1265	339	27	333	96	29
London	1338	357	27	377	91	24
South East Coast	1129	265	23	335	109	33
South Central	986	204	21	197	60	30
South West	1250	342	27	330	104	32
West Midlands	1245	301	24	319	103	32
North West	1599	405	25	380	100	26
Wales	826	209	25	211	82	39
Northern Ireland	269	64	24	84	18	21
Scotland	1380	256	19	307	46	15
United Kingdom	**13994**	**3379**	**24**	**3575**	**1007**	**28**

Table 65 : 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	1002	75	313	23	17	1	1	0	0	0	1333	100	331	25
East Midlands	546	75	170	23	16	2	0	0	0	0	732	100	186	25
East of England	750	74	248	24	16	2	0	0	0	0	1014	100	264	26
London	740	72	272	26	20	2	1	0	0	0	1033	100	293	28
South East Coast	700	75	204	22	23	2	3	0	0	0	930	100	230	25
South Central	626	79	160	20	11	1	0	0	0	0	797	100	171	21
South West	719	71	271	27	19	2	2	0	0	0	1011	100	292	29
West Midlands	769	77	217	22	16	2	1	0	0	0	1003	100	234	23
North West	905	74	292	24	22	2	0	0	0	0	1219	100	314	26
Wales	471	73	163	25	15	2	0	0	0	0	649	100	178	27
Northern Ireland	160	75	47	22	6	3	1	0	0	0	214	100	54	25
Scotland	877	81	203	19	9	1	0	0	0	0	1089	100	212	19
United Kingdom	**8265**	**75**	**2560**	**23**	**190**	**2**	**9**	**0**	**0**	**0**	**11024**	**100**	**2759**	**25**

Table 66 : 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	198	67	88	30	9	3	1	0	1	0	297	100	98	33
East Midlands	90	69	38	29	3	2	0	0	0	0	131	100	41	31
East of England	155	71	53	24	5	2	4	2	0	0	217	100	62	29
London	187	73	61	24	8	3	0	0	0	0	256	100	69	27
South East Coast	135	64	65	31	7	3	3	1	0	0	210	100	75	36
South Central	79	70	32	28	2	2	0	0	0	0	113	100	34	30
South West	138	64	60	28	17	8	1	0	0	0	216	100	78	36
West Midlands	139	69	55	27	8	4	0	0	0	0	202	100	63	31
North West	166	70	62	26	10	4	0	0	0	0	238	100	72	30
Wales	90	63	45	32	6	4	1	1	0	0	142	100	52	37
Northern Ireland	36	72	13	26	1	2	0	0	0	0	50	100	14	28
Scotland	172	83	34	16	2	1	0	0	0	0	208	100	36	17
United Kingdom	**1585**	**70**	**606**	**27**	**78**	**3**	**10**	**0**	**1**	**0**	**2280**	**100**	**694**	**30**

Table 67 : 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	1266	78	351	22	14	1	1	0	1632	100	365	22
East Midlands	733	81	162	18	13	1	0	0	908	100	175	19
East of England	898	77	255	22	15	1	0	0	1168	100	270	23
London	941	76	276	22	16	1	0	0	1233	100	292	24
South East Coast	830	79	194	19	24	2	0	0	1048	100	218	21
South Central	746	82	154	17	12	1	0	0	912	100	166	18
South West	871	76	252	22	19	2	0	0	1142	100	271	24
West Midlands	911	79	234	20	13	1	0	0	1158	100	247	21
North West	1134	78	310	21	18	1	0	0	1462	100	328	22
Wales	592	77	160	21	13	2	0	0	765	100	173	23
Northern Ireland	187	77	51	21	5	2	0	0	243	100	56	23
Scotland	1049	83	208	16	7	1	5	0	1269	100	215	17
United Kingdom	**10158**	**79**	**2607**	**20**	**169**	**1**	**6**	**0**	**12940**	**100**	**2776**	**21**

Table 68 : 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	6	67	3	33	0	0	0	0	9	100	3	33
East Midlands	-	-	-	-	-	-	-	-	-	-	-	-
East of England	0	0	1	100	0	0	0	0	1	100	1	100
London	2	100	0	0	0	0	0	0	2	100	0	0
South East Coast	3	100	0	0	0	0	0	0	3	100	0	0
South Central	3	100	0	0	0	0	0	0	3	100	0	0
South West	3	60	2	40	0	0	0	0	5	100	2	40
West Midlands	3	100	0	0	0	0	0	0	3	100	0	0
North West	10	91	1	9	0	0	0	0	11	100	1	9
Wales	1	100	0	0	0	0	0	0	1	100	0	0
Northern Ireland	5	100	0	0	0	0	0	0	5	100	0	0
Scotland	3	75	1	25	0	0	0	0	4	100	1	25
United Kingdom	**39**	**83**	**8**	**17**	**0**	**0**	**0**	**0**	**47**	**100**	**8**	**17**

Table 69 : 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	32	42	38	50	6	8	0	0	76	100	44	58
East Midlands	18	38	26	55	3	6	0	0	47	100	29	62
East of England	19	31	41	66	2	3	0	0	62	100	43	69
London	30	37	46	56	6	7	0	0	82	100	52	63
South East Coast	27	44	33	53	2	3	0	0	62	100	35	56
South Central	22	56	16	41	1	3	0	0	39	100	17	44
South West	27	33	48	59	7	9	0	0	82	100	55	67
West Midlands	21	40	28	53	4	8	0	0	53	100	32	60
North West	40	43	48	51	6	6	0	0	94	100	54	57
Wales	23	48	23	48	2	4	0	0	48	100	25	52
Northern Ireland	13	68	4	21	2	11	0	0	19	100	6	32
Scotland	52	64	27	33	2	2	0	0	81	100	29	36
United Kingdom	**324**	**43**	**378**	**51**	**43**	**6**	**0**	**0**	**745**	**100**	**421**	**57**

Table 70 : 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	286	71	107	26	10	2	1	0	404	100	117	29
East Midlands	146	78	38	20	3	2	0	0	187	100	41	22
East of England	194	71	69	25	9	3	0	0	272	100	78	29
London	252	76	70	21	8	2	1	0	331	100	78	24
South East Coast	186	70	68	26	11	4	0	0	265	100	79	30
South Central	114	75	37	24	2	1	0	0	153	100	39	25
South West	200	72	60	22	19	7	0	0	279	100	79	28
West Midlands	189	72	67	25	7	3	0	0	263	100	74	28
North West	252	76	67	20	11	3	0	0	330	100	78	24
Wales	117	67	50	29	7	4	0	0	174	100	57	33
Northern Ireland	56	82	11	16	1	1	0	0	68	100	12	18
Scotland	231	87	33	12	2	1	0	0	266	100	35	13
United Kingdom	**2223**	**74**	**677**	**23**	**90**	**3**	**2**	**0**	**2992**	**100**	**767**	**26**

Table 71 : Repeat BCS (all cancers) with initial BCS and a non-operative diagnosis			
Region	All cancers with initial BCS (with non-op diagnosis)	Repeat BCS	
		No	%
N East, Yorks & Humber	1630	206	13
East Midlands	863	111	13
East of England	1231	160	13
London	1289	206	16
South East Coast	1141	187	16
South Central	910	99	11
South West	1228	197	16
West Midlands	1205	150	12
North West	1457	189	13
Wales	791	117	15
Northern Ireland	264	29	11
Scotland	1297	126	10
United Kingdom	**13306**	**1777**	**13**

Table 72 : Converted to mastectomy (all cancers) with initial BCS and a non-operative diagnosis			
Region	All cancers with initial BCS (with non-op diagnosis)	Converted to Mx	
		No	%
N East, Yorks & Humber	1630	122	7
East Midlands	863	63	7
East of England	1231	92	7
London	1289	77	6
South East Coast	1141	47	4
South Central	910	58	6
South West	1228	94	8
West Midlands	1205	73	6
North West	1457	98	7
Wales	791	54	7
Northern Ireland	264	25	9
Scotland	1297	52	4
United Kingdom	**13306**	**855**	**6**

Table 73 : 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	2194	457	21	123	6	59	3
East Midlands	1170	278	24	63	5	2	0
East of England	1540	230	15	92	6	54	4
London	1692	317	19	77	5	30	2
South East Coast	1404	230	16	47	3	11	1
South Central	1139	196	17	58	5	9	1
South West	1538	260	17	94	6	20	1
West Midlands	1522	253	17	73	5	41	3
North West	1928	427	22	98	5	20	1
Wales	1002	182	18	54	5	12	1
Northern Ireland	341	73	21	25	7	-	0
Scotland	1658	323	19	52	3	4	0
United Kingdom	**17128**	**3226**	**19**	**856**	**5**	**262**	**2**

Table 74 : 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	2194	1917	87	277
East Midlands	1180	748	63	432
East of England	1587	1301	82	286
London	1688	1308	77	380
South East Coast	1459	1191	82	268
South Central	1178	1005	85	173
South West	1562	1265	81	297
West Midlands	1552	1359	88	193
North West	1968	1545	79	423
Wales	1029	750	73	279
Northern Ireland	350	291	83	59
Scotland	1681	0	0	1681
United Kingdom	**15747**	**12680**	**81**	**3067**

Table 75 : 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	2194	2184	100	2111	96
East Midlands	1180	1176	100	799	68
East of England	1587	1579	99	1469	93
London	1688	1679	99	1478	88
South East Coast	1459	1449	99	1288	88
South Central	1178	1166	99	1086	92
South West	1562	1539	99	1483	95
West Midlands	1552	1545	100	1510	97
North West	1968	1952	99	1724	88
Wales	1029	1013	98	894	87
Northern Ireland	350	350	100	325	93
Scotland	1681	7	0	7	0
United Kingdom	**15747**	**15632**	**99**	**14167**	**90**

Table 76 : Margin information of final operations for cases treated by breast conserving surgery (BCS)							
Region	Total cases with surgery	Margin clear		Margin not clear		Margin unknown	
		No.	%	No.	%	No.	%
N East, Yorks & Humber	1549	1526	99	16	1	7	0
East Midlands	830	814	98	14	2	2	0
East of England	1202	1179	98	21	2	2	0
London	1254	1213	97	36	3	5	0
South East Coast	1161	1093	94	68	6	0	0
South Central	905	874	97	26	3	5	1
South West	1184	1128	95	35	3	21	2
West Midlands	1175	1159	99	12	1	4	0
North West	1418	1345	95	49	3	24	2
Wales	774	766	99	6	1	2	0
Northern Ireland	252	246	98	6	2	0	0
Scotland	1295	0	0	0	0	1295	100
United Kingdom	**11704**	**11343**	**97**	**289**	**2**	**72**	**1**

