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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 2013 to March 2014

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Forewords

I am delighted, once again, to introduce the UK NHS Breast Screening Programme and association of breast surgery audit of screen-detected breast cancers. This represents the product of enormous effort on the part of breast screening units and of quality assurance (QA) reference centres across the UK. We particularly value the contribution of the devolved nations to this audit since it enables the publication to truly represent the entire country, as does the association, and to reflect the experiences of women wherever they live in the UK.

This year has been a difficult one for the QA teams in England as they are undergoing restructuring to adapt to the new organisation of which we are part. This will enable breast screening QA to take advantage of the new disease and treatment registers that are being established, and will enable this audit to continue with new methods over the next few years. New datasets will be available to be linked and the analysis of the data is expected to provide new ways of learning about what happens to women with breast cancer, and what is the best treatement for them. There will be change in the audit, but this is necessary for progress to be made.

At the moment, considerable manual effort is needed to deliver the audit on time and to the required standard. This would not be possible without the dedication of the team in Birmingham, and the continued input of the screening audit group. I thank them and the women whose data we publish here.

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

We are delighted to present the UK NHS breast screening programme and association of breast surgery audit of screen-detected breast cancers for the year April 2013 to March 2014 with adjuvant therapy data from the preceding year.

Importantly, the audit continues to confirm that the majority of women diagnosed with breast cancer through the UK NHSBSP receive a very high standard of care. However, the quality and detail of the audit data are now enabling us to ask very specific questions regarding the care of women attending breast cancer screening. The introduction last year of new governance arrangements for the different disciplines involved in screening, and the introduction of key performance indicators has proved very successful. It has enabled the identification of apparent outlier performance in some breast screening services compared to their peers. As a result, there are now good examples where further scrutiny of outlier performance has led to changes of practice and improved performance in such breast screening services.

The verification of the audit data is always a team effort from staff in screening services and the QA reference centres. However, the publication of the audit data for England this year is made all the more remarkable as this has been achieved with the Public Health England review occurring in the background. I would like to thank everyone involved for their continued dedication and hard work during this difficult period. A great strength of the audit is the continued collaboration with the Celtic nations that allows us to publish UK wide data comparisons.

Finally I would like to thank all of the members of the Screening Audit Group for their continued input to the audit process, highlighting in particular the efforts of Sam Read, Shan Cheung and Gill Lawrence in ensuring that the audit booklet is published on time.

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

Acknowledgements

The 2013/14 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.

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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 2013/14 audit of screen-detected breast cancer:

- Joanne Baker, QA Audit Officer, for collecting, collating and validating the national data
- 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 adjuvant and survival audit data
- Diane Edwards, GIS specialist at PHE's Knowledge and Intelligence Team (West Midlands), for producing the map of the UK NHSBSP.

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 2013/14 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.

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Introduction

Aims and objectives

The 2013/14 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 2013 to 31 March 2014 and adjuvant therapy undertaken in the period 1 April 2012 to 31 March 2013. 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 2015 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, women with previous breast cancers
- Non-operative diagnosis, number of assessment clinic 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: data completeness, 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 order 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 2013/14 screening year. The cohort of women included was selected to be identical to that included in the statistical KC62 reports for 2013/14, 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 2012 to 31 March 2013 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 2012/13 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 2008 and 31 March 2009 (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 Northern Irish, Scottish

and Welsh cancer registry databases to identify the date of death for any woman who died on or before 31 March 2014. 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 2013/14 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 2013/14 varied from 6,845 to 14,479.

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 Northern Ireland, Scotland and Wales. 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 (ie to ‘sign off’ the data). QA co-ordinators were given the responsibility of 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 English regions and Celtic countries. Data were collated on an English 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 2013/14 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 15 June 2015. Once published, the booklet will be available to download from the NHS Cancer Screening Programmes' website 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

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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 not meeting 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 individual screening units which do not meet national screening QA standards and/or key performance indicators (KPIs). There should be formal recording of the plans put in place to achieve each of the standards and KPIs that have not been met, 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 2014 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. Three measures were chosen for each clinical discipline (radiology, pathology, surgery and oncology) involved in the diagnosis and treatment of women screened by the UK NHSBSP.

Breast screening units named as outliers in the key performance indicators (KPIs) at the ABS Annual Conference in May 2014 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 2013/14 (main audit) or 2012/13 (adjuvant audit) were relatively unchanged from those submitted to the 2014 audit, a further audit of the data for cancers with a first offered screening appointment in the six month period 1 April 2014 to 30 September 2015 was requested. 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 results of these additional audits were also submitted to the audit analysis team at the West Midlands Breast Screening QA Reference Centre**.**

The results of the 2014 radiology, surgery, pathology and oncology KPI audits are presented in tables in appropriate sections of Chapters 2, 3, 4, 6, 7 and 8 of this booklet. These tables summarise the performance of the units identified for audit in 2014, and document their performance against the same or similar measures that have been identified for audit in 2015. The tables also include the new units whose performance in this year's 2015 audit did not meet each KPI.

