Public Health England

ABS ASSOCIATION OF BREAST SURGERY

NHS Breast Screening Programme and Association of Breast Surgery

An Audit of Screen Detected Breast Cancers for the Year of Screening April 2012 to March 2013

About Public Health England

Public Health England's mission is to protect and improve the nation's health and to address inequalities through working with national and local government, the NHS, industry and the voluntary and community sector. PHE is an operationally autonomous executive agency of the Department of Health.

Public Health England
133-155 Waterloo Road
Wellington House
London SE1 8UG
Tel: 020 7654 8000
www.gov.uk/phe
Twitter: @PHE_uk
Facebook: www.facebook.com/PublicHealthEngland

Prepared by the ABS and NHSBSP Breast Screening Audit Group
Printed with the financial assistance of the Association of Breast Surgery

Published May 2014
PHE publications gateway number: 2013-526

Forewords

I am pleased to provide the foreword to the NHS Breast Screening Programme (NHSBSP) and Association of Breast Surgery (ABS) Audit report of screen-detected breast cancers. This is the 17th year of the audit and during that time it has evolved to ensure that it is still relevant to the multidisciplinary community and reflects changes in practice. The audit also demonstrates the integration of quality assurance (QA) within breast screening and the management of women with screen-detected breast cancer. Through these data we can track where this QA process has had a measurable impact on improving quality.

This year the report focuses on a number of key performance indicators (KPIs) which have been informed through discussion with representatives from the relevant professional groups. The report identifies services that are shown to be outliers for these measures. It is important these variations in practice are fully investigated and understood and I look to my QA directors and their teams to lead on this within their own areas.

Following positive feedback on last year's foray into publishing data at unit rather than regional level, this year's report has further increased the number of analyses at this level. This will enable services to compare their performance with that of their neighbours. Services can also choose to undertake such comparisons using the e-atlas tool that is populated by the audit's data. The e-atlas can be accessed at www.wmciu.nhs.uk/atlas/BreastAtlas/atlas.html

I hope you find this report informative and thought provoking. It is important that we 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. A great deal of thanks are due to the surgical and screening teams who contributed the data, to the West Midlands Breast Screening QA Reference Centre and to Mark Sibbering 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 and ABS Audit report for the screening year 1 April 2012 to 31 March 2013, with adjuvant therapy data from the preceding year.

Firstly, it is very important to recognise that the audit results show that the majority of women diagnosed with screen-detected breast cancer are receiving a very high quality of care. However, for a number of years the published audit data has also highlighted apparent ‘outlier performance’ in some breast units compared to their peers that merits further scrutiny. This year we have attempted to address this by developing more robust governance structures in relation to the audit data, and through the introduction of KPIs proposed by each discipline.

The surgery, radiology and pathology ‘Big 18s’ have agreed to take a more active role in the analysis of the audit data relevant to their discipline and have each proposed three KPIs. The adjuvant therapy audit requires the input of oncologists and I am grateful to David Dodwell for his assistance in identifying relevant KPIs and in the formation of an ‘Oncology Group’ to scrutinise the audit data. It is hoped that these changes should support QA directors and their teams in their quest to ensure consistent high quality care for all women attending for breast screening in the NHSBSP.

The quality of any audit is heavily dependent on the quality of the data collected and the verification of that data. Due to the meticulous efforts of the staff in screening units and QA reference centres this remains an audit of the high quality that continues to improve year on year.

This is my first year as the audit chair and I would like to thank all members of the Screening Audit Steering Group for their continued hard work and dedication to the audit. In particular I would like to Shan Cheung, Sam Read, Gill Lawrence and Olive Kearins for guiding me through the new processes in Public Health England and our collaborations with the Celtic nations enabling us to publish the latest instalment of this fantastic and unique audit.

Mr Mark Sibbering
Chair of the NHSBSP and ABS Breast Screening Audit Group

Acknowledgements

The 2012/13 UK NHS Breast Screening Programme (UK NHSBSP) and Association of Breast Surgery (ABS) audit of screen-detected breast cancers was designed and directed by the UK NHSBSP and ABS Screening Audit Group.

Mr Mark Sibbering	Chair of the UK NHSBSP & ABS Screening Audit Group, Consultant Surgeon, Royal Derby Hospital (Derby) and QA Director (East Midlands)
Dr Pauline Carder	Consultant Histopathologist, Bradford Teaching Hospitals (Yorkshire) and Pathology QA Coordinator (North East, Yorkshire & Humber)
Ms Shan Cheung	Project Manager (UK NHSBSP & ABS Breast Screening Audit), West Midlands Breast Screening QA Reference Centre, Public Health England
Dr Rahul Deb	Consultant Histopathologist, Royal Derby Hospital (Derby) and Pathology QA Coordinator (East Midlands)
Prof. David Dodwell	Consultant in Clinical Oncology, St James Hospital, Leeds
Mrs Jacquie Jenkins	Deputy Director of QA, East Midlands Breast Screening QA Reference Centre, Public Health England
Ms Olive Kearins	Director of Cancer Screening Quality Assurance, West Midlands Breast Screening QA Reference Centre, Public Health England
Dr Gill Lawrence	Breast Cancer & Sarcoma Specialist Analytical Advisor, Breast Screening QA Reference Centre, Public Health England
Prof. Julietta Patnick	Director, NHS Cancer Screening Programmes
Mr Sam Read	Data Administrator, West Midlands Breast Screening QA Reference Centre, Public Health England
Dr Nisha Sharma	Consultant Radiologist, Seacroft Hospital (Leeds) and Director of Breast Screening (Leeds/Wakefield Breast Screening Service)
Dr Raj Sripadam	Consultant in Clinical Oncology, Clatterbridge Cancer Centre, Wirral
Mr Paul Stonelake	Consultant Surgeon, Russell's Hall Hospital (Dudley) and Surgical QA Coordinator (West Midlands)
Dr Matthew Wallis	Consultant Radiologist, Cambridge Breast Unit and NIHR Cambridge Biomedical Research Centre
Mrs Margot Wheaton	Chair of the National Breast Screening System Users Group and Programme Manager (Warwickshire, Solihull & Coventry Breast Screening Service), University Hospital, Coventry

The UK NHSBSP & ABS Screening Audit Group would like to extend its thanks to the following individuals and groups for their contributions to the 2012/13 audit of screen-detected breast cancer.

- UK NHSBSP surgical QA co-ordinators, QA co-ordinators and programme directors for overseeing regional data collection and validation at the English regional and Celtic country QA reference centres.

- QA data managers, screening office managers and staff within the UK NHSBSP for collecting, collating and validating the regional data.

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

- Diane Edwards, GIS specialist at PHE's Knowledge and Intelligence Team (West Midlands), for producing the map of the UK NHSBSP.

- Steve Hales, e-communications and IT manager at PHE's Knowledge and Intelligence Team (West Midlands), for enabling the members of the UK NHSBSP and ABS Screening Audit Group to edit the UK NHSBSP & ABS audit booklet online.

The UK NHSBSP & ABS Screening Audit Group would also like to thank the UK NHSBSP National Office for financial support for the organisation and execution of the 2012/13 audit of screen-detected breast cancer, the ABS for financial support for the printing of the audit booklet, and Lucy Davies, ABS Association Manager, for providing invaluable assistance in the printing and distribution of the audit booklet.

Contents

Results of the 2012/13 Audit of Screen-Detected Breast Cancers

Appendices

Introduction

Aims and Objectives

The 2012/13 UK NHS Breast Screening Programme (NHSBSP) and Association of Breast Surgery (ABS) Audit of screen-detected breast cancer was undertaken to examine UK NHSBSP clinical activity in the period 1 April 2012 to 31 March 2013, and adjuvant therapy undertaken in the period 1 April 2011 to 31 March 2012. The audit is designed to assess clinical performance by comparison of data with as many as possible of the clinical quality assurance (QA) standards recommended by the UK NHS Breast Screening Programme. These include the standards set in the following publications:

- Quality Assurance Guidelines for Surgeons in Breast Cancer Screening, NHSBSP Publication No. 20, 4th Edition, March 2009
- Guidelines for Quality Assurance Visits, NHSBSP Publication No. 40, Revised, October 2000

Reference is also made to the following publications:

- Surgical Guidelines for the Management of Breast Cancer, Association of Breast Surgery, 2009
- Guidelines for Non-operative Diagnostic Procedures and Reporting in Breast Cancer Screening. NHSBSP Publication No.50, June 2001
- NHS Clinical Guidelines for Breast Screening Assessment, Publication No.50. January 2005
- NICE Clinical Guideline 80 Early and Locally Advanced Breast Cancer: Diagnosis and Treatment (February 2009)

The 2012/13 UK NHSBSP & ABS Audit covers the following main topic areas:

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

Organisation of the Audit

Organisation of Data Collection

As in previous years, responsibility for English regional and Celtic country data collection was devolved to 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 and QA co-ordinators. This pack included, in electronic format:

- a timetable of events (Appendix A)
- a main UK NHSBSP & ABS Breast Screening Audit data collection form 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 UK NHSBSP & ABS Screening Audit Group and was subject to comment from 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 UK NHSBSP & ABS Breast Screening Audit main questionnaire was designed to enable collection of data describing breast screening activity in the 2012/13 screening year. The cohort of women included was selected to be identical to that included in the statistical KC62 reports for 2012/13, 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 screening 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 2011 to 31 March 2012 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 2011/12 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 UK cancer registries to obtain death data for women with screen-detected breast cancer. Details of the women with screen-detected breast cancer who were screened between 1 April 2007 and 31 March 2008 (with a minimum of five years follow-up) were obtained by the breast screening units and matched to the English National Cancer Registration System and to the Welsh, Scottish and

Northern Irish cancer registry databases to identify the date of death for any woman who died on or before 31 March 2013. Responsibility for survival audit data collection rested with breast screening QA co-ordinators. Effective communication and collaboration with the UK cancer registries is a vital element in the success of the survival audit.

Unit Level Data

Data for 93 screening units were included in the 2012/13 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 unit level graphs in this booklet. The number of women screened by the 20 smallest units in 2012/13 varied from 5,752 to 14,690.

Responsibility for Data Collection

UK NHSBSP & ABS Breast Screening Audit information packs were sent to NHSBSP representatives in the nine QA reference centres in England, and to breast screening information centres in Wales, Scotland and Northern Ireland. In each English region and Celtic country, the surgical QA co-ordinator, QA director and QA co-ordinator and their Celtic country equivalents were responsible for working together to ensure that the data were collected from their breast screening units. Lead surgeons in each breast screening unit were responsible for making sure that the data were available and complete, and lead surgeons in each screening unit were asked to give confirmation to their QA co-ordinator that the data for their breast screening unit were a fair representation of screening activity in the audit period (to “sign off” the data). QA co-ordinators were 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 unit office staff, staff at cancer registries, oncology staff, some non-surgical clinicians who have an interest in QA and some dedicated clinical data collection officers. For those screening units 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 and Celtic countries. Data were collated on a regional or Celtic country 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 English regional and Celtic country QA reference

centre to collate their data in a standard format. Individual screening units either provide the data to their 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 unit level involved detailed consideration of cancers and cross checks against existing KC62 reports.

Data Evaluation

The West Midlands QA Reference Centre, guided by the UK 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 screening QA standards where these were available. Commentary and recommendations were made by the UK NHSBSP & ABS Screening Audit Group.

Publication of Audit Data

The UK NHSBSP & ABS 2012/13 Breast Screening Audit is published as a booklet with financial assistance from the Association of Breast Surgery. The booklet will be distributed at the Association of Breast Surgery Annual Conference on **19 May 2014.** Once published, the booklet will be available to download from the following web sites.

- West Midlands Cancer Intelligence Unit - www.wmciu.nhs.uk
- NHS Cancer Screening Programmes - www.cancerscreening.nhs.uk

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

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 2012 to March 2013", UK NHSBSP & ABS, May 2014.*

Using the Audit Data to Celebrate High Quality Services and to Improve Performance

The annual UK NHSBSP & ABS Breast Screening Audit data should be used to celebrate high quality services. Attention should not only be focused on failure to meet screening 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.

At National Level

The UK NHSBSP & ABS Breast Screening Audit data should be considered formally at meetings of the screening QA directors and QA surgeons in the English regions and the Celtic

countries in order to recognise and congratulate high quality services and to identify recommendations for action where performance does not meet a screening QA standard.

At Local/Regional/Celtic Country Level

The annual UK NHSBSP & ABS Breast Screening Audit data should be considered formally at a meeting of the breast screening QA team, and also at an English regional or Celtic country-wide workshop where the data for individual screening units are analysed and presented. QA reference centres and surgical QA co-ordinators should follow up with individual screening units any failure to meet national screening QA standards. There should be formal recording of the plans put in place to achieve each of the failed standards, and routine monitoring to ensure that action has been taken to rectify problems. Recommendations for action could include training, improvements in the management and/or organisation of services and visits to high performing screening units from whom good practice could be learned.

Key Performance Indicators

As part of the 2013 UK NHSBSP & ABS Breast Screening Audit, the performance of individual breast screening units was assessed against 12 Key Performance Indicators identified by the clinical representatives on the UK NHSBSP & ABS Breast Screening Audit Group. Breast screening units named as outliers in the Key Performance Indicators (KPIs) at the ABS Annual Conference in May 2013 were asked to carry out with their QA reference centres and QA teams a detailed audit of their 2012/13 data (main audit) or 2011/12 data (adjuvant audit) for each KPI. The results of these audits were submitted to the UK NHSBSP & ABS Breast Screening Audit team at the West Midlands Breast Screening QA Reference Centre.
If more recent data for 2012/13 (main audit) or 2011/12 (adjuvant audit) were relatively unchanged from those submitted to the 2013 audit, a further audit of the data for cancers with a first offered screening appointment in the 6 month period 1 April 2013 - 30 September 2013 was requested. The results of these additional audits were also submitted to the audit team at the West Midlands Breast Screening QA Reference Centre**.** QA reference centres were expected to exercise professional judgment and liaise closely with their regional radiological, pathological and surgical QA co-ordinators when deciding whether or not an additional audit of the more recent data was required for a particular KPI.

The 12 Key Performance indicators included in this exercise were as follows:

Radiology 1 - *Non-operative staging of the axilla*: more than 40% of invasive cancers in 2011/12 with no pre-operative ultrasound recorded, and more than 40% of invasive cancers in 2011/12 with no axillary biopsy after an abnormal ultrasound. These data were linked to 3-year high outliers in 2009/10-2011/12 for repeat operations on the axilla after sentinel lymph node biopsy (SLNB)

Radiology 2 - *Repeat visits*: more than 20% of all cancers in 2011/12 with more than one assessment clinic visit to obtain a non-operative diagnosis

Radiology 3 - *Non-operative diagnosis of non-invasive cancers:* 3-year low outliers in 2009/10-2011/12 for non-operative diagnosis of DCIS excluding LCIS

Pathology 1 - *ER status for invasive cancers*: 3-year high and low outliers in 2009/10-2011/12 for positive ER status

Pathology 2 - *HER2 status for invasive cancers*: 3-year high and low outliers in 2009/10-2011/12 for positive HER2 status

Pathology 3 - *Invasive tumour grade*: 3-year high and low outliers in 2009/10-2011/12 for invasive cancers with tumour grade 1, 2 and 3

Surgery 1 - *SLNB*: fewer than 60% of invasive cancers in 2011/12 with a SLNB and more than 50% of SLNBs in 2011/12 using blue dye alone

Surgery 2 - *Mastectomy (Mx) rates and immediate reconstruction (IR):* 3-year high outliers in 2009/10-2011/12 for mastectomy (Mx) rates for small (<15mm) invasive cancers and low IR rates for <15mm invasive cancers in 2011/12

Surgery 3 - *Repeat operations:* - high 3-year outliers in 2009/10-2011/12 for invasive cancers treated with breast conserving surgery (BCS) converted to Mx. These data were linked to overall Mx rates and Mx rates at first operation in 2011/12

Oncology 1 - *BCS and adjuvant radiotherapy:* 3-year high outliers in 2008/09-2010/11 for invasive cancers treated with BCS with no adjuvant radiotherapy

Oncology 2 - *Endocrine therapy for ER positive cancers:* fewer than 90% of ER invasive cancers with NPI >3.4 in 2011/12 with adjuvant endocrine therapy

Oncology 3 - *Chemotherapy for node positive invasive cancers:* 50% or more node positive (macro-metastases) invasive cancers in 2010/11 with no adjuvant chemotherapy

The results of the 2013 radiology, surgery and oncology KPI audits are presented in tables in appropriate sections of Chapters 2, 4, 6, 7 and 8 of this booklet. These tables summarise the performance of the units identified for audit in 2013, and document their performance against the same or similar measures that have been identified for audit in 2014. The tables also include the new units whose performance in this year's 2014 audit failed to meet each KPI. Persistent high or low outlier units for the pathology KPIs are being followed up by the Pathology Big 18 and are not documented in Chapter 3.

Your Comments

The UK NHSBSP & ABS Breast Screening Audit has developed over the years, with improvements in design and organisation resulting in improved data quality and increasingly useful results. To continue this development process your comments and suggestions are extremely useful. If you have comments or suggestions about the 2012/13 audit, this booklet or the development of future UK NHSBSP & ABS Breast Screening Audits please write to:

Mr Mark Sibbering
Chair, UK NHSBSP & ABS Screening Audit Group
C/o Association of Breast Surgery
The Royal College of Surgeons of England
35-43 Lincoln's Inn Fields
London
WC2A 3PE
E-mail: mark.sibbering@nhs.net

Provision of Data for the 2012/13 Audit

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

Screening Units Participating in the 2012/13 Audit

Screening Units Participating in the NHSBSP & ABS Audit							
Region or Celtic Country	Unit Code	Unit Name	Women screened	Total Cancers*	Invasive cancers	Non/micro-invasive cancers	Size
East Midlands	CDN	Chesterfield/North Derby	15,962	125	98	27	
	CDS	Derby	23,812	193	155	38	
	CLE	Leicester	36,977	346	257	89	B14
	CLI	Lincolnshire	31,289	252	197	55	
	CNN	North Nottingham	10,402	82	63	19	S7
	CNO	Nottingham	29,221	251	203	48	
	KKE	Kettering	12,999	105	80	25	S14
	KNN	Northampton	16,155	142	119	23	
East of England	DCB	Cambridge & Huntingdon	17,532	132	104	28	
	DGY	James Paget	11,699	92	72	20	S9
	DKL	King's Lynn	9,994	80	61	19	S5
	DNF	Norfolk & Norwich	25,798	186	150	36	
	DPT	Peterborough	15,758	147	117	30	
	DSU	East Suffolk	16,993	130	104	26	
	DSW	West Suffolk	13,135	112	88	24	S16
	ELD	Beds & Herts	54,201	461	354	106	B3
	FCO	Chelmsford & Colchester	29,843	226	190	36	
	FEP	Epping	10,440	74	59	15	S8
	FSO	South Essex	21,028	149	120	29	
London	EBA	North London	61,811	530	400	128	B1
	ECX	West London	36,272	293	221	72	B15
	FBH	Barking, Havering, Redbridge and Brentwood	22,578	187	154	32	
	FLO	Central and East London	25,651	208	166	42	
	GCA	South East London	48,428	393	327	65	B6
	HWA	South West London	34,270	301	208	93	B18
NEYH	AGA	Gateshead	30,739	234	187	47	
	ANE	Newcastle	37,140	325	254	71	B13
	ANT	North Tees	35,888	280	208	72	B16
	AWC	North Cumbria	15,341	138	113	25	
	BHL	Humberside	33,799	268	220	48	B19
	BHU	Pennine	34,724	272	214	58	B17
	BLE	Leeds/Wakefield	43,030	326	239	87	B10
	BYO	North Yorkshire	28,815	242	188	54	
	CBA	Barnsley	9,703	85	74	11	S3
	CDO	Doncaster/Bassetlaw	16,881	133	103	30	
	CRO	Rotherham	10,271	68	51	17	S6
	CSH	Sheffield	19,045	175	132	43	
North West	NCH	Chester	5,752	63	45	18	S1
	NCR	Crewe	13,009	109	89	18	S15
	NLI	Liverpool	26,439	237	184	53	
	NMA	Macclesfield	17,575	168	139	29	
	NWA	Warrington	21,570	183	148	35	
	NWI	Wirral	14,690	134	103	31	S20
	PBO	Bolton	24,915	204	151	53	
	PLE	East Lancashire	16,673	127	103	24	
	PLN	North Lancashire/South Cumbria	33,329	271	210	61	B20
	PMA	Greater Manchester	45,789	385	297	88	B7
	PWI	South Lancashire	23,539	155	126	29	

20 biggest units | 20 smallest units

* Total cancers detected in 2012/13, includes previous cancers which are only included in Chapter 1

Screening Units Participating in the NHSBSP & ABS Audit							
Region or Celtic Country	**Unit Code**	**Unit Name**	**Women screened**	**Total Cancers***	**Invasive cancers**	**Non/micro-invasive cancers**	**Size**
South Central	JBA	North & Mid Hants	19,357	130	106	24	
	JIW	Isle of Wight	9,120	93	77	16	S2
	JPO	Portsmouth	20,114	208	157	51	
	JSO	Southampton & Salisbury	27,613	265	215	50	
	KHW	Aylesbury & Wycombe	20,336	139	117	22	
	KMK	Milton Keynes	9,931	89	73	16	S4
	KOX	Oxford	24,045	225	171	54	
	KRG	Reading	20,127	193	138	55	
	KWI	Windsor	13,685	113	87	25	S18
South East Coast	GBR	Brighton	29,238	284	233	51	
	GCT1	Canterbury	27,770	245	200	45	
	GCT2	Maidstone	17,837	160	125	35	
	GCT3	Medway	23,634	181	149	32	
	HGU	Guildford	50,170	476	365	109	B4
	HWO	Worthing	31,725	288	234	53	
South West	JDO	Dorset	32,446	297	239	58	
	JSW	Wiltshire	23,440	171	136	35	
	LAV	Avon	43,304	306	248	58	B9
	LCO	Cornwall	19,524	181	137	44	
	LED	East Devon	23,176	181	137	44	
	LGL	Gloucestershire	26,556	241	195	46	
	LPL	West Devon	19,356	163	124	39	
	LSO	Somerset	23,178	206	165	41	
	LTB	South Devon	14,200	114	85	29	S19
West Midlands	MAS	South Staffordshire	24,037	164	143	21	
	MBS	South Birmingham	11,916	94	69	25	S10
	MBW	City, Sandwell & Walsall	40,336	303	229	73	B12
	MCO	Warwickshire, Solihull & Coventry	41,586	382	310	72	B11
	MDU	Dudley & Wolverhampton	21,848	168	130	38	
	MHW	Hereford & Worcester	31,654	248	199	49	
	MSH	Shropshire	17,574	150	120	30	
	MST	North Staffordshire	21,300	184	144	39	
Northern Ireland	ZNE1	Eastern	27,048	188	160	27	
	ZNI1	Northern	12,616	82	65	16	S13
	ZNS1	Southern	12,090	66	61	5	S12
	ZNW1	Western	13,155	107	86	21	S17
Scotland	Unit 1	Edinburgh (South East)	44,535	369	300	59	B8
	Unit 2	Dundee (East)	17,413	150	119	31	
	Unit 4	Aberdeen (North East)	20,962	199	164	35	
	Unit 5	Irvine (South West)	19,913	175	148	27	
	Unit 7	Inverness (North)	11,939	90	74	16	S11
	Unit 8	Glasgow (West)	59,257	536	452	81	B2
Wales	WNM	North Wales	19,050	190	152	38	
	WSE	South Wales	49,025	501	392	109	B5
	WSL	West Wales	25,292	265	212	53	
UK			**2,303,332**	**19,339**	**15,287**	**4,024**	

20 biggest units 20 smallest units

* Total cancers detected in 2012/13, includes previous cancers which are only included in Chapter 1

Key findings and recommendations

Cancers Detected by Screening

Between 1 April 2012 and 31 March 2012, 2,303,332 women were screened by the UK NHSBSP in England, Wales, Northern Ireland and Scotland. Of the 19,339 cancers detected in women of all ages; 79% were invasive, 20% non-invasive and 1% micro-invasive. The invasive status of 28 cancers was unknown. The cancer detection rates for all cancers and for small invasive cancers (<15mm in diameter) were 8.4 and 3.4 per 1,000 women screened respectively. Ten units have had cancer detection rates for small (<15mm diameter) cancers below 3.0 per 1,000 women screened throughout the 3-year period 2010/11-2012/13. Five of these were units screening fewer than 14,000 women annually.

The proportion of cancers diagnosed in women aged 47-49 and 71-73 years has increased from 6.2% in 2010/11 to 9.9% in 2012/13. Only 1.8% of cancers in Northern Ireland were detected in women aged over 70. Although in Scotland and Wales there are also currently no plans to implement the randomised controlled trial age extension, in 2012/13 in these countries, 7.4% and 8.4% of cancers respectively were detected in these older women, which is similar to the UK average of 8.5%.

In 2012/13, 808 (4%) women had a previous breast cancer recorded; of these cancers, 79% were invasive and 21% were non-invasive. The proportion of women with a previous cancer increased rapidly with age; the 3-year average for women aged 71 years and older being 8.6%. Women with previous breast cancers are included in the figures and tables in Sections 1.1 and 1.2 of Chapter 1 and in Chapter 5, but have been excluded from the figures and tables in Chapters 2, 3, 4, 6, 7 and 8. Because women with previous breast cancer have been excluded from the 3-year rolling data comparisons used for the new KPIs, the main audit data for 2010/11 and 2011/12 and the adjuvant audit data for 2009/10 included in these 3-year comparisons will differ from those published in the 2012 and 2013 UK NHSBSP & ABS audit booklets. For some KPIs the results for women with previous breast cancers are significantly different to those for women without a previous breast cancer. It is possible, therefore, that for some screening units which were outliers in the main audit KPIs for 2011/12, this could partly be explained by the inclusion of women with previous cancers in the analyses.

Non-operative Diagnosis

In 2012/13, 96% of cancers detected in the UK NHSBSP were diagnosed non-operatively; 694 cancers did not have a non-operative diagnosis. In the UK as a whole, only 26 cases had C5 cytology only diagnosis. In four units (3 in Northern Ireland, 1 in North East, Yorkshire & Humber) more than 50% of cancers were diagnosed non-operatively by both C5 cytology and B5 core biopsy. In all of these units, the majority of women had their cytology and core biopsy samples taken at a single assessment visit.

The UK non-operative diagnosis rate for invasive cancers was 99%; only 175 invasive cancers did not have a non-operative diagnosis. All units met the 90% minimum standard. Only 1 unit in South Central (at 93.9%) just failed to meet the 95% target. The non-operative diagnosis rate for non-invasive cancers was 86%; 511 non-invasive cancers did not have a non-operative diagnosis. In 2012/13, 37 units failed to meet the 85% minimum standard for the non-operative diagnosis of non-invasive cancers. If cases of LCIS were excluded, the non-operative diagnosis rate for 16 of these units was above 85%. In the 3-year period 2010/11-2012/13, 20 units had an average non-operative diagnosis rate for non-invasive cancers excluding LCIS below 85% and 19 units had an average non-operative diagnosis rate for all non-invasive cancers below 85%. In control charts for this 3-year period, 13 units were 95% low outliers for all non-invasive cancers and for non-invasive cancers excluding LCIS. Of these, 10 units were 99.7% low outliers for all non-invasive cancers and 6 units were 99.7% low outliers for all non-invasive cancers excluding LCIS. Eight units (2 in East of England, 2 in South Central, 1 in East Midlands, 1 in South East Coast and 1 in Wales) were low outliers in both control charts.

In 2012/13, 103 cancers (1%) had invasive status B5c (Not Assessable or Unknown) at core biopsy. Some units code papillary cancers and cancers with micro-invasion as B5c, and these have been included in the B5c category for the purposes of this audit. The core biopsy coding system is still under discussion by the Radiology Big 18 and the National Coordinating Committee for Breast Pathology. Invasive disease was found at surgery for 18% of cancers with a B5a (Non-invasive) non-operative diagnosis. Five units have had rates significantly higher than the UK average rate in the 3-year period 2010/11-2012/13 and, in 2 units more than half of the under-diagnosed cancers had an invasive size of at least 10mm. Ninety seven cancers with a B5b (Invasive) non-operative diagnosis were found to have non-invasive or micro-invasive cancer with no associated invasive disease following surgery. For 62 cancers with a B5b (Invasive) non-operative diagnosis, no malignant disease was identified at surgery, but subsequent audit confirmed that a correct diagnosis of invasive cancer had been reported in the non-operative core biopsy. The steady reduction in the number of cancers with a B5a (Non-invasive) non-operative diagnosis which are found to be invasive at surgery is probably mainly due to the wider use of vacuum assisted biopsy with larger volume cores within which small invasive components can be identified. The increase in the proportion of cases with a B5b (Invasive) core biopsy which were not confirmed to be invasive following surgery also probably reflects the wider use of vacuum assisted biopsy with larger volume cores within which small invasive tumours are fully excised.

Number of Assessment Visits

Of the 18,540 women with breast cancer in 2012/13 in the UK, 15,963 (86%) had one assessment visit. Of these, 15,531 (97%) had a B5/C5 non-operative diagnosis. Eleven percent of women with invasive cancer and 27% of women with non-invasive cancer had more than one assessment visit. In 10 units more than 20% of women required more than one visit to obtain a B5/C5 non-operative diagnosis result. In 45 units more than 20% of women with non-invasive cancer had more than one visit compared to only 6 units for women with invasive cancer. Of the 17,048 women in England, Wales and Northern Ireland diagnosed in 2012/13, 17,032 had a

needle biopsy at an assessment visit. Of these, 738 (4%) did not have a core/cytology result from their first visit. In 4 screening units, over 20% of women had their first needle biopsy result from second or later assessment visits. One thousand one hundred and nineteen women had at least one repeat visit involving a needle biopsy. In 14 units, over 20% of women with non-invasive cancer with a non-operative diagnosis had more than one visit involving a needle biopsy to obtain a B5/C5 diagnosis. There were 387 invasive cancers and 428 non-invasive cancers where repeat needle biopsies were performed at a subsequent assessment visit to obtain a B5/C5 diagnosis. There were 316 invasive cancers and 160 non-invasive cancers where a B5/C5 result was obtained at the first assessment visit, but where repeat needle biopsy was undertaken at a subsequent visit. Four percent of all women with invasive cancer and 3% of all women with non-invasive cancer came back to an assessment clinic for other investigations.

Diagnostic Open Biopsies

In 2012/13, 2,311 diagnostic open biopsies were performed. Of these 70% were benign and 30% were malignant. Benign open biopsy rates were 1.64 and 0.49 per 1,000 women screened for prevalent (first) and incident (subsequent) screens respectively. Only 24 units achieved the target, and 45 (over half of the UK units) did not achieve the minimum standard for prevalent (first) screens. Three units (1 in Wales, 1 in London and 1 in North West) did not achieve the minimum standard for either prevalent or incident screens. The malignant open biopsy rate has fallen from 2.04 per 1,000 women screened in 1996/97 to 0.3 per 1,000 women screened in 2012/13, mirroring the rise in non-operative diagnosis rate from 63% to 96%. The malignant open biopsy rate varied at unit level from 0 per 1,000 women screened in a unit in North East, Yorkshire & Humber to 0.76 per 1,000 women screened in a unit in East of England. The UK benign open biopsy rate has fallen over 14 years from 1.50 per 1,000 women screened in 1996/97 to 0.77 per 1,000 women screened in 2012/13. There were 3 false positive core biopsies one false positive cytology case recorded in 2012/13.

Four cancers which were diagnosed by open biopsy had a mastectomy or a mastectomy with axillary surgery as the first surgical operation and did not have any further surgical treatment. Of the 175 invasive cancers diagnosed by open biopsy, 12 (7%) had no non-operative procedure recorded and of the 517 non/micro-invasive cancers diagnosed by open biopsy, 5 (1%) had no non-operative procedure recorded. Fifty seven invasive cancers and 125 non/micro-invasive cancers diagnosed by malignant open biopsy had a B4/C4 needle biopsy result indicating suspicion of malignant disease. Eighty two invasive cancers and 375 non/micro-invasive cancers diagnosed by malignant open biopsy had a B3/C3 needle biopsy result. The proportion of non-invasive lesions diagnosed by malignant open biopsy which had a B3 core biopsy result has gradually increased with time. This increase could reflect better targeting of calcifications, as B3 results for non/micro-invasive cancers and also for invasive carcinomas may represent atypical intraductal epithelial proliferations resulting from partial sampling of DCIS. Increases in B3 diagnoses may also in part be due to the classification by pathologists of core biopsies which are considered to represent lobular neoplasia (atypical lobular hyperplasia and lobular in situ neoplasia) as B3, in line with current NHSBSP guidelines. In 2012/13, of the 457 cancers that were diagnosed as B3/C3 and had an operation, 128 had only LCIS in the surgical specimen.

Tumour Characteristics

Twenty five units had 100% complete data for cytonuclear grade and size, and only 5% of all surgically treated non-invasive cancers had incomplete cytonuclear grade or/and size. In 12 units, data incompleteness was greater than 10%. The size of 189 non-invasive cancers (5%) was not assessable; 163 of these were LCIS. Of the 191 non-invasive cancers with grade not assessable, 86% were LCIS alone at surgery. Of the 178 surgically treated non-invasive cancers with unknown size, 133 (75%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen. Of the 3,657 surgically treated non-invasive cancers, 36% were less than 15mm in diameter and 14% were larger than 40mm. Fifty six percent of surgically treated non-invasive cancers were high cytonuclear grade, 28% were intermediate cytonuclear grade and 9% were low cytonuclear grade. Sixteen units had significantly higher and 11 units had significantly lower proportions of non-invasive cancers with a high cytonuclear grade than the national average. Fifty three percent of surgically treated cancers had an invasive tumour diameter of less than 15mm. For only 248 cases (2%) was the invasive tumour diameter greater than 50mm. The whole tumour size was not provided for 228 (2%) surgically treated invasive cancers; 32% of these cancers were in Wales and Scotland.

Ninety nine percent of surgically treated invasive cancers had known nodal status; 114 invasive cancers were recorded as having no nodes obtained. Overall, 22% of invasive cancers had positive nodes; this varied between units from 10% to 34%. 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, total number of nodes examined and use of immuno-histochemistry and molecular techniques such as PCR), and whether or not intra-operative nodal assessment was used. The latter may lead to the identification of higher numbers of micro-metastases which would not normally warrant axillary treatment. For 14,272 invasive cancers nodes were examined at surgery, and 1,716 (12%) had one positive node at the first axillary operation. Of these, 1,500 (87%) had detailed information of the type of single node positivity; 485 contained micro-metastases and 1,015 macro-metastases. Of the 3,657 surgically treated non-invasive cancers, 27% had known nodal status; 89% of non-invasive cancers treated with mastectomy had known nodal status compared with 7% of those treated with breast conserving surgery. The nodal status was known for more than 10% of non-invasive cancers treated by breast conserving surgery in 25 units and for more than 30% in 3 units. The nodal status was known for 100% of non-invasive cancers treated by mastectomy in 39 units and for less than 60% in 2 units. Of the 994 non-invasive cancers with known nodal status, 12 (1%) had positive nodal status recorded; 9 after a mastectomy and 3 after breast conserving surgery.

Overall in 2012/13, 26% of invasive cancers were Grade 1, 53% Grade 2 and 20% Grade 3. Grade was not assessable for 50 cancers and unknown for 47 cancers. Three-year control charts for 2010/11-2012/13 suggest that there are local variations in invasive tumour grading (not necessarily due to interpretation) which should be investigated. Units which are persistent outliers should refer to the guidance issued by the National Co-ordinating Committee for Breast Pathology. A Nottingham Prognostic Index (NPI) score could be calculated for 98% of surgically treated invasive cancers with no known neo-adjuvant therapy. Although an NPI score was

provided for 854 of the 924 surgically treated invasive cancers with neo-adjuvant therapy; all cancers with neo-adjuvant therapy recorded were excluded from the analyses as the NPI scores provided may not have reflected the true tumour characteristics at diagnosis. There are local variations in NPI group (not necessarily due to interpretation) which should be investigated. For example, in the PPG control chart, 10 units are 95% high outliers. Of these, 5 are also 95% low outliers for EPG/GPG cancers.

ER status was unknown for 69 invasive cancers. Of the invasive cancers with known ER status, 92% were ER positive. In the 3-year period 2010/11-2012/13, 10 units had a significantly higher proportion of ER positive cancers and 12 had a significantly lower proportion than the national average. In 3 units fewer than 87% of invasive cancers were ER positive. Two of these were in East Midlands and 1 in West Midlands. In 1 unit in South West and 1 unit in Scotland, 98% and 96% of invasive cancers respectively were ER positive. Units which are persistent outliers should refer to the guidance issued by the National Co-ordinating Committee for Breast Pathology. PR status was known for 59% of invasive cancers. Of the invasive cancers with known PR status, 78% were positive. Of the 1,180 invasive cancers that were known to be ER negative, 83% had known PR status; 6% were PR positive and 78% were PR negative. HER2 status data were available for 99% of invasive cancers. 33 units had complete HER2 status for all their invasive cancers while 2 units in East of England and London had 7% and 8% of cancers with unknown HER2 status. Of the invasive cancers with known HER2 status, 10% were positive, 88% were negative and 2% were borderline. In the 3-year period 2010/11-2012/13, 7 units had a significantly higher proportion of HER2 positive invasive cancers and 7 had a significantly lower proportion. In 1 unit in North West, 22% of invasive cancers were HER2 positive and in 1 unit in East of England only 5% were HER2 positive.

ER status was not known for 65% of non/micro-invasive cancers; 89% of non-invasive cancers with known ER status were ER positive. The proportion of non/micro-invasive cancers with ER status varied widely between units as did the proportion of these cancers which were ER positive. PR status was known for 20% of non/micro-invasive cancers. The wide variation between units in the proportion of non/micro-invasive cancers with known ER and PR status reflects the variable practice that has developed in the UK since the publication in 2009 of *NICE Clinical Guidance 80: Early and locally advanced breast cancer, Diagnosis and treatment* which states that Tamoxifen should not be offered to women with non-invasive breast cancers. The closure of the DCIS IBIS trial has also meant that some units have stopped measuring ER and PR status for non-invasive cancers. In the rest of Europe and the US, consideration of endocrine therapy is still recommended for ER positive non-invasive breast cancers.

Surgical Treatment

In 2012/13, 74% of non-invasive cancers were treated with breast conserving surgery and 63 apparently received no surgery. 75 potentially large, high cytonuclear grade non-invasive cancers were treated with breast conserving surgery. Seventy eight percent of invasive breast cancers had breast conserving surgery. Two hundred and seventy seven invasive cancers (2%)

had no surgery recorded within the audit period; of these 52% had neo-adjuvant therapy recorded.

Since 2005/06, the mastectomy rate for small (<15mm) invasive cancers has decreased to an all time low of 13% in 2012/13. Only 7% of cancers with whole tumour size <15mm were treated with mastectomy compared to 81% of small invasive (<15mm diameter) cancers with whole tumour diameter >50mm. These data indicate that the presence of non-invasive disease which extends beyond the invasive lesion accounts for a proportion of the mastectomies performed on small invasive cancers. In 2010/11-2012/13, 9 units had significantly higher mastectomy rates for small <15mm whole size cancers and 9 had significantly lower rates. Of the cancers treated with mastectomy in 2012/13, 29% were recorded as having immediate reconstruction. The highest immediate reconstruction rate was in East of England (65%), while in 2 units (in Northern Ireland and South West) no immediate reconstructions were recorded. Immediate reconstruction rates after mastectomy were almost twice as high for non/micro-invasive cancers (44%) than for invasive cancers (24%). For invasive cancers treated with mastectomy, immediate reconstruction rates varied from over 50% in 5 units to 0% in 2 units. For non/micro-invasive cancers, immediate reconstruction rates varied from 70% in 12 units 0% in 5 units. In 2010/11-2012/13, 19 units had significantly higher immediate reconstruction rates for invasive cancers and 16 had significantly lower rates. Two units (in South West and North East, Yorkshire & Humber) were high mastectomy rate outliers and high immediate reconstruction outliers for all invasive cancers, and 2 units (in Wales and North West) were high mastectomy rate outliers and low immediate reconstruction outliers for all invasive cancers. The unit in Wales and 2 other units (in East Midlands and North East, Yorkshire & Humber) were high mastectomy rate outliers and low immediate reconstruction rates outliers for small <15mm whole size invasive cancers.

Neo-adjuvant Therapy

A total of 700 cancer patients received neo-adjuvant therapy in 2012/13. Of these, 680 were invasive and 8 non-invasive. Of the 277 women with invasive breast cancer who did not have surgery within the audit time period, 52% had neo-adjuvant therapy recorded. The use of neo-adjuvant endocrine therapy was highest for the older women aged 71 years or more; 45% (31 cases) of whom had no surgery recorded. Of the 384 cancers (2%) with neo-adjuvant endocrine therapy recorded, 96% were ER and/or PR positive, 4% had unknown ER and PR status and 2% were ER and PR negative; 110 (29%) had no surgery and 72% were aged 60 years or over. Neo-adjuvant chemotherapy was recorded for 339 breast cancers (2% of all cancers diagnosed in 2012/13); 337 were invasive. Six of the invasive cancers treated with neo-adjuvant chemotherapy were small (20mm or less), Grade 1 and were not proven to have abnormal lymph nodes. Twenty breast cancers (all invasive) were recorded as having received neo-adjuvant trastuzumab. Of these, only 12 (60%) also had neo-adjuvant chemotherapy recorded.

Surgical Caseload

In 2012/13, 578 consultant breast surgeons treated women diagnosed in the UK NHSBSP. Ninety three percent of women were treated by a surgeon with a screening caseload of at least 20 cases. One hundred and seventeen surgeons treated fewer than 10 screen-detected cases.

Of the 117 surgeons treating fewer than 10 screening cases per year, 42 (36%) had a symptomatic caseload of more than 30 cases per year and 13 (11%) either joined or left the UK NHSBSP during 2012/13. Combining the data submitted for the 3-year period 2010/11-2012/13, 284 surgeons (38%) had an annual average caseload of fewer than 10 cases and 6 treated an average of at least 100 cases per year. The highest proportions of surgeons with a screening caseload of fewer than 10 screening cases per year were in Scotland (53%) and London (45%). In Scotland, some low caseload surgeons may also work elsewhere in the UK and their caseload may be underestimated. It is not always possible to identify such surgeons because the codes used to identify surgeons in Scotland are different to those used in the rest of the UK. This problem is much less marked in 2012/13.

Surgical specialisation was highest in Northern Ireland, where only 3 surgeons treated fewer than 10 screening cases per year. During the period 2010/11-2012/13, of the 284 low caseload surgeons, 23% treated more than 30 symptomatic breast cancers each year, and 12% either joined or left the UK NHSBSP. Eleven of the 27 surgeons who had a screening caseload of fewer than 10 cases because of private practice were in London. Information was not available to explain the low caseload of 105 surgeons treating a total of 829 women in the 3-year period 2010/11-2012/13. Fifteen of these surgeons were in South West. A further 33 were in Scotland and could have also treated women elsewhere in the UK.

Repeat Operations

Overall, 24% (4,338) of surgically treated breast cancers had more than one operation. Eighty one percent of invasive cancers and 38% of non/micro-invasive cancers without a non-operative diagnosis had a repeat operation. Although the overall repeat operation rate for the 692 surgically treated cancers (with known invasive status) without a non-operative diagnosis was 48%, repeat operations for cancers without a non-operative diagnosis formed only 8% of the total repeat operations. Eighteen cancers without a non-operative diagnosis, which were not LCIS, had no further surgery despite the margins being involved or of unknown status. One of these cancers received neo-adjuvant therapy and 12 were in Scotland, where margin data were not available. Overall, 23% (4,003) of surgically treated breast cancers with a non-operative diagnosis had more than one operation; 23% of invasive cancers and 24% of non/micro-invasive cancers with a non-operative diagnosis had a repeat therapeutic operation. Twenty seven cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery had more than three therapeutic operations. Seven of these were in South East Coast and 6 were in a single unit within this region. The repeat operation rate was 24% for non/micro-invasive cancers with a B5a (Non-invasive) core biopsy and 21% for invasive cancers with a B5b (Invasive) core biopsy. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest repeat operation rate (61%).

Nineteen percent of all cancers with a non-operative diagnosis were initially treated with breast conserving surgery; 14% had repeat breast conserving surgery and 5% had their initial breast conserving surgery converted to a mastectomy. Repeat operation rates to clear margins were higher for non/micro-invasive cancers than for invasive cancers (22% compared to 14%).

Repeat operation rates for non/micro-invasive cancers varied between units from 0 cases in 2 units (1 in South Central and 1 in Northern Ireland) to 64% in a unit in East Midlands (7 out of 11 cases). Repeat operation rates for invasive cancers varied between units from 4% in a unit in South West to 43% in a unit in East Midlands (17 out of 40 cases). Conversion rates to mastectomy were also higher for non/micro-invasive cancers than for invasive cancers (7% compared to 5%). Twelve percent of invasive cancers with a B5b (Invasive) non-operative diagnosis, initially treated with breast conserving surgery, had repeat breast conserving surgery to clear margins. Twenty eight percent of invasive cancers and 19% of non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had repeat therapeutic breast conserving surgery to clear margins. In the 3-year period 2010/11-2012/13, 18 units and 47 surgeons had high repeat breast conserving surgery rates. Twenty one units and 42 surgeons had low repeat breast conserving surgery operation rates. In the 3-year period 2010/11-2012/13, for non/micro-invasive cancers 12 units had high and 5 had low repeat breast conserving surgery rates. For invasive cancers 17 units had high and 20 had low repeat breast conserving surgery rates. Five units (2 in South East Coast, 2 in South West and 1 in North West) were 95% high outliers for invasive and non-micro-invasive cancers and 2 units (1 in Scotland and 1 in North East, Yorkshire & Humber) were low outliers for invasive and non-micro-invasive cancers.

In the UK as a whole, 5% of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery, were eventually converted to a mastectomy. Conversion rates to mastectomy were higher for non/micro-invasive cancers than for invasive cancers (7% compared to 5%). For non/micro-invasive cancers, conversion rates to mastectomy varied from 30% in 1 small unit in North East, Yorkshire & Humber to 0% in 21 units. For invasive cancers, conversion rates to mastectomy varied from 17% in 1 small unit in South Central to 0% in 3 units. In the unit in South Central with the highest conversion rate (19%), 1 non/micro-invasive and 9 invasive cancers out of a total of 54 cancers were converted to mastectomies. For invasive cancers, 16 units and 25 surgeons had high conversion to mastectomy rates and 9 units and 12 surgeons had low conversion to mastectomy rates.

Sixteen percent of all cancers with a non-operative diagnosis had an initial therapeutic mastectomy at the first operation, and 4% had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent repeat operation. For cancers with a non-operative diagnosis, the initial therapeutic mastectomy rate was higher for non/micro-invasive cancers than for invasive cancers (20% compared to 15%), as was the proportion of non/micro-invasive cancers that had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent repeat operation (5% compared to 4%). Nine units had an overall invasive cancer mastectomy rate above 30% (3 of these units were in North East, Yorkshire & Humber, 2 in North West, 1 in South Central, 1 in East of England, 1 in East Midlands and 1 in Northern Ireland). Within this group, 5 units (2 of which were small) were also high outliers for mastectomy conversion rates in 2010/11-2012/13. One small unit in South Central had a mastectomy rate at first operation greater than 30%.

Of the 16,491 invasive or non/micro-invasive cancers which had surgery to the breast, 91% had complete margin data for all operations. For the first operation, 99% of cancers had information

on whether or not the radial margin was clear and 93% had the margin distance recorded. Of the 12,837 cancers treated with breast conserving surgery, 98% were recorded as having clear margins at final operation. Of the 3,654 cancers treated with a mastectomy, 97% were recorded as having clear margins at final operation. There were 274 cancers (202 invasive and 72 non/micro-invasive) recorded as not having had clear margins at final operation, and 78 cancers (46 invasive and 32 non/micro-invasive) with final margin status recorded as unknown.

The Axilla

Of the 14,381 surgically treated invasive cancers included in the audit, 99% had known nodal status. Of these 3,073 (22%) were node positive and 494 were known to only have micro-metastases. Of the 2,628 invasive cancers without neo-adjuvant therapy recorded that were confirmed to be node positive on surgery, 595 (23%) had positive nodes diagnosed pre-operatively by means of needle biopsy. In the UK excluding Scotland, 14,786 (87%) cancers had a record of an axillary ultrasound at assessment; 84% were confirmed to be invasive after surgery and 15% non-invasive. Overall, 93% of invasive cancers and 64% of non-invasive cancers had axillary ultrasound recorded. These are considerable improvements from 2011/12. Of the 2,098 invasive breast cancers with an abnormal axillary ultrasound result recorded, 1,037 were node positive at surgery giving a positive predictive value of an abnormal ultrasound of 49%. Of the 10,356 invasive cancers with a normal axillary ultrasound result recorded which had axillary assessment during surgery, 1,626 (16%) had positive nodes found after surgery. For 5 units in England, fewer than 80% of invasive breast cancers had an axillary ultrasound result recorded. For 198 invasive cancers an abnormal ultrasound result was apparently not followed up with a needle biopsy and for 92 invasive cancers a needle biopsy was performed despite a normal ultrasound result. In 12 units more than 40% of invasive cancers had no biopsy recorded after an abnormal ultrasound.

In 12 units more than 20% of invasive cancers had C1/B1 recorded as the worst axillary biopsy result. Of the 772 invasive cancers with a C5/B5 diagnosis with abnormal ultrasound and the 8 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 602 had no or unknown neo-adjuvant therapy recorded and had axillary surgery. Of these, 591 were node positive at surgery, giving an overall positive predictive value of a C5/B5 of 98%. Of the 595 invasive cancers with a C5/B5 result and abnormal ultrasound and the 7 invasive cancers with a C5/B5 results and normal ultrasound which had no or unknown neo-adjuvant therapy recorded and had axillary surgery, 10 (2%) had false positive results, i.e. were found to be node negative at surgery. Four of these had axillary clearance. Axillary ultrasound failed to accurately identify positive nodes for 264 (23%) invasive breast cancers. For 10 units more than 20% of node positive cancers had a C1/B1 result.

Of the 14,272 invasive cancers with axillary surgery in 2012/13, 12,359 (87%) had a SLNB. The use of SLNB has increased by 3 percentage points since 2011/12. In 13 units 20% or more invasive cancers having axillary surgery did not have a SLNB, and in 6 of these 40% or more invasive cancers did not have a SLNB. In the UK as a whole in 2012/13, the blue dye only

technique was used for 9% of invasive cancers with axillary surgery. In 10 units blue dye only was used for more than 30% of invasive cancers with axillary surgery.

In 2012/13 the proportion of invasive cancers with known nodal status that had fewer than 4 nodes examined increased to 62.7%; this falls to 0.8% when invasive cancers with a SLNB are excluded. Of the 14,381 surgically treated invasive cancers, 122 had unknown nodal status and 100 had their negative nodal status determined on the basis of 1, 2 or 3 nodes without a SLNB procedure. Of the 1,913 invasive breast cancers, which either did not have a SLNB procedure or where the type of nodal procedure was unknown, 94% had 4 or more nodes taken; 16 units did not achieve the 90% minimum standard. Of the 14,259 invasive cancers with known nodal status, 3,073 (22%) had positive nodes. The proportion of cases with positive nodal status (16%) was lower for cancers which underwent a SLNB procedure compared with those which did not have a SLNB procedure (59%). 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 484 cancers with positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure, 461 only had 1 axillary operation. Of these, 208 (45%) were known to have had micro-metastases and therefore further axillary surgery may not have been appropriate. Since the publication of the results of the Z11 Trial and the IBSCG study, decisions on systemic therapy are increasingly being made on the basis of the available axillary staging (which may include fewer than 4 nodes), rather than subjecting women to unnecessary axillary clearance. Under these circumstances, the remaining 185 cancers with positive nodes and only one axillary operation (77% of which were treated with breast conserving surgery) may have been treated with axillary radiotherapy or have been advised not to have any further axillary intervention.

Of the 136 surgically treated micro-invasive cancers, 72% had known nodal status; 94% of those treated by mastectomy and 58% of those treated with breast conserving surgery. Twenty seven percent of non-invasive cancers had known nodal status. 89% of non-invasive cancers treated with mastectomy had known nodal status, compared with 7% of those treated with breast conserving surgery. Of the 994 non-invasive cancers with known nodal status, 12 had positive nodal status recorded. Eighty eight percent of non-invasive cancers treated with a mastectomy and 95% of non-invasive cancers treated with breast conserving surgery had their nodal status determined on the basis of a SLNB. The maximum numbers of nodes taken for non-invasive cancers treated with breast conserving surgery or mastectomy were both 21. Eleven non-invasive cancers treated with mastectomy and 1 treated with breast conserving surgery had their nodal status determined on the basis of an axillary clearance.

Forty three invasive cancers with a B5b (Invasive) core biopsy, 41 invasive cancers with a B5a (Non-invasive) core biopsy, 3 invasive cancers with a B5c non-operative diagnosis and 17 invasive cancers without a non-operative diagnosis had no axillary procedure recorded. It is possible that under some circumstances, (e.g. a very small, grade 1 cancer, diagnosed after a B5a (Non-invasive) non-operative diagnosis) a further operation to assess nodal involvement may not be appropriate. Axillary surgery was performed on all invasive breast cancers with a B5b (Invasive) core biopsy and all invasive cancers diagnosed by C5 cytology only. Although

94% of invasive cancers with a B5a (Non-invasive) diagnosis had axillary surgery, only 321 (46%) of these cancers had their axillary surgery at the first operation; of these, 90% had SLNB performed, compared to 85% of those with axillary assessment at later operation. During the period 2010/11-2012/13, 5 units had significantly lower rates of axillary surgery at first operation for invasive cancers with a B5a (Non-invasive) diagnosis, and 8 had significantly higher rates. It is possible 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 ration. Four of these units had a significantly higher than average mastectomy and immediate reconstruction rate where limited axillary surgery would be appropriate.

In 2012/13, 36% of invasive cancers with a positive nodal status had a repeat operation to the axilla; 34% following a SLNB and 2% after an axillary operation which did not involve a SLNB. Overall in the UK, 94% of repeat operations on the axilla were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB. This varied from 0% in 2 units in South Central (1 of which was small) to over 80% in 2 units (1 in North East, Yorkshire & Humber and 1 in East of England). In most units; the majority of repeat operations were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB. Thirty one units had significantly higher rates of repeat axillary surgery and were 95% high outliers (24 were 99.7% high outliers), and 23 had significantly lower rates of repeat axillary surgery and were 95% low outliers (16 were 99.7% low outliers). Of the 99.7% high outliers, 4 units (3 in South West and 1 in South Central) had 40% or more invasive cancers with no biopsy after an abnormal axillary ultrasound, and in 1 unit in Wales more than 20% of cancers had no axillary ultrasound. It is therefore possible that the node positivity of some of the invasive cancers in these units could have been identified pre-operatively and that fewer women could have had a repeat operation to the axilla.

Adjuvant Therapy

Scotland did not provide adjuvant therapy data for this year's adjuvant audit. This is the second year that that it has been possible to obtain detailed information on previous cancers diagnosed in women with screen-detected breast cancer by matching NHSBSP data with cancer registration data. Of the 13,162 matched women with invasive breast cancer and 3,226 matched women with non-invasive breast cancer in the 2011/12 adjuvant audit, 1,564 (12%) and 362 (11%) respectively had previous cancers registered. Interpretation of the adjuvant audit data for previous years thus needs to reflect the fact that 10-12% of women are likely to have had a history of a previous malignancy. Of the 1,946 women with previous cancers, 661 (34%) had previous invasive/micro-invasive breast cancers and 138 (7%) had previous non-invasive breast cancers. The second most common previous type of invasive cancer was gynaecological cancer (2%; 257 women). *In situ* cervical cancer was the most common type of previous non-invasive cancer (364 women).

Only 39% of women who had a previous breast cancer had radiotherapy for their subsequent screen-detected breast cancer compared with 73% of those without a previous breast cancer. This is mainly because the surgical treatment of the two cohorts is very different, with 57% of

women who had a previous breast cancer having a mastectomy compared to only 22% of women with no previous history of breast cancer. However, even after adjusting for operation type, women with a previous breast cancer were still less likely to receive radiotherapy; 81% of women with a previous breast cancer who had breast conserving surgery for their subsequent cancer had radiotherapy compared to 88% in women who had not had a previous breast cancer.

Of the 16,993 breast cancers detected in 2011/12, 416 were not included in the adjuvant audit because the adjuvant data were not submitted. A further 790 cancers were excluded because of previous breast cancer diagnoses, leaving 15,787 (93%) for analysis. Eighty one percent of women with invasive cancer, 57% with micro-invasive cancer and 44% with non-invasive cancer had radiotherapy recorded; 26% of the women with invasive cancer and 6 women with non/micro-invasive cancer had chemotherapy recorded. Eighty five percent of women with invasive cancer and 11% with non/micro-invasive cancer had endocrine therapy recorded. Some women with non-invasive breast cancer may have received endocrine therapy as part of a clinical trial. Overall, radiotherapy therapy was the main adjuvant therapy for women with invasive cancer at all ages, followed by endocrine therapy. Sixty eight percent of the 1,099 women with invasive cancer with radiotherapy recorded and no endocrine therapy had ER negative tumours. The proportion of women with invasive cancer treated with breast conserving surgery who received endocrine therapy varied little with age (ranging between 86% and 91%). A slightly smaller proportion of women in every age group treated with mastectomy received endocrine therapy (range 82% to 90%) compared with those with breast conserving surgery.

Ninety eight percent of women aged 50 to 65 years with invasive cancer treated with breast conserving surgery received radiotherapy, and there was only a 2% decrease in the use of radiotherapy for women aged 71 years and over. Overall, only 37% of women treated with mastectomy had radiotherapy, and there was a gradual decrease in the use of radiotherapy with age. The site(s) irradiated were not recorded. For women with non/micro-invasive cancer treated by breast conserving surgery, the use of radiotherapy peaked at 70% for women aged 56-64 and then fell to 58% for those aged older than 70. Four percent of women with non-invasive cancer treated with mastectomy had radiotherapy. The site(s) irradiated were not recorded.

Chemotherapy was the least used adjuvant therapy; being recorded for only 26% of women with invasive cancer. Overall, a higher proportion of women treated with mastectomy received chemotherapy (45% compared with 22%) and this difference was evident in every age group. There was also a clear decrease in the use of chemotherapy with age in both treatment groups. Surgery, radiotherapy and endocrine therapy was the most common treatment pattern for women with invasive cancer treated with breast conserving surgery, with 70% receiving this treatment combination. Fifty one percent of women with non/micro-invasive cancer treated with breast conserving surgery had surgery with radiotherapy. Surgery and endocrine therapy was the most common treatment pattern for women with invasive cancer treated with mastectomy, with 43% receiving this treatment combination. Eighty nine percent of women with non/micro-invasive cancer treated with mastectomy had surgery only.

Overall, 59% of women with invasive cancer received radiotherapy within 60 days of their final surgery and 93% within 90 days. Twenty seven women had not received radiotherapy 200 days after their final surgery. Only 47% of women with invasive cancer and 38% of women with non/micro-invasive cancer had started their radiotherapy within 90 days of their first assessment visit, and 212 women (3%) with invasive cancer had not started radiotherapy after 200 days. In the *Cancer Reform Strategy* published in December 2007, a radiotherapy waiting times standard was introduced which specifies that the time between the date when a person is determined to be 'fit to treat' after surgery and the start of radiotherapy should be no more than 31 days. If this standard is to be achieved, considerable reductions in the time between final surgery and radiotherapy will be required in many screening services. Although there is little evidence available on the possible detrimental effect of radiotherapy, changes to the patient pathway could lead to improvements in radiotherapy waiting times. It will be important to note when a woman was first seen by a clinical oncologist after surgery, and the time delay from the 'actioning' the radiotherapy to the actual start date. This may explain whether the delays are because of delays in the first clinic consultation or in getting the radiotherapy planning scan/treatment.

In 2011/12, 95% of invasive cancers, 88% of micro-invasive cancers and 59% of non-invasive cancers treated with breast conserving surgery had adjuvant radiotherapy. Thirty six percent of invasive cancers and 4% of non-invasive cancers treated with mastectomy had adjuvant radiotherapy. One hundred and ninety eight non-invasive cancers without radiotherapy recorded were high cytonuclear grade and 14 were more than 40mm in diameter. In the 3-year period 2009/10-2011/12, 15 units (6 in South West, 4 in South Central, 2 in London, 2 in South East Coast and 1 in West Midlands) had significantly higher proportions of high grade non-invasive cancers with no or unknown radiotherapy. Two units in South West had more than 30% with unknown radiotherapy. These units were not high outliers in 2010/11 when their radiotherapy data were complete. The 4 highest outlier units (3 in South West and 1 in South Central) had more than 50% of high grade non-invasive cancers with no radiotherapy recorded. Five percent of the 521 conservatively treated invasive cancers which did not have radiotherapy recorded were larger than 20mm in diameter, 21% were Grade 3 and 18% were node positive. Of the latter, 14 had only one positive node containing micro-metastases. In the 3-year period 2009/10-2011/12, 11 units had significantly lower rates of radiotherapy recorded for invasive cancers treated with breast conserving surgery. In 4 of these (2 in South East Coast, 1 in East of England and 1 in South West) more than 9% of cancers had unknown radiotherapy. Of the other outlier units, 3 were in London, 1 in North West, 1 in South East Coast. 1 in South Coast and 1 in South West.

The decision to give endocrine therapy did appear to be dependent on ER and PR status. However in 2011/12, 444 (4%) ER positive invasive cancers had no endocrine therapy and 428 (4%) had unknown endocrine therapy. In addition 17 (35%) ER negative PR positive invasive had no or unknown endocrine therapy. Overall in 2010/11, 27% of ER positive non/micro-invasive cancers had endocrine therapy. This varied widely between units. Over the 3-year period 2009/010-2011/12, 11 units had a significantly higher proportion of ER positive invasive cancers with NPI.3.4 with no or unknown endocrine therapy.

Thirty five percent of women with node positive invasive cancers did not have chemotherapy recorded. Of these, 802 (30%) had no chemotherapy and 124 (5%) had unknown chemotherapy. Of the 926 node positive invasive cancers with no or unknown chemotherapy, 230 (25%) had micro-metastases, 29 (3%) were ER negative, 95 (10%) were Grade 3 (18% of these had micro-metastases) and 32 (3%) were HER2 positive (9% of these had micro-metastases). Twenty nine percent of women aged less than 65 with a node positive invasive cancer had no or unknown chemotherapy, compared to 50% of women aged 65 and above. In 2010/11, in 8 units 50% or more node positive invasive breast cancers had no or unknown chemotherapy. In 1 unit in South West, all 39 cancers had unknown chemotherapy. Over the 3-year period 2009/10-2011/12, 12 units had significantly higher proportions of node positive cancers with macro-metastases with no or unknown chemotherapy. In 2 of these units (in South East Coast and 1 in South West), more than 45% of node positive cancers with macro-metastases had unknown chemotherapy in 2011/12.

Survival

Of the 16,592 cancers submitted to the survival audit for the period 1 April 2007 to 31 March 2008, 15,806 were eligible for inclusion in the analyses. The 5-year relative survival for 12,518 women with screen-detected invasive breast cancer who were screened in 2007/08 was 98.5%. Five-year relative survival has improved significantly from 93.7% in 1990/91. The unit level 5-year relative survival for women screened in 2006/07 and 2007/08 varied from 93.4% in a unit in Northern Ireland to 103.1% in a unit in East of England. The latter unit had a significantly higher relative survival rate than the national average. For 7 units, 5-year relative survival rates were statistically significantly lower than the national average. Two of these were in West Midlands and 1 each in East Midlands, London, North East, Yorkshire & Humber, North West and Northern Ireland.

Five-year relative survival varied with invasive tumour characteristics. It was100.7% for less than 15mm diameter tumours compared to 89.8% for tumours with a diameter greater than 50mm, 100.7% for Grade 1 cancers compared to 92.6% for Grade 3 cancers, and 100% for node negative cancers compared to 93% for node positive cancers. At 101.0% and 101.1% respectively for cancers in the Excellent Prognostic Group (EPG), Good Prognostic Group (GPG), 5-year relative survival was significantly better than that for Moderate Prognostic Group 1 (MPG1) cancers (99.4%) and for Moderate Prognostic Group 2 (MPG2) and the Poor Prognostic Group (PPG) cancers (93.9% and 82.0% respectively).

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 2012/13 UK NHSBSP & ABS audit examines surgical activity undertaken for the 2,303,332 women screened in England, Wales, Northern Ireland and Scotland between 1 April 2012 and 31 March 2013. Ninety three screening UK units in the UK were included. The number of women screened varied from 5,752 in a screening unit in North West (where 63 cancers were detected) to 61,811 in a screening unit in London (where 530 cancers were detected).

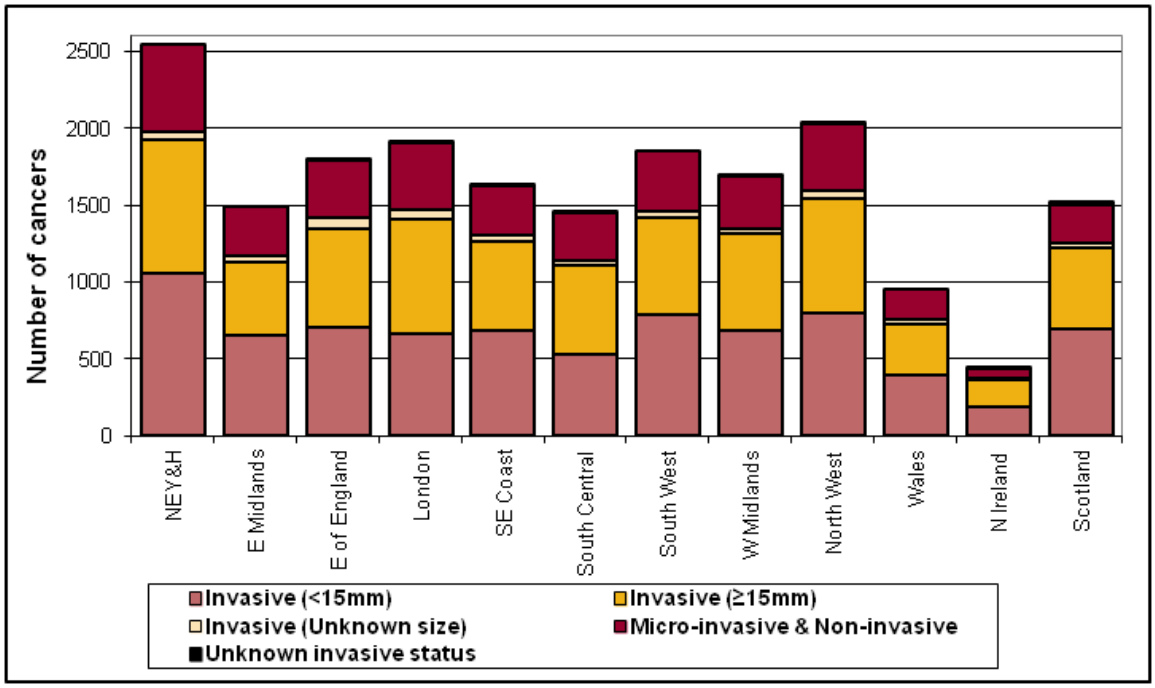

Figure 1 (Table 1): Variation in the number and invasive status of screen-detected breast cancers in each region and country contributing to the 2012/13 NHSBSP & ABS audit

In 2012/13, 19,339 cancers were detected in women of all ages, 15,287 (79%) were invasive, 3,883 (20%) non-invasive and 141 (1%) micro-invasive. The invasive status of 28 cancers was unknown, 13 (46%) of these were in Scotland. Figure 1 shows the number of cancers detected in each English region and in Wales, Northern Ireland and Scotland according to their invasive status.

The following 17-year summary table shows that total and invasive cancer detection rates increased gradually from 1996/97 to 2001/02, and then rose steeply between 2001/02 and 2003/04. The latter probably reflects the impact of the introduction of two views at incident screen. Between 2003/04 and 2010/11, the total and invasive cancer detection rates changed

very little, levelling off at around 8.1 per 1,000 women screened and 6.4 per 1,000 women screened respectively.

17-YEAR COMPARISON: NUMBER OF CANCERS DETECTED

Year of data collection	Number of invasive cancers	Number of <15mm cancers	Number of non/ micro-invasive cancers	Total cancers	Number of women screened	Cancer detection rates per 1,000 women screened			
						Invasive	Invasive (<15mm)	Non/ Micro-invasive	Total
1996/97	5,860	-	1,468	7,410	1,340,175	4.4	-	1.1	5.5
1997/98	6,427	-	1,726	8,215	1,419,287	4.5	-	1.2	5.8
1998/99*	6,337	-	1,634	8,028	1,308,751	4.7	-	1.2	6.1
1999/00	7,675	-	2,076	9,797	1,550,285	5.0	-	1.3	6.3
2000/01	7,945	4,190	2,080	10,079	1,535,019	5.2	2.7	1.4	6.6
2001/02	7,911	4,244	2,218	10,191	1,507,987	5.2	2.8	1.5	6.8
2002/03	8,931	4,971	2,416	11,593	1,579,165	5.7	3.1	1.5	7.3
2003/04	10,400	5,488	2,868	13,290	1,685,661	6.2	3.3	1.7	7.9
2004/05	11,063	5,869	2,953	14,040	1,748,997	6.3	3.4	1.7	8.0
2005/06	12,600	6,673	3,317	15,944	1,942,449	6.5	3.4	1.7	8.2
2006/07	12,491	6,577	3,337	15,856	1,955,825	6.4	3.4	1.7	8.1
2007/08	13,305	7,005	3,466	16,792	2,042,497	6.5	3.4	1.7	8.2
2008/09	13,532	7,028	3,491	17,045	2,116,588	6.4	3.3	1.6	8.1
2009/10	13,672	7,169	3,333	17,013	2,133,189	6.4	3.4	1.6	8.0
2010/11	14,219	7,314	3,612	17,838	2,221,938	6.4	3.3	1.6	8.0
2011/12	14,911	7,764	3,810	18,745	2,261,942	6.6	3.4	1.7	8.3
2012/13	15,287	7,876	4,024	19,339	2,303,332	6.6	3.4	1.7	8.4

* Data from Scotland are absent in 1998/99.

In 2012/13, the number of women screened rose by 1% compared with 2011/12, and the number of cancers found increased by 3%. This change probably reflects the continuing roll out of the randomised controlled trial age extension of the NHSBSP in England. By 31 March 2013, 69/80 screening units in England had started to randomise women aged 47-49 and 71-73 years for invitation to screening in addition to the core 50-70 year age range.

The cancer detection rate in 2012/13 for all cancers was 8.4 per 1,000 women screened. This varied from 6.8 per 1,000 women screened in Northern Ireland to 10.2 per 1,000 women screened in Wales (Table 1). Invasive cancer detection rates varied between 5.7 per 1,000 women screened in Northern Ireland and 8.1 per 1,000 women screened in Wales. Non/micro-invasive cancer detection rates varied from 1.1 per 1,000 women screened in Northern Ireland to 2.1 per 1,000 women screened in Wales.

Figure 2 shows how the cancer detection rates in each screening unit varied according to invasive status. The overall cancer detection rate varied from 5.5 per 1,000 women screened in a unit screening 12,090 women to 11.0 per 1,000 women screened in a unit screening 5,752 women. For small invasive cancers (<15mm in diameter), the UK cancer detection rate was 3.4 per 1,000 women screened; varying between 2.2 per 1,000 women screened in 3 screening units (2 in South Central and 1 in North West) and 4.7 per 1,000 women screened in a

screening unit in Wales. Ten screening units (3 in North West, 2 in London, 1 in South Central, 1 in West Midlands, 1 in East Midlands, 1 in East of England and 1 in North East, Yorkshire & Humber) have had cancer detection rates for small (<15mm in diameter) cancers below 3.0 per 1,000 women screened every year throughout the 3-year period 2010/11-2012/13. Of these 10 units, 5 are small units each of which screened fewer than 14,000 women in 2012/13.

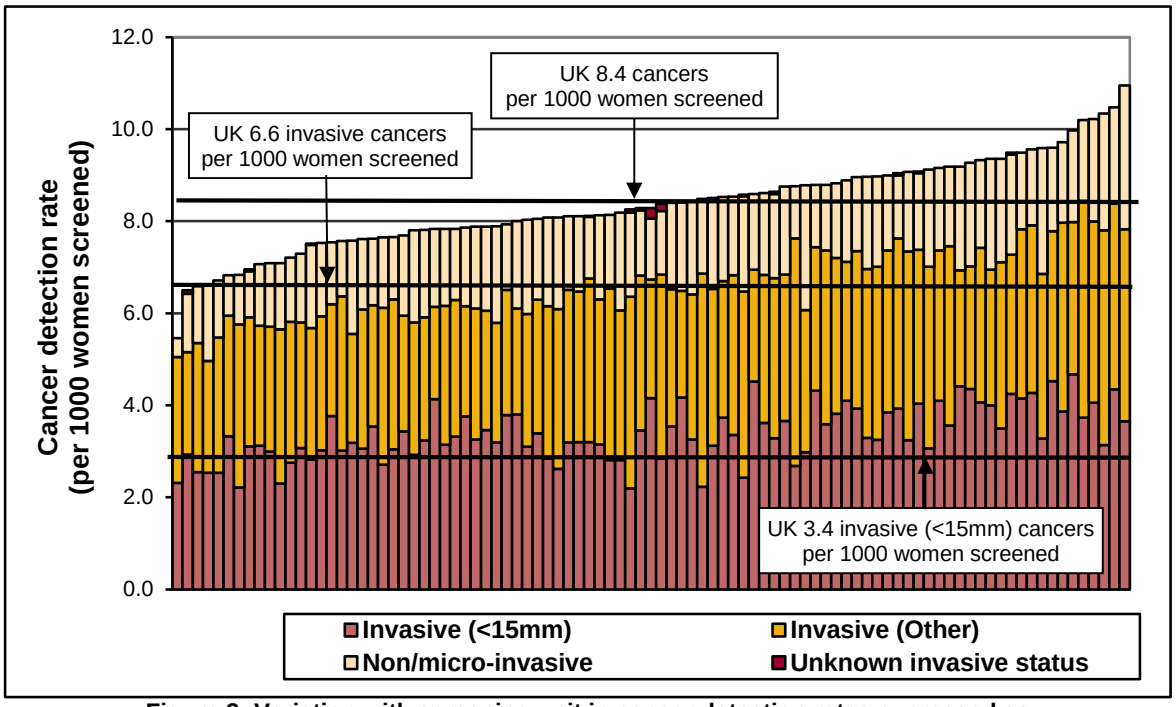

Figure 2: Variation with screening unit in cancer detection rates expressed as the number of cancers detected per 1,000 women screened

1.2 Age Profile of Women with Screen-Detected Breast Cancer

By 31 March 2013, 86% (69 units) of the 80 screening units in England had started the randomised controlled trial age extension of the NHSBSP. The table below shows an increase in the proportion of women in the age groups 47-49 and 71-73 years in 2012/13 compared with the previous two years; from 6.2% in 2010/11 to 9.9% in 2012/13.

AGE DISTRIBUTION OF SCREEN-DETECTED BREAST CANCERS (%)			
Age	***2010/11***	***2011/12***	***2012/13***
<47	*0.1*	*0.3*	*0.4*
47-49	*2.8*	*4.3*	*5.4*
50-64	*63.3*	*60.5*	*58.3*
65-70	*26.4*	*26.8*	*27.3*
71-73	*3.4*	*4.1*	*4.5*
74+	*3.9*	*4.0*	*4.0*
Total	***100***	***100***	***100***

Table 2 shows how the age at first offered screening appointment varied with UK region and country in 2012/13. In England, the proportion of cancers detected in women aged over 70 varied from 7.6% in West Midlands to 10.2% in South East Coast. Wales, Northern Ireland and Scotland currently have no plans to implement the randomised controlled trial age extension. Table 2 clearly demonstrates the relatively small proportion (1.8%) of cancers in Northern Ireland detected in women aged over 70. However, in Scotland and Wales in 2012/13, 7.4% and 8.2% of cancers respectively were detected in these older women, and both of these values are only slightly lower than the UK average of 8.5%.

1.3 Previous Breast Cancer

1.3.1 Identification of Previous Breast Cancers

Of the 19,339 women with screen-detected breast cancer included in the 2012/13 audit, 18,116 (93.7%) could be matched to patients recorded by the UK cancer registries. Of these 18,116 women, 2,161 (12%) had at least one other cancer (excluding non-melanoma skin cancer) diagnosed at least 100 days prior to the diagnosis of the screen-detected breast cancer included in the 2012/13 audit. The proportion of women with previous cancers varied from 8% in Scotland to 14% in East Midlands and Northern Ireland. Further investigation into the smaller proportion of previous cancers recorded in Scotland showed that this was due to some previous cancers not being identified by the Scottish Cancer Registry because of a problem with the Community Health Index (CHI) numbers which were used during the matching process. This issue will hopefully be resolved in next year's audit.

Of the 18,116 matched women, 808 (4%) had at least one breast cancer diagnosed prior to their screen-detected breast cancer. The proportion of women with previous breast cancers varied from 1% in Northern Ireland to 6% in South Central and Wales. Of the 808 women, 635 (79%) had a previous invasive breast cancer, 170 (21%) had a previous non-invasive breast cancer and 3 had previous invasive and non-invasive breast cancers.

1.3.2 Characteristics of Previous Breast Cancers

Figure 3 shows for the screening years 2010/11, 2011/12 and 2012/13 the age distribution of women who had at least one previous breast cancer diagnosed prior to their screen-detected breast cancer. The proportion of women with a previous cancer increased rapidly with age and was highest in the two older age groups; the average in the 3-year period studied for women aged 71 years and older being 8.6%.