Table 77 : Margin information of final operations for cases treated by mastectomy							
Region	Total cases with surgery	Margin clear		Margin not clear		Margin unknown	
		No.	%	No.	%	No.	%
N East, Yorks & Humber	645	632	98	6	1	7	1
East Midlands	350	348	99	2	1	0	0
East of England	385	372	97	5	1	8	2
London	434	425	98	7	2	2	0
South East Coast	298	280	94	14	5	4	1
South Central	273	262	96	4	1	7	3
South West	378	359	95	9	2	10	3
West Midlands	377	366	97	3	1	8	2
North West	550	526	96	11	2	13	2
Wales	255	243	95	6	2	6	2
Northern Ireland	98	93	95	5	5	0	0
Scotland	381	0	0	0	0	381	100
United Kingdom	**4043**	**3906**	**97**	**72**	**2**	**65**	**2**

Table 78 : Axillary ultrasound record for invasive cancers							
Region	Had axillary ultrasound		Did not have axillary ultrasound		Unknown		Total
	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1282	72	487	28	1	0	1770
East Midlands	961	97	28	3	0	0	989
East of England	1060	82	212	16	14	1	1286
London	886	65	457	33	27	2	1370
South East Coast	819	71	294	26	34	3	1147
South Central	829	83	164	16	9	1	1002
South West	820	65	441	35	10	1	1271
West Midlands	1172	93	83	7	4	0	1259
North West	1265	78	339	21	14	1	1618
Wales	675	81	140	17	21	3	836
Northern Ireland	195	71	78	29	0	0	273
Scotland*	-	-	-	-	-	-	-
United Kingdom	**9964**	**78**	**2723**	**21**	**134**	**1**	**12821**

*Scotland did not supply any axillary ultrasound information

Table 79 : Axillary ultrasound result for invasive cancers					
	Normal		Abnormal		Total
Region	No.	%	No.	%	
N East, Yorks & Humber	1022	80	260	20	1282
East Midlands	801	83	160	17	961
East of England	929	88	131	12	1060
London	723	82	163	18	886
South East Coast	726	89	93	11	819
South Central	762	92	67	8	829
South West	707	86	113	14	820
West Midlands	1043	89	129	11	1172
North West	1046	83	219	17	1265
Wales	536	79	139	21	675
Northern Ireland	140	72	55	28	195
Scotland*	-	-	-	-	-
United Kingdom	**8435**	**85**	**1529**	**15**	**9964**

*Excluded cases from Scotland

Table 80 : 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	259	100	1	0	0	0	260
East Midlands	158	99	2	1	0	0	160
East of England	107	82	24	18	0	0	131
London	149	91	14	9	0	0	163
South East Coast	91	98	2	2	0	0	93
South Central	45	67	22	33	0	0	67
South West	94	83	19	17	0	0	113
West Midlands	93	72	36	28	0	0	129
North West	194	89	25	11	0	0	219
Wales	132	95	7	5	0	0	139
Northern Ireland	52	95	3	5	0	0	55
Scotland*	-	-	-	-	-	-	-
United Kingdom	**1374**	**90**	**155**	**10**	**0**	**0**	**1529**

*Excluded cases from Scotland

Table 81 : 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	24	9	124	48	9	3	10	4	92	36	259
East Midlands	25	16	60	38	0	0	5	3	68	43	158
East of England	6	6	33	31	2	2	2	2	64	60	107
London	15	10	90	60	1	1	3	2	40	27	149
South East Coast	11	12	38	42	0	0	0	0	42	46	91
South Central	6	13	12	27	2	4	2	4	23	51	45
South West	15	16	36	38	2	2	3	3	38	40	94
West Midlands	22	24	40	43	1	1	1	1	29	31	93
North West	9	5	109	56	3	2	9	5	64	33	194
Wales	30	23	45	34	3	2	2	2	52	39	132
Northern Ireland	3	6	37	71	1	2	1	2	10	19	52
Scotland*	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**166**	**12**	**624**	**45**	**24**	**2**	**38**	**3**	**522**	**38**	**1374**

*Excluded cases from Scotland

Table 82 : 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	0	0	2	100	0	0	0	0	0	0	2
East Midlands	-	-	-	-	-	-	-	-	-	-	-
East of England	9	23	29	73	0	0	0	0	2	5	40
London	1	7	8	53	1	7	0	0	5	33	15
South East Coast	1	25	3	75	0	0	0	0	0	0	4
South Central	1	11	3	33	0	0	0	0	5	56	9
South West	1	20	2	40	0	0	0	0	2	40	5
West Midlands	0	0	2	50	0	0	0	0	2	50	4
North West	2	33	4	67	0	0	0	0	0	0	6
Wales	1	50	1	50	0	0	0	0	0	0	2
Northern Ireland	1	11	8	89	0	0	0	0	0	0	9
Scotland*	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**17**	**18**	**62**	**65**	**1**	**1**	**0**	**0**	**16**	**17**	**96**

*Excluded cases from Scotland

Table 83 : Positive predictive value of the axillary biopsy results for invasive cancers with an abnormal axillary ultrasound result										
	C1/B1		**C2/B2**		**C3/B3**		**C4/B4**		**C5/B5**	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	10	43	18	15	2	25	3	30	79	100
East Midlands	6	24	8	14	-	-	3	75	49	100
East of England	3	60	4	13	1	50	2	100	46	94
London	7	47	20	24	0	0	1	50	27	96
South East Coast	2	29	6	19	-	-	-	-	33	97
South Central	5	83	8	67	1	50	1	100	17	100
South West	4	31	10	29	1	50	2	100	28	97
West Midlands	11	52	8	21	1	100	1	100	25	100
North West	2	22	19	18	1	50	7	88	52	96
Wales	11	37	10	23	1	33	1	50	44	94
Northern Ireland	0	0	6	16	0	0	1	100	8	100
Scotland*	-	-	-	-	-	-	-	-	-	-
United Kingdom	**61**	**39**	**117**	**20**	**8**	**36**	**22**	**67**	**408**	**97**

*Excluded cases from Scotland
*Excluded cases with neo-adjuvant therapy

Table 84 : 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	10	43	18	15	2	25	3	30	79	100
East Midlands	6	24	8	14	-	-	3	75	49	100
East of England	7	50	10	16	1	50	2	100	48	94
London	7	44	22	24	1	50	1	50	31	94
South East Coast	2	25	8	24	-	-	-	-	33	97
South Central	6	86	8	57	1	50	1	100	20	100
South West	4	29	10	28	1	50	2	100	29	97
West Midlands	11	52	10	25	1	100	1	100	27	100
North West	3	27	20	19	1	50	7	88	52	96
Wales	11	35	10	22	1	33	1	50	44	94
Northern Ireland	1	25	9	20	0	0	1	100	8	100
Scotland*	-	-	-	-	-	-	-	-	-	-
United Kingdom	**68**	**39**	**133**	**20**	**9**	**39**	**22**	**67**	**420**	**97**

*Excluded cases from Scotland
*Excluded cases with neo-adjuvant therapy

Table 85 : 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	381	79	21
East Midlands	187	49	26
East of England	265	48	18
London	297	34	11
South East Coast	237	41	17
South Central	235	21	9
South West	248	32	13
West Midlands	238	27	11
North West	337	53	16
Wales	162	44	27
Northern Ireland	58	8	14
Scotland	-	-	-
United Kingdom	**2645**	**436**	**16**

*Excluded cases from Scotland
*Excluded cases with neo-adjuvant therapy

Table 86 : 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	1432	269	19
East Midlands	805	121	15
East of England	1088	197	18
London	1101	223	20
South East Coast	922	176	19
South Central	892	198	22
South West	1093	196	18
West Midlands	1093	187	17
North West	1338	250	19
Wales	673	95	14
Northern Ireland	206	39	19
Scotland	1329	292	22
United Kingdom	11972	2243	19

*Excluded cases with neo-adjuvant therapy

Table 87 : 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	1739	1726	99	0	0	12	1	1	0
East Midlands	968	962	99	0	0	6	1	0	0
East of England	1265	1247	99	0	0	18	1	0	0
London	1338	1312	98	0	0	25	2	1	0
South East Coast	1129	1105	98	0	0	24	2	0	0
South Central	986	975	99	0	0	11	1	0	0
South West	1250	1235	99	0	0	15	1	0	0
West Midlands	1245	1234	99	0	0	11	1	0	0
North West	1599	1569	98	0	0	30	2	0	0
Wales	826	811	98	0	0	15	2	0	0
Northern Ireland	269	268	100	0	0	1	0	0	0
Scotland	1380	1367	99	0	0	8	1	5	0
United Kingdom	**13994**	**13811**	**99**	**0**	**0**	**176**	**1**	**7**	**0.1**

Table 88 : 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	1279	74	448	26	0	0	1727	100
East Midlands	700	73	262	27	0	0	962	100
East of England	945	76	302	24	0	0	1247	100
London	1113	85	200	15	0	0	1313	100
South East Coast	727	66	378	34	0	0	1105	100
South Central	708	72	268	27	1	0	977	100
South West	1044	85	171	14	18	1	1233	100
West Midlands	993	81	240	19	0	0	1233	100
North West	1174	75	395	25	0	0	1569	100
Wales	657	81	156	19	0	0	813	100
Northern Ireland	218	81	50	19	0	0	268	100
Scotland	977	71	390	29	0	0	1367	100
United Kingdom	**10535**	**76**	**3260**	**24**	**19**	**0**	**13814**	**100**

Table 89 : 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	448	1	0	17	4	430	96	0	0
East Midlands	262	0	0	15	6	247	94	0	0
East of England	302	1	0	22	7	279	92	0	0
London	200	0	0	12	6	188	94	0	0
South East Coast	378	0	0	47	12	331	88	0	0
South Central	269	0	0	8	3	261	97	0	0
South West	189	0	0	21	11	168	89	0	0
West Midlands	240	0	0	19	8	221	92	0	0
North West	395	0	0	55	14	340	86	0	0
Wales	156	1	1	44	28	111	71	0	0
Northern Ireland	50	0	0	1	2	49	98	0	0
Scotland	390	0	0	22	6	368	94	0	0
United Kingdom	**3279**	**3**	**0**	**283**	**9**	**2993**	**91**	**0**	**0**

Table 90 : Nodal status of invasive cancers with known status					
	Total known nodal status	Positive		Negative	
Region		No.	%	No.	%
N East, Yorks & Humber	1726	404	23	1322	77
East Midlands	962	199	21	763	79
East of England	1247	276	22	971	78
London	1312	319	24	993	76
South East Coast	1105	265	24	840	76
South Central	975	256	26	719	74
South West	1235	264	21	971	79
West Midlands	1234	252	20	982	80
North West	1569	357	23	1212	77
Wales	811	165	20	646	80
Northern Ireland	268	60	22	208	78
Scotland	1367	311	23	1056	77
United Kingdom	**13811**	**3128**	**23**	**10683**	**77**

Table 91 : 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	203	16	1076	84	201	45	246	55
East Midlands	102	15	598	85	97	37	165	63
East of England	148	16	797	84	128	42	174	58
London	205	18	907	81	114	57	86	43
South East Coast	126	17	601	83	139	37	239	63
South Central	154	22	552	78	102	38	166	62
South West	156	15	888	85	102	60	71	42
West Midlands	168	17	825	83	84	35	157	65
North West	195	17	979	83	162	41	233	59
Wales	92	14	564	86	73	47	82	53
Northern Ireland	36	17	182	83	24	48	26	52
Scotland	184	19	793	81	127	33	263	67
United Kingdom	**1769**	**17**	**8762**	**83**	**1353**	**42**	**1908**	**59**