The 12 KPIs included in the 2015 NHSBSP audit are as follows:

2015 audit radiology KPIs

R1a **Non-operative staging of the axilla**: units with 15% or more invasive cancers without pre-operative axillary ultrasound recorded

R1b **Non-operative staging of the axilla**: units with 15% or more invasive cancers with an abnormal axillary ultrasound without a needle biopsy recorded

R2 **Repeat visits to obtain a non-operative diagnosis**: units where more than 20% of women have more than one assessment clinic visit

R3 **Non-operative diagnosis for non-invasive cancers**: 1-year low outlier units for non-operative diagnosis of non-invasive cancers (excluding LCIS)

2015 audit pathology KPIs

P1 **Invasive cancers with positive ER status**: 3-year 99.7% high and low outlier units for positive invasive cancer ER status

P2 **Invasive cancers with positive HER status**: 3-year 99.7% high and low outlier units for positive invasive cancer HER2 status

P3 **Invasive cancer grade**: 3-year 99.7% high and low outlier units for invasive cancer grade

2015 audit surgery KPIs

S1a **Repeat operations for involved margins**: Units with less than 80% of invasive cancers with an involved closest radial margin after breast conserving surgery with a repeat operation to the breast

S1b **Repeat operations for close margins**: Units with more than 5% of invasive cancers with a closest radial margin greater than 5mm after breast conserving surgery with a repeat operation to the breast

S2a **Surgical examination of axillary lymph nodes**: 1-year high outlier units with more than 5 nodes obtained from node negative invasive cancers (excluding cases with neo-adjuvant therapy)

S2b **Surgical examination of axillary lymph nodes**: 1-year high outlier units for axillary node surgery performed on non-invasive cancers treated with breast conserving surgery

S3a **Mastectomy for non-invasive cancers**: 1-year high outlier units for mastectomy rates for non-invasive cancers

S3b **Immediate reconstruction for non-invasive cancers**: 1-year low outlier units for immediate reconstruction for non-invasive cancers

2015 audit oncology KPIs

O1 **Radiotherapy after breast conserving surgery**: 1-year high outlier units for invasive cancers treated with breast conserving surgery with no or unknown adjuvant radiotherapy

O2 **Endocrine therapy for ER positive invasive cancers**: 1-year high outlier units for ER positive invasive cancers with NPI >3.4 with no or unknown adjuvant endocrine therapy

O3 **Chemotherapy for node positive invasive cancers**: 1-year high outlier units for node positive (with macro-metastases) invasive cancers which are Grade 3 and/or ER negative and/or HER2 positive with no or unknown adjuvant chemotherapy

The surgical KPIs used in the 2014 audit, which were different to those used in this year's audit, are shown in the table below.

2014 audit surgery KPIs	
S1a	**Use of SLNB for axillary staging**: units with less than 70% of invasive cancers with axillary surgery having a SLNB
S1b	**Use of SLNB for axillary staging**: units where more than 30% of SLNB procedures were carried out using blue dye only
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 outliers for immediate reconstruction
S3	**Conversion of breast conserving surgery to mastectomy**: 1-year and 3-year high outliers for the conversion of breast conserving surgery to mastectomy for invasive cancers linked to 3-year high outliers for mastectomy at first operation and mastectomy rates for invasive cancers

The results of the 2014 surgery KPI audits are presented in tables in appropriate sections of Chapters 4, 6 and 7 of this booklet.

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 2013/14 audit, this booklet or the development of future UK NHSBSP & ABS Breast Screening Audits please write to:

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Provision of data for the 2013/14 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 2013/14 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	16,861	131	108	23	
	CDS	Derby	25,369	226	167	59	
	CLE	Leicester	42,909	369	292	77	B11
	CLI	Lincolnshire	27,471	226	179	47	
	CNN	North Nottingham	10,840	74	63	11	S8
	CNO	Nottingham	29,700	238	183	55	
	KKE	Kettering	14,479	134	101	33	S20
	KNN	Northampton	15,696	122	93	29	
East of England	DCB	Cambridge & Huntingdon	19,647	148	111	37	
	DGY	James Paget	8,691	70	51	18	S3
	DKL	King's Lynn	8,881	84	61	23	S4
	DNF	Norfolk & Norwich	26,823	180	146	34	
	DPT	Peterborough	11,407	99	82	17	S10
	DSU	East Suffolk	18,194	151	126	25	
	DSW	West Suffolk	13,223	137	99	38	S15
	ELD	Beds & Herts	60,845	509	390	119	B3
	FCO	Chelmsford & Colchester	35,561	278	232	46	
	FEP	Epping	9,971	83	70	13	S6
	FSO	South Essex	24,612	182	142	39	
London	EBA	North London	61,026	508	367	141	B2
	ECX	West London	42,977	358	268	90	B10
	FBH	Barking, Havering, Redbridge and Brentwood	27,620	215	162	53	
	FLO	Central and East London	25,373	193	155	38	
	GCA	South East London	50,192	356	276	80	B6
	HWA	South West London	39,506	383	284	98	B15
NEYH	AGA	Gateshead	39,071	277	225	52	B17
	ANE	Newcastle	37,761	357	283	74	B18
	ANT	North Tees	37,594	317	255	62	B19
	AWC	North Cumbria	12,151	112	93	19	S12
	BHL	Humberside	42,454	312	257	55	B12
	BHU	Pennine	39,320	317	242	75	B16
	BLE	Leeds/Wakefield	35,504	329	251	78	
	BYO	North Yorkshire	37,150	295	214	81	B20
	CBA	Barnsley	11,239	94	78	16	S9
	CDO	Doncaster/Bassetlaw	16,542	178	138	40	
	CRO	Rotherham	11,678	74	60	14	S11
	CSH	Sheffield	18,916	150	126	24	
North West	NCH	Chester	8,321	82	68	14	S2
	NCR	Crewe	13,493	128	106	22	S18
	NLI	Liverpool	30,634	277	218	59	
	NMA	East Cheshire	21,515	193	155	37	
	NWA	Warrington	25,656	246	203	43	
	NWI	Wirral	14,836	156	117	38	
	PBO	Bolton	23,944	200	138	62	
	PLE	East Lancashire	26,519	150	125	25	
	PLN	North Lancashire/South Cumbria	35,650	317	248	69	
	PMA	Greater Manchester	40,785	396	330	66	B14
	PWI	South Lancashire	26,901	236	196	40	