For women aged 71-73 years, the proportion with previous cancers was lower in the 2012/13 screening cohort than in either of the previous screening cohorts (6.4% compared to 8.2% and 9.9%). This could reflect differences in the methods used to identify previous cancers for the 2012/13 cohort, because English screen-detected breast cancers were matched to the new national cancer registration database rather than to individual regional cancer registration databases as in previous years. The problems in identifying all the previous cancers in Scotland could also have contributed to this difference.

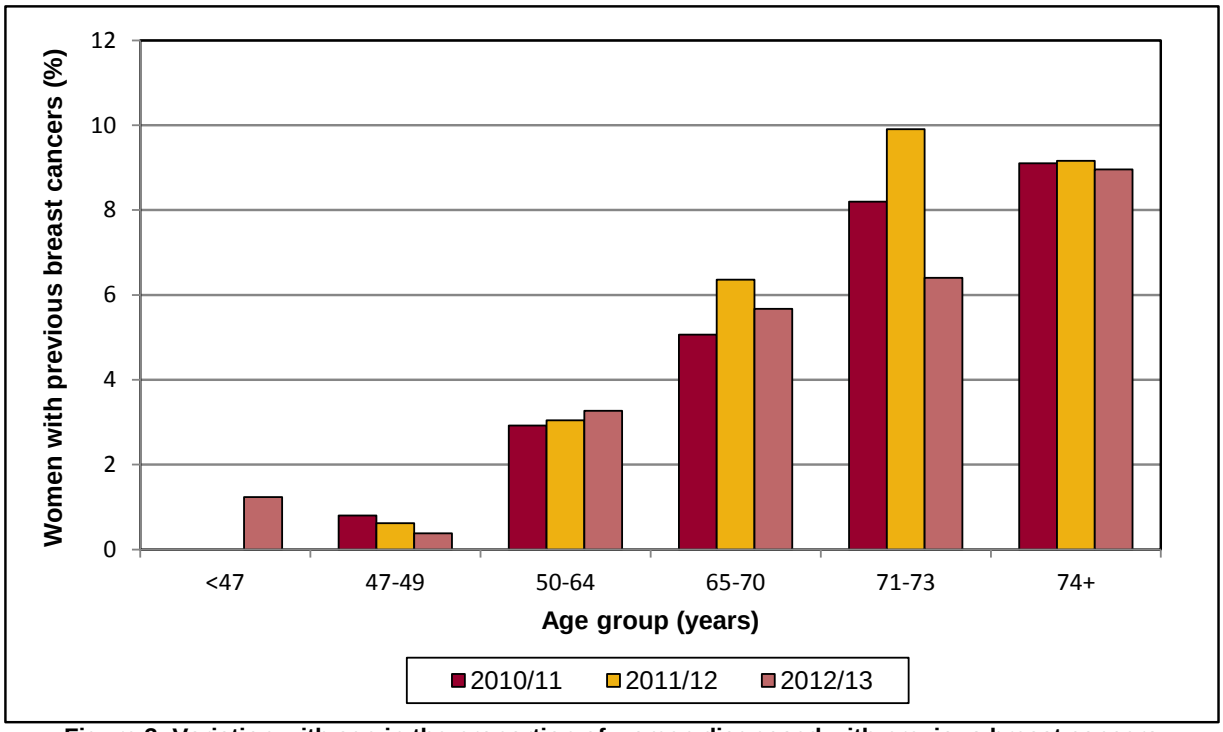

Figure 3: Variation with age in the proportion of women diagnosed with previous breast cancers

The summary table below shows the age distribution of new primary breast cancers detected via the NHSBSP after women with previous cancers have been excluded from the total number of cancers detected each year. The proportion of new primary breast cancers detected in women aged over 70 has increased from 7.0% in 2010/11 to 8.2% in 2012/13.

AGE DISTRIBUTION OF SCREEN-DETECTED BREAST CANCERS (%)			
Age	***2010/11***	***2011/12***	***2012/13***
<47	*0.1*	*0.3*	*0.4*
47-49	*2.9*	*4.5*	*5.6*
50-64	*63.9*	*61.3*	*58.8*
65-70	*26.1*	*26.3*	*26.9*
71-73	*3.3*	*3.9*	*4.4*
74+	*3.7*	*3.8*	*3.8*
Total	***100***	***100***	***100***

1.3.2 Previous Breast Cancers and the KPIs

Women with previous breast cancers are included in the figures and tables in Sections 1.1 and 1.2 of Chapter 1 and in Chapter 5, but have been excluded from the figures and tables in Chapters 2, 3, 4, 6, 7 and 8. Although this is the first year that women with a previous breast cancer have been excluded from the published main audit analyses, these women have been excluded from the data for the previous years that have been included in 3-year rolling data comparisons used for the new KPIs. The main audit data for 2010/11 and 2011/12 included in

these 3-year comparisons will thus differ from those published in the 2012 and 2013 UK NHSBSP & ABS audit booklets. Women with previous breast cancers were excluded from the adjuvant data analysed in the UK NHSBSP & ABS audit booklet published in 2013 (2011/12 data) but not from the 2009/10 data analysed in the booket published in 2012.

The following table summarises for each KPI, the values obtained for women in the 2012/13 cohort who did and did not have a previous breast cancer recorded. For some KPIs the results for women with previous breast cancers are significantly different to those for women without a previous breast cancer

- *main audit* - pre-operative ultrasound performed on the axilla, HER-2 positivity, invasive Grade, SLNB rate, mastectomy rate for small whole size invasive cancers, mastectomies for all invasive cancers, mastectomy at first operation
- *adjuvant audit* - breast conserving surgery with no radiotherapy; node positive cancers with no adjuvant chemotherapy.

It is possible, therefore, that for some screening units which were outliers in the main audit KPIs for 2011/12, this could partly be explained by the inclusion of women with previous cancers in the analyses.

KPI Number and Definition		Previous breast cancer? Yes	No	*P value*
Radiology				
R1a	No pre-operative ultasound on axilla - invasive cancers	7%	4%	*0.006*
R1b	No needle biopsy after abnormal axillary ultrasound - invasive cancers	14%	9%	*0.336*
R1c	Repeat axillary operations with a positive SLNB - invasive cancers*	41%	49%	*0.061*
R2	Non-operative diagnosis at repeat visits - all cancers	11%	12%	*0.300*
R3	Non-operative diagnosis - non-invasive cancers	93%	86%	*0.066*
Pathology				
P1	Positive ER status - invasive cancers	92%	92%	*0.944*
P2	Positive HER2 status - invasive cancers	11%	10%	*0.017*
P3	Tumour Grade 1 - invasive cancers	17%	26%	*0.000*
	Tumour Grade 2 - invasive cancers	59%	53%	
	Tumour Grade 3 - invasive cancers	24%	20%	
Surgery				
S1a	Use of SLNB - invasive cancers	75%	85%	*0.000*
S1b	Use of blue dye only - invasive cancers	7%	9%	*0.399*
S2a	Mastectomy - <15mm whole size invasive cancers	48%	7%	*0.000*
S2b	Immediate reconstruction - <15mm whole size invasive cancers*	22%	26%	*0.773*
S3a	BCS converted to mastectomy - invasive cancers	7%	5%	*0.448*
S3b	All mastectomies - invasive cancers*	53%	20%	*0.000*
S3c	Mastectomy at first operation - invasive cancers*	49%	15%	*0.000*
Oncology				
O1	BCS with no radiotherapy - invasive cancers	7%	2%	*0.000*
O2	ER positive, NPI >3.4 without endocrine therapy - invasive cancers	91%	94%	*0.390*
O3	Node positive (macro-mets) without chemotherapy - invasive cancers	38%	26%	*0.039*

* Other measures linked to the main KPIs to gain further information

KPI values for women with and without previous cancers which are significantly different ($p<0.050$) are shaded

KEY FINDINGS

- Between 1 April 2012 and 31 March 2012, 2,303,332 women were screened by the UK NHSBSP in England, Wales, Northern Ireland and Scotland.
- Of the 19,339 cancers detected in women of all ages; 79% were invasive, 20% non-invasive and 1% micro-invasive. The invasive status of 28 cancers was unknown.
- The cancer detection rates for all cancers and for small invasive cancers (<15mm in diameter) were 8.4 and 3.4 per 1,000 women screened respectively.
- Ten screening units have had cancer detection rates for small (<15mm diameter) cancers below 3.0 per 1,000 women screened throughout the 3-year period 2010/11-2012/13. Five of these were units screening fewer than 14,000 women annually.
- The proportion of cancers diagnosed in women aged 47-49 and 71-73 years has increased from 6.2% in 2010/11 to 9.9% in 2012/13.
- Only 1.8% of cancers in Northern Ireland were detected in women aged over 70. Although in Scotland and Wales there are also currently no plans to implement the randomised controlled trial age extension, in 2012/13 in these countries, 7.4% and 8.4% of cancers respectively were detected in these older women, which is similar to the UK average of 8.5%.
- In 2012/13, 808 (4%) women had a previous breast cancer recorded; of these cancers, 79% were invasive and 21% were non-invasive. The proportion of women with a previous cancer increased rapidly with age; the 3-year average for women aged 71 years and older being 8.6%.
- Women with previous breast cancers are included in the figures and tables in Sections 1.1 and 1.2 of Chapter 1 and in Chapter 5, but have been excluded from the figures and tables in Chapters 2, 3, 4, 6, 7 and 8.
- Because women with previous breast cancer have been excluded from the 3-year rolling data comparisons used for the new KPIs, the main audit data for 2010/11 and 2011/12 and the adjuvant audit data for 2009/10 included in these 3-year comparisons will differ from those published in the 2012 and 2013 UK NHSBSP & ABS audit booklets.
- For some KPIs the results for women with previous breast cancers are significantly different to those for women without a previous breast cancer. It is possible, therefore, that for some screening units which were outliers in the main audit KPIs for 2011/12, this could partly be explained by the inclusion of women with previous cancers in the analyses.

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 4 in 2012/13. These cancers are only included in Table 3.

In 2012/13, 17,846 (96%) of the cancers detected in the UK NHSBSP were diagnosed non-operatively; 694 cancers did not have a non-operative diagnosis (Table 4). Over the last 17 years the non-operative diagnosis rate for the UK as a whole has risen from 63% in 1996/97 to 96% in 2012/13. This rise has been accompanied by an increase from 17% to 93% in the proportion of cancers diagnosed by B5 core biopsy alone.

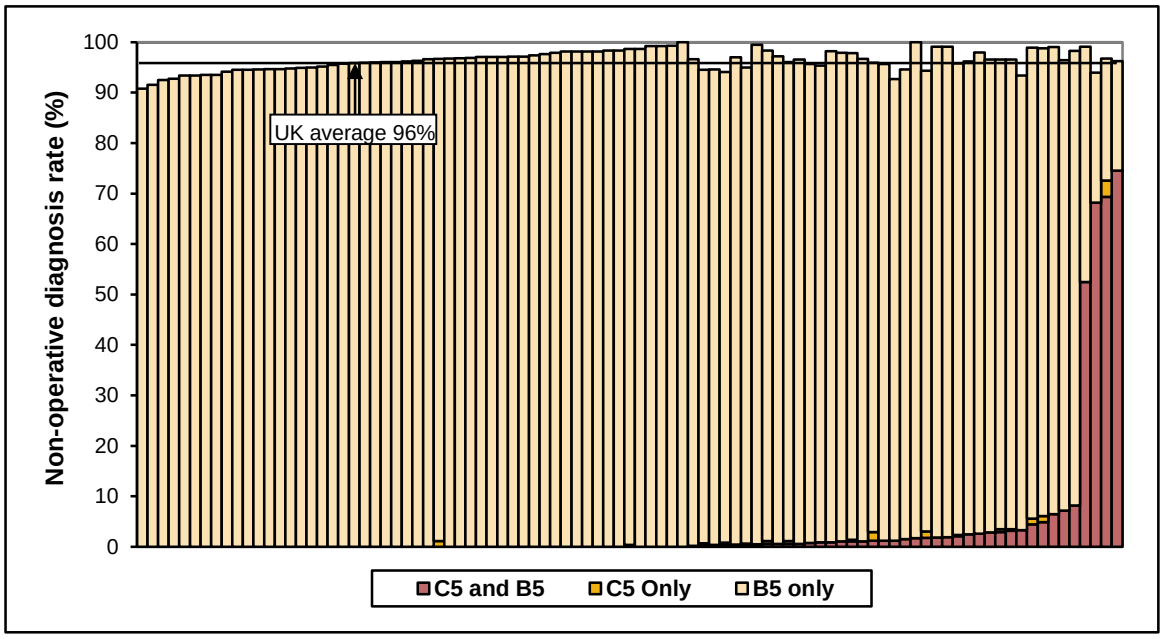

Figure 4: Variation between screening units in non-operative diagnosis rate and in the proportion of cancers detected by cytology alone, core biopsy alone or cytology and core biopsy as a percentage of cancers detected

Table 4 shows how the non-operative diagnosis rate and the proportion of cancers diagnosed by C5 cytology only, B5 core biopsy alone and by both C5 cytology and B5 core biopsy varied between regions in 2012/13. Figure 4 shows how the non-operative diagnosis rate and the proportion of cancers diagnosed by C5 cytology only, B5 core biopsy alone, and by both C5 cytology and B5 core biopsy varied between screening units. In 4 screening units (3 in Northern Ireland, 1 in North East, Yorkshire & Humber) more than 50% of cancers were diagnosed non-operatively by both C5 cytology and B5 core biopsy. In all 4units, the majority of women had cytology and core biopsy samples taken at a single assessment visit.

KEY FINDINGS

- In 2012/13, 96% of cancers detected in the UK NHSBSP were diagnosed non-operatively; 694 cancers did not have a non-operative diagnosis.
- In the UK as a whole, only 26 cases had C5 cytology only diagnosis.
- In four screening units (3 in Northern Ireland, 1 in North East, Yorkshire & Humber) more than 50% of cancers were diagnosed non-operatively by both C5 cytology and B5 core biopsy. In all of these units, the majority of women had their cytology and core biopsy samples taken at a single assessment visit.

2.1.1 Non-operative Diagnosis Rate for Invasive Cancers

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

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

In the UK as a whole, the non-operative diagnosis rate for invasive cancers was 99% and only 175 invasive cancers did not have a non-operative diagnosis (Table 5). All screening units met the 90% minimum standard. Only 1 unit in South Central (93.9%) 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 Standard	**90% of all non-invasive cancers should have a non-operative pathological diagnosis**

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

In 2012/13, the UK's non-operative diagnosis rate for non-invasive cancers was 86%; 511 of the 3,720 non-invasive cancers did not have a non-operative diagnosis (Table 6).

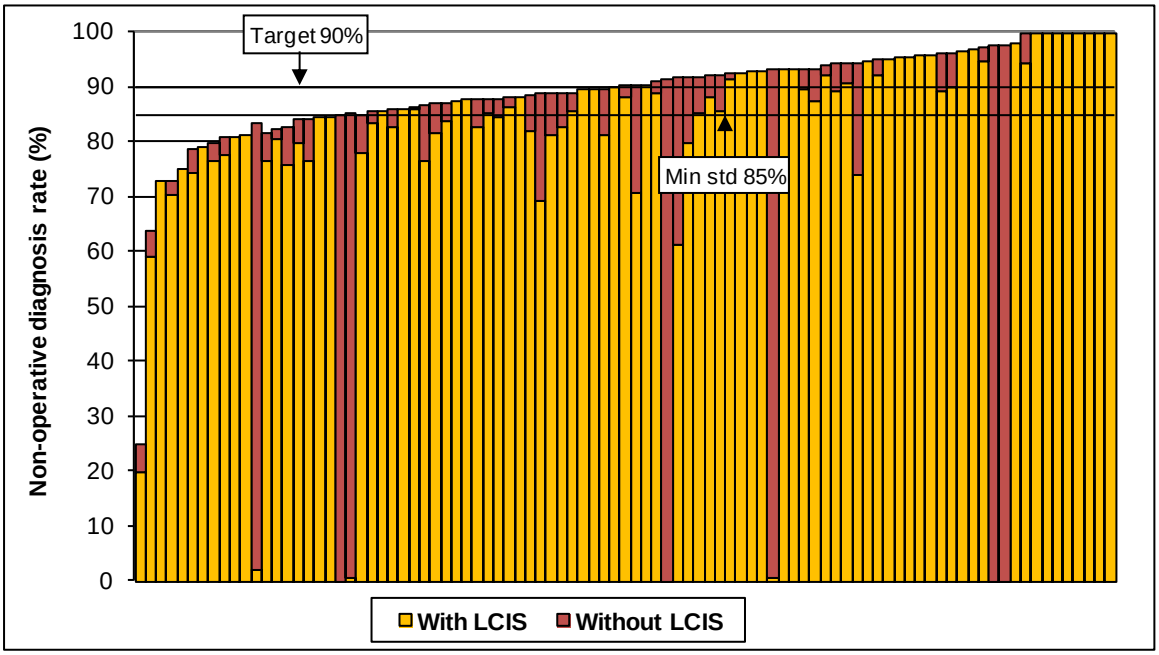

Figure 5: Variation between screening units in the proportion of non-invasive cancers with a non-operative diagnosis with and without LCIS

Figure 5 shows the variation between screening units in the proportion of non-invasive cancers with and without LCIS with a non-operative diagnosis in 2012/13. For most units the non-operative diagnosis rate for all non-invasive cancers (orange) is higher than the non-operative diagnosis rate for non-invasive cancers excluding LCIS (dark red). In 7 screening units the non-operative diagnosis rate without LCIS is lower than the rate for all non-invasive cancers.

Only 34 screening units achieved the 90% non-operative diagnosis target for all non-invasive cancers. Thirty seven units failed to meet the 85% minimum standard. This has decreased slightly from 43 units in 2011/12. If cancers with LCIS alone in the surgical excision specimen are excluded, 22 screening units failed to meet the 85% non-operative diagnosis minimum standard for all non-invasive cancers. Only one unit met the 85% minimum standard for all non-invasive cancers but failed to meet the minimum standard if LCIS was excluded.

In the 3-year period 2010/11-2012/13, 20 units had an average non-operative diagnosis rate for non-invasive cancers including LCIS below 85% and 19 units had an average non-operative diagnosis rate for all non-invasive cancers below 85%. In control charts for this 3-year period (not shown), 13 units were 95% low outliers for all non-invasive cancers and for non-invasive cancers excluding LCIS. Of these, 10 units were 99.7% low outliers for all non-invasive cancers and 6 units were 99.7% low outliers for all non-invasive cancers excluding LCIS. Eight units (2 in East of England, 2 in South Central, 1 in East Midlands, 1 in South East Coast and 1 in Wales) were low outliers in both control charts.

KEY FINDINGS

- The UK non-operative diagnosis rate for invasive cancers was 99%; only 175 invasive cancers did not have a non-operative diagnosis. All screening units met the 90% minimum standard. Only 1 unit in South Central (at 93.9%) just failed to meet the 95% target.
- The non-operative diagnosis rate for non-invasive cancers was 86%; 511 non-invasive cancers did not have a non-operative diagnosis.
- In 2012/13, 37 screening units failed to meet the 85% minimum standard for the non-operative diagnosis of non-invasive cancers. If cases of LCIS were excluded, the non-operative diagnosis rate for 16 of these units was above 85%.
- In the 3-year period 2010/11-2012/13, 20 units had an average non-operative diagnosis rate for non-invasive cancers excluding LCIS below 85% and 19 units had an average non-operative diagnosis rate for all non-invasive cancers below 85%. In control charts for this 3-year period, 13 units were 95% low outliers for all non-invasive cancers and for non-invasive cancers excluding LCIS. Of these, 10 units were 99.7% low outliers for all non-invasive cancers and 6 units were 99.7% low outliers for all non-invasive cancers excluding LCIS. Eight units (2 in East of England, 2 in South Central, 1 in East Midlands, 1 in South East Coast and 1 in Wales) were low outliers in both control charts

Radiology KPI R3

Non-operative diagnosis of non-invasive cancers
3-year low outlier units for non-operative diagnosis of non-invasive cancers including LCIS

The previous audit in 2013 (2009/10-2011/12 data) identified as outliers screening units which had a non-operative diagnosis rate of less than 85% for non-invasive cancers excluding LCIS. In this year's audit of 3-year data for 2010/11-2012/13, non-operative diagnosis rates for all non-invasive cancers were examined. Of the 8 units which were low outliers in the 2013 audit, 6 were still low outliers for non-operative diagnosis of non-invasive cancers excluding LCIS. Four of these (2 in South Central, 1 in East of England and 1 in London) were also 99.7% low outliers for the non-operative diagnosis of all non-invasive cancers. The 2 units with the biggest difference between the two non-operative diagnosis rates (in London and South Central) had relatively high numbers of LCIS cases.

In this year's audit, 10 additional units (4 in East of England, 1 in East Midlands, 1 in South East Coast, 1 in South West, 1 in West Midlands, 1 in Northern Ireland and 1 in Wales) were identified as low outliers for the non-operative diagnosis of all non-invasive cancers in the 3-year period 2010/11-2012/13. Six of these units were also low outliers for the non-operative diagnosis of non-invasive cancers excluding LCIS in this 3-year period. The 4 units which were not also low outliers for non-invasive cancers excluding LCIS had relatively large numbers of LCIS cases.

Regional QA reference centres should follow up the 14 units in the following KPI R3 summary table (4 audited in 2013 and 10 in this year's audit) which have a non-operative diagnosis rate of less than 80% in 2012/13 or are outliers for the non-operative diagnosis of all non-invasive cancers in the 3-year period 2010/11-2012/13 to ascertain the reason for this unusual practice.

Region	Unit	Non-op diagnosis non-invasive excl LCIS 3-year 2009/10-2011/12 (%)	Non-op diagnosis all non-invasive 2012/13 (%)	Non-op diagnosis all non-invasive 3-year 2010/11-2012/13 No.	Non-op diagnosis all non-invasive 3-year 2010/11-2012/13 (%)	Non-op diagnosis non-invasive excl LCIS 3-year 2010/11-2012/13 (%)	LCIS cases 3-year 2010/11-2012/13 No.	Outcome of QARC audit
Units audited in 2013*								
East Midlands	CNN	84.4	83.3	28	80.0	79.0	6	6m April - Sept 2013 meets 85% min std
East of England	ELD	75.2	77.9	184	75.1	78.9	5	To be followed up at QA visit in Sept 2014
London	ECX	84.7	79.7	144	77.8	89.0	15	High B3 rates + use of VAB
NEYH	AWC	82.4	85.7	32	76.2	78.0	2	2012/13 rate above 85%
South Central	JPO	77.0	76.6	74	74.0	77.9	5	Now digital + VAB, no. cores, sites increased
South Central	KHW	76.6	61.1	40	64.5	76.9	16	Now digital + VAB, no. cores, sites increased
South West	LAV	83.3	84.9	135	82.3	83.1	2	2012/13 rate above 85%
South West	JSW	76.0	88.2	78	82.1	82.1	0	2012/13 rate above 85%
New units to audit in 2014**								
East Midlands	CLE	83.8	76.6	126	75.9	83.4	9	
East of England	DCB	86.8	69.2	54	71.1	82.0	20	
East of England	DPT	83.1	59.3	52	73.2	76.5	4	
East of England	DKL	83.3	76.5	35	74.5	81.0	11	
East of England	FSO	81.8	70.4	68	79.1	79.8		
South East Coast	GBR	76.2	76.6	108	73.5	76.3	5	
South West	LED	89.6	70.7	94	79.0	92.0	17	
West Midlands	MBW	86.2	81.4	159	79.9	88.0	10	
Northern Ireland	ZNS1	71.8	20.0	19	61.3	67.9	10	
Wales	WSL	80.2	72.9	137	74.9	77.4	3	

* excluding LCIS
** all non-invasive cancers
<85%
<60%
99.7% high outlier 2010/11-2012/13
95% high outlier 2010/11-2012/13

2.1.3 Invasive Status at Core Biopsy

Screening units were asked to supply the invasive status predicted at core biopsy for cancers with a B5 diagnosis. Of the 17,820 cancers with a B5 diagnosis, 3,995 (22%) were B5a (Non-invasive) and 13,722 (77%) were B5b (Invasive) at core biopsy. One hundred and three cancers (1%) had invasive status B5c (Not Assessable or Unknown) at core biopsy (Table 7), of these, 27 were in West Midlands. Some screening units code papillary cancers and cancers with micro-invasion as B5c, and these have been included in the B5c category for the purposes of the audit. The core biopsy coding system is still under discussion by the Radiology Big 18 and the National Co-ordinating Committee for Breast Pathology.

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. Of the 3,995 cancers with a B5a (Non-invasive) non-operative diagnosis, 64 had no surgery and 3 had unknown surgical treatment, so the non-operative diagnosis of non-invasive cancer was retained. A retrospective audit of non-invasive cancers

which have no surgery recorded by cancer registries is currently being carried out in the '*Forget Me Not*' study in order to obtain information on the outcomes for women with non-invasive breast cancer who have received no surgical treatment. Of the 3,928 cancers with a B5a (Non-invasive) non-operative diagnosis where a definitive invasive status was obtained at surgery, 2,966 (76%) were non-invasive and 124 (3%) were micro-invasive (Table 8). For 703 cancers (18%), invasive disease was found at surgery. For 135 cancers (3%), no malignant disease was identified at surgery, but subsequent audit confirmed that a correct diagnosis of non-invasive cancer had been reported in the non-operative core biopsy.

Figure 6 shows for the 3-year period 2010/11-2012/13, 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) pre-operatively. The dotted and dashed lines in Figure 6 are the upper and lower control limits which represent the 95% and 99.7% confidence intervals of the average rate (solid line). Five screening units (open red diamonds) had a significantly higher proportion of B5a (Non-invasive) cancers found to be invasive at surgery and are above the 95% upper control limit. Of these, 1 unit in South East Coast is above the 99.7% upper control limit. Five screening units had a significantly lower proportion of B5a (Non-invasive) cancers found to be invasive at surgery (open red diamonds) and are below the 95% lower control limit. Of these, 1 unit in North East, Yorkshire & Humber is below the 99.7% lower control limit. For 2 screening units (yellow diamonds in Figure 6), more than half of the B5a (non-invasive) cancers found to be invasive at surgery had an invasive size of at least 10mm.

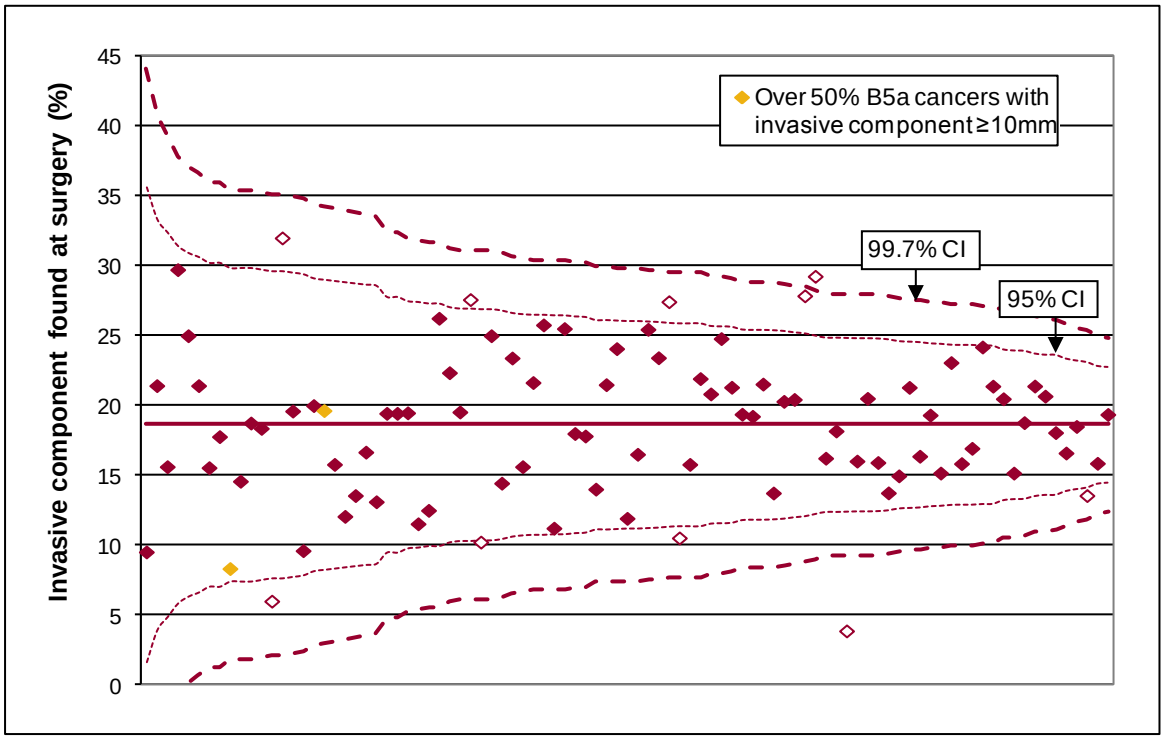

Figure 6: Variation between screening units in the proportion of cancers with a B5a (Non-invasive) non-operative diagnosis found to be invasive at surgery in the 3-year period 2010/11-2012/13 (Open diamonds represent units which lie outside the upper control limits)

Of the 13,722 cancers with a B5b (Invasive) non-operative diagnosis, 275 (2%) had no surgery recorded within the audit period, and 17 had unknown surgical treatment (14 of these cancers were in Scotland). Of the 275 cancers with no surgery recorded, 144 (52%) had neo-adjuvant therapy. In the UK as a whole, 99% of the remaining 13,430 cancers had surgical confirmation of invasive cancer (Table 9). One hundred and eleven cancers with a B5b (Invasive) non-operative diagnosis were found to be non-invasive (96 cancers) or micro-invasive (15 cancers) with no associated invasive disease in the surgical specimen. For 62 cancers with a B5b (Invasive) non-operative diagnosis no malignant disease was identified at surgery, but subsequent audit confirmed that a correct diagnosis of invasive cancer had been reported in the non-operative core biopsy. These cancers are referred to as “invasive - biopsy only”. A further 4 cancers had unknown histological status at surgery. Of these, 2 had surgery to the axilla only, and for 2 the histological status at surgery was not provided by East of England and East Midlands.

The proportion of cancers that had a B5a (Non-invasive) non-operative diagnosis which were found to be invasive after surgery has fallen by 7 percentage points in the past 13 years; from 25% in 2000/01 to 18% in 2012/13. This reduction is probably mainly due to the wider use of vacuum assisted biopsy with larger volume cores within which small invasive components can be identified. The proportion of cases with a B5b (Invasive) core biopsy which were not confirmed to be invasive following surgery has increased gradually from 0.5% in 2004/05 to 1.3% in 2012/13. The absence of residual tumour in the surgical specimen is the main reason for this increase. This probably also reflects the wider use of vacuum assisted biopsy with larger volume cores within which small invasive tumours are fully excised at biopsy.

KEY FINDINGS

- In 2012/13, 103 cancers (1%) had invasive status B5c (Not Assessable or Unknown) at core biopsy. Some units code papillary cancers and cancers with micro-invasion as B5c, and these have been included in the B5c category for the purposes of this audit. The core biopsy coding system is still under discussion by the Radiology Big 18 and the National Co-ordinating Committee for Breast Pathology.
- Invasive disease was found at surgery for 18% of cancers with a B5a (Non-invasive) non-operative diagnosis. Five screening units have had rates significantly higher than the UK average rate in the 3-year period 2010/11-2012/13 and, in 2 units more than half of the under-diagnosed cancers had an invasive size of at least 10mm.
- Ninety seven cancers with a B5b (Invasive) non-operative diagnosis were found to have non-invasive or micro-invasive cancer with no associated invasive disease following surgery.
- For 62 cancers with a B5b (Invasive) non-operative diagnosis, no malignant disease was identified at surgery, but subsequent audit confirmed that a correct diagnosis of invasive cancer had been reported in the non-operative core biopsy.
- The steady reduction in the number of cancers with a B5a (Non-invasive) non-operative diagnosis which are found to be invasive at surgery is probably mainly due to the wider use of vacuum assisted biopsy with larger volume cores within which small invasive components can be identified.
- The increase in the proportion of cases with a B5b (Invasive) core biopsy which were not confirmed to be invasive following surgery also probably reflects the wider use of vacuum assisted biopsy with larger volume cores within which small invasive tumours are fully excised.

2.2 Number of Assessment Visits

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

Of the 18,540 women with screen-detected breast cancer diagnosed in the UK in 2012/13, 15,963 (86%) had one assessment visit (Table 10). Of these, 15,531 (97%) had a B5/C5 non-operative diagnosis. Eleven percent (1,555 women) of all women with invasive cancer and 27% (993 women) of all women with non-invasive cancer had more than one assessment visit.

In 2012/13 in 10 screening units, more than 20% of all women with a B5/C5 diagnosis result had more than one assessment visit. In 9 of these units, an average of more than 20% of women also had more than one assessment visit in the 3-year period 2010/11-2012/13. Four of these units were in South West, 3 in North West, 1 in North East, Yorkshire & Humber, 1 in South East Coast and 1 in West Midlands. In one further unit in South East Coast, an average of 20% or more of these women had more than one assessment visit in the 3-year period 2010/11-2012/13, but only 18% had more than one visit in 2012/13.

Figure 7 shows how the proportion of women with a non-operative diagnosis and more than one assessment visit varied between screening units for women with invasive (left hand graph) and non-invasive (right hand graph) cancers in 2012/13. Overall, 10% of women with an invasive cancer and 21% of women with a non-invasive cancer had more than one visit.

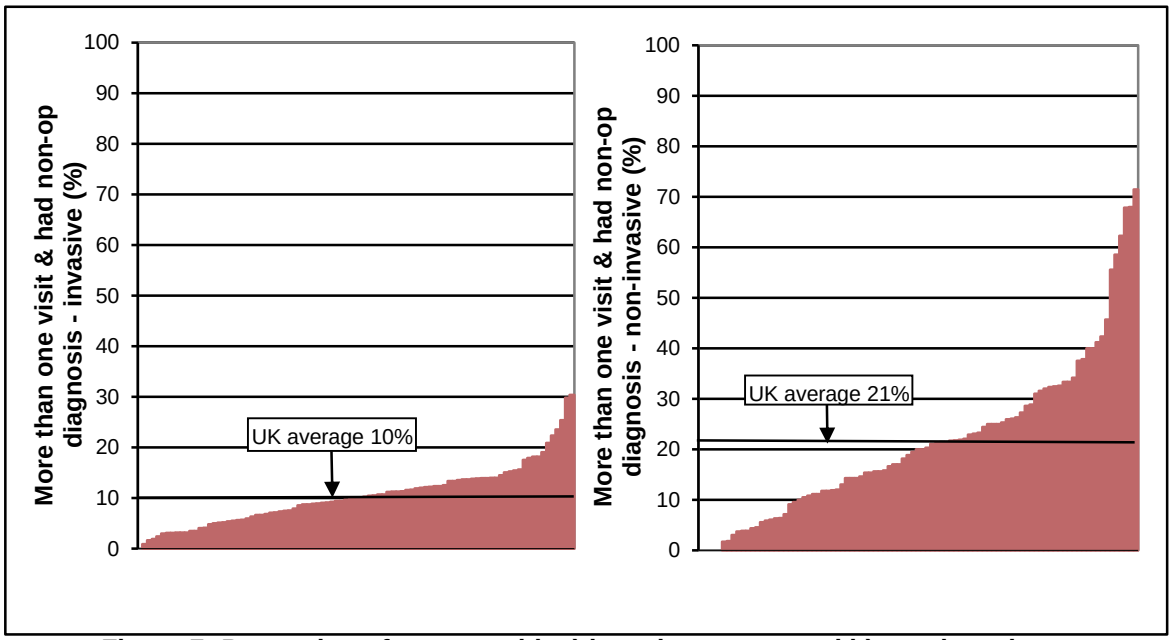

Figure 7: Proportion of women with a) invasive cancer and b) non-invasive cancer who had more than one assessment visit to obtain a non-operative diagnosis

In 2012/13, in 45 units more than 20% of women with non-invasive cancer had more than one visit compared to only 6 units for women with invasive cancer. All of the units

with high repeat visit rates for invasive cancers had a higher proportion of repeat visits for non-invasive cancers.

Radiology KPI R2

Repeat visits to obtain a non-operative diagnosis
Units in 2012/13 where more than 20% of women had more than one assessment clinic visit to obtain a non-operative diagnosis

Region	Unit	>20% repeat visits all cancers 2011/12	>20% repeat visits all cancers 2012/13		>20% repeat visits invasive 2012/13	>20% repeat visits non-invasive 2012/13	Outcome of QARC audit
		%	No.	%	%	%	
Units audited in 2013							
North West	NMA	27.3	52	31.7	23.5	71.4	Assessment clinic timimg changed
North West	NWI	22.6	50	38.5	30.4	67.9	Clinic organisation QA visit action point
South Central	KOX	27.1	38	18.2	13.9	32.0	2012/13 improvement - no action required
South East Coast	GCT3	23.3	25	14.5	11.2	31.0	2012/13 improvement - no action required
South East Coast	HWO	41.8	102	36.4	29.8	68.0	Move to new accommodation in Dec 2013
South West	LCO	45.3	58	33.5	25.4	58.5	Assessment clinic timimg to be changed
South West	LPL	26.2	36	23.4	13.7	55.6	Major scheduling changes made
South West	LED	28.4	44	25.4	22.3	34.2	Stereo cores and u/s biopsies now same day
South West	LAV	21.7	71	24.8	15.7	62.3	Unit relocating in July 2014
West Midlands	MBS	28.9	20	22.0	17.9	33.3	More recent data to be reviewed
New units to audit in 2014							
NEYH	CDO		29	23.0	18.2	42.3	
North West	NLI		53	23.0	20.9	28.6	

more than 20% to 40% More than 40%

In the previous audit in 2013 (2011/12 data) in 10 screening units more than 20% of women with breast cancer (invasive or non-invasive) required more than one assessment clinic visit to obtain a non-operative diagnosis. In this year's audit of data for 2012/13, of the 10 units were audited in 2013, 8 still had more than 20% of women with repeat assessment clinic visits. Five of these (2 in North West, 2 in South West and 1 in South East Coast had a high proportion of repeat assessment clinic visits for women with invasive and non-invasive cancers.

In this year's audit, 2 additional units (1 in North east, Yorkshire & Humber and 1 in North West) were identified as having more than 20% of women with breast cancer (invasive or non-invasive) who required more than one assessment clinic visit to obtain a non-operative diagnosis. One of these units had a high proportion of repeat assessment clinic visits for women with invasive and non-invasive cancers, the other a high proportion for non-invasive cancers only. Regional QA reference centres should follow up the 10 units (8 audited in 2013 and 2 in this year's audit) where more than 20% of women with breast cancer (invasive or non-invasive) required more than one assessment clinic visit to obtain a non-operative diagnosis to ascertain the reason for this unusual practice.

2.2.1 *Cases with no Core/cytology Result at the First Visit*

Scotland was unable to provide cytology and core biopsy results for individual assessment visits. The analyses in Sections 2.2.1 – 2.2.3 are thus only for cancers diagnosed in England, Wales and Northern Ireland. Of the 17,048 women in England, Wales and Northern Ireland diagnosed with screen-detected breast cancer in 2012/13, 17,032 had a needle biopsy at an assessment visit. Of these, 738 (4%) did not have a core/cytology result from their first visit (Table 11). Of these, 732 had their first core/cytology result from their second assessment visit and 6 had their first core/cytology result from their third or fourth assessment visits. In 4 screening units (2 in South West, 1 in South East Coast and 1 in North West), over 20% of women had their first core/cytology result from second or later assessment visits. Three hundred and eighty two invasive cancers (3%) and 349 non-invasive cancers (10%) had no core/cytology results from the first assessment visit.

2.2.2 *Multiple Visits with Cytology or Core biopsy*

Of the 16,391 women with a B5/C5 non-operative diagnosis result, the majority (93%) had only one visit where a core biopsy and/or cytology fine needle aspiration was performed. One thousand one hundred and nineteen women (7%) had more than one visit involving a needle biopsy (Table 12). For women with a B5/C5 non-operative diagnosis, 658 (5%) with invasive cancer had more than one visit involving a needle biopsy, compared to 447 women (15%) with non-invasive cancer. Twenty one women with a B5/C5 non-operative diagnosis result and non-invasive cancer had three visits involving a needle biopsy. Figure 8 shows that in 14 screening units, over 20% of women with non-invasive cancer had more than one visit involving a needle biopsy and a non-operative diagnosis.

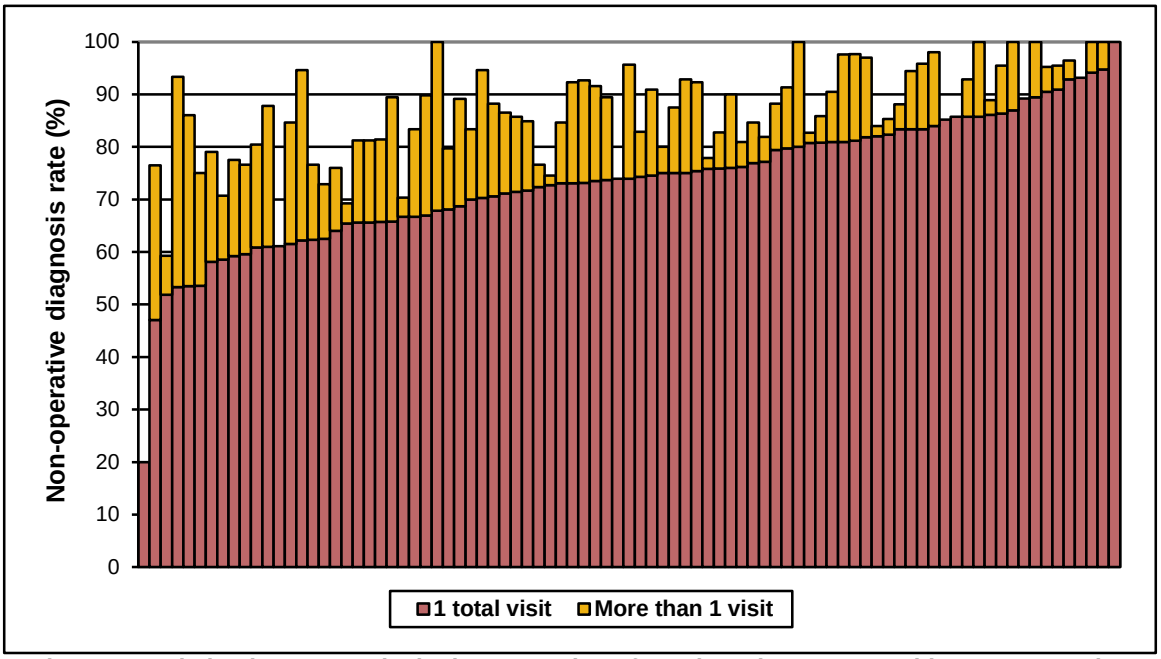

Figure 8: Variation between units in the proportion of non-invasive cancers with a non-operative diagnosis with one biopsy visit and more than one biopsy visit.
Data for Scotland are not available

Of the 703 women with invasive cancers with more than one visit involving a needle biopsy, 387 (55%) did not achieve a B5/C5 diagnosis after one visit involving a needle biopsy and repeat needle biopsies were performed at a subsequent visit. Of these 387 cancers, a non-operative diagnosis was achieved for 88% and 45 required an open diagnostic surgical biopsy. There were 316 (45%) invasive cancers where a B5/C5 diagnosis was obtained at the first visit involving a needle biopsy but where repeat needle biopsies were performed at a subsequent visit in an attempt to upgrade to invasive disease or to confirm a C5 diagnosis, or from a separate area for surgical planning. Of the 588 non-invasive cancers with more than one visit involving a needle biopsy, 428 (73%) did not achieve a B5/C5 diagnosis after one visit involving a needle biopsy, and repeat needle biopsies were performed at a subsequent visit. Of these 428 cancers, a non-operative diagnosis was achieved for 287 (67%) and 141 (33%) required an open diagnostic surgical biopsy. Table 13 shows that of the 287 non-invasive cancers, 93 (32%) had a B1/C1 or B2/C2 diagnosis at their first visit involving a needle biopsy and 194 (68%) had a B3/C3 or B4/C4 diagnosis. For 160 women (27%) with non-invasive cancers who had a B5/C5 diagnosis at the first visit involving a needle biopsy, repeat needle biopsies were performed at subsequent visits.

2.2.3 Assessment Visits after the Core/cytology Biopsy

In England, Northern Ireland and Wales, of the 17,033 women who had a definitive needle biopsy result, 595 (3%) were recalled for further investigations (only 1 lesion per woman was recorded in the audit). Four percent (494 women) of all women with invasive cancer and 3% (97 women) of all women with non-invasive cancer came back to an assessment clinic for other investigations (Table 14). These extra visits could have been for pre-operative nodal assessment, MRI, clinical assessment or needle biopsy of another lesion. The reason for each extra visit was not requested as part of the audit.

KEY FINDINGS

- Of the 18,540 women with breast cancer in 2012/13 in the UK, 15,963 (86%) had one assessment visit. Of these, 15,531 (97%) had a B5/C5 non-operative diagnosis. Eleven percent of women with invasive cancer and 27% of women with non-invasive cancer had more than one assessment visit.
- In 10 screening units more than 20% of women required more than one visit to obtain a B5/C5 non-operative diagnosis result. In 45 units more than 20% of women with non-invasive cancer had more than one visit compared to only six units for women with invasive cancer.
- Of the 17,048 women in England, Wales and Northern Ireland diagnosed in 2012/13, 17,032 had a needle biopsy at an assessment visit. Of these, 738 (4%) did not have a core/cytology result from their first visit. In 4 screening units, over 20% of women had their first needle biopsy result from second or later assessment visits.
- One thousand one hundred and nineteen women had at least one repeat visit involving a needle biopsy. In 14 screening units, over 20% of women with non-invasive cancer with a non-operative diagnosis had more than one visit involving a needle biopsy to obtain a B5/C5 diagnosis.
- There were 387 invasive cancers and 428 non-invasive cancers where repeat needle biopsies were performed at a subsequent assessment visit to obtain a B5/C5 diagnosis. There were 316 invasive cancers and 160 non-invasive cancers where a B5/C5 result was obtained at the first assessment visit, but where repeat needle biopsy was undertaken at a subsequent visit.
- Four percent of all women with invasive cancer and 3% of all women with non-invasive cancer came back to an assessment clinic for other investigations.

2.3 Diagnostic Open Biopsies

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

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

2.3.1 Status of Diagnostic Open Biopsies

In 2012/13, 2,311 diagnostic open biopsies were performed. Of these 1,617 (70%) were benign and 694 (30%) were malignant. The UK prevalent (first screen) benign open biopsy rate was 1.64 per 1,000 women screened (Table 16), which is higher than the 1.5 per 1,000 women screened minimum standard. Only 24 screening units achieved the target, and 45 (over half of the UK screening units) did not achieve the minimum standard for prevalent (first) screens (Figure 9). The UK incident (subsequent screen) benign open biopsy rate was 0.49 per 1,000 women screened (Table 15). At screening unit level, the incident (subsequent screen) benign open biopsy rate varied from 0.00 to 1.8 per 1,000 women screened. Three units (1 in Wales, 1 in London and 1 in North West) did not achieve the minimum standard at either incident or prevalent screen.

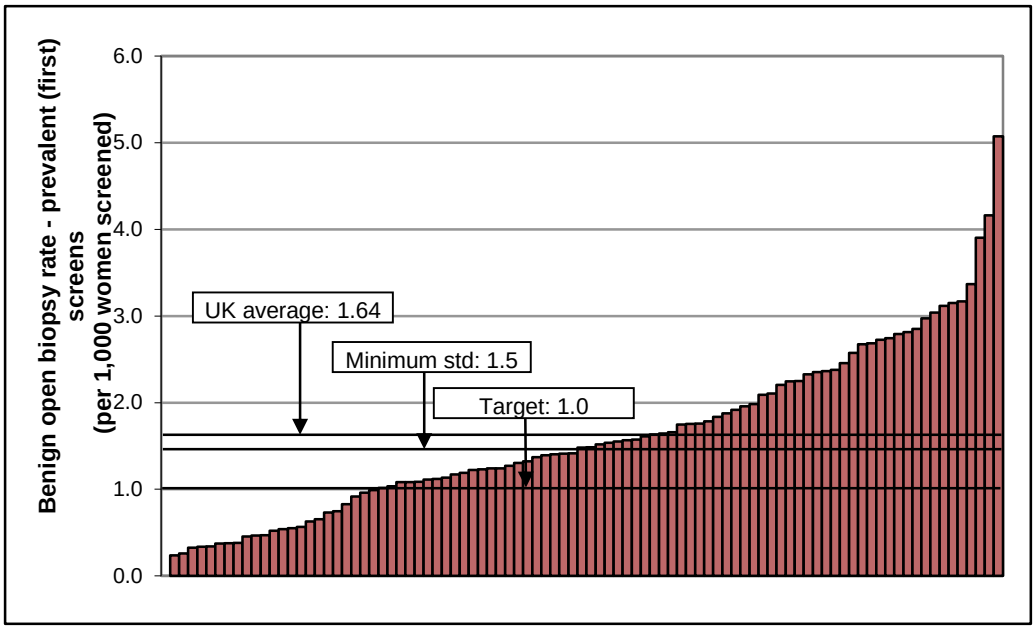

Figure 9: Variation between screening units in benign diagnostic open biopsy rates for prevalent (first) screens expressed as the number of diagnostic open biopsies undertaken per 1,000 women screened

In the UK as a whole, 694 malignant diagnostic open biopsies were performed in 2012/13. The malignant open biopsy rate was 0.3 per 1,000 women screened. This has fallen from 2.04 per 1,000 women screened in 1996/97 to 0.3 per 1,000 women screened in 2012/13 mirroring the

rise in non-operative diagnosis rate from 63% to 96%. Over the same 17-year period, the UK benign open biopsy rate has fallen from 1.50 per 1,000 women screened in 1996/97 to 0.77 per 1,000 women screened in 2012/13. The malignant open biopsy rate varied at screening unit level from 0 per 1,000 women screened in a unit in North East, Yorkshire & Humber to 0.76 per 1,000 women screened in a unit in East of England. Table 16 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 three false positive core biopsy cases and one false positive cytology case recorded. These cases are not included in the audit as they are not cancers.

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

The number of cancers diagnosed by open biopsy decreased slightly from 744 in 2011/12 to 694 in 2012/13. Of the latter, 175 (25%) were invasive, 6 (1%) micro-invasive and 511 (74%) non-invasive (Table 17). A further 2 cancers had unknown invasive status. Both of these were confirmed to be cancer because of malignant cells in the lymph node.

Seven of the 694 cancers had no surgery to the breast, but did have axillary assessment. Three hundred and fifty one (51%) had a diagnostic open biopsy and did not have any further surgical treatment. Of these, 4 cancers were treated by mastectomy or mastectomy with axillary surgery as their first surgical treatment.

Tables 18 and 19 describe the non-operative history of cancers diagnosed by open biopsy. For 87% of invasive cancers diagnosed by open biopsy there had been unsuccessful attempts to obtain a non-operative diagnosis using core biopsy alone (Table 18). 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 19). Tables 18 and 19 also show that, of the 175 invasive cancers diagnosed by open biopsy, 12 (7%) had no non-operative procedure recorded and that, of the 517 non/micro-invasive cancers diagnosed by open biopsy, 5 (1%) had no non-operative procedure recorded.

Of the 175 invasive cancers diagnosed by open biopsy in 2012/13, 8 (5%) had an inadequate (C1) cytology sample or a normal (B1) core biopsy sample (Table 20). Nine percent had a benign result (B2/C2, 16 cancers), 82 (47%) were lesions of uncertain malignant potential (B3) or were atypia and probably benign (C3), and a further 57 (33%) were suspicious of malignant disease (B4/C4). Of the 517 non/micro-invasive cancers which had a malignant open biopsy in 2012/13, 125 (24%) had a B4 and/or C4 needle biopsy result and 375 (73%) had a B3/C3 non-operative result (Table 21). Of the 517 non/micro-invasive cancers which had a malignant open biopsy in 2012/13, 143 were LISN/LCIS. Of these, 12 (8%) had a B4 and/or C4 needle biopsy result and 128 (90%) had a B3/C3 non-operative result. In 2012/13, of the 457 cancers that were diagnosed as B3/C3 and had an operation, 81 were found to be invasive at surgery and 128 (28%) had only LCIS in the surgical specimen.

The proportion of non-invasive lesions diagnosed by malignant open biopsy which had a B3 core biopsy result has gradually increased with time. This increase could reflect better targeting

of calcifications, as B3 results for non/micro-invasive and invasive carcinomas may represent atypical intraductal epithelial proliferations resulting from partial sampling of ductal carcinoma *in situ* (DCIS). Increases in B3 diagnoses may also in part be due to the classification by pathologists of core biopsies which are considered to represent lobular neoplasia (atypical lobular hyperplasia and lobular in situ neoplasia [LISN]) 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.

The Sloane Project is actively collecting screen-detected cases of LCIS, LISN, atypical ductal hyperplasia and flat epithelial atypia, and will still accept new cases of DCIS screened before 1 April 2012.

KEY FINDINGS

- In 2012/13, 2,311 diagnostic open biopsies were performed. Of these 70% were benign and 30% were malignant.
- Benign open biopsy rates were 1.64 and 0.49 per 1,000 women screened for prevalent (first) and incident (subsequent) screens respectively. Only 24 screening units achieved the target, and 45 (over half of the UK screening units) did not achieve the minimum standard for prevalent (first) screens. Three units (1 in Wales, 1 in London and 1 in North West) did not achieve the minimum standard for either prevalent or incident screens.
- The malignant open biopsy rate has fallen from 2.04 per 1,000 women screened in 1996/97 to 0.3 per 1,000 women screened in 2012/13, mirroring the rise in non-operative diagnosis rate from 63% to 96%. The malignant open biopsy rate varied at screening unit level from 0 per 1,000 women screened in a unit in North East, Yorkshire & Humber to 0.76 per 1,000 women screened in a unit in East of England.
- The UK benign open biopsy rate has fallen over 14 years from 1.50 per 1,000 women screened in 1996/97 to 0.77 per 1,000 women screened in 2012/13.
- There were 3 false positive core biopsies one false positive cytology case recorded in 2012/13.
- Four cancers which were diagnosed by open biopsy had a mastectomy or a mastectomy with axillary surgery as the first surgical operation and did not have any further surgical treatment.
- Of the 175 invasive cancers diagnosed by open biopsy, 12 (7%) had no non-operative procedure recorded and of the 517 non/micro-invasive cancers diagnosed by open biopsy, 5 (1%) had no non-operative procedure recorded.
- Fifty seven invasive cancers and 125 non/micro-invasive cancers diagnosed by malignant open biopsy had a B4/C4 needle biopsy result indicating suspicion of malignant disease. Eighty two invasive cancers and 375 non/micro-invasive cancers diagnosed by malignant open biopsy had a B3/C3 needle biopsy result.
- The proportion of non-invasive lesions diagnosed by malignant open biopsy which had a B3 core biopsy result has gradually increased with time. This increase could reflect better targeting of calcifications, as B3 results for non/micro-invasive cancers and also for invasive carcinomas may represent atypical intraductal epithelial proliferations resulting from partial sampling of DCIS.
- Increases in B3 diagnoses may also in part be due to the classification by pathologists of core biopsies which are considered to represent lobular neoplasia (atypical lobular hyperplasia and lobular in situ neoplasia) as B3, in line with current NHSBSP guidelines. In 2012/13, of the 457 cancers that were diagnosed as B3/C3 and had an operation, 128 had only LCIS in the surgical specimen.

Chapter 3: Tumour characteristics

3.1 Cytonuclear Grade and Size for Non-invasive Breast Cancers

3.1.1 Data Completeness

In the UK as a whole, data completeness for non-invasive cancers has improved markedly since 2000/01; unknown cytonuclear grade 6% in 2000/01 compared with 1% in 2012/13; unknown size 11% in 2000/01 compared with 5% in 2012/13; unknown cytonuclear grade and unknown size 14% in 2000/01 compared with 5% in 2012/13 (Table 22). In 2012/13 for the first time, non-invasive breast cancers diagnosed in women with previous breast cancers (163 cancers) were excluded from the main audit data. This has had little effect on data completeness. There were 171 non-invasive cases which had LCIS only at surgery in 2012/13. Of these, 164 were correctly recorded as cytonuclear grade not assessable and 7 as cytonuclear grade unknown. The size of 189 (5%) non-invasive cancers was recorded as not assessable (Table 23); 163 of these were LCIS. A size was provided for 6 cases of LCIS.

Of the 178 surgically treated non-invasive cancers with unknown size (Table 22), 133 (75%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen. The NHSBSP pathology guidelines state that if a tumour is completely removed at core, the original biopsy should be reviewed and minimum dataset (MDS) items should be provided wherever possible. Of the 35 surgically treated non-invasive cancers with unknown cytonuclear grade (Table 22), 14 (40%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen; one of these was LCIS. Of the 191 non-invasive cancers with cytonuclear grade not assessable (Table 24), 164 (86%) were LCIS alone at surgery.

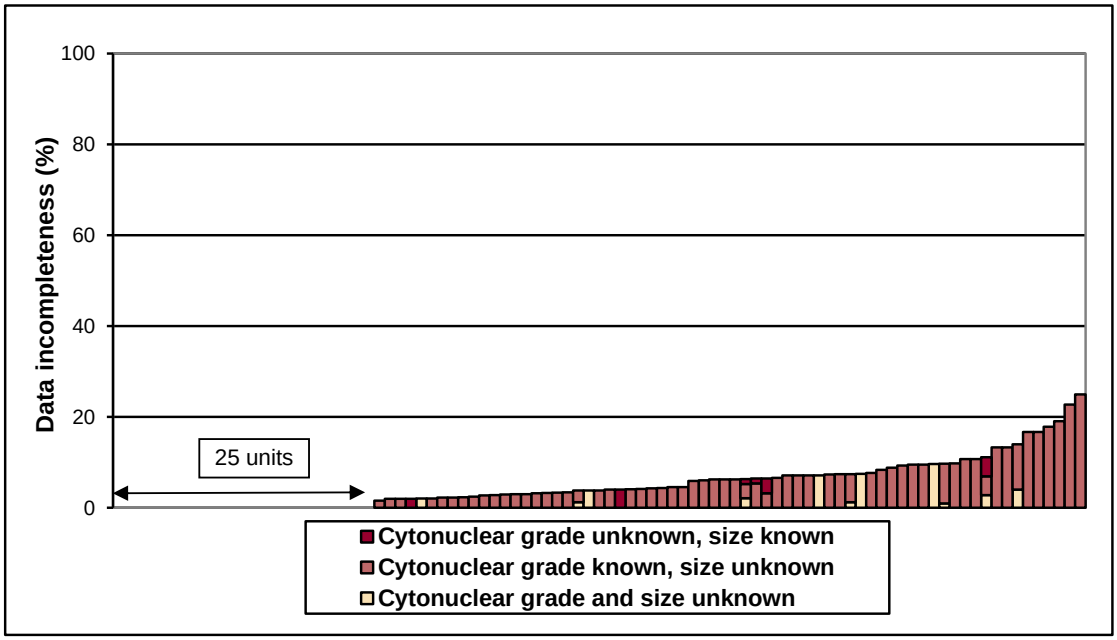

Figure 10: Variation between screening units in the incompleteness of cytonuclear grade and size data for non-invasive cancers (Cases with no surgery and LCIS cases are excluded)

Figure 10 shows how the proportion of surgically treated non-invasive cancers with unknown cytonuclear grade and/or size varied between screening units in 2012/13. LCIS cases have been excluded. Twenty five units had 100% complete data for cytonuclear grade and size, and only 5% (191 cases) of all surgically treated non-invasive cancers had incomplete cytonuclear grade or/and size (Table 22). In 12 units, data incompleteness was greater than 10%.

3.1.2 Non-invasive Cancer Size and Cytonuclear Grade

In 2012/13, 36% of the 3,657 surgically treated non-invasive cancers were less than 15mm in diameter and 14% were larger than 40mm (Table 23). Figure 11 shows the variation in non-invasive cancer size between screening units. The proportion of non-invasive cancers with a tumour diameter of less than 15mm varied from 5% to 74%, and the proportion with a diameter greater than 40mm varied from 2% to 35%.

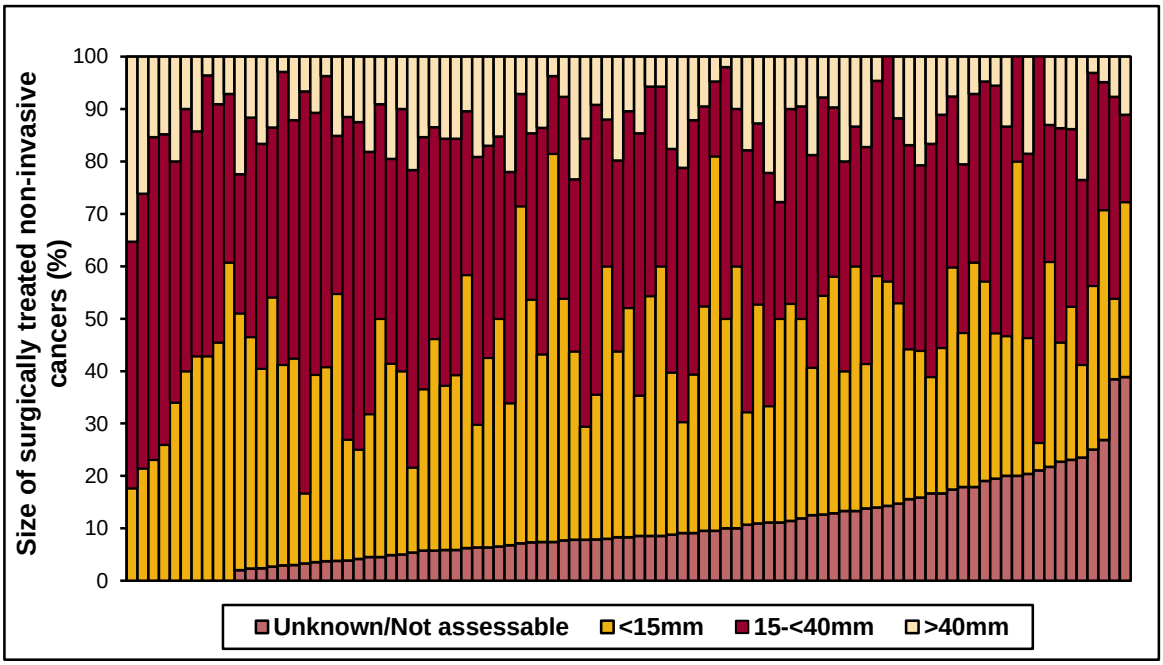

Figure 11: Variation between screening units in non-invasive cancer size (Cases with no surgery and LCIS cases are excluded)

In 2012/13, in the UK as a whole, 56% of surgically treated non-invasive cancers were high cytonuclear grade (Table 24), 28% were intermediate cytonuclear grade and 9% were low cytonuclear grade. Figure 12 shows for each screening unit over the 3-year period 2010/11-2012/13, the proportion of non-invasive cancers with a high cytonuclear grade. The dashed and dotted lines are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average proportion of cases with high cytonuclear grade (solid line). In this chart, cancers were plotted with the assumption that the proportions were normally distributed whereas the national pathology audit group uses binomial distribution for control charts.

There was considerable variation between screening units in the proportion of high grade non-invasive cancers, with 16 lying above the 95% upper control limit (8 above the 99.7% control limit) and 11 below the 95% lower control limit (4 below the 99.7% control limit).

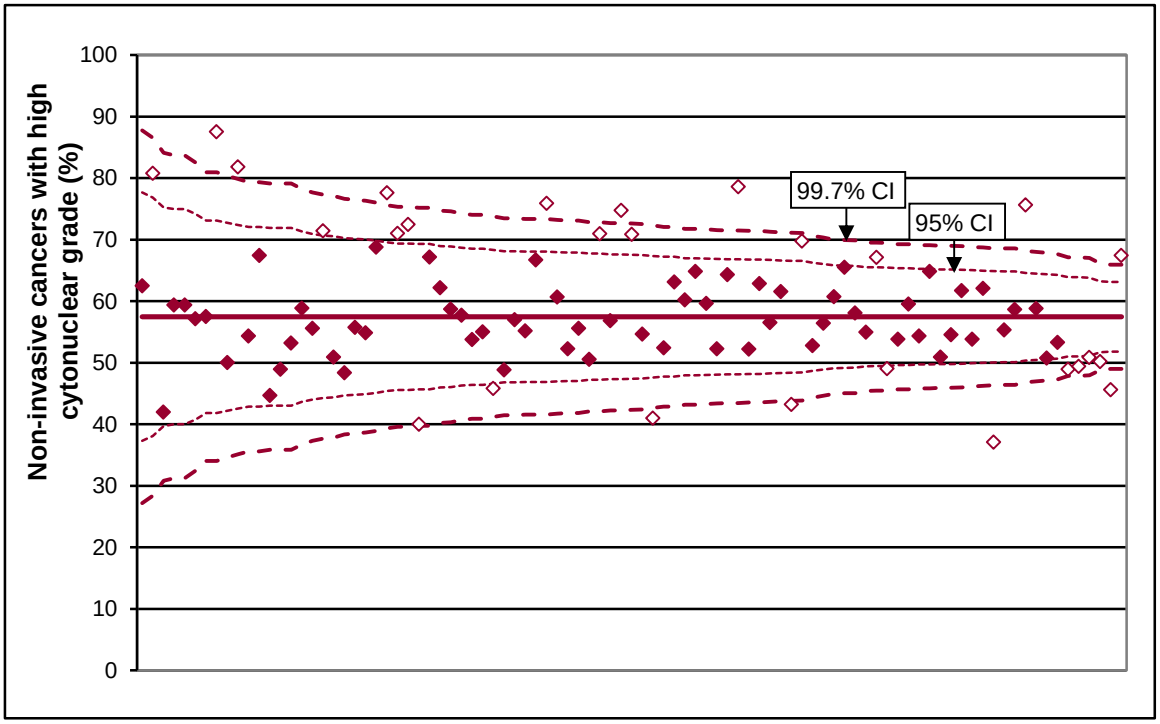

Figure 12: Variation between screening units in the proportion of non-invasive cancers with a high cytonuclear grade in (2010/11-2012/13) (Cases with no surgery are excluded) (Open diamonds represent units which lie outside the 95% control limits)

KEY FINDINGS

- Twenty five screening units had 100% complete data for cytonuclear grade and size, and only 5% of all surgically treated non-invasive cancers had incomplete cytonuclear grade or/and size. In 12 units, data incompleteness was greater than 10%.
- The size of 189 non-invasive cancers (5%) was not assessable; 163 of these were LCIS.
- Of the 191 non-invasive cancers with grade not assessable, 86% were LCIS alone at surgery.
- Of the 178 surgically treated non-invasive cancers with unknown size, 133 (75%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen.
- Of the 3,657 surgically treated non-invasive cancers, 36% were less than 15mm in diameter and 14% were larger than 40mm.
- Fifty six percent of surgically treated non-invasive cancers were high cytonuclear grade, 28% were intermediate cytonuclear grade and 9% were low cytonuclear grade.
- Sixteen units had significantly higher and 11 units had significantly lower proportions of non-invasive cancers with a high cytonuclear grade than the national average.

3.2 Tumour Size for Invasive Breast Cancers

Of the 14,381 surgically treated invasive cancers, 3,682 (26%) had an invasive tumour diameter of less than10mm and 7,551 (53%) had an invasive tumour diameter of less than 15mm. Only 248 cancers (2%) had an invasive tumour diameter greater than 50mm (Table 25). The whole tumour size is the maximum diameter of the whole tumour, including any non-invasive component which extends beyond the invasive lesion. In 2012/13, whole tumour size was not provided for 228 (2%) of surgically treated invasive cancers compared with 209 cancers in 2011/12 (Table 26). Four percent of the surgically treated invasive cancers in Wales (29 cases) and in Scotland (44 cases) did not have whole size recorded.

KEY FINDINGS

- Fifty three percent of surgically treated cancers had an invasive tumour diameter of less than 15mm. For only 248 cases (2%) was the invasive tumour diameter greater than 50mm.
- The whole tumour size was not provided for 228 (2%) surgically treated invasive cancers; 32% of these cancers were in Wales and Scotland.

3.3 Lymph Node Status

Screening guidelines recommend that invasive cancers should have axillary node assessment. Two hundred and seventy seven invasive cancers which did not have surgery (2% of all invasive cancers) have been excluded from this section as no information was available concerning their lymph node status (Table 44).

3.3.1 Availability of Nodal Status for Invasive Cancers

In 2012/13, nodal status was known for 99% of surgically treated invasive cancers (Table 76). Eight invasive cancers did not have a record of whether or not nodes were obtained. Nodal status was known for 100% of invasive cancers in 41 screening units, an increase from 24 units in 2011/12. All screening units met the 90% minimum standard. A total of 114 invasive cancers were recorded as having no nodes obtained. Of these, 1 had the entire invasive tumour removed at core biopsy and 4 were non-invasive at surgery. Previous axillary surgery, previous cancer/surgery on breast (these previous cancers had not been identified through the cancer registration matching exercise), patient choice and co-morbidities, no nodes found, MDT decision, papillary cancer, phyllodes tumour, unit policy for women aged over 80 years and low risk were amongst the explanations provided. No explanations were provided for 46 cases.

3.3.2 Lymph Node Status for Invasive Cancers

In 2012/13, of the 14,259 invasive cancers with known nodal status, 3,073 (22%) had positive nodes (Table 78). The exclusion in 2012/13 of women with previous cancers from these analyses made no significant difference to the overall proportion of women with positive nodes. The proportion of invasive cancers with positive nodes varied from 10% to 34% in individual screening units.

Figure 13 shows for the 3-year period 201/11-2012/13, the variation in nodal status between screening units. The dashed and dotted lines are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average proportion of cases with positive nodal status (solid line). In this chart, cancers were plotted with the assumption that the proportions were normally distributed whereas the national pathology audit group uses binomial distribution for control charts. Eleven units lie above the 95% upper control limits (3 above the 99.7% upper control limits) and 4 below the 95% lower control limits. It would be interesting to determine whether this wide range of node positivity is related to differences in pathological handling (e.g. the number of levels or blocks taken, the total number of nodes examined and the use of immunohistochemistry and molecular techniques such as PCR), and whether or not

intra-operative nodal assessment was used. The latter may lead to the identification of higher numbers of micro-metastases which would not normally warrant axillary treatment.

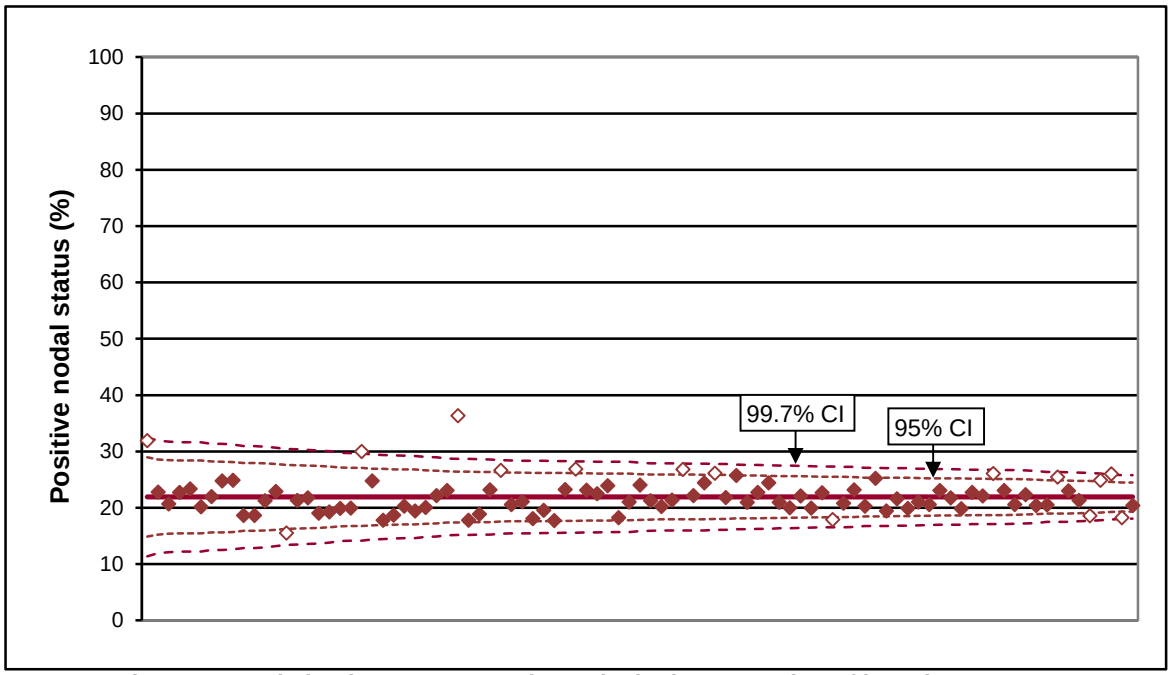

Figure 13: Variation between screening units in the proportion of invasive cancers with positive nodal status expressed as a percentage of cases with known nodal status (Open diamonds represent units which lie outside the 95% control limits)

For 14,272 invasive cancers that nodes were examined at surgery, 1,716 (12%) had one positive node at the first axillary operation. Of these, 1,500 (87%) had more detailed information of the type of single node positivity. Four hundred and eighty five (32%) contained micro-metastases and 1,015 (68%) contained macro-metastases.

3.3.3 Availability of Nodal Status for Non-invasive Cancers

Sixty three non-invasive cancers (2% of all the non-invasive cancers) which did not have surgery have been excluded from this section as no data were available concerning their lymph node status (Table 39). Although nodal assessment is not usually indicated for non-invasive cancers, nodes are frequently obtained when a mastectomy is performed, especially if the assessment process provides suspicion of invasive disease or if the woman has immediate reconstruction. Of the 3,657 surgically treated non-invasive cancers, 27% had known nodal status (Table 83). Of the non-invasive cancers treated by mastectomy, 89% had known nodal status. Only 7% of non-invasive cancers treated with breast conserving surgery had known nodal status (Table 84). Of the 994 non-invasive cancers with known nodal status, 12 (1%) had positive nodal status recorded (Table 85); 9 after a mastectomy and 3 after breast conserving surgery.

Figure 14 shows the variation between screening units in 2012/13 in the proportion of cancers treated with breast conserving surgery or mastectomy with known nodal status. In 2012/13, the nodal status was known for more than 10% of non-invasive cancers treated by breast conserving surgery in 25 screening units and for more than 30% in 3 units (in East of England,

London and West Midlands) (left hand graph in Figure 14). Fourteen screening units were 95% high outliers (6 were 99.7% high outliers) in a 3-year control chart for 2010/11-2012/13 (not shown). The 99.7% high outlier units were in West Midlands (2 units), East of England, London, South Central and Wales. In 2012/13, the nodal status was known for 100% of non-invasive cancers treated by mastectomy in 39 screening units and for less than 60% in 2 units (in East Midlands and Wales) (right hand graph in Figure 14). Ten units were 95% low outliers (5 were 99.7% low outliers) in a 3-year control chart for 2010/11-2012/13 (not shown).

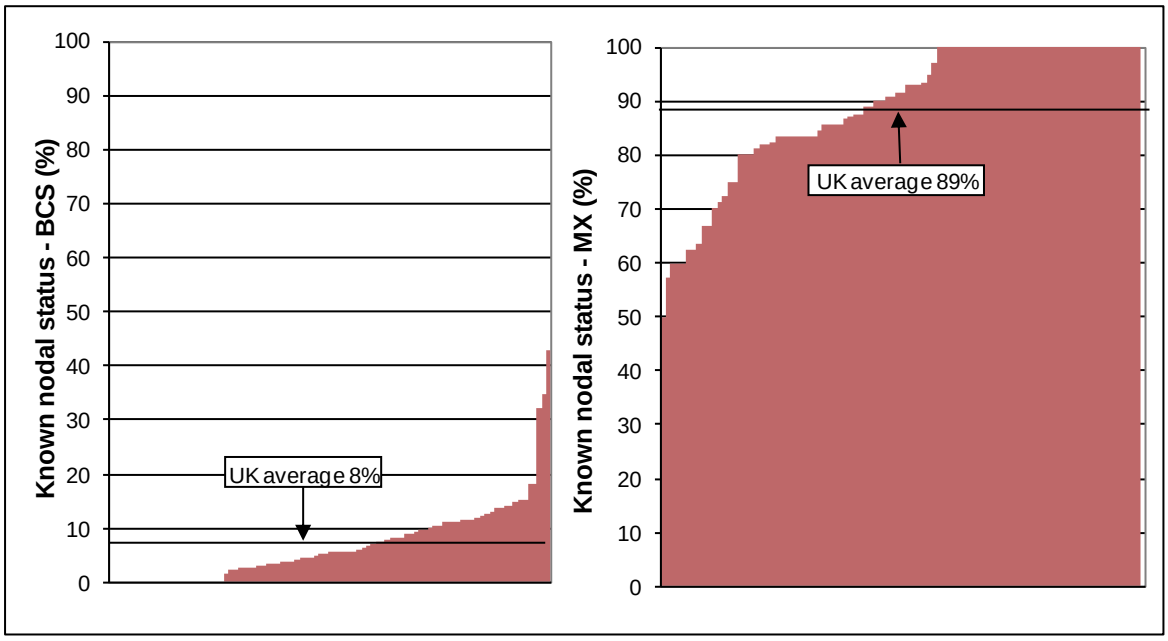

Figure 14: Variation with screening unit in the proportion of non-invasive cancers treated with a) breast conserving surgery (BCS) or b) mastectomy with known nodal status

KEY FINDINGS

- In the UK as a whole in 2012/13, 99% of surgically treated invasive cancers had known nodal status; 114 invasive cancers were recorded as having no nodes obtained.
- Overall, 22% of invasive cancers had positive nodes; this varied from 10% to 34% in individual screening units. It would be interesting to determine whether this wide range of node positivity is related to differences in pathological handling (e.g. the number of levels or blocks taken, the total number of nodes examined and the use of immunohistochemistry and molecular techniques such as PCR), and whether or not intra-operative nodal assessment was used. The latter may lead to the identification of higher numbers of micro-metastases which would not normally warrant axillary treatment.
- For 14,272 invasive cancers nodes were examined at surgery, and 1,716 (12%) had one positive node at the first axillary operation. Of these, 1,500 (87%) had more detailed information of the type of single node positivity; 485 contained micro-metastases and 1,015 macro-metastases.
- Of the 3,657 surgically treated non-invasive cancers, 27% had known nodal status; 89% of non-invasive cancers treated with mastectomy had known nodal status compared with 7% of those treated with breast conserving surgery.
- The nodal status was known for more than 10% of non-invasive cancers treated by breast conserving surgery in 25 screening units and for more than 30% in 3 units.
- The nodal status was known for 100% of non-invasive cancers treated by mastectomy in 39 screening units and for less than 60% in 2 units.
- Of the 994 non-invasive cancers with known nodal status, 12 (1%) had positive nodal status recorded; 9 after a mastectomy and 3 after breast conserving surgery.