Table 92 : 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	24	96	1	4	25	31	17	147	83	178
East Midlands	17	100	0	0	17	24	28	61	72	85
East of England	5	100	0	0	5	45	31	98	69	143
London	32	100	0	0	32	39	23	134	77	173
South East Coast	14	100	0	0	14	38	34	74	66	112
South Central	18	100	0	0	18	77	57	59	43	136
South West	11	92	1	8	12	39	27	105	73	144
West Midlands	12	100	0	0	12	36	23	120	77	156
North West	20	95	1	5	21	17	10	157	90	174
Wales	6	100	0	0	6	7	8	79	92	86
Northern Ireland	2	100	0	0	2	8	24	26	76	34
Scotland	26	96	1	4	27	71	45	86	55	157
United Kingdom	**187**	**98**	**4**	**2**	**191**	**432**	**27**	**1146**	**73**	**1578**

Table 93 : Status of invasive cases with <4 nodes obtained													
	Total with nodal status known	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	1726	775	44.9	25	1.4	2	0.1	733	42.5	15	0.9	0	0
East Midlands	962	431	44.8	17	1.8	3	0.3	399	41.5	12	1.2	0	0
East of England	1247	548	43.9	5	0.4	0	0.0	520	41.7	23	1.8	0	0
London	1312	716	54.6	32	2.4	2	0.2	672	51.2	10	0.8	0	0
South East Coast	1105	527	47.7	14	1.3	6	0.5	466	42.2	41	3.7	0	0
South Central	975	469	48.1	18	1.8	1	0.1	443	45.4	7	0.7	0	0
South West	1235	704	57.0	12	1.0	3	0.2	670	54.3	19	1.5	0	0
West Midlands	1234	599	48.5	12	1.0	3	0.2	567	45.9	17	1.4	0	0
North West	1569	812	51.8	21	1.3	4	0.3	736	46.9	51	3.3	0	0
Wales	811	520	64.1	6	0.7	2	0.2	470	58.0	42	5.2	0	0
Northern Ireland	268	141	52.6	2	0.7	0	0.0	138	51.5	1	0.4	0	0
Scotland	1367	588	43.0	27	2.0	2	0.1	539	39.4	20	1.5	0	0
United Kingdom	**13811**	**6830**	**49.5**	**191**	**1.4**	**28**	**0.2**	**6353**	**46.0**	**258**	**1.9**	**0**	**0**

Table 94 : 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	449	163	36	0	0	285	63	1	0
East Midlands	217	81	37	0	0	136	63	0	0
East of England	310	102	33	0	0	208	67	0	0
London	356	102	29	0	0	253	71	1	0
South East Coast	315	78	25	0	0	237	75	0	0
South Central	186	59	32	0	0	127	68	0	0
South West	314	102	32	0	0	212	68	0	0
West Midlands	307	109	36	0	0	198	64	0	0
North West	365	115	32	0	0	250	68	0	0
Wales	205	55	27	0	0	150	73	0	0
Northern Ireland	79	22	28	0	0	57	72	0	0
Scotland	301	81	27	0	0	219	73	1	0
United Kingdom	**3404**	**1069**	**31**	**0**	**0**	**2332**	**69**	**3**	**0**

Table 95 : Treatment for non-invasive cancers with known nodal status						
Region	With known nodal status		Total Conservation	With known nodal status		Total mastectomy
	No.	%		No.	%	
N East, Yorks & Humber	29	10	300	134	90	149
East Midlands	12	9	138	69	87	79
East of England	31	14	229	71	88	81
London	24	9	262	78	84	93
South East Coast	19	8	241	59	80	74
South Central	13	10	135	46	90	51
South West	23	11	217	79	81	97
West Midlands	28	13	210	81	84	97
North West	17	7	245	98	82	120
Wales	19	12	157	36	75	48
Northern Ireland	4	7	59	18	90	20
Scotland	13	6	226	68	91	75
United Kingdom	**232**	**10**	**2419**	**837**	**85**	**984**

Table 96 : Nodal status of non-invasive cancers					
Region	Total known nodal status	Positive		Negative	
		No.	%	No.	%
N East, Yorks & Humber	163	1	1	162	99
East Midlands	81	0	0	81	100
East of England	102	0	0	102	100
London	102	1	1	101	99
South East Coast	78	0	0	78	100
South Central	59	0	0	59	100
South West	102	0	0	102	100
West Midlands	109	0	0	109	100
North West	115	1	1	114	99
Wales	55	0	0	55	100
Northern Ireland	22	0	0	22	100
Scotland	81	3	4	78	96
United Kingdom	**1069**	**6**	**1**	**1063**	**99**

Table 97 : Mean, median & maximum number of nodes obtained (non-invasive cancers)							
	Total with nodal status known	Conservation			Mastectomy		
Region		Mean	Median	Maximum	Mean	Median	Maximum
N East, Yorks & Humber	163	3	2	6	4	3	22
East Midlands	81	3	1.5	9	4	3	14
East of England	102	3	2	9	3	3	13
London	102	3	2	14	4	3	44
South East Coast	78	2	2	10	3	2	13
South Central	59	3	2	8	3	2.5	10
South West	102	2	2	4	3	3	16
West Midlands	109	3	2	11	3	3	14
North West	115	2	2	8	3	2	13
Wales	55	2	2	4	4	3	13
Northern Ireland	22	2	2	3	3	3	8
Scotland	81	3	4	7	4	3	21
United Kingdom	**1069**	**3**	**2**	**14**	**4**	**3**	**44**

Table 98 : Sentinel lymph node procedure for non-invasive cancers with a mastectomy and known nodal status									
	With SLNB		Without SLNB		Unknown SLNB		Total non-invasive cancers with surgery	Total with known nodal status	% determined on basis of SLNB
Region	No.	%	No.	%	No.	%			
N East, Yorks & Humber	104	70	30	20	0	0.0	149	134	78
East Midlands	54	68	15	19	0	0.0	79	69	78
East of England	56	69	15	19	0	0.0	81	71	79
London	63	68	15	16	0	0.0	93	78	81
South East Coast	40	54	19	26	0	0.0	74	59	68
South Central	32	63	13	25	1	2.0	51	46	70
South West	71	73	7	7	1	1.0	97	79	90
West Midlands	64	66	17	18	0	0.0	97	81	79
North West	83	69	15	13	0	0.0	120	98	85
Wales	29	60	7	15	0	0.0	48	36	81
Northern Ireland	15	75	3	15	0	0.0	20	18	83
Scotland	43	57	25	33	0	0.0	75	68	63
United Kingdom	**654**	**66**	**181**	**18**	**2**	**0.2**	**984**	**837**	**78**

Table 99 : Sentinel lymph node procedure for non-invasive cancers with conservation surgery and known nodal status									
	With SLNB		Without SLNB		Unknown SLNB		Total non-invasive cancers with surgery	Total with known nodal status	% determined on basis of SLNB
Region	No.	%	No.	%	No.	%			
N East, Yorks & Humber	25	8	4	1	0	0.0	300	29	86
East Midlands	11	8	1	1	0	0.0	138	12	92
East of England	27	12	4	2	0	0.0	229	31	87
London	22	8	2	1	0	0.0	262	24	92
South East Coast	18	7	1	0	0	0.0	241	19	95
South Central	11	8	2	1	0	0.0	135	13	85
South West	21	10	2	1	0	0.0	217	23	91
West Midlands	23	11	5	2	0	0.0	210	28	82
North West	16	7	1	0	0	0.0	245	17	94
Wales	15	10	4	3	0	0.0	157	19	79
Northern Ireland	4	7	0	0	0	0.0	59	4	100
Scotland	12	5	1	0	0	0.0	226	13	92
United Kingdom	**205**	**8**	**27**	**1**	**0**	**0.0**	**2419**	**232**	**88**

Table 100 : 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	1632	100	1624	100	1	0	9	89	7	78	1	11	76	96	37	49	36	47
East Midlands	908	99	902	99	0	0	-	-	-	-	-	-	47	100	22	47	25	53
East of England	1168	99	1155	99	0	0	1	100	0	0	1	100	62	94	25	40	33	53
London	1233	99	1221	99	0	0	2	100	2	100	0	0	82	90	34	41	40	49
South East Coast	1048	98	1024	98	5	0	3	100	3	100	0	0	62	95	32	52	27	44
South Central	912	99	906	99	0	0	3	100	3	100	0	0	39	97	21	54	17	44
South West	1142	99	1127	99	2	0	5	100	4	80	1	20	82	95	36	44	42	51
West Midlands	1158	99	1150	99	0	0	3	100	3	100	0	0	53	94	29	55	21	40
North West	1462	99	1435	98	6	0	11	100	11	100	0	0	94	93	48	51	39	41
Wales	765	99	756	99	0	0	1	100	1	100	0	0	48	94	31	65	14	29
Northern Ireland	243	100	241	99	1	0	5	100	5	100	0	0	19	100	13	68	6	32
Scotland	1264	100	1259	100	0	0	4	75	3	75	0	0	81	100	67	83	14	17
United Kingdom	**12935**	**99**	**12800**	**99**	**15**	**0**	**47**	**96**	**42**	**89**	**3**	**6**	**745**	**95**	**395**	**53**	**314**	**42**

Table 101 : Repeat axillary operations for invasive cancers with positive nodal status							
	Re ax op & with SLNB		Re ax op & without/unknown SLNB		Total invasive with positive nodal status	Total with repeat axillary operation	% repeat operation after SLNB
Region	No	%	No	%			
N East, Yorks & Humber	148	37	36	9	404	184	80
East Midlands	61	31	13	7	199	74	82
East of England	98	36	20	7	276	118	83
London	134	42	11	3	319	145	92
South East Coast	74	28	17	6	265	91	81
South Central	59	23	6	2	256	65	91
South West	106	40	9	3	264	115	92
West Midlands	120	48	6	2	252	126	95
North West	158	44	34	10	357	192	82
Wales	79	48	11	7	165	90	88
Northern Ireland	26	43	2	3	60	28	93
Scotland	87	28	17	5	311	104	84
United Kingdom	**1150**	**37**	**182**	**6**	**3128**	**1332**	**86**

APPENDIX F: ADJUVANT THERAPY DATA TABLES (102 – 141)

ADJUVANT THERAPY AUDIT WITH TUMOUR DATA FROM THE 2009/10 AUDIT OF SCREEN-DETECTED BREAST CANCERS

Table 102 : 2009/10 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	2163	0	0	16	1	2147	99	2069	96
East Midlands	1260	0	0	33	3	1227	97	1227	97
East of England	1646	0	0	24	1	1622	99	1476	90
London	1665	27	2	47	3	1591	96	1555	93
South East Coast	1407	0	0	51	4	1356	96	1295	92
South Central	1160	0	0	40	3	1120	97	1093	94
South West	1605	0	0	37	2	1568	98	1529	95
West Midlands	1515	0	0	174	11	1341	89	1324	87
North West	1809	0	0	41	2	1768	98	1598	88
Wales	989	0	0	13	1	976	99	953	96
Northern Ireland	399	0	0	3	1	396	99	385	96
Scotland	1400	0	0	4	0	1396	100	1395	100
United Kingdom	**17018**	**27**	**0**	**483**	**3**	**16508**	**97**	**15899**	**93**