20 biggest units | 20 smallest units

* Cancers detected in 2013/14, 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	20,675	164	136	28	
	JIW	Isle of Wight	6,845	62	52	10	S1
	JPO	Portsmouth	20,787	225	173	52	
	JSO	Southampton & Salisbury	21,619	187	145	42	
	KHW	Aylesbury & Wycombe	20,960	165	139	26	
	KMK	Milton Keynes	10,647	85	68	17	S7
	KOX	Oxford	26,681	260	197	63	
	KRG	Reading (West Berkshire)	19,057	200	139	61	
	KWI	Windsor (East Berkshire)	19,452	173	140	33	
South East Coast	GBR	Brighton	33,408	317	259	58	
	GCT1	Canterbury	30,438	268	218	50	
	GCT2	Maidstone	19,153	154	120	34	
	GCT3	Medway	24,059	179	146	33	
	HGU	Guildford	52,307	516	402	114	B5
	HWO	Worthing	28,225	290	229	61	
South West	JDO	Dorset	35,643	335	260	75	
	JSW	Wiltshire	26,591	222	179	43	
	LAV	Avon	48,858	476	374	102	B7
	LCO	Cornwall	22,046	199	161	38	
	LED	East Devon	25,292	203	141	62	
	LGL	Gloucestershire	26,781	225	174	51	
	LPL	West Devon	21,189	195	157	38	
	LSO	Somerset	19,678	169	135	34	
	LTB	South Devon	13,315	117	97	20	S16
West Midlands	MAS	South Staffordshire	25,284	236	193	43	
	MBS	South Birmingham	14,154	124	100	24	S19
	MBW	City, Sandwell & Walsall	42,109	368	287	81	B13
	MCO	Warwickshire, Solihull & Coventry	47,628	410	338	72	B8
	MDU	Dudley & Wolverhampton	20,704	224	174	50	
	MHW	Hereford & Worcester	32,740	258	210	47	
	MSH	Shropshire	16,694	144	110	34	
	MST	North Staffordshire	18,476	148	105	43	
Northern Ireland	ZNE1	Eastern	23,528	170	144	26	
	ZNI1	Northern	13,448	90	74	16	S17
	ZNS1	Southern	12,187	59	51	8	S13
	ZNW1	Western	9,616	55	47	8	S5
Scotland	Unit 1	Edinburgh (South East)	45,155	445	374	71	B9
	Unit 2	Dundee (East)	19,945	148	131	17	
	Unit 4	Aberdeen (North East)	24,820	200	175	25	
	Unit 5	Irvine (South West)	19,756	167	139	28	
	Unit 7	Inverness (North)	13,177	133	115	18	S14
	Unit 8	Glasgow (West)	61,986	548	459	89	B1
Wales	WNM	North Wales	29,351	330	254	76	
	WSE	South Wales	55,669	540	418	122	B4
	WSW	West Wales	32,034	365	295	70	
UK			**2,447,675**	**21,195**	**16,768**	**4,421**	

20 biggest units 20 smallest units

* Cancers detected in 2013/14, includes previous cancers which are only included in Chapter 1

Key findings and recommendations

Cancers detected by screening

Between 1 April 2013 and 31 March 2014, 2,447,675 women were screened by the UK NHSBSP in England, Northern Ireland, Scotland and Wales. Of the 21,195 cancers detected in women of all ages; 79% were invasive, 20% non-invasive and 1% micro-invasive. The invasive status of six cancers was unknown. The cancer detection rates for all cancers and for small invasive cancers (<15mm in diameter) were 8.7 and 3.5 per 1,000 women screened respectively. Three 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. Two of these units screened fewer than 14,000 women annually.

By 31 March 2014, 73 of the 80 screening units in England had started the randomised controlled trial age extension of the NHSBSP. As a result, the proportion of cancers diagnosed in women aged 71-73 has increased from 4.1% in 2010/11 to 5.2% in 2013/14. Northern Ireland, Scotland and Wales have no plans to implement the randomised controlled trial age extension. Only 2.9% of cancers in Northern Ireland were detected in women aged over 70. However, in Scotland and in 2013/14, 8.9% and 9.4% of cancers respectively were detected in women aged over 70. These figures are only slightly lower than the UK average of 10.4%.

In 2013/14, 1,156 (6%) women had a previous breast cancer recorded; of these cancers, 80% were invasive/micro-invasive and 19% were non-invasive. The proportion of women with a previous breast cancer increased rapidly with age; the average for women aged 71 and older being 9.2%. 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 2011/12 included in these 3-year comparisons will differ from those published in the 2012 and 2013 UK NHSBSP & ABS audit booklets. Main audit data for 2012/13 included in the 3-year comparisons also differ from those published in the 2014 UK NHSBSP & ABS audit booklet, because previous cancer data from Scotland, which were not available in 2014, have been provided for this year's audit report.