3.4 Grade of Invasive Cancers

Of the 14,381 invasive cancers which had surgery, 3,679 (26%) were Grade 1, 7,659 (53%) Grade 2 and 2,946 (20%) Grade 3 (Table 27). Grade was not assessable for 50 cancers and grade was unknown for 47 cancers.

The control charts in Figure 15 show the variation in the proportions of Grade 1, 2 and 3 cancers recorded for individual screening units in 2010/11 – 2012/13. In these charts, cancers were plotted with the assumption that the proportions were normally distributed whereas the national pathology audit group uses binomial distribution for control charts. 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 dotted lines (95% upper and lower control limits) or dashed lines (99.7% upper and lower control limits) are considered as significantly higher or lower than the average represented by the solid line.

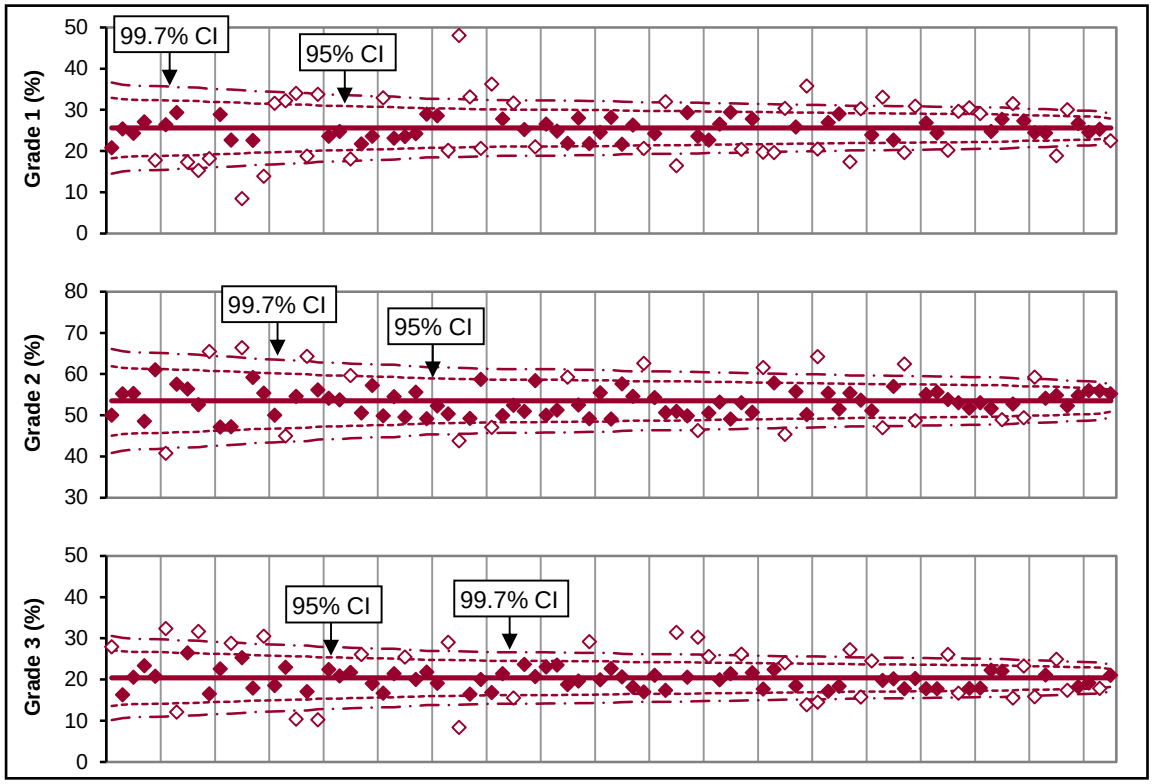

Figure 15: Variation between screening units in the grade of surgically treated invasive cancers in the 3-year period 2010/11-2012/13 (Open diamonds represent units which lie outside the 95% control limits)

The 3-year control charts in Figure 15 suggest that there are local variations in invasive tumour grading (not necessarily due to interpretation) which should be investigated. For example, in the Grade 3 control chart, 11 units are 99.7% high outliers. Of these, 6 units (4 in East of England and 2 in North East, Yorkshire & Humber) are also 99.7% low outliers in the Grade 1 control chart and 2 (both in South Central) are 99.7% low outliers in the Grade 2 control chart. Similarly, of the 7 units which are 99.7% low outliers in the Grade 3 control chart, 3 (in North West, East Midlands and North East, Yorkshire &Humber) are 99.7% high outliers in the Grade 1 control

chart and 2 (in Wales and London) are 99.7% high outliers in the Grade 2 control chart. Units which are persistent outliers should refer to the guidance issued by the National Co-ordinating Committee for Breast Pathology.

KEY FINDINGS

- Overall in 2012/13, 26% of invasive cancers were Grade 1, 53% Grade 2 and 20% Grade 3. Grade was not assessable for 50 cancers and unknown for 47 cancers.
- 3-year control charts for 2010/11-2012/13 suggest that there are local variations in invasive tumour grading (not necessarily due to interpretation) which should be investigated. Units which are persistent outliers should refer to the guidance issued by the National Co-ordinating Committee for Breast Pathology.

Pathology KPI P3

Grade for invasive cancers
3-year high and low outlier units for invasive cancer grade

Screening units which were identified in the 2013 audit as persistent high or low outliers for invasive cancer grade in the 3-year period 2009/10-2011/12 are currently being followed up by regional QA reference centres in conjunction with pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology. Regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology will also be responsible for following up any new outlier units identified in this year's audit of breast cancers diagnosed in 2012/13 and in the 3-year period 2010/11-2012/13.

3.5 NPI of Invasive Cancers

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

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

Although an NPI score was provided for 854 of the 924 surgically treated invasive cancers with neo-adjuvant therapy; all cancers with neo-adjuvant therapy recorded have been excluded from the following analyses as the NPI scores provided may not have reflected the true tumour characteristics at diagnosis. An NPI score could not be calculated for 277 (2%) surgically

treated invasive cancers with no known neo-adjuvant therapy (Table 28). Of these, 32 had no cancer cells found in the surgical specimen. Pathology guidelines state that if a tumour is completely removed at core, the original biopsy should be reviewed and minimum dataset (MDS) items should be provided wherever possible.

Of the 13,180 surgically treated invasive cancers with a known NPI score (excluding cancers with neo-adjuvant therapy), the highest proportion fell into the Good Prognostic Group (38%), with only 740 cancers (6%) in the Poor Prognostic Group (Table 29). As expected for cancers detected by screening, in the UK as a whole, the majority (59%) of cancers fell into the two best prognostic groups (EPG and GPG).

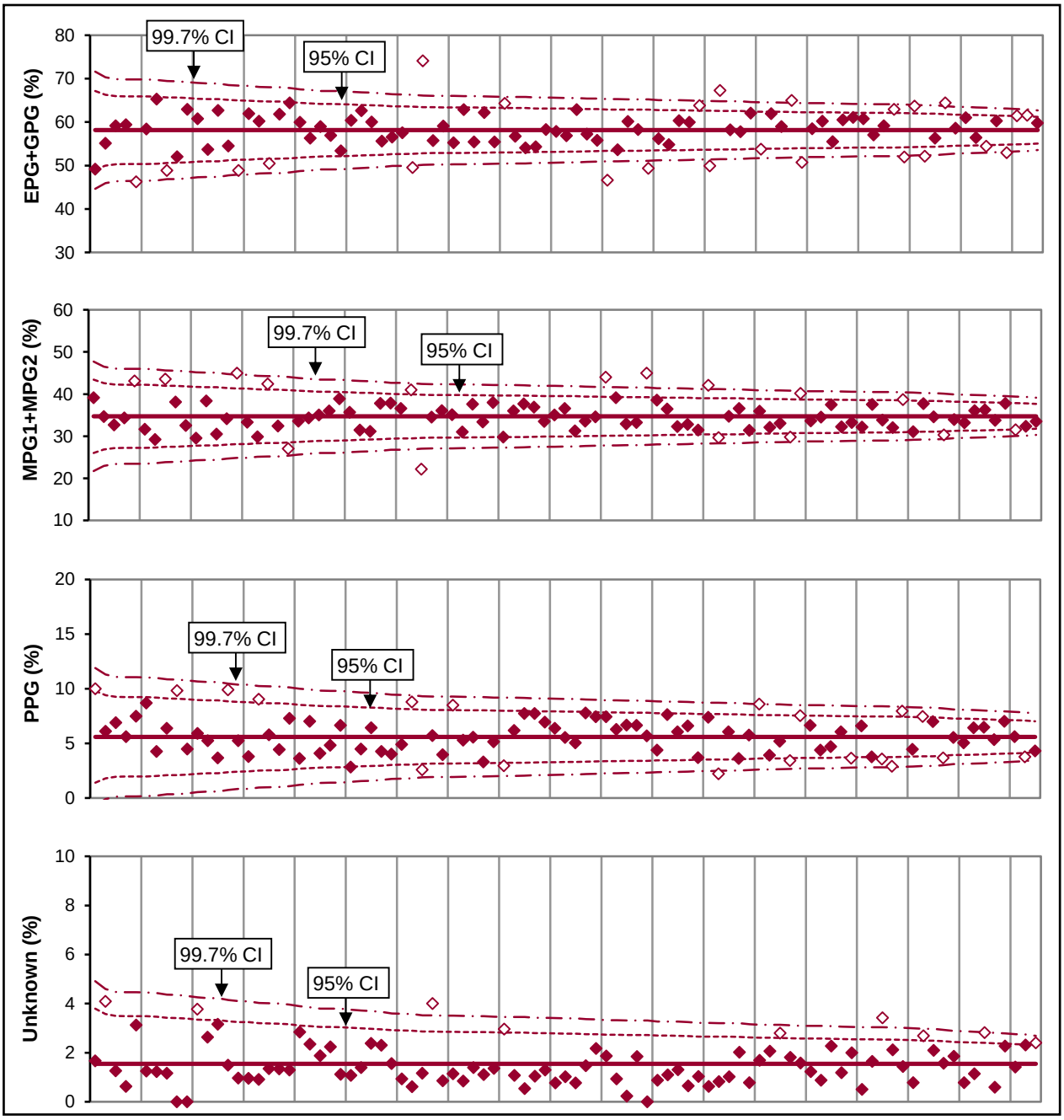

Figure 16: Variation between screening units in NPI groups for surgically treated of surgically treated invasive cancers in the 3-year period 2010/11-2012/13 -- excluding cases with neo-adjuvant therapy (Open diamonds represent units which lie outside the 95% control limits)

In Figure 16, the proportion of invasive cancers in each NPI group and with unknown NPI group is plotted in the control charts for individual screening units. As in Figure 15, data for the same unit can be compared vertically across the 4 graphs. Any points that are outside the dotted and dashed lines (95% and 99.7% upper and lower control limits respectively) are considered as significantly higher or lower than the average, represented by the solid line. In these charts, cancers were plotted with the assumption that the proportions were normally distributed whereas the national pathology audit group uses binomial distribution for control charts.

The 3-year control charts in Figure 16 suggest that there are local variations in NPI group (not necessarily due to interpretation) which should be investigated. For example, in the PPG control chart, 10 units are 95% high outliers. Of these, 5 units (2 in North East, Yorkshire & Humber, 1 in North West, 1 in London and 1 in South Central) are also 95% low outliers for EPG/GPG cancers. Similarly, 7 of the 10 units which are 95% high outliers for EPG/GPG cancers are also 95% low outliers for PPG cancers.

KEY FINDINGS

- A Nottingham Prognostic Index (NPI) score could be calculated for 98% of surgically treated invasive cancers with no known neo-adjuvant therapy.
- Although an NPI score was provided for 854 of the 924 surgically treated invasive cancers with neo-adjuvant therapy; all cancers with neo-adjuvant therapy recorded were excluded from the analyses as the NPI scores provided may not have reflected the true tumour characteristics at diagnosis.
- There are local variations in NPI group (not necessarily due to interpretation) which should be investigated. For example, in the PPG control chart, 10 units are 95% high outliers. Of these, 5 are also 95% low outliers for EPG/GPG cancers.

3.6 Receptor Status

Oestrogen Receptor (ER) and Human Epidermal Growth Factor Receptor 2 (HER2 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 (PR) status may provide additional prognostic information for ER negative cancers.

3.6.1 ER Status of Invasive Cancers

In the UK as a whole, ER status was unknown for 69 (0.5%) invasive cancers included in the main audit (Table 30). This may be because the test was not done, the test result was unknown or no information on ER status was provided. These may also be cases where the invasive focus is too small to be tested.

In the UK as a whole in 2012/13, 13,409 (91%) of the 14,658 invasive cancers were ER positive (Table 30). Of the 14,589 invasive cancers with known ER status, 13,409 (92%) were ER positive. Figure 17 shows for each screening unit over the 3-year period 2010/11-2012/13, the proportion of invasive cancers with a positive ER status. The dashed and dotted lines are the

upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average proportion of ER positive invasive cancers (solid line) (92%). In this chart, cancers were plotted with the assumption that the proportions were normally distributed whereas the national pathology audit group uses binomial distribution for control charts.

ER positivity for invasive cancers with known ER status varied widely between screening units. Ten units lie above the 95% upper control limits (2 above the 99.7% upper control limits) and 12 below the 95% lower control limits (4 below the 99.7% lower control limits). In 3 units fewer than 87% of invasive cancers were ER positive. Two of these were in in East Midlands and 1 in West Midlands. In 1 unit in South West and 1 unit in Scotland, 98% and 96% of invasive cancers respectively were ER positive. Units which are persistent outliers should refer to the guidance issued by the National Coordinating Committee for Breast Pathology.

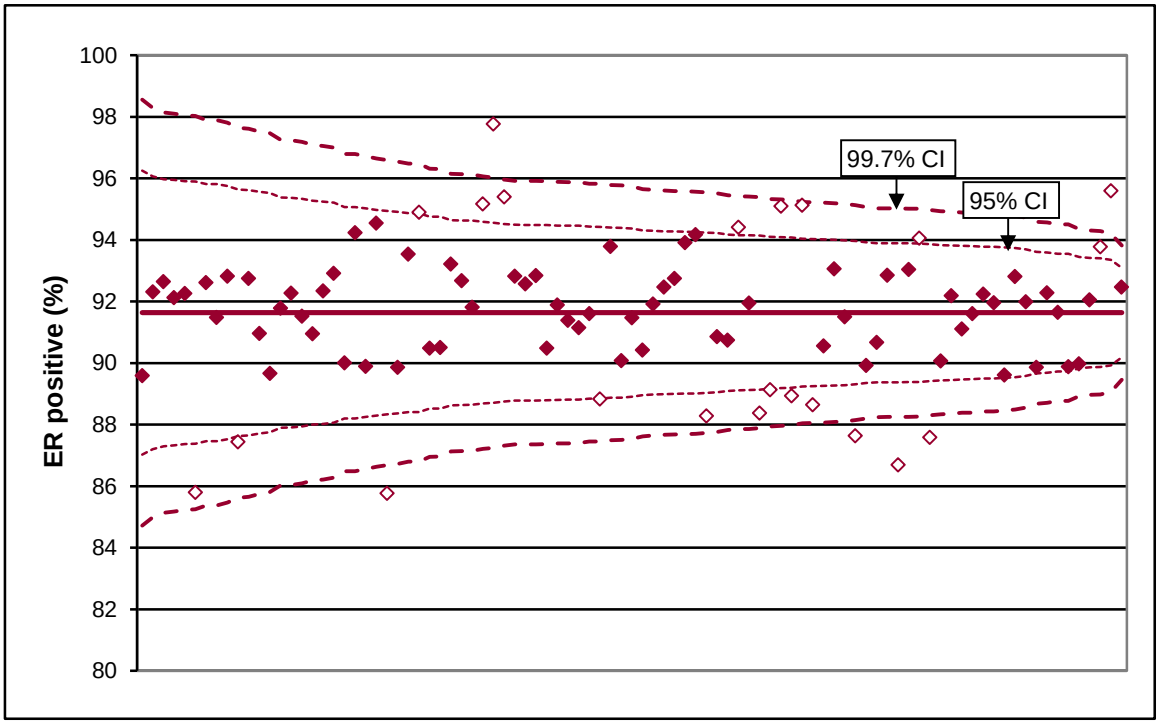

Figure 17: Variation with screening unit of the ER status for invasive cancers in the 3-year period 2010/11-2012/13 (Open diamonds represent units which lie outside the 95% control limits)

Pathology KPI P1

Positive ER status for invasive cancers
3-year high and low outlier units for ER status for invasive cancers

Screening units which were identified in the 2013 audit as persistent high or low outliers for invasive cancer positive ER status in the 3-year period 2009/10-2011/12 are currently being followed up by regional QA reference centres in conjunction with pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology. Regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology will also be responsible for following up any new outlier units identified in this year's audit of breast cancers diagnosed in 2012/13 and in the 3-year period 2010/11-2012/13.

3.6.2 PR Status of Invasive Cancers

In 2012/13, PR status was known for 59% of invasive cancers (Table 31). Of the 8,719 invasive cancers with known PR status, 78% were positive. Of the 1,180 invasive cancers that were known to be ER negative, 83% had known PR status; 6% were PR positive and 78% were PR negative (Table 32).

3.6.3 HER2 Status of Invasive Cancers

In 2012/13, all but 214 (1%) of the 14,658 invasive cancers included in the main audit (Table 33) had HER2 status data. At unit level, 33 units had complete HER2 status for all their invasive cancers while 2 units in East of England and London had 7% and 8% of cancers with unknown HER2 status. Of the 214 cases without a HER2 status, 36% had an invasive size of less than 10mm, 27% were Grade 1 and 64% had negative nodal status (Table 34).

Of the 14,444 invasive cancers with known HER2 status in 2012/13, 10% were positive, 88% were negative and 2% were borderline. The method used to classify samples as borderline (immuno-histochemistry or fluorescent in-situ hybridization) was not collected in the audit. HER2 positivity varied widely between screening units from 3% in a unit in East of England to 19% in a unit in South Central and 40% in a unit in North West. An investigation was carried out by the latter unit and this confirmed a data input error.

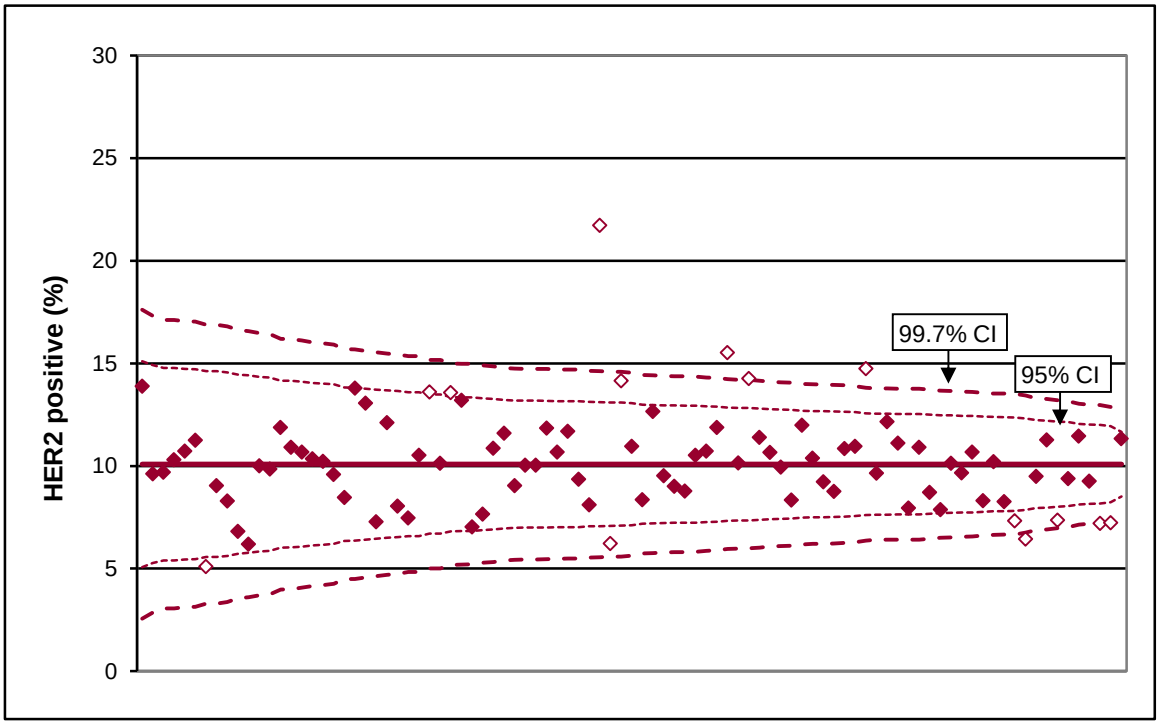

Figure 18: Variation with screening unit in HER2 positivity for invasive cancers in the 3-year period 2010/11-2012/13 (Open diamonds represent units which lie outside the control limits)

Figure 18 shows for each screening unit over the 3-year period 2010/11-2012/13, the proportion of invasive cancers with positive HER2 status. The dashed and dotted lines are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average proportion of cases with positive HER2 status (solid line) (10%). In this chart, cancers were plotted with the assumption that the proportions were normally distributed whereas the

national pathology audit group uses binomial distribution for control charts. HER2 positivity for invasive cancers with known HER2 status varied widely between screening units. Seven units lay above the 95% upper control limits (4 above the 99.7% upper control limits) and 7 below the 95% lower control limits (3 below the 99.7% lower control limits). In 1 unit in North West, 22% of invasive cancers were HER2 positive and in 1 unit in East of England only 5% of were HER2 positive. Units which are persistent outliers should refer to the guidance issued by the National Coordinating Committee for Breast Pathology.

Pathology KPI P2	**Positive HER2 status for invasive cancers** 3-year high and low outlier units for HER2 status for invasive cancers

Screening units which were identified in the 2013 audit as persistent high or low outliers for invasive cancer positive HER2 status in the 3-year period 2009/10-2011/12 are currently being followed up by regional QA reference centres in conjunction with pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology. Regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology will also be responsible for following up any new outlier units identified in this year's audit of breast cancers diagnosed in 2012/13 and in the 3-year period 2010/11-2012/13.

3.6.4 Non/micro-Invasive Cancers

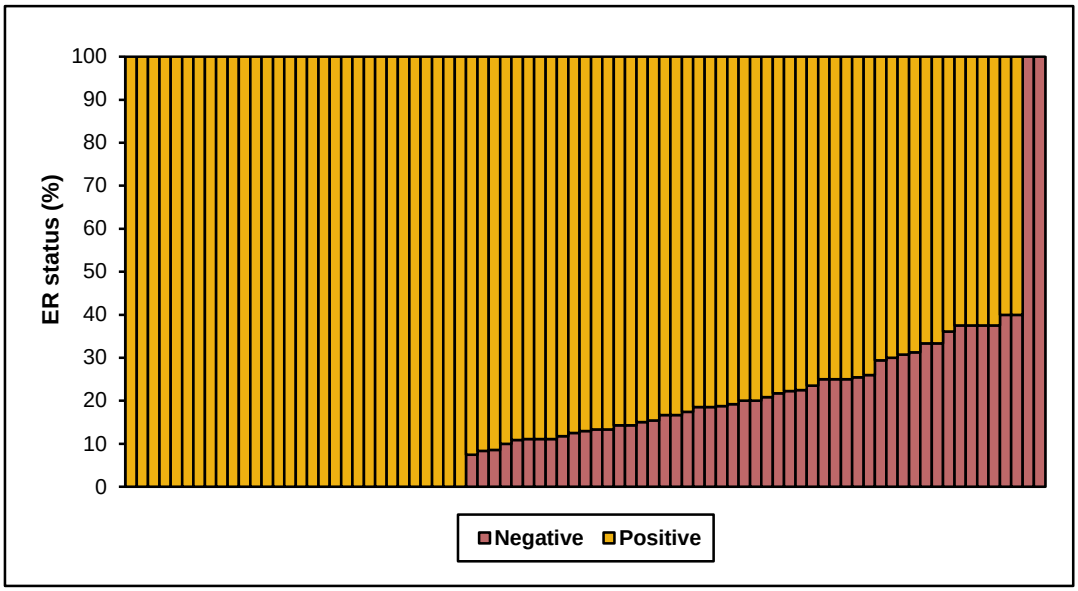

Figure 19: Variation between screening units in the ER status of non/micro-invasive cancers with known ER status (12 screening units have been excluded because they had 100% unknown ER status)

ER status was not known for 65% of non/micro-invasive cancers (Table 35). Of the non/micro-invasive cancers with known ER status, 89% were ER positive compared with 92% of invasive cancers with known ER status. PR status was known 20% of non/micro-invasive cancers. This is a marked decrease from 2007/08 when PR status was known 40% of non-invasive cancers.

There was, very wide variation between screening units in the proportion of non/micro-invasive cancers with known ER status (from 0% in 2 units to 100% in 30 units), and in the proportion of ER positive cancers in each unit (from 0% in 2 units to 100% in 14 units) (Figure 19).

The wide variation between screening units in the proportion of non/micro-invasive cancers with known ER and PR status reflects the variable practice that has developed in the UK since the publication in 2009 of *NICE Clinical Guidance 80: Early and locally advanced breast cancer, Diagnosis and treatment* which states that Tamoxifen should not be offered to women with non-invasive breast cancers. The closure of the DCIS IBIS trial has also meant that some screening units have stopped measuring ER and PR status for non-invasive cancers. In the rest of Europe and the US, consideration of endocrine therapy is still recommended for ER positive non-invasive breast cancers.

KEY FINDINGS

- ER status was unknown for 69 invasive cancers. Of the invasive cancers with known ER status, 92% were ER positive.
- In the 3-year period 2010/11-2012/13, 10 units had a significantly higher proportion of ER positive cancers and 12 had a significantly lower proportion than the national average. In 3 units fewer than 87% of invasive cancers were ER positive. Two of these were in East Midlands and 1 in West Midlands. In 1 unit in South West and 1 unit in Scotland, 98% and 96% of invasive cancers respectively were ER positive. Units which are persistent outliers should refer to the guidance issued by the National Co-ordinating Committee for Breast Pathology.
- PR status was known for 59% of invasive cancers. Of the invasive cancers with known PR status, 78% were positive. Of the 1,180 invasive cancers that were known to be ER negative, 83% had known PR status; 6% were PR positive and 78% were PR negative.
- HER2 status data were available for 99% of invasive cancers. 33 units had complete HER2 status for all their invasive cancers while 2 units in East of England and London had 7% and 8% of cancers with unknown HER2 status.
- Of the invasive cancers with known HER2 status, 10% were positive, 88% were negative and 2% were borderline.
- In the 3-year period 2010/11-2012/13, 7 units had a significantly higher proportion of HER2 positive invasive cancers and 7 had a significantly lower proportion than the national average. In 1 unit in North West, 22% of invasive cancers were HER2 positive and in 1 unit in East of England only 5% were HER2 positive.
- ER status was not known for 65% of non/micro-invasive cancers; 89% of non-invasive cancers with known ER status were ER positive. The proportion of non/micro-invasive cancers with ER status varied widely between screening units as did the proportion of these cancers which were ER positive.
- PR status was known for 20% of non/micro-invasive cancers.
- The wide variation between screening units in the proportion of non/micro-invasive cancers with known ER and PR status reflects the variable practice that has developed in the UK since the publication in 2009 of *NICE Clinical Guidance 80: Early and locally advanced breast cancer, Diagnosis and treatment* which states that Tamoxifen should not be offered to women with non-invasive breast cancers. The closure of the DCIS IBIS trial has also meant that some screening units have stopped measuring ER and PR status for non-invasive cancers. In the rest of Europe and the US, consideration of endocrine therapy is still recommended for ER positive non-invasive breast cancers.

Chapter 4: Surgical treatment

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

In the UK as a whole in 2012/13, 74% of the 3,720 non-invasive cancers were treated by breast conserving surgery and 24% by mastectomy, 63 cancers (2%) apparently received no surgery, and for 2 cancers it was not known whether or not surgery had been performed (Table 36). All 136 micro-invasive cancers received surgery, 62% had breast conserving surgery and 38% had a mastectomy (Table 37).

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 2012/13, 36% of the 3,657 non-invasive cases treated surgically were less than 15mm in diameter and 14% were larger than 40mm in diameter (Table 23). Of the 497 non-invasive cancers larger than 40mm in diameter, 91 (18%) had breast conserving surgery (Table 38). Of these, 65 were high cytonuclear grade (see summary table). A further 10 non-invasive cancers with unknown size, were either high cytonuclear grade or had unknown cytonuclear grade.

NUMBER OF NON-INVASIVE CANCERS TREATED WITH BREAST CONSERVING SURGERY

Region	***>40mm***		***Unknown size***		***Total****
	High cytonuclear grade *(Table 39)*	***Unknown cytonuclear grade***	***High cytonuclear grade***	***Unknown cytonuclear grade*** *(Table 40)*	
N East, Yorks & Humber	*8*	*0*	*0*	*0*	*8*
East Midlands	*3*	*0*	*0*	*0*	*3*
East of England	*0*	*0*	*1*	*0*	*1*
London	*8*	*0*	*0*	*1*	*9*
South East Coast	*6*	*0*	*0*	*0*	*6*
South Central	*5*	*0*	*0*	*0*	*5*
South West	*7*	*0*	*0*	*0*	*7*
West Midlands	*5*	*0*	*0*	*1*	*6*
North West	*3*	*0*	*1*	*1*	*5*
Wales	*9*	*0*	*2*	*0*	*11*
Northern Ireland	*1*	*0*	*0*	*0*	*1*
Scotland	*10*	*0*	*0*	*3*	*13*
United Kingdom	***65***	***0***	***4***	***6***	*75*

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

KEY FINDINGS

- 74% of non-invasive cancers were treated with breast conserving surgery and 63 apparently received no surgery.
- 75 potentially large, high cytonuclear grade non-invasive cancers were treated with breast conserving surgery.

4.2 Surgical Treatment for Invasive Breast Cancer

Of the 14,658 invasive breast cancers detected by the UK NHSBSP in 2012/13, 11,380 (78%) underwent breast conserving surgery and 2,996 (20%) had a mastectomy (Table 41). Mastectomy rates in individual screening units varied between 6% (one unit in East of England with 102 cancers) and 44% (one unit in South Central with 68 cancers) (Figure 20).

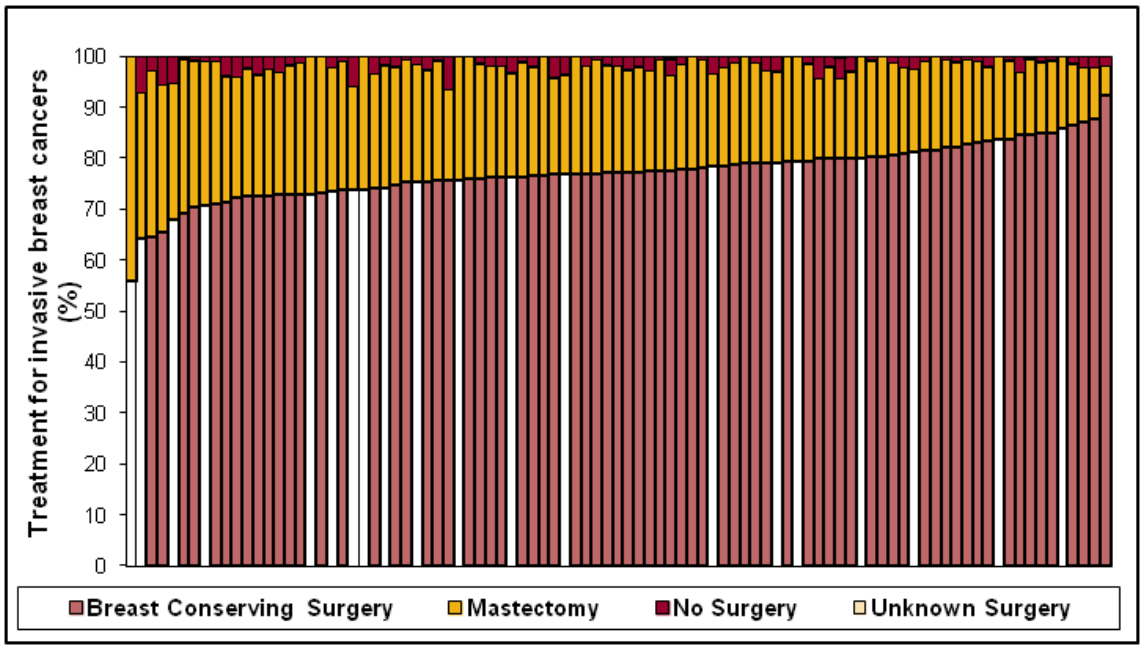

Figure 20: Variation between screening units in the type of treatment for invasive cancers (all sizes) (The 20 smallest units are highlighted in white)

Two hundred and seventy seven invasive cancers (2%) had no surgery recorded within the audit period, and treatment information was unavailable for 5 invasive cancers. Of the invasive cancers with no surgery recorded, 145 (52%) had neo-adjuvant therapy; 104 (38%) had neo-adjuvant endocrine therapy, 49 (18%) had neo-adjuvant chemotherapy and 4 (1%) had neo-adjuvant trastuzumab.

4.2.1 Surgical Treatment of Invasive Cancers According to Invasive Size

There was a clear variation in mastectomy rate with invasive tumour size; the overall rate ranging from 13% for cancers with an invasive tumour diameter of less than 15mm, to 92% for cancers with an invasive tumour diameter greater than 50mm (Table 42). The 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 13% in 2012/13.

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. There was a clear variation in mastectomy rate with whole tumour size; the overall rate ranging from 7% for small cancers (whole tumour <15mm), to 81% for large cancers (whole tumour size >50mm) (Table 43). The following table shows how mastectomy rates in 2012/13 increased as the size of the invasive cancer and the whole tumour size increased. For small (<15mm) invasive cancers, mastectomy rates also increased as the whole tumour size increased (Table 44). Thus, while only 7% of small (<15mm) cancers with whole tumour size <15mm were treated with a mastectomy, 81% of small (<15mm) cancers with whole tumour size >50mm had a mastectomy. The lower mastectomy rate for small (<15mm) cancers with whole tumour size <15mm indicates that the presence of non-invasive disease which extends beyond the invasive lesion accounts for a significant proportion of the mastectomies performed on small (<15mm) invasive cancers.

INVASIVE CANCER TREATMENT – VARIATION WITH TUMOUR SIZE

Size	Invasive size (Table 42)		Whole tumour size for cancers with invasive component <15mm (Table 44)	
	No.	Mastectomy Rate (%)	No.	Mastectomy Rate (%)
<15mm	987	13	397	7
15-≤20mm	583	18	109	13
>20-≤35mm	807	32	152	25
>35-≤50mm	352	62	156	60
>50mm	227	92	161	81

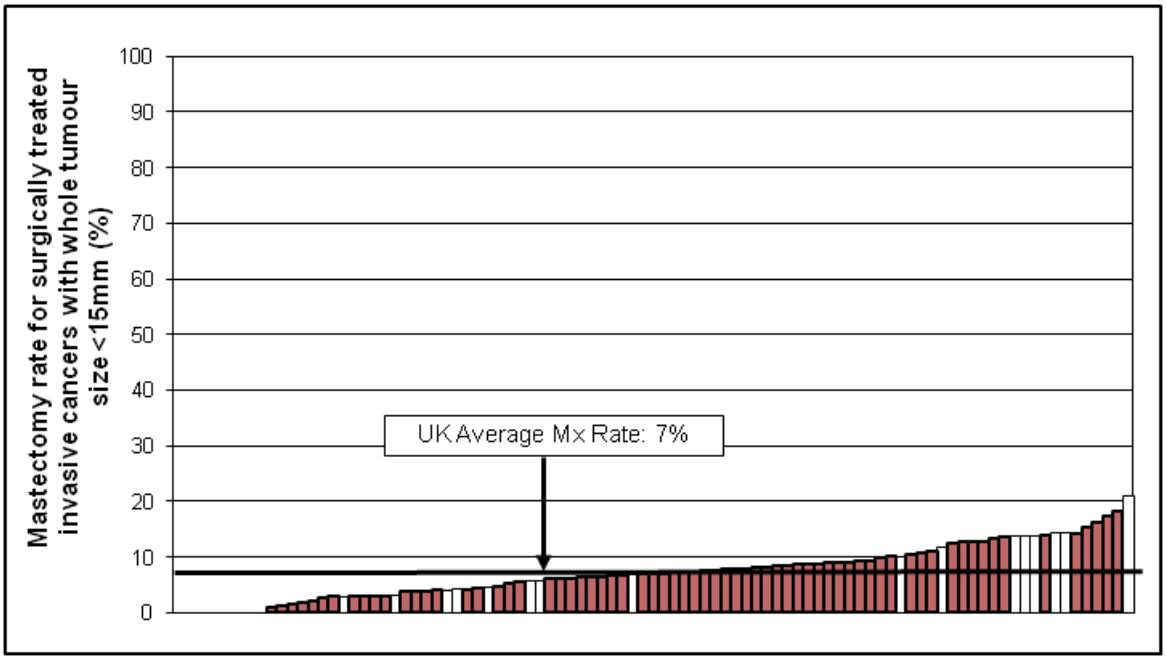

Figure 21: Variation between screening units in the mastectomy rates for invasive cancers with whole tumour size <15mm (The 20 smallest units are highlighted in white)

Figure 21 shows how the mastectomy rate for small invasive cancers with whole tumour size <15mm varied between screening units in 2012/13. Nine screening units treated none of these cancers with mastectomy and in 5 units the mastectomy rate was 15% or more.

Figure 22 shows the variation between screening units in the mastectomy rate for invasive cancers with whole tumour size <15mm in the 3-year period 2010/11-2012/13. The dotted and dashed lines are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average mastectomy rate (solid line). Mastectomy rates which are outside the control limits are significantly higher or lower than the average rate of 8%.

Of the 9 units with unusually high mastectomy rates, 3 were above the 99.7% control limit (1 in East Midlands, 1 in North East, Yorkshire & Humber and 1 in Wales) and 6 were above the 95% control limit (1 in North West, 1 in Scotland, 1 in South Central, 2 in North East, Yorkshire & Humber and 1 in Wales). Of the 9 units with unusually low mastectomy rates, 1 in South East Coast was below the 99.7% control limit and 8 were below the 95% control limit (2 in East Midlands, 2 in South East Coast, 2 in South West, 1 in North East, Yorkshire & Humber and 1 in West Midlands).

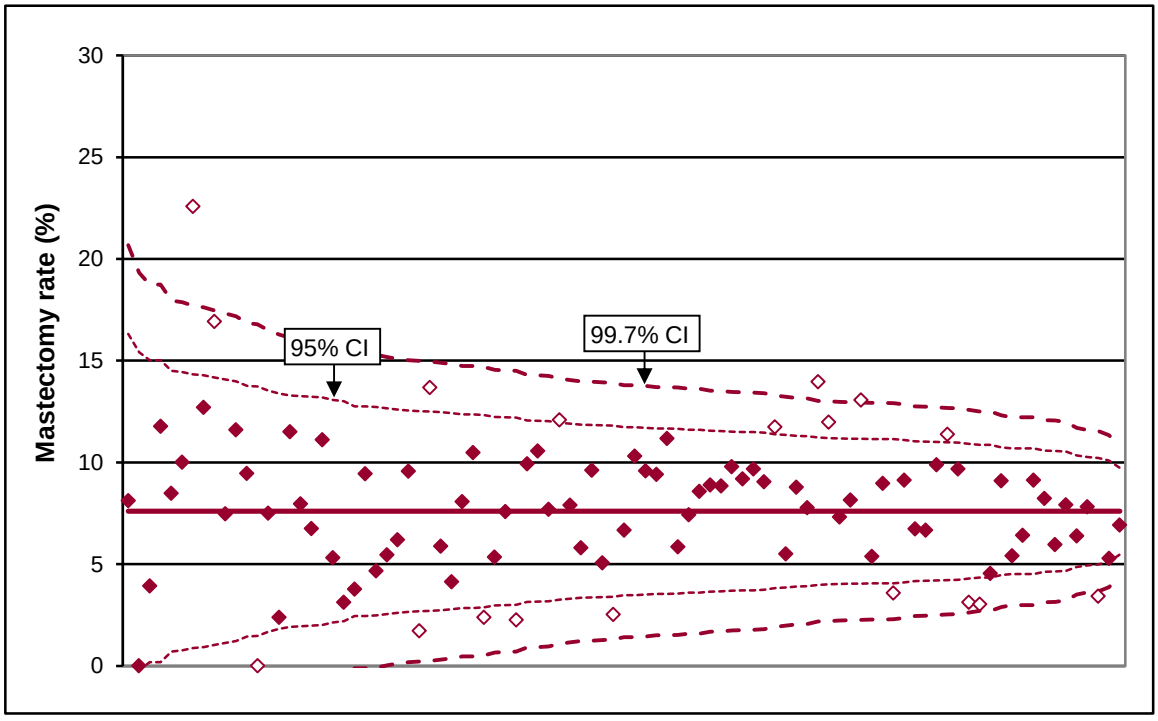

Figure 22: Variation between screening units in the mastectomy rates for invasive cancers with whole tumour size <15mm in 2010/11-2012/13
(Open diamonds represent units which lie outside the control limits)

4.3 Immediate Reconstruction Following Mastectomy

Overall, of the 18,540 cancers detected in 2012/13, 3,957 (21%) were treated with mastectomy. Of the latter cancers, 1,138 (29%) were recorded as having immediate reconstruction, 2,691 (68%) had no immediate reconstruction recorded, and for 128 (3%) it was unknown whether or not immediate reconstruction was performed (Table 45).

Recorded immediate reconstruction rates for all cancers treated with mastectomy varied widely between screening units in 2012/13 (Figure 23). The highest rate was in a unit in East of England (65%), while in 2 units (in Northern Ireland and South West) no immediate reconstructions were recorded. Four screening units had high proportions of cancers where it was not known whether or not immediate reconstruction was performed. These were in East of England (57 cancers), London (32 cancers), South East Coast (17 cancers) and South West (10 cancers).

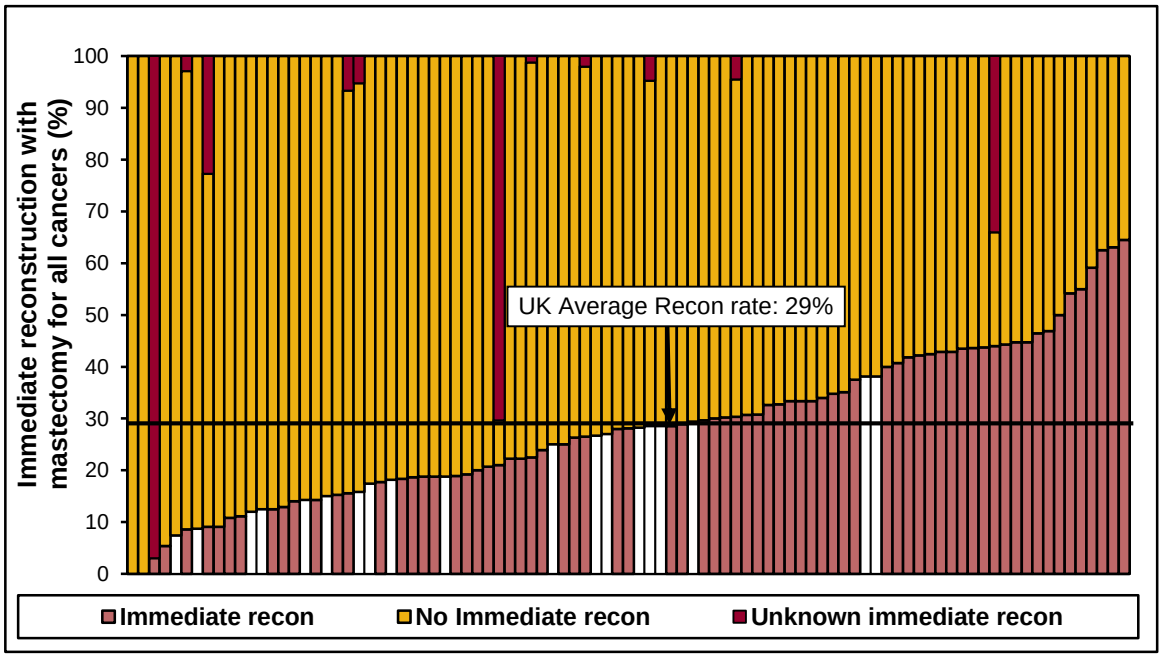

Figure 23: Variation between screening units in the proportion of all cancers in 2012/13 having immediate reconstruction following a mastectomy (The 20 smallest units are highlighted in white)

Immediate reconstruction rates after mastectomy were almost twice as high for non/micro-invasive cancers (44%) than for invasive cancers (24%). The following summary table shows that, for invasive and non/micro-invasive cancers, immediate reconstruction rates after a mastectomy have increased by 6 percentage points since 2010/11.

IMMEDIATE RECONSTRUCTION RATES FOR BREAST CANCER PATIENTS TREATED BY MASTECTOMY			
Invasive Status	***2010/11***	***2011/12***	***2012/13***
Invasive	*19%*	*23%*	*24%*
Non/micro-invasive	*37%*	*42%*	*44%*
Overall	***23%***	***27%***	***29%***

Figure 24 shows the very wide variation in recorded immediate reconstruction between screening units in 2012/13; with rates for invasive cancers ranging from 0 cancers in 2 units to over 50% of cancers in 5 units and rates for non/micro-invasive cancers ranging from 0 cancers in 5 units to over 70% of cancers in 12 units. Immediate reconstruction rates were higher for non/micro-invasive cancers in the majority of units (77 units).

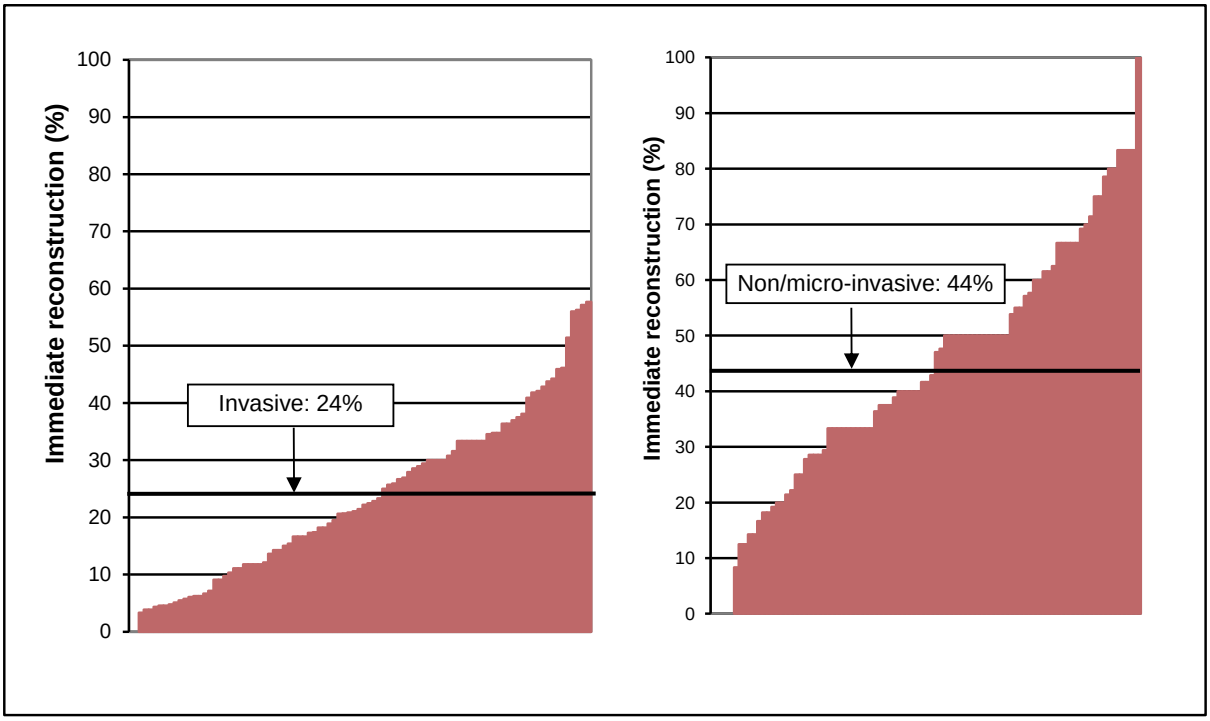

Figure 24: Variation between screening units in immediate reconstruction rates for invasive and non/micro-invasive cancers

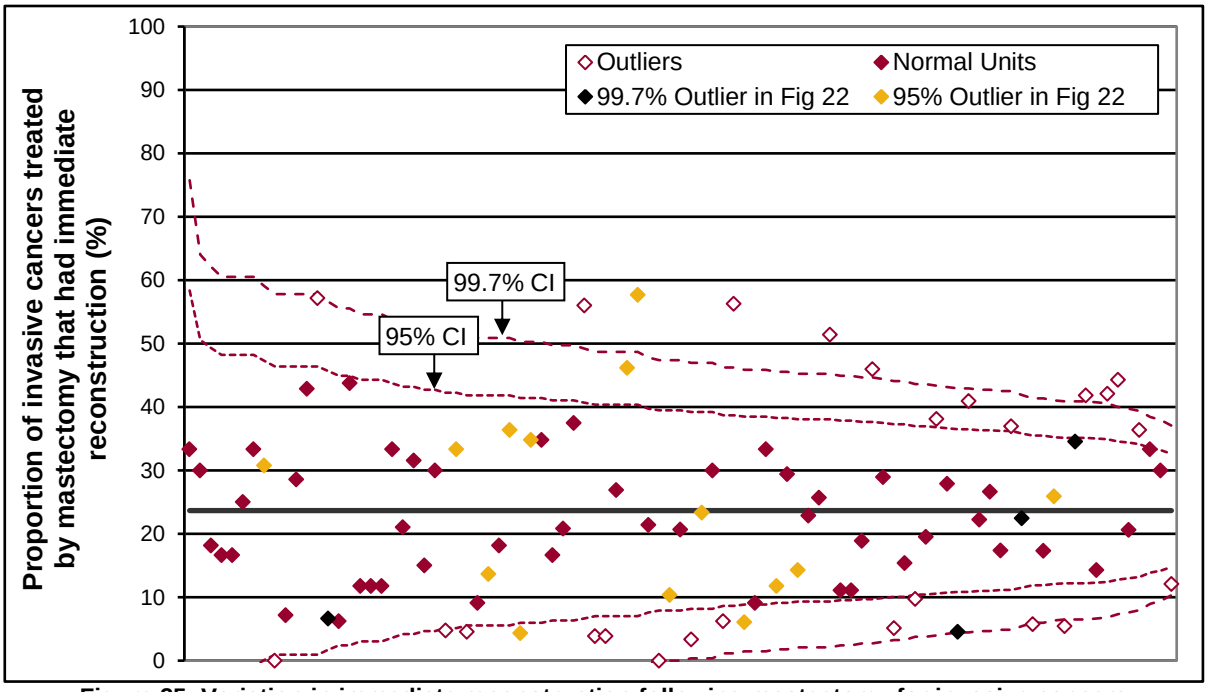

Figure 25: Variation in immediate reconstruction following mastectomy for invasive cancers in each screening unit in 2010/11-2012/13 (Open diamonds represent units which lie outside the control limits)

Figure 25 demonstrates the variation between screening units in the proportion of invasive cancers which had immediate reconstruction in the 3-year period 2010/11-2012/13. The dotted and dashed lines are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average mastectomy rate (solid line). Immediate reconstruction rates which are outside the control limits are significantly higher (14 units) or lower (16 units) than the average rate of 24%. Of the 14 units with unusually high mastectomy

rates, 8 were above the 99.7% control limit (3 in North East, Yorkshire & Humber, 2 in East of England, 1 in North West, 1 in London and 1 in West Midlands) and 6 were above the 95% control limit (2 in South West, 2 in North West, 1 in London and 1 in South East Coast). Of the 16 units with unusually low mastectomy rates, 1 unit in West Midlands was below the 99.7% control limit and 15 were below the 95% control limit (3 in South West, 3 in North West, 2 in London, 2 in West Midlands, 2 in Northern Ireland, 1 in South Central, 1 in Scotland and 1 in Wales).

Two units (1 in South West and 1 in North East, Yorkshire & Humber) were high mastectomy rate outliers and high immediate reconstruction outliers for all invasive cancers. One screening unit in Wales and 1 unit in North West were high mastectomy rate outliers and low immediate reconstruction outliers for all invasive cancers. The unit in Wales was also a high mastectomy rate outlier and low immediate reconstruction outlier for small <15mm whole size invasive cancers. Two other units (1 in East Midlands and 1 in North East, Yorkshire & Humber) were high mastectomy rate outliers and low immediate reconstruction rates outliers for small <15mm whole size invasive cancers.

KEY FINDINGS

- In the UK as a whole, 78% of invasive breast cancers had breast conserving surgery.
- Two hundred and seventy seven invasive cancers (2%) had no surgery recorded within the audit period; of these 52% had neo-adjuvant therapy recorded.
- Since 2005/06, the mastectomy rate for small (<15mm) invasive cancers has decreased to an all time low of 13% in 2012/13.
- Only 7% of cancers with whole tumour size <15mm were treated with mastectomy compared to 81% of small invasive (<15mm diameter) cancers with whole tumour diameter >50mm. These data indicate that the presence of non-invasive disease which extends beyond the invasive lesion accounts for a proportion of the mastectomies performed on small invasive cancers.
- In 2010/11-2012/13 9 screening units had significantly higher mastectomy rates for small <15mm whole size cancers and 9 units had significantly lower rates.
- Of the cancers treated with mastectomy in 2012/13, 29% were recorded as having immediate reconstruction. The highest immediate reconstruction rate was in East of England (65%), while in 2 units (in Northern Ireland and South West) no immediate reconstructions were recorded.
- Immediate reconstruction rates after mastectomy were almost twice as high for non/micro-invasive cancers (44%) than for invasive cancers (24%).
- For invasive cancers treated with mastectomy, immediate reconstruction rates varied from over 50% in 5 screening units to 0% in 2 units. For non/micro-invasive cancers, immediate reconstruction rates varied from 70% in 12 units 0% in 5 units.
- In 2010/11-2012/13, 19 screening units had significantly higher immediate reconstruction rates for invasive cancers and 16 had significantly lower rates.
- Two units (in South West and North East, Yorkshire & Humber) were high mastectomy rate outliers and high immediate reconstruction outliers for all invasive cancers, and 2 units (in Wales and North West) were high mastectomy rate outliers and low immediate reconstruction outliers for all invasive cancers. The unit in Wales and 2 other units (in East Midlands and North East, Yorkshire & Humber) were high mastectomy rate outliers and low immediate reconstruction rates outliers for small <15mm whole size invasive cancers.

Surgery KPI S2

Mastectomy rates for small invasive cancers
1-year and 3-year high outlier units for mastectomy rates for small <15mm whole size invasive cancers linked to 3-year low outliers for immediate reconstruction

Region	Unit	MX <15mm whole size 3-year 2009/10-2011/12 %	MX <15mm whole size 2012/13 %	MX <15mm whole size 3-year 2010/11-2012/13 No.	MX <15mm whole size 3-year 2010/11-2012/13 %	IR all inv cancers 3-year 2010/11-2012/13 %	Outcome of QARC audit
Units audited in 2013							
East Midlands	CNN	20.5	11.8	14	22.6	6.7	Changed margin protocol and patient counselling
East Midlands	CNO	16.7	7.1	24	9.7	22.9	2012/13 decrease - changed margin protocol
NEYH	AGA	15.7	4.2	0	8.1	56.3	2012/13 decrease - no action required
NEYH	ANE	20.5	7.4	30	14.0	34.5	2012/13 decrease - no action required
NEYH	AWC	15.6	7.7	16	13.7	13.6	2012/13 decrease, IR rate still low
North West	NCH	22.5	0.0	3	8.1	16.7	Case reveiew - all treatment satisfacory
North West	PWI	22.9	4.2	18	12.1	4.3	Unit offers true patient choice
Wales	WSL	13.7	12.8	29	13.1	4.5	No QARC report available
New units to audit in 2014							
East of England	DNF	10.2	18.2	15	9.6	17.4	
East Midlands	CDN	6.3	15.2	11	9.6	16.7	
NEYH	BYO	13.8	10.0	23	11.7	25.9	
NEYH	ANT	13.3	13.4	20	9.0	14.3	
South Central	KMK	17.2	20.8	11	16.9	23.3	
South Central	KOX	9.5	17.2	15	10.6	28.9	
South East Coast	HGU	7.4	1.9	14	3.4	22.4	
West MIdlands	MBW	12.2	14.3	16	9.4	5.5	
Scotland	Unit 5	13.0	12.7	26	12.0	14.3	
Wales	WNM	12.7	16.2	28	11.4	11.8	

99.7% low outlier in 2012/13 or 2010/11-2012/13
95% low outlier in 2012/13 or 2010/11-2012/13
99.7% high outlier in 2012/13 or 2010/11-2012/13
95% high outlier in 2012/13 or 2010/11-2012/13

Of the 8 units which were high outliers in the 2013 audit for mastectomy rates for <15mm whole size cancers in 2009/10-2011/12, none were high outliers in 2012/13, but 5 (1 in East Midlands, 2 in North East, Yorkshire & Humber, 1 in North West and 1 in Wales) were still 95% or 99.7% high outliers in the 3-year period 2010/11-2012/13. The improvement in the most recent year for these 8 units presumably reflects recent changes in clinical practice. However, 2 units (1 in North West and 1 in Wales) which were still 3-year high outliers for mastectomy rates for <15mm invasive cancers were also 95% low outliers for immediate reconstruction for invasive cancers in 2010/11-2012/13.

In this year's audit, 9 additional units (1 in East of England, 1 in East Midlands, 2 in North East, Yorkshire & Humber, 2 in South Central, 1 in West Midlands, 1 in Scotland and 1 in Wales) were identified as high outliers for mastectomy rates for <15mm whole size cancers in 2012/13 and/or the 3-year period 2010/11-2012/13. The unit in West Midlands was also a 99.7% low outlier for immediate reconstruction for invasive cancers in 2010/11-2012/13. One unit in South East Coast was identified as a 99.7% low outliers for mastectomy rates for <15mm whole size

cancers in the 3-year period 2010/11-2012/13 and a 95% low outlier in 2012/13. Regional QA reference centres should follow up the 2 units audited in 2013 which are low 3-year outliers for immediate reconstruction for all invasive cancers, the 9 newly identified units which are high outliers for mastectomy rates for <15mm whole size cancers in 2012/13 and/or the 3-year period 2010/11-2012/13 (one of which is also a 3-year low outlier for immediate reconstruction for all invasive cancers), and the unit that was a low outlier for mastectomy rates for <15mm whole size cancers in 2012/13 and 2010/11-2012/13 to ascertain the reason for this unusual practice.

4.4 Neo-adjuvant Therapy

A total of 700 women received neo-adjuvant therapy in 2012/13 (Table 46). The 700 cancers treated with neo-adjuvant therapy included 680 invasive cancers (5% of all invasive cancers), 8 non-invasive cancers, 1 micro-invasive cancer and 11 cancers with unknown invasive status. For 7 women (6 in Scotland and 1 in London), it was not known whether they did or did not receive neo-adjuvant therapy. All of the 8 women with non-invasive cancer receiving neo-adjuvant therapy received neo-adjuvant endocrine therapy.

Two hundred and seventy seven women with invasive breast cancer (2%) (Table 41) had no surgery recorded within the audit time period. Of these, 145 (52%) had neo-adjuvant therapy recorded. This may be because neo-adjuvant therapy was the only treatment received by the patient or because surgery was not planned until the course of neo-adjuvant therapy was completed and, as a result, the surgery took place after the audit cut-off date.

The following table shows how the use of neo-adjuvant therapy varied with age for all women with invasive breast cancer. 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; 45% (31 cases) of whom had no surgery recorded. Of the women aged less than 50 years who had neo-adjuvant endocrine therapy recorded 20% (2 cases) had no surgery recorded.

USE OF NEO-ADJUVANT THERAPIES			
Age	***Chemotherapy***	***Trastuzumab***	***Endocrine therapy***
<50	*4.1%*	*0.5%*	*1.6%*
50 – 64	*2.9%*	*0.1%*	*1.9%*
65 – 70	*1.4%*	*0.1%*	*2.9%*
71+	*0.4%*	*0.0%*	*5.4%*

4.4.1 Neo-adjuvant Endocrine Therapy

Of the 384 breast cancers (2%) with neo-adjuvant endocrine therapy recorded (Table 47), 366 were invasive, 8 non-invasive, 1 micro-invasive and the invasive status of 9 cancers was unknown. One hundred and ten (29%) had no surgery recorded within the audit period, and 31

(8%) also had other neo-adjuvant therapy. Of the 384 cancers, 362 (94%) were ER and/or PR positive, 15 (4%) had unknown ER and PR status, and the remaining 7 (2%) were ER and PR negative. It was not known whether the endocrine receptor status was determined from the core biopsy or from resection specimens. Two hundred and seventy eight (72%) of the cancers receiving neo-adjuvant endocrine therapy were diagnosed in women aged 60 years or over.

4.4.2 Neo-adjuvant Chemotherapy

Neo-adjuvant chemotherapy was recorded for 339 breast cancers (2% of all cancers diagnosed in 2012/13) (Table 48); 337 were invasive and 2 had unknown invasive status. Of the 337 invasive cancers for which neo-adjuvant chemotherapy was recorded, 49 (15%) did not have surgery recorded within the audit period. A further 28 (8%) had surgery, but no malignant component was found in the surgical specimen.

Of the 339 cancers treated with neo-adjuvant chemotherapy, 155 (46%) were larger than 20mm in diameter on mammography, 95 (28%) were 20mm or less in diameter on mammography, 87 (26%) had an unknown size on mammography and 2 had unknown invasive status. Of the 339 cancers, 190 (56%) had an abnormal axillary ultrasound result. Of these, 157 (83%) had a needle core biopsy, and for 131 (69%) a C5/B5 result was recorded. Only 31 (9%) of the 339 cancers treated with neo-adjuvant chemotherapy were Grade 1 (at core and/or surgery) and 281 (83%) were Grade 2 or 3. Six cancers were small (20mm or less), Grade 1 and were not proven to have abnormal ultrasound with the lymph nodes.

4.4.3 Neo-adjuvant Trastuzumab

In the UK as a whole in 2012/13, 20 breast cancers (all invasive) were recorded as having received neo-adjuvant Trastuzumab (Table 49). Of these, 18 were HER2 positive, 1 was HER2 negative and 1 had borderline HER2 status. Of the 20 cancers treated with Trastuzumab, only 12 (60%) also had neo-adjuvant chemotherapy recorded.

KEY FINDINGS

- A total of 700 cancer patients received neo-adjuvant therapy in 2012/13. Of these, 680 were invasive and 8 non-invasive.
- Of the 277 women with invasive breast cancer who did not have surgery within the audit time period, 52% had neo-adjuvant therapy recorded.
- The use of neo-adjuvant endocrine therapy was highest for the older women aged 71 years or more; 45% (31 cases) of whom had no surgery recorded.
- Of the 384 cancers (2%) with neo-adjuvant endocrine therapy recorded, 96% were ER and/or PR positive, 4% had unknown ER and PR status and 2% were ER and PR negative; 110 (29%) had no surgery and 72% were aged 60 years or over.
- Neo-adjuvant chemotherapy was recorded for 339 breast cancers (2% of all cancers diagnosed in 2012/13); 337 were invasive.
- Six of the invasive cancers treated with neo-adjuvant chemotherapy were small (20mm or less), Grade 1 and were not proven to have abnormal lymph nodes.
- 20 breast cancers (all invasive) were recorded as having received neo-adjuvant Trastuzumab. Of these only 12 (60%) also had neo-adjuvant chemotherapy recorded.

Chapter 5: Surgical caseload

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

For patients without surgery, a responsible surgeon is occasionally recorded, and these 'no surgery' cases have been included in the surgeon's caseload. If a surgeon has treated cases in more than one region, the totals in each region have been combined, and the surgeon and their combined caseload have been assigned to only one region. This allocation method has also been used in the 3-year comparisons, and has had the overall effect of decreasing slightly compared with years prior to 2011/12, the number of surgeons who have a low caseload.

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

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

In 2012/13, 578 consultant breast surgeons treated patients with cancers diagnosed through the UK NHSBSP. Of the 578 consultant surgeons included in the audit (Table 50), 70 treated patients from more than one region and their overall caseload was allocated to only one region. Five hundred and seventy two surgeons were identified by their name or unique GMC registration code. Data for the remaining 6 unidentified surgeons, 1 of which was confirmed to be an overseas surgeon and 3 of whom were in Scotland, have been assumed to be for 6 individual surgeons.

The 13-year summary table shows that the proportion of women managed or treated by surgeons with a screening caseload of 20 or more has increased from 86% in 2000/01 to 93% in 2012/13. In 2012/13, 81% of women were treated by surgeons with an annual caseload of more than 30 screen-detected cancers, and only 2% (335) were treated by surgeons with an annual caseload of fewer than 10 screen-detected cancers (Table 51). Of the 117 surgeons treating fewer than 10 screening cases per year (Table 54), 42 (36%) had a symptomatic caseload of more than 30 cases per year, 13 (11%) either joined or left the UK NHSBSP during

2012/13, 21 (18%) were plastic surgeons, 15 (13%) were in private practice, 6 (5%) had other reasons and for 20 (17%) no information was provided.

13-YEAR SUMMARY: SCREENING SURGICAL CASELOAD

Year of data collection	Number of screening surgeons	Median screening caseload	Proportion of women treated by a surgeon with screening caseload 20+ (%)	Number of surgeons with screening caseload <10	Number of surgeons with no information to explain screening caseload <10
2000/01	419	17	86	159	25
2001/02	439	18	85	156	52
2002/03	472	18	86	174	55
2003/04	481	19	89	161	15
2004/05*	484	20	91	151	10
2005/06	511	23	93	149	11
2006/07	559	22	91	186	16
2007/08	526	30	92	142	6
2008/09	549	27	92	149	4
2009/10	544	29	92	138	6
2010/11	592	28	91	160	25
2011/12	580	30	93	142	18
2012/13	578	30	93	117	20

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

Combining the data submitted for the 2010/11, 2011/12 and 2012/13 UK NHSBSP & ABS audits, an annual average screening caseload could be calculated for 753 consultant surgeons who managed or treated patients with screen-detected cancers. Seven hundred and seven surgeons were identified by their name or unique GMC registration code. Data for the remaining 46 unidentified surgeons, 5 of whom were confirmed to be overseas surgeons and 27 of whom were from Scotland, have been assumed to be for 46 individual surgeons. It is possible that these surgeons may have been treating women in other parts of the UK and that their caseload is higher than that calculated. Of the 753 surgeons (Table 52), 151 (20%) surgeons treated patients from more than one region and their overall caseload was allocated to one region.

SURGEON CASELOAD AND NUMBER OF WOMEN TREATED IN 2010/11-2012/13

Caseload	Surgeons		Women treated	
	No.	%	No.	%
100+	6	1	2,094	4
30-99	282	37	40,782	73
20-29	91	12	6,791	12
10-19	90	12	3,935	7
<10	284	38	2,286	4
Total	**753**	**100**	**55,888**	**100**

The previous table summarises for the UK NHSBSP as a whole, the number of consultants with a given surgical caseload in the 3-year period 2010/11-2012/13 and the number of women treated by surgeons in each caseload group. Of the 753 surgeons examined, 284 had a caseload of fewer than 10 screening cases per annum, but these surgeons treated only 4% of women. The 6 surgeons who had a caseload of more than 100 screening cases per year also treated only 4% of women. It is possible that some of these women were not actually treated by these very high caseload surgeons, and that their operations were performed by associate specialists or trainees under consultant surgeon direction.

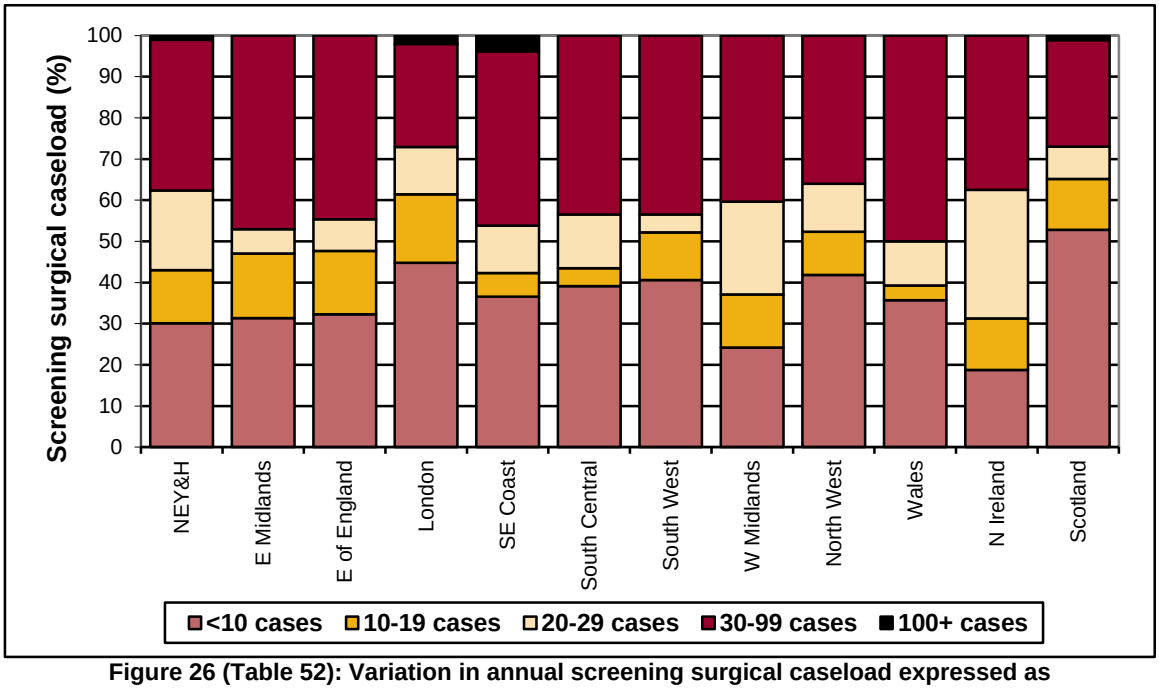

Figure 26 (Table 52): Variation in annual screening surgical caseload expressed as number of cases per surgeon (3-year data 2010/11-2012/13)

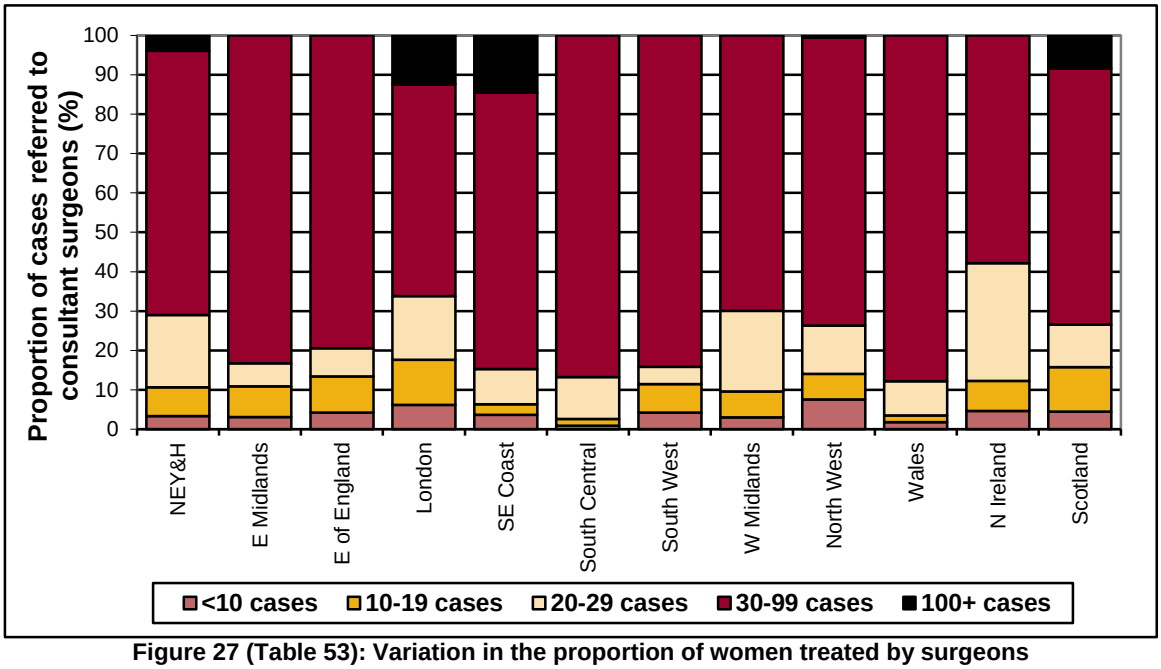

Figure 27 (Table 53): Variation in the proportion of women treated by surgeons with differing screening caseloads (3-year data 2010/11-2012/13)

The variation in screening surgical caseload in each region in the 3-year period 2010/11-2012/13 is shown in Figure 26. The highest proportions of surgeons with a screening caseload of fewer than 10 screening cases per year were in Scotland (53%) and London (45%). Surgical specialisation was highest in Northern Ireland, where only 3 surgeons (19%) treated fewer than 10 screening cases per year. Figure 27 shows the variation in the proportion of women treated by surgeons with differing average annual screening caseloads in the 3-year period 2010/11-2012/13. In North West and London, 8% (460 cases) and 6% (330 cases) of women respectively were treated by surgeons with an average annual screening caseload of fewer than 10 cases (Table 53).

A list of 6 possible reasons was provided to explain why surgeons had an average annual screening caseload of fewer than 10 cases. If multiple reasons were given, only one was included. The reasons given to explain average annual caseloads of fewer than 10 cases are shown in Figure 28.

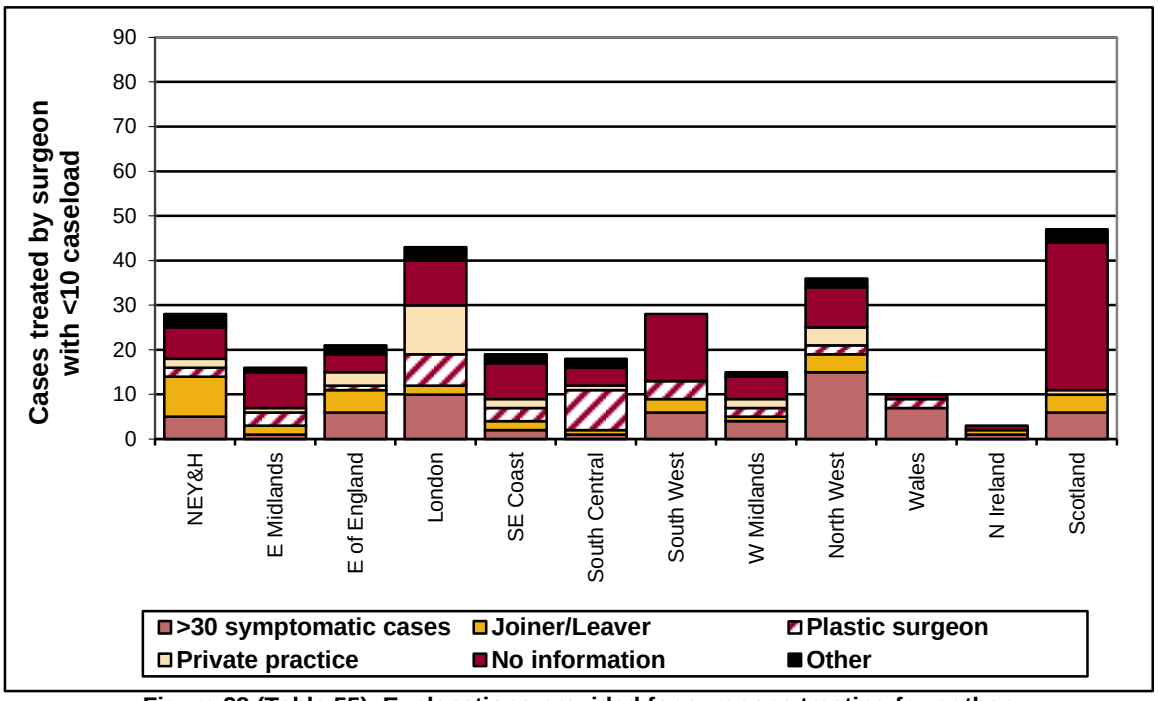

Figure 28 (Table 55): Explanations provided for surgeons treating fewer than 10 screening cases (3-year data 2010/11-2012/13)

Of the 284 surgeons in the UK with an average annual screening caseload of fewer than 10 cases in the 3-year period 2010/11-2012/13, 64 (23%) treated more than 30 symptomatic breast cancers each year during this period, and 34 (12%) either joined or left the UK NHSBSP during the 3-year period (Table 55). Other reasons (plastic surgeon, private practice) were given for 62 surgeons (22%). Eleven (41%) of the 27 surgeons who had an average annual screening caseload of fewer than 10 cases due to private practice were in London.