* 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 HT		Complete RT,CT & HT	
		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2147	2113	98	2109	98	2119	99	2069	96
East Midlands	1227	1227	100	1227	100	1227	100	1227	100
East of England	1622	1622	100	1622	100	1476	91	1476	91
London	1591	1584	100	1569	99	1570	99	1555	98
South East Coast	1356	1330	98	1307	96	1335	98	1295	96
South Central	1120	1112	99	1104	99	1112	99	1093	98
South West	1568	1557	99	1550	99	1553	99	1529	98
West Midlands	1341	1337	100	1333	99	1331	99	1324	99
North West	1768	1726	98	1649	93	1717	97	1598	90
Wales	976	968	99	964	99	964	99	953	98
Northern Ireland	396	395	100	386	97	387	98	385	97
Scotland	1396	1395	100	1396	100	1396	100	1395	100
United Kingdom	**16508**	**16366**	**99**	**16216**	**98**	**16187**	**98**	**15899**	**96**

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.	%	
NEYH	1301	76	406	24	1707	170	45	212	55	382	1485	70	628	30	2113
East Midlands	760	78	209	22	969	120	48	128	52	248	883	72	344	28	1227
East of England	1020	79	274	21	1294	161	52	149	48	310	1196	74	426	26	1622
London	965	77	283	23	1248	129	39	199	61	328	1096	69	488	31	1584
South East Coast	844	81	194	19	1038	108	38	174	62	282	957	72	373	28	1330
South Central	750	81	175	19	925	62	34	121	66	183	814	73	298	27	1112
South West	1063	85	192	15	1255	104	36	181	64	285	1175	75	382	25	1557
West Midlands	928	85	165	15	1093	110	47	123	53	233	1046	78	291	22	1337
North West	1114	79	289	21	1403	135	44	174	56	309	1255	73	471	27	1726
Wales	611	80	156	20	767	88	45	108	55	196	702	73	266	27	968
Northern Ireland	268	83	55	17	323	40	56	31	44	71	309	78	86	22	395
Scotland	947	81	215	19	1162	126	57	95	43	221	1082	78	313	22	1395
United Kingdom	**10571**	**80**	**2613**	**20**	**13184**	**1353**	**44**	**1695**	**56**	**3048**	**12000**	**73**	**4366**	**27**	**16366**

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.	%	
NEYH	496	29	1214	71	1710	2	1	396	99	398	498	24	1611	76	2109
East Midlands	228	24	741	76	969	1	0	257	100	258	229	19	998	81	1227
East of England	317	24	977	76	1294	2	1	326	99	328	319	20	1303	80	1622
London	333	27	899	73	1232	3	1	334	99	337	336	21	1233	79	1569
South East Coast	244	24	778	76	1022	0	0	285	100	285	244	19	1063	81	1307
South Central	269	29	646	71	915	1	1	187	99	188	270	24	834	76	1104
South West	319	26	928	74	1247	1	0	300	100	301	320	21	1230	79	1550
West Midlands	305	28	784	72	1089	1	0	243	100	244	306	23	1027	77	1333
North West	367	28	967	72	1334	3	1	312	99	315	370	22	1279	78	1649
Wales	175	23	587	77	762	1	0	201	100	202	176	18	788	82	964
Northern Ireland	80	25	235	75	315	1	1	70	99	71	81	21	305	79	386
Scotland	328	28	835	72	1163	0	0	233	100	233	328	23	1068	77	1396
United Kingdom	**3461**	**27**	**9591**	**73**	**13052**	**16**	**1**	**3144**	**99**	**3160**	**3477**	**21**	**12739**	**79**	**16216**

Table 106 : Endocrine therapy															
	Invasive					Non/micro-invasive					Overall				
	HT		No HT		Invasive total	HT		No HT		Non-invasive total	HT		No HT		Overall total
Region	No.	%	No.	%		No.	%	No.	%		No.	%	No.	%	
NEYH	1514	88	204	12	1718	47	12	352	88	399	1562	74	557	26	2119
East Midlands	770	79	199	21	969	53	21	205	79	258	823	67	404	33	1227
East of England	1050	88	140	12	1190	17	6	269	94	286	1067	72	409	28	1476
London	1061	86	174	14	1235	27	8	308	92	335	1088	69	482	31	1570
South East Coast	927	88	123	12	1050	33	12	252	88	285	960	72	375	28	1335
South Central	812	88	113	12	925	23	12	163	88	186	835	75	277	25	1112
South West	1102	88	152	12	1254	26	9	271	91	297	1130	73	423	27	1553
West Midlands	965	89	123	11	1088	13	5	230	95	243	978	73	353	27	1331
North West	1229	89	150	11	1379	86	25	252	75	338	1315	77	402	23	1717
Wales	656	86	108	14	764	30	15	170	85	200	686	71	278	29	964
Northern Ireland	275	87	41	13	316	18	25	53	75	71	293	76	94	24	387
Scotland	1004	86	159	14	1163	10	4	223	96	233	1014	73	382	27	1396
United Kingdom	**11365**	**87**	**1686**	**13**	**13051**	**383**	**12**	**2748**	**88**	**3131**	**11751**	**73**	**4436**	**27**	**16187**

Table 107 : Radiotherapy by number of operations									
	Had RT		Total No Surgery	1 operation		Total 1 op	> 1 operation		Total Re-op
Region	No.	%		No.	%		No.	%	
N East, Yorks & Humber	12	28	43	1155	72	1598	318	63	506
East Midlands	6	26	23	699	74	940	178	67	264
East of England	2	8	24	892	77	1152	302	68	446
London	2	7	28	842	71	1181	252	66	382
South East Coast	4	19	21	690	72	960	263	70	375
South Central	4	24	17	613	75	820	197	70	283
South West	2	17	12	850	76	1117	323	74	439
West Midlands	2	17	12	792	81	978	252	72	351
North West	4	20	20	974	74	1320	277	65	428
Wales	2	10	20	541	75	722	159	68	234
Northern Ireland	0	0	5	238	81	294	71	73	97
Scotland	6	29	21	873	79	1110	203	77	265
United Kingdom	**46**	**19**	**246**	**9159**	**75**	**12192**	**2795**	**69**	**4070**

Table 108 : Radiotherapy by number of operations for invasive cancers									
Region	Had RT		Total No Surgery	1 operation		Total 1 op	> 1 operation		Total Re-op
	No.	%		No.	%		No.	%	
N East, Yorks & Humber	12	31	39	1020	79	1296	269	67	399
East Midlands	5	29	17	621	81	764	134	71	188
East of England	2	9	22	767	82	934	251	74	338
London	2	7	27	739	80	921	224	74	304
South East Coast	4	25	16	616	80	766	224	79	282
South Central	4	25	16	568	83	686	178	78	228
South West	2	20	10	774	86	902	287	82	348
West Midlands	2	18	11	711	87	820	215	81	265
North West	3	18	17	866	81	1070	245	73	337
Wales	2	13	16	484	82	593	125	76	165
Northern Ireland	0	0	4	210	86	245	58	78	74
Scotland	6	33	18	761	83	922	180	81	223
United Kingdom	**44**	**21**	**213**	**8137**	**82**	**9919**	**2390**	**76**	**3151**

Table 109 : Radiotherapy by number of operations for non-invasive cancers									
Region	Had RT		Total No Surgery	1 operation		Total 1 op	> 1 operation		Total Re-op
	No.	%		No.	%		No.	%	
N East, Yorks & Humber	0	0	3	126	44	289	44	45	97
East Midlands	1	17	6	77	45	173	42	61	69
East of England	0	0	2	114	55	206	47	46	102
London	0	0	1	103	40	257	26	36	73
South East Coast	0	0	5	70	37	189	38	43	88
South Central	0	0	1	44	34	130	18	33	54
South West	-	-	0	71	34	207	33	39	84
West Midlands	0	0	1	76	50	153	34	43	80
North West	1	33	3	103	43	240	31	36	87
Wales	0	0	4	55	44	126	33	49	67
Northern Ireland	0	0	1	27	56	48	13	57	23
Scotland	0	0	3	108	60	181	18	49	37
United Kingdom	**2**	**7**	**30**	**974**	**44**	**2199**	**377**	**44**	**861**

Table 110 : Chemotherapy by number of operations for invasive cancers									
Region	Had CT		Total No Surgery	1 operation		Total 1 op	> 1 operation		Total Re-op
	No.	%		No.	%		No.	%	
N East, Yorks & Humber	13	33	39	313	24	1296	170	43	399
East Midlands	9	53	17	153	20	764	66	35	188
East of England	4	18	22	195	21	934	118	35	338
London	9	33	27	211	23	921	113	37	304
South East Coast	4	25	16	156	20	766	84	30	282
South Central	7	44	16	165	24	686	97	43	228
South West	3	30	10	191	21	902	125	36	348
West Midlands	1	9	11	188	23	820	116	44	265
North West	2	12	17	221	21	1070	144	43	337
Wales	4	25	16	116	20	593	55	33	165
Northern Ireland	2	50	4	54	22	245	24	32	74
Scotland	3	17	18	220	24	922	105	47	223
United Kingdom	**61**	**29**	**213**	**2183**	**22**	**9919**	**1217**	**39**	**3151**

Table 111 : Women in each age group treated with breast conserving surgery who had adjuvant therapy recorded							
	Invasive				Non-invasive		
Age group	Radiotherapy %	Chemotherapy %	Endocrine Therapy %	Number of cancers	Radiotherapy %	Endocrine Therapy %	Number of cancers
<=48	92	33	89	36	19	8	16
49	98	34	89	152	62	4	45
50-52	98	32	89	1187	56	4	387
53-55	98	32	86	889	57	3	213
56-58	97	30	87	1019	66	4	240
59-61	96	23	88	1398	60	2	295
62-64	96	18	88	1691	69	3	339
65-67	96	17	90	1495	59	2	286
68-70	95	11	88	1105	58	2	191
71+	92	5	89	589	51	3	126
Total	**96**	**21**	**88**	**9561**	**60**	**3**	**2138**

* with completed data only

Table 112 : Women in each age group treated with mastectomy who had adjuvant therapy recorded							
	Invasive				Non-invasive		
Age group	Radiotherapy %	Chemotherapy %	Endocrine Therapy %	Number of cancers	Radiotherapy %	Endocrine Therapy %	Number of cancers
<=48	29	43	100	14	0	7	5
49	53	61	94	49	0	4	12
50-52	38	54	87	446	5	2	149
53-55	40	52	84	299	6	3	85
56-58	37	49	84	333	0	3	93
59-61	33	49	79	409	4	1	102
62-64	34	39	84	466	3	3	118
65-67	33	37	83	473	1	1	88
68-70	26	28	83	352	2	2	85
71+	31	21	82	238	0	0	50
Total	**34**	**42**	**84**	**3079**	**1**	**2**	**787**