Non-operative diagnosis

In 2013/14, 97% of cancers detected in the UK NHSBSP were diagnosed non-operatively; 650 cancers did not have a non-operative diagnosis and only 11 cases had C5 cytology only diagnosis. In four units [Northern Ireland (3) and North East, Yorkshire & Humber (1)] 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 in 2013/14 was 99%; only 130 invasive cancers did not have a non-operative diagnosis. All units met the 90% minimum standard. The non-operative diagnosis rate for non-invasive cancers in 2013/14 was 87%: 511 non-invasive cancers did not have a non-operative diagnosis. In 2013/14, 36 units did not meet the 85% minimum standard for the non-operative diagnosis of non-invasive cancers. If cases of LCIS are excluded, the non-operative diagnosis rate for 21 of these units was above 85%.
In the 3-year period 2011/12 to 2013/14, 18 units had an average non-operative diagnosis rate for non-invasive cancers excluding LCIS below 85% and 31 units had an average non-operative diagnosis rate for all non-invasive cancers below 85%. In control charts for this 3-year period, 16 units are 95% low outliers for all non-invasive cancers and seven units for non-invasive cancers excluding LCIS. Regional QA reference centres should follow up the two units audited in 2014 (East Midlands CLE and South Central JPO) and the three units identified in this year's audit (North West PLN, South Central JBA and Scotland Unit 5) that are low outliers for non-invasive cancers excluding LCIS treated in 2013/14 to ascertain the reason for this clinical practice. The two units in East of England (DKL and DPT) with non-operative diagnosis rates for non-invasive cancers excluding LCIS below 80% in 2013/14 should also be followed up together with the unit in South West (LAV) which is a 3-year outlier in 2010/11 to 2012/13 and has a non-operative diagnosis rate below the 85% minimum standard in 2013/14.

In 2013/14, 114 cancers (1%) had invasive status B5c (not sssessable 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. Two units have significantly higher proportions of B5a (non-invasive) cancers found to be invasive at surgery in the 3-year period 2010/11 to 2012/13, and in three units, more than half of these cancers had an invasive size of at least 10mm.

One hundred and thirty one 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 126 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 are 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 clinic visits

Of the 20,039 women with breast cancer in 2013/14, 17,175 (86%) had one assessment clinic visit. Of these, 16,786 (98%) 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 visit. In nine units more than 20% of women with a B5/C5 non-operative diagnosis result had more than one assessment clinic visit. In 40 units more than 20% of women with non-invasive cancer had more than one visit compared to only five units for women with invasive cancer. Regional QA reference centres should follow up the five units audited in 2014 (North West NWI and NLI, South East Coast HWO, South West LCO and LED) and the four units identified in this year's audit (East Midlands CDS and KKE, North West PBO and South East Coast GCT2) where more than 20% of women with breast cancer (invasive or non-invasive) had more than one assessment clinic visit to ascertain the reason for this clinical practice.

Of the 18,474 women in England, Northern Ireland and Wales diagnosed in 2013/14, 18,459 had a needle biopsy at an assessment clinic visit. Of these, 753 (4%) did not have a core/cytology result from their first visit. In four units [South East Coast (2) and South West (2)], over 20% of women had their first needle biopsy result from their second or later visits. One thousand two hundred and twelve women had at least one repeat visit involving a needle biopsy. In 21 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 407 invasive cancers and 446 non-invasive cancers where repeat needle biopsies were performed at a subsequent assessment clinic visit to obtain a B5/C5 diagnosis. There were 364 invasive cancers and 161 non-invasive cancers where a B5/C5 result was obtained at the first visit, but where a repeat needle biopsy was undertaken at a subsequent visit. Four percent of women with invasive cancer and 4% of women with non-invasive cancer came back to an assessment clinic for other investigations.

Diagnostic open biopsies

In 2013/14, 2,217 diagnostic open biopsies were performed. Of these 71% were benign and 29% were malignant. Benign open biopsy rates were 1.64 and 0.42 per 1,000 women screened for prevalent (first) and incident (subsequent) screens respectively. Only 35 units achieved the 1.0 per 1,000 women screened target, and 41 units did not achieve the minimum standard for prevalent (first) screens. Three units (in East of England, South Central and South East Coast) 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 0.27 per 1,000 women screened in 2013/14, mirroring the rise in the non-operative diagnosis rate from 63% to 97%. The malignant open biopsy rate varied between units from zero in three units to 1.0 per 1,000 women screened in a unit in East of England. 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 2013/14. Five false positive core biopsies were recorded in 2013/14.

Of the 130 invasive cancers diagnosed by open biopsy, three had no non-operative procedure recorded, and, of the 519 non/micro-invasive cancers diagnosed by open biopsy, two had no

non-operative procedure recorded. Forty four invasive cancers and 133 non/micro-invasive cancers diagnosed by malignant open biopsy had a B4/C4 needle biopsy result indicating suspicion of malignant disease. Sixty seven invasive cancers and 366 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 cancers 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 [LISN]) as B3, in line with current NHSBSP guidelines. In 2013/14, of the 434 cancers that were diagnosed as B3/C3 and had an operation, 125 had only lobular carcinoma *in situ* (LCIS) in the surgical specimen. The Sloane Project is actively collecting screen-detected cases of LCIS, pleomorphic LCIS, atypical lobular hyperplasia, atypical ductal hyperplasia and flat epithelial atypia. The Sloane Project will still accept new cases of ductal carcinoma *in situ* (DCIS) screened before 1 April 2012 if all data forms have been completed for the patient.