For 19 surgeons who treated a total of 141 women, a reason other than one of the 6 listed reasons was provided. There was no information provided to explain the low average annual

screening caseload recorded for 105 surgeons who treated a total of 829 women. Thirty three (31%) of these surgeons were in Scotland and 15 (14%) were in South West (Table 55).

KEY FINDINGS

- In 2012/13, 578 consultant breast surgeons treated women diagnosed in the UK NHSBSP. Ninety three percent of women were treated by a surgeon with a screening caseload of at least 20 cases. One hundred and seventeen surgeons treated fewer than 10 screen-detected cases.
- Of the 117 surgeons treating fewer than 10 screening cases per year, 42 (36%) had a symptomatic caseload of more than 30 cases per year and 13 (11%) either joined or left the UK NHSBSP during 2012/13.
- Combining the data submitted for the 3-year period 2010/11-2012/13, 284 surgeons (38%) had an annual average caseload of fewer than 10 cases and 6 treated an average of at least 100 cases per year.
- The highest proportions of surgeons with a screening caseload of fewer than 10 screening cases per year were in Scotland (53%) and London (45%). In Scotland, some low caseload surgeons may also work elsewhere in the UK and their caseload may be underestimated. It is not always possible to identify such surgeons because the codes used to identify surgeons in Scotland are different to those used in the rest of the UK. This problem is much less marked in 2012/13.
- Surgical specialisation was highest in Northern Ireland, where only 3 surgeons treated fewer than 10 screening cases per year.
- During the period 2010/11-2012/13, of the 284 low caseload surgeons, 23% treated more than 30 symptomatic breast cancers each year, and 12% either joined or left the UK NHSBSP. Eleven of the 27 surgeons who had a screening caseload of fewer than 10 cases because of private practice were in London.
- Information was unavailable to explain the low caseload of 105 surgeons treating a total of 829 women in the 3-year period 2010/11-2012/13. Fifteen of these surgeons were in South West. A further 33 were in Scotland and could have also treated women elsewhere in the UK.

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 (eg Cons & Ax, Mx & Ax).

Diagnostic open biopsies were coded as breast conserving surgery. For a cancer without a non-operative diagnosis by B5 core biopsy or C5 cytology, the first operation was defined to be diagnostic even if there was also therapeutic intent. The number of therapeutic operations is thus one fewer than the total number of operations and the number of therapeutic operations is counted from the second operation. The number of therapeutic operations for cancers 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, 4,338 (24%) of the 18,174 surgically treated breast cancers (with known invasive status) had more than one operation; 3,373 invasive cancers (23%) and 965 non/micro-invasive cancers (25%) had more than one operation (Table 56).

Table 57 shows the repeat operation rates in each region for the 692 surgically treated cancers (with known invasive status) that did not have a non-operative diagnosis. Although the overall repeat operation rate for these cancers was 48% (335 cases), repeat operations for cancers without a non-operative diagnosis formed only 8% of the total repeat operations. Of the 175 invasive cancers without a non-operative diagnosis, 141 (81%) had a repeat operation. Only 38% (194 cases) of the 517 non/micro-invasive cancers without a non-operative diagnosis had a repeat operation.

Of the remaining 357 surgically treated cancers (with known invasive status) without a non-operative diagnosis which had only one operation, 4 had a mastectomy and 6 had surgery to the axilla alone. A further 347 had breast conserving surgery; 295 (85%) of these had clear margins (tumour removed no further operation), 51 (15%) had involved or unknown margin status and one had no residual tumour found at surgery. Of the 51 cancers with involved or unknown margin status, 33 (65%) had LCIS only and had no further surgery. Eighteen cancers were not LCIS and had no further surgery despite the margins being involved or of unknown status. Only 1 of these 18 cancers received neo-adjuvant therapy. Twelve of these cancers were in Scotland, where margin data were not available.

6.2 Repeat Therapeutic Operations

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

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

Of the 17,498 surgically treated cancers with a non-operative diagnosis, 4,003 (23%) underwent more than one therapeutic operation. This is 1% lower than the repeat operation rate for all surgically treated cancers (with known invasive status). Twenty three percent of the 14,206 surgically treated invasive cancers with a non-operative diagnosis (3,232 cancers) and 24% of the 3,276 surgically treated non/micro-invasive cancers with a non-operative diagnosis (771 cancers) underwent more than one therapeutic operation.

Of the 14,483 invasive cancers with a non-operative diagnosis, 11,706 were initially treated by therapeutic breast conserving surgery. Of these, 23% had repeat therapeutic operations (Table 58); 226 cancers had three operations and 15 had more than three operations. Of the 2,535 non/micro-invasive cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery, 27% had repeat therapeutic operations (Table 59); 92 had three operations and 12 had more than three operations. Seven of the 27 cases (invasive and micro/non-invasive) with more than three operations were in South East Coast and 6 were in a single unit within this region.

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

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

Scenario 2: Margins not clear because of an unexpected tumour component (invasive or non-invasive) and a repeat operation (breast conserving surgery or mastectomy) undertaken to clear involved margin(s)
- multi-focal invasive or non-invasive cancer present
- small cancers with a B5b (Invasive) non-operative diagnosis found after surgery to have DCIS present which reaches the excision margin(s)

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 3: 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 4: Additional therapeutic nodal procedure(s)

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

The following table summarises for the UK NHSBSP as a whole, the repeat operation rates for all surgically treated cancers, surgically treated cancers with and without a non-operative diagnosis, and cancers with a non-operative diagnosis treated with breast conserving surgery. Cancers with unknown invasive status are excluded from this table.

Cohort	*All cases*	*Repeat operations*	*% with repeat operations*
All surgically treated cancers	***18,174***	***4,338***	***24***
Invasive (Table 56)	*14,381*	*3,373*	*23*
Non/micro-invasive (Table 56)	*3,793*	*965*	*25*
Surgically treated cancers without a non-operative diagnosis	***692***	***335***	***48***
Invasive (Table 57)	*175*	*141*	*81*
Non/micro-invasive (Table 57)	*517*	*194*	*38*
Surgically treated cancers with a non-operative diagnosis	***17,482***	***4,003***	***23***
Invasive (Section 6.2)	*14,206*	*3,232*	*23*
Non/micro-invasive (Section 6.2)	*3,276*	*771*	*24*
Invasive - B5b (Table 60)	*13,433*	*2,777*	*21*
Invasive - C5 only no B5 (Table 61)	*19*	*6*	*32*
Invasive - B5a (Table 62)	*703*	*426*	*61*
Non/micro-invasive - B5a (Table 63)	*3,227*	*759*	*24*
Invasive - initially treated with BCS (Table 58)	*11,706*	*2,710*	*23*
Non/micro-invasive - initially treated with BCS (Table 59)	*2,535*	*678*	*27*

Invasive cancers with a B5b core biopsy diagnosis had the lowest proportion of repeat operations (21%). Invasive cancers with a C5 cytology only diagnosis had a repeat operation rate of 32% (6 cases). Non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had a repeat operation rate of 24%. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest repeat operation rate (61%).

Nineteen (86%) of the 22 surgically treated cancers with C5 cytology only and no B5 core biopsy proved to be invasive after surgery. For these cancers, where the invasive status cannot be determined microscopically, radiological or clinical features are of increased importance when planning the therapeutic operation. Overall, 3,090 (79%) of the 3,928 surgically treated cancers with a B5a (Non-invasive) core biopsy result (Table 8) were confirmed following surgery to be non/micro-invasive and 703 (18%) were identified as having invasive disease. Ninety nine percent (13,253) of the 13,430 cancers with a B5b (Invasive) core biopsy result (Table 9) proved to be invasive following therapeutic surgery. With a B5b (Invasive) core biopsy result therapeutic surgery can be planned in advance and these cases are least likely to require a repeat therapeutic operation. Of the 263 B5b (Invasive) cancers with a first operation involving only the axilla (Figure 29), 244 (93%) used a SLNB procedure and for 10 (59%) of the 17 cases where the only operation was to the axilla, a SLNB procedure was used. Fifty nine (22%) of the 263 B5b (Invasive) cancers with a first operation involving only the axilla had neo-adjuvant therapy and 9 of these had no further surgery. However, surgery might have taken place after the audit data submission. 202 (77%) B5b (Invasive) cancers had a subsequent mastectomy and 148 (73%) of these had immediate reconstruction.

KEY FINDINGS

- Overall, 24% (4,338) of surgically treated breast cancers had more than one operation.
- Eighty one percent of invasive cancers and 38% of non/micro-invasive cancers without a non-operative diagnosis had a repeat operation. Although the overall repeat operation rate for the 692 surgically treated cancers (with known invasive status) without a non-operative diagnosis was 48%, repeat operations for cancers without a non-operative diagnosis formed only 8% of the total repeat operations.
- Eighteen cancers without a non-operative diagnosis, which were not LCIS, had no further surgery despite the margins being involved or of unknown status. One of these cancers received neo-adjuvant therapy and 12 were in Scotland, where margin data were not available.
- Overall, 23% (4,003) of surgically treated breast cancers with a non-operative diagnosis had more than one operation; 23% of invasive cancers and 24% of non/micro-invasive cancers with a non-operative diagnosis had a repeat therapeutic operation.
- Twenty seven cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery had more than three therapeutic operations. Seven of these were in South East Coast and 6 were in a single unit within this region.
- The repeat operation rate was 24% for non/micro-invasive cancers with a B5a (Non-invasive) core biopsy and 21% for invasive cancers with a B5b (Invasive) core biopsy. Invasive cancers with a B5a (Non-invasive) core biopsy had the highest repeat operation rate (61%).

6.3 Sequence of Therapeutic Operations

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 29 shows the flow chart for cancers with a B5b (Invasive) core biopsy, Figure 30 for cancers with C5 cytology only, Figure 31 for non/micro-invasive cancers with a B5a (Non-invasive) core biopsy and Figure 32 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.

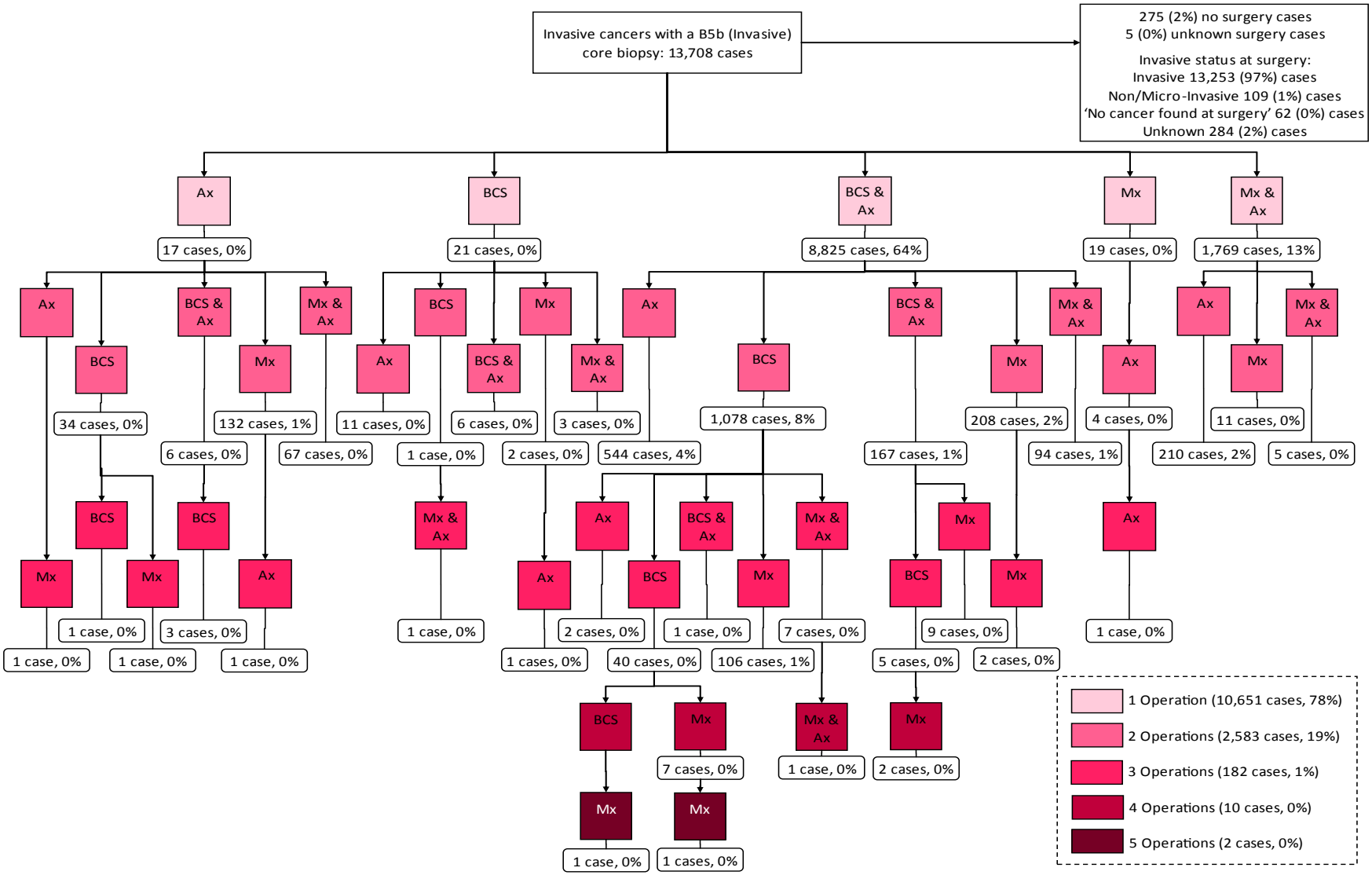

Figure 29: Sequence of operations for invasive cancers with a B5b (invasive) core biopsy

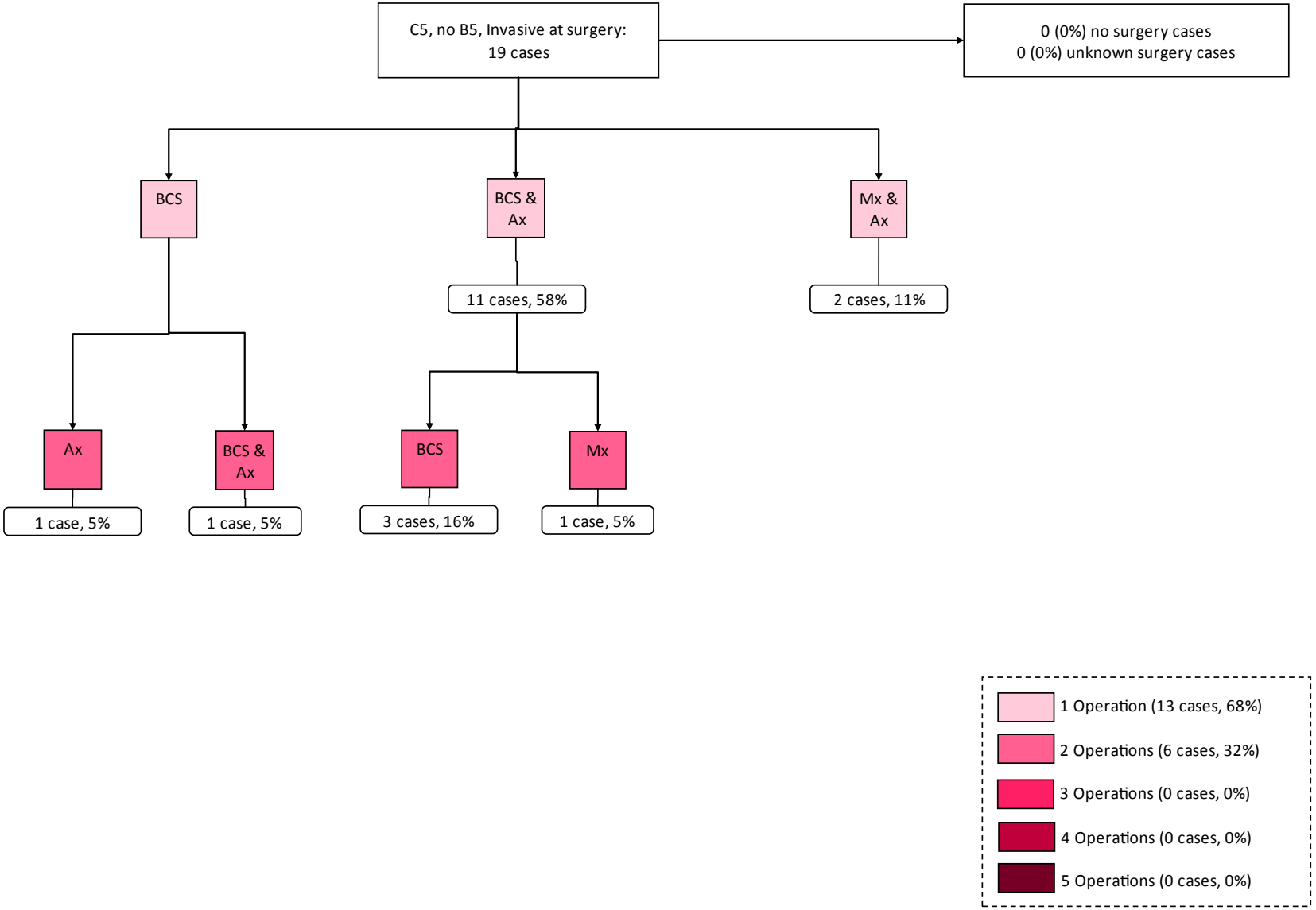

Figure 30: Sequence of operations for invasive cancers with a C5 cytology, no B5 core biopsy

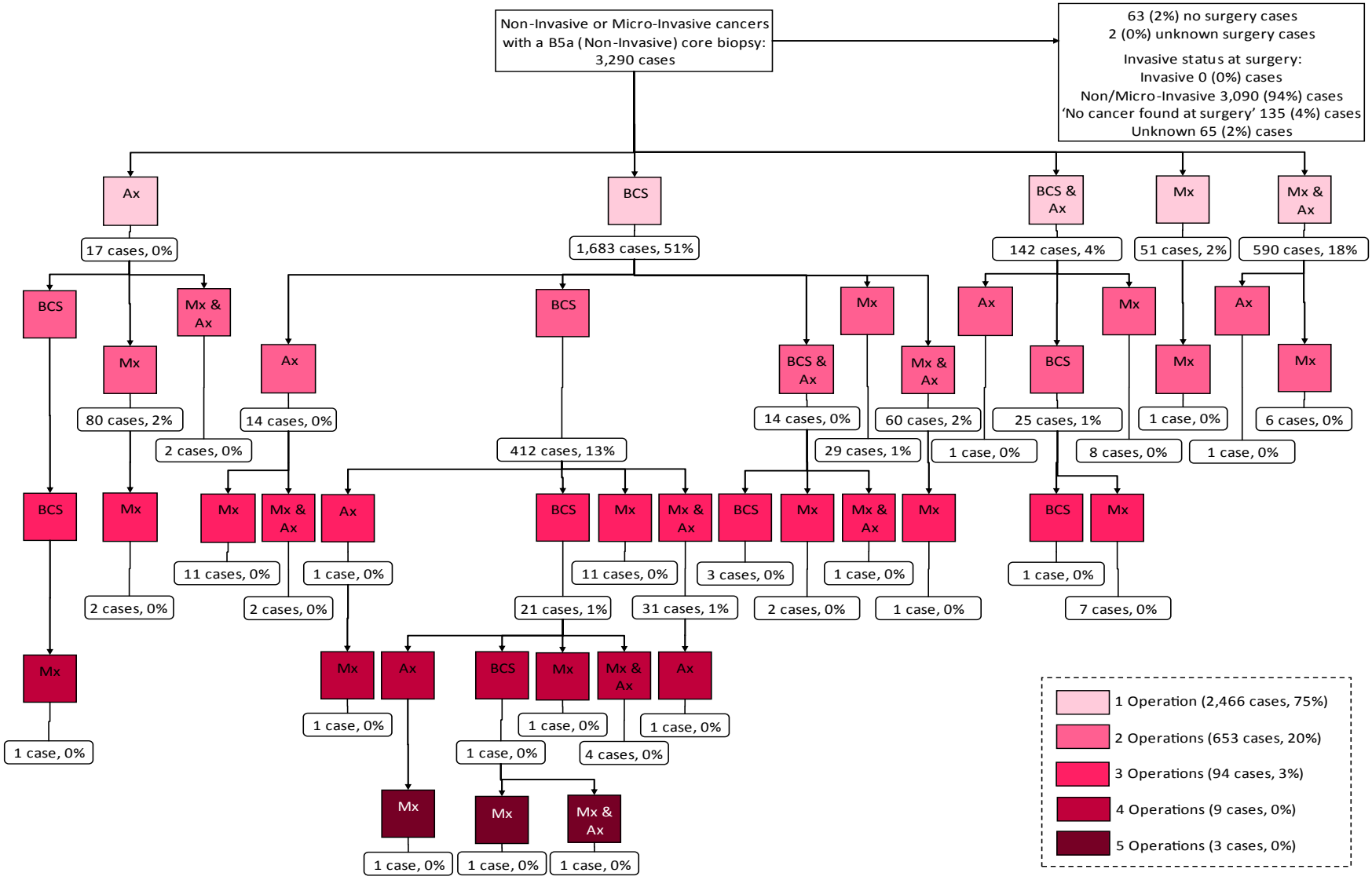

Figure 31: Sequence of operations for non/micro-invasive cancers with a B5a (non-invasive) core biopsy

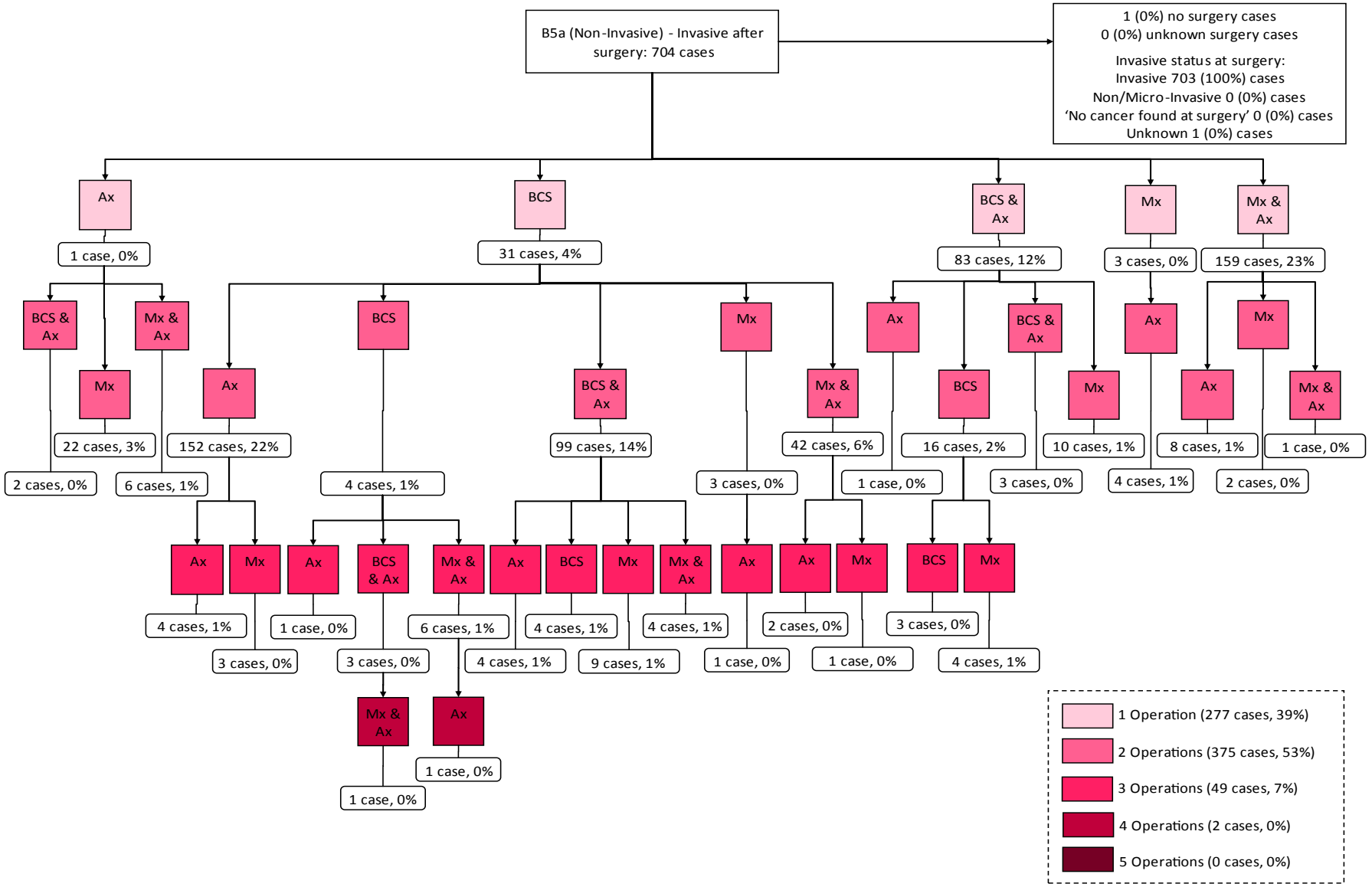

Figure 32: Sequence of operations for cancers with a B5a (non-invasive) core biopsy determined to be invasive after surgery

6.4 Repeat Surgery to Clear Margins

In the UK as a whole, 19% of all cancers with a non-operative diagnosis, which were initially treated with breast conserving surgery, had repeat therapeutic operations (breast conserving surgery or mastectomy) to clear margins; 14% had repeat breast conserving surgery (Table 64) and 5% had their initial breast conserving surgery converted to a mastectomy (Table 65).

Repeat operation rates to clear margins were higher for non/micro-invasive cancers than for invasive cancers (22% compared to 14%). Repeat operation rates for non/micro-invasive cancers varied between screening units from 0 cases in 2 units (1 in South Central and 1 in Northern Ireland) to 64% in a unit in East Midlands (7 out of 11 cases). Repeat operation rates for invasive cancers varied between screening units from 4% in a unit in South West to 43% in a screening unit in East Midlands (17 out of 40 cases). Conversion rates to mastectomy were also higher for non/micro-invasive cancers than for invasive cancers (7% compared to 5%).

The following summary table shows for cancers with various non-operative diagnoses, the proportion initially treated with breast conserving surgery that had repeat surgery to clear margins. In the UK as a whole, 12% of invasive cancers with a B5b (Invasive) non-operative diagnosis had repeat breast conserving surgery to clear margins. There were 4 (24%) invasive cancers with a C5 cytology only non-operative diagnosis which had repeat breast conserving surgery. Nineteen percent of non/micro-invasive cancers with a B5a (Non-invasive) non-operative had repeat breast conserving surgery. Invasive cancers with a B5a (Non-invasive) non-operative diagnosis had the highest repeat breast conserving surgery rate (28%).

REPEAT BREAST CONSERVING SURGERY TO CLEAR MARGINS

Operation type	***Invasive cancers***						***Non/micro-invasive cancers***	
	B5b		***C5 only, no B5***		***B5a***		***B5a***	
	No.	***%***	***No.***	***%***	***No.***	***%***	***No.***	***%***
Repeat breast conserving surgery to clear margins	*1,300*	*12*	*4*	*24*	*137*	*28*	*478*	*19*
Initially treated with breast conserving surgery but went on to have mastectomy	*445*	*4*	*1*	*6*	*87*	*18*	*173*	*7*

In the UK as a whole, 4% of invasive cancers with a B5b (Invasive) non-operative diagnosis, initially treated with breast conserving surgery, went on to have a mastectomy. One of the 17 surgically treated invasive cancers diagnosed by C5 cytology only went on to have a mastectomy. Seven percent of non/micro-invasive cancers with a B5a (Non-invasive) non-operative diagnosis went on to have a mastectomy.

6.4.1 Repeat Breast Conserving Surgery

Overall in 2012/13, 14% of all cancers with a non-operative diagnosis had repeat breast conserving surgery (Table 64). The proportion of all cancers having repeat breast conserving surgery varied widely between screening units (Figure 33). Nine units (3 of which were small) had repeat rates above 20% and for 16 units (4 of which were small) the rate was below 10%.

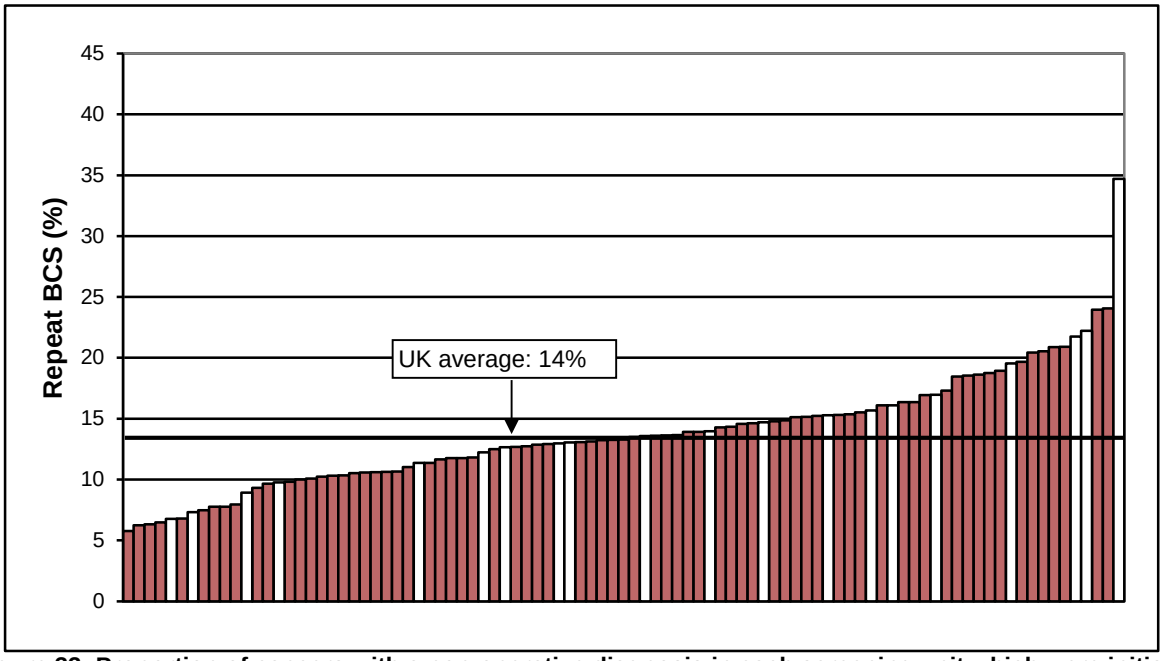

Figure 33: Proportion of cancers with a non-operative diagnosis in each screening unit which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins (The 20 smallest units are highlighted in white)

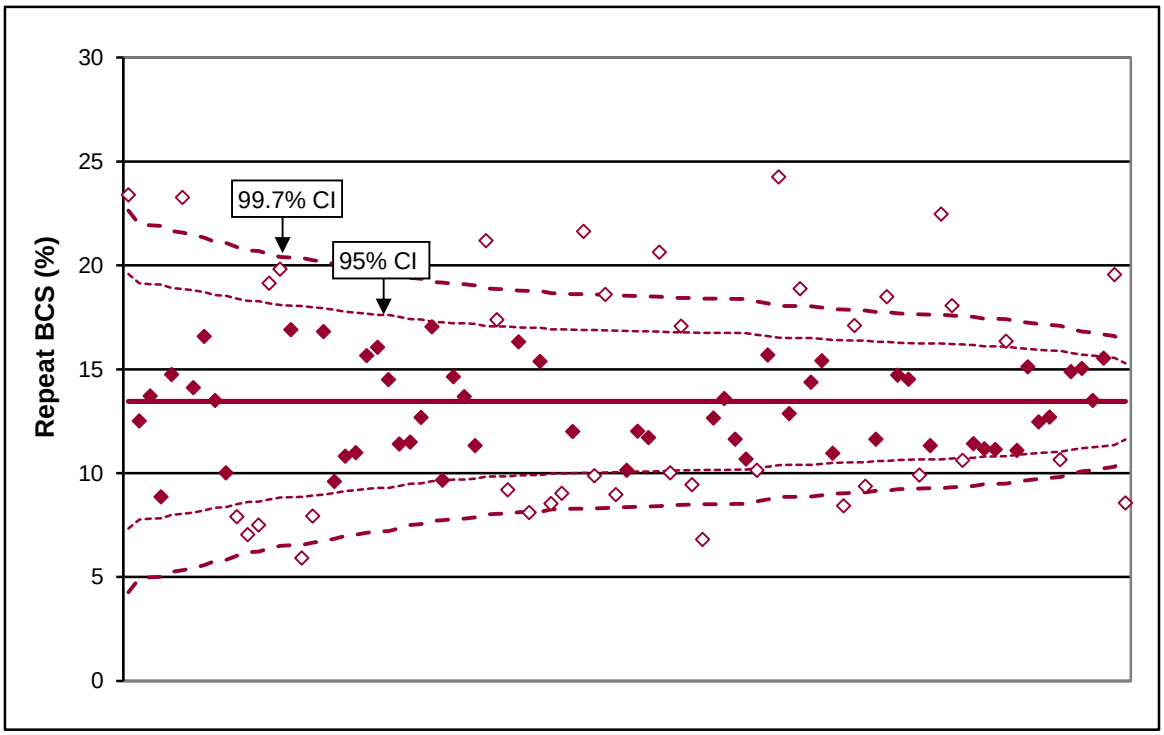

Figure 34: Variation between screening units in the proportion of cancers with a non-operative diagnosis which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins in 2010/11-2012/13 (Open diamonds represent units which lie outside the control limits)

Figure 34 shows how the proportion of all cancers initially treated with breast conserving surgery that had repeat breast conserving surgery varied with screening unit over the 3-year period 2010/11-2012/13. The dotted and dashed lines in Figure 34 are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average rate of 13% (solid line). Eighteen units had repeat rates above the 95% upper control limit (12 of these were above the 99.7% control limit of which 3 were in South East Coast and 3 in South West), and 21 units had rates below the 95% lower control limit (5 of these were below the 99.7% control limit of which 3 were in Scotland).

For non/micro-invasive cancers 12 units were 95% high outliers (4 of these being 99.7% high outliers) and 5 units were 95% low outliers (1 of these being a 99.7% low outlier) (control chart not shown). For invasive cancers, 17 units were 95% high outliers (11 of these being 99.7% high outliers) and 20 units were 95% low outliers (4 of these being 99.7% low outliers) (control chart not shown). Five units (2 in South East Coast, 2 in South West and 1 in North West) were 95% high outliers in both control charts and 2 units (1 in Scotland and 1 in North East, Yorkshire & Humber) were low outliers in both control charts.

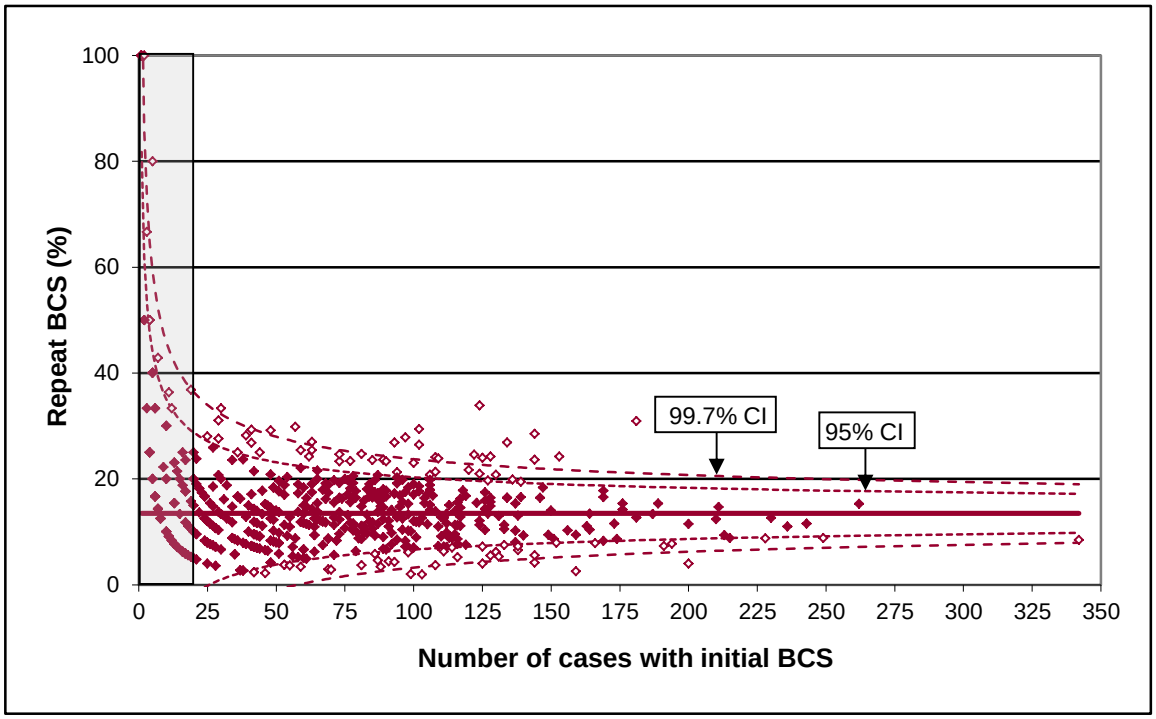

Figure 35: Variation between surgeons in the proportion of all cancers which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins in 2010/11-2012/13 (Open diamonds represent surgeons who lie outside the control limits)

Figure 35 shows the variation between surgeons in the proportion of invasive 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 2010/11-2012/13. The dotted and dashed lines in Figure 35 are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average rate of 13% (solid line). Surgeons who initially treated fewer than 20 cases with breast conserving surgery over the 3-year period are shaded. Of the 554 surgeons, 470 had 20 or more cases with initial breast

conserving surgery and, of these, 47 had repeat rates above the 95% upper control limit and of these 19 were above the 99.7% upper control limit. 42 surgeons had repeat rates below the 95% lower control limit and of these 6 were below the 99.7% lower control limit.

KEY FINDINGS

- Nineteen percent of all cancers with a non-operative diagnosis were initially treated with breast conserving surgery; 14% had repeat breast conserving surgery and 5% had their initial breast conserving surgery converted to a mastectomy.
- Repeat operation rates to clear margins were higher for non/micro-invasive cancers than for invasive cancers (22% compared to 14%).
- Repeat operation rates for non/micro-invasive cancers varied between screening units from 0 cases in 2 units (1 in South Central and 1 in Northern Ireland) to 64% in a unit in East Midlands (7 out of 11 cases). Repeat operation rates for invasive cancers varied between screening units from 4% in a unit in South West to 43% in a screening unit in East Midlands (17 out of 40 cases).
- Conversion rates to mastectomy were also higher for non/micro-invasive cancers than for invasive cancers (7% compared to 5%).
- Twelve percent of invasive cancers with a B5b (Invasive) non-operative diagnosis, initially treated with breast conserving surgery, had repeat breast conserving surgery to clear margins.
- Twenty eight percent of invasive cancers and 19% of non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had repeat therapeutic breast conserving surgery to clear margins.
- In the 3-year period 2010/11-2012/13, 18 screening units and 47 surgeons had high repeat breast conserving surgery rates. Twenty one screening units and 42 surgeons had low repeat breast conserving surgery operation rates.
- In the 3-year period 2010/11-2012/13, for non/micro-invasive cancers 12 units had high and 5 had low repeat breast conserving surgery rates. For invasive cancers 17 units had high and 20 had low repeat breast conserving surgery rates.
- Five units (2 in South East Coast, 2 in South West and 1 in North West) were 95% high outliers for invasive and non-micro-invasive cancers and 2 units (1 in Scotland and 1 in North East, Yorkshire & Humber) were low outliers for invasive and non-micro-invasive cancers.

6.4.2 Breast Conserving Surgery Converted to Mastectomy

In the UK as a whole in 2012/13, 5% of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery, were eventually converted to a mastectomy (Table 65). Conversion rates to mastectomy were higher for non/micro-invasive cancers than for invasive cancers (7% compared to 5%). For non/micro-invasive cancers, conversion rates to mastectomy varied from 30% (3/10) in a small unit in North East, Yorkshire & Humber to 0% in 21 units. For invasive cancers, conversion rates to mastectomy varied from 20% (9/45) in 1 small unit in South Central to 0% in 3 units. In the small unit in South Central with the highest conversion rate (19%), 1 non/micro-invasive and 9 invasive cancers out of a total of 54 cancers were converted to mastectomies.

Figure 36 shows how the proportion of invasive 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 2010/11-2012/13. The dotted and dashed lines are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average rate of 6% (solid line). Sixteen units had conversion rates above the 95% upper control limit (8 of these were above the 99.7% upper

control limit), and 9 units had conversion rates below the 95% lower control limit (2 of these were below the 99.7% lower control limit).

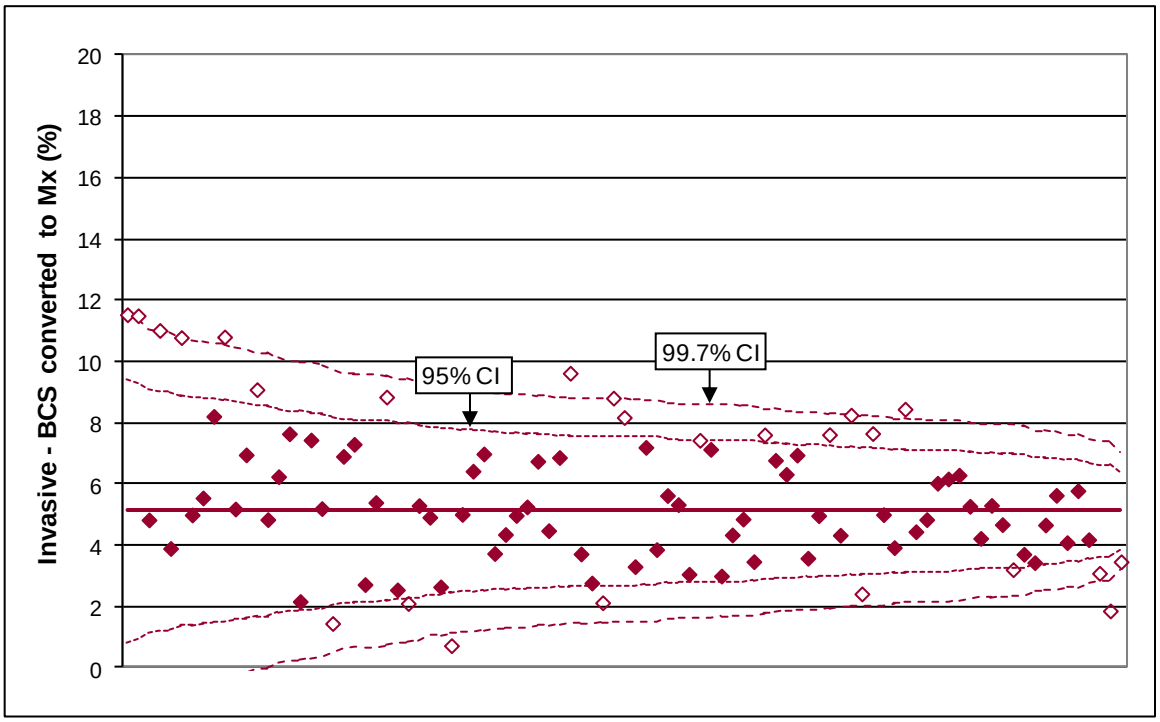

Figure 36: Variation between screening units in the proportion of invasive cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy in 2010/11-2012/13 (Open diamonds represent units which lie outside the control limits)

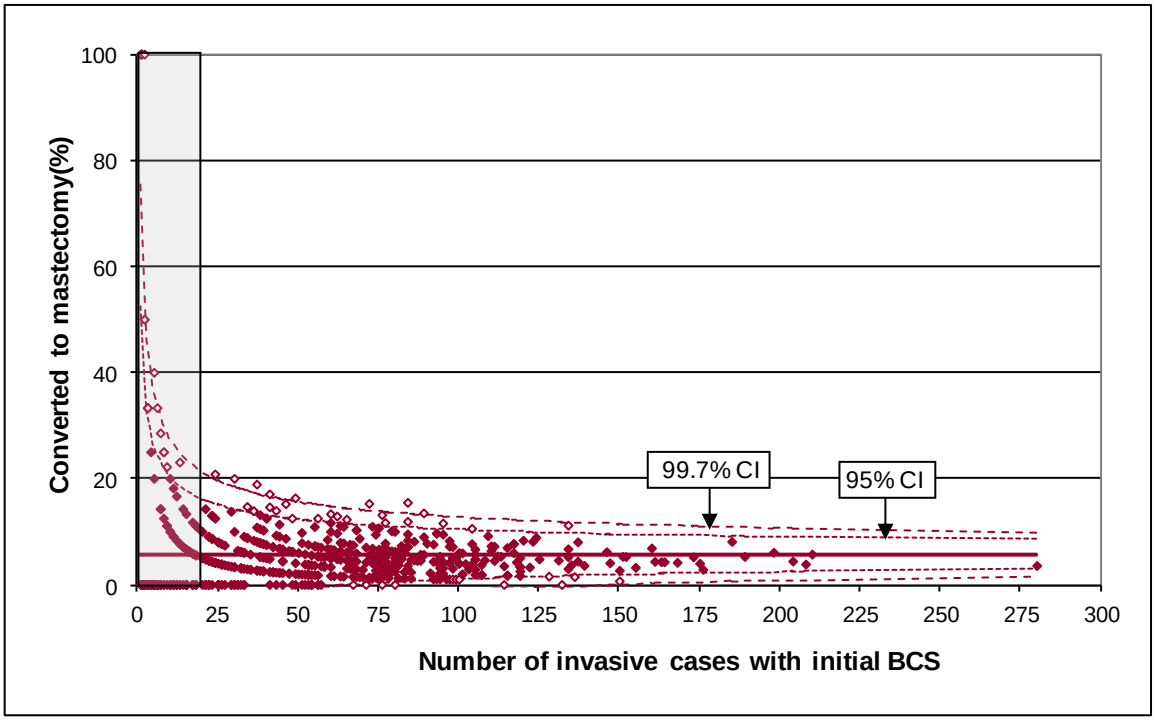

Figure 37: Variation between surgeons in the proportion of invasive cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy in 2010/11-2012/13 (Open diamonds represent surgeons who lie outside the control limits)

Figure 37 shows the variation between surgeons in the proportion of invasive cancers with a non-operative diagnosis, initially treated with therapeutic breast conserving surgery and eventually converted to a mastectomy over the 3-year period 2010/11-2012/13. The dotted and dashed lines in Figure 37 are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average rate of 6% (solid line). Surgeons who initially treated fewer than 20 cases with breast conserving surgery over the 3-year period are shaded.

Of the 635 surgeons, 457 had 20 or more cases with initial breast conserving surgery, and of these, 25 surgeons had conversion rates above the 95% upper control limit (8 of these surgeons were above the 99.7% upper control limit; 2 in West Midlands, 1 in North East, Yorkshire & Humber, 1 in North West, 1 in South Central, 1 in South West, 1 in Northern Ireland and 1 in Wales), and 12 surgeons had conversion rates below the 95% lower control limit (no surgeon was below the 99.7% lower control limit).

KEY FINDINGS

- In the UK as a whole, 5% of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery, were eventually converted to a mastectomy. Conversion rates to mastectomy were higher for non/micro-invasive cancers than for invasive cancers (7% compared to 5%).
- For non/micro-invasive cancers, conversion rates to mastectomy varied from 30% in 1 small unit in North East, Yorkshire & Humber to 0% in 21 units. For invasive cancers, conversion rates to mastectomy varied from 17% in 1 small unit in South Central to 0% in 3 units. In the small unit in South Central with the highest conversion rate (19%), 1 non/micro-invasive and 9 invasive cancers out of a total of 54 cancers were converted to mastectomies.
- For invasive cancers, 16 screening units and 25 surgeons had high conversion to mastectomy rates and 9 screening units and 12 surgeons had low conversion to mastectomy rates.

6.4.3 Mastectomy at First Operation and Breast Conservation Surgery to Mastectomy Conversion Rates

In the UK as a whole, 16% of all cancers with a non-operative diagnosis had an initial therapeutic mastectomy at the first operation. Invasive cancers with a B5b (Invasive) core biopsy had an initial mastectomy rate of 15%. Two (10%) of the 20 invasive cancers diagnosed by C5 cytology only had a mastectomy as their first therapeutic operation. Non/micro-invasive cancers with a B5a (Non-invasive) core biopsy had an initial mastectomy rate of 20%. Four percent of all cancers (717 cancers) with a non-operative diagnosis had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent operation, and 2% of all cancers (315 cancers) with a non-operative diagnosis had initial surgery only to the axilla converted to a mastectomy at a subsequent operation.

For cancers with a non-operative diagnosis, the initial mastectomy rate was higher for non/micro-invasive cancers than for invasive cancers (20% compared to 15%), as was the proportion of non/micro-invasive cancers that had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent operation (5% compared to 4%). The proportion of non/micro-invasive cancers with a non-operative diagnosis that had initial surgery only to the

axilla converted to a mastectomy at a subsequent operation was also higher than for invasive cancers (3% compared to 2%).

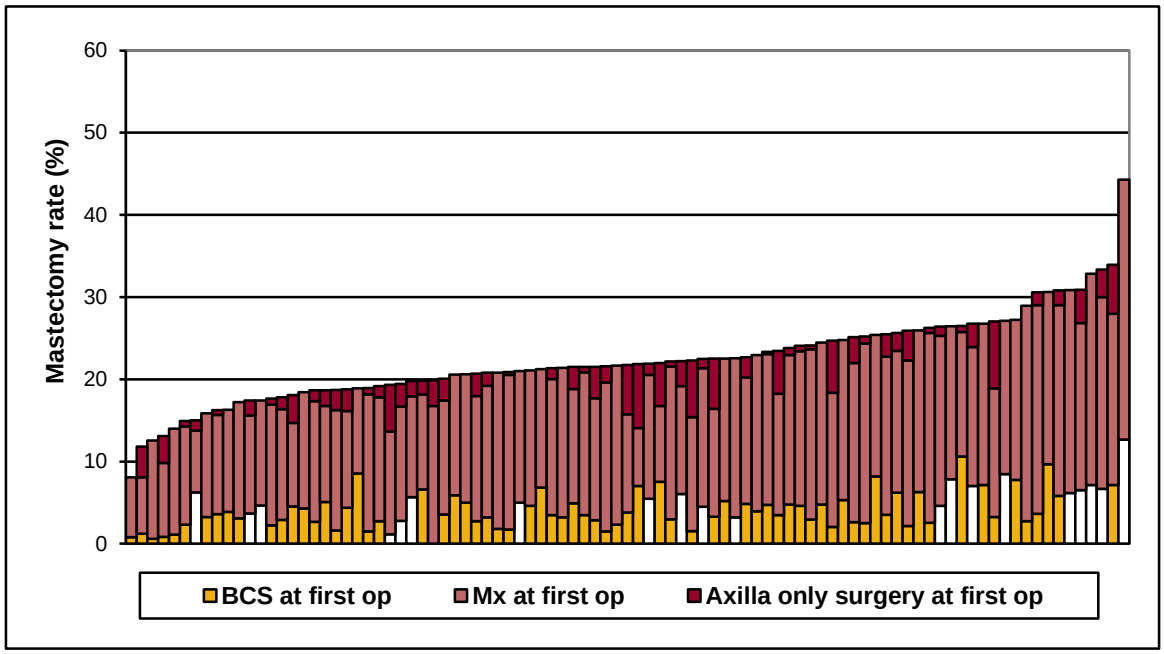

Figure 38: Variation between screening units in the proportions of invasive cancers with a non-operative diagnosis undergoing a mastectomy at first operation and at subsequent operations after BCS or surgery to the axilla (The 20 smallest units are highlighted in white)

Figure 38 shows the wide variation in 2012/13 between screening units in the proportion of invasive cancers with a non-operative diagnosis either having a mastectomy as an initial therapeutic operation, or having a mastectomy after initial therapeutic breast conserving surgery or axillary surgery alone. Nine units had an overall invasive cancer mastectomy rate above 30% (3 of these units were in North East, Yorkshire & Humber, 2 in North West, 1 in East of England, 1 in East Midlands, 1 in South Central and 1 in Northern Ireland). Within this group, 5 units (2 of which were small) were also high outliers for breast conserving surgery to mastectomy conversion rates for invasive cancers in 2010/11-2012/13 (Figure 36). One small unit in South Central had an invasive cancer mastectomy rate at first operation greater than 30%.

KEY FINDINGS

- Sixteen percent of all cancers with a non-operative diagnosis had an initial therapeutic mastectomy at the first operation, and 4% had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent repeat operation.
- For cancers with a non-operative diagnosis, the initial therapeutic mastectomy rate was higher for non/micro-invasive cancers than for invasive cancers (20% compared to 15%), as was the proportion of non/micro-invasive cancers that had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent repeat operation (5% compared to 4%)
- Nine units had an overall invasive cancer mastectomy rate above 30% (3 of these units were in North East, Yorkshire & Humber, 2 in North West, 1 in South Central, 1 in East of England, 1 in East Midlands and 1 in Northern Ireland). Within this group, 5 units (2 of which were small) were also high outliers for mastectomy conversion rates in 2010/11-2012/13. One small unit in South Central had a mastectomy rate at first operation greater than 30%.

Surgery KPI S3

Conversion of breast conserving surgery to mastectomy
1-year and 3-year high outlier units for the conversion of breast conserving surgery to mastectomy for invasive cancers linked to 3-year high outliers for mastectomy at first operation for invasive cancers and 3-year high outliers for mastectomy rates for invasive cancers

Region	Unit	BCS to MX all cancers 3-year 2009/10-2011/12 %	BCS to MX invasive 2012/13 %	BCS to MX invasive 3-year 2010/11-2012/13 (%) No.	%	MX at 1st surgery invasive 3-year 2010/11-2012/13 %	MX 3-year invasive 2010/11-2012/13 %	Outcome of QARC audit
Units audited in 2013								
East Midlands	CNN	13.6	7.5	12	11.5	31.3	38.5	2012/13 decrease - no action required
East Midlands	CNO	9.7	4.9	27	6.8	18.8	24.7	2012/13 decrease - no action required
East of England	DCB	12.6	1.4	20	8.8	14.2	26.1	No feedback from QARC
East of England	DGY	12.5	5.1	15	10.8	19.1	28.2	Continue to audit Mx rate. Review at visit May 2014
East of England	DKL	13.4	8.5	15	9.1	12.5	22.5	Continue to audit Mx rate. Review at visit Oct 2014
NEYH	AGA	8.6	2.1	19	4.3	16.2	19.8	2012/13 decrease - no action required
NEYH	ANE	12.6	3.6	41	8.5	23.7	30.2	2012/13 decrease - no action required
NEYH	AWC	10.9	3.5	12	5.4	20.4	25.9	2012/13 decrease - no action required
NEYH	BHU	8.4	4.5	31	6.2	14.1	21.5	2012/13 decrease - no action required
NEYH	BYO	8.7	8.4	30	7.6	25.3	32.4	2012/13 decrease. Review at visit May 2014
North West	NCH	16.4	10.3	13	11.5	17.5	26.4	Suggest remove multi-focal cancers from analysis
South West	LED	9.7	7.5	27	8.2	11.7	18.7	2012/13 decrease. surgeon retired. QARC data query
South West	LTB	12.1	3.1	11	7.0	13.1	21.5	2012/13 decrease. QARC data query
West Midlands	MBW	9.7	6.1	35	7.7	18.4	27.0	2012/13 decrease. Discussed at regional study day
West Midlands	MHW	9.1	3.2	32	6.3	10.5	18.0	2012/13 decrease. Audit of surgical margins
Northern Ireland	ZNI1	13.4	7.8	16	10.8	20.8	28.9	Report not available
Northern Ireland	ZNS1	10.1	4.2	12	8.2	15.3	22.0	Report not available
New units to audit in 2014								
East of England	DNF	7.8	9.1	24	7.2	18.1	28.2	
East of England	FSO	5.9	10.2	14	4.5	7.3	16.6	
NEYH	ANT	7.4	9.3	33	7.6	23.5	29.2	
North West	NWA	7.1	5.8	27	7.4	14.5	20.5	
South Central	KMK	6.5	20.0	14	11.0	22.4	30.4	
South West	JSW	8.1	8.6	22	6.9	10.5	16.6	
West Midlands	MSH	7.6	12.5	31	9.6	12.4	21.6	
Northern Ireland	ZNE1	8.3	10.2	29	8.8	15.5	23.4	
Wales	WNM	8.4	7.7	37	8.3	15.4	22.1	

99.7% low outlier in 2012/13 or 2010/11-2012/13
95% low outlier in 2012/13 or 2010/11-2012/13
99.7% high outlier in 2012/13 or 2010/11-2012/13
95% high outlier in 2012/13 or 2010/11-2012/13

Of the 17 units which were high outliers in the 2013 audit for all cancers with breast conserving surgery converted to mastectomy (BCS conversion) in the 3-year period 2009/10-2011/12, only 1 (in North East, Yorkshire & Humber) was a high outlier in 2012/13 and in the 3-year period 2010/11-2012/13 when invasive cancers alone were examined in this year's audit. Seven of the 17 units were not high BCS conversion outliers for invasive cancers in 2012/13 or in the 3-year period 2009/10-2011/12, and 9 were either 99.7% or 95% high BCS conversion outliers for invasive cancers in 2010/11-2012/13 but were not outliers in 2012/13. For the latter units, the improvement in the most recent years presumably reflects recent changes in clinical practice.

In this year's audit, 9 additional units were identified as high BCS conversion outliers for invasive cancers in 2012/13 and/or the 3-year period 2010/11-2012/13. Two of the 95% high outliers in 2012/13 (in East of England and South West) had significantly low rates for invasive cancers treated with mastectomy at first operation and invasive cancer mastectomies. Their relatively high BCS conversion rates are therefore probably acceptable clinical practice. Two of the new 3-year high BCS conversion outliers (in North West and Wales) are not high outliers in 2012/13. This probably reflects recent changes in clinical practice. Another of the new 3-year high outliers (in East of England) is not a high BCS conversion outlier in 2010/11-2012/13, but is a 99.7% high outlier for invasive cancer mastectomy rate in this 3-year period. The other 4 new units are high BCS conversion outliers in 2012/13 and 2010/11-2012/13. Two of these units (in West Midlands and Northern Ireland) are not 3-year high outliers for invasive cancer mastectomy rate at first operation or invasive cancer mastectomy rate. The other 2 units (in North East, Yorkshire & Humber and South Central) are also 3-year high outliers for invasive cancer mastectomy rate at first operation and invasive cancer mastectomy rate. Regional QA reference centres should follow up the 8 units which are high BCS conversion outliers in 2012/13 to ascertain the reason for this unusual clinical practice.

6.5 Excision Margins

Information on whether or not the radial excision margin was clear of tumour and the closest radial margin distance was requested for all cancers. Scotland was not able to provide these data. Of the 17,048 cancers in England, Wales and Northern Ireland in 2012/13, 16,491 had surgery to the breast and were found to be malignant (invasive or non/micro-invasive) at surgery. Of these, 91% had complete margin data for all operations (Table 66).

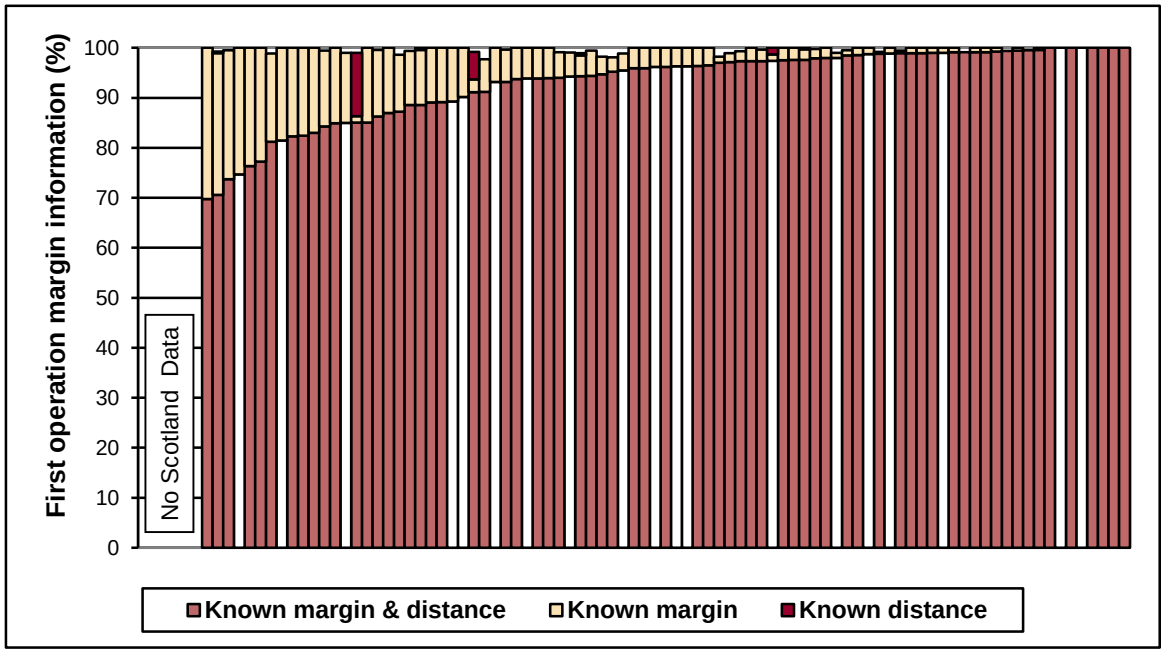

Figure 39: Variation between screening units in the proportions of cases with known margin information for first operation (The 19 smallest units are highlighted in white)

Of the 16,101 cases with malignant surgery to the breast at first operation, 99% of cases had information on whether or not the radial margin was clear, and 93% of the cases had the margin

distance recorded (this represents a 2% increase from 2011/12). Ninety three per cent of cases had both information on whether or not the radial margin was clear and on margin distance, this varied from 100% in 10 units (6 in North East, Yorkshire & Humber, 2 in East of England, 1 in South West and 1 in West Midlands) to 70% in 1 unit in South East Coast (Figure 39).

Of 16,491 cases with surgery to the breast which were invasive or non/micro-invasive at surgery, 12,837 were treated with breast conserving surgery. Of these, 98% (12,589 cases) were recorded as having clear margins at their final operation. The final margin status was recorded as unknown for a further 46 cases. Two hundred and two cases (2%) were recorded as not having had clear margins at the final operation (Table 67). Of the 3,654 cases treated with a mastectomy (Table 68), 3,550 (97%) had clear margins recorded at their final operation, 32 (1%) 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, 5% of cases treated with a mastectomy were recorded as not having had clear margins at the final operation.

KEY FINDINGS

- Of the 16,491 invasive or non/micro-invasive cancers which had surgery to the breast, 91% had complete margin data for all operations.
- For the first operation, 99% of cancers had information on whether or not the radial margin was clear and 93% had the margin distance recorded.
- Of the 12,837 cancers treated with breast conserving surgery, 98% were recorded as having clear margins at their final operation.
- Of the 3,654 cancers treated with a mastectomy, 97% were recorded as having clear margins at their final operation.
- 274 cancers (202 invasive and 72 non/micro-invasive) were recorded as not having had clear margins at the final operation, and 78 cancers (46 invasive and 32 non/micro-invasive) where the final margin status was recorded as unknown.

Chapter 7: The axilla

This chapter draws together data on the use of pre-operative assessment and Sentinel Lymph Node Biopsy (SLNB) to determine axillary nodal status, and data on repeat operations to the axilla. Overall, of the 14,381 surgically treated invasive cancers included in the audit, 14,259 (99%) had known nodal status (Table 76). Of these 3,073 (22%) were node positive (Table 78) and 494 were known to only have micro-metastases. Of the 2,628 invasive cancers without neo-adjuvant therapy recorded confirmed to be node positive on surgery, 595 (23%) had positive nodes diagnosed pre-operatively by means of needle biopsy (Table 75). This is 7% higher than the proportion of positive nodes in the 11,586 invasive cancers without neo-adjuvant therapy that did not have an axillary biopsy before surgery or where it was not known whether an axillary biopsy was taken (Table 76).

7.1 Pre-operative Assessment of the Axilla

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

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

Scotland was not able to provide information on axillary ultrasound examinations. Data from England, Wales and Northern Ireland for a total of 17,048 cancers are included in this section. Eighty seven percent of cancers (14,786) had a record of an axillary ultrasound at assessment, compared to only 77% in 2011/12 and 71% in 2010/11. Of these, 12,454 (84%) were confirmed after surgery to have an invasive cancer, 97 (1%) a micro-invasive cancer, 2,226 (15%) a non-invasive cancer and a further 9 cancers had no confirmed invasive status. Thus, 93% of patients with invasive cancer (Table 69), 73% with micro-invasive cancer and 64% with non-invasive cancer had axillary ultrasound recorded.

Of the 2,098 invasive cancers with an abnormal axillary ultrasound result recorded (Table 70), 1,037 were node positive at surgery giving a positive predictive value of an abnormal ultrasound of 49%. Of the 10,356 invasive cancers with a normal axillary ultrasound result recorded which had axillary assessment during surgery (Table 70), 1,626 (16%) had positive nodes at surgery.

7.1.1 Axillary Ultrasound and Axillary Biopsy for Invasive Cancers

Overall, 17% of invasive cancers with axillary ultrasound had an abnormal axillary ultrasound result (Table 70). This varied widely between screening units in the proportion of invasive cancers with an axillary result recorded and with a normal or abnormal ultrasound result (Figure 40). In 5 units (2 in Wales, 1 in East of England, 1 in North East, Yorkshire & Humber and 1 in

South Central) 20% or more invasive cancers did not have axillary ultrasound recorded in 2012/13. For 2 of these units (in North East, Yorkshire & Humber and South Central) 40% or more invasive cancers did not have axillary ultrasound recorded in the 3-year period 2010/11-2012/13.

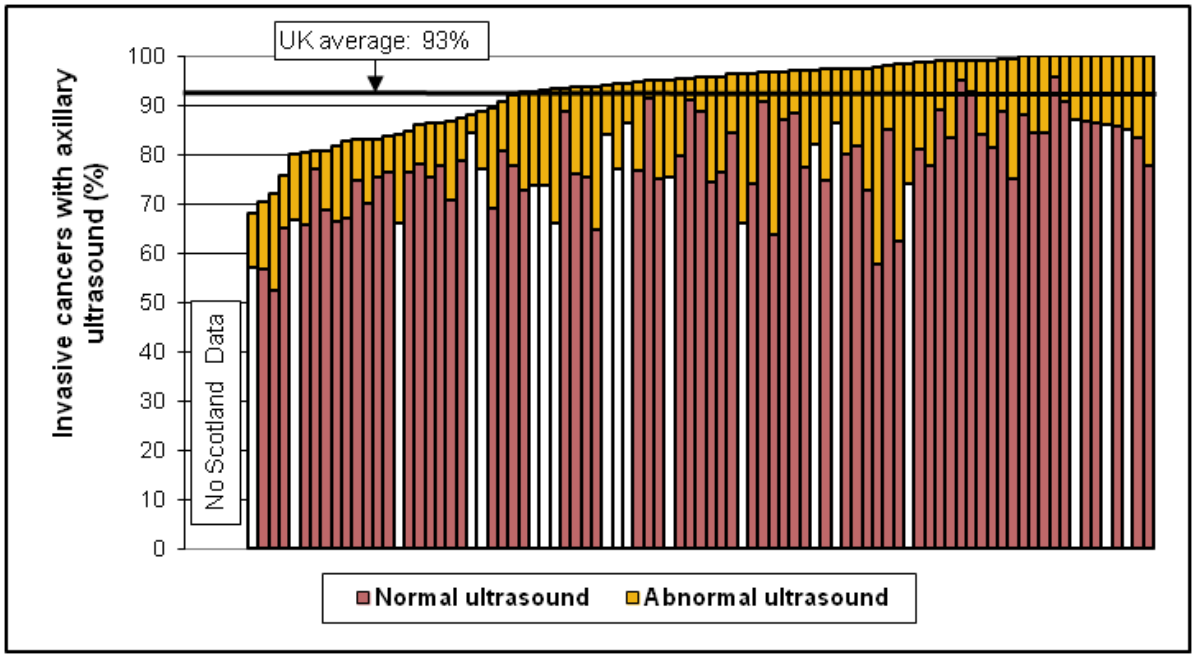

Figure 40: Variation between screening units in the proportion of invasive cancers with abnormal and normal axillary ultrasound results
Data for Scotland are not available (19 of the 20 smallest units are highlighted in white)

Of the 2,098 invasive cancers with an abnormal ultrasound result, 1,899 (91%) had needle biopsy or cytological assessment of the axillary nodes (Table 71). For 198 invasive cancers an abnormal ultrasound result was apparently not followed up with a needle biopsy and for 92 invasive cancers a needle biopsy was performed despite a normal ultrasound result.

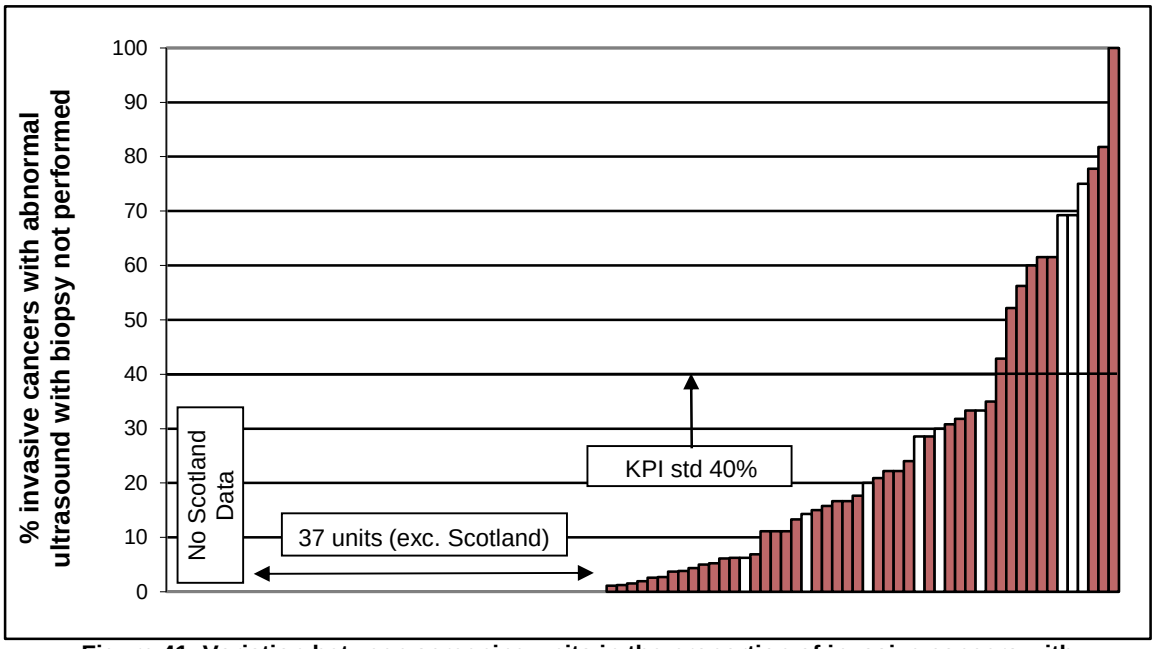

Figure 41: Variation between screening units in the proportion of invasive cancers with an abnormal axillary ultrasound with unknown/no axillary biopsy performed
Data for Scotland are not available (9 of the 20 smallest units are highlighted in white)

Figure 41 shows how the proportion of invasive cancers with an abnormal ultrasound where no needle biopsy was done varied between screening units in 2012/13. For 12 units, 40% or more invasive cancers had no needle biopsy recorded after an abnormal ultrasound (4 units were in South Central, 4 in South West, 2 in West Midlands, 1 in North West and 1 in Northern Ireland). Seven of these units (3 in South Central, 2 in South West, 1 in North West and 1 in West Midlands) had 40% or more invasive cancers with no needle biopsy recorded after an abnormal ultrasound the 3-year period 2010/11-2012/13.

Radiology KPIs R1a & 1b	**Non-operative staging of the axilla** Units with 20% or more invasive cancers with no pre-operative axillary ultrasound recorded and Units with 40% or more invasive cancers with an abnormal axillary ultrasound and no needle biopsy recorded

In the 2013 audit (2011/12 data), units which had more than 40% of invasive cancers with no pre-operative ultrasound performed and/or more than 40% of invasive cancers with an abnormal axillary ultrasound and no needle biopsy were identified for audit. In this year's audit (2012/13 data), invasive cancers where it was not known whether or not a pre-operative ultrasound had been performed or whether a needle biopsy had been carried out after an abnormal ultrasound were examined. This means that some of the values for 2011/12 are slightly different to those published in 2013. Also, this year, the audit cut off point for pre-operative ultrasound has been changed from more than 40% to 20% or more.

In the 2013 audit (2011/12 data), 14 units either had more than 40% of invasive cancers with no pre-operative ultrasound performed or more than 40% of invasive cancers with an abnormal axillary ultrasound and no needle biopsy. Two of these units (in North East, Yorkshire & Humber and in South Central) had 20% or more invasive cancers with no pre-operative ultrasound recorded in 2012/13. Two other units (in South Central and South West) had more than 40% of invasive cancers with an abnormal pre-operative axillary ultrasound with no needle biopsy recorded in 2012/13.

In this year's audit (2012/13 data), 3 units which were not audited in 2013 had 20% or more invasive cancers with no pre-operative ultrasound performed in 2012/13 (2 of these units were in Wales and 1 in East of England). A further 10 units which were not audited in 2013 had 40% or more invasive cancers with an abnormal pre-operative axillary ultrasound with no needle biopsy in 2012/13 (3 of these units were in South Central, 3 in South West, 2 in West Midlands, 1 in North West and 1 in Northern Ireland. Regional QA reference centres should follow up the 5 units with 20% or more invasive cancers with no pre-operative ultrasound recorded in 2012/13 and the 12 units that had 40% or more invasive cancers with an abnormal pre-operative axillary ultrasound with no needle biopsy recorded in 2012/13 to ascertain the reason for this unusual clinical practice.

Region	Unit	>40% pre-op ax u/s not done invasive 2011/12	>40% no needle after abn pre-op ax u/s invasive 2011/12	20% or more pre-op ax u/s unknown or not done invasive 2012/13		40% or more no needle after abnormal pre-op ax u/s invasive 2012/13		Outcome of QARC audit
		%	%	No.	%	No.	%	
Units audited in 2013								
East of England	DGY	56.1	50.0	4	5.7	0	0.0	Data errors, practice reviewed
East of England	DKL	50.0	66.7	7	12.1	0	0.0	Data errors, practice reviewed
East of England	DSU	0.0	66.7	1	1.0	0	0.0	Protocol changed
East of England	FSO	15.5	83.3	1	0.9	0	0.0	Data errors, practice reviewed
London	ECX	42.2	2.9	9	4.4	0	0.0	Data errors, practice reviewed
NEYH	CRO	57.4	0.0	9	20.0	0	0.0	2012/13 improvement - no action required
South Central	KOX	52.5	30.0	27	17.1	8	61.5	Data errors, practice reviewed
South Central	JBA	37.8	100.0	19	19.9	4	33.3	Data errors, practice reviewed
South Central	KWI	40.4	30.0	27	32.1	3	33.3	Data errors, practice reviewed
South East Coast	HWO	89.7	5.0	0	0.0	0	0.0	Data errors, practice reviewed
South West	LED	3.8	100.0	22	16.9	10	100.0	Data errors, but practice not changed
South West	JDO	3.4	41.7	7	3.0	7	35.0	Protocol changed
West Midlands	MBS	11.8	55.6	2	3.0	3	30.0	2012/13 improvement - no action required
West Midlands	MST	6.7	40.0	6	4.4	1	3.9	2012/13 improvement - no action required
New units to audit in 2014								
East of England	ELD	24.9	5.9	95	28.0	1	1.5	
North West	NWA	32.7	25.0	19	13.2	12	52.2	
South Central	JIW	4.2	36.4	2	2.7	6	75.0	
South Central	KMK	34.0	25.0	5	7.3	9	69.2	
South Central	KRG	11.4	26.7	12	9.2	8	61.5	
South West	JSW	16.1	11.1	7	5.1	3	60.0	
South West	LGL	30.4	30.0	29	15.3	9	56.2	
South West	LSO	25.0	10.0	7	4.5	9	81.8	
West Midlands	MDU	27.8	0.0	20	16.3	7	77.8	
West Midlands	MSH	14.3	0.0	1	0.9	3	42.9	
Northern Ireland	ZNW1	0.0	0.0	0	0.0	9	69.2	
Wales	WNM	15.8	4.4	43	29.7	0	0.0	
Wales	WSL	18.1	0.0	49	24.4	0	0.0	

40% or more not performed 2011/12

40% or more unknown or not done 2012/13

20% or more unknown or not done 2012/13

Values for 2011/12 are slightly different to those published in 2013 as previous cancers have been excluded and % include cancers with unknown values as well as those with procedure not done

7.1.2 Worst Axillary Ultrasound Result for Invasive Cancers

Of the 1,899 invasive cancers with an abnormal ultrasound result which had an axillary node biopsy, 772 (41%) had a C5/B5 diagnosis, 941 (50%) had C2/B2 to C4/B4 diagnoses, and 186 (10%) had an inadequate or normal sample (C1/B1) (Table 72). There was wide variation between units in the worst axillary biopsy result recorded for invasive cancers with an abnormal axillary ultrasound result (Figure 42). In 12 screening units (4 of which were in South Central, 3 in South West and 2 in East of England) more than 20% of invasive cancers had C1/B1 recorded as the worst axillary biopsy result. Of the 12 units with more than 20% C1/B1 results, 4

(2 in South Central, 1 in South West and 1 in West Midlands) also had more than 40% of invasive cancers with no biopsy recorded after an abnormal ultrasound in 2012/13 (Figure 41).