* with completed data only

Table 113 : Combinations of adjuvant therapy for invasive cancers with complete data								
	BCS				Mx			
	Invasive		Non-invasive		Invasive		Non-invasive	
Treatment	No.	%	No.	%	No.	%	No.	%
Surgery & RT & ET	6659	70	186	9	253	8	3	0
Surgery & RT & CT & ET	1495	16	2	0	639	21	2	0
Surgery & ET	242	3	87	4	1316	43	59	7
Surgery & RT & CT	498	5	2	0	147	5	0	0
Surgery & RT	552	6	1092	51	20	1	17	2
Surgery & CT & ET	38	0	1	0	366	12	2	0
Surgery only	60	1	766	36	191	6	703	89
Surgery & CT	17	0	2	0	147	5	1	0
Total	**9561**	**100**	**2138**	**100**	**3079**	**100**	**787**	**100**

Table 114 : 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	11	1	613	66	890	96	912	99	922	100	54
East Midlands	0	0	21	4	302	53	537	94	572	100	574	100	59
East of England	2	0	19	3	417	55	713	94	741	98	751	99	57
London	11	2	44	7	322	50	584	90	625	97	641	99	61
South East Coast	1	0	4	1	195	35	468	83	531	94	556	98	69
South Central	1	0	19	4	268	58	411	89	444	97	456	99	56
South West	0	0	3	0	277	36	649	85	748	97	767	100	67
West Midlands	2	0	7	1	304	48	595	94	631	99	634	100	61
North West	1	0	19	2	486	64	710	93	741	97	759	100	54
Wales	0	0	4	1	168	37	375	84	432	96	448	100	66
Northern Ireland	0	0	5	2	68	34	159	79	196	98	201	100	69
Scotland	1	0	9	1	321	49	606	93	633	97	644	99	61
United Kingdom	**19**	**0**	**165**	**2**	**3741**	**51**	**6697**	**91**	**7206**	**97**	**7353**	**99**	**60**

Table 115 : Time from final surgery to radiotherapy (excluding neo-adjuvant and intra-operative RT cases and cases with chemotherapy) – non-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	106	63	154	92	165	98	166	99	55.5
East Midlands	0	0	3	3	58	49	111	93	119	100	119	100	61
East of England	0	0	5	3	94	59	151	95	157	99	159	100	57
London	1	1	11	10	43	39	96	87	108	98	110	100	67
South East Coast	0	0	1	1	36	36	87	86	97	96	100	99	69
South Central	0	0	0	0	35	59	51	86	57	97	58	98	54
South West	0	0	0	0	33	33	83	82	100	99	101	100	69
West Midlands	0	0	1	1	46	44	93	89	103	98	105	100	64
North West	0	0	4	3	77	63	110	89	120	98	122	99	52
Wales	0	0	0	0	22	25	75	85	85	97	88	100	69.5
Northern Ireland	0	0	1	3	10	26	31	82	36	95	38	100	72
Scotland	1	1	2	2	55	44	118	94	122	98	124	99	63
United Kingdom	**2**	**0**	**28**	**2**	**615**	**47**	**1160**	**90**	**1269**	**98**	**1290**	**100**	**60**

Table 116 : 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	42	5	491	53	805	87	915	98	89
East Midlands	0	0	0	0	35	6	277	48	476	83	555	97	91
East of England	0	0	1	0	49	6	384	51	646	85	741	98	90
London	0	0	1	0	42	6	227	35	473	73	615	95	103
South East Coast	0	0	1	0	6	1	92	16	344	61	537	95	114
South Central	3	1	9	2	39	8	228	48	382	80	462	96	92
South West	0	0	0	0	16	2	200	26	523	68	750	98	107
West Midlands	0	0	0	0	19	3	276	43	518	81	627	98	94
North West	0	0	0	0	61	8	395	52	632	83	746	98	89.5
Wales	0	0	0	0	17	4	183	41	341	76	443	99	96
Northern Ireland	0	0	0	0	13	6	84	42	148	74	199	99	97
Scotland	0	0	0	0	48	7	295	45	533	81	624	95	93
United Kingdom	**3**	**0**	**12**	**0**	**387**	**5**	**3132**	**42**	**5821**	**78**	**7214**	**97**	**96**

Table 117 : Time from assessment to radiotherapy (excluding cases with chemotherapy) – non-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	4	2	68	40	129	77	164	98	97.5
East Midlands	0	0	0	0	2	2	38	32	86	72	117	98	104
East of England	0	0	0	0	7	4	64	40	121	76	156	98	98
London	0	0	0	0	5	5	23	21	71	65	107	97	108.5
South East Coast	0	0	0	0	0	0	11	11	41	41	93	92	128
South Central	0	0	0	0	4	7	24	41	39	66	57	97	105
South West	0	0	0	0	0	0	15	15	55	54	96	95	119
West Midlands	0	0	0	0	1	1	35	33	65	62	104	99	106
North West	0	0	0	0	9	7	54	44	97	78	119	96	93
Wales	0	0	0	0	0	0	22	25	58	66	86	98	103
Northern Ireland	0	0	0	0	1	3	11	29	24	63	36	95	109
Scotland	0	0	0	0	2	2	52	42	104	83	123	98	97
United Kingdom	**0**	**0**	**0**	**0**	**35**	**3**	**417**	**32**	**890**	**69**	**1258**	**97**	**103**

Table 118: 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	64.5
East Midlands	59	47	72
East of England	57	48	70
London	61	45	76
South East Coast	69	55	84
South Central	56	47	72
South West	67	56	83
West Midlands	61	50	73
North West	54	44	66
Wales	66	55	82
Northern Ireland	69	55	88
Scotland	61	42	73
United Kingdom	**60**	**48**	**74**

Table 119 : 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	1707	81	22	1	382	18	2	0	2113	100
East Midlands	969	79	10	1	248	20	0	0	1227	100
East of England	1294	80	18	1	310	19	0	0	1622	100
London	1248	79	8	1	328	21	0	0	1584	100
South East Coast	1038	78	10	1	282	21	0	0	1330	100
South Central	925	83	3	0	183	16	1	0	1112	100
South West	1255	81	15	1	285	18	2	0	1557	100
West Midlands	1093	82	11	1	233	17	0	0	1337	100
North West	1403	81	14	1	309	18	0	0	1726	100
Wales	767	79	5	1	196	20	0	0	968	100
Northern Ireland	323	82	1	0	71	18	0	0	395	100
Scotland	1162	83	12	1	221	16	0	0	1395	100
United Kingdom	**13184**	**81**	**129**	**1**	**3048**	**19**	**5**	**0**	**16366**	**100**

Table 120 : 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	1184	69	486	28	37	2	0	0	1707	100
East Midlands	691	71	261	27	17	2	0	0	969	100
East of England	964	74	308	24	22	2	0	0	1294	100
London	936	75	285	23	27	2	0	0	1248	100
South East Coast	787	76	235	23	16	2	0	0	1038	100
South Central	694	75	217	23	14	2	0	0	925	100
South West	1000	80	245	20	10	1	0	0	1255	100
West Midlands	854	78	228	21	11	1	0	0	1093	100
North West	1027	73	359	26	17	1	0	0	1403	100
Wales	581	76	175	23	11	1	0	0	767	100
Northern Ireland	246	76	73	23	4	1	0	0	323	100
Scotland	865	74	278	24	18	2	1	0	1162	100
United Kingdom	**9829**	**75**	**3150**	**24**	**204**	**2**	**1**	**0**	**13184**	**100**

Table 121 : Radiotherapy for invasive cancers treated by breast conservation surgery						
	Radiotherapy		No radiotherapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	1141	96	43	4	1184	100
East Midlands	673	97	18	3	691	100
East of England	908	94	56	6	964	100
London	870	93	66	7	936	100
South East Coast	759	96	28	4	787	100
South Central	655	94	39	6	694	100
South West	969	97	31	3	1000	100
West Midlands	832	97	22	3	854	100
North West	999	97	28	3	1027	100
Wales	559	96	22	4	581	100
Northern Ireland	236	96	10	4	246	100
Scotland	844	98	21	2	865	100
United Kingdom	**9445**	**96**	**384**	**4**	**9829**	**100**

Table 122 : Invasive cancers treated by breast conservation surgery without radiotherapy							
		>20mm		Grade 3		Nodal status positive	
Region	Total	No	%	No	%	No	%
North, Yorks & Humber	43	9	21	6	14	8	19
East Midlands	18	1	6	0	0	1	6
East of England	56	11	20	9	16	9	16
London	66	15	23	12	18	11	17
South East Coast	28	6	21	4	14	11	39
South Central	39	3	8	2	5	2	5
South West	31	1	3	4	13	2	6
West Midlands	22	3	14	5	23	1	5
North West	28	5	18	0	0	4	14
Wales	22	1	5	3	14	2	9
Northern Ireland	10	2	20	3	30	1	10
Scotland	21	3	14	2	10	2	10
United Kingdom	**384**	**60**	**16**	**50**	**13**	**54**	**14**

Table 123 : Radiotherapy for non-invasive cancers treated by breast conservation surgery						
	Radiotherapy		No radiotherapy		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	165	59	113	41	278	100
East Midlands	118	72	47	28	165	100
East of England	161	67	79	33	240	100
London	127	54	110	46	237	100
South East Coast	106	50	108	50	214	100
South Central	60	45	73	55	133	100
South West	102	47	117	53	219	100
West Midlands	110	69	50	31	160	100
North West	131	62	79	38	210	100
Wales	87	59	60	41	147	100
Northern Ireland	35	71	14	29	49	100
Scotland	126	75	42	25	168	100
United Kingdom	**1328**	**60**	**892**	**40**	**2220**	**100**

Table 124 : Cytonuclear grade of non-invasive cancers treated by breast conservation surgery without radiotherapy												
	High		Intermediate		Low		Not assessable		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	11	10	53	47	33	29	2	2	14	12	113	100
East Midlands	5	11	28	60	10	21	0	0	4	9	47	100
East of England	10	13	26	33	25	32	9	11	9	11	79	100
London	22	20	34	31	31	28	18	16	5	5	110	100
South East Coast	35	32	38	35	20	19	1	1	14	13	108	100
South Central	20	27	27	37	18	25	5	7	3	4	73	100
South West	26	22	54	46	25	21	4	3	8	7	117	100
West Midlands	7	14	24	48	11	22	8	16	0	0	50	100
North West	10	13	42	53	20	25	1	1	6	8	79	100
Wales	7	12	29	48	21	35	3	5	0	0	60	100
Northern Ireland	3	21	3	21	8	57	0	0	0	0	14	100
Scotland	5	12	15	36	8	19	14	33	0	0	42	100
United Kingdom	**161**	**18**	**373**	**42**	**230**	**26**	**65**	**7**	**63**	**7**	**892**	**100**