Tumour characteristics

In 2013/14, 30 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 11 units, data incompleteness was greater than 10%. The size of 196 non-invasive cancers (5%) was not assessable; 178 of these were LCIS. Of the 197 non-invasive cancers with grade not assessable, 90% were LCIS alone at surgery. Of the 178 surgically treated non-invasive cancers with unknown size, 151 (85%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen. Of the 3,987 surgically treated non-invasive cancers, 36% were less than 15mm in diameter and 15% were larger than 40mm. Fifty seven percent of surgically treated non-invasive cancers were high cytonuclear grade, 27% were intermediate cytonuclear grade and 10% were low cytonuclear grade. Eighteen units had significantly higher and 12 units had significantly lower proportions of non-invasive cancers with a high cytonuclear grade than the national average of 57%. Fifty two percent of surgically treated cancers had an invasive tumour diameter of less than 15mm. For only 274 cases (2%) was the invasive tumour diameter greater than 50mm. The whole tumour size was not provided for 287 (2%) surgically treated invasive cancers.

In 2013/14, 99% of surgically treated invasive cancers had known nodal status; 123 invasive cancers were recorded as having no nodes obtained. Twenty two percent of invasive cancers had positive nodes; this varied from 9% to 45% in individual units. For 15,416 invasive cancers, nodes were examined at surgery and 1,963 (13%) had one positive node at the first axillary operation. Of these, 1,836 (94%) had more detailed information of the type of single node positivity; 646 contained micro-metastases and 1,185 macro-metastases. In the 3-year period 2011/12 to 2013/14, 10 units had an usually high and 12 units an unusually low proportion of positive nodes compared with the UK average of 21.7%. It would be interesting to determine whether this wide range of node positivity is related to differences in pathological handling (eg

the number of levels or blocks taken, the total number of nodes examined and the use of immunohistochemistry and molecular techniques such as PCR). Seven of the 10 high outlier units are served by hospitals known to use intra-operative nodal assessment which may lead to the identification of higher numbers of micro-metastases which would not normally warrant axillary treatment. Four of these seven units and two other units served by hospitals not known to use intra-operative nodal assessment had 25% or more micro-metastatic nodes compared with the UK average of 16%.

Of the 3,987 surgically treated non-invasive cancers, 27% had known nodal status; 91% of non-invasive cancers treated with mastectomy had known nodal status compared with 7% of non-invasive cancers treated with breast conserving surgery. The nodal status was known for more than 10% of non-invasive cancers treated by breast conserving surgery in 19 units and for more than 30% in two units. The nodal status was known for 100% of non-invasive cancers treated by mastectomy in 44 units and for less than 60% in two units. Of the 1,062 non-invasive cancers with known nodal status, 11 (1%) had positive nodal status recorded − five after a mastectomy and six after breast conserving surgery.

In 2013/14, 25% of invasive cancers were grade 1, 54% grade 2 and 20% grade 3. Grade was not assessable for 45 cancers and unknown for 62 cancers. The nine units which are 99.7% high or low outliers for invasive cancer grade in 2011/12 to 2013/14 and in 2013/14 (4 of which were audited in 2014 [East of England DSW, North East, Yorkshire & Humber CDO, Wales WNM and WSW] and five of which are newly identified in 2015 [East of England FSO, North East, Yorkshire & Humber BHU, South Central JIW, South East Coast GBR and West Midlands MAS]) should be followed up by regional QA reference centres, pathology QA co-ordinators and 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. Five hundred and eighty two surgically invasive cancers treated with neo-adjuvant therapy which had an NPI score recorded were excluded from the analyses as the scores provided may not have reflected the true tumour characteristics at diagnosis. In 2013/14, of the 14,536 surgically treated invasive cancers with a known NPI score, 21% were in the excellent prognostic group, 38% in the good prognostic group), 36% in moderate prognostic groups 1 and 2 (MPG1 and MPG2) and 5% in the poor prognostic group (PPG). There are local variations in NPI group (not necessarily due to interpretation) which should be investigated. For example, in the PPG control chart, three units are 95% high outliers. Of these, two are also 95% low outliers for EPG/GPG cancers.

ER status was unknown for 53 invasive cancers. Of the invasive cancers with known ER status, 91% were ER positive. There are no 99.7% high or low outliers for ER-positive invasive cancer to be followed up by regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology. PR status was known for 59% of invasive cancers: 76% were positive. Of the 1,298 invasive cancers that were known to be ER negative, 86% had known PR status: 4% were PR positive and 82% were PR negative. HER2 status data were available for 99% of invasive cancers. Twenty-four units had complete HER2

status for all their invasive cancers while two units in East of England had 11% and 13% of cancers with unknown HER2 status. Of the invasive cancers with known HER2 status, 10% were positive, 89% were negative and 1% were borderline. There are no 99.7% high or low outliers for positive invasive cancer HER2 status to be followed up by regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology.

ER status was not known for 64% of non/micro-invasive cancers; 82% 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 'International Breast Cancer Intervention (IBIS) DCIS 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 2013/14, 75% (3041) of non-invasive cancers were treated with breast conserving surgery and 69 apparently received no surgery: 105 potentially large, high cytonuclear grade non-invasive cancers were treated with breast conserving surgery. Regional QA reference centres and regional QA surgeons should follow up the four units (London FBH, North East, Yorkshire & Humber ANE, North West PLN and Scotland Unit 7) that are high outliers for non-invasive cancer mastectomy rate in 2013/14 to ascertain the reason for this clinical practice.

In 2013/14, 78% of invasive breast cancers had breast conserving surgery. Two hundred and ninety eight invasive cancers (2%) had no surgery recorded within the audit period: of these 58% 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 2013/14. Only 7% of cancers with whole tumour size <15mm were treated with mastectomy compared to 83% 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 2011/12 to 2013/14, seven units had significantly higher mastectomy rates for small <15mm whole size cancers and 17 had significantly lower rates.