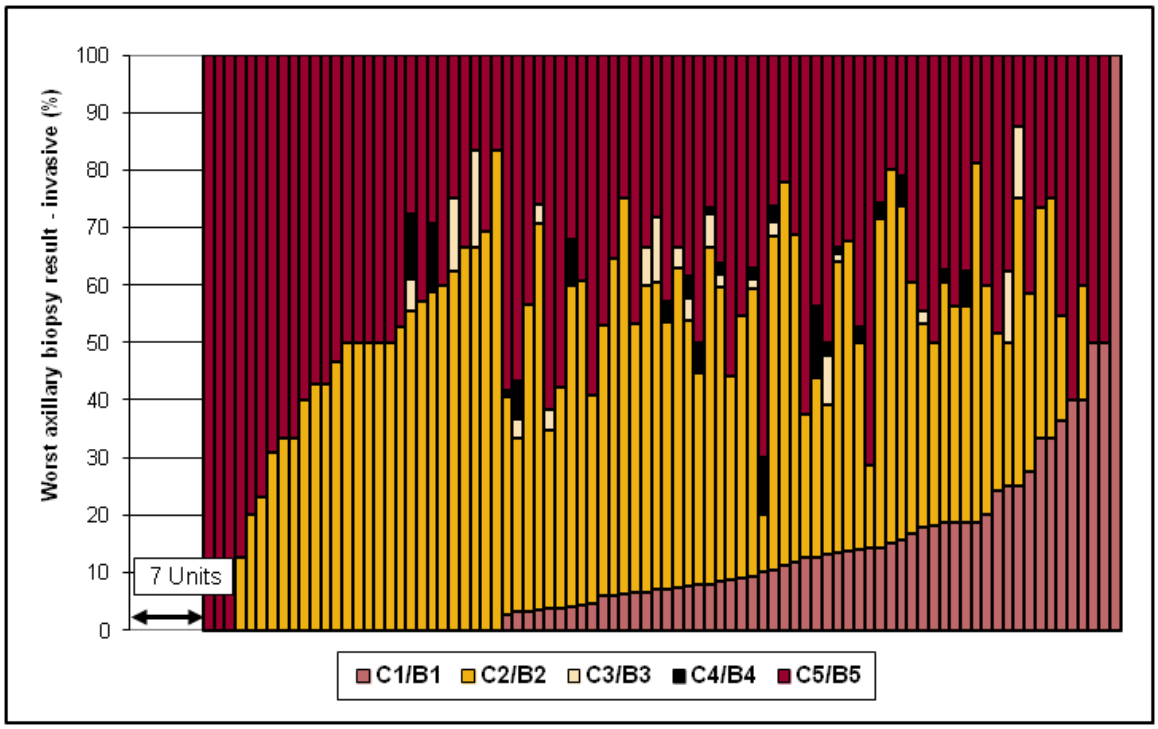

Figure 42: Variation between screening units in the worst axillary biopsy result for invasive cancers with an abnormal axillary ultrasound result – Data for Scotland are not available

Of the 92 invasive cancers with a normal ultrasound result which had an axillary node biopsy, 8 (9%) had a C5/B5 diagnosis, 66 (72%) had C2/B2 diagnoses, and 16 (17%) had an inadequate or normal sample (C1/B1) (Table 73). Of the 772 invasive cancers with a B5/C5 diagnosis with abnormal ultrasound and the 8 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 595 and 7 respectively had no or unknown neo-adjuvant therapy recorded and had axillary surgery. Of these, 591 were node positive at surgery, giving an overall positive predictive value of a C5/B5 of 98% (Table 74).

Of the 595 invasive cancers with a C5/B5 result and abnormal ultrasound and the 7 invasive cancers with a C5/B5 result and normal ultrasound which had no or unknown neo-adjuvant therapy recorded and had axillary surgery, 10 (2%) had false positive results, i.e. were found to be node negative at surgery and 1 cancer had unknown nodal status. It is possible that the axilla was over-treated for these 11 cancers, 4 of which had axillary clearance. Of the 1,133 invasive cancers with a normal or abnormal ultrasound result and with a C1/B1 to C4/B4 diagnosis which had no or unknown neo-adjuvant therapy recorded and had axillary assessment at surgery, 264 (23%) had positive nodes at surgery. Axillary biopsy thus failed to accurately identify positive nodes for these invasive cancers.

7.1.3 Worst Axillary Ultrasound Result for Node Positive Invasive Cancers

Of the 2,628 invasive cancers in England, Wales and Northern Ireland with positive nodal status (excluding cases with neo-adjuvant therapy and no axillary assessment at surgery), 63 (2%)

had a C1/B1 axillary biopsy, 176 (7%) had a C2/B2 axillary biopsy, 12 had a C3/B3 axillary biopsy, 21 (1%) had a C4/B4 axillary biopsy and 595 (23%) had a C5/B5 axillary biopsy (Table 77). For 10 screening units (5 of which were in South Central) more than 20% of node positive invasive cancers with an axillary biopsy recorded had C1/B1 recorded as the worst axillary biopsy result. In 16 screening units C2/B2 was that worst axillary biopsy result recorded for more than 35% of node positive invasive cancers and in 4 screening units a C3/B3 result was the worst result recorded for more than 10% of node positive invasive cancers.

KEY FINDINGS

- Of the 14,381 surgically treated invasive cancers included in the audit, 99% had known nodal status. Of these 3,073 (22%) were node positive and 494 were known to only have micro-metastases. Of the 2,628 invasive cancers without neo-adjuvant therapy recorded that were confirmed to be node positive on surgery, 595 (23%) had positive nodes diagnosed pre-operatively by means of needle biopsy.
- In the UK excluding Scotland, 14,786 (87%) cancers had a record of an axillary ultrasound at assessment; 84% were confirmed to be invasive after surgery and 15% non-invasive. Overall, 93% of invasive cancers and 64% of non-invasive cancers had axillary ultrasound recorded. These are considerable improvements from 2011/12.
- Of the 2,098 invasive breast cancers with an abnormal axillary ultrasound result recorded, 1,037 were node positive at surgery giving a positive predictive value of an abnormal ultrasound of 49%.
- Of the 10,356 invasive cancers with a normal axillary ultrasound result recorded which had axillary assessment during surgery, 1,626 (16%) had positive nodes found after surgery.
- For 5 units in England, fewer than 80% of invasive breast cancers had an axillary ultrasound result recorded. For 198 invasive cancers an abnormal ultrasound result was apparently not followed up with a needle biopsy and for 92 invasive cancers a needle biopsy was performed despite a normal ultrasound result.
- In 12 screening units more than 40% of invasive cancers had no biopsy recorded after an abnormal ultrasound. In 12 screening units more than 20% of invasive cancers had C1/B1 recorded as the worst axillary biopsy result.
- Of the 772 invasive cancers with a C5/B5 diagnosis with abnormal ultrasound and the 8 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 602 had no or unknown neo-adjuvant therapy recorded and had axillary surgery. Of these, 591 were node positive at surgery, giving an overall positive predictive value of a C5/B5 of 98%.
- Of the 595 invasive cancers with a C5/B5 result and abnormal ultrasound and the 7 invasive cancers with a C5/B5 results and normal ultrasound which had no or unknown neo-adjuvant therapy recorded and had axillary surgery, 10 (2%) had false positive results, i.e. were found to be node negative at surgery. Four of these had axillary clearance.
- Axillary ultrasound failed to accurately identify positive nodes for 264 (23%) invasive breast cancers. For 10 units more than 20% of node positive cancers had a C1/B1 result.

7.2 Invasive Cancers – Sentinel Lymph Node Biopsy Use and Technique

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

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

In 2012/13, of the 14,272 invasive cancers with axillary surgery 12,359 (87%) had a SLNB (Table 79). Of the 158 invasive breast cancers with axillary surgery that did not have a non-operative diagnosis, eight had axillary surgery at the first operation and 2 of these had a SLNB. The overall use of SLNB has increased by 3 percentage points since 2011/12.

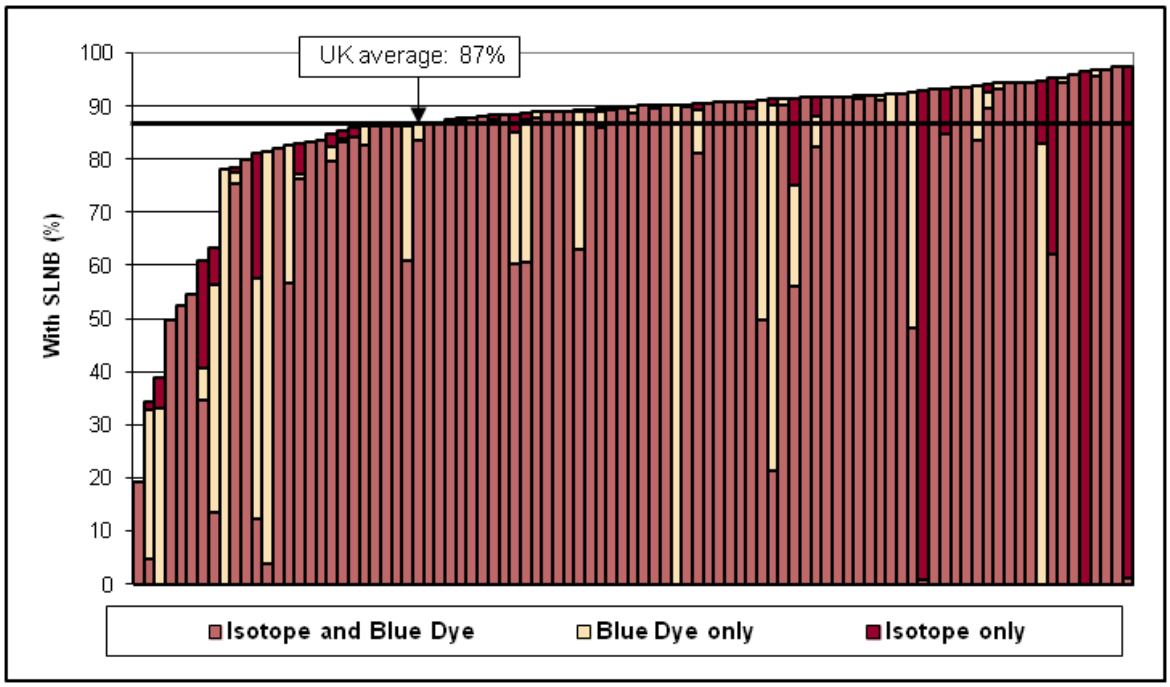

Figure 43: Variation between screening units in the use of SLNB for invasive breast cancers with axillary surgery

Figure 43 shows how the use of SLNB for invasive cancers having axillary surgery varied between screening units in 2012/13. In 44 units, over 90% of invasive cancers which had axillary surgery had a SLNB. In 13 units 20% or more invasive cancers having axillary surgery did not have a SLNB, and in 6 of these (2 in South Central, 1 in East of England, 1 in North East, Yorkshire & Humber, 1 in West Midlands and 1 in Scotland) 40% or more invasive cancers did not have a SLNB. In all 13 units, 30% or more of invasive cancers with axillary surgery did not have a SLNB in the 3-year period 2010/11-2012/13.

In the UK as a whole, the blue dye only technique was used for 9% of invasive cancers with axillary surgery. Figure 54 shows how the SLNB technique recorded varied between screening units; with some units using the recommended isotope and blue dye method for very few or none of their patients. In 10 units (4 in East of England, 1 in East Midlands, 1 in North West, 1 in London, 1 in South Central, 1 in South East Coast and 1 in Northern Ireland) blue dye only was used for more than 30% of invasive cancers with axillary surgery in 2012/13. All of these units used blue dye only for more than 30% of SLNB procedures over the 3-year period 2010/11-2012/13, and 3 of these units (2 in East of England and 1 in North West) used SLNB to stage fewer than 20% of invasive cancers in 2012/13.

Surgery KPIs S1a & 1b

Use of SLNB for axillary staging
Units with less than 70% of invasive cancers with axillary surgery having a SLNB
Units where more than 30% SLNB procedures were carried out using blue dye only

Region	Unit	<60% with SLNB invasive 2011/12 %	>50% Blue dye only invasive with SLNB 2011/12 %	<70% with SLNB invasive 2012/13 No.	<70% with SLNB invasive 2012/13 %	>30% Blue dye only invasive with SLNB 2012/13 No.	>30% Blue dye only invasive with SLNB 2012/13 %	Outcome of QARC audit
Units audited in 2013								
East Midlands	CLI	58.8	0.0	30	83.4	0	0.0	2012/13 improvement - no action required
East Midlands	CNN	50.9	100.0	10	81.1	41	95.3	Full dual technique to be implemented
East of England	DSU	17.9	100.0	22	78.0	78	100.0	Practice changed during 2012/13
East of England	DGY	87.7	96.0	43	38.6	23	85.2	No isotope licence
East of England	DSW	83.1	100.0	8	90.1	73	100.0	No isotope licence
East of England	FCO	73.8	96.4	19	89.3	0	0.0	Data errors, practice reviewed
East of England	FSO	62.2	87.3	6	94.6	92	87.6	Still in training
London	EBA	85.4	100.0	54	85.2	2	0.6	95% data errors, 12 blue dye only (1 hospital)
London	HWA	80.4	83.0	36	81.1	86	55.8	90% data errors, 14 blue dye only (1 hospital)
NEYH	ANT	37.8	66.2	129	34.2	55	82.1	Business case for duel technique prepared
North West	PLE	58.8	15.7	5	95.1	1	1.0	2012/13 improvement - no action required
North West	NWA	60.1	88.8	53	63.2	62	68.1	Practice changed during 2012/13
North West	PWI	83.1	70.3	10	91.5	7	6.5	2012/13 improvement - no action required
South Central	KOX	35.0	43.9	18	88.5	42	30.1	2012/13 improvement - no action required
South East Coast	GBR	40.6	5.0	85	60.8	13	9.8	Data errors suspected, auditing 2013 data
South East Coast	HGU	88.0	84.0	30	91.2	236	75.6	Data errors suspected, auditing 2013 data
South West	LAV	71.5	89.0	30	86.1	55	29.6	2012/13 improvement - no action required
Northern Ireland	ZNS1	77.3	94.1	7	88.3	15	28.3	No report available
Scotland	Unit 7	0.0	0.0	59	19.2	0	0.0	No report available
New units to audit in 2014								
East of England	ELD	91.8	27.8	57	93.2	84	31.5	
South Central	KMK	79.2	5.3	32	52.2	0	0.0	
South Central	KRG	77.9	0.0	63	49.6	0	0.0	
South Central	KWI	88.8	39.8	6	92.4	35	47.9	
West Midlands	MSH	61.9	0.0	50	54.5	0	0.0	
Northern Ireland	ZNE1	86.8	33.1	14	91.0	64	45.4	

<60% with SLNB in 2011/12
>50% with blue dye only in 2011/12
Values for 2011/12 are slightly different to those published in 2013 as previous cancers have been excluded

<70% with SLNB or >30% with blue dye only in 3-year data for 2010/11-2012/13
<70% with SLNB or >30% with blue dye only in 2012/13 and in 3-year data for 2010/11-2012/13

In the 2013 audit (2011/12 data), 19 units had fewer than 60% of invasive cancers with a SLNB performed and/or more than 50% of invasive cancers with a blue dye only SLNB. Because of the improved performance for this KPI in 2012/13 across the NHSBSP, the auditable values have been changed in 2012/13 to less than 70% with a SLNB performed and more than 30%

with blue dye only SLNB. Of the 8 units with fewer than 60% of invasive cancers with a SLNB performed in 2011/12, 3 failed to meet the new 70% audit level in 2012/13. Five additional units had fewer than 70% of invasive cancers with a SLNB in 2012/13. One of these had only just met the 60% audit level in 2011/12.

Fourteen units appeared to use blue dye only in 2011/12 for more than 50% of their invasive cancers with axillary operations. Four of these units met the new 30% audit level in 2012/13 for their invasive cancers with a SLNB. However, for 10 other units the use of blue dye only was still higher than the new 30% audit level in 2012/13. Three additional units used blue dye only for more than 30% of SLNBs in 2012/13 and not in 2011/12. Regional QA reference centres should follow up the 8 units that had fewer than 70% of invasive cancers with a SLNB in 2012/13 and the 13 units that used blue dye only for more than 30% of SLNBs in 2012/13 to ascertain the reason for this unusual clinical practice.

7.3 Invasive Cancers – Sentinel Lymph Node Biopsy and Nodal 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 cancers should have an axillary staging procedure carried out if metastatic nodal metastasis is not confirmed non-operatively**
Target Standard	**100% of women treated for early invasive cancers should have an axillary staging procedure carried out if metastatic nodal metastasis is not confirmed non-operatively**

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

The proportion of invasive breast cancers for which nodal status was recorded based on the examination of fewer than 4 nodes has decreased from 10.6% in 1996/97 to 4.8% in 2003/04. Since 2005/6 this has risen to 62.7% because of the introduction of SLNB. 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 0.8% (113 cancers) in 2012/13.

In the UK in 2012/13, 94% of the 1,913 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 81). Figure 44 shows that 49 screening units achieved the 100% target that all invasive cancers without a SLNB or with an unknown nodal procedure should have at least 4 nodes obtained. Sixteen screening units did not achieve the 90% minimum standard; a decrease from 29 units in 2011/12.

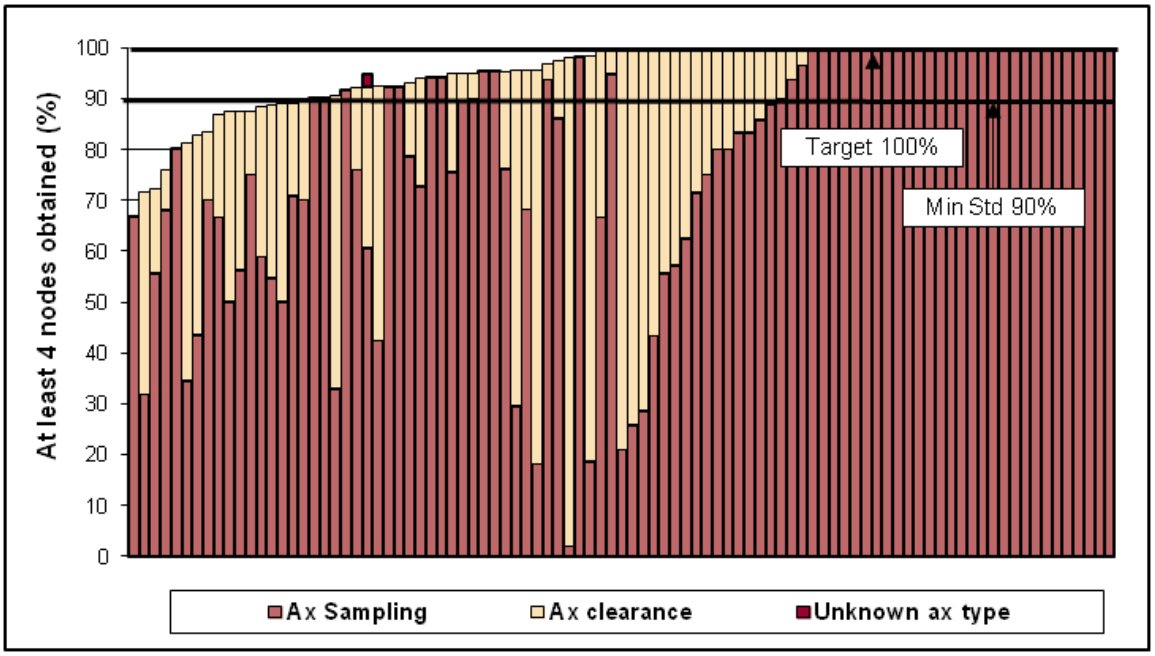

Figure 44: Invasive cancers with at least 4 nodes obtained expressed as a proportion of the invasive cancers without a sentinel node procedure

Of the 14,259 invasive breast cancers with known nodal status, 3,073 (22%) had positive nodes (Table 80). Of these, 194 (6%) were known to have micro-metastases rather than macro-metastases. Table 82 shows that the proportion of cancers with positive nodal status (16%) was lower for cancers which underwent a SLNB procedure compared with cancers which did not have a SLNB procedure (59%). This could be due to the selection of women for axillary sampling or clearance, who were considered to be of high risk (eg high grade, palpable nodes) or who had positive nodes on non-operative ultrasound guided cytology or core biopsy.

Of the 1,939 invasive cancers which had their positive nodal status determined from a SLNB procedure, 1,063 (55%) had a subsequent axillary procedure (Table 83). A further 427 (22%) of the 1,939 cases had 4 or more nodes taken in the only axillary operation, which indicates that other nodes were taken as well as the sentinel node at this time. The remaining 449 (23%) cases had fewer than 4 nodes taken in a single axillary operation.

Of the 14,381 surgically treated invasive breast cancers, 99% had known nodal status and 122 cancers had unknown nodal status (Table 78). Of the 14,259 invasive cancers with known nodal status, 8,939 (63%) had their nodal status determined on basis of 1, 2 or 3 nodes (Table 84). Fifty nine percent of invasive cancers (8,355 cancers) with fewer than 4 nodes examined had their negative nodal status determined using a SLNB procedure

One hundred (1%) cases had their negative nodal status determined on the basis of 1, 2 or 3 nodes without an SLNB procedure, and 484 (3%) had their positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure. Therefore, 706 (5%) of invasive cancers with known nodal status may have had insufficient nodal information to provide a full diagnostic work-up. Of the 484 invasive cancers that had their positive nodal status determined on the basis of 1, 2 or 3 nodes, 471 were determined on the basis of an SLNB procedure and a

further 13 were determined without an SLNB procedure. Of these 471 cancers, 449 (95%) had no subsequent axillary procedure(s) recorded (Table 83).

Figure 45 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 varied between screening units. Of the 484 cancers with positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure, 23 (5%) had further axillary surgery, and of the remaining 461 cancers with only 1 axillary operation, 208 (45%) were known to have had micro-metastases and therefore further axillary surgery may not have been appropriate.

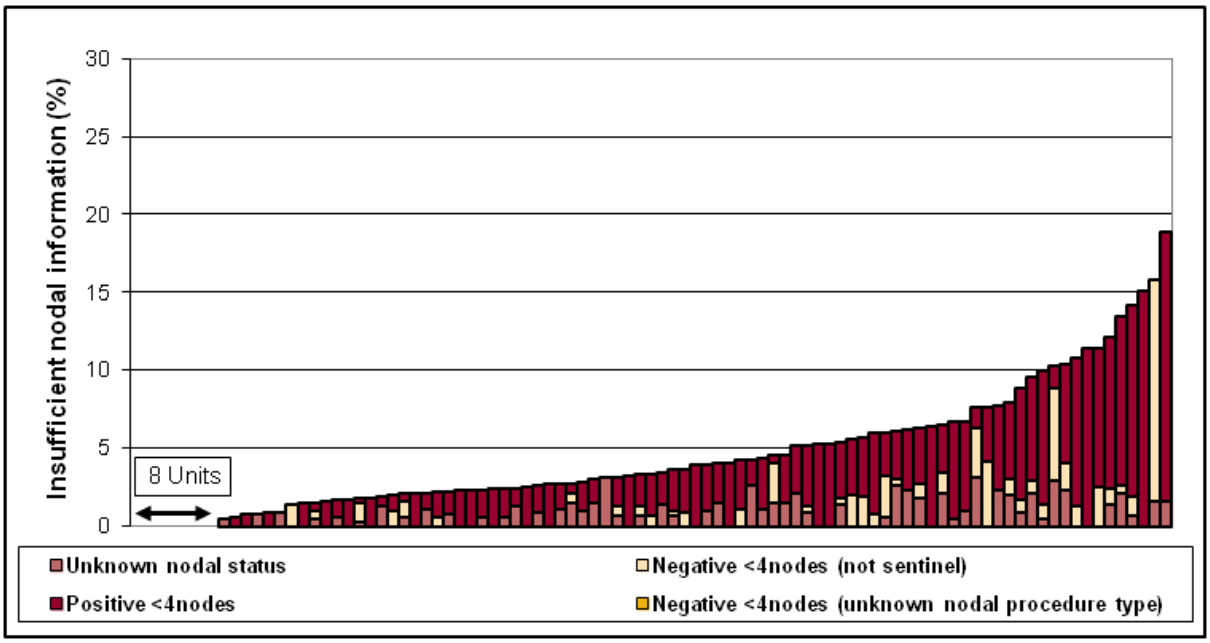

Figure 45: Variation between screening units in the proportion of invasive cancers which may have had insufficient nodal information

Since the publication of the results of the Z11 Trial and the IBSCG study, decisions on systemic therapy are increasingly being made on the basis of the available axillary staging (which may include fewer than 4 nodes) and on tumour grade, size and biomarker information rather than subjecting women to possibly unnecessary axillary clearance. Under these circumstances, the remaining 185 cancers with positive nodes and only one axillary operation (143 (77%) of which were treated with breast conserving surgery) may have been treated with axillary radiotherapy or have been advised not to have any further axillary intervention.

KEY FINDINGS

- Of the 14,272 invasive cancers with axillary surgery in 2012/13, 12,359 (87%) had a SLNB. The use of SLNB has increased by 3 percentage points since 2011/12. In 13 units 20% or more invasive cancers having axillary surgery did not have a SLNB, and in 6 of these 40% or more invasive cancers did not have a SLNB.
- In the UK as a whole, the blue dye only technique was used for 9% of invasive cancers with axillary surgery. In 10 units blue dye only was used for more than 30% of invasive cancers with axillary surgery in 2012/13.
- In 2012/13 the proportion of invasive cancers with known nodal status that had fewer than 4 nodes examined increased again to 62.7%; this falls to 0.8% when invasive cancers with a SLNB are excluded.

KEY FINDINGS (cont)

- Of the 14,381 surgically treated invasive cancers, 122 had unknown nodal status and 100 had their negative nodal status determined on the basis of 1, 2 or 3 nodes without a SLNB procedure.
- Of the 1,913 invasive breast cancers, which either did not have a SLNB procedure or where the type of nodal procedure was unknown, 94% had 4 or more nodes taken; 16 screening units did not achieve the 90% minimum standard.
- Of the 14,259 invasive cancers with known nodal status, 3,073 (22%) had positive nodes. The proportion of cases with positive nodal status (16%) was lower for cases which underwent a SLNB procedure compared with cases which did not have a SLNB procedure (59%). This could be due to the selection of patients for axillary sampling or clearance, who were considered to be of high risk (eg high grade, palpable nodes) or who had positive nodes on non-operative ultrasound guided cytology or core biopsy.
- Of the 484 cancers with positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure, 461 only had 1 axillary operation. Of these, 208 (45%) were known to have had micro-metastases and therefore further axillary surgery may not have been appropriate.
- Since the publication of the results of the Z11 Trial and the IBSCG study, decisions on systemic therapy are increasingly being made on the basis of the available axillary staging (which may include fewer than 4 nodes), rather than subjecting women to unnecessary axillary clearance. Under these circumstances, the remaining 185 cancers with positive nodes and only one axillary operation (77% of which were treated with breast conserving surgery) may have been treated with axillary radiotherapy or have been advised not to have any further axillary intervention.

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

Of the 136 surgically treated micro-invasive cancers, 98 (72%) had known nodal status. Forty nine (94%) of the 52 micro-invasive cancers treated by mastectomy and 49 (58%) of 84 micro-invasive cancers treated with breast conserving surgery had known nodal status. Five (5%) of the 98 micro-invasive cancers with known nodal status had positive nodal status recorded (3 in London, 1 in North East, Yorkshire & Humber and 1 in South West).

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 3,657 surgically treated non-invasive cancers, 27% had known nodal status and 73% had no nodes obtained (Table 85). Eighty nine percent of the non-invasive cancers treated by mastectomy and 7% of non-invasive cancers treated with breast conserving surgery had known nodal status (Table 86). Of the 994 non-invasive cancers with known nodal status, 12 (1%) had positive nodal status recorded (Table 87).

Overall, 89% of non-invasive cancers treated with mastectomy had known nodal status, and 88% of these had their nodal status determined on the basis of a SLNB (Table 88). There was wide variation between screening units (Figure 46). In 23 screening units where the nodal status was known for all cancers, the status was always determined by a SLNB, while in 2 units (1 in East of England and 1 in South Central) where the nodal status was known for all cancers, the status was always determined without a SLNB.

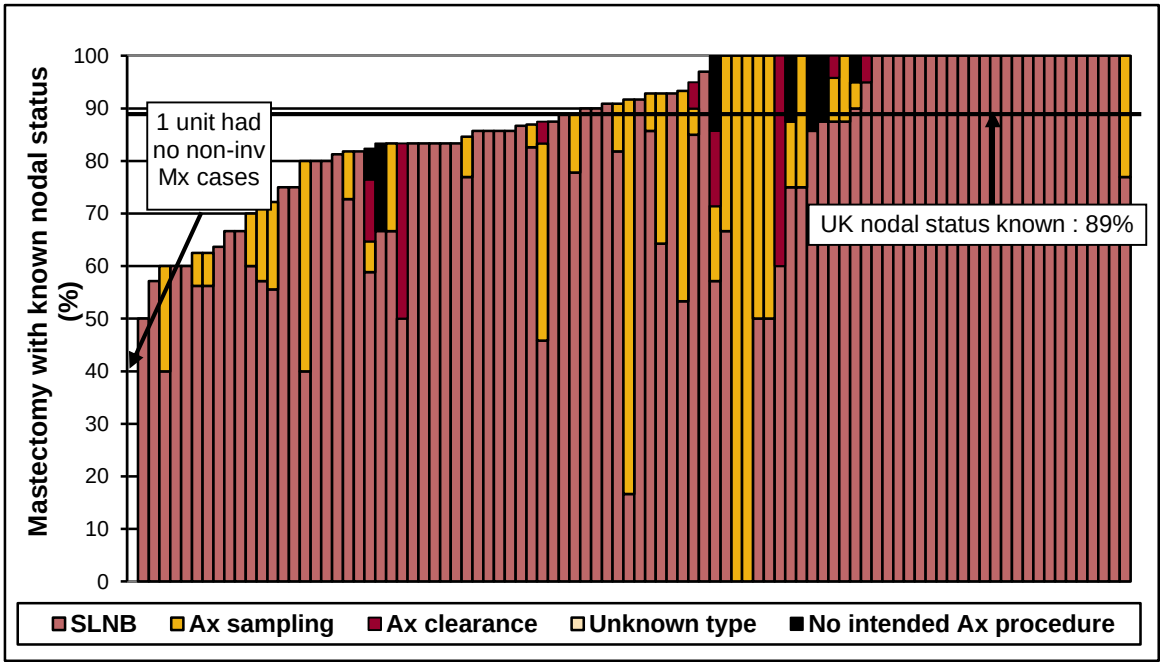

Figure 46: Variation between screening units in the use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with a mastectomy

One hundred and eighty three (7%) non-invasive cancers treated with breast conserving surgery had known nodal status, and 95% of these had their nodal status determined on the basis of a SLNB (Tables 86 and 89). 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.

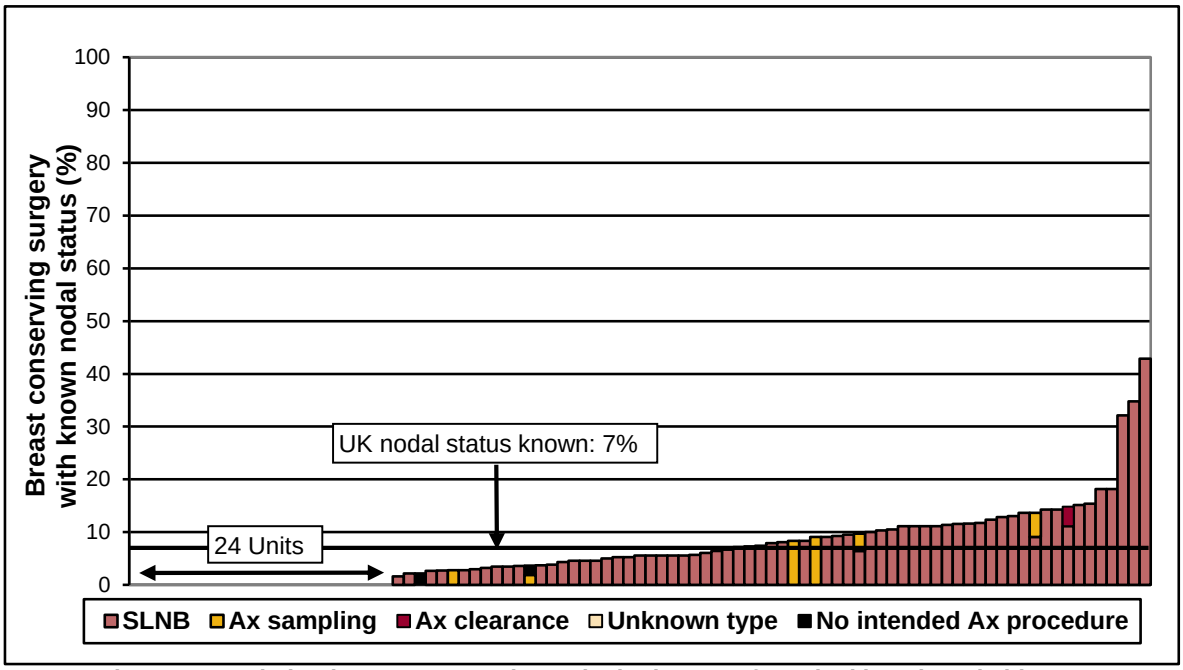

Figure 47: Variation between screening units in the use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with breast conserving surgery

Figure 47 shows that compared with non-invasive cancers treated with mastectomy, variation in practice between screening units was less marked for non-invasive cancers treated with breast

conserving surgery that had known nodal status; with most units determining the nodal status on the basis of a SLNB. Twenty four units had no non-invasive cancers with known nodal status and 5 units did not use SLNB to determine nodal status for their non-invasive cancers.

In the UK as a whole the median numbers of nodes taken for non-invasive cancers undergoing breast conserving surgery or mastectomy were both 2 (Table 90). The maximum numbers of nodes taken for non-invasive cancers treated with breast conserving surgery or mastectomy were both 21. Eleven non-invasive cancers treated with mastectomy and 1 non-invasive cancer treated with breast conserving surgery had their nodal status determined on the basis of an axillary clearance. Thirteen non-invasive cancers had more than 10 nodes taken.

Twelve non-invasive cancers had positive nodal status recorded (Table 87) and were audited by QA reference centres. Although these cancers had positive nodes and would normally be classified as invasive, there was no invasive focus identified in the breast. Ten of these cancers had a SLNB procedure (5 in South Central, 4 in North West and 1 in North East, Yorkshire & Humber) and 2 had axillary clearance procedures (1 in London and 1 in West Midlands). Four cancers (3 in North West and 1 in North East, Yorkshire & Humber) had their positive nodal status determined using intra-operative assessment. Of the 10 non-invasive cancers which had their positive nodal status determined from a SLNB procedure, 7 (4 in South Central, 2 in North West and 1 in North East, Yorkshire & Humber), had a subsequent axillary procedure in the same operation or in a subsequent operation.

KEY FINDINGS

- Of the 136 surgically treated micro-invasive cancers, 72% had known nodal status; 94% of those treated by mastectomy and 58% of those treated with breast conserving surgery.
- Twenty seven percent of non-invasive cancers had known nodal status. 89% of non-invasive cancers treated with mastectomy had known nodal status, compared with 7% of those treated with breast conserving surgery.
- Of the 994 non-invasive cancers with known nodal status, 12 had positive nodal status recorded.
- 88% of non-invasive cancers treated with a mastectomy and 95% of non-invasive cancers treated with breast conserving surgery had their nodal status determined on the basis of a SLNB.
- The maximum numbers of nodes taken for non-invasive cancers treated with breast conserving surgery or mastectomy were both 21.
- Eleven non-invasive cancers treated with mastectomy and 1 treated with breast conserving surgery had their nodal status determined on the basis of an axillary clearance.

7.5 Invasive Cancers with No Axillary Surgery Recorded

Of the 14,381 surgically treated invasive cancers, 114 did not have nodes taken at surgery (Table 78). Forty three invasive cancers with a B5b (Invasive) non-operative diagnosis had no axillary procedure recorded; 8 of these were in South East Coast (6 in one unit) and 8 in North East, Yorkshire and Humber. Forty one invasive cancers (6%) with a B5a (Non-invasive) non-operative diagnosis had no surgery to the axilla recorded. In London 12% of B5a (Non-invasive) cancers that were found to be invasive at surgery (10 cancers) had no axillary operation recorded. In addition to these 84 cancers, 3 invasive cancers with a B5c non-operative diagnosis and 17 invasive cancers without a non-operative diagnosis had no surgery to the

axilla. It is possible that under some circumstances, (e.g. a very small, grade 1 cancer, diagnosed after a B5a (Non-invasive) non-operative diagnosis) a further operation to assess nodal involvement may have been deemed not be appropriate after multidisciplinary team discussion.

KEY FINDINGS

- 43 invasive cancers with a B5b (Invasive) core biopsy, 41 invasive cancers with a B5a (Non-invasive) core biopsy, 3 invasive cancers with a B5c non-operative diagnosis and 17 invasive cancers without a non-operative diagnosis had no axillary procedure recorded.
- It is possible that under some circumstances, (e.g. a very small, grade 1 cancer, diagnosed after a B5a (Non-invasive) non-operative diagnosis) a further operation to assess nodal involvement may not be appropriate.

7.6 Repeat Operations Involving the Axilla

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

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

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

Scenario 2: Additional therapeutic nodal procedure(s)

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

Overall in 2012/13 (Table 91), axillary surgery was performed for 100% of surgically treated invasive cancers with a B5b (Invasive) core biopsy and 94% of invasive cancers with a B5a (Non-invasive) non-operative diagnosis. Only 27 of the B5b (Invasive) cancers had axillary surgery at a repeat operation. A similar picture was apparent for invasive cancers diagnosed by C5 cytology only, with only 2 cancers (11%) having axillary surgery at a repeat operation.

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

Of the 703 invasive cancers with a B5a (Non-invasive) non-operative diagnosis, 94% had axillary surgery; 46% (321 cancers) at the first operation and 49% (341 cancers) at a repeat operation (Table 91). Of the 321 cases with axillary assessment at first operation, 290 (90%) had SLNB performed, compared to 291 (85%) of the 341 cases 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 61 units to 50% in one unit in South West (Figure 48).

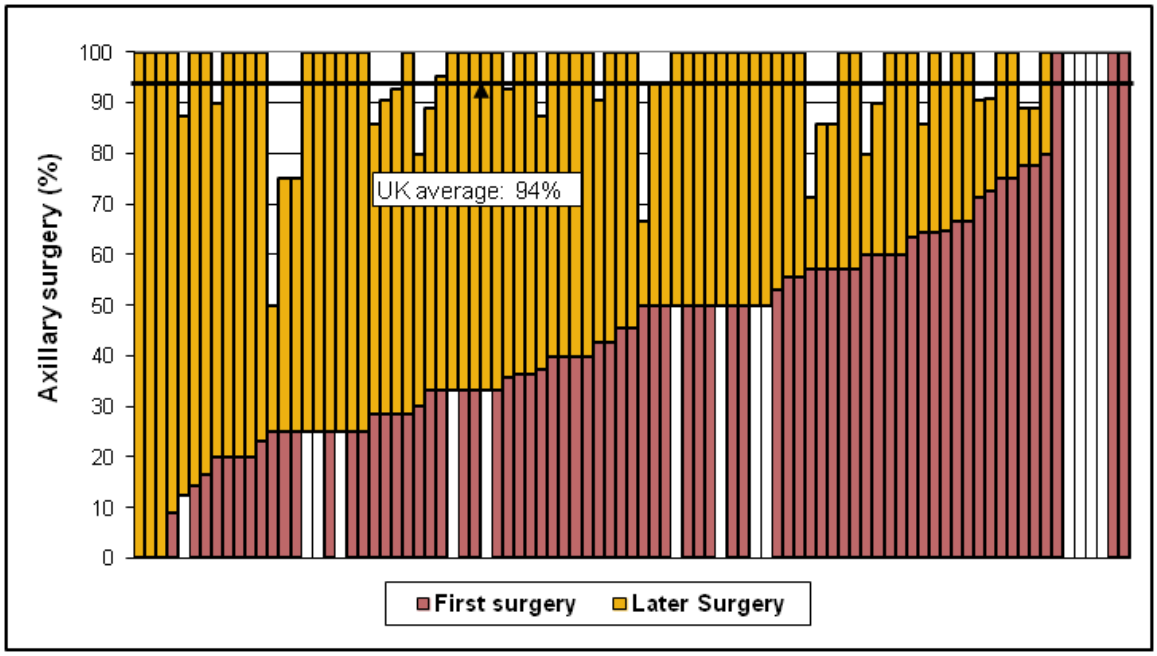

Figure 48: Variation between screening units in the proportion of invasive cancers with a B5a (Non-invasive) non-operative diagnosis having axillary surgery at first and repeat operations - 4 units were excluded as they had no B5a to invasive cancers (14 of the 20 smallest units are highlighted in white)

In the 3-year period studied, 52% of invasive cancers with a B5a (Non-invasive) non-operative diagnosis had a mastectomy at first operation and 40% had initial breast conserving surgery. The variation between units in the proportion of invasive cancers with a B5a (Non-invasive) non-operative diagnosis that had axillary surgery at the first operation in the 3-year period 2010/11-2012/13 is examined in the control chart in Figure 49 in which the dotted and dashed lines in are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average rate (solid line).

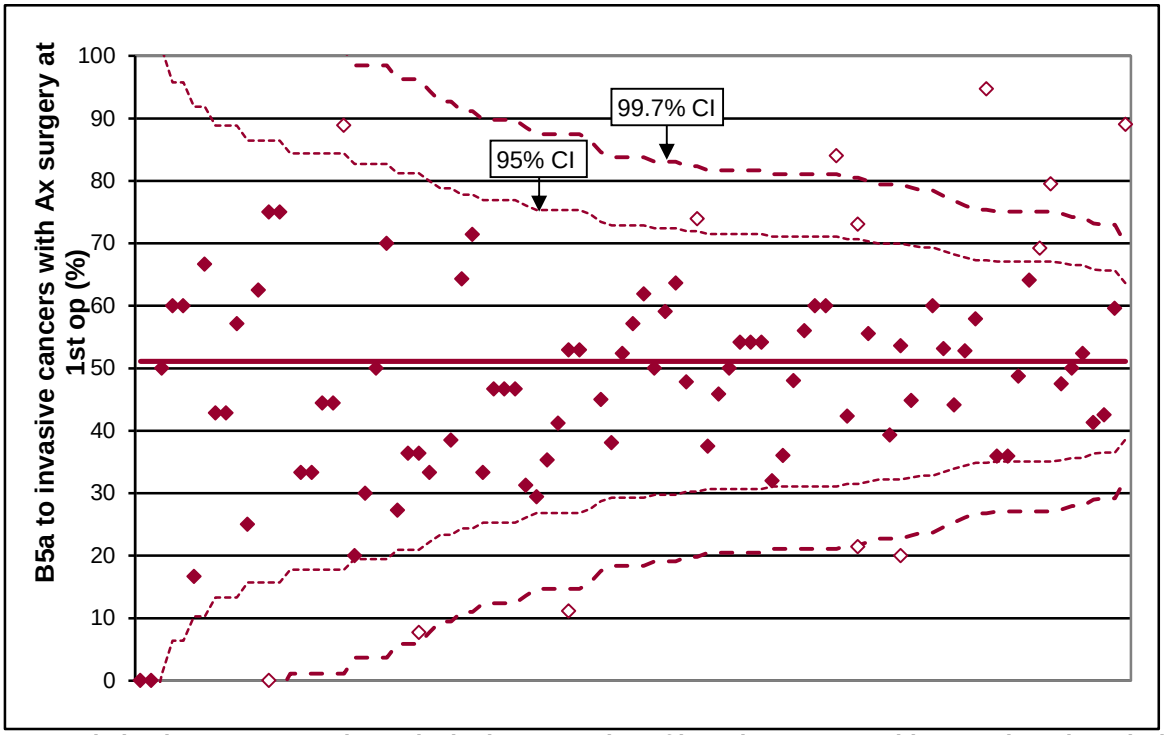

Figure 49: Variation between screening units in the proportion of invasive cancers with a B5a (Non-invasive) non-operative diagnosis having axillary surgery at first operation in the 3-year period 2010/11-2012/13

Eight units lie above the 95% upper control limit (and 4 of these units were also above the 99.7% upper control limit) and had significantly higher rates of axillary surgery at first operation, and 5 units lie below the 95% and 99.7% lower control limits. Of these 13 outliers, 3 are in Scotland (3 high), 2 are in North East, Yorkshire & Humber (1 high and 1 low) and 2 are in South West (1 high and 1 low). It is possible that the high outlier units 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. Of the 8 high outlier units, 4 (2 in Scotland, 1 in London and 1 in North East, Yorkshire & Humber) had a significantly higher than average mastectomy and immediate reconstruction rates (Figure 25) where limited axillary surgery would also be appropriate.

KEY FINDINGS

- In 2012/13 axillary surgery was performed for all invasive breast cancers with a B5b (Invasive) core biopsy and all invasive cancers diagnosed by C5 cytology only.
- Although 94% of invasive cancers with a B5a (Non-invasive) diagnosis had axillary surgery, only 321 (46%) of these cancers had their axillary surgery at the first operation; of these, 90% had SLNB performed, compared to 85% of those with axillary assessment at later operation.
- During the period 2010/11-2012/13, 5 screening units had significantly lower rates of axillary surgery at first operation for invasive cancers with a B5a (Non-invasive) diagnosis, and 8 had significantly higher rates.
- It is possible 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 ration. Four of these units had a significantly higher than average mastectomy and immediate reconstruction rate where limited axillary surgery would be appropriate.

7.8 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. In this case, the NHSBSP surgical guidelines state that further axillary treatment should be offered. However, since the publication of the results of the Z11 and IBCSG trials, axillary node clearance has become less common and more units now offer radiotherapy to the axilla (following publication of the AMAROS trial results) or no further treatment to the axilla (especially if only micro-metastases were found).

In the UK as a whole, 36% of node positive invasive cancers had a repeat operation to the axilla (Table 92). Thirty four percent of invasive cancers with positive nodal status had a repeat operation to the axilla following a SLNB and 2% after an axillary operation which did not involve a SLNB. Overall in the UK, 94% of repeat operations on the axilla were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB.

The proportion of repeat operations to the axilla varied widely between screening units for invasive cancers with positive nodal status (Figure 50), from 0% in 2 units in South Central (1 of which was small) to over 80% in 2 units (1 in North East, Yorkshire & Humber and 1 in East of England). In most screening units; the majority of repeat operations were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB.

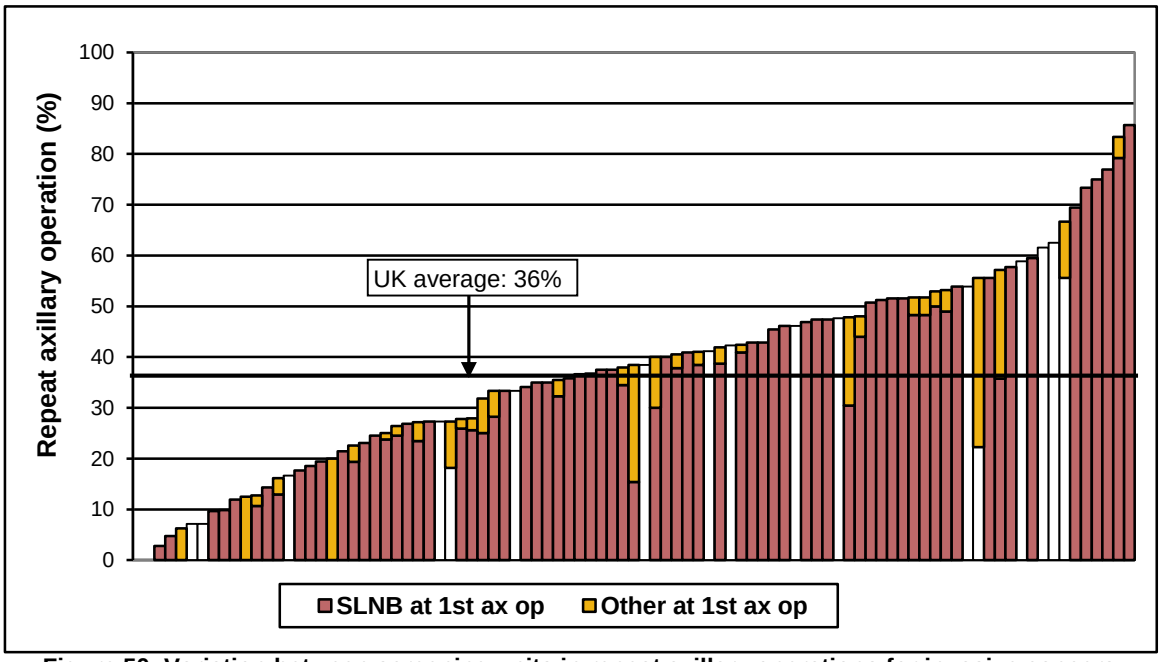

Figure 50: Variation between screening units in repeat axillary operations for invasive cancers with positive nodal status (19 of the smallest units are highlighted in white)

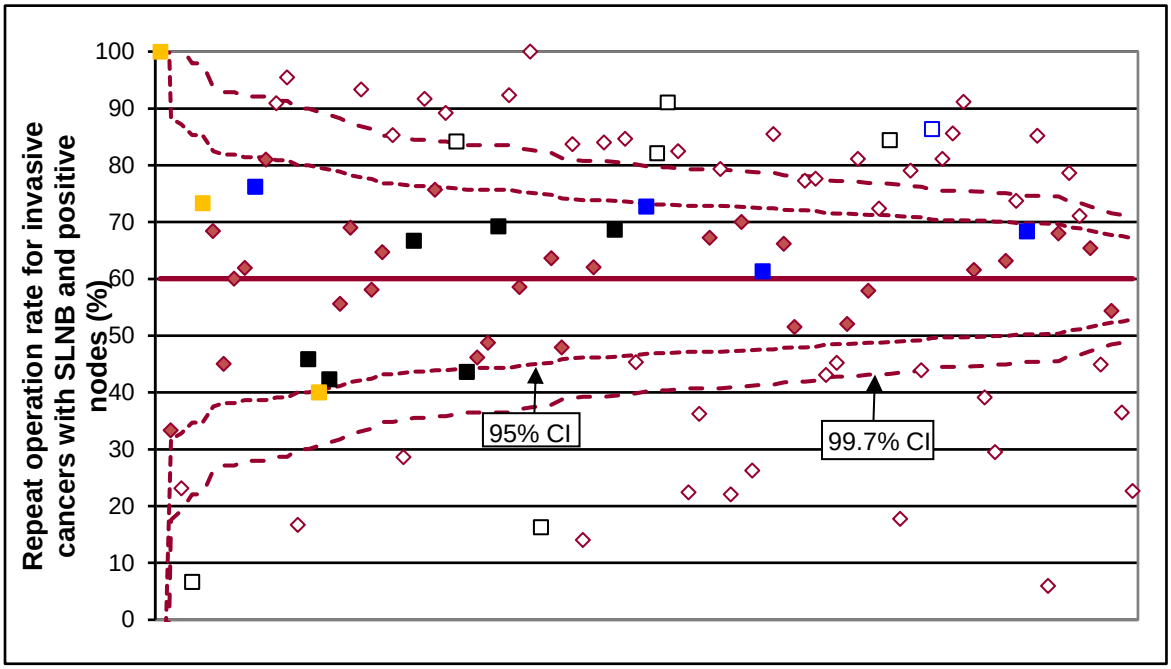

Figure 51: Variation between screening units in repeat axillary operations for invasive cancers with positive nodal status determined on the basis of a SLNB in the 3-year period 2010/11-2012/13
Blue squares represent units where 20% or more invasive cancers had no axillary ultrasound in 2012/13
Black squares represent units with 40% or more invasive cancers with no needle biopsy after an abnormal axillary ultrasound in 2012/13
Orange squares represent units where 40% or more invasive cancers did not have a SLNB in 2012/13
Dark red diamonds represent all other units
(Open diamonds or squares represent units which lie outside the control limits)

The variation between screening units in the 3-year period 2010/11-2012/13 in the proportion of invasive cancers with their positive nodal status determined on the basis of a SLNB that had repeat axillary surgery is examined in the control chart in Figure 51 in which the dotted and dashed lines in are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average rate (solid line). Blue squares represent the 5 units where

20% or more invasive cancers had no axillary ultrasound in 2012/13 (Figure 40). Black squares represent the 12 units with 40% or more invasive cancers with no needle biopsy after an abnormal axillary ultrasound in 2012/13 (Figure 41). Orange squares represent the 3 units where 40% or more invasive cancers did not have a SLNB in 2012/13 (Figure 43)

Thirty one units had significantly higher rates of repeat axillary surgery and were 95% high outliers (and 24 of these units were also 99.7% high outliers), and 23 had significantly lower rates of repeat axillary surgery and were 95% low outliers (16 of these units were also 99.7% low outliers). Of the 99.7% high outliers, 4 units (3 in South West and 1 in South Central) had 40% or more invasive cancers with no needle biopsy after an abnormal axillary ultrasound in 2012/13 and in 1 unit in Wales, 20% or more invasive cancers had no axillary ultrasound in 2012/13. It is therefore possible that the node positivity of some of the invasive cancers in these units could have been identified pre-operatively and that fewer women could have had a repeat operation to the axilla.

KEY FINDINGS

- In 2012/13, 36% of invasive cancers with a positive nodal status had a repeat operation to the axilla; 34% following a SLNB and 2% after an axillary operation which did not involve a SLNB.
- Overall in the UK, 94% of repeat operations on the axilla were carried out on invasive cancers with positive nodal status determined on the basis of a SLNB. This varied from 0% in 2 units in South Central (1 of which was small) to over 80% in 2 units (1 in North East, Yorkshire & Humber and 1 in East of England).
- 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.
- Thirty one units had significantly higher rates of repeat axillary surgery and were 95% high outliers (24 were 99.7% high outliers), and 23 had significantly lower rates of repeat axillary surgery and were 95% low outliers (16 were 99.7% low outliers).
- Of the 99.7% high outliers, 4 units (3 in South West and 1 in South Central) had 40% or more invasive cancers with no biopsy after an abnormal axillary ultrasound in 2012/13 and in 1 unit in Wales more than 20% of cancers had no axillary ultrasound in 2012/13. It is therefore possible that the node positivity of some of the invasive cancers in these units could have been identified pre-operatively and that fewer women could have had a repeat operation to the axilla.

Chapter 8: Adjuvant therapy

Surgeons were asked to supply radiotherapy, chemotherapy and endocrine therapy information for cancers detected through screening between 1 April 2011 and 31 March 2012, the period covered by the previous screening audit. Oestrogen receptor (ER), progesterone receptor (PR) and Human Epidermal Growth Factor Receptor 2 (HER2) status were also requested. The cut off point for adjuvant therapy was 31 March 2013, allowing a minimum of 12 months follow up. Scotland did not provide adjuvant audit data this year.

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 start date.

Detailed information on previous cancers diagnosed in women with screen-detected breast cancer was collected from cancer registries in the UK. This is of importance in the interpretation of data concerning the use of adjuvant therapy, both local (radiotherapy) and systemic (endocrine therapy, chemotherapy, trastuzumab) since the previous use of these therapies will be influential in the determination of their appropriateness for the second (screen-detected) breast cancer. As in last year's screening audit, women known to have had previous breast cancers have been excluded the adjuvant audit data analysis.

8.1 Previous Cancers

As part of the adjuvant audit, information on previous cancers, excluding non-melanoma skin cancer, was requested from the English National Cancer Registration Service, the Welsh Cancer Intelligence & Surveillance Unit and the Northern Ireland Cancer Registry through regional QA reference centres. Previous cancers were those registered at any time point prior to the breast cancer recorded in the adjuvant audit. The follow-up period depended on the date that each cancer registry started to operate, but a minimum follow up of 18 years was available for all women.

For the 16,577 women who had a first offered screening appointment between April 2011 and March 2012, 16,525 (99.7%) were matched to the cancer registration databases (Table 93). Of the 16,525 matched women, 1,946 (12%) had at least one previous cancer registered. Of the 13,162 matched women with invasive breast cancer and 3,226 matched women with non-invasive breast cancer in the 2011/12 adjuvant audit, 1,564 (12%) and 362 (11%) respectively had previous cancers registered.

Of the 1,946 women with previous cancers, 661 (34%) had previous invasive/micro-invasive breast cancers and 138 (7%) had previous non-invasive breast cancers (Table 94). Together these women with breast cancer equate to 5% of the 16,525 matched women. The second most common previous type of invasive cancer was gynaecological cancer (2%; 257 women). *In situ* cervical cancer was the most common type of previous non-invasive cancer (364 women).

Because women with a previous breast cancer can also have other previous invasive and non-invasive cancers, the totals in Table 94 are not additive.

Of the 790 women with previous breast cancers, 39% had radiotherapy for their 2011/12 screen-detected breast cancer, 17% had chemotherapy and 67% had endocrine therapy (Table 95). For those without a previous breast cancer diagnosis (Table 99, 101 and 103), 73% had radiotherapy for their 2011/12 screen-detected breast cancer, 21% had chemotherapy and 70% had endocrine therapy. The biggest difference between the two cohorts was the proportion of women who had radiotherapy (39% of those who had a previous breast cancer compared with 73% of those without a previous breast cancer). This is mainly because the surgical treatment of the two cohorts was also very different, with 57% of patients (451 women) who had a previous breast cancer having a mastectomy compared to only 22% of women without a previous breast cancer. However, even after adjusting for operation type, women with a previous breast cancer were still less likely to receive radiotherapy for their subsequent breast cancer; and only 81% of women with a previous breast cancer who had breast conserving surgery for their subsequent breast cancer had radiotherapy compared to 88% in women who had not had a previous breast cancer.

KEY FINDINGS

- This is the second year that that it has been possible to obtain detailed information on previous cancers diagnosed in women with screen-detected breast cancer by matching NHSBSP data with cancer registration data.
- Of the 13,162 matched women with invasive breast cancer and 3,226 matched women with non-invasive breast cancer in the 2011/12 adjuvant audit, 1,564 (12%) and 362 (11%) respectively had previous cancers registered.
- Interpretation of the adjuvant audit data for previous years thus needs to reflect the fact that 10-12% of women are likely to have had a history of a previous malignancy.
- Of the 1,946 women with previous cancers, 661 (34%) had previous invasive/micro-invasive breast cancers and 138 (7%) had previous non-invasive breast cancers.
- The second most common previous type of invasive cancer was gynaecological cancer (2%; 257 women). *In situ* cervical cancer was the most common type of previous non-invasive cancer (364 women).
- Only 39% of women who had a previous breast cancer had radiotherapy for their subsequent screen-detected breast cancer compared with 73% of those without a previous breast cancer. This is mainly because the surgical treatment of the two cohorts is very different, with 57% of women who had a previous breast cancer having a mastectomy compared to only 22% of women with no previous history of breast cancer.
- However, even after adjusting for operation type, women with a previous breast cancer were still less likely to receive radiotherapy; 81% of women with a previous breast cancer who had breast conserving surgery for their subsequent cancer had radiotherapy compared to 88% in women who had not had a previous breast cancer.

8.2 Data Completeness for the Adjuvant Therapy Audit

The 2011/12 NHSBSP audit reported tumour characteristics and primary treatment data for 16,993 screen-detected breast cancers in England, Wales and Northern Ireland. When data for these cancers were requested for inclusion in this year's adjuvant therapy audit, 2 additional cancers which were not included in the 2011/12 main audit were identified, and 2 cancers were

found to be non-breast cancer. Another 416 cancers were not included because data were not submitted to the adjuvant audit. No 2010/11 cases were excluded from last year's audit for this reason and in the previous year's audit, only 50 cancers were not submitted. Of the 16,577 breast cancers which were thus eligible for inclusion in the adjuvant therapy audit, a further 790 were excluded because of previous breast cancer diagnoses (Table 96).

Cancers with unknown adjuvant treatment data (i.e. unknown radiotherapy, chemotherapy and endocrine therapy) have been included in this chapter. These cancers were excluded in previous audits. This change is due to the data collection process used this year. In previous years, some QA reference centres converted cancers with 'unknown treatment' to 'no treatment' prior to central data submission. In this year's audit, cancers with 'unknown treatment' have not been assumed to have had 'no treatment' and values for 'no' and 'unknown' are presented in the tables in Appendix F. This approach has also been applied to the data for 2008/09 and 2009/10 included in 3-year comparisons, and values for these individual years may therefore differ slightly from the single year data published in previous UK NHSBSP & ABS booklets.

Screening units in South East Coast (5), South West (2) and North East, Yorkshire & Humber (1), London (1) are most affected by this change and appear in unit level graphs to have a high proportion of cancers with 'unknown treatment' rather than 'no treatment' (Figure 52).

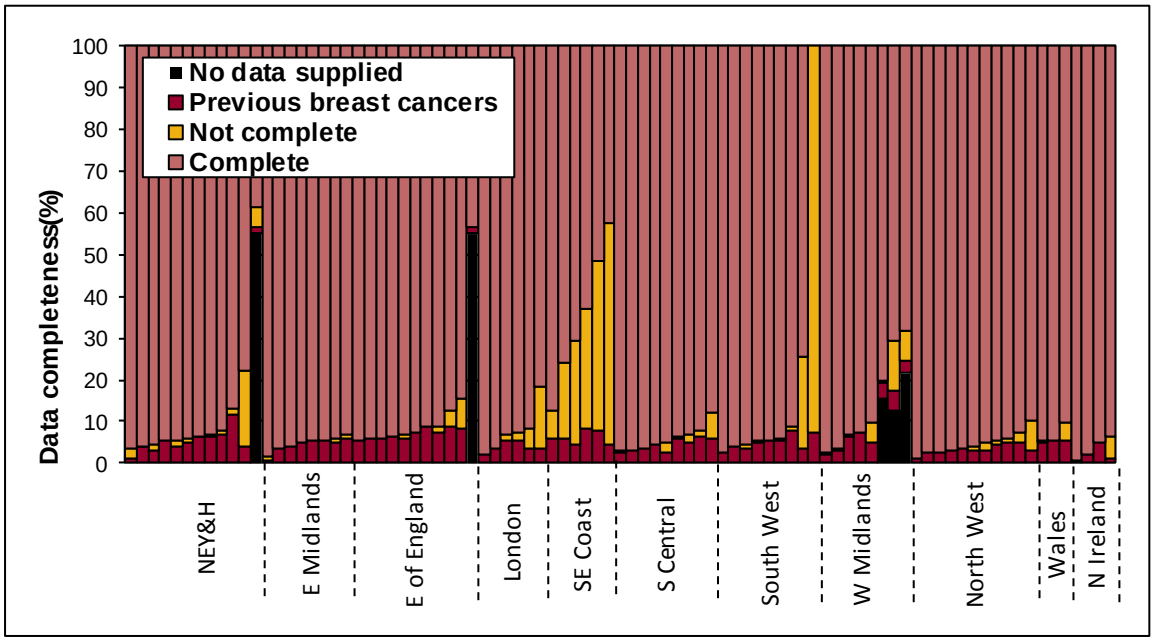

Figure 52: Variation between screening nuts in case exclusion and data completeness. No adjuvant therapy data were provided for Scotland

Following the exclusions described above, 15,787 breast cancers (93%) were eligible for inclusion in the adjuvant therapy audit (Table 96). Of these, 12,551 (80%) were invasive, 3,103 (20%) were non-invasive and 127 (1%) were micro-invasive (Table 114). In the UK as a whole, data completeness for radiotherapy, chemotherapy and endocrine therapy was 95%, 96% and 96% respectively, and 93% of cases had complete radiotherapy, chemotherapy and endocrine therapy data (Tables 97).

8.3 Adjuvant Therapy

In general, women with invasive cancer received more adjuvant therapy than women with non/micro-invasive breast cancer. Of all women with breast cancer, 11,559 (73%) had radiotherapy recorded and 4,228 were recorded as having had no or unknown radiotherapy by the audit cut off date. Eighty one percent of women with invasive cancer, 57% with micro-invasive cancer and 44% with non-invasive cancer had radiotherapy recorded (Table 98). Twenty six percent of women with invasive cancer and 6 with non/micro-invasive cancer (2 of which were micro-invasive and 4 non-invasive) had adjuvant chemotherapy recorded (Table 100). Regional QA reference centres were asked to check whether the latter finding was correct before submitting the data for national collation.

Eighty five percent of women with invasive cancer and 11% of women with non/micro-invasive cancer received endocrine therapy (Table 102). This difference reflects the relatively low proportion of non/micro-invasive cancers known to be ER positive (42% compared with 92% for invasive cancers), and differing opinions regarding the benefit of offering endocrine therapy to women with non-invasive cancer. Some women with non-invasive cancer may have received endocrine therapy as part of a clinical trial. Twenty five (10%) of the women with breast cancer who did not have surgery recorded (Table 104) and 23 (12%) of the 194 women with invasive cancer who did not have surgery, had chemotherapy recorded (Table 105).

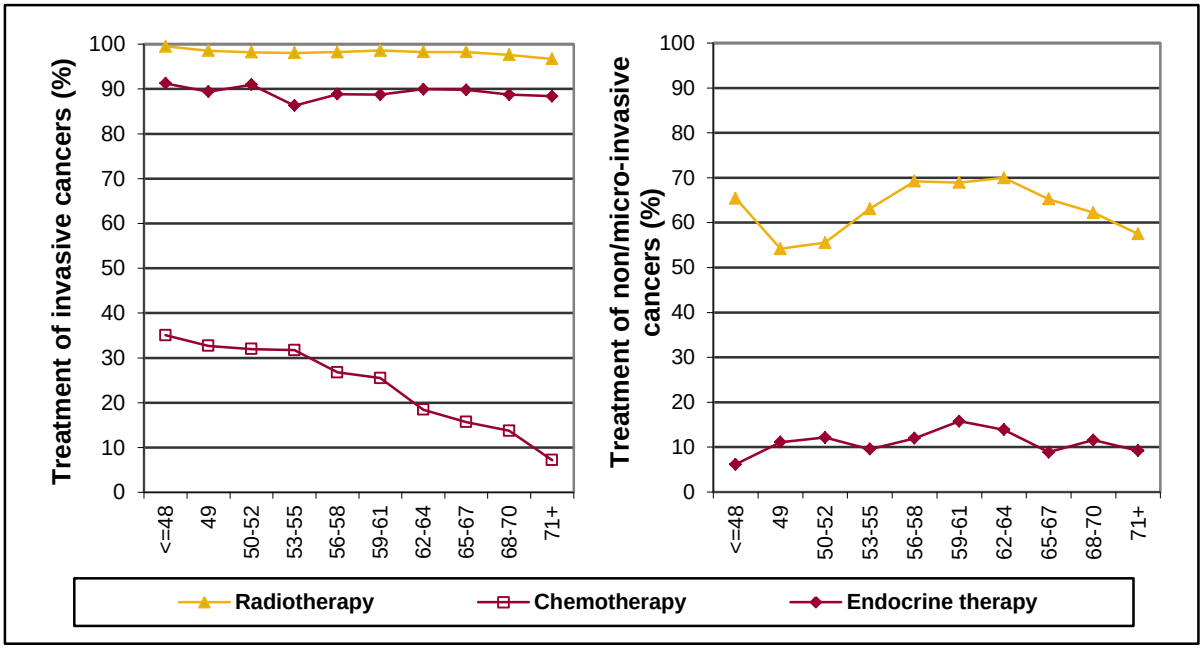

Figure 53 (Table 106) : Percentage of women in each age group treated with BCS who had radiotherapy, chemotherapy and endocrine therapy recorded, for cases with complete adjuvant data
No adjuvant therapy data were provided for Scotland

Figures 53 and 54 show how the level of adjuvant therapy recorded for women with invasive and non/micro-invasive cancers varied with age for 11,371 women treated with breast conserving surgery and for 3,167 women treated with mastectomy. Chemotherapy recorded for women with non-invasive cancer has been excluded because the numbers are small (4 cases) and the accuracy of the data is questionable. Overall, radiotherapy therapy was the main

adjuvant therapy for women with invasive cancer at all ages, followed by endocrine therapy. Sixty eight percent of the 1,099 women with invasive cancer with radiotherapy recorded and no endocrine therapy had ER negative tumours. The proportion of women with invasive cancer treated with breast conserving surgery who received endocrine therapy varied little with age (ranging between 86% and 91%). A slightly smaller proportion of women in every age group treated with mastectomy received endocrine therapy (range 82% to 90%) compared with those who had breast conserving surgery.

Ninety eight percent of women aged 50 to 65 years with invasive cancer treated with breast conserving surgery received radiotherapy, and there was only a 2% decrease in the use of radiotherapy for women aged 71 years and over. Overall, only 37% of women with invasive cancer treated with mastectomy had radiotherapy, and there was a gradual decrease in the use of radiotherapy with age (from around 41% in women aged 50-52 years and below to around 27% in women aged 71 years and older) (Figure 54). The site(s) irradiated (breast/chest wall with/without axilla or other regional nodes) were not recorded in the audit.

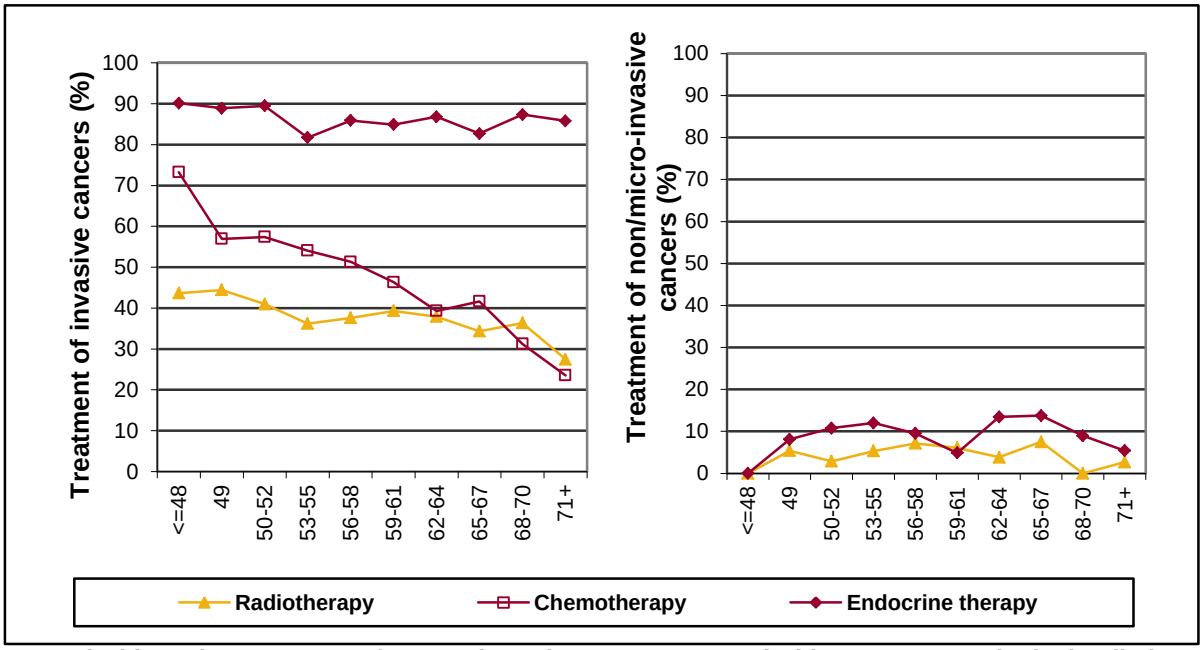

Figure 54 (Table 107): Percentage of women in each age group treated with mastectomy who had radiotherapy, chemotherapy and endocrine therapy recorded, for cases with complete adjuvant data
No adjuvant therapy data were provided for Scotland

For women with non/micro-invasive cancer treated by breast conserving surgery, the use of radiotherapy peaked at 70% for women aged 56-64 years and then fell to 58% for those aged older than 70 years (Figure 53). Four percent of women with non/micro-invasive cancer treated with mastectomy had radiotherapy. The indication for post mastectomy RT for non-invasive cancer would be interesting to note, but was not recorded. The site(s) irradiated (breast/chest wall with/without axilla or other regional nodes) were also not known.

Chemotherapy was the least used adjuvant therapy; being recorded for only 26% of women with invasive cancer (Table 100). 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 compared to those underging breast conserving surgery received chemotherapy (45% compared with 22%) 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 15% 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 37% of women treated with mastectomy aged 65-70 years having chemotherapy recorded compared to 56% of women aged 49-55 years. This may be because a higher proportion of younger women have more aggressive, fast growing cancers, but may also be indicative of a reluctance to prescribe chemotherapy to older women where the risk/benefit balance and clinical effectiveness are perceived to be less clear.

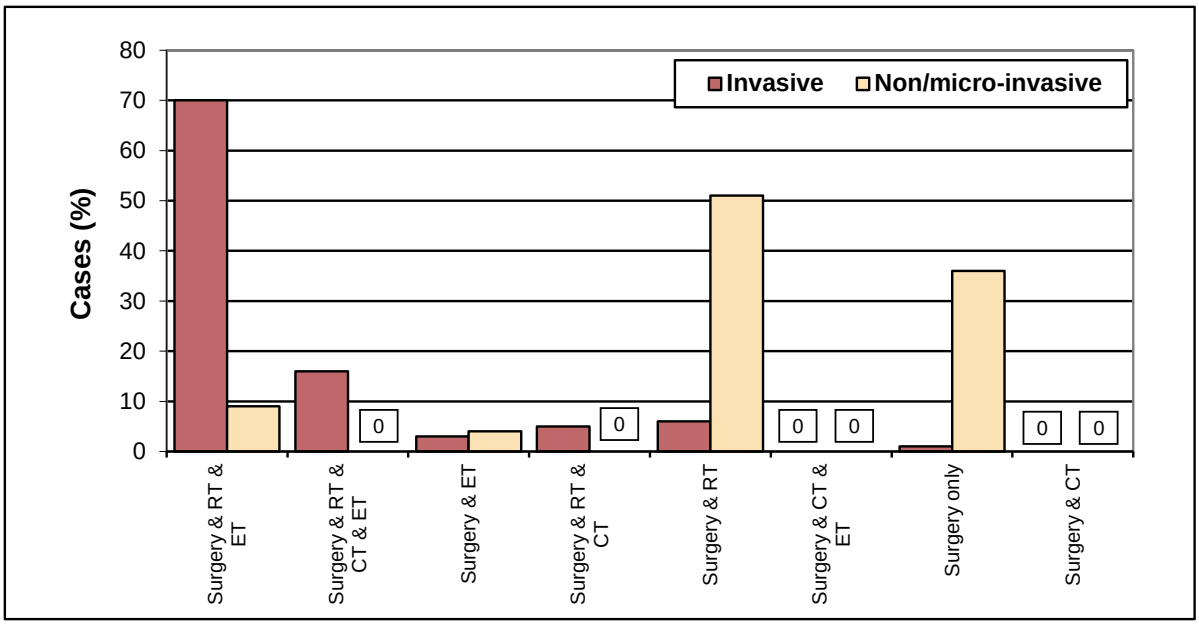

Figure 55 (Table 108): Combinations of treatment for women treated with breast conserving surgery, expressed as a percentage of cases with complete adjuvant therapy data
No adjuvant therapy data were provided for Scotland

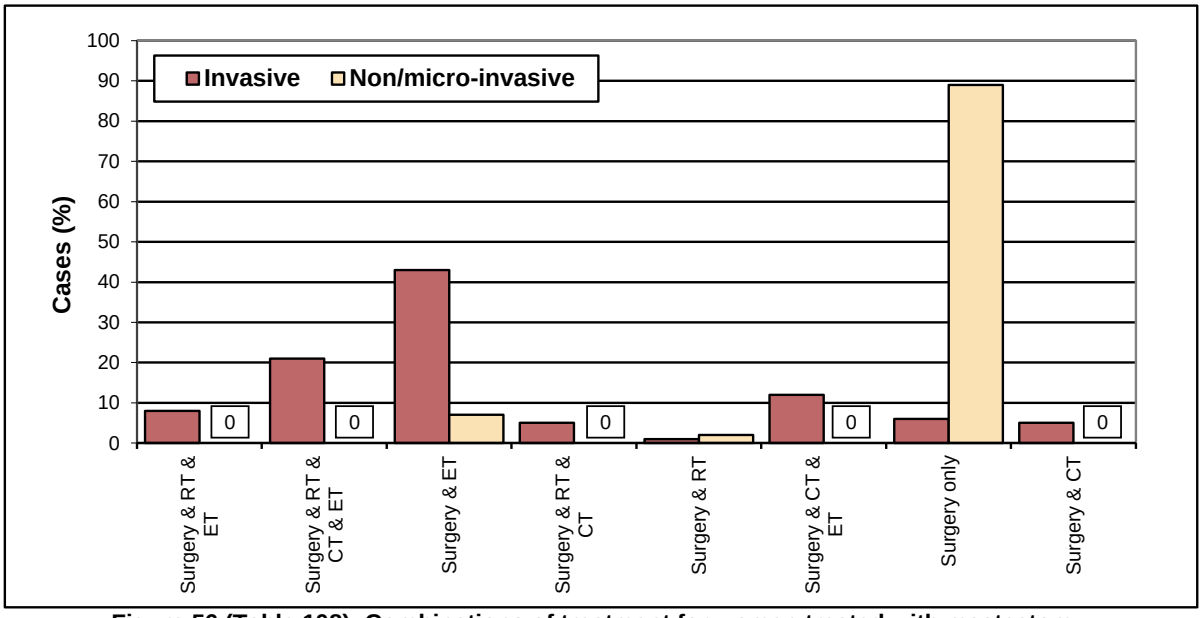

Figure 56 (Table 108): Combinations of treatment for women treated with mastectomy, expressed as a percentage of cases with complete adjuvant therapy data
No adjuvant therapy data were provided for Scotland

Surgery (ST), radiotherapy (RT) and endocrine therapy (ET) as a combination of treatment was the most common treatment pattern for women with invasive cancer treated with breast conserving surgery, with 70% (6,542 women) receiving this treatment combination (Figure 55). Fifty one percent of women with non/micro-invasive cancer treated with breast conserving surgery had surgery with radiotherapy. The second most commonly used treatment combination, received by 36% of the women with non/micro-invasive cancer treated with breast conserving surgery, was surgery alone.