Table 125 : 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	63	56	23	20	0	0	2	2	25	22	113	100
East Midlands	27	57	13	28	0	0	0	0	7	15	47	100
East of England	48	61	11	14	0	0	8	10	12	15	79	100
London	51	46	25	23	5	5	16	15	13	12	110	100
South East Coast	66	61	17	16	4	4	0	0	21	19	108	100
South Central	42	58	21	29	1	1	4	5	5	7	73	100
South West	72	62	32	27	2	2	3	3	8	7	117	100
West Midlands	31	62	15	30	1	2	3	6	0	0	50	100
North West	35	44	24	30	2	3	1	1	17	22	79	100
Wales	38	63	13	22	0	0	3	5	6	10	60	100
Northern Ireland	9	64	3	21	1	7	0	0	1	7	14	100
Scotland	29	69	5	12	1	2	5	12	2	5	42	100
United Kingdom	**511**	**57**	**202**	**23**	**17**	**2**	**45**	**5**	**117**	**13**	**892**	**100**

Table 126 : Chemotherapy for node positive invasive cancers						
	Chemotherapy		No chemotherapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	270	69	119	31	389	100
East Midlands	123	71	51	29	174	100
East of England	183	64	103	36	286	100
London	173	68	82	32	255	100
South East Coast	143	61	93	39	236	100
South Central	165	78	47	22	212	100
South West	158	67	79	33	237	100
West Midlands	151	72	58	28	209	100
North West	202	68	96	32	298	100
Wales	90	66	47	34	137	100
Northern Ireland	49	70	21	30	70	100
Scotland	178	66	93	34	271	100
United Kingdom	**1885**	**68**	**889**	**32**	**2774**	**100**

Table 127 : Nodal status positive invasive cancers without chemotherapy					
	Total	Grade 3		HER2 positive	
Region	No	No	%	No	%
North, Yorks & Humber	119	9	8	5	4
East Midlands	51	2	4	1	2
East of England	103	26	25	7	7
London	82	8	10	5	6
South East Coast	93	18	19	3	3
South Central	47	5	11	2	4
South West	79	11	14	6	8
West Midlands	58	10	17	1	2
North West	96	8	8	5	5
Wales	47	5	11	3	6
Northern Ireland	21	2	10	0	0
Scotland	93	13	14	1	1
United Kingdom	**889**	**117**	**13**	**39**	**4**

Table 128 : 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	1751	83	243	11	125	6	2119	100
East Midlands	978	80	106	9	143	12	1227	100
East of England	1157	78	123	8	196	13	1476	100
London	1215	77	139	9	216	14	1570	100
South East Coast	1070	80	121	9	144	11	1335	100
South Central	874	79	119	11	119	11	1112	100
South West	1299	84	146	9	108	7	1553	100
West Midlands	1085	82	122	9	124	9	1331	100
North West	1465	85	142	8	110	6	1717	100
Wales	716	74	92	10	156	16	964	100
Northern Ireland	318	82	47	12	22	6	387	100
Scotland	1124	81	155	11	117	8	1396	100
United Kingdom	**13052**	**81**	**1555**	**10**	**1580**	**10**	**16187**	**100**

Table 129 : 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	1536	88	9	1	205	12	1	0	1751	100
East Midlands	886	91	3	0	89	9	0	0	978	100
East of England	1083	94	6	1	68	6	0	0	1157	100
London	1104	91	3	0	108	9	0	0	1215	100
South East Coast	947	89	4	0	119	11	0	0	1070	100
South Central	819	94	1	0	54	6	0	0	874	100
South West	1141	88	6	0	151	12	1	0	1299	100
West Midlands	991	91	5	0	89	8	0	0	1085	100
North West	1269	87	6	0	190	13	0	0	1465	100
Wales	673	94	1	0	42	6	0	0	716	100
Northern Ireland	278	87	0	0	40	13	0	0	318	100
Scotland	1022	91	8	1	94	8	0	0	1124	100
United Kingdom	**11749**	**90**	**52**	**0**	**1249**	**10**	**2**	**0**	**13052**	**100**

Table 130 : Endocrine therapy for ER positive invasive cancers						
	Endocrine therapy		No endocrine therapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	1498	98	38	2	1536	100
East Midlands	768	87	118	13	886	100
East of England	1037	96	46	4	1083	100
London	1031	93	73	7	1104	100
South East Coast	913	96	34	4	947	100
South Central	801	98	18	2	819	100
South West	1098	96	43	4	1141	100
West Midlands	963	97	28	3	991	100
North West	1221	96	48	4	1269	100
Wales	653	97	20	3	673	100
Northern Ireland	272	98	6	2	278	100
Scotland	995	97	27	3	1022	100
United Kingdom	**11250**	**96**	**499**	**4**	**11749**	**100**

Table 131 : ER positive invasive cancers without endocrine therapy							
	Total	>20mm		Grade 3		Nodal status positive	
Region	cases	No.	%	No.	%	No.	%
N East, Yorks & Humber	38	3	8	4	11	3	8
East Midlands	118	0	0	4	3	0	0
East of England	46	0	0	4	9	2	4
London	73	11	15	9	12	8	11
South East Coast	34	10	29	8	24	12	35
South Central	18	1	6	4	22	2	11
South West	43	2	5	1	2	2	5
West Midlands	28	4	14	4	14	1	4
North West	48	8	17	8	17	7	15
Wales	20	1	5	4	20	2	10
Northern Ireland	6	3	50	1	17	1	17
Scotland	27	4	15	5	19	5	19
United Kingdom	**499**	**47**	**9**	**56**	**11**	**45**	**9**

Table 132 : Endocrine therapy for ER negative, PgR positive invasive cancers						
	Endocrine therapy		No endocrine therapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	4	100	0	0	4	100
East Midlands	2	100	0	0	2	100
East of England	4	100	0	0	4	100
London	4	50	4	50	8	100
South East Coast	5	100	0	0	5	100
South Central	2	50	2	50	4	100
South West	3	100	0	0	3	100
West Midlands	0	0	1	100	1	100
North West	2	40	3	60	5	100
Wales	0	0	1	100	1	100
Northern Ireland	1	100	0	0	1	100
Scotland	3	50	3	50	6	100
United Kingdom	**30**	**68**	**14**	**32**	**44**	**100**

Table 133 : Endocrine therapy for all ER negative cancers						
	Endocrine therapy		No endocrine therapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	14	6	229	94	243	100
East Midlands	2	2	104	98	106	100
East of England	10	8	113	92	123	100
London	18	13	121	87	139	100
South East Coast	10	8	111	92	121	100
South Central	11	9	108	91	119	100
South West	5	3	141	97	146	100
West Midlands	1	1	121	99	122	100
North West	7	5	135	95	142	100
Wales	2	2	90	98	92	100
Northern Ireland	2	4	45	96	47	100
Scotland	4	3	151	97	155	100
United Kingdom	**86**	**6**	**1469**	**94**	**1555**	**100**

Table 134 : ER status for non/micro-invasive cancers with endocrine therapy								
	ER positive		ER negative		ER Not done or Unknown		Total*	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	41	11	0	0	6	2	47	12
East Midlands	39	16	0	0	14	6	53	21
East of England	15	5	0	0	2	1	17	5
London	20	6	1	0	6	2	27	8
South East Coast	30	11	2	1	1	0	33	12
South Central	21	11	0	0	2	1	23	12
South West	24	8	1	0	1	0	26	9
West Midlands	13	6	0	0	0	0	13	6
North West	84	25	1	0	1	0	86	26
Wales	26	13	0	0	4	2	30	15
Northern Ireland	18	25	0	0	0	0	18	25
Scotland	9	4	0	0	1	0	10	5
United Kingdom	**340**	**11**	**5**	**0**	**38**	**1**	**383**	**12**

*Number of non-invasive cancers with endocrine therapy as a percentage of the number of non-invasive cancers

Table 135 : Endocrine therapy for ER positive non/micro-invasive cancers						
	Endocrine therapy		No endocrine therapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	41	19	173	81	214	100
East Midlands	39	42	53	58	92	100
East of England	15	20	59	80	74	100
London	20	18	91	82	111	100
South East Coast	30	24	93	76	123	100
South Central	21	38	34	62	55	100
South West	24	15	133	85	157	100
West Midlands	13	14	81	86	94	100
North West	84	43	112	57	196	100
Wales	26	60	17	40	43	100
Northern Ireland	18	45	22	55	40	100
Scotland	9	9	93	91	102	100
United Kingdom	**340**	**26**	**961**	**74**	**1301**	**100**

Table 136 : Invasive status, nodal status and ER status of cancers with known chemotherapy data														
	Invasive						Micro-invasive		Non-invasive		Invasive status unknown		Total	
	ER negative Node negative		ER negative Node positive		Other									
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	131	6	46	2	1533	73	21	1	377	18	1	0	2109	100
East Midlands	61	5	19	2	889	72	10	1	248	20	0	0	1227	100
East of England	85	5	29	2	1180	73	18	1	310	19	0	0	1622	100
London	88	6	19	1	1125	72	8	1	329	21	0	0	1569	100
South East Coast	54	4	27	2	941	72	9	1	276	21	0	0	1307	100
South Central	74	7	21	2	820	74	4	0	184	17	1	0	1104	100
South West	90	6	24	2	1133	73	15	1	286	18	2	0	1550	100
West Midlands	67	5	26	2	996	75	11	1	233	17	0	0	1333	100
North West	87	5	22	1	1225	74	14	1	301	18	0	0	1649	100
Wales	70	7	11	1	681	71	5	1	197	20	0	0	964	100
Northern Ireland	28	7	6	2	281	73	1	0	70	18	0	0	386	100
Scotland	95	7	34	2	1034	74	12	1	221	16	0	0	1396	100
United Kingdom	**930**	**6**	**284**	**2**	**11838**	**73**	**128**	**1**	**3032**	**19**	**4**	**0**	**16216**	**100**

Table 137 : Chemotherapy for ER negative invasive cancers						
	Chemotherapy		No chemotherapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	128	70	54	30	182	100
East Midlands	52	63	30	37	82	100
East of England	72	62	45	38	117	100
London	62	57	47	43	109	100
South East Coast	55	65	30	35	85	100
South Central	51	53	46	47	97	100
South West	73	63	43	37	116	100
West Midlands	75	78	21	22	96	100
North West	80	73	30	27	110	100
Wales	51	60	34	40	85	100
Northern Ireland	21	60	14	40	35	100
Scotland	104	80	26	20	130	100
United Kingdom	**824**	**66**	**420**	**34**	**1244**	**100**

Table 138 : Chemotherapy for ER negative node positive and negative invasive cancers										
	Node positive					Node negative				
	Chemotherapy		No chemotherapy		Total	Chemotherapy		No chemotherapy		Total
Region	No.	%	No.	%		No.	%	No.	%	
N East, Yorks & Humber	44	96	2	4	46	80	61	51	39	131
East Midlands	17	89	2	11	19	33	54	28	46	61
East of England	27	93	2	7	29	44	52	41	48	85
London	16	84	3	16	19	44	50	44	50	88
South East Coast	24	89	3	11	27	28	52	26	48	54
South Central	20	95	1	5	21	29	39	45	61	74
South West	21	88	3	13	24	50	56	40	44	90
West Midlands	24	92	2	8	26	50	75	17	25	67
North West	20	91	2	9	22	60	69	27	31	87
Wales	9	82	2	18	11	39	56	31	44	70
Northern Ireland	6	100	0	0	6	14	50	14	50	28
Scotland	34	100	0	0	34	69	73	26	27	95
United Kingdom	**262**	**92**	**22**	**8**	**284**	**540**	**58**	**390**	**42**	**930**