Of the cancers treated with mastectomy in 2013/14, 30% were recorded as having immediate reconstruction. The highest immediate reconstruction rate was in a unit in North West (59%), and in a West Midlands unit no immediate reconstructions were recorded. Immediate

reconstruction rates after mastectomy were almost twice as high for non/micro-invasive cancers (47%) as for invasive cancers (24%). For invasive cancers treated with mastectomy, immediate reconstruction rates in 2013/14 varied from over 50% in two units to zero in two units. In 2011/12 to 2013/14, 21 units had significantly higher immediate reconstruction rates for invasive cancers and 27 had significantly lower rates. Three units (in East Midlands, North East, Yorkshire & Humber and Wales) which are high mastectomy rate outliers for invasive cancers with whole tumour size <15mm are also 99.7% low immediate reconstruction outliers for all invasive cancers. One unit (in North East, Yorkshire & Humber) with a high mastectomy rate for small invasive cancers is also a 99.7% high immediate reconstruction outlier for all invasive cancers. While a relatively high mastectomy rate may be acceptable for the latter units where women have chosen to have immediate reconstruction, high mastectomy rates in units with lower than average immediate reconstruction rates warrant further examination to ensure that women were offered the appropriate treatment options.

For non/micro-invasive cancers, immediate reconstruction rates in 2013/14 varied from 70% in 14 units to zero in six units. Regional QA reference centres and regional QA surgeons should follow up the five units (East Midlands KKE, East of England DGY and DSW, South Central KRG and Wales WSW) that are 95% low outliers and have five or more non-invasive cancers without immediate reconstruction in 2013/14 to ascertain the reason for this clinical practice. The two units (East Midlands CNN and North West PBO) with high mastectomy rates and lower than average immediate reconstruction rates for non-invasive cancers in the 3-year period 2011/12 to 2013/14 should also be followed up in order to ensure that women were offered the appropriate treatment options.

Neo-adjuvant therapy

A total of 883 women received neo-adjuvant therapy in 2013/14. Of these, 863 had invasive breast cancer and 20 had non-invasive breast cancer. Of the 298 women with invasive breast cancer who did not have surgery within the audit time period, 58% had neo-adjuvant therapy recorded. The use of neo-adjuvant endocrine therapy was highest in older women aged 71 or more: 36% (31 cases) of whom had no surgery recorded. Of the 457 women (2%) with neo-adjuvant endocrine therapy recorded, 97% had cancers that were ER and/or PR positive, 3% had cancers with unknown ER and PR status and 1% had cancers which were ER and PR negative; 124 (27%) of these women had no surgery and 72% were aged 60 or over. Neo-adjuvant chemotherapy was recorded for 454 invasive cancers (3% of all invasive cancers diagnosed in 2013/14). Six of the invasive cancers treated with neo-adjuvant chemotherapy were small (20mm or less), grade 1 and not proven to have abnormal lymph nodes. Fifty one women with invasive cancer were recorded as having received neo-adjuvant trastuzumab. Of these only 46 (90%) also had neo-adjuvant chemotherapy recorded.

Surgical caseload

In 2013/14, 625 consultant breast surgeons treated women diagnosed in the UK NHSBSP. Ninety two percent of women were treated by a surgeon with a screening caseload of at least 20 cases. One hundred and fifty two surgeons treated fewer than 10 screen-detected cases. Of

the 152 surgeons treating fewer than 10 screening cases per year, 53 (35%) had a symptomatic caseload of more than 30 cases per year and 35 (23%) either joined or left the NHSBSP during 2013/14. Combining the data submitted for the 3-year period 2011/12 to 2013/14, 256 surgeons (34%) had an annual average caseload of fewer than 10 cases and six 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 (49%) and London (46%). Surgical specialisation was highest in Northern Ireland, where only three surgeons treated fewer than 10 screening cases per year. During the period 2011/12 to 2013/14, of the 256 low caseload surgeons, 23% treated more than 30 symptomatic breast cancers each year, and 15% either joined or left the NHSBSP. Eleven of the 24 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 90 surgeons treating a total of 870 women in the 3-year period 2011/12 to 2013/14. Twenty two of these surgeons were in Scotland.

Repeat operations

Overall in 2013/14, 22% (4,424) of surgically treated breast cancers had more than one operation: 85% of invasive cancers and 34% of non/micro-invasive cancers without a non-operative diagnosis had a repeat operation. Although the overall repeat operation rate for the 649 surgically treated cancers (with known invasive status) without a non-operative diagnosis was 45%, repeat operations for cancers without a non-operative diagnosis formed only 7% of all repeat operations. Twenty nine cancers without a non-operative diagnosis, which were not LCIS, had no further surgery despite the margins being involved or of unknown status. Twenty one of these cancers were treated in Scotland, where margin data were not available. Overall, 22% (4,135) of surgically treated breast cancers with a non-operative diagnosis had more than one operation: 21% of invasive cancers and 24% of non/micro-invasive cancers with a non-operative diagnosis had a repeat therapeutic operation. Thirteen cancers with a non-operative diagnosis initially treated by therapeutic breast conserving surgery had more than three therapeutic operations. The repeat operation rate was 24% for non/micro-invasive cancers with a B5a (non-invasive) core biopsy and 19% for invasive cancers with a B5b (invasive) core biopsy. Invasive cancers with a B5a (non-invasive) core biopsy had the highest repeat operation rate (63%).