Surgery (ST) and endocrine therapy (ET) was the most common treatment pattern for women with invasive breast cancer treated with mastectomy, with 43% (992 women) receiving this treatment combination (Figure 56). Eighty nine percent of women with non/micro-invasive cancer treated with mastectomy had surgery alone.

KEY FINDINGS

- Of the 16,993 breast cancers detected in 2011/12, 416 were not included in the adjuvant audit because the adjuvant data were not submitted. A further 790 cancers were excluded because of previous breast cancer diagnoses, leaving 15,787 (93%) for analysis.
- Eighty one percent of women with invasive cancer, 57% with micro-invasive cancer and 44% with non-invasive cancer had radiotherapy recorded; 26% of the women with invasive cancer and 6 women with non/micro-invasive cancer had chemotherapy recorded.
- Eighty five percent of women with invasive cancer and 11% with non/micro-invasive cancer had endocrine therapy recorded. Some women with non-invasive breast cancer may have received endocrine therapy as part of a clinical trial.
- Overall, radiotherapy therapy was the main adjuvant therapy for women with invasive cancer at all ages, followed by endocrine therapy. Sixty eight percent of the 1,099 women with invasive cancer with radiotherapy recorded and no endocrine therapy had ER negative tumours.
- The proportion of women with invasive cancer treated with breast conserving surgery who received endocrine therapy varied little with age (ranging between 86% and 91%).
- A slightly smaller proportion of women in every age group treated with mastectomy received endocrine therapy (range 82% to 90%) compared with those who had breast conserving surgery.
- Ninety eight percent of women aged 50 to 65 years with invasive cancer treated with breast conserving surgery received radiotherapy, and there was only a 2% decrease in the use of radiotherapy for women aged 71 years and over. Overall, only 37% of women treated with mastectomy had radiotherapy, and there was a gradual decrease in the use of radiotherapy with age. The site(s) irradiated were not recorded.
- For women with non/micro-invasive cancer treated by breast conserving surgery, the use of radiotherapy peaked at 70% for women aged 56-64 years and then fell to 58% for those aged older than 70. Four percent of women with non-invasive cancer treated with mastectomy had radiotherapy. The site(s) irradiated were not recorded.
- Chemotherapy was the least used adjuvant therapy; being recorded for only 26% of women with invasive cancer. Overall, a higher proportion of women treated with mastectomy received chemotherapy (45% compared with 22%) and this difference was evident in every age group. There was also a clear decrease in the use of chemotherapy with age in both treatment groups.
- Surgery, radiotherapy and endocrine therapy was the most common treatment pattern for women with invasive cancer treated with breast conserving surgery, with 70% receiving this treatment combination. Fifty one percent of women with non/micro-invasive cancer treated with breast conserving surgery had surgery with radiotherapy.
- Surgery and endocrine therapy was the most common treatment pattern for women with invasive cancer treated with mastectomy, with 43% receiving this treatment combination. Eighty nine percent of women with non/micro-invasive cancer treated with mastectomy had surgery only.

8.4 Waiting Time for Radiotherapy

Tables 109 to 112 show the regional variation in the cumulative percentages of women with breast cancer recorded as having various therapies within 14, 30, 60, 90, 120 and 200 days. Women who received chemotherapy after their operation, 3 women who had neo-adjuvant radiotherapy recorded and 17 women who had intra-operative radiotherapy have been excluded.

In Figure 57, 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 England, Wales and Northern Ireland as a whole, 59% of women with invasive cancer received radiotherapy within 60 days of their final surgery and 93% within 90 days. Twenty seven women had not received radiotherapy within 200 days of their final surgery. The right hand graph in Figure 57 shows that 47% of women with invasive cancer and 38% of women with non-invasive cancer with radiotherapy recorded had started their radiotherapy within 90 days of their first assessment visit, and that 212 women (3%) with invasive cancer and 28 women (2%) with non-invasive cancer had not started radiotherapy even after 200 days.

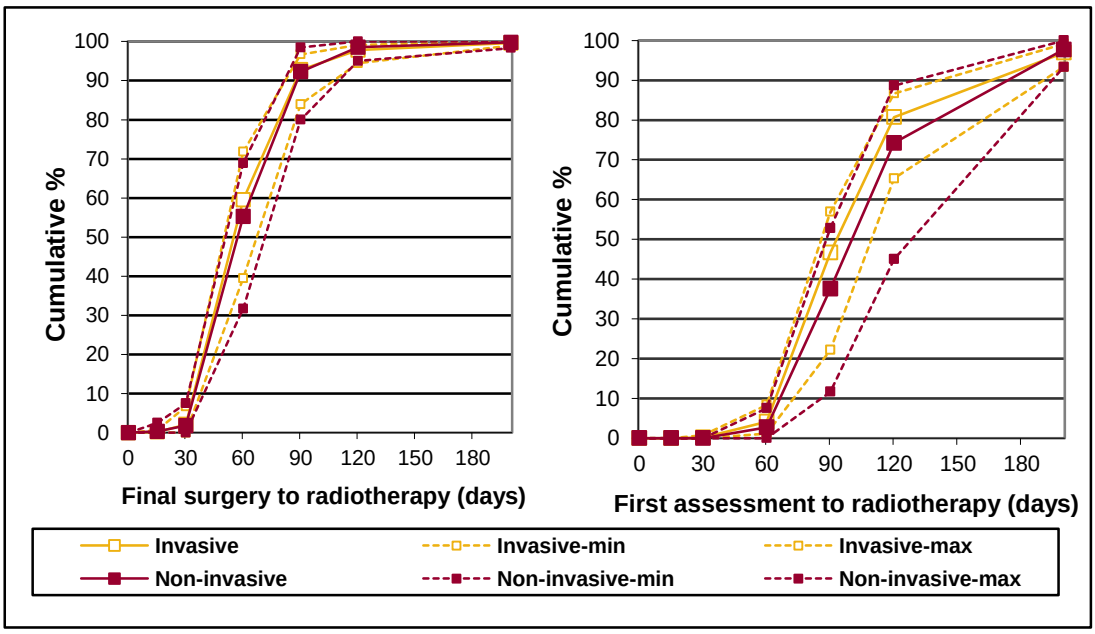

Figure 57 (Table 109 to 112): Cumulative percentage of women with surgery and adjuvant radiotherapy, who had radiotherapy recorded up to 200 days after final surgery (left) and first assessment (right) No adjuvant therapy data were provided for Scotland

Table 113 shows the median number of days from final surgery to radiotherapy in each region for women with invasive cancers excluding women who had chemotherapy or radiotherapy before surgery or intra-operative radiotherapy recorded. The longest times between final surgery and radiotherapy were in South West (64 days) and Northern Ireland (64 days). In the UK as a whole, the median number of days from final surgery to radiotherapy was 56 days for invasive cancers and 57 days for non-invasive cancers.

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 58 shows the proportion of women with invasive cancer in each screening unit who, after having breast conserving surgery, received radiotherapy within 52 days of their final operation. This varied from 97% in 1 small unit to 0 women in 4 units.

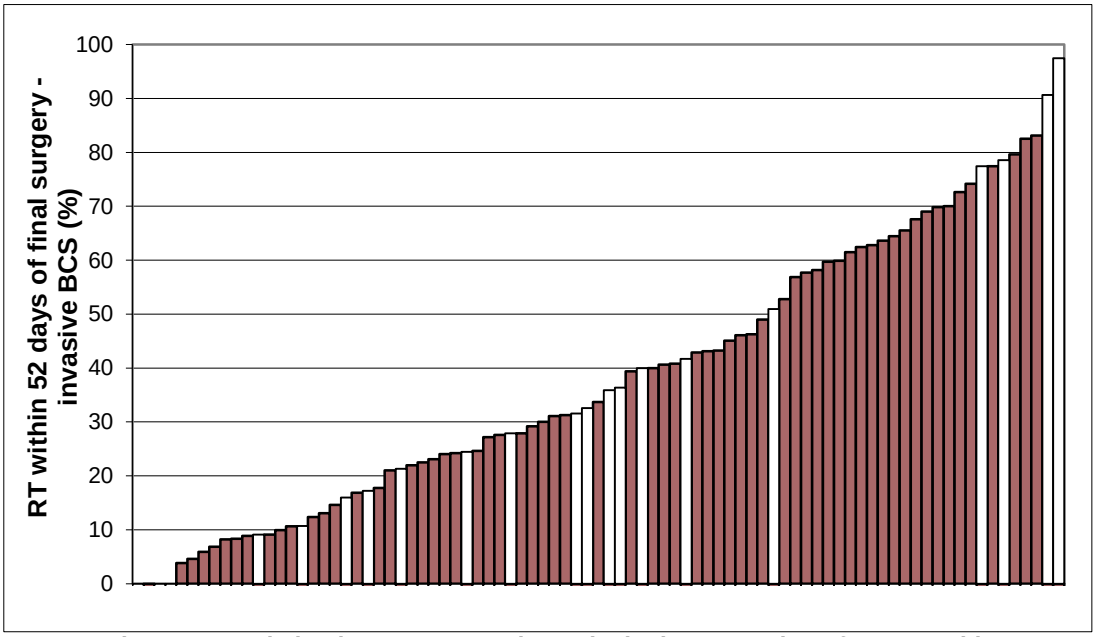

Figure 58: Variation between screening units in the proportion of women with invasive cancer who received radiotherapy within 52 days of their final surgery (18 of the 20 smallest units are highlighted in white: 1 unit was excluded as it had fewer than 10 cases) No adjuvant therapy data were provided for Scotland

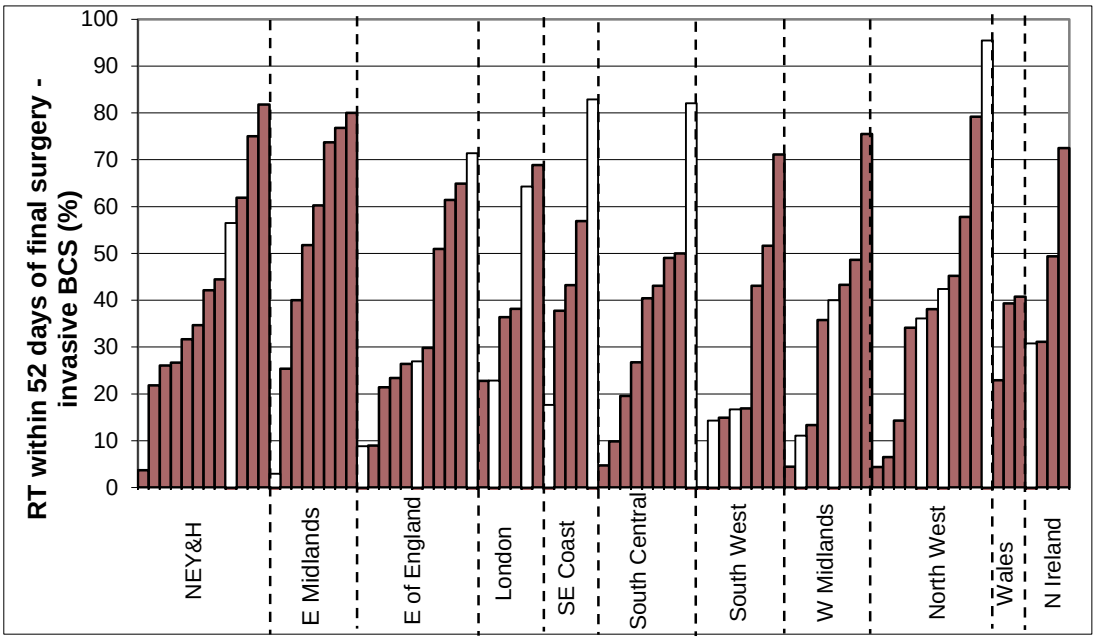

Figure 59: In-region variation between screening units in the proportion of women with invasive cancer who received radiotherapy within 52 days of their final surgery (18 of the 20 smallest units are highlighted in white) No adjuvant therapy data were provided for Scotland

Difficulties with radiotherapy waiting times appear to exist in most but not all of the screening units in all regions (Figure 59). It is important to examine the reasons for such large differences between units, particularly those where women are being referred to the same radiotherapy centre. Overall, these data suggest that if the 31 day standard is to be achieved, considerable reductions in the time between final surgery and radiotherapy will be required in many screening services. Although there is little prospective evidence concerning the possible detrimental effect of delayed radiotherapy, changes to the patient pathway could lead to improvements in radiotherapy waiting times. It will be important to note when a women was first seen by a clinical oncologist after surgery, and the time delay from the 'actioning' the radiotherapy to the actual start date. This may explain whether the delays are because of delays in the first clinic consultation or in getting the radiotherapy planning scan/treatment.

KEY FINDINGS

- Overall, 59% of women with invasive cancer received radiotherapy within 60 days of their final surgery and 93% within 90 days. Twenty seven women had not received radiotherapy 200 days after their final surgery.
- Only 47% of women with invasive cancer and 38% of women with non/micro-invasive cancer had started their radiotherapy within 90 days of their first assessment visit, and 212 women (3%) with invasive cancer had not started radiotherapy after 200 days.
- In the *Cancer Reform Strategy* published in December 2007, a radiotherapy waiting times standard was introduced which specifies that the time between the date when a person is determined to be 'fit to treat' after surgery and the start of radiotherapy should be no more than 31 days. If this standard is to be achieved, considerable reductions in the time between final surgery and radiotherapy will be required in many screening services.
- Although there is little evidence available on the possible detrimental effect of radiotherapy, changes to the patient pathway could lead to improvements in radiotherapy waiting times. It will be important to note when a woman was first seen by a clinical oncologist after surgery, and the time delay from the 'actioning' the radiotherapy to the actual start date. This may explain whether the delays are because of delays in the first clinic consultation or in getting the radiotherapy planning scan/treatment.

8.5 Combinations of Adjuvant Therapy According to Tumour Characteristics

This section examines the adjuvant therapy given to tumours with various prognostic characteristics. It is clear that different screening units follow different protocols. It is hoped that presenting analyses for three specific key performance indicators (KPIs), will allow informative discussions to take place on how to improve clinical practice.

8.5.1 Breast Conserving Surgery and Radiotherapy

Oncology KPI O1

Radiotherapy after breast conserving surgery
1-year and 3-year high outlier units for invasive cancers treated with breast conserving surgery with no or unknown adjuvant radiotherapy

Of the 15,787 eligible breast cancers, 80% were invasive, 1% micro-invasive and 20% non-invasive (Table 114). Seventy seven percent (9,696) of the invasive cancers were treated with breast conserving surgery (Table 115). Of these, 521 (5%) did not have adjuvant radiotherapy

recorded (unknown or confirmed no radiotherapy) (Table 116). Forty one percent of non-invasive cancers (Table 118) and 12% of micro-invasive cancers treated with breast conserving surgery did not have radiotherapy recorded.

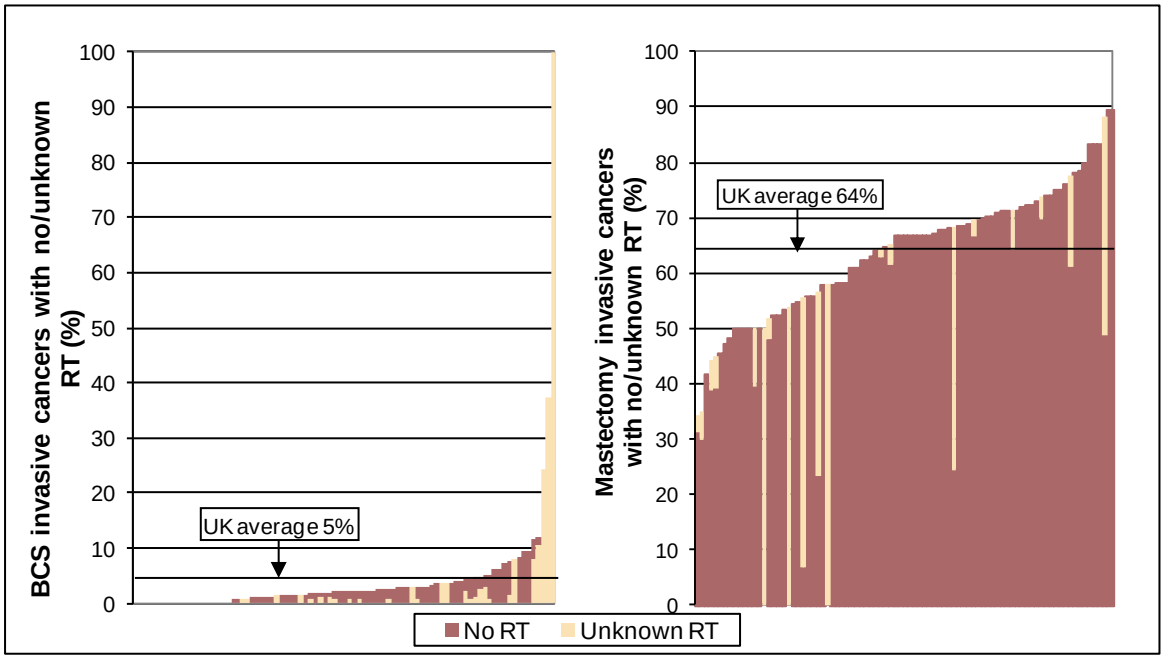

Figure 60 : Variation between screening units in the proportion of invasive cancers treated with breast conserving surgery (left) and mastectomy (right) that have no or unknown radiotherapy recorded. No adjuvant therapy data were provided for Scotland

In 2011/12 the proportion of invasive cancers treated with breast conserving surgery or mastectomy that received radiotherapy varied widely between screening units (Figure 60). The left hand graph in Figure 60 shows that overall, 5% of invasive breast cancers treated with breast conserving surgery in each unit either did not have radiotherapy (180 cancers) or it was not known whether or not radiotherapy had been given (341 cancers). The proportion of invasive cancers with no radiotherapy varied from 0% in 30 units to more than 6% in 7 screening units (2 in East of England, 2 in East Midlands, 1 in London, 1 in North West and 1 in South Central). The proportion of invasive cancers with unknown RT varied from 0% in 59 units to more than 5% in 6 screening units (3 in South East Coast, 1 in East of England, 1 in London and 1 in South West). In the South West unit, all of the 121 invasive cancers treated with breast conserving surgery had unknown radiotherapy.

Overall in 2011/12, 5% (26 cancers) of the invasive cancers treated with breast conserving surgery which had no or unknown radiotherapy were larger than 20mm in diameter, 21% (107 cancers) were Grade 3 and 18% (95 cancers) were node positive (Table 117). Of the 95 node positive cancers, 54 (57%) had only one positive node and of these, 14 had only micro-metastases in the SLNB taken at the first operation.

The right hand graph in Figure 60 shows that 64% of the invasive cancers treated with mastectomy did not receive radiotherapy. This varied from 34% in a unit in West Midlands to 89% in a unit in Wales. Data incompleteness does not appear to be the main reason for this

variation between units. The site(s) irradiated (breast/chest wall with/without axilla or other regional nodes) for invasive cancers receiving radiotherapy were not recorded.

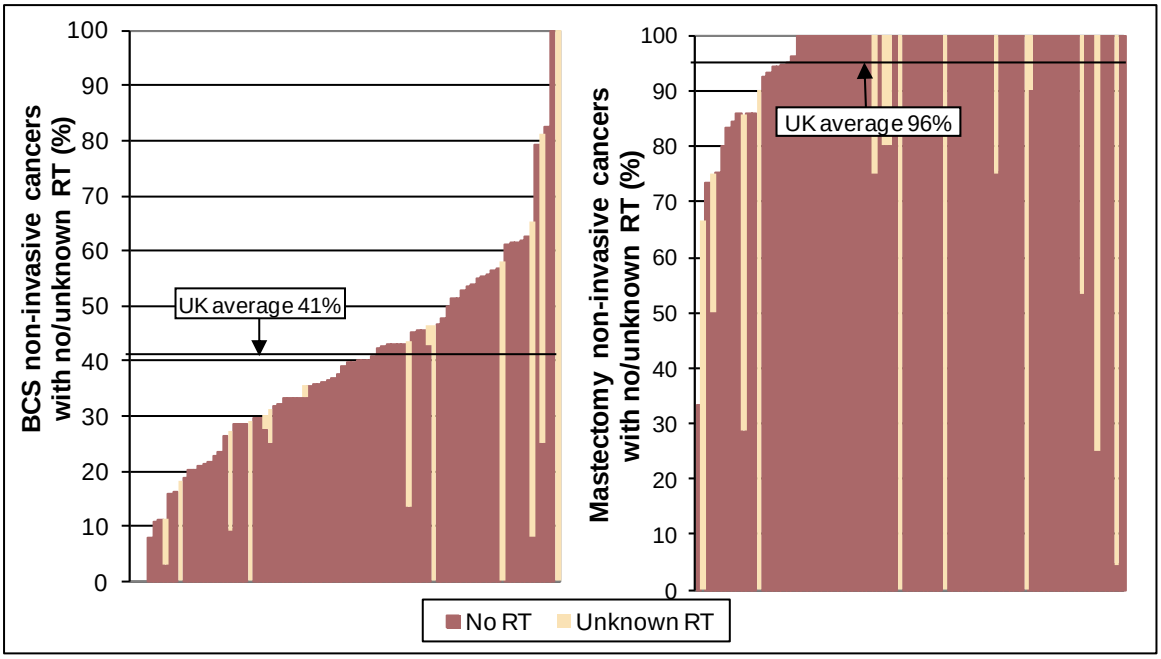

Figure 61: Variation between screening units in the proportion of non-invasive cancers treated with breast conserving surgery (left) and mastectomy (right) that have no/unknown radiotherapy recorded. No adjuvant therapy data were provided for Scotland

Compared with invasive cancers, a higher proportion of non-invasive cancers did not have radiotherapy in both the breast conserving surgery cohort and mastectomy cohort. Of the 2,273 non-invasive cancers treated with breast conserving surgery, 941 (41%) did not have a confirmed adjuvant radiotherapy record (Table 118). This varied from 0% in 4 units treating a total of 53 cancers to 83% and 100% in 2 units in South Central which treated 5 and 23 cancers respectively. In 1 unit in South West, all of the 24 non-invasive cancers treated with breast conserving surgery had unknown radiotherapy.

As expected, and as with invasive cancers, non-invasive cancers which had a mastectomy (96%) (right hand graph in Figure 61) were less likely to receive radiotherapy than those which had breast conserving surgery (41%) (left hand graph in Figure 61). Thirty non-invasive cancers treated with mastectomy had radiotherapy recorded (7 in North East, Yorkshire & Humber, 6 in West Midlands, 5 in London, 4 in Northern Ireland and 2 each in East of England, North West, South East Coast, and South West). For 85 non-invasive cancers treated with mastectomy, it was not known whether or not radiotherapy was given; 52 (61%) of these were in South East Coast and 16 (19%) in South West.

The significance of the variation between screening units in the proportion of invasive cancers treated with breast conserving surgery which did not have radiotherapy or had unknown radiotherapy over the 3-year period 2009/10-2011/12 is examined in the control chart in Figure 62 in which the dotted and dashed lines in are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average rate (solid line). In this chart, data for 2009/10 have been updated with the additional data collected by regional QA

reference centres in the two radiotherapy audits that have been undertaken since the original data were published in the two annual audit reports. Women with previous breast cancers have been excluded for all 3 years. Eleven units lie above the 95% upper control limit (9 above the 99.7% control limit) and had significantly lower rates of radiotherapy. For 4 units (2 in South East Coast, 1 in East of England and 1 in South West) more than 9% of cancers had unknown radiotherapy (blue open diamonds in Figure 62). Of the other 99.7% outlier units, 3 were in London, 1 in South Coast and 1 in South West. The two units between the 99.7% and 95% control limits were in North West and South East Coast.

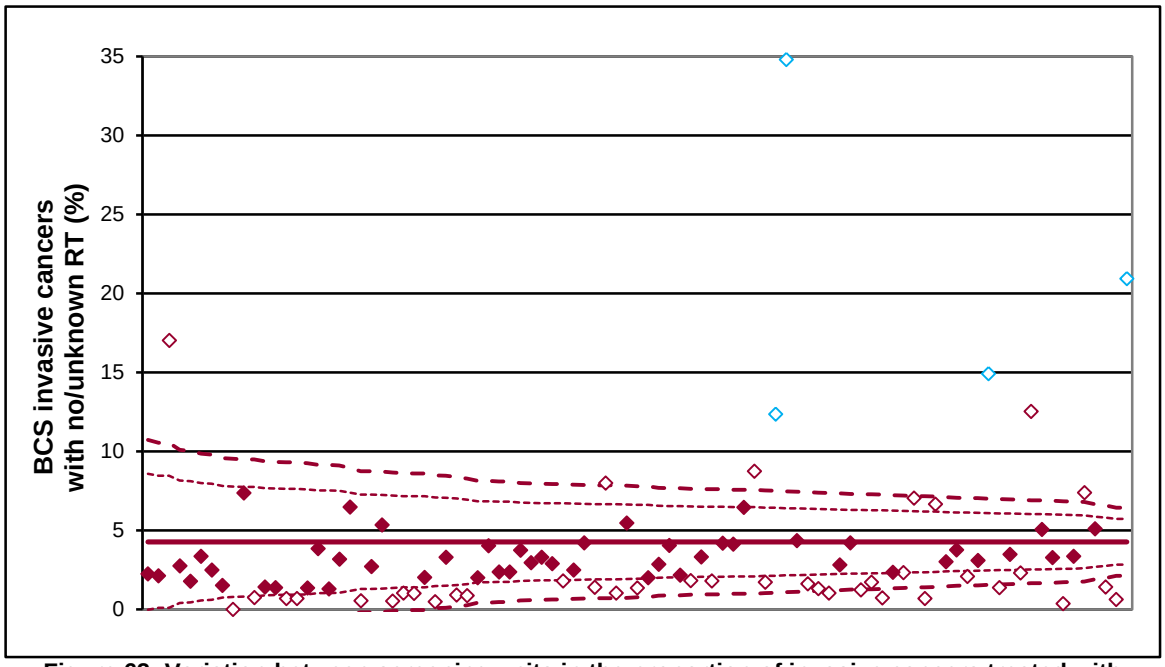

Figure 62: Variation between screening units in the proportion of invasive cancers treated with breast conserving surgery that have no or unknown radiotherapy (2009/10-2011/12) (Open diamonds represent units which lie outside the control limits - high outliers in blue line diamond had 10% or more cancers with unknown RT)

In 2012/13, 941 non-invasive cancers treated with breast conserving surgery had no or unknown radiotherapy recorded. Twenty one percent (198 cancers) of these were high cytonuclear grade (Table 119) and 14 (1%) were more than 40mm in diameter (Table 120). The significance of the variation between screening units in the proportion of non-invasive high cytonuclear grade cancers treated with breast conserving surgery which had no or unknown radiotherapy over the 3-year period 2009/10-2011/12 is examined in the control chart in Figure 63, in which the dotted and dashed lines in are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average rate (solid line). Fifteen units (6 in South West, 4 in South Central, 2 in London, 2 in South East Coast and 1 in West Midlands) had significantly higher proportions of cancers with no or unknown radiotherapy (15 above the 95% and 10 above the 99.7% upper control limit). Two units in South West had more than 30% of high grade non-invasive cancers with unknown radiotherapy (blue open diamond in Figure 63). These units were not high outliers in 2010/11 when their radiotherapy data were complete. The 4 highest outlier units (3 in South West and 1 in South Central) had more than 50% of high grade non-invasive cancers with no radiotherapy recorded.

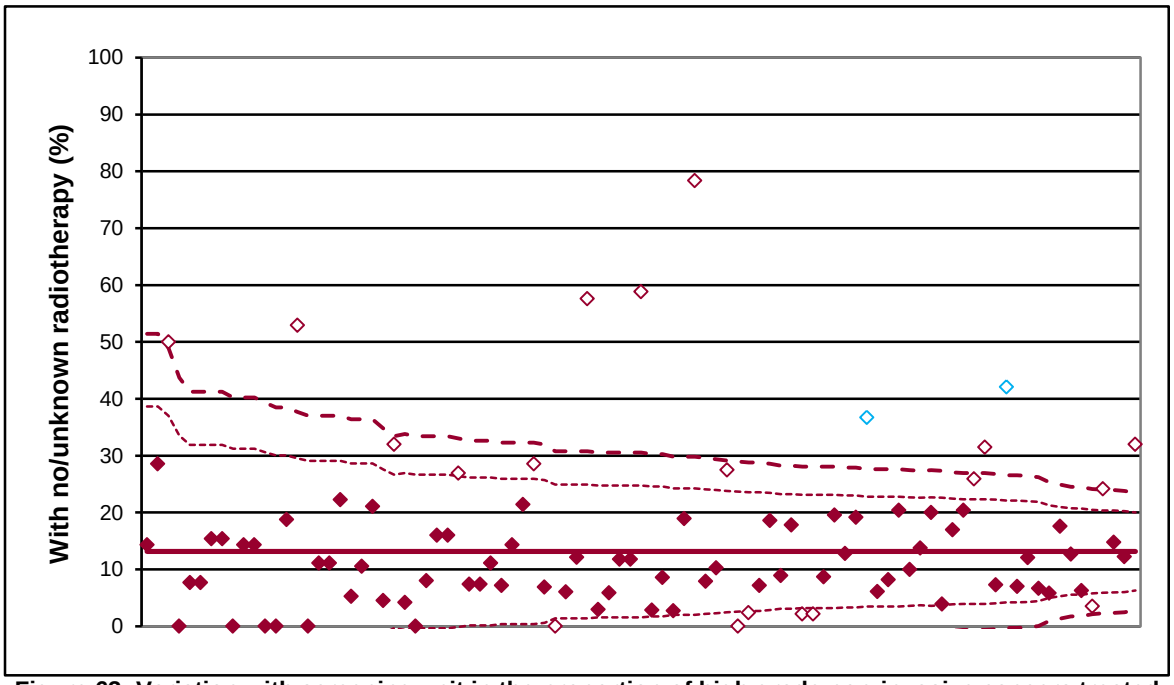

Figure 63: Variation with screening unit in the proportion of high grade non-invasive cancers treated With breast conserving surgery that did not receive radiotherapy (2009/10-2011/12)
(Open diamonds represent units which lie outside the control limits
- high outliers in blue open diamond had more than 30% of cancers with unknown radiotherapy)

Provided that the tumour margins were adequate, it may be acceptable for non-invasive 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.

KEY FINDINGS

- In 2011/12, 95% of invasive cancers, 88% of micro-invasive cancers and 59% of non-invasive cancers treated with breast conserving surgery had adjuvant radiotherapy.
- Thirty six percent of invasive cancers and 4% of non-invasive cancers treated with mastectomy had adjuvant radiotherapy.
- One hundred and ninety eight non-invasive cancers without radiotherapy recorded were high cytonuclear grade and 14 were more than 40mm in diameter.
- In the 3-year period 2009/10-2011/12, 15 units (6 in South West, 4 in South Central, 2 in London, 2 in South East Coast and 1 in West Midlands) had significantly higher proportions of high grade non-invasive cancers with no or unknown radiotherapy. Two units in South West had more than 30% with unknown radiotherapy. These units were not high outliers in 2010/11 when their radiotherapy data were complete. The 4 highest outlier units (3 in South West and 1 in South Central) had more than 50% of high grade non-invasive cancers with no radiotherapy recorded.
- Five percent of the 521 conservatively treated invasive cancers which did not have radiotherapy recorded were larger than 20mm in diameter, 21% were Grade 3 and 18% were node positive. Of the latter, 14 had only one positive node containing micro-metastases.
- In the 3-year period 2009/10-2011/12, 11 screening units had significantly lower rates of radiotherapy recorded for invasive cancers treated with breast conserving surgery. In 4 of these (2 in South East Coast, 1 in East of England and 1 in South West) more than 9% of cancers had unknown radiotherapy. Of the other outlier units, 3 were in London, 1 in North West, 1 in South East Coast. 1 in South Coast and 1 in South West.

Oncology KPI O1

Radiotherapy after breast conserving surgery
1-year and 3-year high outlier units for invasive cancers treated with breast conserving surgery with no or unknown adjuvant radiotherapy

Region	Unit	No RT after BCS invasive 3-year 2008/09-2010/11 %	No or unknown RT after BCS invasive 2011/12 %	No or unknown RT after BCS invasive 3-year 2009/10-2011/12 No.	No or unknown RT after BCS invasive 3-year 2009/10-2011/12 %	Outcome of QARC audit
Units audited in 2013*						
East of England	ELD	*10.5*	*6.1*	67	*12.5*	No reasons supplied by referral hospitals
London	EBA	*5.0*	*4.6*	33	*5.1*	3 valid reason, 10 recurrences, 29 no
London	FLO	*10.4*	*8.5*	30	*8.8*	19 valid reason, 14 patient choice, 2 no
London	GCA	*9.4*	*1.9*	43	*7.5*	30 data errors, 6 valid reason, 6 patient
North West	PLN	*9.9*	*2.4*	30	*6.7*	1 trial patient, 2 patients declined, 1 data error, remainder MDT decision
South Central	JPO	*9.5*	*2.3*	22	*6.5*	2011/12 data improved - no action required
South Central	JSO	*17.5*	*0.0*	16	*5.4*	2011/12 data improved - no action required
South Central	JIW	*20.7*	*9.4*	16	*17.0*	QARC to continue to monitor
South East Coast	HGU	*5.9*	*37.3*	166	*20.9*	2011/12 data improved - no action required
South West	LPL	*5.9*	*1.0*	9	*3.3*	2011/12 data improved - no action required
South West	LED	*8.7*	*5.2*	23	*8.0*	High proportion of elderly patients do not wish to travel for RT
Northern Ireland	ZNE1	*6.0*	*0.9*	10	*3.7*	No report available
New units to audit in 2014**						
East of England	DSW	*4.5*	*11.8*	11	*6.5*	
London	FBH	*3.5*	*12.0*	44	*12.4*	
South East Coast	GBR	*4.8*	*7.9*	31	*7.0*	
South East Coast	HWO	*3.1*	*24.1*	74	*14.9*	
South West	LGL	*1.9*	*100.0*	127	*34.8*	

*No RT after BCS invasive
** No or unknown RT after BCS invasive

99.7% high outlier
95% high outlier

Of the twelve 3-year high outlier units in the previous audit in 2013 (2008/09-2010/11 data), 7 were still 3-year high outliers in this year's audit which examined invasive cancers treated with breast conserving surgery with no or unknown radiotherapy. Of these 7 units, 1 was a high outlier in 2011/12, the most recent year examined. Four other units which were not 3-year high outliers in the 2013 audit were high outliers this year; 3 of these were high outliers in 2011/12, and had high levels of unknown radiotherapy rather than no radiotherapy. One further unit was a 95% high outlier in 2011/12. Regional QA reference centres should follow up the units that are high outliers for no and unknown radiotherapy in 2011/12 and in 2009/10-2011/12 to ascertain the reason for this unusual clinical practice. Reasons for 'no' and 'unknown' radiotherapy following breast conserving surgery for invasive disease in units which remain high outliers or who have not responded to audit requests continue to be pursued by NHSBSP audit processes.

8.5.2 ER Status and Endocrine Therapy

Oncology KPI O2	**Endocrine therapy for ER positive invasive cancers** 1-year and 3-year high outlier units for ER positive invasive cancers with NPI >3.4 with no adjuvant endocrine therapy

Unlike data for surgery and radiotherapy, endocrine therapy data are not collected electronically in routine national datasets and may have to be obtained from clinic letters/notes etc. The duration and compliance of endocrine therapy is as important as the fact of knowing that endocrine therapy was given, but this information is once again hard to obtain.

NICE Clinical Guideline 80 Early and locally advanced breast cancer: Diagnosis and treatment (2009) states: "The benefit from endocrine therapy with Tamoxifen or an aromatase inhibitor in low-risk breast cancer (for example small tumours <2 cm, grade 1, lymph node-negative) is very small and needs to be weighed with the effects on quality of life (and indeed whether the patient reliably takes the medication)".

Of the 15,787 breast cancer patients included in the adjuvant therapy analysis for England, Wales and Northern Ireland, 12,777 (81%) were ER positive, 1,306 (8%) ER negative and for 1,704 (11%) either the ER status was not tested or the ER status was unknown (Table 121). Ninety percent of the ER positive cancers with known endocrine therapy data were invasive and 10% non/micro-invasive (Table 122). Four hundred and forty four (4%) ER positive invasive cancers did not have endocrine therapy recorded and 428 (4%) had no information on endocrine therapy (Table 123).

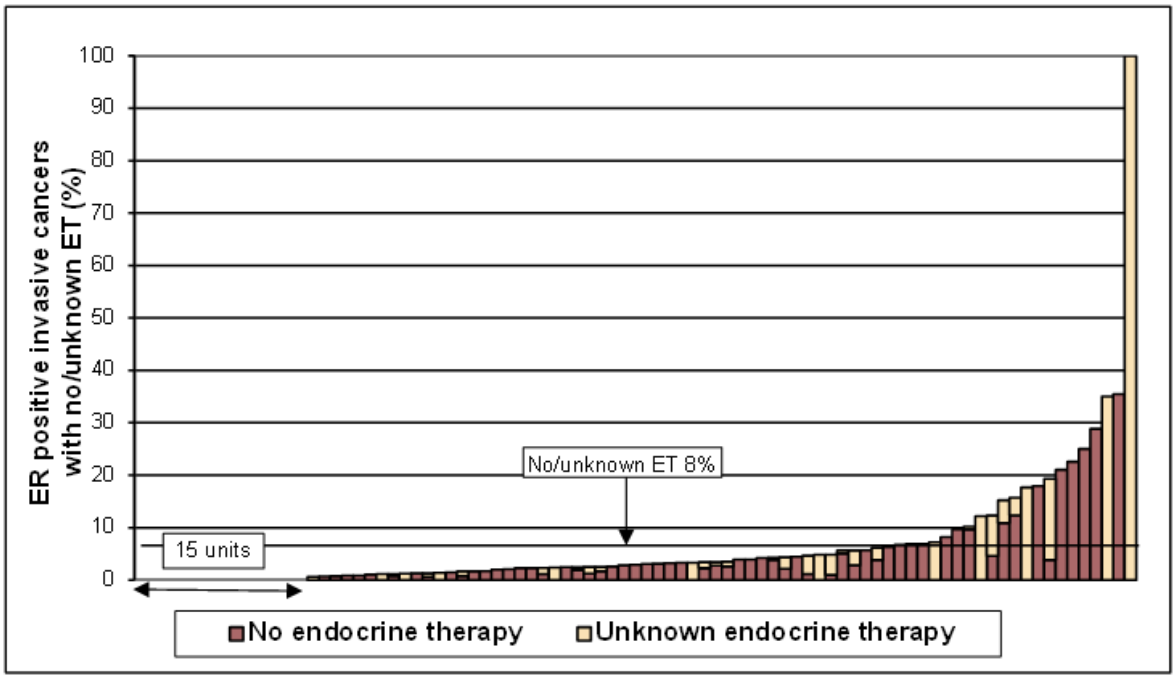

Figure 64: Variation between screening units in the proportion of ER positive, invasive cancers that have no or unknown endocrine therapy recorded (12 of the 20 smallest units are highlighted in white) No adjuvant therapy data were provided for Scotland

Figure 64 shows the proportion of ER positive invasive cancers in each screening unit which had no or unknown endocrine therapy recorded in 2011/12. This varied from 0 cancers in 15 units to a unit in South East Coast where 35% of cancers had unknown endocrine therapy and a unit in South West where endocrine therapy data were not available for any invasive cancers. In 7 units (2 in East Midlands, 2 in North East, Yorkshire & Humber, 2 in South West and 1 in South East Coast) more than 20% of invasive cancers had no or unknown endocrine therapy. Overall, 143 (16%) of the ER positive invasive cancers that had no/unknown endocrine therapy were Grade 3, 143 (16%) were node positive and 49 (6%) were larger than 20mm in diameter (Table 124).

Figure 65 shows how the proportion of ER positive invasive cancers with NPI score >3.4 with no or unknown endocrine therapy varied between screening units in 2011/12. This varied from 0 cancers in 39 units to a unit in South East Coast where 30% of cancers had unknown endocrine therapy and a unit in South West where endocrine therapy data were not available for any invasive cancers.

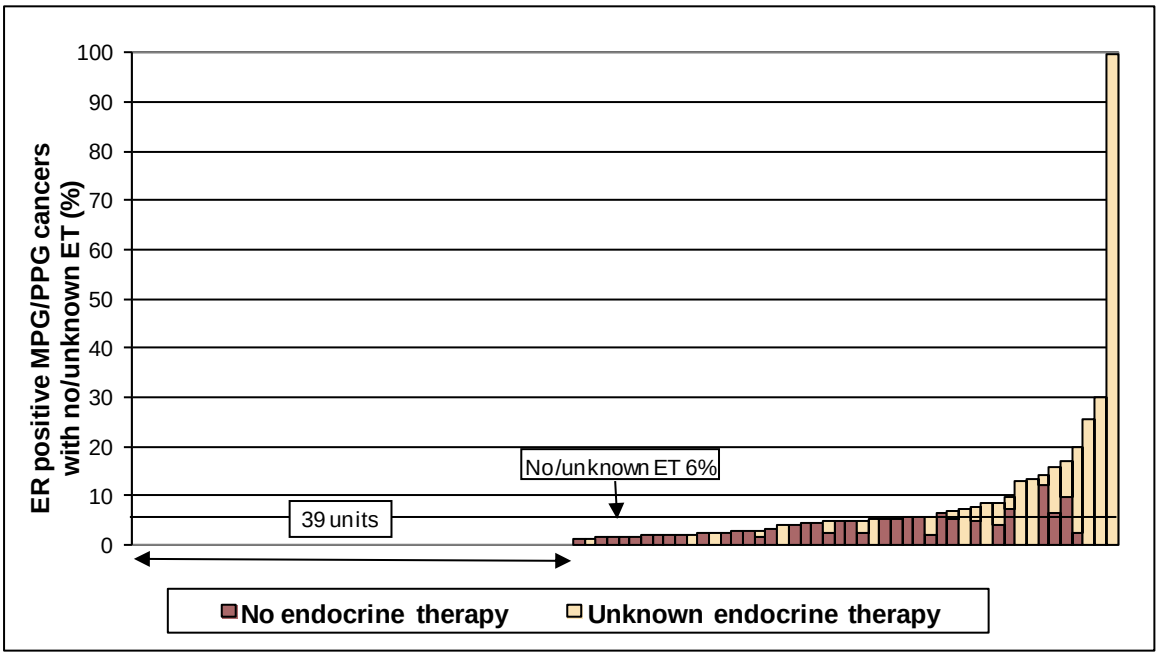

Figure 65: Variation between screening units in the proportion of ER positive, invasive cancers with NPI >3.4 that have no or unknown endocrine therapy recorded (12 of the 20 smallest units are highlighted in white) No adjuvant therapy data were provided for Scotland

The significance of the variation between screening units in the proportion of ER positive invasive cancers with NPI score >3.4 with no or unknown endocrine therapy over the 3-year period 2009/10-2011/12 is examined in the control chart in Figure 66 in which the dotted and dashed lines in are the upper and lower control limits which approximate to the 95% and 99.7% confidence intervals of the average rate of 5% (solid line). Eleven units lie above the 95% control limit (8 above the 99.7% control limit). Three of the outlier units had more than 30% cancers with unknown endocrine therapy in 2011/12.

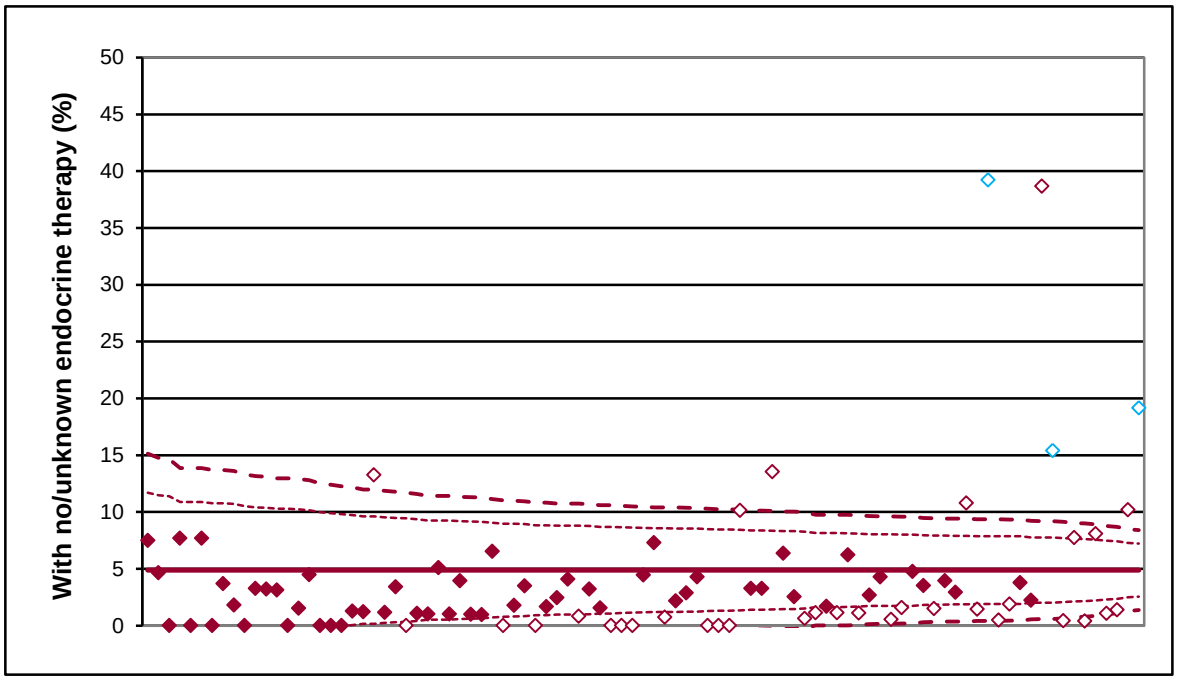

Figure 66: Variation with screening unit in the proportion of ER positive invasive cancers with NPI >3.4 that did not receive endocrine therapy (2009/10-2011/12)
(Open diamonds represent units which lie outside the control limits
- high outliers in blue open diamonds had more than 30% of cancers with unknown endocrine therapy in 2011/12)

Overall, 17 (35%) ER negative, PR positive invasive cancers had no or unknown endocrine therapy recorded (Table 125) and 52 ER negative cancers (4%) did have endocrine therapy recorded (Table 126). Thirty two (62%) of the latter were PR positive invasive cancers.

NICE Clinical Guideline 80 Early and locally advanced breast cancer: Diagnosis and treatment (2009) states that Tamoxifen should not be offered to women with non-invasive breast cancer. In England, Wales and Northern Ireland in 2011/12, 27% of ER positive non/micro-invasive cancers (343 cancers) had endocrine therapy (Table 127). The use of endocrine therapy for ER positive non/micro-invasive cancers varied widely between screening units from 0% in 29 units to 100% (21 cancers) in a unit in London and 88% (34 cancers) in a unit in South Central.

KEY FINDINGS

- The decision to give endocrine therapy did appear to be dependent on ER and PR status. However in 2011/12, 444 (4%) ER positive invasive cancers had no endocrine therapy and 428 (4%) had unknown endocrine therapy. In addition 17 (35%) ER negative PR positive invasive had no or unknown endocrine therapy.
- Overall in 2010/11, 27% of ER positive non/micro-invasive cancers had endocrine therapy. This varied widely between screening units.
- Over the 3-year period 2009/010-2011/12, 11 units had a significantly higher proportion of ER positive invasive cancers with NPI.3.4 with no or unknown endocrine therapy.

Oncology KPI O2	**Endocrine therapy for ER positive invasive cancers** 1-year and 3-year high outlier units for ER positive invasive cancers with NPI >3.4 with no adjuvant endocrine therapy

Region	Unit	<90% ET invasive ER +ve NPI>3.4 2010/11	No or unknown ET invasive ER +ve NPI >3.4 2011/12	No or unknown ET invasive ER +ve NPI >3.4 (%) 3-year 2009/10-2011/12		Outcome of QARC audit
		%	%	No.	%	
Units audited in 2013						
East of England	ELD	*47.0*	*2.3*	87	*38.7*	No response from treating hospitals
East of England	FEP	*83.3*	*5.6*	4	*7.7*	Cases in private hospitals, no data available
London	EBA	*89.7*	*14.3*	33	*10.2*	No response from treating hospitals
North West	PBO	*88.0*	*4.8*	10	*7.3*	Issue discussed at annual surgical meeting
North West	PLN	*88.2*	*1.4*	22	*10.8*	Issue discussed at annual surgical meeting
South Central	JIW	*88.9*	*5.6*	2	*4.7*	Patient choice (1 case)
New units to audit in 2014						
East of England	DSW	*92.3*	*15.6*	11	*13.3*	
London*	FBH	*87.0*	*0.0*	21	*13.5*	
London*	HWA	*88.6*	*2.5*	21	*8.1*	
North West	NWA	*96.0*	*17.1*	15	*10.1*	
South East Coast*	HGU	*85.5*	*29.9*	65	*19.2*	
South East Coast*	HWO	*86.9*	*25.6*	35	*15.4*	
South West	LGL	*100.0*	*100.0*	82	*39.2*	
West Midlands	MCO	*98.8*	*20.0*	19	*7.8*	

less than 90% with ET in 2010/11

99.7% high outlier

95% high outlier

* These units were not outliers in the 2013 audit when cancers with unknown ET were not included in the calculations

Of the 6 units in the previous audit in 2013 (2010/11 data) with fewer than 90% of ER positive invasive cancers with NPI >3.4 with endocrine therapy recorded, 3 were 3-year high outliers for invasive cancers with NPI >3.4 with no or unknown endocrine therapy in 2009/10-2011/12 and 1 was a 1-year high outlier in 2011/12. Eight other units were 3-year high outliers in this year's audit (2009/10-2011/12 data). Six of these were high outliers in 2011/12, and 4 had high levels of unknown endocrine therapy rather than no endocrine therapy. Four of the 8 units would have been selected for audit in 2013 if unknown endocrine therapy had been included as well as no endocrine therapy.

Decisions regarding the provision of endocrine therapy to ER positive invasive cancers with NPI>3.4 should take into account age and comorbidity in order to make a judgement on the relative risks and benefits to an individual patient, and it may be that all of the patients without endocrine therapy recorded were treated appropriately. However, regional QA reference centres should follow up the 7 units that are high outliers in 2011/12 for no and unknown endocrine therapy for ER positive invasive cancers with NPI>3.4 to ascertain the reason for this unusual clinical practice. Reasons for 'no' and 'unknown' endocrine therapy in cases of invasive disease (NPI>3.4) in units which remain outliers or who have not responded to audit requests continue to be pursued by NHSBSP audit processes.

8.5.3 Node Positive Invasive Cancers and Chemotherapy

Oncology KPI O3	**Chemotherapy for node positive invasive cancers** 1-year and 3-year high outlier units for node positive (macro-metastases) invasive cancers with no adjuvant chemotherapy

In 2011/12, of the 15,787 eligible cancers, 2,652 (17%) were node positive invasive cancers and, of these, 802 (30%) had no chemotherapy and 124 (5%) had unknown chemotherapy (Table 128). Of the 926 node positive invasive cancers with no or unknown chemotherapy, 230 (25%) had micro-mets, 29 (3%) were ER negative (Table 129), 95 (10%) were Grade 3 (18% of these had micro-mets) and 32 (3%) were HER2 positive (9% of these had micro-mets). Five hundred and thirty four of the 926 cancers were diagnosed in women aged less than 65 years. These 534 cancers accounted for only 29% of all the node positive invasive cancers in women in this age group. In contrast, in women aged 65 years and above, the 392 cases without chemotherapy recorded constituted 50% of all node positive invasive cancers. In women aged less than 65 years, 29% of node positive invasive cancers with no chemotherapy recorded were known to have micro-mets compared with 22% in women aged 65 years and older.

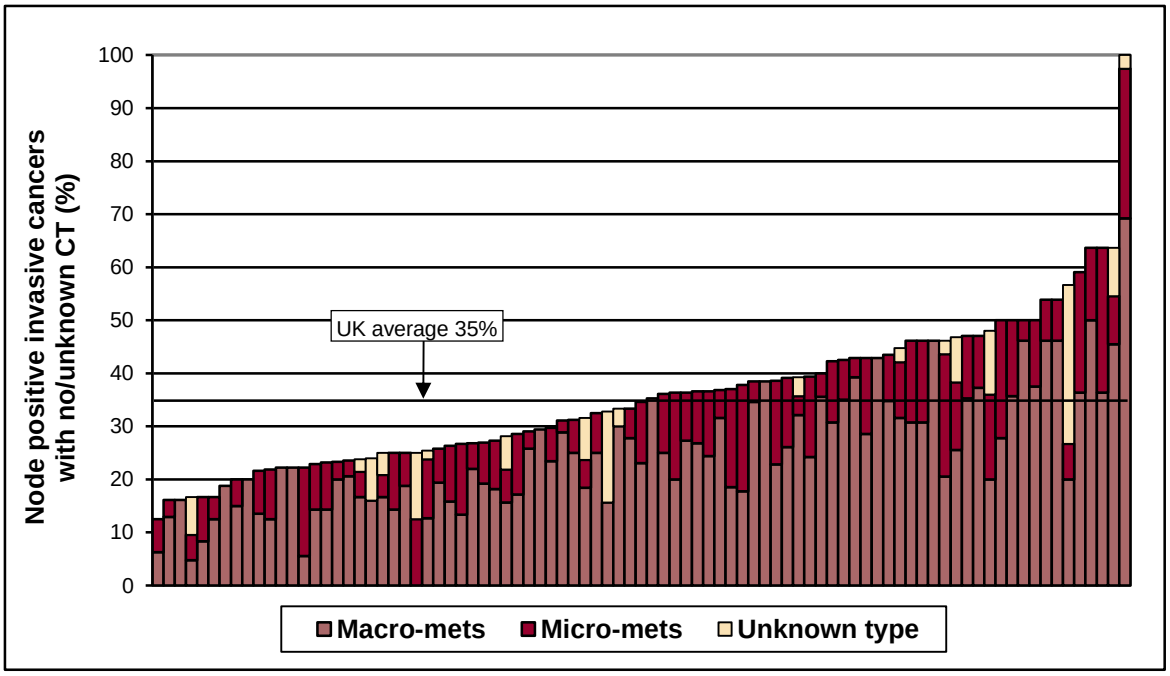

Figure 67: Variation between screening units in the proportion of node positive invasive cancers (macro and micro-mets) that have no/unknown chemotherapy recorded
(19 of the 20 smallest units are highlighted in white)
No adjuvant therapy data were provided for Scotland

Figure 67 shows the proportion of node positive invasive breast cancers with macro and micro-mets in each screening unit in 2011/12 which had no or unknown chemotherapy. In 8 units, 50% or more of the node positive invasive breast cancers had no or unknown chemotherapy. In 1 unit in South West, all 39 cancers had unknown chemotherapy. When the significance of the variation between screening units in the proportion of node positive invasive cancers with macro-mets which had no or unknown chemotherapy over the 3-year period 2009/10-2011/12 was

examined in a control chart (Figure 68), 12 units were high 95% outliers (8 were high 99.7% outliers) and 13 were low 95% outliers (4 were low 99.7% outliers). In 2 of the high outlier units (1 in South East Coast and 1 in South West), more than 45% of node positive cancers with macro-mets had unknown chemotherapy in 2011/12.

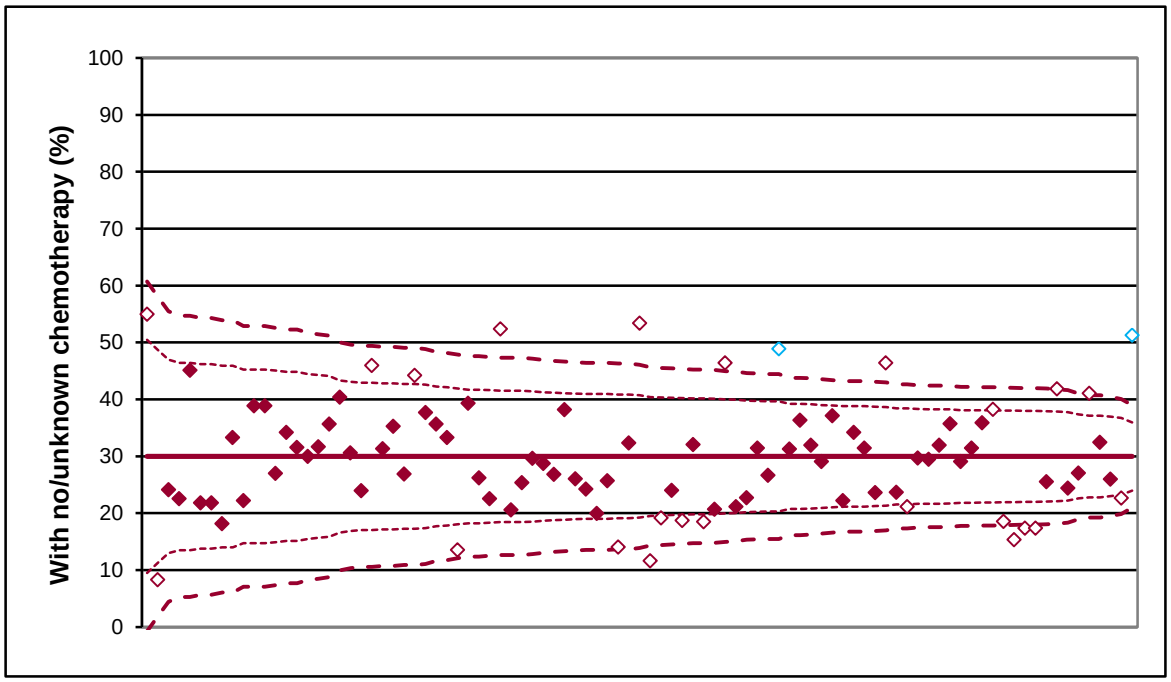

Figure 68: Variation with screening unit in the proportion of node positive invasive cancers with macro-mets that did not receive chemotherapy (2009/10-2011/12)
(Open diamonds represent units which lie outside the control limits
- high outliers in blue open diamond had more than 45% of cancers with unknown chemotherapy in 2011/12)

KEY FINDINGS

- Thirty five percent of women with node positive invasive cancers did not have chemotherapy recorded. Of these, 802 (30%) had no chemotherapy and 124 (5%) had unknown chemotherapy.
- Of the 926 node positive invasive cancers with no or unknown chemotherapy, 230 (25%) had micro-mets, 29 (3%) were ER negative, 95 (10%) were Grade 3 (18% of these had micro-mets) and 32 (3%) were HER2 positive (9% of these had micro-mets).
- Twenty nine percent of women aged less than 65 years with a node positive invasive cancer had no or unknown chemotherapy, compared to 50% of women aged 65 years and above.
- In 2010/11, in 8 screening units 50% or more of their node positive invasive breast cancers had no or unknown chemotherapy. In 1 unit in South West, all 39 cancers had unknown chemotherapy.
- Over the 3-year period 2009/10-2011/12, 12 units had significantly higher proportions of node positive cancers with macro-mets with no or unknown chemotherapy. In 2 of these units (in South East Coast and 1 in South West), more than 45% of node positive cancers with macro-mets had unknown chemotherapy in 2011/12.

Oncology KPI O3

Chemotherapy for node positive invasive cancers
1-year and 3-year high outlier units for node positive (macro-metastases) invasive cancers with no adjuvant chemotherapy

Region	Unit	50% or more invasive node +ve (macro-mets) no/unknown CT 2010/11 %	Invasive node +ve (macro-mets) no/unknown CT 2011/12 %	Invasive node +ve (macro-mets) no/unknown CT 3-year 2009/10-2011/12 No.	%	Outcome of QARC audit
Units audited in 2013						
East of England	DCB	*61.1*	*29.4*	24	*39.3*	Patient choice (8), other health factors (6),
East of England	DSW	*54.6*	*40.0*	19	*40.4*	PREDICT or Adjuvant on line show little
East of England	FSO	*50.0*	*48.0*	39	*53.4*	benefit (12)
NEYH	CSH	*53.3*	*21.7*	19	*28.8*	2011/12 data improved - no action required
South Central	JIW	*57.1*	*33.0*	11	*55.0*	Patient choice
Northern Ireland	ZNI1	*50.0*	*22.2*	14	*38.9*	No report available
Northern Ireland	ZNW1	*66.7*	*21.4*	11	*33.3*	
New units to audit in 2014						
London	ECX	*39.5*	*42.2*	57	*41.9*	
London	FBH	*46.4*	*37.0*	39	*46.4*	
NEYH	BYO	*39.3*	*39.0*	52	*46.4*	
North West**	PLE	*50.0*	*57.9*	33	*52.4*	
South East Coast	HGU	*45.5*	*54.9*	120	*51.3*	
South West	LGL	*16.7*	*100.0*	44	*48.9*	
South West	LAV	*35.4*	*44.4*	49	*38.3*	
South West	LCO	*44.4*	*47.1*	23	*44.2*	
South West	LTB	*22.2*	*60.0*	14	*45.2*	
Scotland*	Unit 1	*41.3*	-	67	*41.1*	

50% or more with no or unknown in 2010/11 — 99.7% high outlier

95% high outlier

* Scotland did not provide adjuvant audit data for 2011/12

** This unit was not an outlier in the 2013 audit as unknowns were not included in the calculations

Seven units had 50% or more invasive node positive cancers with macro-mets with no or unknown chemotherapy the previous audit in 2013 (2010/11 data); 2 of these were 3-year high outliers in 2009/10-2011/12, but neither were high outliers in 2011/12. Ten other units were 3-year high outliers this year's audit (2009/10-2011/12 data). Four of these were also 1-year high outliers in 2011/12 and had 50% or more node positive invasive cancers with macro-mets with no and unknown endocrine therapy. One of these units would have been selected for audit in 2013 if unknown chemotherapy had been included as well as no chemotherapy. The performance of one unit in Scotland in 2011/12 is not known because Scottish adjuvant therapy data were not submitted to this year's audit. Decisions regarding the provision of chemotherapy to node positive invasive cancers with macro-mets should take into account the number of positive nodes, tumour size, grade, ER status and HER2 status, age and comorbidity in order to make a judgement on the relative risks and benefits to an individual patient and it may be that all of the patients without chemotherapy recorded were treated appropriately. However, regional QA reference centres should follow up the 4 high outlier units in 2011/12 with 50% or more node positive invasive cancers with macro-mets with no and unknown endocrine therapy and the unit in Scotland with no data for 2011/12 to ascertain the reason for this unusual clinical practice.

Chapter 9: Survival analysis

UK NHSBSP data for women with breast cancers detected by screening from 1 April 2007 to 31 March 2008 were combined with data recorded by the English National Cancer Registration System and the Welsh, Northern Ireland and Scottish Cancer Registries to analyse breast cancer survival. All women were followed up to the study end date of 31 March 2013, enabling survival for periods of up to five years from the date of diagnosis to be calculated. Age at diagnosis, invasive grade, invasive tumour size and nodal status were requested from the screening services. Date of death and underlying cause of death were obtained from cancer registries and the Office for National Statistics (ONS).

9.1 Survival Analysis Methods

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

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

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

Details of 16,592 breast cancers detected by screening between 1 April 2007 and 31 March 2008 were submitted to the survival audit. Of these, 786 cancers (5%) were excluded for one of the following reasons, leaving 15,806 eligible cases for inclusion in the survival audit:

- unknown invasive status (6 cases)
- case not registered by the cancer registries or registered with an unknown diagnosis date (200 cases)
- screen-detected cancer not confirmed to be the first primary breast cancer (580 cases)

Details of the number of cases excluded in each UK NHSBSP region for the last two reasons are provided in the summary table on the following page. This year, for the first time, English screen-detected breast cancers were matched to the new national cancer registration database rather than to individual regional cancer registration databases. This may explain the changes in the proportions of unregistered cancers (200 for 2007/08 compared to 67 for 2006/07) and

cancers not confirmed to be primary breast cancers (580 for 2007/08 compared to 274 for 2006/07) compared with last year's survival audit.

DATA COMPLETENESS FOR THE 2007/08 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	30	1	80	3	2,212	95	2,322
East Midlands	18	1	58	5	1,143	94	1,221
East of England	23	1	71	4	1,595	94	1,690
London	22	2	48	3	1,383	95	1,453
South East Coast	20	2	53	4	1,234	94	1,307
South Central	17	2	46	4	1,069	94	1,132
South West	17	1	56	4	1,485	95	1,559
West Midlands	9	1	54	4	1,367	96	1,430
North West	34	2	48	3	1,722	95	1,805
Wales	0	0	27	3	937	97	964
Northern Ireland	0	0	0	0	323	100	324
Scotland	10	1	39	3	1,336	96	1,385
United Kingdom	200	1.2	580	3	15,806	95	16,592

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 (460 cases). This can occur where the cancer registration data are incomplete, for example a registration based on the second operation instead of the first operation.

9.3 Cause of Death

The main advantage of calculating relative survival rather than cause-specific survival is that knowledge of the cause of death is not required. However, the underlying cause of death was requested from the cancer registries and the ONS. Up to 31 March 2013, deaths were recorded for 812 (6%) of the 12,518 women with invasive breast cancer. Forty nine percent of the deaths were recorded as being due to breast cancer, 20% to another type of cancer and 29% to non-cancer related causes. Death cause was unknown for 13 women (2%), 6 of whom were in Scotland. There were variations in the proportions of women with invasive cancer recorded as dying from each cause of death in each UK NHSBSP region (Table 130); with the proportion of breast cancer deaths varying from 38% in London to 71% in Northern Ireland.

There were 4 deaths (3%) recorded amongst the 117 women with micro-invasive breast cancer detected by screening in 2007/08 (Table 131); 3 of these were in North East, Yorkshire & Humber. All 4 deaths were from another cancer. Of the 87 deaths (3%) in the 3,171 women with non-invasive breast cancer, 10 (11%) were recorded as being due to breast cancer, 39 (45%) from another cancer and 37 (43%) were non-cancer deaths (Table 132).

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

For 12,518 women with invasive breast cancer diagnosed by screening in 2007/08, the overall 5-year relative survival rate is 98.5%. Figure 69 shows the variation in 5-year survival between UK NHSBSP regions. Women with screen-detected invasive breast cancer diagnosed in West Midlands had a statistically significantly lower survival rate (95.9%) compared to the UK average 5-year relative survival rate. This difference was still apparent after adjusting for regional variation in the life tables for the local population (Table 133).

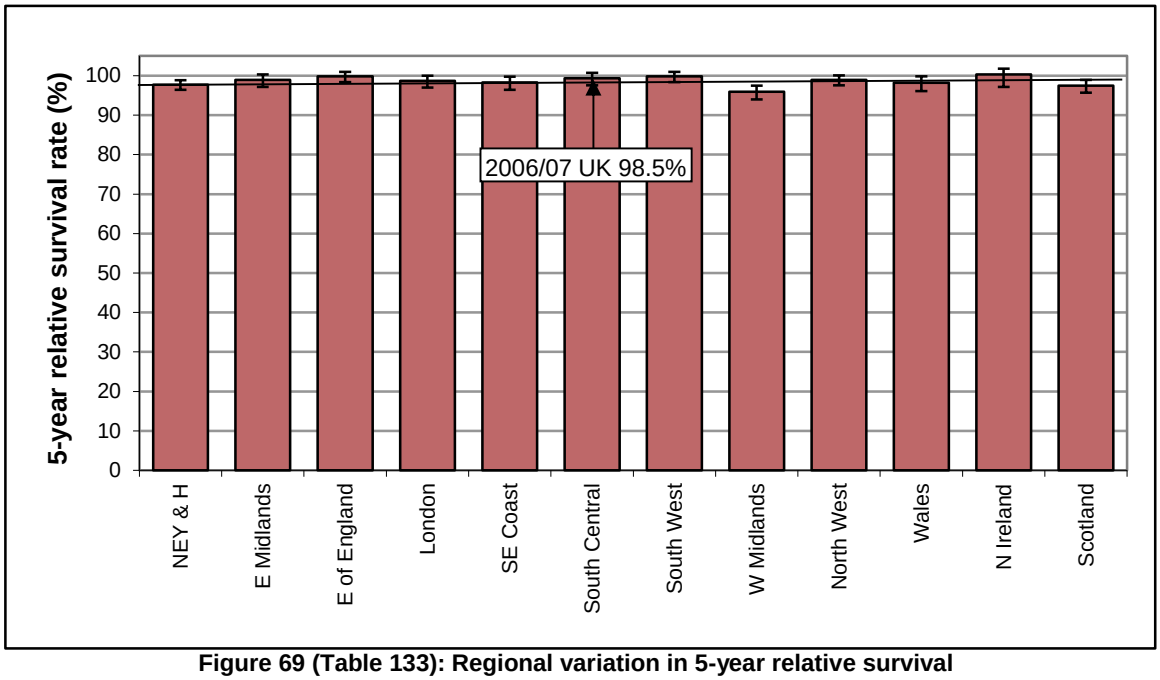

Figure 69 (Table 133): Regional variation in 5-year relative survival for women with invasive breast cancer who were screened in 2007/08

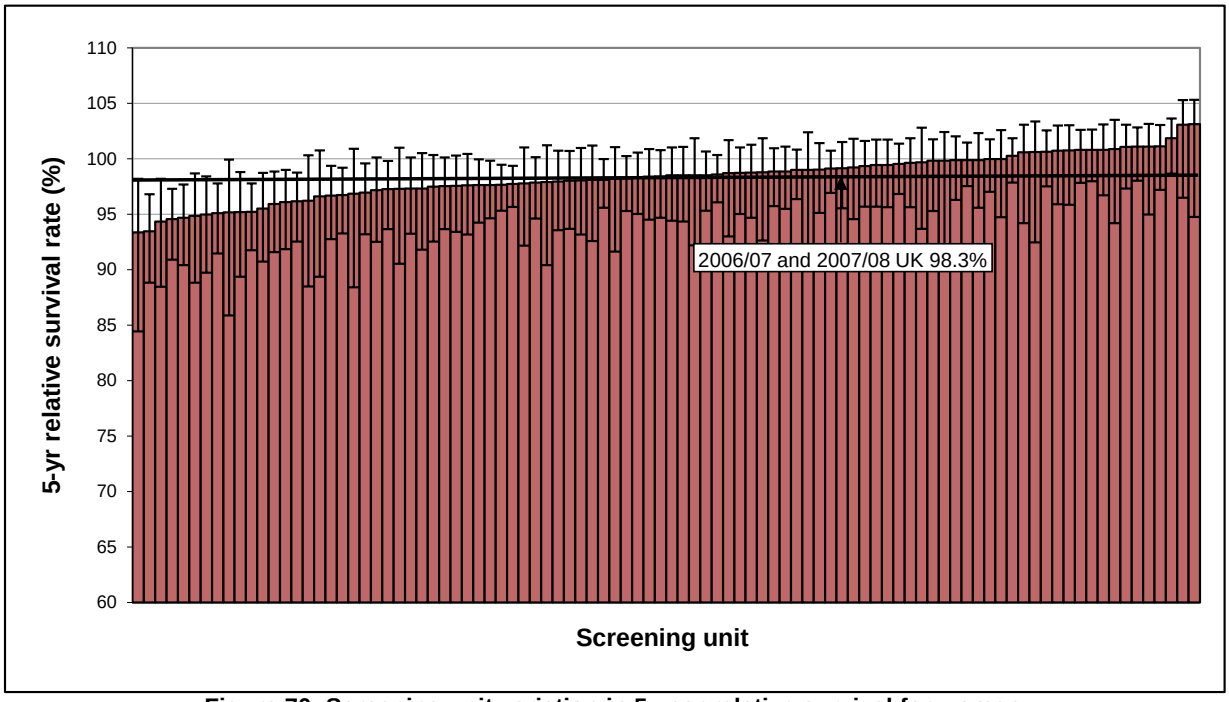

Figure 70: Screening unit variation in 5-year relative survival for women with invasive breast cancer who were screened in 2006/07 and 2007/08

Figure 70 shows how 5-year relative survival varies between screening units for screen-detected breast cancers diagnosed in 2006/07 and 2007/08. The 5-year relative survival rates for some units have large confidence intervals, which reflect their small numbers of eligible invasive cancers (overall range 72 to 811). For 7 units where the upper confidence interval does not reach the line representing the UK average, 5-year relative survival rates were statistically significantly lower than the national average of 98.3%. Two of these screening units were in West Midlands (94.6% and 95.1%), 1 in East Midlands (93.5%), 1 in London (94.7%), 1 in North East, Yorkshire & Humber (95.2%), 1 in North West (94.4%) and 1 in Northern Ireland (93.4%). One screening unit in East of England had a 5-year relative survival rate (101.9%) significantly higher than the national average.

9.5 Variation in 5-year Relative Survival with Tumour Characteristics

Parameter		Cancers included in each analysis group 2007/08	
		Number	%
Invasive status	Invasive	12,518	79
	Non-invasive	3,171	20
	Micro-invasive	117	1
	Total	15,806	100
Age group (invasive cancers only)	<50	139	1
	50-52	1,523	12
	53-55	1,243	10
	56-58	1,561	12
	59-61	2,078	17
	62-64	1,790	14
	65-67	1,741	14
	68-70	1,720	14
	71+	723	6
Invasive cancer size	<15mm	6,716	54
	15-≤20mm	2,944	24
	>20-≤35mm	2,129	17
	>35-≤50mm	402	3
	>50mm	226	2
	Unknown	101	1
Invasive grade	Grade 1	3,356	27
	Grade 2	6,503	52
	Grade 3	2,534	20
	Not assessable	50	0
	Unknown	75	1
Nodal status (invasive cancers only)	Negative	9,559	76
	Positive	2,766	22
	Unknown	193	2
NPI group (invasive cancers only)	EPG	2,666	21
	GPG	4,533	36
	MPG1	2,888	23
	MPG2	1,358	11
	PPG	755	6
	Unknown	318	3

The preceding table shows the characteristics of the 15,806 screen-detected breast cancers in the 2007/08 cohort. Of these, 12,518 (79%) were invasive, and 93% of the invasive breast cancers were diagnosed in women aged 50-70 years. Ninety seven percent of the invasive breast cancers had complete invasive size, grade and/or nodal status data. Of these, 78% were less than or equal to 20mm in diameter, 79% were Grade 1 or Grade 2, 76% were node negative, 58% were in the Excellent (EPG) and Good (GPG) Prognostic Groups and only 6% were in the Poor Prognostic Group (PPG). Three percent had unknown NPI group. These proportions are similar to those recorded in last year's audit of screen-detected cancers diagnosed in 2006/07.

9.5.1 Variation in Relative Survival with Invasive Status

The overall 5-year relative survival rate for women with breast cancer screened in 2007/08 was 99.2%. For women with invasive breast cancer, the 5-year relative survival rate was 98.5%, and for those with non-invasive breast cancer it was significantly higher at 101.8% with a lower confidence interval which is greater than 100%. This implies that non-invasive breast cancer patients have better survival than the female population as a whole. This may be because women who attend for breast screening tend to be more affluent and more health aware, and thus have longer life expectancy than the general population in the same age group. The 5-year relative survival rate for women with micro-invasive breast cancer was also over 100% but this is not significantly different to the rate for women with invasive breast cancer because of the wide confidence intervals caused by the very small numbers of micro-invasive cancers.

5-year relative survival (%) and 95% confidence intervals 2007/08 cohort	
Invasive	*98.5 (98.0,98.9)*
Micro-invasive	*101.7 (96.2,103.5)*
Non-invasive	*101.8 (101.1,102.3)*
Overall	*99.2 (98.8,99.5)*

At 99.2% the overall 5-year relative survival rate for women with screen-detected cancers in the 2007/08 cohort was significantly higher than the 94.8% relative survival rate reported for the 1990/91 cohort in the 2011 UK NHSBSP & ABS audit booklet. The table below which summarises 5-year, 10-year, 15-year and 20-year relative survival rates for women in the 1990/91 cohort is taken from the 2011 booklet.

Relative survival (%) and 95% confidence intervals 1990/91 cohort				
Invasive status	***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)***

The following summary table shows that the 5-year relative survival rate for women with screen-detected invasive breast cancer has increased from 93.7% for those screened in 1990/91 to 98.5% for those screened in 2007/08. This increase is statistically significant.