Table 139 : Grade of ER negative node negative invasive cancers given chemotherapy										
	Grade 1		Grade 2		Grade 3		Unknown or Not assessable		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	0	0	15	19	65	81	0	0	80	100
East Midlands	1	3	5	15	27	82	0	0	33	100
East of England	1	2	4	9	39	89	0	0	44	100
London	0	0	8	18	36	82	0	0	44	100
South East Coast	0	0	1	4	27	96	0	0	28	100
South Central	1	3	8	28	19	66	1	3	29	100
South West	0	0	8	16	41	82	1	2	50	100
West Midlands	0	0	6	12	44	88	0	0	50	100
North West	0	0	12	20	46	77	2	3	60	100
Wales	0	0	11	28	28	72	0	0	39	100
Northern Ireland	0	0	3	21	11	79	0	0	14	100
Scotland	0	0	7	10	62	90	0	0	69	100
United Kingdom	**3**	**1**	**88**	**16**	**445**	**82**	**4**	**1**	**540**	**100**

Table 140 : Chemotherapy for HER-2 positive invasive cancers						
	Chemotherapy		No Chemotherapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	60	92	5	8	65	100
East Midlands	22	96	1	4	23	100
East of England	41	85	7	15	48	100
London	34	87	5	13	39	100
South East Coast	23	88	3	12	26	100
South Central	27	93	2	7	29	100
South West	28	82	6	18	34	100
West Midlands	25	96	1	4	26	100
North West	30	86	5	14	35	100
Wales	9	75	3	25	12	100
Northern Ireland	10	100	0	0	10	100
Scotland	33	97	1	3	34	100
United Kingdom	**342**	**90**	**39**	**10**	**381**	**100**

Table 141 : HER-2 positive invasive cancers without chemotherapy					
Region	Total cases	>20mm		Grade 3	
		No.	%	No.	%
North, Yorks & Humber	5	2	40	1	20
East Midlands	1	1	100	0	0
East of England	7	5	71	5	71
London	5	5	100	4	80
South East Coast	3	2	67	2	67
South Central	2	0	0	0	0
South West	6	2	33	1	17
West Midlands	1	0	0	0	0
North West	5	2	40	3	60
Wales	3	3	100	2	67
Northern Ireland	0	-	-	-	-
Scotland	1	1	100	1	100
United Kingdom	**39**	**23**	**59**	**19**	**49**

APPENDIX G: SURVIVAL ANALYSIS DATA TABLES (142-159)

DATA OBTAINED FROM THE SURVIVAL AUDIT OF SCREEN-DETECTED BREAST CANCERS
1. FOR CANCER PATIENTS SCREENED BETWEEN 1 APRIL 2005 AND 31 MARCH 2006
2. FOR CANCER PATIENTS SCREENED BETWEEN 1 JANUARY 1990 AND 31 DECEMBER 1991

Table 142 : Cause of death of eligible invasive cancers with death before 31/03/2011 (1990/91 cohort)

	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**Total**
N East, Yorks & Humber	205	41	73	15	167	33	55	11	500	47	1072
East Midlands	89	33	48	18	87	32	48	18	272	49	559
East of England	145	35	57	14	123	30	90	22	415	49	841
London	163	46	51	14	123	35	18	5	355	45	790
South East Coast	131	48	52	19	79	29	9	3	271	39	697
South Central	134	45	42	14	81	27	39	13	296	47	630
South West	66	22	35	12	61	21	132	45	294	41	716
West Midlands	177	48	64	17	109	30	19	5	369	47	783
North West	132	38	71	20	141	40	7	2	351	45	782
Wales	37	37	22	22	39	39	2	2	100	43	232
Northern Ireland	-	-	-	-	-	-	-	-	-	-	-
Scotland	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**1279**	**40**	**515**	**16**	**1010**	**31**	**419**	**13**	**3223**	**45**	**7102**

Table 143 : Cause of death of eligible invasive cancers with death before 31/03/2011 (2005/06 cohort)

	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**Total**
N East, Yorks & Humber	67	55	20	17	30	25	4	3	121	8	1585
East Midlands	36	42	19	22	25	29	6	7	86	9	1005
East of England	35	43	23	28	19	23	4	5	81	7	1158
London	39	50	19	24	18	23	2	3	78	7	1088
South East Coast	42	51	25	30	13	16	3	4	83	8	978
South Central	34	61	12	21	10	18	0	0	56	6	939
South West	33	41	20	25	17	21	10	13	80	7	1189
West Midlands	33	44	18	24	22	29	2	3	75	7	1098
North West	47	53	17	19	23	26	2	2	89	7	1282
Wales	25	48	14	27	11	21	2	4	52	8	626
Northern Ireland	4	67	2	33	0	0	0	0	6	3	187
Scotland	41	45	20	22	25	27	5	5	91	9	1046
United Kingdom	**436**	**49**	**209**	**23**	**213**	**24**	**40**	**4**	**898**	**7**	**12181**

Table 144 : Cause of death of eligible micro-invasive cancers with death before 31/03/2011 (1990/91 cohort)

	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	1	100	1	10	10
East Midlands	1	33	0	0	1	33	1	33	3	27	11
East of England	0	0	2	29	4	57	1	14	7	35	20
London	0	0	0	0	1	100	0	0	1	25	4
South East Coast	1	25	0	0	3	75	0	0	4	24	17
South Central	3	75	0	0	1	25	0	0	4	33	12
South West	3	13	2	8	7	29	12	50	24	26	94
West Midlands	0	0	0	0	4	80	1	20	5	24	21
North West	0	0	3	75	1	25	0	0	4	44	9
Wales	0	0	0	0	1	100	0	0	1	33	3
Northern Ireland	-	-	-	-	-	-	-	-	-	-	-
Scotland	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**8**	**15**	**7**	**13**	**23**	**43**	**16**	**30**	**54**	**27**	**201**

Table 145 : Cause of death of eligible micro-invasive cancers with death before 31/03/2011 (2005/06 cohort)											
	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	No.	%	No.	%	No.	%	No.	%	No.	%	Total
N East, Yorks & Humber	0	0	3	75	0	0	1	25	4	17	23
East Midlands	0	-	0	-	0	-	0	-	0	0	9
East of England	0	0	1	100	0	0	0	0	1	10	10
London	0	-	0	-	0	-	0	-	0	0	4
South East Coast	0	-	0	-	0	-	0	-	0	-	0
South Central	0	0	0	0	1	100	0	0	1	6	16
South West	0	-	0	-	0	-	0	-	0	0	9
West Midlands	0	0	1	50	1	50	0	0	2	13	16
North West	0	0	0	0	1	100	0	0	1	4	23
Wales	0	-	0	-	0	-	0	-	0	0	7
Northern Ireland	0	-	0	-	0	-	0	-	0	-	0
Scotland	0	-	0	-	0	-	0	-	0	0	15
United Kingdom	**0**	**0**	**5**	**56**	**3**	**33**	**1**	**11**	**9**	**7**	**132**

Table 146 : Cause of death of eligible non-invasive cancers with death before 31/03/2011 (1990/91 cohort)											
	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	No.	%	No.	%	No.	%	No.	%	No.	%	Total
N East, Yorks & Humber	12	22	13	24	23	42	7	13	55	31	175
East Midlands	5	20	6	24	10	40	4	16	25	31	81
East of England	30	27	15	13	40	35	28	25	113	42	268
London	17	34	14	28	16	32	3	6	50	27	186
South East Coast	11	23	21	45	13	28	2	4	47	31	151
South Central	11	24	12	26	16	35	7	15	46	29	159
South West	5	23	3	14	6	27	8	36	22	31	71
West Midlands	4	18	6	27	10	45	2	9	22	22	102
North West	10	23	12	27	20	45	2	5	44	28	159
Wales	3	20	5	33	7	47	0	0	15	30	50
Northern Ireland	-	-	-	-	-	-	-	-	-	-	-
Scotland	-	-	-	-	-		-	-	-	-	-
United Kingdom	**108**	**25**	**107**	**24**	**161**	**37**	**63**	**14**	**439**	**31**	**1402**

Table 147 : Cause of death of eligible non-invasive cancers with death before 31/03/2011 (2005/06 cohort)											
	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	No.	%	No.	%	No.	%	No.	%	No.	%	Total
N East, Yorks & Humber	3	23	1	8	9	69	0	0	13	3	408
East Midlands	0	0	1	25	3	75	0	0	4	2	230
East of England	8	47	2	12	7	41	0	0	17	6	289
London	4	31	4	31	4	31	1	8	13	4	321
South East Coast	2	17	5	42	4	33	1	8	12	4	269
South Central	1	17	1	17	4	67	0	0	6	3	206
South West	0	0	4	50	4	50	0	0	8	2	358
West Midlands	2	40	2	40	1	20	0	0	5	2	228
North West	0	0	6	55	5	45	0	0	11	4	296
Wales	0	0	4	80	1	20	0	0	5	3	169
Northern Ireland	0	-	0	-	0	-	0	-	0	0	48
Scotland	1	8	4	33	6	50	1	8	12	5	251
United Kingdom	**21**	**20**	**34**	**32**	**48**	**45**	**3**	**3**	**106**	**3**	**3073**

Table 148 : Relative survival by region – primary invasive cancers only (1990/91 cohort)				
Region	**5 year**	**10 year**	**15 year**	**20 year**
N East, Yorks & Humber	92.0 (89.8,93.9)	84.9 (81.9,87.7)	80.6 (76.9,84.0)	75.5 (71.1,79.8)
East Midlands	92.5 (89.4,95.0)	88.9 (84.8,92.5)	82.2 (77.1,87.0)	74.7 (68.4,80.8)
East of England	93.1 (90.6,95.2)	87.0 (83.6,90.1)	82.2 (78.0,86.2)	75.9 (70.6,81.0)
London	94.9 (92.5,96.8)	87.9 (84.5,90.9)	82.6 (78.4,86.5)	78.7 (73.6,83.7)
South East Coast	96.3 (93.9,98.2)	93.7 (90.3,96.6)	92.9 (88.6,96.8)	89.4 (83.8,94.6)
South Central	92.9 (90.0,95.2)	86.8 (82.9,90.3)	81.0 (76.2,85.4)	76.7 (71.0,82.3)
South West	95.0 (92.5,97.0)	91.5 (88.0,94.5)	90.1 (85.7,94.0)	86.7 (81.2,91.9)
West Midlands	92.3 (89.7,94.4)	86.2 (82.8,89.3)	80.8 (76.6,84.7)	74.9 (69.8,79.8)
North West	94.5 (92.1,96.5)	88.2 (84.8,91.3)	84.9 (80.7,88.8)	77.8 (72.5,82.9)
Wales	94.2 (89.3,97.6)	94.0 (87.8,98.8)	87.7 (79.7,94.5)	84.5 (74.6,93.6)
Northern Ireland	-	-	-	-
Scotland	-	-	-	-
United Kingdom	**93.7 (92.9,94.4)**	**88.3 (87.2,89.4)**	**84.0 (82.7,85.4)**	**78.9 (77.2,80.6)**