Eighteen percent of all cancers with a non-operative diagnosis, initially treated with breast conserving surgery, had a repeat operation: 13% 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 (24% compared to 16%). Repeat operation rates for non/micro-invasive cancers varied between units from 7% in two units (in East Midlands and Scotland) to 53% in a West Midlands unit. Repeat operation rates for invasive cancers varied between units from 5% in a North East, Yorkshire & Humber unit to 31% in a unit in East of England.

Eleven 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 seven 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 2011/12 to 2013/14, 20 units and 38 surgeons had high repeat breast conserving surgery rates. Twenty six units and 90 surgeons had low repeat breast conserving surgery operation rates. 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. For non/micro-invasive cancers, conversion rates to mastectomy varied from 38% in one small North East, Yorkshire & Humber unit to zero in 21 units. For invasive cancers, conversion rates to mastectomy varied from 20% in one small Northern Ireland unit to zero in five units. Sixteen percent of all cancers with a non-operative diagnosis had an initial therapeutic mastectomy at the first operation, and 5% had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent operation. For cancers with a non-operative diagnosis, the initial therapeutic mastectomy rate was higher for non/micro-invasive cancers than for invasive cancers (18% 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 (7% compared to 4%).

Of the 18,475 invasive or non/micro-invasive cancers which had surgery to the breast, 93% 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 95% had the margin distance recorded. Of the 13,957 cancers treated with breast conserving surgery, 99% were recorded as having clear margins at their final operation. Of the 3,884 cancers treated with a mastectomy, 98% were recorded as having clear margins at their final operation: 162 cancers treated with breast conserving surgery and 69 cancers treated with a mastectomy were recorded as not having had clear margins at the final operation. In the UK (excluding Scotland) in 2013/14, 93% of invasive cancers with an involved closest radial margin had a repeat operation to the breast. This varied from 100% in 48 units to only 56% in a unit in North West. Regional QA reference centres and regional QA surgeons should follow up the four units (London FBH, North East, Yorkshire & Humber ANE, North West PLN and South East Coast GCT1) with fewer than 80% of invasive cancers with an involved closest radial margin after breast conserving surgery with a repeat operation to the breast in 2013/14 and with five or more cancers without repeat breast surgery in 2013/14 to ascertain the reason for this clinical practice. In the UK (excluding Scotland) in 2013/14, 2% of invasive cancers with a closest radial margin greater than 5mm had a repeat operation to the breast. This varied from zero in 51 units to 19% in a unit in Northern Ireland. Regional QA reference centres and regional QA surgeons should follow up the seven units (North East, Yorkshire & Humber AGA, North West NWA, NCH and PMA, South Central JBA, South West LED, and Northern Ireland ZNI1) with more than 5% of invasive cancers with a closest radial margin greater than 5mm with a repeat operation to the breast in 2013/14 to ascertain the reason for this clinical practice.

The axilla

In 2013/14, of the 15,543 surgically treated invasive cancers included in the audit, 99% had known nodal status: 3,382 (22%) were node positive and 641 were known to only have micro-metastases. Of the 2,907 invasive cancers without neo-adjuvant therapy recorded that were

confirmed to be node positive on surgery, 668 (23%) had positive nodes diagnosed pre-operatively by means of needle biopsy. In the UK (excluding Scotland), 90% of cancers had a record of an axillary ultrasound at assessment: 84% were confirmed to be invasive after surgery and 15% non-invasive. Ninety six percent of invasive cancers and 67% of non-invasive cancers had axillary ultrasound recorded. These are considerable improvements from 2012/13. Of the 2,469 invasive cancers with an abnormal axillary ultrasound result recorded, 1,154 were node positive at surgery giving a positive predictive value of an abnormal ultrasound of 49%. Of the 11,430 invasive cancers with a normal axillary ultrasound result recorded which had axillary assessment during surgery, 1,909 (17%) had positive nodes (ie the negative predictive value of normal ultrasound was 83%).

In 2013/14, 18% of invasive cancers with axillary ultrasound had an abnormal axillary ultrasound result recorded: 95% had a subsequent needle biopsy of cytological assessment of the axillary nodes. For 124 invasive cancers an abnormal ultrasound result was apparently not followed up with a needle biopsy and for 137 invasive cancers a needle biopsy was performed despite a normal ultrasound result. Regional QA reference centres should follow up the two units (East of England ELD and Wales WNM) with 15% or more invasive cancers with no pre-operative ultrasound recorded in 2013/14, and the four units (North West NWA and PBO, South Central KHW and South West JSW) with 15% or more invasive cancers with an abnormal pre-operative axillary ultrasound with no needle biopsy recorded in 2013/14 to ascertain the reason for this clinical practice.

Of the 939 invasive cancers with a C5/B5 diagnosis with abnormal ultrasound and the 21 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 699 and 18 respectively had no or unknown neo-adjuvant therapy recorded and had axillary surgery. Of these, 668 were node positive at surgery, giving an overall positive predictive value of a C5/B5 of 95%. Of the 699 invasive cancers with a C5/B5 result and abnormal ultrasound, and the 18 invasive cancers with a C5/B5 results and normal ultrasound which had no or unknown neo-adjuvant therapy recorded and which had axillary surgery, 34 (5%) had false positive results, ie were found to be node negative at surgery. It is possible that the axilla was over-treated for these 49 cancers, 16 of which had axillary clearance. Of the 1,431 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, 313 (22%) had positive nodes at surgery. Axillary biopsy thus did not accurately identify positive nodes for these invasive cancers. Of the 3,116 invasive cancers with positive nodal status (excluding cases with neo-adjuvant therapy and no axillary assessment at surgery), 63 (2%) had a C1/B1 axillary biopsy, 226 (7%) had a C2/B2 axillary biopsy, 11 had a C3/B3 axillary biopsy, 14 had a C4/B4 axillary biopsy and 668 (21%) had a C5/B5 axillary biopsy.