14-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	*7,108*	*93.7 (92.9,94.4)*
Mar 1992 – Apr 1993	*5,573*	*93.5 (92.6,94.3)*
Mar 1993 – Apr 1994	*3,705*	*93.9 (93.2,94.7)*
Mar 1994 – Apr 1995	*4,554*	*93.1 (92.4,93.9)*
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	*12,181*	*97.9 (97.4,98.4)*
Mar 2006 – Apr 2007	*11,794*	*98.0 (97.6,98.5)*
Mar 2007 – Apr 2008	*12,518*	*98.5 (98.0,98.9)*

9.5.2 Variation in Relative Survival with Age for Invasive Breast Cancers

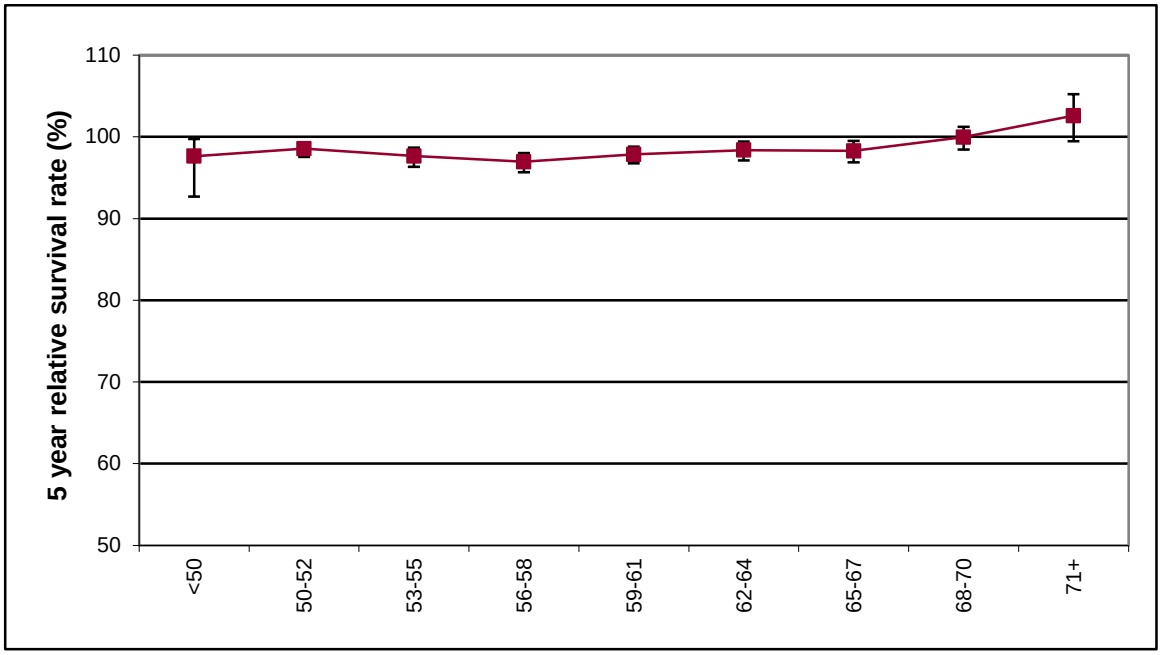

Figure 71 (Table 134): Variation in relative survival with age at diagnosis for women with invasive breast cancer who were screened in 2007/08

Figure 71 shows the variation with age at diagnosis in the 5-year relative survival rates for invasive breast cancers diagnosed in 2007/08. Women with invasive cancer in the screening

age range (50 to 70 years) had survival rates ranging from 97% to 100%. The 5-year relative survival rate for women aged over 70 years was 102.6%, which is significantly higher than that for women in 50 to 67 age groups. In 2007/08, all patients aged over 70 years were self-referrals to the UK NHSBSP. The comparatively high relative survival of these women may be due to a number of factors. Firstly, it is possible that routine follow-up appointments for breast cancer result in the earlier identification of other health problems in women diagnosed with early stage breast cancer than would normally be the case for women of the same age in the general population. Secondly, self-referral women may be from a more affluent socio-economic group and therefore have better overall health than the general population as a whole.

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

Although 5-year survival is relatively good for all women with screen-detected breast cancer, it is dependent on the characteristics of the tumour detected. Thus, the 5-year relative survival rate for women with a small invasive breast cancer (<15mm diameter) was 100.7% (Table 135 and Figure 72), while for women with a large invasive breast cancer (>50mm diameter) it was only 89.8%. Similarly, the 5-year survival rate for women with a Grade 1 invasive breast cancer was 100.7% but only 92.6% for women with a Grade 3 cancer (Table 136). Finally, while the 5-year relative survival rate for women with positive nodal status was 93.0%, it was 100.3% for women with negative nodal status (Table 137).

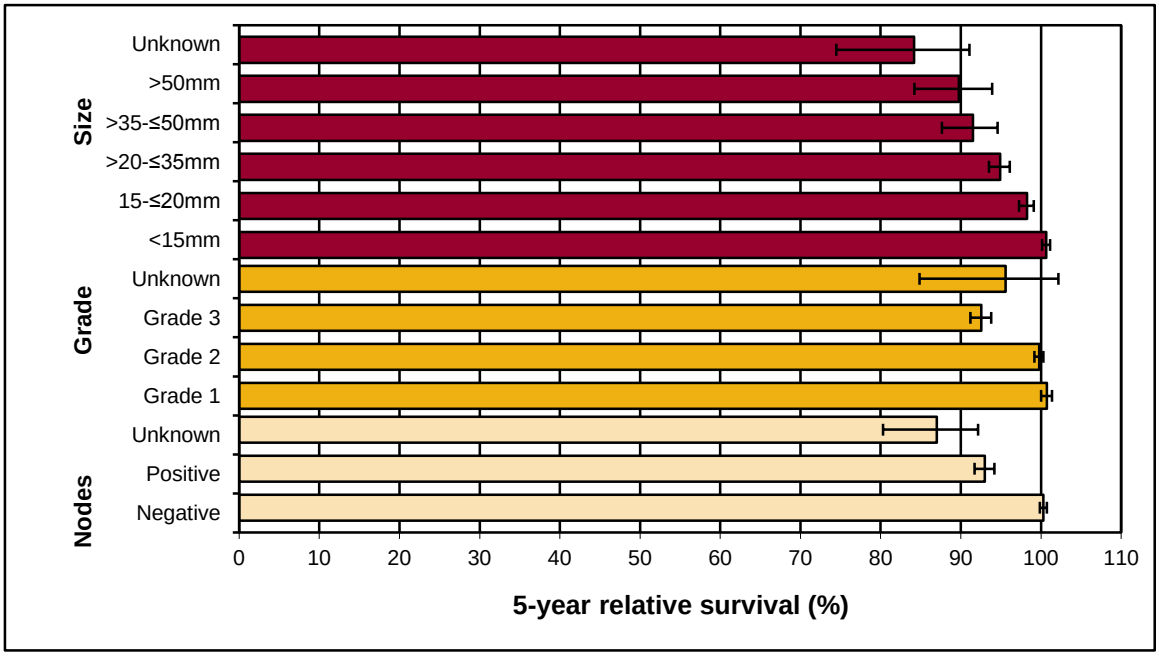

Figure 72 (Tables 135 to 137): Variation in 5-year relative survival rates with invasive tumour size, invasive grade and nodal status for women with invasive breast cancer who were screened in 2007/08

9.5.4 Variation in Relative Survival of Invasive Cancers with NPI Group

At 101.0% and 101.1% respectively, the 5-year relative survival rates for women with invasive breast cancers in the Excellent Prognostic Group (EPG), Good Prognostic Group (GPG) (Table 138 and Figure 73), were no worse than for the general population as a whole. Although excellent, at 99.4%, the 5-year relative survival rate for women with breast cancers in the

Moderate Prognostic Group 1 (MPG1) was significantly worse than that of women with cancers in the EPG and GPG groups. The 5-year relative survival rates for the women with cancers in the Moderate Prognostic Group 2 (MPG2) and the Poor Prognostic Group (PPG) at 93.9% and 82.0% respectively were significantly lower than those for all of the other prognostic groups.

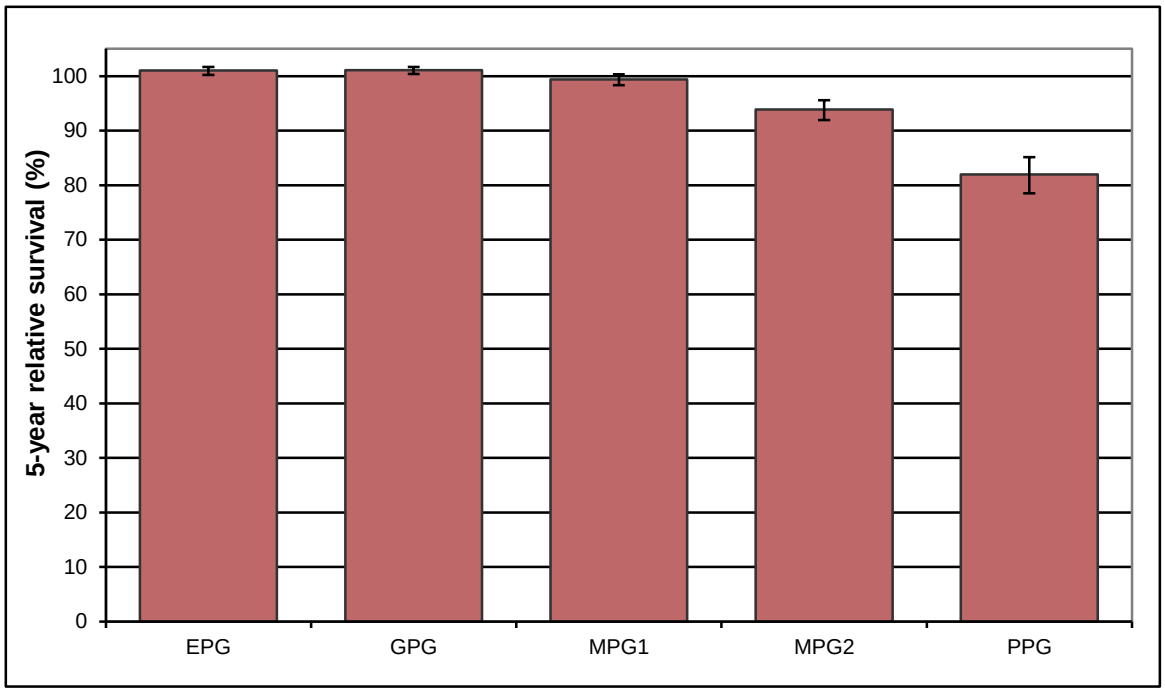

Figure 73 (Table 138): Variation in 5-year relative survival rates with NPI group for women with invasive breast cancer who were screened in 2007/08

KEY FINDINGS

- Of the 16,592 cancers submitted to the survival audit for the period 1 April 2007 to 31 March 2008, 15,806 were eligible for inclusion in the analyses.
- The 5-year relative survival for 12,518 women with screen-detected invasive breast cancer who were screened in 2007/08 was 98.5%. Five-year relative survival has improved significantly from 93.7% in 1990/91.
- The unit level 5-year relative survival for women screened in 2006/07 and 2007/08 varied from 93.4% in a unit in Northern Ireland to 103.1% in a unit in East of England. The latter unit has a significantly higher relative survival rate than the national average. For 7 units, 5-year relative survival rates were statistically significantly lower than the national average. Two of these were in West Midlands and 1 each in East Midlands, London, North East, Yorkshire & Humber, North West and Northern Ireland.
- The 5-year relative survival varied with invasive tumour characteristics: 100.7% for less than 15mm diameter tumours compared to 89.8% for tumours with a diameter greater than 50mm; 100.7% for Grade 1 cancers compared to 92.6% for Grade 3 cancers; 100% for node negative cancers compared to 93% for node positive cancers.
- At 101.0% and 101.1% respectively for cancers in the Excellent Prognostic Group (EPG), Good Prognostic Group (GPG), 5-year relative survival was significantly better than that for Moderate Prognostic Group 1 (MPG1) cancers (99.4%) and for Moderate Prognostic Group 2 (MPG2) and the Poor Prognostic Group (PPG) cancers (93.9% and 82.0% respectively).

APPENDIX A: TIMETABLE OF EVENTS

NHSBSP and ABS AUDIT OF SCREEN-DETECTED BREAST CANCERS
FOR THE YEAR OF SCREENING 1 APRIL 2012 - 31 MARCH 2013

AUDIT TIMETABLE	
	Event
6 Sept 2013 (Friday)	**Deadline for receipt of survival audit data from QARCs at the WMQARC. (EM, EoE, NEYH, NW, SC and SW QARCs).**
9 – 11 Sept 2013	EM, EoE, NEYH, NW, SC and SW QARCs to ensure that an appropriate member of staff is available to respond to any queries from the WMQARC regarding the survival audit.
4 Oct 2013	**Deadline for receipt of survival audit data from remaining QARCs at the WMQARC. (London, SEC and Celtic countries).**
4 – 9 Oct 2013	London, SEC and Celtic countries QARCs to ensure that an appropriate member of staff is available to respond to any queries from the WMCIU regarding the survival audit.
1 Nov 2013 (Friday)	**Deadline for receipt of patient identifiable data in the Previous cancer section of the Adjuvant audit at the WMQARC (all English QARCs).**
8 Nov 2013	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, e.g. QA Team requirements.*
11 Nov 13– 6 Jan 14	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.
2 Dec 2013 (Monday)	**Deadline for receipt of Patients section of the Main audit at the WMQARC (All English QARCs).**
6 Jan 2014 (Monday)	**Deadline for receipt of main and adjuvant audit data at the WMQARC. (UK).**
7 – 17 Jan 2014	All QARCs to ensure that an appropriate member of staff is available to respond to queries from the WMQARC. The WMQARC liaises with other QARCs to ensure data are complete, correct and surgically confirmed. It will not be possible to incorporate new or late data after this stage.
6 Feb 2014	First draft of audit booklet (tables and figures only) emailed to Audit Steering Group for comment.
21 Feb 2014	Audit booklet tables (first draft) emailed to QARCs for information. *All draft data should be marked "Not for circulation" to avoid unpublished data getting into the public domain.*
14 April 2014	Deadline for receipt of the audit booklet at the printers.
19 – 20 May 2014	2014 ABS conference (Liverpool).
20 May 2014	Wash-up meeting (Liverpool).

APPENDIX B: MAIN AUDIT DATA FORM

NHSBSP & ABS AUDIT OF WOMEN WITH SCREEN-DETECTED BREAST CANCERS DETECTED FOLLOWING INVITATION BETWEEN 1 APRIL 2012 AND 31 MARCH 2013

PLEASE SUPPLY DATA FOR WOMEN OF ALL AGES WITH SCREEN-DETECTED BREAST CANCERS WITH FIRST OFFERED APPOINTMENT FROM 1 APRIL 2012 - 31 MARCH 2013 INCLUSIVE ACCORDING TO THE REGIONAL BOUNDARIES EXTANT AT 1 APRIL 2013

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

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

Named breast screening unit data, for selected data items, will be available in an e-atlas format on the WMCIU website. www.wmciu.nhs.uk/atlas/BreastAtlas/atlas.html

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

The deadline for submission of 'Patient' sheet by the regional QA co-ordinator to the WMQARC is 2 December 2013
The deadline for submission of the remaining data by the regional QA co-ordinator to the WMQARC is 6 January 2014

****

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 2012/13. If bilateral or multiple cancers have been detected, the KC62 software selects the worst prognosis cancer. The same rules should be applied for the audit. All data for bilateral cases should be taken from the cancer included in the KC62.

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

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

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

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

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

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

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

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

Invasive status:
<u>Invasive status of the surgical specimen</u>*:* the worst invasive status diagnosed at surgery.

Final invasive status*:* this takes into account the non-operative diagnosis, invasive status of surgical specimen and the final decision of the MDT (in some cases).

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

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

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

Invasive status coding rules:

B5b diagnosis but non-invasive at surgery
Final invasive status: invasive
Invasive size: unknown
Whole tumour size: non-invasive size at surgery
Invasive grade: core biopsy invasive grade

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

B5 (a or b or c) diagnosis but benign surgery
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

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

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

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

Screening surgical caseload: ***The caseload spreadsheet is referred to consultant surgeon column, not treating surgeon column. To each cancer in Part A assign the GMC code of the 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.***

Reasons for low caseload: An explanation is required for consultant surgeons who have screening caseload <10 in 2012/13. Explanations given at unit level may become redundant when caseloads are collated at regional and then at national level.

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

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

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

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

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

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

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

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

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

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

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

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

DATA CHECKS

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

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

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

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

Queries

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

Ms Shan Cheung
Project Manager (NHSBSP & ABS Breast Screening Audit)
West Midlands Breast Screening QA Reference Centre
Public Health England
1st Floor
5 St Philip's Place
Colmore Row
Birmingham
B3 2PW
Tel: 0121 214 9182
Shan.cheung@phe.gov.uk

NHSBSP & ABS BREAST SCREENING AUDIT 2012/13

PRELIMINARY DATA SHEET

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SCREENING SURGICAL CASELOAD AUDIT

Please fill in Part A first.

Screening surgical caseload should be calculated by summing the number of times each Consultant GMC code appears in Part A.

In rare cases where there is no consultant surgeon, the GMC code for the case should be coded as “NoRef” in Part A, and counted on the top line.

If the consultant surgeon is from outside region, please input Y in Surgeon from other region field and provide region name in Other reason field

Consultant GMC Code	Screening caseload (from Part A)	If caseload <10 was this because: (write Y in the first applicable reason)							
		Other breast caseload > 30 per year	Joined NHSBSP 2012/13	Left NHSBSP 2012/13	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

NHSBSP & ABS ADJUVANT AUDIT FOR WOMEN WITH SCREEN-DETECTED BREAST CANCERS DETECTED BETWEEN 1 APRIL 2011 AND 31 MARCH 2012

PLEASE SUPPLY DATA FOR WOMEN OF ALL AGES WITH SCREEN-DETECTED BREAST CANCER WITH FIRST OFFERED SCREENING APPOINTMENT FROM 1 APRIL 2011 TO 31 MARCH 2012 INCLUSIVE ACCORDING TO THE REGIONAL BOUNDARIES EXTANT FROM 1 APRIL 2013

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 6 January 2014

DEFINITIONS AND GUIDANCE NOTES

Audit cut-off date: If a woman has not received radiotherapy or chemotherapy or hormonal therapy before 31 March 2013 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 2011/12 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 2011 to 31 March 2012. 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)	Women with node positive invasive breast cancer should normally receive chemotherapy if they have cancers which are Grade 3, or HER-2 positive, or ER negative. 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 (Non-invasive cancers with CT)	Patients with non-invasive cancer should not receive chemotherapy. All cases flagged should be checked for data errors.

Previous cancers

To complete this sheet, QARCs will need to liaise with cancer registries in the region to:

1. Match 2011/12 screening audit cancer cases to the cancer registry (CR) database. The screen-detected cancer should be matched to the cancer and the patient in CR (for screen-detected recurrences, it is acknowledged that some cancer registries may not have recorded this cancer and therefore it is necessary to attempt the match at tumour and patient level).
2. Draw out all the cancers (except non-melanoma skin cancers) which were diagnosed previously in the matched patients.
3. Record the requested data for all relevant cases starting at the most recent and working backwards in time.

Tips for cancer registry staff

1. To match the tumour, you need to use laterality, date of surgery and date of assessment. Firstly, the date of diagnosis in your system cannot be earlier than the date of assessment, and you can limit the date of diagnosis to be within 30 days after the first surgery. This should pick up most, if not all, the cases. Therefore,

   Date of assessment ≤ date of diagnosis ≤ date of first surgery + 30
2. In the spreadsheet, only one breast cancer diagnosed in this study period is recorded for each patient, and the breast cancer with the worst prognosis is recorded. If you have matched the breast cancer using date of assessment and date of first surgery, but cannot match with laterality, you should investigate the case. For example, look into your system manually and/or contact your regional QARC to check whether or not laterality was recorded correctly.
3. If your laterality is unknown and you have found one matched breast cancer, accept the matched cancer as the correct match. If your laterality is unknown and you have found more than one matched cancer, match the case with invasive status. If you have found more than one matched cancer, accept the one diagnosed earliest. If they were diagnosed on the same day, randomly accept one as the current cancer.
4. If you have more than one breast cancer in your system matched to the breast cancer in the spreadsheet after using laterality, invasive status, date of assessment and date of surgery, input the earliest one in the 'current cancer' columns in the spreadsheet.
5. If you cannot find a cancer using laterality, invasive status, date of assessment and date of surgery, this might be because (a) the current cancer is a recurrence, (b) a non-breast cancer is recorded, instead of a breast cancer, and (c) wrong or missing information is recorded in either cancer registry or QARC. For (c), you should investigate the case further with your data quality staff and QARC staff.
6. If the cancer in the spreadsheet is a **recurrence**, you can probably match the patient but not the tumour. The primary cancer should be inputted into the 'Previous cancer 1' columns, leave the 'current cancer' columns blank and flag the case as being a matched patient but an unmatched tumour.
7. If no breast cancer fits the criteria but a **non-breast cancer** fits the criteria. You should (a) find out whether the patient had a breast cancer recorded in the system which was not picked up by your query (such as date of diagnosis is 31 days after the surgery). Is the 30 days criterion too short for your region? And, (b) find out whether the case recorded in the spreadsheet is really not a breast cancer but another type of cancer located in the breast (such as D48.6). Please note that last year there were a handful of these cases in the audit. It is acceptable but rare to have a non-breast cancer located in the breast recorded in the 'current cancer' columns.

8. Once you have found the current cancer, you should report all cancers, except non-melanoma skin cancers, diagnosed before the current cancer.
9. For **bilateral/multiple cancers**, two cancers may be diagnosed on different days (For example, cancer A in the left breast was diagnosed on 01/01/2012 and cancer B in the right breast was diagnosed on 02/01/2012). Sometimes you might pick up the latter cancer (cancer B) as the current cancer because it matches the laterality of the breast cancer and/or invasive status in the spreadsheet. This is acceptable, and report any cancer diagnosed before the current cancer. In this example, cancer A would be reported in the 'Previous cancer 1' columns.

Check list for cancer registry staff

- ☑ Did you attempt to match by patient?
- ☑ Did you attempt to match by tumour?
- ☑ Did you exclude all the non-melanoma skin cancers?
- ☑ Are all the previous cancers diagnosed later than the current cancer?
- ☑ Are all the previous cancers in reverse chronological order?

Queries

Any queries about the adjuvant audit should be directed to:

Ms Shan Cheung
Project Manager
West Midlands QA Reference Centre
1st Floor, 5 St Philip's Place
Colmore Row
Birmingham
B3 2PW
shan.cheung@phe.gov.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 2011 TO 31 MARCH 2012 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 2011 TO 31 MARCH 2012 INCLUSIVE

To aid data collection by the consultant surgeon. Do <u>not</u> send to West Midlands QA Reference Centre				*Data from 2011/12 Main Audit*					
{D} **Sx Number**	*{K}* **Name**	*{L}* **NHS Number**	*{M}* **Hospital Number**	*{N}* **Final invasive status** (I,M,N,U)	*{O}* **Overall surgical treatment** (C,M,NS,U)	*{P}* **Nodal status** *(P,N,U)*	*{Q}* **Invasive size in mm** *(1,2.., U,X)*	*{R}* **Invasive grade** *(I, II, III, NA, U, X)*	*{S}* **Laterality** *(L,R)*

ADJUVANT THERAPY AUDIT - TO BE COMPLETED FOR ALL CANCERS WITH DATE OF FIRST OFFERED APPOINTMENT FROM 1 APRIL 2011 TO 31 MARCH 2012 INCLUSIVE

Enter dates in dd/mm/yyyy format (e.g. 01/04/2012) or U=Unknown, NS=No surgery, NRT=No radiotherapy,
Chemotherapy & Endocrine therapy: Y = therapy given before 31/03/13, N = No therapy given before 31/03/13, U=Unknown
ER Status, PgR Status, Cerb-B2/HER-2 (P = Positive, N = Negative, B=Borderline, U = Unknown) to be completed according to local definitions.
(Cerb-B2/HER-2 positive if immunohistochemistry 3+ or FISH +)

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

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

Signature (Surgeon):
Print Name:
Date:

ADJUVANT THERAPY AUDIT - TO BE COMPLETED FOR ALL CANCERS WITH DATE OF FIRST OFFERED APPOINTMENT FROM 1 APRIL 2011 TO 31 MARCH 2012 INCLUSIVE

Previous cancers (except non-melanoma skin cancers)

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

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

APPENDIX D: SURVIVAL AUDIT DATA COLLECTION SHEET

NHSBSP & ABS SURVIVAL AUDIT FOR SCREEN-DETECTED BREAST CANCER PATIENTS WHO WERE SCREENED BETWEEN 1 APRIL 2007 AND 31 MARCH 2008

The completed spreadsheets should be submitted by the Breast Screening QA Reference Centre to the West Midlands QA Reference Centre by 4 October 2013 (if QARCs to request CR data).

Aim:

To combine data recorded by cancer registries with NHS Breast Screening Programme (NHSBSP) data, recorded from 1 April 2007 to 31 March 2008, for women with breast cancers detected by screening to enable post-diagnosis analysis of breast cancer for five years. Where tumour size, grade and nodal status are available the survival profiles according to prognostic characteristics will be examined. The audit will continue to demonstrate effective information exchange between the NHSBSP and cancer registries.

Study population:

All women with breast cancers detected by the NHSBSP and screened between 1 April 2007 and 31 March 2008 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 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 2013. If the latter is not the case, an alternative date to which survival can be calculated should be provided.

Data collection:

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

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

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

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

For cancers detected by screening between 1 April 2007 and 31 March 2008, 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 CANCER REGISTRIES

Cancer registries will be asked by the QA reference centers to match breast cancers detected following screening from 1 April 2007 to 31 March 2008 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 2007, then the date of diagnosis of this non-invasive/micro-invasive screening case will be recorded. Please refer to additional guidance on Page 6 for more examples.

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

The following data items are required from the cancer registry for all breast cancers detected following screening from 1 April 2007 to 31 March 2008.

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

The censor date for the survival audit has been set at **31 March 2013**. The cancer registry should confirm to the QA reference centre that death data are complete to **31 March 2013**, 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
Project Manager
West Midlands Breast Screening QA Reference Centre
Public Health England
1st Floor
5 St Philip's Place
Colmore Row
Birmingham
B3 2PW

Tel: 0121 214 9182
Shan.cheung@phe.gov.uk

SURVIVAL AUDIT: SCREENING OFFICE DATA FOR PATIENT SCREENED IN 2007/08

Region:
Screening Unit:
Cancer Registry:

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

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

SURVIVAL AUDIT: CANCER REGISTRY DATA FOR PATIENT SCREENED IN 2007/08

Region:
Screening Unit:
Cancer Registry:

Data complete to: 31/03/2013

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

ADDITIONAL GUIDANCE

Non-registered cases
A case should be recorded as a non-registered case (NR) if
1. the patient is not registered on the cancer registry database
2. the patient is registered, but the screen-detected breast cancer is not registered.

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

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

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

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

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

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

APPENDIX E: MAIN AUDIT DATA TABLES (1 - 92)

DATA FROM THE 2012/13 AUDIT OF SCREEN-DETECTED BREAST CANCERS IN WOMEN ALL AGES FOR THE PERIOD 1 APRIL 2012 – 31 MARCH 2013

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

Region	Invasive		Invasive (<15mm)		Micro-invasive		Non-invasive		Status unknown		Total		Total women screened	Micro/ Non-invasive cancer rate	Invasive cancer rate	Invasive <15mm rate
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%				
N East, Yorks & Humber	1983	78	1061	42	19	1	544	21	0	0	2546	100	315376	1.8	6.3	3.4
East Midlands	1172	78	659	44	14	1	310	21	0	0	1496	100	176817	1.8	6.6	3.7
East of England	1419	79	711	40	12	1	357	20	1	0	1789	100	226421	1.6	6.3	3.1
London	1476	77	662	35	22	1	410	21	4	0	1912	100	229010	1.9	6.4	2.9
South East Coast	1306	80	690	42	9	1	316	19	3	0	1634	100	180374	1.8	7.2	3.8
South Central	1141	78	535	37	14	1	299	21	1	0	1455	100	164328	1.9	6.9	3.3
South West	1466	79	788	42	14	1	380	20	0	0	1860	100	225180	1.7	6.5	3.5
West Midlands	1344	79	689	41	14	1	333	20	2	0	1693	100	210251	1.7	6.4	3.3
North West	1595	78	798	39	16	1	423	21	2	0	2036	100	243280	1.8	6.6	3.3
Wales	756	79	398	42	2	0	198	21	0	0	956	100	93367	2.1	8.1	4.3
Northern Ireland	372	84	186	42	2	0	67	15	2	0	443	100	64909	1.1	5.7	2.9
Scotland	1257	83	699	46	3	0	246	16	13	1	1519	100	174019	1.4	7.2	4.0
United Kingdom	**15287**	**79**	**7876**	**41**	**141**	**1**	**3883**	**20**	**28**	**0**	**19339**	**100**	**2303332**	**1.7**	**6.6**	**3.4**

Table 2 : Age at first offered screening appointment

Region	<50		50-64		65-70		71-75		76+		Total	>70	
	No.	%	No.	%	No.	%	No.	%	No.	%		No.	%
N East, Yorks & Humber	187	7	1449	57	694	27	167	7	49	2	2546	216	8
East Midlands	94	6	834	56	427	29	103	7	38	3	1496	141	9
East of England	149	8	1037	58	458	26	88	5	57	3	1789	145	8
London	109	6	1199	63	451	24	101	5	52	3	1912	153	8
South East Coast	108	7	906	55	454	28	112	7	54	3	1634	166	10
South Central	69	5	874	60	378	26	86	6	48	3	1455	134	9
South West	140	8	1001	54	545	29	125	7	49	3	1860	174	9
West Midlands	106	6	1001	59	457	27	94	6	35	2	1693	129	8
North West	145	7	1156	57	552	27	149	7	34	2	2036	183	9
Wales	15	2	564	59	306	32	44	5	27	3	956	71	7
Northern Ireland	7	2	299	67	129	29	3	1	5	1	443	8	2
Scotland	0	0	956	63	438	29	78	5	47	3	1519	125	8
United Kingdom	**1129**	**6**	**11276**	**58**	**5289**	**27**	**1150**	**6**	**495**	**3**	**19339**	**1645**	**9**

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	2431	3	0.12
East Midlands	1430	1	0.07
East of England	1701	0	0.00
London	1835	0	0.00
South East Coast	1571	0	0.00
South Central	1378	0	0.00
South West	1784	0	0.00
West Midlands	1617	0	0.00
North West	1956	0	0.00
Wales	905	0	0.00
Northern Ireland	440	0	0.00
Scotland	1492	0	0.00
United Kingdom	**18540**	**4**	**0.02**

Table 4 : Non-operative diagnosis rate											
Region	Total cancers	C5 only		C5 & B5		B5 only		Non-operative diagnosis		No non-operative diagnosis	
		No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	2431	1	0	131	5	2222	91	2354	97	77	3
East Midlands	1430	0	0	6	0	1367	96	1373	96	57	4
East of England	1701	3	0	5	0	1610	95	1618	95	83	5
London	1835	3	0	23	1	1749	95	1775	97	60	3
South East Coast	1571	1	0	2	0	1494	95	1497	95	74	5
South Central	1378	2	0	7	1	1302	94	1311	95	67	5
South West	1784	4	0	20	1	1693	95	1717	96	67	4
West Midlands	1617	0	0	5	0	1553	96	1558	96	59	4
North West	1956	5	0	16	1	1879	96	1900	97	56	3
Wales	905	0	0	1	0	862	95	863	95	42	5
Northern Ireland	440	7	2	257	58	161	37	425	97	15	3
Scotland	1492	0	0	62	4	1393	93	1455	98	37	2
United Kingdom	**18540**	**26**	**0**	**535**	**3**	**17285**	**93**	**17846**	**96**	**694**	**4**

Table 5 : Non-operative diagnosis rate (invasive cancers)											
Region	Total cancers	C5 only		C5 & B5		B5 only		Non-operative diagnosis		No non-operative diagnosis	
		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1889	0	0	128	7	1737	92	1865	99	24	1
East Midlands	1120	0	0	6	1	1097	98	1103	98	17	2
East of England	1354	2	0	5	0	1333	98	1340	99	14	1
London	1414	2	0	22	2	1372	97	1396	99	18	1
South East Coast	1251	0	0	1	0	1232	98	1233	99	18	1
South Central	1082	2	0	7	1	1055	98	1064	98	18	2
South West	1402	4	0	18	1	1359	97	1381	99	21	1
West Midlands	1281	0	0	5	0	1262	99	1267	99	14	1
North West	1536	5	0	14	1	1509	98	1528	99	8	1
Wales	723	0	0	1	0	708	98	709	98	14	2
Northern Ireland	371	5	1	249	67	117	32	371	100	0	0
Scotland	1235	0	0	60	5	1166	94	1226	99	9	1
United Kingdom	**14658**	**20**	**0**	**516**	**4**	**13947**	**95**	**14483**	**99**	**175**	**1**

Table 6 : Non-operative diagnosis rate (non-invasive cancers)											
	Total cancers	C5 only		C5 & B5		B5 only		Non-operative diagnosis		No non-operative diagnosis	
Region		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	524	1	0	3	1	468	89	472	90	52	10
East Midlands	296	0	0	0	0	258	87	258	87	38	13
East of England	335	0	0	0	0	266	79	266	79	69	21
London	397	0	0	1	0	354	89	355	89	42	11
South East Coast	308	0	0	1	0	253	82	254	82	54	18
South Central	281	0	0	0	0	233	83	233	83	48	17
South West	369	0	0	2	1	321	87	323	88	46	12
West Midlands	320	0	0	0	0	277	87	277	87	43	13
North West	404	0	0	2	0	354	88	356	88	48	12
Wales	180	0	0	0	0	152	84	152	84	28	16
Northern Ireland	65	0	0	7	11	43	66	50	77	15	23
Scotland	241	0	0	2	1	211	88	213	88	28	12
United Kingdom	**3720**	**1**	**0**	**18**	**0**	**3190**	**86**	**3209**	**86**	**511**	**14**

Table 7 : Invasive status of the diagnostic core biopsy							
	Total Cancers with B5	B5a (Non-invasive)		B5b (Invasive)		B5c (Micro-invasive, Not Assessable or Unknown)	
Region		No.	%	No.	%	No.	%
N East, Yorks & Humber	2353	578	25	1763	75	12	1
East Midlands	1373	315	23	1051	77	7	1
East of England	1615	334	21	1272	79	9	1
London	1772	454	26	1307	74	11	1
South East Coast	1496	324	22	1168	78	4	0
South Central	1309	293	22	1011	77	5	0
South West	1713	390	23	1311	77	12	1
West Midlands	1558	338	22	1193	77	27	2
North West	1895	453	24	1433	76	9	0
Wales	863	194	22	668	77	1	0
Northern Ireland	418	63	15	353	84	2	0
Scotland	1455	259	18	1192	82	4	0
United Kingdom	**17820**	**3995**	**22**	**13722**	**77**	**103**	**1**

Table 8 : B5a (Non-invasive) core biopsy: histological status after surgery												
	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	93	16	17	3	437	76	28	5	0	0	575	100
East Midlands	49	16	11	4	239	76	14	4	0	0	313	100
East of England	60	18	11	3	250	77	4	1	0	0	325	100
London	84	19	21	5	300	69	27	6	0	0	432	100
South East Coast	63	20	8	2	243	75	8	2	0	0	322	100
South Central	49	17	13	4	224	78	3	1	0	0	289	100
South West	61	16	12	3	300	79	9	2	0	0	382	100
West Midlands	61	18	10	3	249	75	13	4	0	0	333	100
North West	86	19	14	3	327	73	22	5	0	0	449	100
Wales	40	21	2	1	143	75	5	3	0	0	190	100
Northern Ireland	11	17	2	3	49	78	1	2	0	0	63	100
Scotland	46	18	3	1	205	80	1	0	0	0	255	100
United Kingdom	**703**	**18**	**124**	**3**	**2966**	**76**	**135**	**3**	**0**	**0**	**3928**	**100**

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

Table 9 : B5b (Invasive) core biopsy: histological status after surgery												
	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1710	98	2	0	22	1	7	0	0	0	1741	100
East Midlands	1008	99	1	0	7	1	2	0	1	0	1019	100
East of England	1206	97	3	0	17	1	12	1	2	0	1240	100
London	1248	99	0	0	3	0	9	1	1	0	1261	100
South East Coast	1128	99	1	0	6	1	9	1	0	0	1144	100
South Central	979	99	0	0	5	1	6	1	0	0	990	100
South West	1266	99	2	0	11	1	5	0	0	0	1284	100
West Midlands	1168	99	1	0	5	0	5	0	0	0	1179	100
North West	1385	99	3	0	13	1	5	0	0	0	1406	100
Wales	653	99	2	0	1	0	1	0	0	0	657	100
Northern Ireland	347	99	0	0	3	1	1	0	0	0	351	100
Scotland	1155	100	0	0	3	0	0	0	0	0	1158	100
United Kingdom	**13253**	**99**	**15**	**0**	**96**	**1**	**62**	**0**	**4**	**0**	**13430**	**100**

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

Table 10 : Number of assessment visits for each patient														
	0		1		2		3+		Unknown		Total		Repeat (2+) visit	
Region	No	%	No	%	No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	1	0	2055	85	346	14	29	1	0	0	2431	100	375	15
East Midlands	0	0	1251	87	163	11	16	1	0	0	1430	100	179	13
East of England	0	0	1550	91	142	8	9	1	0	0	1701	100	151	9
London	0	0	1556	85	264	14	15	1	0	0	1835	100	279	15
South East Coast	0	0	1306	83	247	16	18	1	0	0	1571	100	265	17
South Central	0	0	1190	86	177	13	11	1	0	0	1378	100	188	14
South West	0	0	1434	80	301	17	49	3	0	0	1784	100	350	20
West Midlands	0	0	1348	83	245	15	24	1	0	0	1617	100	269	17
North West	0	0	1612	82	304	16	40	2	0	0	1956	100	344	18
Wales	0	0	826	91	75	8	4	0	0	0	905	100	79	9
Northern Ireland	0	0	415	94	23	5	2	0	0	0	440	100	25	6
Scotland	0	0	1420	95	71	5	1	0	0	0	1492	100	72	5
United Kingdom	**1**	**0**	**15963**	**86**	**2358**	**13**	**218**	**1**	**0**	**0**	**18540**	**100**	**2576**	**14**

Table 11 : The assessment visit with the earliest core/cytology result										
	1		2		3+		Total		First core/cyt at 2+ visit	
Region	No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	2380	98	49	2	0	0	2429	100	49	2
East Midlands	1389	97	39	3	1	0	1429	100	40	3
East of England	1668	98	30	2	1	0	1699	100	31	2
London	1762	96	71	4	0	0	1833	100	71	4
South East Coast	1415	90	153	10	0	0	1568	100	153	10
South Central	1337	97	37	3	1	0	1375	100	38	3
South West	1590	89	190	11	2	0	1782	100	192	11
West Midlands	1575	97	42	3	0	0	1617	100	42	3
North West	1850	95	105	5	1	0	1956	100	106	5
Wales	890	98	14	2	0	0	904	100	14	2
Northern Ireland	438	100	2	0	0	0	440	100	2	0
Scotland	-	-	-	-	-	-	-	-	-	-
United Kingdom	**16294**	**96**	**732**	**4**	**6**	**0**	**17032**	**100**	**738**	**4**

*Excluded cases from Scotland

Table 12 : Number of visits with a core biopsy/cytology result for cases with a non-operative diagnosis

	Invasive					Non-Invasive					Overall				
	1		2+			1		2+			1		2+		
Region	**No**	**%**	**No**	**%**	**Total**	**No**	**%**	**No**	**%**	**Total**	**No**	**%**	**No**	**%**	**Total**
N East, Yorks & Humber	1778	95	87	5	1865	378	80	94	20	472	2172	92	182	8	2354
East Midlands	1050	95	53	5	1103	217	84	41	16	258	1277	93	96	7	1373
East of England	1292	96	48	4	1340	244	92	22	8	266	1547	96	71	4	1618
London	1310	94	86	6	1396	287	81	68	19	355	1618	91	157	9	1775
South East Coast	1192	97	41	3	1233	239	94	15	6	254	1441	96	56	4	1497
South Central	1005	94	59	6	1064	200	86	33	14	233	1218	93	93	7	1311
South West	1304	94	77	6	1381	278	86	45	14	323	1592	93	125	7	1717
West Midlands	1201	95	66	5	1267	232	84	45	16	277	1447	93	111	7	1558
North West	1420	93	108	7	1528	297	83	59	17	356	1730	91	170	9	1900
Wales	682	96	27	4	709	137	90	15	10	152	821	95	42	5	863
Northern Ireland	365	98	6	2	371	40	80	10	20	50	409	96	16	4	425
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**12599**	**95**	**658**	**5**	**13257**	**2549**	**85**	**447**	**15**	**2996**	**15272**	93	**1119**	7	**16391**

*Excluded cases from Scotland

Table 13 : Worst core/cytology biopsy results of the first non-operative needle biopsy visit for non-invasive cancers with a non-operative diagnosis

	C5, B5 or both		C4, B4 or both		C3, B3 or both		C2, B2 or both		C1, B1 or both		
Region	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**Total**
N East, Yorks & Humber	403	85	21	4	30	6	7	1	11	2	472
East Midlands	226	88	15	6	7	3	5	2	5	2	258
East of England	253	95	3	1	4	2	3	1	3	1	266
London	321	90	6	2	18	5	5	1	5	1	355
South East Coast	244	96	2	1	2	1	3	1	3	1	254
South Central	209	90	12	5	8	3	2	1	2	1	233
South West	294	91	13	4	6	2	6	2	4	1	323
West Midlands	246	89	13	5	8	3	4	1	6	2	277
North West	324	91	11	3	9	3	7	2	5	1	356
Wales	141	93	2	1	2	1	4	3	3	2	152
Northern Ireland	48	96	0	0	2	4	0	0	0	0	50
Scotland	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**2709**	**90**	**98**	**3**	**96**	**3**	**46**	**2**	**47**	**2**	**2996**

*Excluded cases from Scotland

Table 14 : Any further visits after core/cytology biopsy result

	Invasive					Non-Invasive					Overall				
	Further visit		No further visit			Further visit		No further visit			Further visit		No further visit		
Region	**No**	**%**	**No**	**%**	**Total**	**No**	**%**	**No**	**%**	**Total**	**No**	**%**	**No**	**%**	**Total**
N East, Yorks & Humber	114	6	1774	94	1888	21	4	503	96	524	135	6	2295	94	2430
East Midlands	31	3	1088	97	1119	6	2	290	98	296	37	3	1392	97	1429
East of England	28	2	1324	98	1352	10	3	325	97	335	38	2	1661	98	1699
London	31	2	1382	98	1413	5	1	391	99	396	40	2	1793	98	1833
South East Coast	49	4	1200	96	1249	10	3	298	97	308	59	4	1509	96	1568
South Central	38	4	1043	96	1081	4	1	275	99	279	42	3	1333	97	1375
South West	41	3	1359	97	1400	8	2	361	98	369	49	3	1733	97	1782
West Midlands	84	7	1197	93	1281	15	5	305	95	320	99	6	1518	94	1617
North West	62	4	1474	96	1536	14	3	390	97	404	76	4	1880	96	1956
Wales	11	2	712	98	723	3	2	176	98	179	14	2	890	98	904
Northern Ireland	5	1	366	99	371	1	2	64	98	65	6	1	434	99	440
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**494**	**4**	**12919**	**96**	**13413**	**97**	**3**	**3378**	**97**	**3475**	**595**	**3**	**16438**	**97**	**17033**

*Excluded cases from Scotland

Table 15 : Status of diagnostic open biopsies			
	Benign biopsy rate		Malignant biopsy rate
Region	Prevalent	Incident	
N East, Yorks & Humber	1.06	0.32	0.24
East Midlands	1.16	0.41	0.32
East of England	1.63	0.42	0.37
London	1.78	0.52	0.26
South East Coast	1.96	0.73	0.41
South Central	2.34	0.50	0.41
South West	1.69	0.48	0.30
West Midlands	2.09	0.45	0.28
North West	1.30	0.49	0.23
Wales	3.33	0.83	0.45
Northern Ireland	1.12	0.36	0.23
Scotland	1.42	0.61	0.21
United Kingdom	**1.64**	**0.49**	**0.30**

Table 16 : 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	2	0.63
East Midlands	0	0.00	0	0.00
East of England	0	0.00	0	0.00
London	0	0.00	0	0.00
South East Coast	0	0.00	0	0.00
South Central	0	0.00	0	0.00
South West	0	0.00	0	0.00
West Midlands	0	0.00	1	0.48
North West	0	0.00	0	0.00
Wales	0	0.00	0	0.00
Northern Ireland	1	1.54	0	0.00
Scotland	0	0.00	0	0.00
United Kingdom	**1**	**0.04**	**3**	**0.13**

Table 17 : 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	77	24	31	1	1	52	68	0	0
East Midlands	57	17	30	2	4	38	67	0	0
East of England	83	14	17	0	0	69	83	0	0
London	60	18	30	0	0	42	70	0	0
South East Coast	74	18	24	1	1	54	73	1	1
South Central	67	18	27	1	1	48	72	0	0
South West	67	21	31	0	0	46	69	0	0
West Midlands	59	14	24	1	2	43	73	1	2
North West	56	8	14	0	0	48	86	0	0
Wales	42	14	33	0	0	28	67	0	0
Northern Ireland	15	0	0	0	0	15	100	0	0
Scotland	37	9	24	0	0	28	76	0	0
United Kingdom	**694**	**175**	**25**	**6**	**1**	**511**	**74**	**2**	**0**

Table 18 : 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	24	1	4	0	0	22	92	1	4
East Midlands	17	1	6	0	0	16	94	0	0
East of England	14	2	14	0	0	12	86	0	0
London	18	1	6	1	6	13	72	3	17
South East Coast	18	2	11	0	0	15	83	1	6
South Central	18	1	6	2	11	15	83	0	0
South West	21	2	10	0	0	18	86	1	5
West Midlands	14	0	0	0	0	13	93	1	7
North West	8	0	0	0	0	8	100	0	0
Wales	14	0	0	0	0	14	100	0	0
Northern Ireland	0	0	-	0	-	0	-	0	-
Scotland	9	2	22	1	11	6	67	0	0
United Kingdom	**175**	**12**	**7**	**4**	**2**	**152**	**87**	**7**	**4**

Table 19 : 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	53	1	2	0	0	50	94	2	4
East Midlands	40	0	0	1	3	37	93	2	5
East of England	69	0	0	1	1	67	97	1	1
London	42	1	2	0	0	40	95	1	2
South East Coast	55	0	0	1	2	54	98	0	0
South Central	49	2	4	1	2	46	94	0	0
South West	46	0	0	1	2	45	98	0	0
West Midlands	44	0	0	0	0	44	100	0	0
North West	48	0	0	0	0	45	94	3	6
Wales	28	1	4	0	0	27	96	0	0
Northern Ireland	15	0	0	0	0	5	33	10	67
Scotland	28	0	0	0	0	28	100	0	0
United Kingdom	**517**	**5**	**1**	**5**	**1**	**488**	**94**	**19**	**4**

Table 20 : 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	24	1	4	9	38	13	54	0	0	1	4
East Midlands	17	1	6	5	29	9	53	0	0	2	12
East of England	14	2	14	4	29	8	57	0	0	0	0
London	18	1	6	8	44	8	44	0	0	1	6
South East Coast	18	2	11	3	17	11	61	2	11	0	0
South Central	18	1	6	7	39	4	22	5	28	1	6
South West	21	2	10	10	48	6	29	2	10	1	5
West Midlands	14	0	0	5	36	6	43	3	21	0	0
North West	8	0	0	4	50	4	50	0	0	0	0
Wales	14	0	0	1	7	9	64	3	21	1	7
Northern Ireland	0	0	-	0	-	0	-	0	-	0	-
Scotland	9	2	22	1	11	4	44	1	11	1	11
United Kingdom	**175**	**12**	**7**	**57**	**33**	**82**	**47**	**16**	**9**	**8**	**5**

Table 21 : Highest cytology and core biopsy result prior to malignant diagnostic open biopsies (micro/non-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	53	1	2	11	21	38	72	3	6	0	0
East Midlands	40	0	0	5	13	35	88	0	0	0	0
East of England	69	0	0	18	26	51	74	0	0	0	0
London	42	1	2	5	12	36	86	0	0	0	0
South East Coast	55	0	0	15	27	36	65	4	7	0	0
South Central	49	2	4	11	22	34	69	2	4	0	0
South West	46	0	0	17	37	29	63	0	0	0	0
West Midlands	44	0	0	12	27	32	73	0	0	0	0
North West	48	0	0	18	38	29	60	0	0	1	2
Wales	28	1	4	6	21	20	71	0	0	1	4
Northern Ireland	15	0	0	3	20	12	80	0	0	0	0
Scotland	28	0	0	4	14	23	82	1	4	0	0
United Kingdom	**517**	**5**	**1**	**125**	**24**	**375**	**73**	**10**	**2**	**2**	**0**

Table 22 : Data completeness for surgically treated non-invasive cancers							
Region	Unknown cytonuclear grade		Unknown size		Unknown cytonuclear grade and/or size		Total with surgery
	No.	%	No.	%	No.	%	No.
N East, Yorks & Humber	5	1	28	5	28	5	521
East Midlands	0	0	18	6	18	6	294
East of England	0	0	11	3	11	3	328
London	4	1	30	8	30	8	375
South East Coast	3	1	11	4	12	4	306
South Central	1	0	5	2	5	2	277
South West	0	0	9	2	9	2	361
West Midlands	1	0	15	5	15	5	316
North West	5	1	23	6	24	6	400
Wales	1	1	16	9	17	10	176
Northern Ireland	0	0	1	2	1	2	65
Scotland	15	6	11	5	21	9	238
United Kingdom	**35**	**1.0**	**178**	**5**	**191**	**5**	**3657**

Table 23 : Size of surgically treated non-invasive cancers												
Region	<15mm		15-≤40mm		>40 mm		Size not assessable		Size unknown		Total non-invasive with surgery	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	170	33	219	42	79	15	25	5	28	5	521	100
East Midlands	89	30	127	43	49	17	11	4	18	6	294	100
East of England	108	33	136	41	35	11	38	12	11	3	328	100
London	118	31	146	39	57	15	24	6	30	8	375	100
South East Coast	120	39	126	41	31	10	18	6	11	4	306	100
South Central	103	37	116	42	41	15	12	4	5	2	277	100
South West	147	41	141	39	43	12	21	6	9	2	361	100
West Midlands	131	41	111	35	45	14	14	4	15	5	316	100
North West	146	37	167	42	50	13	14	4	23	6	400	100
Wales	69	39	63	36	25	14	3	2	16	9	176	100
Northern Ireland	27	42	24	37	8	12	5	8	1	2	65	100
Scotland	73	31	116	49	34	14	4	2	11	5	238	100
United Kingdom	**1301**	**36**	**1492**	**41**	**497**	**14**	**189**	**5**	**178**	**5**	**3657**	**100**

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	306	59	143	27	41	8	26	5	5	1	521	100
East Midlands	158	54	102	35	23	8	11	4	0	0	294	100
East of England	183	56	80	24	26	8	39	12	0	0	328	100
London	181	48	120	32	46	12	24	6	4	1	375	100
South East Coast	180	59	81	26	24	8	18	6	3	1	306	100
South Central	164	59	75	27	24	9	13	5	1	0	277	100
South West	214	59	91	25	35	10	21	6	0	0	361	100
West Midlands	181	57	92	29	28	9	14	4	1	0	316	100
North West	219	55	123	31	41	10	12	3	5	1	400	100
Wales	88	50	51	29	33	19	3	2	1	1	176	100
Northern Ireland	35	54	11	17	14	22	5	8	0	0	65	100
Scotland	154	65	56	24	8	3	5	2	15	6	238	100
United Kingdom	**2063**	**56**	**1025**	**28**	**343**	**9**	**191**	**5**	**35**	**1**	**3657**	**100**

Table 25 : 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	521	28	483	26	409	22	314	17	66	4	42	2	32	2	1867	100
East Midlands	304	28	328	30	233	21	161	15	40	4	12	1	10	1	1088	100
East of England	303	23	367	28	336	25	219	17	43	3	17	1	39	3	1324	100
London	302	22	328	24	345	25	263	19	74	5	37	3	19	1	1368	100
South East Coast	323	26	343	28	258	21	210	17	50	4	24	2	19	2	1227	100
South Central	239	23	267	25	274	26	215	20	42	4	14	1	10	1	1061	100
South West	377	27	381	28	302	22	218	16	54	4	29	2	15	1	1376	100
West Midlands	329	26	333	26	304	24	223	18	53	4	12	1	12	1	1266	100
North West	371	25	400	27	348	23	273	18	70	5	26	2	21	1	1509	100
Wales	204	29	178	25	153	21	125	18	33	5	13	2	6	1	712	100
Northern Ireland	78	21	107	29	77	21	82	22	9	2	10	3	5	1	368	100
Scotland	331	27	354	29	282	23	188	15	35	3	12	1	13	1	1215	100
United Kingdom	**3682**	**26**	**3869**	**27**	**3321**	**23**	**2491**	**17**	**569**	**4**	**248**	**2**	**201**	**1**	**14381**	**100**

Table 26 : Whole size of surgically treated invasive breast cancers																
	<10mm		10-<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	308	16	434	23	433	23	429	23	147	8	100	5	16	1	1867	100
East Midlands	174	16	286	26	258	24	223	20	89	8	38	3	20	2	1088	100
East of England	191	14	307	23	348	26	321	24	89	7	45	3	23	2	1324	100
London	169	12	305	22	328	24	314	23	142	10	93	7	17	1	1368	100
South East Coast	211	17	299	24	280	23	276	22	83	7	60	5	18	1	1227	100
South Central	138	13	216	20	274	26	280	26	97	9	46	4	10	1	1061	100
South West	220	16	327	24	330	24	310	23	102	7	69	5	18	1	1376	100
West Midlands	201	16	286	23	310	24	309	24	100	8	46	4	14	1	1266	100
North West	254	17	367	24	347	23	345	23	126	8	53	4	17	1	1509	100
Wales	129	18	161	23	154	22	158	22	55	8	26	4	29	4	712	100
Northern Ireland	50	14	91	25	81	22	106	29	20	5	18	5	2	1	368	100
Scotland	201	17	323	27	311	26	236	19	57	5	43	4	44	4	1215	100
United Kingdom	**2246**	**16**	**3402**	**24**	**3454**	**24**	**3307**	**23**	**1107**	**8**	**637**	**4**	**228**	**2**	**14381**	**100**

Table 27 : Grade of surgically treated invasive cancers												
	Grade 1		Grade 2		Grade 3		Not assessable		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	493	26	1013	54	349	19	5	0	7	0	1867	100
East Midlands	303	28	565	52	218	20	1	0	1	0	1088	100
East of England	272	21	715	54	324	24	11	1	2	0	1324	100
London	349	26	745	54	263	19	6	0	5	0	1368	100
South East Coast	310	25	653	53	253	21	5	0	6	0	1227	100
South Central	262	25	551	52	243	23	2	0	3	0	1061	100
South West	358	26	738	54	268	19	9	1	3	0	1376	100
West Midlands	295	23	691	55	273	22	3	0	4	0	1266	100
North West	472	31	732	49	300	20	5	0	0	0	1509	100
Wales	195	27	396	56	118	17	0	0	3	0	712	100
Northern Ireland	67	18	211	57	88	24	1	0	1	0	368	100
Scotland	303	25	649	53	249	20	2	0	12	1	1215	100
United Kingdom	**3679**	**26**	**7659**	**53**	**2946**	**20**	**50**	**0**	**47**	**0**	**14381**	**100**

Table 28 : Data completeness for surgically treated invasive cancers (excluding cases with neo-adjuvant therapy)									
	Unknown invasive size		Unknown nodal status		Unknown grade		Unknown NPI*		Total invasive
Region	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	26	1.4	18	1.0	7	0.4	47	2.6	1831
East Midlands	10	0.9	3	0.3	1	0.1	12	1.1	1059
East of England	25	2.0	6	0.5	2	0.2	35	2.8	1247
London	13	1.0	16	1.2	5	0.4	32	2.4	1311
South East Coast	12	1.0	12	1.0	3	0.3	25	2.1	1169
South Central	6	0.6	8	0.8	2	0.2	16	1.6	1021
South West	12	0.9	21	1.6	1	0.1	31	2.4	1306
West Midlands	9	0.7	6	0.5	4	0.3	17	1.4	1208
North West	20	1.4	8	0.5	0	0.0	30	2.0	1468
Wales	5	0.7	4	0.6	3	0.4	10	1.4	699
Northern Ireland	5	1.4	4	1.1	1	0.3	9	2.5	367
Scotland	6	0.8	6	0.8	6	0.8	13	1.7	771
United Kingdom	**149**	**1.1**	**112**	**0.8**	**35**	**0.3**	**277**	**2.1**	**13457**

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

Table 29 : NPI Group of surgically treated invasive cancers (with known NPI excluding cases with neo-adjuvant therapy)												
	EPG		GPG		MPG1		MPG2		PPG		Total with known NPI	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	399	22	681	38	406	23	194	11	104	6	1784	100
East Midlands	248	24	400	38	251	24	97	9	51	5	1047	100
East of England	226	19	457	38	347	29	120	10	62	5	1212	100
London	248	19	467	37	319	25	158	12	87	7	1279	100
South East Coast	235	21	430	38	287	25	129	11	63	6	1144	100
South Central	195	19	349	35	273	27	121	12	67	7	1005	100
South West	271	21	503	39	328	26	118	9	55	4	1275	100
West Midlands	242	20	446	37	306	26	129	11	68	6	1191	100
North West	362	25	492	34	349	24	154	11	81	6	1438	100
Wales	160	23	275	40	141	20	75	11	38	6	689	100
Northern Ireland	50	14	141	39	105	29	36	10	26	7	358	100
Scotland	165	22	306	40	187	25	62	8	38	5	758	100
United Kingdom	**2801**	**21**	**4947**	**38**	**3299**	**25**	**1393**	**11**	**740**	**6**	**13180**	**100**

Table 30 : ER status (invasive cancers)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1725	91	154	8	10	1	1889
East Midlands	1030	92	88	8	2	0	1120
East of England	1246	92	90	7	18	1	1354
London	1266	90	136	10	12	1	1414
South East Coast	1154	92	95	8	2	0	1251
South Central	994	92	85	8	3	0	1082
South West	1289	92	108	8	5	0	1402
West Midlands	1170	91	105	8	6	0	1281
North West	1384	90	151	10	1	0	1536
Wales	669	93	51	7	3	0	723
Northern Ireland	341	92	30	8	0	0	371
Scotland	1141	92	87	7	7	1	1235
United Kingdom	**13409**	**91**	**1180**	**8**	**69**	**0**	**14658**

Table 31 : PgR status (invasive)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	482	26	186	10	1221	65	1889
East Midlands	264	24	143	13	713	64	1120
East of England	263	19	115	8	976	72	1354
London	1064	75	283	20	67	5	1414
South East Coast	761	61	127	10	363	29	1251
South Central	542	50	150	14	390	36	1082
South West	556	40	148	11	698	50	1402
West Midlands	529	41	168	13	584	46	1281
North West	1105	72	291	19	140	9	1536
Wales	275	38	90	12	358	50	723
Northern Ireland	248	67	66	18	57	15	371
Scotland	719	58	144	12	372	30	1235
United Kingdom	**6808**	**46**	**1911**	**13**	**5939**	**41**	**14658**

Table 32 : PgR status of invasive cancers with negative ER status							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	6	4	102	66	46	30	154
East Midlands	2	2	51	58	35	40	88
East of England	5	6	62	69	23	26	90
London	8	6	126	93	2	1	136
South East Coast	8	8	71	75	16	17	95
South Central	9	11	68	80	8	9	85
South West	7	6	64	59	37	34	108
West Midlands	4	4	95	90	6	6	105
North West	6	4	143	95	2	1	151
Wales	0	0	42	82	9	18	51
Northern Ireland	1	3	29	97	0	0	30
Scotland	9	10	62	71	16	18	87
United Kingdom	**65**	**6**	**915**	**78**	**200**	**17**	**1180**

Table 33 : HER-2 status for invasive cancers									
	Positive		Negative		Borderline		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	172	9	1622	86	59	3	36	2	1889
East Midlands	111	10	1005	90	0	0	4	0	1120
East of England	141	10	1159	86	12	1	42	3	1354
London	141	10	1235	87	11	1	27	2	1414
South East Coast	104	8	1068	85	53	4	26	2	1251
South Central	134	12	895	83	36	3	17	2	1082
South West	138	10	1237	88	14	1	13	1	1402
West Midlands	133	10	1119	87	5	0	24	2	1281
North West	188	12	1273	83	70	5	5	0	1536
Wales	60	8	653	90	3	0	7	1	723
Northern Ireland	36	10	308	83	24	6	3	1	371
Scotland	133	11	1092	88	0	0	10	1	1235
United Kingdom	**1491**	**10**	**12666**	**86**	**287**	**2**	**214**	**1**	**14658**

Table 34 : 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	36	15	42	13	36	26	72
East Midlands	4	3	75	2	50	3	75
East of England	42	8	19	9	21	25	60
London	27	6	22	7	26	14	52
South East Coast	26	12	46	4	15	18	69
South Central	17	5	29	6	35	12	71
South West	13	7	54	3	23	8	62
West Midlands	24	13	54	8	33	18	75
North West	5	3	60	2	40	1	20
Wales	7	4	57	2	29	3	43
Northern Ireland	3	1	33	0	0	3	100
Scotland	10	1	10	1	10	5	50
United Kingdom	**214**	**78**	**36**	**57**	**27**	**136**	**64**

Table 35 : ER status (micro/non-invasive cancers)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	159	29	52	10	331	61	542
East Midlands	79	25	13	4	218	70	310
East of England	44	13	13	4	289	84	346
London	117	28	20	5	281	67	418
South East Coast	114	36	20	6	183	58	317
South Central	50	17	8	3	237	80	295
South West	144	38	26	7	212	55	382
West Midlands	47	14	10	3	277	83	334
North West	266	63	56	13	97	23	419
Wales	11	6	2	1	169	93	182
Northern Ireland	30	45	6	9	31	46	67
Scotland	52	21	7	3	185	76	244
United Kingdom	**1113**	**29**	**233**	**6**	**2510**	**65**	**3856**

Table 36 : Treatment for non-invasive breast cancers										
	Conservation surgery		Mastectomy		No surgery		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	374	71	147	28	3	1	0	0	524	100
East Midlands	203	69	91	31	2	1	0	0	296	100
East of England	245	73	81	24	7	2	2	1	335	100
London	270	68	105	26	22	6	0	0	397	100
South East Coast	251	81	55	18	2	1	0	0	308	100
South Central	208	74	69	25	4	1	0	0	281	100
South West	289	78	72	20	8	2	0	0	369	100
West Midlands	236	74	80	25	4	1	0	0	320	100
North West	303	75	97	24	4	1	0	0	404	100
Wales	138	77	38	21	4	2	0	0	180	100
Northern Ireland	45	69	20	31	0	0	0	0	65	100
Scotland	185	77	53	22	3	1	0	0	241	100
United Kingdom	**2747**	**74**	**908**	**24**	**63**	**2**	**2**	**0**	**3720**	**100**

Table 37 : Treatment for micro-invasive breast cancers										
	Conservation surgery		Mastectomy		No surgery		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	11	61	7	39	0	0	0	0	18	100
East Midlands	8	57	6	43	0	0	0	0	14	100
East of England	9	82	2	18	0	0	0	0	11	100
London	11	52	10	48	0	0	0	0	21	100
South East Coast	5	56	4	44	0	0	0	0	9	100
South Central	12	86	2	14	0	0	0	0	14	100
South West	9	69	4	31	0	0	0	0	13	100
West Midlands	8	57	6	43	0	0	0	0	14	100
North West	8	53	7	47	0	0	0	0	15	100
Wales	1	50	1	50	0	0	0	0	2	100
Northern Ireland	0	0	2	100	0	0	0	0	2	100
Scotland	2	67	1	33	0	0	0	0	3	100
United Kingdom	**84**	**62**	**52**	**38**	**0**	**0**	**0**	**0**	**136**	**100**

Table 38 : Treatment for non-invasive breast cancers size >40mm								
	Conservation surgery		Mastectomy		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	12	15	67	85	0	0	79	100
East Midlands	5	10	44	90	0	0	49	100
East of England	2	6	33	94	0	0	35	100
London	12	21	45	79	0	0	57	100
South East Coast	7	23	24	77	0	0	31	100
South Central	7	17	34	83	0	0	41	100
South West	11	26	32	74	0	0	43	100
West Midlands	7	16	38	84	0	0	45	100
North West	5	10	45	90	0	0	50	100
Wales	11	44	14	56	0	0	25	100
Northern Ireland	1	13	7	88	0	0	8	100
Scotland	11	32	23	68	0	0	34	100
United Kingdom	**91**	**18**	**406**	**82**	**0**	**0**	**497**	**100**

Table 39 : Treatment of high cytonuclear grade non-invasive cancers (>40mm)								
	Conservation surgery		Mastectomy		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	8	13	52	87	0	0	60	100
East Midlands	3	9	29	91	0	0	32	100
East of England	0	0	29	100	0	0	29	100
London	8	18	37	82	0	0	45	100
South East Coast	6	27	16	73	0	0	22	100
South Central	5	19	22	81	0	0	27	100
South West	7	22	25	78	0	0	32	100
West Midlands	5	16	26	84	0	0	31	100
North West	3	8	34	92	0	0	37	100
Wales	9	53	8	47	0	0	17	100
Northern Ireland	1	17	5	83	0	0	6	100
Scotland	10	33	20	67	0	0	30	100
United Kingdom	**65**	**18**	**303**	**82**	**0**	**0**	**368**	**100**

Table 40 : 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	1	100	0	0	0	0	1	100
South East Coast	0	-	0	-	0	-	0	-
South Central	0	-	0	-	0	-	0	-
South West	0	-	0	-	0	-	0	-
West Midlands	1	100	0	0	0	0	1	100
North West	1	100	0	0	0	0	1	100
Wales	0	-	0	-	0	-	0	-
Northern Ireland	0	-	0	-	0	-	0	-
Scotland	3	60	2	40	0	0	5	100
United Kingdom	**6**	**75**	**2**	**25**	**0**	**0**	**8**	**100**

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

Table 41 : Treatment for invasive breast cancers										
	Conservation surgery		Mastectomy		No Surgery		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1458	77	409	22	22	1	0	0	1889	100
East Midlands	871	78	217	19	32	3	0	0	1120	100
East of England	1044	77	278	21	30	2	2	0	1354	100
London	1079	76	289	20	46	3	0	0	1414	100
South East Coast	1010	81	217	17	24	2	0	0	1251	100
South Central	809	75	252	23	21	2	0	0	1082	100
South West	1123	80	252	18	26	2	1	0	1402	100
West Midlands	992	77	274	21	15	1	0	0	1281	100
North West	1182	77	327	21	27	2	0	0	1536	100
Wales	554	77	158	22	11	2	0	0	723	100
Northern Ireland	275	74	93	25	3	1	0	0	371	100
Scotland	983	80	230	19	20	2	2	0	1235	100
United Kingdom	**11380**	**78**	**2996**	**20**	**277**	**2**	**5**	**0**	**14658**	**100**

Table 42 : Mastectomy rate with invasive tumour size										
	<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	147	15	70	17	103	33	43	65	41	98
East Midlands	80	13	39	17	55	34	28	70	12	100
East of England	96	14	55	16	70	32	31	72	15	88
London	80	13	44	13	85	32	45	61	33	89
South East Coast	63	9	53	21	48	23	30	60	21	88
South Central	87	17	50	18	76	35	24	57	14	100
South West	84	11	51	17	66	30	26	48	23	79
West Midlands	89	13	59	19	78	35	32	60	12	100
North West	90	12	71	20	93	34	43	61	25	96
Wales	60	16	27	18	43	34	17	52	10	77
Northern Ireland	29	16	15	19	29	35	9	100	10	100
Scotland	82	12	49	17	61	32	24	69	11	92
United Kingdom	**987**	**13**	**583**	**18**	**807**	**32**	**352**	**62**	**227**	**92**

Table 43 : Mastectomy rate with whole tumour size										
	<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	52	7	57	13	110	26	94	64	89	89
East Midlands	27	6	39	15	57	26	54	61	34	89
East of England	36	7	43	12	88	27	63	71	40	89
London	34	7	26	8	66	21	79	56	83	89
South East Coast	18	4	31	11	64	23	50	60	50	83
South Central	33	9	45	16	78	28	53	55	41	89
South West	34	6	38	12	69	22	47	46	57	83
West Midlands	40	8	48	15	92	30	51	51	38	83
North West	43	7	56	16	102	30	74	59	49	92
Wales	34	12	22	14	46	29	29	53	18	69
Northern Ireland	15	11	11	14	32	30	17	85	17	94
Scotland	35	7	40	13	71	30	35	61	34	79
United Kingdom	**401**	**7**	**456**	**13**	**875**	**26**	**646**	**58**	**550**	**86**

Table 44 : 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	51	7	17	15	21	24	33	77	23	82
East Midlands	27	6	13	18	16	27	11	46	11	73
East of England	33	7	12	14	17	30	17	71	16	94
London	34	7	4	6	8	18	14	58	20	87
South East Coast	18	4	5	7	10	23	11	65	19	83
South Central	33	9	13	21	12	23	20	69	9	82
South West	34	6	5	5	15	20	10	50	18	90
West Midlands	40	8	10	14	19	29	9	41	10	63
North West	43	7	10	14	10	24	14	56	13	93
Wales	34	12	6	17	9	33	5	45	3	43
Northern Ireland	15	11	2	10	5	31	3	60	4	80
Scotland	35	7	12	16	10	21	9	64	15	71
United Kingdom	**397**	**7**	**109**	**13**	**152**	**25**	**156**	**60**	**161**	**81**

Table 45 : Immediate reconstruction with mastectomy (all cancers)								
	Immediate reconstruction		No immediate reconstruction		Unknown		Total mastectomies	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	214	38	348	62	1	0	563	100
East Midlands	92	29	222	71	0	0	314	100
East of England	108	30	195	54	58	16	361	100
London	113	28	259	64	32	8	404	100
South East Coast	91	33	169	61	17	6	277	100
South Central	76	24	245	76	2	1	323	100
South West	60	18	255	78	13	4	328	100
West Midlands	98	27	262	73	0	0	360	100
North West	146	34	284	66	1	0	431	100
Wales	42	21	155	79	0	0	197	100
Northern Ireland	19	17	96	83	0	0	115	100
Scotland	79	28	201	71	4	1	284	100
United Kingdom	**1138**	**29**	**2691**	**68**	**128**	**3**	**3957**	**100**

Table 46 : Any neo-adjuvant therapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	
N East, Yorks & Humber	42	2	2389	98	0	0	2431
East Midlands	58	4	1372	96	0	0	1430
East of England	94	6	1607	94	0	0	1701
London	78	4	1756	96	1	0	1835
South East Coast	68	4	1503	96	0	0	1571
South Central	51	4	1327	96	0	0	1378
South West	79	4	1705	96	0	0	1784
West Midlands	70	4	1547	96	0	0	1617
North West	63	3	1893	97	0	0	1956
Wales	23	3	882	97	0	0	905
Northern Ireland	2	0	438	100	0	0	440
Scotland	72	5	1414	95	6	0	1492
United Kingdom	**700**	**4**	**17833**	**96**	**7**	**0**	**18540**

Table 47 : Neo-adjuvant endocrine therapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	
N East, Yorks & Humber	22	1	2409	99	0	0	2431
East Midlands	34	2	1396	98	0	0	1430
East of England	40	2	1661	98	0	0	1701
London	35	2	1800	98	0	0	1835
South East Coast	42	3	1529	97	0	0	1571
South Central	33	2	1345	98	0	0	1378
South West	26	1	1758	99	0	0	1784
West Midlands	42	3	1575	97	0	0	1617
North West	43	2	1913	98	0	0	1956
Wales	17	2	888	98	0	0	905
Northern Ireland	1	0	439	100	0	0	440
Scotland	49	3	1437	96	6	0	1492
United Kingdom	**384**	**2**	**18150**	**98**	**6**	**0**	**18540**

Table 48 : Neo-adjuvant chemotherapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	20	1	2411	99	0	0	2431
East Midlands	25	2	1405	98	0	0	1430
East of England	56	3	1645	97	0	0	1701
London	49	3	1786	97	0	0	1835
South East Coast	26	2	1545	98	0	0	1571
South Central	22	2	1356	98	0	0	1378
South West	56	3	1728	97	0	0	1784
West Midlands	30	2	1587	98	0	0	1617
North West	22	1	1934	99	0	0	1956
Wales	7	1	898	99	0	0	905
Northern Ireland	1	0	439	100	0	0	440
Scotland	25	2	1461	98	6	0	1492
United Kingdom	**339**	**2**	**18195**	**98**	**6**	**0**	**18540**

Table 49 : Neo-adjuvant Traztuzumab							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	4	0	2427	100	0	0	2431
East Midlands	0	0	1430	100	0	0	1430
East of England	4	0	1697	100	0	0	1701
London	3	0	1831	100	1	0	1835
South East Coast	3	0	1568	100	0	0	1571
South Central	1	0	1377	100	0	0	1378
South West	1	0	1783	100	0	0	1784
West Midlands	3	0	1614	100	0	0	1617
North West	0	0	1956	100	0	0	1956
Wales	0	0	905	100	0	0	905
Northern Ireland	0	0	440	100	0	0	440
Scotland	1	0	1485	100	6	0	1492
United Kingdom	**20**	**0**	**18513**	**100**	**7**	**0**	**18540**

Table 50 : Annual screening surgical caseload per surgeon (2012/13)												
	Total	<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases		
Region	surgeons	No.	%	No.	%	No.	%	No.	%	No.	%	Median
N East, Yorks & Humber	75	16	21	4	5	14	19	39	52	2	3	31
East Midlands	41	8	20	5	12	6	15	22	54	0	0	32
East of England	51	6	12	8	16	5	10	32	63	0	0	36
London	75	22	29	13	17	10	13	28	37	2	3	21
South East Coast	40	7	18	4	10	6	15	21	53	2	5	34
South Central	35	8	23	2	6	3	9	21	60	1	3	38
South West	55	12	22	9	16	7	13	27	49	0	0	29
West Midlands	53	7	13	6	11	16	30	24	45	0	0	27
North West	66	14	21	10	15	10	15	32	48	0	0	27
Wales	26	7	27	3	12	3	12	13	50	0	0	32
Northern Ireland	14	1	7	2	14	4	29	7	50	0	0	29.5
Scotland	47	9	19	7	15	9	19	20	43	2	4	26
United Kingdom	**578**	**117**	**20**	**73**	**13**	**93**	**16**	**286**	**49**	**9**	**2**	30

The surgeons in each region are credited with their total UK screening caseload.

Table 51 : Proportion of women referred to consultant surgeons according to annual caseload of surgeon (2012/13)											
Region	Total (referred)	<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases	
		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2546	54	2	52	2	366	14	1815	71	259	10
East Midlands	1494	16	1	71	5	151	10	1256	84	0	0
East of England	1785	14	1	113	6	129	7	1529	86	0	0
London	1866	66	4	187	10	238	13	1136	61	239	13
South East Coast	1632	14	1	59	4	143	9	1142	70	274	17
South Central	1453	14	1	31	2	83	6	1226	84	99	7
South West	1852	31	2	144	8	175	9	1502	81	0	0
West Midlands	1682	25	1	90	5	392	23	1175	70	0	0
North West	2028	56	3	166	8	228	11	1578	78	0	0
Wales	956	18	2	42	4	65	7	831	87	0	0
Northern Ireland	443	2	0	30	7	108	24	303	68	0	0
Scotland	1517	25	2	113	7	210	14	905	60	264	17
United Kingdom	**19254**	**335**	**2**	**1098**	**6**	**2288**	**12**	**14398**	**75**	**1135**	**6**

Table 52 : Annual screening surgical caseload per surgeon (2010/11-2012/13)												
Region	Total surgeons	<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases		Median
		No.	%	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	93	28	30	12	13	18	19	34	37	1	1	72
East Midlands	51	16	31	8	16	3	6	24	47	0	0	79
East of England	65	21	32	10	15	5	8	29	45	0	0	78
London	96	43	45	16	17	11	11	24	25	2	2	37
South East Coast	52	19	37	3	6	6	12	22	42	2	4	83
South Central	46	18	39	2	4	6	13	20	43	0	0	71
South West	69	28	41	8	12	3	4	30	43	0	0	56
West Midlands	62	15	24	8	13	14	23	25	40	0	0	73
North West	86	36	42	9	10	10	12	31	36	0	0	47
Wales	28	10	36	1	4	3	11	14	50	0	0	92
Northern Ireland	16	3	19	2	13	5	31	6	38	0	0	76
Scotland	89	47	53	11	12	7	8	23	26	1	1	20
United Kingdom	**753**	**284**	**38**	**90**	**12**	**91**	**12**	**282**	**37**	**6**	**1**	**60.0**

The surgeons in each region are credited with their total UK screening caseload.