Table 149 : 5 year relative survival by region – primary invasive cancers only (2005/06 cohort)		
Region	**Un-adjusted**	**Adjusted**
N East, Yorks & Humber	97.3 (95.8,98.5)	97.1 (95.7,98.3)
East Midlands	97.1 (95.2,98.7)	97.0 (95.1,98.5)
East of England	98.4 (96.7,99.7)	98.2 (96.5,99.6)
London	98.0 (96.2,99.4)	97.8 (96.1,99.2)
South East Coast	97.2 (95.2,98.8)	97.0 (95.1,98.6)
South Central	99.2 (97.4,100.6)	99.0 (97.3,100.4)
South West	99.4 (97.9,100.7)	99.3 (97.7,100.5)
West Midlands	98.0 (96.3,99.4)	97.8 (96.1,99.2)
North West	98.1 (96.6,99.4)	98.0 (96.4,99.3)
Wales	97.1 (94.7,99.0)	97.4 (94.9,99.3)
Northern Ireland	100.0 (96.1,101.9)	100.2 (96.2,102.0)
Scotland	96.5 (94.5,98.1)	97.7 (95.7,99.4)
United Kingdom	**97.9 (97.4,98.4)**	**97.9 (97.4,98.4)**

Table 150 : Relative survival by age for primary invasive cancers (1990/91 cohort)				
Age	**5 year**	**10 year**	**15 year**	**20 year**
<50	88.4 (75.9,95.1)	82.7 (68.8,91.6)	83.5 (68.9,93.1)	74.2 (57.8,86.7)
50-52	91.7 (89.4,93.5)	87.1 (84.3,89.6)	82.3 (79.0,85.3)	78.8 (75.0,82.4)
53-55	92.4 (90.4,94.1)	87.4 (84.7,89.7)	82.8 (79.6,85.8)	76.8 (73.0,80.4)
56-58	91.7 (89.8,93.4)	85.8 (83.3,88.2)	83.3 (80.4,86.1)	78.2 (74.5,81.7)
59-61	95.1 (93.5,96.5)	88.4 (86.1,90.6)	83.2 (80.3,86.0)	77.6 (74.0,81.2)
62-64	94.2 (92.4,95.7)	89.6 (87.1,92.0)	85.3 (82.0,88.4)	80.1 (75.9,84.2)
65+	101.0 (97.4,103.8)	96.6 (90.6,101.8)	91.9 (83.7,99.7)	89.4 (77.9,101.0)
All invasive cancers	**93.7 (92.9,94.4)**	**88.3 (87.2,89.4)**	**84.0 (82.7,85.4)**	**78.9 (77.2,80.6)**

Table 151 : 5 year relative survival by age for primary invasive cancers (2005/06 cohort)		
Age	**Un-adjusted**	**Adjusted**
<50	98.9 (93.9,100.5)	98.8 (93.8,100.5)
50-52	98.4 (97.3,99.2)	98.4 (97.3,99.2)
53-55	96.6 (95.2,97.8)	96.6 (95.2,97.8)
56-58	97.7 (96.5,98.6)	97.7 (96.5,98.6)
59-61	96.8 (95.5,97.9)	96.8 (95.5,97.9)
62-64	95.9 (94.4,97.2)	95.9 (94.4,97.1)
65-67	98.0 (96.5,99.3)	98.0 (96.5,99.2)
68-70	98.8 (97.2,100.2)	98.8 (97.2,100.2)
71+	105.3 (102.4,107.7)	105.4 (102.5,107.8)
All invasive cancers	**97.9 (97.4,98.4)**	**97.9 (97.4,98.4)**

Table 152 : Relative survival by invasive tumor size for primary invasive cancers (1990/91 cohort)				
Size	**5 year**	**10 year**	**15 year**	**20 year**
<15mm	98.0 (97.1,98.9)	95.4 (93.9,96.7)	91.9 (89.9,93.7)	87.3 (84.7,89.7)
15-≤20mm	93.9 (92.4,95.3)	87.7 (85.5,89.6)	82.8 (80.1,85.3)	75.9 (72.7,79.1)
>20-≤35mm	87.4 (85.0,89.6)	76.4 (73.2,79.5)	70.1 (66.4,73.7)	65.9 (61.5,70.2)
>35-≤50mm	78.7 (71.3,84.8)	71.8 (63.2,79.2)	65.4 (55.8,74.2)	57.1 (46.2,67.8)
>50mm	75.5 (64.6,84.0)	61.8 (49.6,72.6)	55.5 (42.4,68.0)	55.4 (40.8,70.0)
Unknown	88.8 (85.5,91.5)	84.5 (80.4,88.2)	83.2 (78.3,87.7)	79.7 (73.7,85.4)
All invasive cancers	**93.7 (92.9,94.4)**	**88.3 (87.2,89.4)**	**84.0 (82.7,85.4)**	**78.9 (77.2,80.6)**

Table 153 : 5 year relative survival by invasive tumor size for primary invasive cancers (2005/06 cohort)		
Size	**Un-adjusted**	**Adjusted**
<15mm	100.0 (99.4,100.5)	99.9 (99.4,100.5)
15-≤20mm	98.2 (97.2,99.1)	98.2 (97.2,99.1)
>20-≤35mm	94.3 (92.8,95.6)	94.3 (92.8,95.6)
>35-≤50mm	89.6 (85.3,93.1)	89.6 (85.3,93.1)
>50mm	86.1 (78.5,91.7)	86.1 (78.5,91.7)
Unknown	78.9 (69.4,86.2)	79.0 (69.5,86.4)
All invasive cancers	**97.9 (97.4,98.4)**	**97.9 (97.4,98.4)**

Table 154 : Relative survival by invasive grade for primary invasive cancers (1990/91 cohort)				
Grade	**5 year**	**10 year**	**15 year**	**20 year**
1	99.4 (98.2,100.4)	98.0 (96.1,99.7)	95.0 (92.4,97.4)	88.2 (84.7,91.6)
2	94.3 (92.9,95.6)	87.9 (85.9,89.8)	81.1 (78.6,83.6)	77.1 (74.0,80.1)
3	80.1 (76.9,83.0)	71.4 (67.6,75.0)	67.7 (63.4,71.8)	63.2 (58.2,68.1)
Not assessable	91.8 (87.8,94.9)	87.7 (82.6,92.1)	82.9 (76.6,88.6)	77.8 (70.1,85.0)
Unknown	94.2 (92.7,95.5)	87.8 (85.7,89.8)	85.1 (82.5,87.6)	80.0 (76.7,83.2)
All invasive cancers	**93.7 (92.9,94.4)**	**88.3 (87.2,89.4)**	**84.0 (82.7,85.4)**	**78.9 (77.2,80.6)**

Table 155 : 5 year relative survival by invasive grade for primary invasive cancers (2005/06 cohort)		
Grade	**Un-adjusted**	**Adjusted**
1	101.2 (100.5,101.8)	101.2 (100.5,101.8)
2	99.2 (98.6,99.8)	99.2 (98.6,99.8)
3	90.2 (88.6,91.6)	90.2 (88.7,91.6)
Not assessable	95.4 (86.3,100.1)	95.5 (86.3,100.2)
Unknown	87.4 (77.3,94.1)	87.6 (77.5,94.3)
All invasive cancers	**97.9 (97.4,98.4)**	**97.9 (97.4,98.4)**

Table 156 : Relative survival by nodal status for primary invasive cancers (1990/91 cohort)				
Nodal status	**5 year**	**10 year**	**15 year**	**20 year**
Positive	80.7 (78.0,83.1)	70.3 (67.1,73.4)	62.9 (59.3,66.5)	57.9 (53.7,62.1)
Negative	97.6 (96.5,98.6)	93.9 (92.2,95.5)	90.4 (88.1,92.5)	85.7 (82.8,88.6)
Unknown	95.1 (94.0,96.1)	90.2 (88.7,91.6)	86.4 (84.5,88.3)	81.0 (78.5,83.3)
All invasive cancers	**93.7 (92.9,94.4)**	**88.3 (87.2,89.4)**	**84.0 (82.7,85.4)**	**78.9 (77.2,80.6)**

Table 157 : 5 year relative survival by nodal status for primary invasive cancers (2005/06 cohort)		
Nodal status	**Un-adjusted**	**Adjusted**
Positive	92.5 (91.1,93.7)	92.5 (91.1,93.7)
Negative	99.8 (99.3,100.2)	99.7 (99.3,100.2)
Unknown	90.7 (86.1,94.4)	90.7 (86.1,94.3)
All invasive cancers	**97.9 (97.4,98.4)**	**97.9 (97.4,98.4)**

Table 158 : Relative survival by invasive tumor size for primary invasive cancers (1990/91 cohort)				
NPI group	**5 year**	**10 year**	**15 year**	**20 year**
EPG	102.0 (100.2,103.1)	100.3 (97.0,102.8)	98.5 (94.0,102.3)	93.8 (87.8,99.3)
GPG	98.7 (96.7,100.2)	94.3 (91.1,97.0)	88.9 (84.8,92.7)	83.7 (78.4,88.7)
MPG1	93.6 (90.7,96.0)	88.0 (84.0,91.5)	81.1 (76.2,85.7)	75.7 (69.7,81.6)
MPG2	80.2 (74.7,84.8)	70.9 (64.5,76.7)	65.8 (58.6,72.5)	61.0 (52.8,69.0)
PPG	54.6 (46.8,62.0)	37.8 (30.2,45.6)	34.1 (26.3,42.3)	27.1 (19.4,35.9)
Unknown	94.3 (93.3,95.1)	89.0 (87.7,90.3)	85.0 (83.3,86.7)	79.9 (77.8,82.0)
All invasive cancers	**93.7 (92.9,94.4)**	**88.3 (87.2,89.4)**	**84.0 (82.7,85.4)**	**78.9 (77.2,80.6)**

Table 159 : 5 year relative survival by NPI prognostic group for primary invasive cancers (2005/06 cohort)		
NPI group	**Un-adjusted**	**Adjusted**
EPG	101.3 (100.5,102.0)	101.3 (100.5,101.9)
GPG	100.8 (100.2,101.4)	100.8 (100.2,101.4)
MPG1	98.0 (96.9,98.9)	98.0 (96.9,98.9)
MPG2	93.2 (91.2,94.9)	93.2 (91.3,94.9)
PPG	78.9 (75.4,82.0)	78.9 (75.4,82.0)
Unknown	92.6 (89.0,95.4)	92.6 (89.0,95.4)
All invasive cancers	**97.9 (97.4,98.4)**	**97.9 (97.4,98.4)**

Produced by the West Midlands NHS Breast Screening Quality Assurance Reference Centre