Table 53 : Proportion of women referred to consultant surgeons according to annual caseload of surgeon (2010/11-2012/13)											
Region	Total (referred)	<10 cases		10-19 cases		20-29 cases		30-99 cases		100+ cases	
		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	7256	241	3	530	7	1333	18	4865	67	287	4
East Midlands	4200	130	3	328	8	244	6	3498	83	0	0
East of England	5087	216	4	467	9	362	7	4042	79	0	0
London	5344	330	6	610	11	864	16	2873	54	667	12
South East Coast	4701	171	4	128	3	417	9	3299	70	686	15
South Central	3923	34	1	68	2	416	11	3405	87	0	0
South West	5278	222	4	381	7	235	4	4440	84	0	0
West Midlands	5001	151	3	328	7	1024	20	3498	70	0	0
North West	6080	460	8	394	6	745	12	4443	73	38	1
Wales	2823	51	2	47	2	247	9	2478	88	0	0
Northern Ireland	1233	57	5	94	8	369	30	713	58	0	0
Scotland	4962	223	4	560	11	535	11	3228	65	416	8
United Kingdom	**55888**	**2286**	**4**	**3935**	**7**	**6791**	**12**	**40782**	**73**	**2094**	**4**

Table 54 : Explanations for surgeons treating less than 10 screening cases (2012/13)								
Region	**Number surgeons with caseload <10**	**Other caseload >30 year**	**Joined NHSBSP**	**Left NHSBSP**	**Plastic surgeon**	**Private practice**	**No information**	**Other**
N East, Yorks & Humber	16	2	2	2	1	3	3	3
East Midlands	8	0	1	0	2	1	3	1
East of England	6	3	2	0	0	1	0	0
London	22	9	1	1	5	5	1	0
South East Coast	7	3	0	0	2	1	0	1
South Central	8	1	0	0	5	1	1	0
South West	12	1	2	0	2	0	7	0
West Midlands	7	2	0	0	1	2	2	0
North West	14	12	0	0	1	1	0	0
Wales	7	5	0	0	2	0	0	0
Northern Ireland	1	0	1	0	0	0	0	0
Scotland	9	4	1	0	0	0	3	1
United Kingdom	**117**	**42**	**10**	**3**	**21**	**15**	**20**	**6**

Table 55 : Explanations for surgeons treating less than 10 screening cases annually (2010/11-2012/13)								
Region	**Number surgeons with caseload <10**	**Other caseload >30 year**	**Joined NHSBSP**	**Left NHSBSP**	**Plastic surgeon**	**Private practice**	**No information**	**Other**
N East, Yorks & Humber	28	5	5	4	2	2	7	3
East Midlands	16	1	1	1	3	1	8	1
East of England	21	6	3	2	1	3	4	2
London	43	10	1	1	7	11	10	3
South East Coast	19	2	1	1	3	2	8	2
South Central	18	1	1	0	9	1	4	2
South West	28	6	3	0	4	0	15	0
West Midlands	15	4	0	1	2	2	5	1
North West	36	15	0	4	2	4	9	2
Wales	10	7	0	0	2	0	1	0
Northern Ireland	3	1	1	0	0	0	1	0
Scotland	47	6	1	3	0	1	33	3
United Kingdom	**284**	**64**	**17**	**17**	**35**	**27**	**105**	**19**

Table 56 : 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	1867	418	22	539	126	23
East Midlands	1088	241	22	308	78	25
East of England	1324	357	27	339	88	26
London	1368	344	25	396	86	22
South East Coast	1227	314	26	315	81	26
South Central	1061	238	22	291	82	28
South West	1376	329	24	374	99	26
West Midlands	1266	314	25	330	98	30
North West	1509	351	23	415	102	25
Wales	712	177	25	178	59	33
Northern Ireland	368	95	26	67	14	21
Scotland	1215	195	16	241	52	22
United Kingdom	**14381**	**3373**	**23**	**3793**	**965**	**25**

Table 57 : 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	24	20	83	53	17	32
East Midlands	17	17	100	40	21	53
East of England	14	11	79	69	24	35
London	18	14	78	42	12	29
South East Coast	18	15	83	55	19	35
South Central	18	15	83	49	18	37
South West	21	12	57	46	13	28
West Midlands	14	13	93	44	24	55
North West	8	7	88	48	13	27
Wales	14	12	86	28	19	68
Northern Ireland	0	0	-	15	5	33
Scotland	9	5	56	28	9	32
United Kingdom	**175**	**141**	**81**	**517**	**194**	**38**

Table 58 : 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	1185	79	290	19	19	1	1	0	0	0	1495	100	310	21
East Midlands	692	77	183	20	16	2	2	0	0	0	893	100	201	23
East of England	805	74	255	24	21	2	1	0	0	0	1082	100	277	26
London	828	77	228	21	19	2	2	0	0	0	1077	100	249	23
South East Coast	757	74	244	24	24	2	3	0	0	0	1028	100	271	26
South Central	649	76	180	21	20	2	1	0	0	0	850	100	201	24
South West	873	76	243	21	32	3	3	0	0	0	1151	100	278	24
West Midlands	772	75	235	23	16	2	0	0	0	0	1023	100	251	25
North West	952	78	252	21	23	2	1	0	0	0	1228	100	276	22
Wales	432	76	127	22	13	2	0	0	0	0	572	100	140	24
Northern Ireland	211	71	74	25	10	3	1	0	0	0	296	100	85	29
Scotland	839	83	158	16	13	1	0	0	1	0	1011	100	171	17
United Kingdom	**8995**	**77**	**2469**	**21**	**226**	**2**	**15**	**0**	**1**	**0**	**11706**	**100**	**2710**	**23**

Table 59 : 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	278	75	75	20	17	5	1	0	0	0	371	100	93	25
East Midlands	135	71	50	26	6	3	0	0	0	0	191	100	56	29
East of England	159	76	40	19	8	4	1	0	0	0	208	100	49	24
London	196	77	51	20	8	3	1	0	0	0	256	100	60	23
South East Coast	158	73	48	22	6	3	4	2	0	0	216	100	58	27
South Central	132	70	47	25	8	4	1	1	0	0	188	100	56	30
South West	191	71	68	25	11	4	0	0	0	0	270	100	79	29
West Midlands	166	73	48	21	11	5	2	1	0	0	227	100	61	27
North West	206	73	70	25	8	3	0	0	0	0	284	100	78	27
Wales	80	68	32	27	5	4	1	1	0	0	118	100	38	32
Northern Ireland	26	74	6	17	3	9	0	0	0	0	35	100	9	26
Scotland	130	76	39	23	1	1	1	1	0	0	171	100	41	24
United Kingdom	**1857**	**73**	**574**	**23**	**92**	**4**	**12**	**0**	**0**	**0**	**2535**	**100**	**678**	**27**

Table 60 : 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	1407	81	318	18	16	1	0	0	1741	100	334	19
East Midlands	831	82	171	17	17	2	0	0	1019	100	188	18
East of England	937	75	287	23	16	1	2	0	1242	100	303	24
London	977	77	267	21	17	1	0	0	1261	100	284	23
South East Coast	887	78	237	21	20	2	0	0	1144	100	257	22
South Central	801	81	170	17	19	2	0	0	990	100	189	19
South West	1004	78	248	19	32	2	1	0	1285	100	280	22
West Midlands	926	79	244	21	9	1	0	0	1179	100	253	21
North West	1120	80	271	19	15	1	0	0	1406	100	286	20
Wales	512	78	135	21	10	2	0	0	657	100	145	22
Northern Ireland	263	75	77	22	11	3	0	0	351	100	88	25
Scotland	985	85	158	14	12	1	3	0	1158	100	170	15
United Kingdom	**10650**	**79**	**2583**	**19**	**194**	**1**	**6**	**0**	**13433**	**100**	**2777**	**21**

Table 61 : 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	0	-	0	-	0	-	0	-	0	-	0	-
East Midlands	0	-	0	-	0	-	0	-	0	-	0	-
East of England	0	0	2	100	0	0	0	0	2	100	2	100
London	2	100	0	0	0	0	0	0	2	100	0	0
South East Coast	0	-	0	-	0	-	0	-	0	-	0	-
South Central	2	100	0	0	0	0	0	0	2	100	0	0
South West	2	50	2	50	0	0	0	0	4	100	2	50
West Midlands	0	-	0	-	0	-	0	-	0	-	0	-
North West	5	100	0	0	0	0	0	0	5	100	0	0
Wales	0	-	0	-	0	-	0	-	0	-	0	-
Northern Ireland	2	50	2	50	0	0	0	0	4	100	2	50
Scotland	0	-	0	-	0	-	0	-	0	-	0	-
United Kingdom	**13**	**68**	**6**	**32**	**0**	**0**	**0**	**0**	**19**	**100**	**6**	**32**

Table 62 : 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	34	57	61	4	4	0	0	93	100	61	66
East Midlands	15	31	33	67	1	2	0	0	49	100	34	69
East of England	21	35	33	55	6	10	0	0	60	100	39	65
London	39	46	40	48	5	6	0	0	84	100	45	54
South East Coast	21	33	35	56	7	11	0	0	63	100	42	67
South Central	15	31	32	65	2	4	0	0	49	100	34	69
South West	30	49	25	41	6	10	0	0	61	100	31	51
West Midlands	20	33	34	56	7	11	0	0	61	100	41	67
North West	30	35	47	55	9	10	0	0	86	100	56	65
Wales	20	50	17	43	3	8	0	0	40	100	20	50
Northern Ireland	6	55	5	45	0	0	0	0	11	100	5	45
Scotland	28	61	17	37	1	2	0	0	46	100	18	39
United Kingdom	**277**	**39**	**375**	**53**	**51**	**7**	**0**	**0**	**703**	**100**	**426**	**61**

Table 63 : 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	373	77	91	19	18	4	0	0	482	100	109	23
East Midlands	207	78	51	19	6	2	0	0	264	100	57	22
East of England	201	75	55	21	9	3	2	1	267	100	64	24
London	275	79	64	18	9	3	0	0	348	100	73	21
South East Coast	197	76	52	20	10	4	0	0	259	100	62	24
South Central	176	73	54	23	10	4	0	0	240	100	64	27
South West	239	74	69	21	13	4	0	0	321	100	82	26
West Midlands	202	74	58	21	12	4	0	0	272	100	70	26
North West	277	76	78	21	8	2	0	0	363	100	86	24
Wales	110	73	34	23	6	4	0	0	150	100	40	27
Northern Ireland	43	83	6	12	3	6	0	0	52	100	9	17
Scotland	166	79	41	20	2	1	0	0	209	100	43	21
United Kingdom	**2466**	**76**	**653**	**20**	**106**	**3**	**2**	**0**	**3227**	**100**	**759**	**24**

Table 64 : Repeat BCS (all cancers) with initial BCS and a non-operative diagnosis			
	All cancers with initial BCS (with non-op diagnosis)	Repeat BCS	
Region		**No**	**%**
N East, Yorks & Humber	1866	221	12
East Midlands	1084	150	14
East of England	1291	170	13
London	1333	188	14
South East Coast	1244	190	15
South Central	1038	150	14
South West	1421	230	16
West Midlands	1251	186	15
North West	1512	181	12
Wales	690	109	16
Northern Ireland	332	40	12
Scotland	1182	125	11
United Kingdom	**14244**	**1940**	**14**

Table 65 : Converted to mastectomy (all cancers) with initial BCS and a non-operative diagnosis			
	All cancers with initial BCS (with non-op diagnosis)	Converted to Mx	
Region		**No**	**%**
N East, Yorks & Humber	1866	101	5
East Midlands	1084	53	5
East of England	1291	74	6
London	1333	45	3
South East Coast	1244	49	4
South Central	1038	72	7
South West	1421	68	5
West Midlands	1251	67	5
North West	1512	75	5
Wales	690	36	5
Northern Ireland	332	29	9
Scotland	1182	48	4
United Kingdom	**14244**	**717**	**5**

Table 66 : 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	2369	2275	96	94
East Midlands	1379	1231	89	148
East of England	1639	1431	87	208
London	1718	1536	89	182
South East Coast	1523	1290	85	233
South Central	1341	1201	90	140
South West	1735	1615	93	120
West Midlands	1577	1526	97	51
North West	1897	1765	93	132
Wales	882	801	91	81
Northern Ireland	431	411	95	20
Scotland	-	-	-	-
United Kingdom	**16491**	**15082**	**91**	**1409**

*Excluded cases from Scotland

Table 67 : 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	1808	1765	98	16	1	27	1
East Midlands	1067	1064	100	3	0	0	0
East of England	1283	1264	99	19	1	0	0
London	1316	1276	97	35	3	5	0
South East Coast	1248	1216	97	32	3	0	0
South Central	1018	986	97	26	3	6	1
South West	1409	1379	98	25	2	5	0
West Midlands	1217	1200	99	17	1	0	0
North West	1467	1454	99	11	1	2	0
Wales	687	669	97	17	2	1	0
Northern Ireland	317	316	100	1	0	0	0
Scotland	-	-	-	-	-	-	-
United Kingdom	**12837**	**12589**	**98**	**202**	**2**	**46**	**0**

*Excluded cases from Scotland

Table 68 : 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	561	544	97	6	1	11	2
East Midlands	312	306	98	6	2	0	0
East of England	356	346	97	9	3	1	0
London	402	398	99	1	0	3	1
South East Coast	275	258	94	14	5	3	1
South Central	323	316	98	3	1	4	1
South West	326	311	95	10	3	5	2
West Midlands	360	348	97	9	3	3	1
North West	430	421	98	7	2	2	0
Wales	195	188	96	7	4	0	0
Northern Ireland	114	114	100	0	0	0	0
Scotland	-	-	-	-	-	-	-
United Kingdom	**3654**	**3550**	**97**	**72**	**2**	**32**	**1**

*Excluded cases from Scotland

Table 69 : Axillary ultrasound record for invasive cancers							
	Had axillary ultrasound		Did not have axillary ultrasound		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1803	95	86	5	0	0	1889
East Midlands	1114	99	6	1	0	0	1120
East of England	1234	91	45	3	75	6	1354
London	1286	91	54	4	74	5	1414
South East Coast	1242	99	9	1	0	0	1251
South Central	964	89	48	4	70	6	1082
South West	1244	89	95	7	63	4	1402
West Midlands	1222	95	33	3	26	2	1281
North West	1389	90	81	5	66	4	1536
Wales	603	83	113	16	7	1	723
Northern Ireland	353	95	13	4	5	1	371
Scotland*	-	-	-	-	-	-	-
United Kingdom	**12454**	**93**	**583**	**4**	**386**	**3**	**13423**

*Scotland did not supply any axillary ultrasound information

Table 70 : Axillary ultrasound result for invasive cancers					
	Normal		Abnormal		Total
Region	No.	%	No.	%	
N East, Yorks & Humber	1384	77	419	23	1803
East Midlands	929	83	185	17	1114
East of England	1034	84	200	16	1234
London	1037	81	249	19	1286
South East Coast	1079	87	163	13	1242
South Central	835	87	129	13	964
South West	1099	88	145	12	1244
West Midlands	1031	84	191	16	1222
North West	1153	83	236	17	1389
Wales	487	81	116	19	603
Northern Ireland	288	82	65	18	353
Scotland*	-	-	-	-	-
United Kingdom	**10356**	**83**	**2098**	**17**	**12454**

*Excluded cases from Scotland

Table 71 : 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	416	99	3	1	0	0	419
East Midlands	180	97	5	3	0	0	185
East of England	191	96	9	5	0	0	200
London	242	97	7	3	0	0	249
South East Coast	158	97	5	3	0	0	163
South Central	78	60	50	39	1	1	129
South West	101	70	44	30	0	0	145
West Midlands	168	88	23	12	0	0	191
North West	197	83	39	17	0	0	236
Wales	116	100	0	0	0	0	116
Northern Ireland	52	80	13	20	0	0	65
Scotland*	-	-	-	-	-	-	-
United Kingdom	**1899**	**91**	**198**	**9**	**1**	**0**	**2098**

*Excluded cases from Scotland

Table 72 : Worst axillary biopsy result for invasive cancer cases with an abnormal axillary ultrasound result

Region	C1/B1		C2/B2		C3/B3		C4/B4		C5/B5		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	41	10	213	51	15	4	3	1	144	35	416
East Midlands	18	10	72	40	3	2	3	2	84	47	180
East of England	22	12	80	42	1	1	5	3	83	43	191
London	22	9	87	36	5	2	7	3	121	50	242
South East Coast	12	8	79	50	2	1	4	3	61	39	158
South Central	14	18	37	47	2	3	0	0	25	32	78
South West	13	13	40	40	1	1	1	1	46	46	101
West Midlands	16	10	69	41	0	0	2	1	81	48	168
North West	13	7	114	58	3	2	1	1	66	34	197
Wales	13	11	63	54	1	1	1	1	38	33	116
Northern Ireland	2	4	26	50	1	2	0	0	23	44	52
Scotland*	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**186**	**10**	**880**	**46**	**34**	**2**	**27**	**1**	**772**	**41**	**1899**

*Excluded cases from Scotland

Table 73 : 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	1	100	0	0	0	0	0	0	0	0	1
East Midlands	0	0	3	100	0	0	0	0	0	0	3
East of England	0	0	1	100	0	0	0	0	0	0	1
London	1	7	8	57	0	0	1	7	4	29	14
South East Coast	0	-	0	-	0	-	0	-	0	-	0
South Central	2	100	0	0	0	0	0	0	0	0	2
South West	4	40	4	40	0	0	0	0	2	20	10
West Midlands	1	20	3	60	0	0	0	0	1	20	5
North West	2	20	7	70	1	10	0	0	0	0	10
Wales	1	13	6	75	0	0	0	0	1	13	8
Northern Ireland	4	11	34	89	0	0	0	0	0	0	38
Scotland*	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**16**	**17**	**66**	**72**	**1**	**1**	**1**	**1**	**8**	**9**	**92**

*Excluded cases from Scotland

Table 74 : 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	26	30	15	2	14	3	100	126	98
East Midlands	4	24	15	22	1	33	3	100	61	98
East of England	6	29	12	17	1	100	2	50	54	100
London	9	47	19	23	3	100	5	83	83	95
South East Coast	6	55	17	23	0	0	3	75	46	100
South Central	8	57	9	27	1	50	0	-	16	100
South West	5	38	6	17	0	-	1	100	31	100
West Midlands	6	40	10	15	0	-	2	100	59	97
North West	4	31	26	24	2	67	1	100	54	100
Wales	3	27	13	19	0	0	1	100	35	100
Northern Ireland	0	0	9	15	1	100	0	-	21	100
Scotland*	-	-	-	-	-	-	-	-	-	-
United Kingdom	**63**	**34**	**169**	**19**	**11**	**37**	**21**	**84**	**591**	**98**

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

Table 75 : 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	384	126	33
East Midlands	200	61	31
East of England	221	54	24
London	328	88	27
South East Coast	253	46	18
South Central	249	18	7
South West	240	32	13
West Midlands	246	60	24
North West	296	54	18
Wales	135	35	26
Northern Ireland	76	21	28
Scotland	-	-	-
United Kingdom	**2628**	**595**	**23**

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

Table 76 : 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	1425	213	15
East Midlands	899	116	13
East of England	1092	146	13
London	1075	198	18
South East Coast	1022	181	18
South Central	942	211	22
South West	1190	194	16
West Midlands	1057	168	16
North West	1263	206	16
Wales	580	83	14
Northern Ireland	276	45	16
Scotland	765	147	19
United Kingdom	**11586**	**1908**	**16**

*Excluded cases with neo-adjuvant therapy

Table 77 : Axillary biopsy results for invasive cancers with positive nodal status										
Region	C1/B1		C2/B2		C3/B3		C4/B4		C5/B5	
	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	10	6	30	18	2	1	3	2	126	74
East Midlands	4	5	15	18	1	1	3	4	61	73
East of England	6	8	12	16	1	1	2	3	54	72
London	10	8	24	18	3	2	5	4	88	68
South East Coast	6	8	17	24	0	0	3	4	46	64
South Central	9	24	9	24	2	5	0	0	18	47
South West	5	11	8	17	0	0	1	2	32	70
West Midlands	6	8	10	13	0	0	2	3	60	77
North West	4	4	29	32	2	2	1	1	54	60
Wales	3	6	13	25	0	0	1	2	35	67
Northern Ireland	0	0	9	29	1	3	0	0	21	68
Scotland*	-	-	-	-	-	-	-	-	-	-
United Kingdom	**63**	**7**	**176**	**20**	**12**	**1**	**21**	**2**	**595**	**69**

*Excluded cases from Scotland

Table 78 : Availability of lymph node status for surgically treated invasive cancers									
	Total invasive cancers with surgery	Nodal status known		Nodes obtained but status unknown		No nodes obtained		Unknown if nodes obtained	
Region		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1867	1849	99	0	0	18	1	0	0
East Midlands	1088	1083	100	0	0	4	0	1	0
East of England	1324	1316	99	0	0	6	0	2	0
London	1368	1352	99	0	0	15	1	1	0
South East Coast	1227	1214	99	0	0	13	1	0	0
South Central	1061	1053	99	0	0	8	1	0	0
South West	1376	1355	98	0	0	20	1	1	0
West Midlands	1266	1260	100	0	0	6	0	0	0
North West	1509	1501	99	0	0	8	1	0	0
Wales	712	708	99	0	0	4	1	0	0
Northern Ireland	368	364	99	0	0	4	1	0	0
Scotland	1215	1204	99	0	0	8	1	3	0
United Kingdom	**14381**	**14259**	**99**	**0**	**0**	**114**	**1**	**8**	**0.1**

Table 79 : 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	1558	84	292	16	0	0	1850	100
East Midlands	955	88	128	12	0	0	1083	100
East of England	1129	86	189	14	0	0	1318	100
London	1176	87	177	13	0	0	1353	100
South East Coast	1029	85	187	15	0	0	1216	100
South Central	886	84	168	16	0	0	1054	100
South West	1212	89	147	11	0	0	1359	100
West Midlands	1101	87	160	13	0	0	1261	100
North West	1338	89	163	11	0	0	1501	100
Wales	647	91	61	9	0	0	708	100
Northern Ireland	322	88	42	12	0	0	364	100
Scotland	1006	83	199	17	0	0	1205	100
United Kingdom	**12359**	**87**	**1913**	**13**	**0**	**0**	**14272**	**100**

Table 80 : Nodal status of invasive cancers with known status					
	Total known nodal status	Positive		Negative	
Region		No.	%	No.	%
N East, Yorks & Humber	1849	393	21	1456	79
East Midlands	1083	210	19	873	81
East of England	1316	253	19	1063	81
London	1352	358	26	994	74
South East Coast	1214	276	23	938	77
South Central	1053	272	26	781	74
South West	1355	267	20	1088	80
West Midlands	1260	270	21	990	79
North West	1501	317	21	1184	79
Wales	708	137	19	571	81
Northern Ireland	364	77	21	287	79
Scotland	1204	243	20	961	80
United Kingdom	**14259**	**3073**	**22**	**11186**	**78**

Table 81 : Number of nodes taken for invasive cases without SLNB/ with unknown nodal procedure type									
Region	Total with axillary surgery	0 node obtained		1,2,3 nodes obtained		≥4nodes obtained		Unknown	
		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	292	1	0	10	3	281	96	0	0
East Midlands	128	0	0	3	2	124	97	1	1
East of England	189	2	1	3	2	184	97	0	0
London	177	0	0	8	5	168	95	1	1
South East Coast	187	0	0	14	7	173	93	0	0
South Central	168	1	1	28	17	139	83	0	0
South West	147	1	1	9	6	137	93	0	0
West Midlands	160	0	0	8	5	152	95	0	0
North West	163	0	0	9	6	154	94	0	0
Wales	61	0	0	7	11	54	89	0	0
Northern Ireland	42	0	0	0	0	42	100	0	0
Scotland	199	0	0	13	7	185	93	1	1
United Kingdom	**1913**	**5**	**0**	**112**	**6**	**1793**	**94**	**3**	**0**

Table 82 : Nodal status of invasive cancers with/without SLNB								
Region	With SLNB				Without SLNB			
	Positive		Negative		Positive		Negative	
	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	229	15	1329	85	164	56	127	43
East Midlands	130	14	825	86	80	63	48	38
East of England	159	14	970	86	94	50	93	49
London	211	18	965	82	147	83	29	16
South East Coast	179	17	848	82	97	52	90	48
South Central	195	22	691	78	77	46	90	54
South West	174	14	1035	85	93	63	53	36
West Midlands	172	16	928	84	98	61	62	39
North West	209	16	1129	84	108	66	55	34
Wales	90	14	557	86	47	77	14	23
Northern Ireland	48	15	274	85	29	69	13	31
Scotland	143	14	862	86	100	50	99	50
United Kingdom	**1939**	**16**	**10413**	**84**	**1134**	**59**	**773**	**40**

Table 83 : Number of nodes obtained for invasive cancers with positive nodal status determined from SLNB										
Region	1-<4 nodes obtained					4+ nodes obtained				
	1 Ax op		2+ Ax ops		Total	1 Ax op		2+ Ax ops		Total
	No.	%	No.	%		No.	%	No.	%	
N East, Yorks & Humber	57	100	0	0	57	44	26	128	74	172
East Midlands	46	100	0	0	46	15	18	69	82	84
East of England	14	100	0	0	14	33	23	112	77	145
London	64	97	2	3	66	37	26	108	74	145
South East Coast	14	93	1	7	15	54	33	110	67	164
South Central	49	100	0	0	49	92	63	54	37	146
South West	56	97	2	3	58	21	18	95	82	116
West Midlands	32	100	0	0	32	39	28	101	72	140
North West	33	100	0	0	33	29	16	147	84	176
Wales	14	100	0	0	14	14	18	62	82	76
Northern Ireland	2	100	0	0	2	13	28	33	72	46
Scotland	68	80	17	20	85	36	62	22	38	58
United Kingdom	**449**	**95**	**22**	**5**	**471**	**427**	**29**	**1041**	**71**	**1468**

Table 84 : Status of invasive cases with <4 nodes obtained													
Region	Total with nodes obtained	Nodal status determined on basis of <4 nodes		Positive sentinel procedure(s)		Positive (Other)		Negative sentinel procedure(s)		Negative (Other)		Unknown status	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1849	1104	59.7	57	3.1	1	0.1	1037	56.1	9	0.5	0	0
East Midlands	1083	656	60.6	46	4.2	0	0.0	606	56.0	4	0.4	0	0
East of England	1316	709	53.9	14	1.1	0	0.0	692	52.6	3	0.2	0	0
London	1352	872	64.5	66	4.9	2	0.1	798	59.0	6	0.4	0	0
South East Coast	1214	699	57.6	15	1.2	2	0.2	670	55.2	12	1.0	0	0
South Central	1053	658	62.5	49	4.7	2	0.2	581	55.2	26	2.5	0	0
South West	1355	962	71.0	58	4.3	2	0.1	895	66.1	7	0.5	0	0
West Midlands	1260	749	59.4	32	2.5	0	0.0	709	56.3	8	0.6	0	0
North West	1501	984	65.6	33	2.2	0	0.0	942	62.8	9	0.6	0	0
Wales	708	492	69.5	14	2.0	3	0.4	471	66.5	4	0.6	0	0
Northern Ireland	364	220	60.4	2	0.5	0	0.0	218	59.9	0	0.0	0	0
Scotland	1204	834	69.3	85	7.1	1	0.1	736	61.1	12	1.0	0	0
United Kingdom	**14259**	**8939**	**62.7**	**471**	**3.3**	**13**	**0.1**	**8355**	**58.6**	**100**	**0.7**	**0**	**0**

Table 85 : 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	521	158	30	0	0	363	70	0	0
East Midlands	294	92	31	0	0	202	69	0	0
East of England	328	100	30	0	0	226	69	2	1
London	375	120	32	0	0	255	68	0	0
South East Coast	306	57	19	0	0	249	81	0	0
South Central	277	70	25	0	0	207	75	0	0
South West	361	78	22	0	0	283	78	0	0
West Midlands	316	99	31	0	0	217	69	0	0
North West	400	106	27	0	0	294	74	0	0
Wales	176	43	24	0	0	133	76	0	0
Northern Ireland	65	20	31	0	0	45	69	0	0
Scotland	238	51	21	0	0	186	78	1	0
United Kingdom	**3657**	**994**	**27**	**0**	**0**	**2660**	**73**	**3**	**0**

Table 86 : Treatment for non-invasive cancers with known nodal status						
Region	Conservation with known nodal status		Total Conservation	Mastectomy with known nodal status		Total mastectomy
	No.	%		No.	%	
N East, Yorks & Humber	18	5	374	140	95	147
East Midlands	8	4	203	84	92	91
East of England	27	11	245	73	90	81
London	23	9	270	97	92	105
South East Coast	10	4	251	47	85	55
South Central	12	6	208	58	84	69
South West	18	6	289	60	83	72
West Midlands	30	13	236	69	86	80
North West	18	6	303	88	91	97
Wales	10	7	138	33	87	38
Northern Ireland	4	9	45	16	80	20
Scotland	5	3	185	46	87	53
United Kingdom	**183**	**7**	**2747**	**811**	**89**	**908**

Table 87 : Nodal status of non-invasive cancers					
Region	Total known nodal status	Positive		Negative	
		No.	%	No.	%
N East, Yorks & Humber	158	1	1	157	99
East Midlands	92	0	0	92	100
East of England	100	0	0	100	100
London	120	1	1	119	99
South East Coast	57	0	0	57	100
South Central	70	5	7	65	93
South West	78	0	0	78	100
West Midlands	99	1	1	98	99
North West	106	4	4	102	96
Wales	43	0	0	43	100
Northern Ireland	20	0	0	20	100
Scotland	51	0	0	51	100
United Kingdom	**994**	**12**	**1**	**982**	**99**

Table 88 : Sentinel lymph node procedure for non-invasive cancers with a mastectomy and known nodal status													
Region	With SLNB		Without SLNB								Total with mastectomy	Total known nodal status	% determined on basis of SLNB
			Ax sampling		Ax clearance		Unknown procedure		No intended Ax procedure				
	No.	%	No.	%	No.	%	No.	%	No.	%			
N East, Yorks & Humber	119	81	19	13	1	0.7	0	0.0	1	0.7	147	140	85
East Midlands	74	81	9	10	0	0.0	0	0.0	1	1.1	91	84	88
East of England	59	73	7	9	3	3.7	0	0.0	4	4.9	81	73	81
London	90	86	5	5	2	1.9	0	0.0	0	0.0	105	97	93
South East Coast	37	67	10	18	0	0.0	0	0.0	0	0.0	55	47	79
South Central	49	71	9	13	0	0.0	0	0.0	0	0.0	69	58	84
South West	54	75	4	6	2	2.8	0	0.0	0	0.0	72	60	90
West Midlands	63	79	3	4	3	3.8	0	0.0	0	0.0	80	69	91
North West	86	89	2	2	0	0.0	0	0.0	0	0.0	97	88	98
Wales	31	82	1	3	0	0.0	0	0.0	1	2.6	38	33	94
Northern Ireland	16	80	0	0	0	0.0	0	0.0	0	0.0	20	16	100
Scotland	38	72	8	15	0	0.0	0	0.0	0	0.0	53	46	83
United Kingdom	**716**	**79**	**77**	**8**	**11**	**1.2**	**0**	**0.0**	**7**	**0.8**	**908**	**811**	**88**

Table 89 : Sentinel lymph node procedure for non-invasive cancers with BCS and known nodal status													
Region	With SLNB		Without SLNB								Total with BCS	Total known nodal status	% determined on basis of SLNB
			Ax sampling		Ax clearance		Unknown procedure		No intended Ax procedure				
	No.	%	No.	%	No.	%	No.	%	No.	%			
N East, Yorks & Humber	18	5	0	0	0	0.0	0	0.0	0	0.0	374	18	100
East Midlands	5	2	2	1	0	0.0	0	0.0	1	0.5	203	8	63
East of England	26	11	1	0	0	0.0	0	0.0	0	0.0	245	27	96
London	22	8	0	0	0	0.0	0	0.0	1	0.4	270	23	96
South East Coast	10	4	0	0	0	0.0	0	0.0	0	0.0	251	10	100
South Central	12	6	0	0	0	0.0	0	0.0	0	0.0	208	12	100
South West	17	6	0	0	1	0.3	0	0.0	0	0.0	289	18	94
West Midlands	28	12	2	1	0	0.0	0	0.0	0	0.0	236	30	93
North West	18	6	0	0	0	0.0	0	0.0	0	0.0	303	18	100
Wales	10	7	0	0	0	0.0	0	0.0	0	0.0	138	10	100
Northern Ireland	4	9	0	0	0	0.0	0	0.0	0	0.0	45	4	100
Scotland	4	2	1	1	0	0.0	0	0.0	0	0.0	185	5	80
United Kingdom	**174**	**6**	**6**	**0**	**1**	**0.0**	**0**	**0.0**	**2**	**0.1**	**2747**	**183**	**95**

Table 90 : Mean, median & maximum number of nodes obtained (non-invasive cancers)							
	Total known nodal status	Conservation			Mastectomy		
Region		Mean	Median	Maximum	Mean	Median	Maximum
N East, Yorks & Humber	158	2	1.5	7	3	2	13
East Midlands	92	3	2	5	3	2	6
East of England	100	2	2	6	3	3	17
London	120	2	2	3	3	2	21
South East Coast	57	2	2	4	4	3	13
South Central	70	3	2	10	3	2	16
South West	78	3	2	8	2	2	6
West Midlands	99	2	2	5	3	2	10
North West	106	2	1	4	3	2	16
Wales	43	2	2	4	2	2	6
Northern Ireland	20	2	1.5	5	3	2	11
Scotland	51	7	4	21	3	3	6
United Kingdom	**994**	**2**	**2**	**21**	**3**	**2**	**21**

Table 91 : 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	1741	100	1731	99	2	0	0	-	0	-	0	-	93	94	42	45	45	48
East Midlands	1019	100	1016	100	0	0	0	-	0	-	0	-	49	98	17	35	31	63
East of England	1240	100	1236	100	1	0	2	100	1	50	1	50	60	98	29	48	30	50
London	1261	100	1256	100	2	0	2	100	2	100	0	0	84	88	46	55	28	33
South East Coast	1144	99	1135	99	1	0	0	-	0	-	0	-	63	95	24	38	36	57
South Central	990	100	987	100	0	0	2	100	2	100	0	0	49	96	18	37	29	59
South West	1284	100	1277	99	3	0	4	100	4	100	0	0	61	92	31	51	25	41
West Midlands	1179	100	1175	100	4	0	0	-	0	-	0	-	61	97	24	39	35	57
North West	1406	100	1396	99	6	0	5	100	5	100	0	0	86	97	31	36	52	60
Wales	657	100	657	100	0	0	0	-	0	-	0	-	40	93	22	55	15	38
Northern Ireland	351	99	347	99	1	0	4	100	3	75	1	25	11	91	6	55	4	36
Scotland	1156	100	1145	99	7	1	0	-	0	-	0	-	46	91	31	67	11	24
United Kingdom	**13428**	**100**	**13358**	**99**	**27**	**0**	**19**	**100**	**17**	**89**	**2**	**11**	**703**	**94**	**321**	**46**	**341**	**49**

Table 92 : First axillary operation type for invasive cancers with positive nodal status and repeat axillary operations							
	SLNB at 1st Ax op		No SLNB at 1st Ax op		Total node positive invasive	Total with repeat Ax op	% repeat Ax op after SLNB
Region	No	%	No	%			
N East, Yorks & Humber	125	32	13	3	393	138	91
East Midlands	69	33	4	2	210	73	95
East of England	112	44	5	2	253	117	96
London	109	30	4	1	358	113	96
South East Coast	109	39	6	2	276	115	95
South Central	54	20	1	0	272	55	98
South West	96	36	3	1	267	99	97
West Midlands	100	37	4	1	270	104	96
North West	139	44	13	4	317	152	91
Wales	62	45	3	2	137	65	95
Northern Ireland	33	43	0	0	77	33	100
Scotland	39	16	10	4	243	49	80
United Kingdom	**1047**	**34**	**66**	**2**	**3073**	**1113**	**94**

APPENDIX F: ADJUVANT THERAPY DATA TABLES (93 – 129)

ADJUVANT THERAPY AUDIT WITH TUMOUR DATA
FROM THE 2011/12 AUDIT OF SCREEN-DETECTED BREAST CANCERS
*Scotland have not submitted any adjuvant cases in 2011/12

Table 93: Number of cases with previous cancers

Region	Total cases	Total pt matched	% matched	Had previous cancers		No previous cancers	
				No.	%	No.	%
N East, Yorks & Humber	2352	2350	100	252	11	2098	89
East Midlands	1414	1413	100	160	11	1253	89
East of England	1490	1490	100	215	14	1275	86
London	1736	1707	98	154	9	1553	91
South East Coast	1576	1568	99	180	11	1388	89
South Central	1274	1273	100	158	12	1115	88
South West	1787	1784	100	202	11	1582	89
West Midlands	1647	1640	100	205	13	1435	88
North West	2053	2053	100	229	11	1824	89
Wales	816	815	100	108	13	707	87
Northern Ireland	432	432	100	83	19	349	81
Scotland	-	-	-	-	-	-	-
United Kingdom	**16577**	**16525**	**100**	**1946**	**12**	**14579**	**88**

Table 94: Type of previous cancers

Region	Total matched	Total previous cancers	Invasive/micro-invasive					Non-invasive	
			Breast	Gynae-cological	Bowel	Haema-tological	Other	Breast	Other
N East, Yorks & Humber	2350	252	98	29	11	6	25	17	85
East Midlands	1413	160	57	27	8	9	16	10	43
East of England	1490	215	82	20	10	11	26	22	58
London	1707	154	61	20	10	9	30	8	31
South East Coast	1568	180	73	22	4	7	19	24	46
South Central	1273	158	48	22	4	6	27	7	58
South West	1784	202	74	26	11	8	21	16	63
West Midlands	1640	205	63	21	14	11	21	16	78
North West	2053	229	60	51	15	6	50	11	54
Wales	815	108	37	16	7	2	17	7	30
Northern Ireland	432	83	8	3	7	4	6	0	62
Scotland	-	-	-	-	-	-	-	-	-
United Kingdom	**16525**	**1946**	**661**	**257**	**101**	**79**	**258**	**138**	**608**
% of previous cancers	**-**	**100%**	**34%**	**13%**	**5%**	**4%**	**13%**	**7%**	**31%**
% of matched	**100%**	**11.8%**	**4.0%**	**1.6%**	**0.6%**	**0.5%**	**1.6%**	**0.8%**	**3.7%**

Table 95: Adjuvant treatment of cases with previous breast cancers							
Region	Women with previous breast cancers	Had RT		Had CT		Had ET	
		No.	%	No.	%	No.	%
N East, Yorks & Humber	114	44	39	27	24	75	66
East Midlands	65	20	31	10	15	46	71
East of England	101	43	43	13	13	71	70
London	68	24	35	11	16	47	69
South East Coast	96	31	32	12	13	61	64
South Central	55	21	38	13	24	36	65
South West	89	25	28	11	12	55	62
West Midlands	79	43	54	11	14	53	67
North West	71	31	44	16	23	50	70
Wales	44	21	48	9	20	27	61
Northern Ireland	8	4	50	1	13	5	63
Scotland	-	-	-	-	-	-	-
United Kingdom	**790**	**307**	**39**	**134**	**17**	**526**	**67**

Table 96 : 2011/12 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	2477	125	5	114	5	2238	90	2180	88
East Midlands	1414	0	0	65	5	1349	95	1345	95
East of England	1674	184	11	101	6	1389	83	1374	82
London	1736	0	0	68	4	1668	96	1613	93
South East Coast	1576	0	0	96	6	1480	94	942	60
South Central	1274	0	0	55	4	1219	96	1202	94
South West	1787	0	0	89	5	1698	95	1429	80
West Midlands	1756	109	6	79	4	1568	89	1504	86
North West	2053	0	0	71	3	1982	97	1956	95
Wales	816	0	0	44	5	772	95	762	93
Northern Ireland	432	0	0	8	2	424	98	420	97
Scotland	-	-	-	-	-	-	-	-	-
United Kingdom	**16995**	**418**	**2**	**790**	**5**	**15787**	**93**	**14727**	**87**

* cases which are eligible and with complete RT, CT and HT data

Table 97 : Data completeness for adjuvant therapy									
Region	Total Eligible	Complete RT		Complete CT		Complete ET		Complete RT, CT & ET	
		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2238	2203	98	2217	99	2227	100	2180	97
East Midlands	1349	1346	100	1347	100	1347	100	1345	100
East of England	1389	1377	99	1375	99	1380	99	1374	99
London	1668	1623	97	1624	97	1649	99	1613	97
South East Coast	1480	1036	70	1178	80	1209	82	942	64
South Central	1219	1209	99	1207	99	1209	99	1202	99
South West	1698	1437	85	1491	88	1494	88	1429	84
West Midlands	1568	1555	99	1526	97	1522	97	1504	96
North West	1982	1974	100	1974	100	1961	99	1956	99
Wales	772	769	100	763	99	767	99	762	99
Northern Ireland	424	420	99	420	99	420	99	420	99
Scotland	-	-	-	-	-	-	-	-	-
United Kingdom	**15787**	**14949**	**95**	**15122**	**96**	**15185**	**96**	**14727**	**93**

Table 98 : Radiotherapy

Region	Invasive							Non-invasive						
	RT		No RT		Unknown RT		Invasive total	RT		No RT		Unknown RT		Non-invasive total
	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	
N East, Yorks & Humber	1468	82	303	17	19	1	1790	211	49	203	47	14	3	428
East Midlands	911	81	209	19	3	0	1123	106	49	110	51	0	0	216
East of England	911	83	174	16	10	1	1095	152	56	116	43	2	1	270
London	1045	80	225	17	29	2	1299	150	43	187	53	14	4	351
South East Coast	853	72	37	3	287	24	1177	122	41	19	6	153	52	294
South Central	828	84	150	15	9	1	987	85	38	139	62	1	0	225
South West	966	73	160	12	191	15	1317	111	30	185	51	70	19	366
West Midlands	1061	86	153	12	13	1	1227	158	47	177	53	0	0	335
North West	1288	81	298	19	6	0	1592	154	41	219	58	2	1	375
Wales	500	83	102	17	2	0	604	75	46	87	53	1	1	163
Northern Ireland	289	85	48	14	3	1	340	40	50	39	49	1	1	80
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**10120**	**81**	**1859**	**15**	**572**	**5**	**12551**	**1364**	**44**	**1481**	**48**	**258**	**8**	**3103**

Table 99 : Radiotherapy

Region	Overall						
	RT		No RT		Unknown RT		Overall total
	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1688	75	515	23	35	2	2238
East Midlands	1021	76	325	24	3	0	1349
East of England	1080	78	297	21	12	1	1389
London	1205	72	418	25	45	3	1668
South East Coast	979	66	57	4	444	30	1480
South Central	918	75	291	24	10	1	1219
South West	1087	64	350	21	261	15	1698
West Midlands	1223	78	332	21	13	1	1568
North West	1447	73	527	27	8	0	1982
Wales	579	75	190	25	3	0	772
Northern Ireland	332	78	88	21	4	1	424
Scotland	-	-	-	-	-	-	-
United Kingdom	**11559**	**73**	**3390**	**21**	**838**	**5**	**15787**

Table 100 : Chemotherapy

Region	Invasive							Micro/non-invasive						
	CT		No CT		Unknown CT		Invasive total	CT		No CT		Unknown CT		Micro/non-invasive total
	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	
N East, Yorks & Humber	547	31	1228	69	15	1	1790	0	0	441	99	6	1	447
East Midlands	246	22	875	78	2	0	1123	0	0	226	100	0	0	226
East of England	275	25	808	74	12	1	1095	0	0	292	99	2	1	294
London	329	25	942	73	28	2	1299	1	0	352	96	15	4	368
South East Coast	262	22	686	58	229	19	1177	2	1	227	75	73	24	302
South Central	299	30	678	69	10	1	987	1	0	229	99	2	1	232
South West	291	22	855	65	171	13	1317	0	0	345	91	36	9	381
West Midlands	357	29	831	68	39	3	1227	1	0	337	99	3	1	341
North West	414	26	1171	74	7	0	1592	1	0	385	99	1	0	387
Wales	146	24	450	75	8	1	604	0	0	167	99	1	1	168
Northern Ireland	71	21	266	78	3	1	340	0	0	83	99	1	1	84
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**3237**	**26**	**8790**	**70**	**524**	**4**	**12551**	**6**	**0**	**3084**	**95**	**140**	**4**	**3230**

Table 101 : Chemotherapy							
	Overall						
	CT		No CT		Unknown CT		Overall total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	547	24	1670	75	21	1	2238
East Midlands	246	18	1101	82	2	0	1349
East of England	275	20	1100	79	14	1	1389
London	330	20	1294	78	44	3	1668
South East Coast	265	18	913	62	302	20	1480
South Central	300	25	907	74	12	1	1219
South West	291	17	1200	71	207	12	1698
West Midlands	358	23	1168	74	42	3	1568
North West	416	21	1558	79	8	0	1982
Wales	146	19	617	80	9	1	772
Northern Ireland	71	17	349	82	4	1	424
Scotland	-	-	-	-	-	-	-
United Kingdom	**3245**	**21**	**11877**	**75**	**665**	**4**	**15787**

Table 102 : Endocrine Therapy														
	Invasive							Micro/non-invasive						
	ET		No ET		Unknown ET		Invasive total	ET		No ET		Unknown ET		Micro/non-invasive total
Region	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	
N East, Yorks & Humber	1556	87	228	13	6	0	1790	37	8	405	91	5	1	447
East Midlands	915	81	206	18	2	0	1123	8	4	218	96	0	0	226
East of England	977	89	111	10	7	1	1095	22	7	270	92	2	1	294
London	1113	86	173	13	13	1	1299	50	14	312	85	6	2	368
South East Coast	903	77	70	6	204	17	1177	49	16	186	62	67	22	302
South Central	896	91	83	8	8	1	987	42	18	188	81	2	1	232
South West	1016	77	133	10	168	13	1317	23	6	322	85	36	9	381
West Midlands	1048	85	136	11	43	4	1227	1	0	337	99	3	1	341
North West	1410	89	168	11	14	1	1592	103	27	277	72	7	2	387
Wales	532	88	68	11	4	1	604	19	11	148	88	1	1	168
Northern Ireland	306	90	31	9	3	1	340	5	6	78	93	1	1	84
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**10672**	**85**	**1407**	**11**	**472**	**4**	**12551**	**359**	**11**	**2741**	**85**	**130**	**4**	**3230**

Table 103 : Endocrine Therapy							
	Overall						
	ET		No ET		Unknown ET		Overall total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1594	71	633	28	11	0	2238
East Midlands	923	68	424	31	2	0	1349
East of England	999	72	381	27	9	1	1389
London	1164	70	485	29	19	1	1668
South East Coast	952	64	257	17	271	18	1480
South Central	938	77	271	22	10	1	1219
South West	1039	61	455	27	204	12	1698
West Midlands	1049	67	473	30	46	3	1568
North West	1513	76	448	23	21	1	1982
Wales	551	71	216	28	5	1	772
Northern Ireland	311	73	109	26	4	1	424
Scotland	-	-	-	-	-	-	-
United Kingdom	**11033**	**70**	**4152**	**26**	**602**	**4**	**15787**

Table 104 : Radiotherapy by number of operations									
	RT (no surgery)		Total No Surgery	RT with 1 op		Total 1 op	RT with >1 op		Total Re-op
Region	No.	%		No.	%		No.	%	
N East, Yorks & Humber	5	19	26	1325	78	1688	358	68	524
East Midlands	2	9	22	813	77	1055	206	76	272
East of England	0	0	13	811	82	988	269	69	388
London	3	7	42	914	75	1216	288	70	410
South East Coast	0	0	26	732	68	1082	247	66	372
South Central	1	8	13	724	77	937	193	72	269
South West	3	10	29	799	68	1180	285	58	489
West Midlands	2	17	12	919	82	1125	302	70	431
North West	7	19	36	1078	77	1404	362	67	542
Wales	2	12	17	414	78	531	163	73	224
Northern Ireland	0	0	6	259	81	321	73	75	97
Scotland	-	-	-	-	-	-	-	-	-
United Kingdom	**25**	**10**	**242**	**8788**	**76**	**11527**	**2746**	**68**	**4018**

Table 105 : Chemotherapy by number of operations for invasive cancers									
	CT (no surgery)		Total No Surgery	CT with 1 op		Total 1 op	CT with >1 op		Total Re-op
Region	No.	%		No.	%		No.	%	
N East, Yorks & Humber	5	24	21	369	27	1364	173	43	405
East Midlands	4	20	20	163	19	876	79	35	227
East of England	2	15	13	161	21	785	112	38	297
London	2	6	33	204	22	945	123	38	321
South East Coast	0	0	18	179	20	881	83	30	278
South Central	2	18	11	225	29	768	72	35	208
South West	2	10	20	170	19	918	119	31	379
West Midlands	0	0	10	220	25	890	137	42	327
North West	3	11	28	238	21	1144	173	41	420
Wales	3	21	14	80	19	420	63	37	170
Northern Ireland	0	0	6	52	20	258	19	25	76
Scotland	-	-	-	-	-	-	-	-	-
United Kingdom	**23**	**12**	**194**	**2061**	**22**	**9249**	**1153**	**37**	**3108**

Table 106 : Women in each age group treated with conservation surgery who had adjuvant therapy recorded							
	Invasive				Non/micro-invasive		
	Radiotherapy	Chemotherapy	Endocrine Therapy	Number of cancers	Radiotherapy	Endocrine Therapy	Number of cancers
Age group	%	%	%		%	%	
<=48	99	35	91	194	65	6	81
49	99	33	89	208	54	11	72
50-52	98	32	91	1108	56	12	371
53-55	98	32	86	867	63	10	241
56-58	98	27	89	960	69	12	234
59-61	99	25	89	1126	69	16	235
62-64	98	18	90	1502	70	14	303
65-67	98	16	90	1443	65	9	282
68-70	98	14	89	1101	62	12	225
71+	97	7	88	698	58	9	120
Total	**98**	**22**	**89**	**9207**	**64**	**12**	**2164**

* with completed data only

Table 107 : Women in each age group treated with mastectomy who had adjuvant therapy recorded							
	Invasive				Non/micro-invasive		
Age group	Radiotherapy %	Chemotherapy %	Endocrine Therapy %	Number of cancers	Radiotherapy %	Endocrine Therapy %	Number of cancers
<=48	44	73	90	71	0	0	33
49	44	57	89	72	5	8	37
50-52	41	57	89	371	3	11	139
53-55	36	54	82	246	5	12	75
56-58	38	51	86	234	7	10	84
59-61	39	46	85	285	6	5	82
62-64	38	39	87	364	4	13	104
65-67	34	42	83	329	8	14	80
68-70	36	31	87	253	0	9	67
71+	27	24	86	204	3	5	37
Total	**37**	**45**	**86**	**2429**	**4**	**10**	**738**

* with completed data only

Table 108 : Combinations of adjuvant therapy for invasive and non/micro-invasive cancers with complete data								
	Conservation Surgery				Mastectomy			
	Invasive		Non/micro-invasive		Invasive		Non/micro-invasive	
Treatment	No.	%	No.	%	No.	%	No.	%
Surgery & RT & ET	6542	70	182	9	219	8	6	0
Surgery & RT & CT & ET	1542	16	2	0	541	21	0	0
Surgery & ET	102	3	66	4	992	43	65	7
Surgery & RT & CT	437	5	0	0	122	5	0	0
Surgery & RT	512	6	1195	51	21	1	26	2
Surgery & CT & ET	26	0	0	0	336	12	1	0
Surgery only	38	1	718	36	99	6	639	89
Surgery & CT	8	0	1	0	99	5	1	0
Total	**9207**	**100**	**2164**	**100**	**2429**	**100**	**738**	**100**

Table 109 : 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	2	0	12	1	692	72	932	97	956	99	962	100	52
East Midlands	0	0	21	3	476	68	676	96	697	99	703	100	54
East of England	3	1	7	1	345	61	541	95	558	98	566	100	55
London	5	1	51	7	513	67	702	92	735	96	763	100	53
South East Coast	0	0	11	3	135	39	311	91	337	99	339	99	63
South Central	0	0	5	1	349	62	518	92	552	98	557	99	55
South West	2	0	9	1	299	42	591	84	665	94	702	100	64
West Midlands	0	0	2	0	430	58	697	94	728	98	737	100	56
North West	1	0	19	2	602	64	891	95	926	98	940	100	54.5
Wales	0	0	0	0	170	46	332	89	363	97	371	99	62
Northern Ireland	1	0	5	2	94	41	205	90	225	99	228	100	64
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**14**	**0**	**142**	**2**	**4105**	**60**	**6396**	**93**	**6742**	**98**	**6868**	**100**	**56**

Table 110 : Time from final surgery to radiotherapy (excluding neo-adjuvant and intra-operative RT cases and cases with chemotherapy) – non -invasive

Region	≤ 14 days		≤ 30 days		≤ 60 days		≤ 90 days		≤ 120 days		≤ 200 days		Median
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	0	0	0	0	128	66	184	94	191	98	194	99	55
East Midlands	0	0	1	1	73	69	104	98	105	99	106	100	55
East of England	0	0	1	1	83	65	126	98	128	100	128	100	55
London	2	1	11	7	94	64	135	92	144	98	147	100	52
South East Coast	0	0	3	5	19	32	48	80	57	95	59	98	68
South Central	1	1	1	1	41	49	78	94	83	100	83	100	61
South West	0	0	0	0	41	38	95	89	106	99	107	100	65
West Midlands	0	0	1	1	80	52	141	91	153	99	154	99	60
North West	0	0	3	2	87	58	139	93	146	98	149	100	56
Wales	0	0	0	0	28	38	64	86	73	99	74	100	65.5
Northern Ireland	1	3	1	3	13	33	34	85	40	100	40	100	70
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**4**	**0**	**22**	**2**	**687**	**55**	**1148**	**92**	**1226**	**99**	**1241**	**100**	**57**

Table 111 : Time from assessment to radiotherapy (excluding cases with chemotherapy) - invasive

Region	≤ 14 days		≤ 30 days		≤ 60 days		≤ 90 days		≤ 120 days		≤ 200 days		Median
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	0	0	0	0	38	4	548	57	834	86	951	98	87
East Midlands	0	0	0	0	38	5	384	54	599	85	679	96	87
East of England	0	0	4	1	35	6	325	57	495	87	563	99	87
London	0	0	2	0	50	6	366	47	605	78	735	95	91
South East Coast	0	0	0	0	4	1	76	22	224	65	333	97	110
South Central	0	0	4	1	21	4	266	47	462	81	550	97	92
South West	0	0	1	0	9	1	177	25	473	67	660	93	105
West Midlands	0	0	0	0	17	2	355	48	611	82	719	97	91
North West	0	0	0	0	45	5	467	49	792	84	929	98	91
Wales	0	0	0	0	10	3	161	43	303	81	365	98	93
Northern Ireland	0	0	1	0	19	8	104	46	191	84	226	99	92
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**0**	**0**	**12**	**0**	**286**	**4**	**3229**	**47**	**5589**	**81**	**6710**	**97**	**92**

Table 112 : Time from assessment to radiotherapy (excluding cases with chemotherapy) – non -invasive

Region	≤ 14 days		≤ 30 days		≤ 60 days		≤ 90 days		≤ 120 days		≤ 200 days		Median
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	0	0	0	0	2	1	94	48	161	83	193	99	91
East Midlands	0	0	0	0	3	3	56	53	94	89	104	98	88.5
East of England	0	0	0	0	9	7	64	50	105	82	126	98	90.5
London	0	0	0	0	6	4	56	38	110	75	147	100	100
South East Coast	0	0	0	0	2	3	7	12	27	45	56	93	125
South Central	0	0	0	0	0	0	30	36	66	80	81	98	98
South West	0	0	0	0	1	1	13	12	59	55	103	96	117
West Midlands	0	0	0	0	1	1	51	33	113	73	149	96	100
North West	0	0	0	0	5	3	59	39	112	74	148	98	98
Wales	0	0	0	0	2	3	21	28	47	64	71	96	111
Northern Ireland	0	0	0	0	3	8	17	43	31	78	40	100	93.5
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**0**	**0**	**0**	**0**	**34**	**3**	**468**	**38**	**925**	**74**	**1218**	**98**	**99**

Table 113: Median days from final surgery to radiotherapy for women with invasive breast cancer			
Region	**Median**	**First quartile**	**Third quartile**
N East, Yorks & Humber	52	45	62
East Midlands	54	48	64
East of England	55	45	67
London	53	42	65
South East Coast	63	56	76
South Central	55	44	67
South West	64	54	79
West Midlands	56	49.75	68
North West	55	44	67
Wales	62	54	76
Northern Ireland	64	54	77
Scotland	-	-	-
United Kingdom	56	**47**	**69**

Table 114 : Invasive status of cancers										
	Invasive		**Micro-invasive**		**Non-invasive**		**Unknown**		**Total**	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	1790	80	19	1	428	19	1	0	2238	100
East Midlands	1123	83	10	1	216	16	0	0	1349	100
East of England	1095	79	24	2	270	19	0	0	1389	100
London	1299	78	17	1	351	21	1	0	1668	100
South East Coast	1177	80	8	1	294	20	1	0	1480	100
South Central	987	81	7	1	225	18	0	0	1219	100
South West	1317	78	15	1	366	22	0	0	1698	100
West Midlands	1227	78	6	0	335	21	0	0	1568	100
North West	1592	80	12	1	375	19	3	0	1982	100
Wales	604	78	5	1	163	21	0	0	772	100
Northern Ireland	340	80	4	1	80	19	0	0	424	100
Scotland	-	-	-	-	-	-	-	-	-	-
United Kingdom	**12551**	**80**	**127**	**1**	**3103**	**20**	**6**	**0**	**15787**	**100**

Table 115 : Treatment of invasive cancers										
	Conservation surgery		**Mastectomy**		**No Surgery**		**Unknown**		**Total**	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	1335	75	434	24	21	1	0	0	1790	100
East Midlands	845	75	258	23	20	2	0	0	1123	100
East of England	858	78	224	20	13	1	0	0	1095	100
London	1003	77	260	20	33	3	3	0	1299	100
South East Coast	943	80	216	18	18	2	0	0	1177	100
South Central	775	79	201	20	11	1	0	0	987	100
South West	1049	80	248	19	20	2	0	0	1317	100
West Midlands	955	78	262	21	10	1	0	0	1227	100
North West	1197	75	367	23	28	2	0	0	1592	100
Wales	478	79	112	19	14	2	0	0	604	100
Northern Ireland	258	76	76	22	6	2	0	0	340	100
Scotland	-	-	-	-	-	-	-	-	-	-
United Kingdom	**9696**	**77**	**2658**	**21**	**194**	**2**	**3**	**0**	**12551**	**100**

Table 116 : Radiotherapy for invasive cancers treated by conservation surgery						
	Radiotherapy		No/unknown radiotherapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	1314	98	21	2	1335	100
East Midlands	819	97	26	3	845	100
East of England	830	97	28	3	858	100
London	952	95	51	5	1003	100
South East Coast	772	82	171	18	943	100
South Central	755	97	20	3	775	100
South West	898	86	151	14	1049	100
West Midlands	937	98	18	2	955	100
North West	1172	98	25	2	1197	100
Wales	469	98	9	2	478	100
Northern Ireland	257	100	1	0	258	100
Scotland	-	-	-	-	-	-
United Kingdom	**9175**	**95**	**521**	**5**	**9696**	**100**

Table 117 : Invasive cancers treated by conservation surgery with no/unknown radiotherapy							
		>20mm		Grade 3		Nodal status positive	
Region	Total	No	%	No	%	No	%
North, Yorks & Humber	21	1	5	1	5	1	5
East Midlands	26	2	8	5	19	5	19
East of England	28	2	7	10	36	5	18
London	51	3	6	11	22	9	18
South East Coast	171	5	3	27	16	36	21
South Central	20	2	10	3	15	5	25
South West	151	9	6	37	25	24	16
West Midlands	18	1	6	5	28	3	17
North West	25	1	4	5	20	5	20
Wales	9	0	0	2	22	1	11
Northern Ireland	1	0	0	1	100	1	100
Scotland	-	-	-	-	-	-	-
United Kingdom	**521**	**26**	**5**	**107**	**21**	**95**	**18**

Table 118 : Radiotherapy for non-invasive cancers treated by conservation surgery						
	Radiotherapy		No/unknown radiotherapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	204	69	90	31	294	100
East Midlands	106	71	43	29	149	100
East of England	150	70	65	30	215	100
London	145	57	110	43	255	100
South East Coast	120	54	104	46	224	100
South Central	85	52	80	48	165	100
South West	109	40	163	60	272	100
West Midlands	152	59	104	41	256	100
North West	150	56	117	44	267	100
Wales	75	63	44	37	119	100
Northern Ireland	36	63	21	37	57	100
Scotland	-	-	-	-	-	-
United Kingdom	**1332**	**59**	**941**	**41**	**2273**	**100**

Table 119 : Cytonuclear grade of non-invasive cancers treated by conservation surgery with no/unknown radiotherapy												
	High		Intermediate		Low		Not assessable		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	11	12	40	44	20	22	15	17	4	4	90	100
East Midlands	10	23	18	42	8	19	7	16	0	0	43	100
East of England	13	20	22	34	18	28	12	18	0	0	65	100
London	15	14	35	32	29	26	26	24	5	5	110	100
South East Coast	23	22	41	39	27	26	13	13	0	0	104	100
South Central	25	31	34	43	16	20	5	6	0	0	80	100
South West	57	35	49	30	42	26	14	9	1	1	163	100
West Midlands	15	14	51	49	17	16	21	20	0	0	104	100
North West	20	17	59	50	29	25	7	6	2	2	117	100
Wales	5	11	24	55	12	27	3	7	0	0	44	100
Northern Ireland	4	19	4	19	10	48	3	14	0	0	21	100
Scotland	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**198**	**21**	**377**	**40**	**228**	**24**	**126**	**13**	**12**	**1**	**941**	**100**

Table 120 : Size of non-invasive cancers treated by conservation surgery with no/unknown radiotherapy												
	<15mm		15-≤40mm		>40mm		Not assessable		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	48	53	14	16	0	0	15	17	13	14	90	100
East Midlands	28	65	4	9	0	0	7	16	4	9	43	100
East of England	43	66	6	9	1	2	12	18	3	5	65	100
London	53	48	20	18	0	0	26	24	11	10	110	100
South East Coast	58	56	22	21	3	3	13	13	8	8	104	100
South Central	41	51	28	35	4	5	5	6	2	3	80	100
South West	93	57	32	20	4	2	15	9	19	12	163	100
West Midlands	54	52	21	20	1	1	21	20	7	7	104	100
North West	72	62	25	21	1	1	7	6	12	10	117	100
Wales	26	59	12	27	0	0	3	7	3	7	44	100
Northern Ireland	12	57	2	10	0	0	3	14	4	19	21	100
Scotland	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**528**	**56**	**186**	**20**	**14**	**1**	**127**	**13**	**86**	**9**	**941**	**100**

Table 121 : ER status of all cases								
	ER Positive		ER Negative		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	1827	82	217	10	194	9	2238	100
East Midlands	1114	83	124	9	111	8	1349	100
East of England	1083	78	90	6	216	16	1389	100
London	1315	79	128	8	225	13	1668	100
South East Coast	1216	82	115	8	149	10	1480	100
South Central	965	79	105	9	149	12	1219	100
South West	1398	82	122	7	178	10	1698	100
West Midlands	1214	77	136	9	218	14	1568	100
North West	1687	85	190	10	105	5	1982	100
Wales	596	77	46	6	130	17	772	100
Northern Ireland	362	85	33	8	29	7	424	100
Scotland	-	-	-	-	-	-	-	-
United Kingdom	**12777**	**81**	**1306**	**8**	**1704**	**11**	**15787**	**100**

Table 122 : Invasive status of ER positive cases										
	Invasive		Micro-invasive		Non-invasive		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1619	89	8	0	199	11	1	0	1827	100
East Midlands	1016	91	4	0	94	8	0	0	1114	100
East of England	1008	93	11	1	64	6	0	0	1083	100
London	1198	91	8	1	109	8	0	0	1315	100
South East Coast	1080	89	7	1	129	11	0	0	1216	100
South Central	899	93	4	0	62	6	0	0	965	100
South West	1222	87	11	1	165	12	0	0	1398	100
West Midlands	1115	92	5	0	94	8	0	0	1214	100
North West	1457	86	2	0	228	14	0	0	1687	100
Wales	559	94	1	0	36	6	0	0	596	100
Northern Ireland	314	87	2	1	46	13	0	0	362	100
Scotland	-	-	-	-	-	-	-	-	-	-
United Kingdom	**11487**	**90**	**63**	**0**	**1226**	**10**	**1**	**0**	**12777**	**100**

Table 123 : Endocrine therapy for ER positive invasive cancers								
	Endocrine therapy		No endocrine therapy		Unknown endocrine therapy		Total	
Region	No	%	No	%	No	%	No	%
North, Yorks & Humber	1544	95	70	4	5	0	1619	100
East Midlands	912	90	102	10	2	0	1016	100
East of England	967	96	34	3	7	1	1008	100
London	1101	92	87	7	10	1	1198	100
South East Coast	902	84	0	0	178	16	1080	100
South Central	887	99	5	1	7	1	899	100
South West	1015	83	46	4	161	13	1222	100
West Midlands	1046	94	27	2	42	4	1115	100
North West	1405	96	42	3	10	1	1457	100
Wales	532	95	23	4	4	1	559	100
Northern Ireland	304	97	8	3	2	1	314	100
Scotland	-	-	-	-	-	-	-	-
United Kingdom	**10615**	**92**	**444**	**4**	**428**	**4**	**11487**	**100**

Table 124 : ER positive invasive cancers with no/unknown endocrine therapy							
	Total	>20mm		Grade 3		Nodal status positive	
Region	cases	No.	%	No.	%	No.	%
N East, Yorks & Humber	75	0	0	10	13	4	5
East Midlands	104	0	0	3	3	3	3
East of England	41	2	5	9	22	3	7
London	97	6	6	16	16	12	12
South East Coast	178	12	7	28	16	46	26
South Central	12	1	8	3	25	5	42
South West	207	19	9	48	23	39	19
West Midlands	69	4	6	20	29	17	25
North West	52	5	10	2	4	7	13
Wales	27	0	0	3	11	6	22
Northern Ireland	10	0	0	1	10	1	10
Scotland	-	-	-	-	-	-	-
United Kingdom	**872**	**49**	**6**	**143**	**16**	**143**	**16**

Table 125 : Endocrine therapy for ER negative, PR positive invasive cancers						
	Endocrine therapy		No/unknown endocrine therapy		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	7	88	1	13	8	100
East Midlands	1	33	2	67	3	100
East of England	3	75	1	25	4	100
London	6	86	1	14	7	100
South East Coast	1	17	5	83	6	100
South Central	7	88	1	13	8	100
South West	0	0	1	100	1	100
West Midlands	2	40	3	60	5	100
North West	3	75	1	25	4	100
Wales	0	-	0	-	0	-
Northern Ireland	2	67	1	33	3	100
Scotland	-	-	-	-	-	-
United Kingdom	**32**	**65**	**17**	**35**	**49**	**100**

Table 126 : Endocrine therapy for all ER negative cancers								
	Endocrine therapy		No endocrine therapy		Unknown endocrine therapy		Total	
Region	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
North, Yorks & Humber	13	6	202	93	2	1	217	100
East Midlands	2	2	122	98	0	0	124	100
East of England	9	10	81	90	0	0	90	100
London	9	7	117	91	2	2	128	100
South East Coast	1	1	86	75	28	24	115	100
South Central	8	8	95	90	2	2	105	100
South West	1	1	114	93	7	6	122	100
West Midlands	2	1	133	98	1	1	136	100
North West	5	3	182	96	3	2	190	100
Wales	0	0	46	100	0	0	46	100
Northern Ireland	2	6	31	94	0	0	33	100
Scotland	-	-	-	-	-	-	-	-
United Kingdom	**52**	**4**	**1209**	**93**	**45**	**3**	**1306**	**100**

Table 127 : Endocrine therapy for ER positive non/micro-invasive cancers								
	Endocrine therapy		No endocrine therapy		Unknown endocrine therapy		Total	
Region	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
North, Yorks & Humber	35	17	170	82	2	1	207	100
East Midlands	8	8	90	92	0	0	98	100
East of England	21	28	54	72	0	0	75	100
London	46	39	67	57	4	3	117	100
South East Coast	49	36	57	42	30	22	136	100
South Central	39	59	26	39	1	2	66	100
South West	23	13	150	85	3	2	176	100
West Midlands	1	1	97	98	1	1	99	100
North West	102	44	124	54	4	2	230	100
Wales	15	41	22	59	0	0	37	100
Northern Ireland	4	8	43	90	1	2	48	100
Scotland	-	-	-	-	-	-	-	-
United Kingdom	**343**	**27**	**900**	**70**	**46**	**4**	**1289**	100

Table 128 : Chemotherapy for node positive invasive cancers							
	CT		No CT		Unknown CT		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	268	71	107	28	5	1	380
East Midlands	146	69	65	31	2	1	213
East of England	153	64	84	35	3	1	240
London	179	63	99	35	5	2	283
South East Coast	165	62	51	19	52	19	268
South Central	155	67	70	30	5	2	230
South West	146	54	84	31	41	15	271
West Midlands	180	72	67	27	4	2	251
North West	216	63	124	36	2	1	342
Wales	72	64	35	31	5	4	112
Northern Ireland	46	74	16	26	0	0	62
Scotland	-	-	-	-	-	-	-
United Kingdom	**1726**	**65**	**802**	**30**	**124**	**5**	**2652**

Table 129 : Node positive invasive cancers with no/unknown chemotherapy							
		ER negative		Grade 3		HER-2 positive	
Region	Total	No	%	No	%	No	%
North, Yorks & Humber	112	2	2	8	7	3	3
East Midlands	67	1	1	3	4	7	10
East of England	87	1	1	6	7	1	1
London	104	1	1	10	10	1	1
South East Coast	103	4	4	11	11	6	6
South Central	75	5	7	11	15	2	3
South West	125	5	4	19	15	5	4
West Midlands	71	3	4	8	11	1	1
North West	126	6	5	13	10	4	3
Wales	40	1	3	3	8	2	5
Northern Ireland	16	0	0	3	19	0	0
Scotland	-	-	-	-	-	-	-
United Kingdom	**926**	**29**	**3**	**95**	**10**	**32**	**3**

APPENDIX G: SURVIVAL ANALYSIS DATA TABLES (130-138)

DATA OBTAINED FROM THE SURVIVAL AUDIT OF SCREEN-DETECTED BREAST CANCERS FOR CANCER PATIENTS SCREENED BETWEEN 1 APRIL 2007 AND 31 MARCH 2008

Table 130 : Cause of death of eligible invasive cancers with death before 31/03/2013

	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**Total**
N East, Yorks & Humber	61	50	25	21	35	29	0	0	121	7	1698
East Midlands	25	45	12	21	19	34	0	0	56	6	904
East of England	37	54	11	16	19	28	1	1	68	6	1219
London	25	38	11	17	28	43	1	2	65	6	1061
South East Coast	29	44	13	20	24	36	0	0	66	7	953
South Central	26	49	8	15	17	32	2	4	53	6	883
South West	33	54	7	11	20	33	1	2	61	5	1180
West Midlands	53	55	24	25	19	20	0	0	96	9	1104
North West	39	44	18	20	31	35	0	0	88	6	1421
Wales	28	57	7	14	12	24	2	4	49	7	753
Northern Ireland	5	71	2	29	0	0	0	0	7	3	249
Scotland	38	46	23	28	15	18	6	7	82	8	1093
United Kingdom	399	49	161	20	239	29	13	2	812	6	12518

Table 131 : Cause of death of eligible micro-invasive cancers with death before 31/03/2013

	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**Total**
N East, Yorks & Humber	0	0	3	100	0	0	0	0	3	13	23
East Midlands	0	-	0	-	0	-	0	-	0	0	15
East of England	0	-	0	-	0	-	0	-	0	0	4
London	0	-	0	-	0	-	0	-	0	0	10
South East Coast	0	-	0	-	0	-	0	-	0	0	13
South Central	0	0	1	100	0	0	0	0	1	25	4
South West	0	-	0	-	0	-	0	-	0	0	15
West Midlands	0	-	0	-	0	-	0	-	0	0	8
North West	0	-	0	-	0	-	0	-	0	0	10
Wales	0	-	0	-	0	-	0	-	0	0	5
Northern Ireland	0	-	0	-	0	-	0	-	0	0	4
Scotland	0	-	0	-	0	-	0	-	0	0	6
United Kingdom	0	0	4	100	0	0	0	0	4	3	117

Table 132 : Cause of death of eligible non-invasive cancers with death before 31/03/2013											
	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	No.	%	No.	%	No.	%	No.	%	No.	%	Total
N East, Yorks & Humber	1	8	7	54	5	38	0	0	13	3	491
East Midlands	0	0	1	17	5	83	0	0	6	3	224
East of England	1	13	5	63	2	25	0	0	8	2	372
London	2	25	4	50	2	25	0	0	8	3	312
South East Coast	0	0	2	29	4	57	1	14	7	3	268
South Central	1	33	0	0	2	67	0	0	3	2	182
South West	1	25	1	25	2	50	0	0	4	1	290
West Midlands	1	11	4	44	4	44	0	0	9	4	255
North West	0	0	6	67	3	33	0	0	9	3	291
Wales	2	20	5	50	3	30	0	0	10	6	179
Northern Ireland	0	-	0	-	0	-	0	-	0	0	70
Scotland	1	10	4	40	5	50	0	0	10	4	237
United Kingdom	10	11	39	45	37	43	1	1	87	3	3171

Table 133 : 5-year relative survival by region – primary invasive cancers only		
Region	**Un-adjusted**	**Adjusted**
N East, Yorks & Humber	97.7 (96.4,98.9)	97.5 (96.1,98.6)
East Midlands	98.9 (97.1,100.3)	98.7 (96.9,100.1)
East of England	99.8 (98.4,101.0)	99.6 (98.1,100.7)
London	98.7 (97.0,100.0)	98.4 (96.8,99.7)
South East Coast	98.3 (96.4,99.8)	98.0 (96.2,99.5)
South Central	99.3 (97.5,100.8)	99.1 (97.3,100.5)
South West	99.8 (98.4,101.0)	99.6 (98.1,100.7)
West Midlands	95.9 (94.0,97.5)	95.7 (93.8,97.2)
North West	99.0 (97.6,100.1)	98.7 (97.3,99.8)
Wales	98.2 (96.1,99.8)	98.4 (96.3,100.0)
Northern Ireland	100.3 (97.2,101.8)	100.5 (97.3,102.0)
Scotland	97.5 (95.7,98.9)	98.6 (96.8,100.1)
United Kingdom	**98.5 (98.0,98.9)**	**98.4 (97.9,98.8)**

Table 134 : 5-year relative survival by age for primary invasive cancers		
Age	**Un-adjusted**	**Adjusted**
<50	97.6 (92.7,99.8)	97.6 (92.7,99.7)
50-52	98.6 (97.6,99.3)	98.5 (97.5,99.3)
53-55	97.7 (96.3,98.7)	97.6 (96.3,98.7)
56-58	97.0 (95.7,98.0)	96.9 (95.6,98.0)
59-61	97.9 (96.8,98.8)	97.8 (96.7,98.7)
62-64	98.4 (97.1,99.4)	98.3 (97.1,99.4)
65-67	98.3 (96.9,99.5)	98.2 (96.8,99.4)
68-70	100.0 (98.5,101.2)	99.8 (98.3,101.1)
71+	102.6 (99.5,105.2)	102.2 (99.1,104.9)
All invasive cancers	**98.5 (98.0,98.9)**	**98.4 (97.9,98.8)**

Table 135 : 5-year relative survival by invasive tumor size for primary invasive cancers		
Size	**Un-adjusted**	**Adjusted**
<15mm	100.7 (100.1,101.1)	100.6 (100.0,101.0)
15-≤20mm	98.3 (97.3,99.1)	98.2 (97.2,99.0)
>20-≤35mm	94.9 (93.5,96.1)	94.8 (93.4,96.0)
>35-≤50mm	91.5 (87.6,94.6)	91.4 (87.6,94.5)
>50mm	89.8 (84.2,93.9)	89.7 (84.2,93.9)
Unknown	84.2 (74.5,91.1)	84.2 (74.5,91.1)
All invasive cancers	**98.5 (98.0,98.9)**	**98.4 (97.9,98.8)**

Table 136 : 5-year relative survival by invasive grade for primary invasive cancers		
Grade	**Un-adjusted**	**Adjusted**
Grade 1	100.7 (100.0,101.4)	100.6 (99.9,101.3)
Grade 2	99.8 (99.2,100.3)	99.7 (99.1,100.2)
Grade 3	92.6 (91.2,93.8)	92.5 (91.1,93.8)
Not assessable	95.6 (83.1,100.7)	95.6 (83.2,100.8)
Unknown	89.5 (78.8,96.1)	89.5 (78.7,96.0)
All invasive cancers	**98.5 (98.0,98.9)**	**98.4 (97.9,98.8)**

Table 137 : 5-year relative survival by nodal status for primary invasive cancers		
Nodal status	**Un-adjusted**	**Adjusted**
Positive	93.0 (91.7,94.2)	92.9 (91.7,94.1)
Negative	100.3 (99.9,100.7)	100.2 (99.8,100.6)
Unknown	87.0 (80.3,92.2)	86.8 (80.1,92.0)
All invasive cancers	**98.5 (98.0,98.9)**	**98.4 (97.9,98.8)**

Table 138 : 5-year relative survival by NPI prognostic group for primary invasive cancers		
NPI group	**Un-adjusted**	**Adjusted**
EPG	101.0 (100.2,101.7)	100.9 (100.1,101.6)
GPG	101.1 (100.4,101.6)	101.0 (100.3,101.5)
MPG1	99.4 (98.5,100.2)	99.3 (98.4,100.1)
MPG2	93.9 (92.1,95.5)	93.8 (92.0,95.4)
PPG	82.0 (78.7,84.9)	82.0 (78.7,84.8)
Unknown	91.5 (87.0,95.1)	91.4 (86.9,95.0)
All invasive cancers	**98.5 (98.0,98.9)**	**98.4 (97.9,98.8)**