The proportion of invasive breast cancers for which nodal status was recorded based on the examination of fewer than four nodes decreased from 10.6% in 1996/97 to 4.8% in 2003/04. This rose to 66% in 2013/14 because of the introduction of SLNB. When invasive cancers which had an SLNB are excluded, this figure falls to 6%. The median number of nodes taken in an SLNB procedure was 2 compared with 12 for other nodal procedures. Of the 15,425 invasive

cancers with axillary surgery in 2013/14, 13,676 (89%) had a SLNB: the blue dye only technique was used for 9% of invasive cancers with axillary surgery. The use of SLNB has increased by 2 percentage points since 2012/13. The East of England QA reference centre and QA surgeon should follow up unit DGY to ascertain the progress it has made towards ensuring that at least 70% of invasive cancers with axillary surgery have a SLNB. QA reference centres and QA surgeons should follow up the other 7 units (East of England DSU, DSW and FSO, East Midlands CNN, North West NWA, South Central KWI and Northern Ireland ZNE) to ascertain the progress they have made towards ensuring that no more than 30% of invasive cancers with axillary surgery have a SLNB involving blue dye only.

Of the 15,543 surgically treated invasive cancers, 127 had unknown nodal status and 86 had their negative nodal status determined on the basis of 1, 2 or 3 nodes without a SLNB. Of the 1,749 invasive breast cancers, which either did not have a SLNB or where the type of nodal procedure was unknown, 94% had 4 or more nodes taken; 41 units did not achieve the 90% 4 or more nodes minimum standard. Of the 15,416 invasive cancers with known nodal status, 3,382 (22%) had positive nodes. The proportion of cases with positive nodal status (16%) was lower for cancers which underwent a SLNB compared with cancers which did not have a SLNB (66%). This could be due to the selection of women for axillary sampling or clearance who were considered to be of high risk (e.g. high grade, palpable nodes) or who had positive nodes on non-operative ultrasound guided cytology or core biopsy. Of the 651 cancers with positive nodal status determined on the basis of 1, 2 or 3 nodes using any type of nodal procedure, 636 only had one axillary operation. Of these, 350 (55%) were known to have had micro-metastases and further axillary surgery may not have been appropriate. Since the publication of the results of the Z11 trial and the ‘International Breast Cancer Study Group (IBSCG)’ study, decisions on systemic therapy are increasingly being made on the basis of the available axillary staging (which may include fewer than four nodes), rather than subjecting women to unnecessary axillary clearance. Under these circumstances, the remaining 286 cancers with positive nodes and only one axillary operation (79% 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. Although radiotherapy treatment is recorded in the audit, the site(s) irradiated (breast/chest wall with/without axilla or other regional nodes) are not recorded. It is therefore not possible to investigate this further.

In 2013/14, 5.7% of node negative invasive cancers had more than five nodes examined. Regional QA reference centres and regional QA surgeons should follow up the seven high outlier units (East Midlands CNN, London ECX, North East, Yorkshire & Humber ANT, North West NWA and PWI, South East Coast GBR and South West JSW) with high proportions of node negative invasive cancers (excluding those treated with neo-adjuvant therapy) with more than five nodes examined in 2013/14 to ascertain the reason for this clinical practice.

Of the 138 surgically treated micro-invasive cancers, 69% had known nodal status: 96% of those treated by mastectomy and 53% of those treated with breast conserving surgery. Twenty seven percent of non-invasive cancers had known nodal status: 91% of non-invasive cancers treated with mastectomy had known nodal status, compared with 7% of those treated with

breast conserving surgery. The maximum numbers of nodes taken for non-invasive cancers treated with breast conserving surgery or mastectomy were 12 and 17 respectively. Of the 1,062 non-invasive cancers with known nodal status, 11 had positive nodal status recorded. Ninety four percent of non-invasive cancers treated with a mastectomy and 97% of non-invasive cancers treated with breast conserving surgery had their nodal status determined on the basis of an SLNB. Eleven non-invasive cancers treated with mastectomy had their nodal status determined on the basis of an axillary clearance. The median number of nodes taken in an SLNB procedure carried out on non-invasive cancers treated with mastectomy was two compared with four for other nodal procedures. Because the risk of axillary nodal metastasis is extremely low in screen-detected lesions where a final (post-operative) diagnosis of DCIS is made, the routine determination of nodal status for non-invasive cancers treated with breast conserving surgery is not recommended by either the National Institute of Health and Care Excellence or the Association of Breast Surgery.

Of the 200 non-invasive cancers treated with breast conserving surgery that had known nodal status, 97% had their nodal status determined on the basis of an SLNB. The median number of nodes taken in an SLNB carried out on non-invasive cancers treated with breast conserving surgery was two compared with four for other nodal procedures. Regional QA reference centres and regional QA surgeons should follow up the seven high outlier units (East Midlands CNN, London ECX, North East, Yorkshire & Humber ANT, North West NWA and PWI, South East Coast GBR and South West JSW) with high proportions of node negative invasive cancers (excluding those treated with neo-adjuvant therapy) with more than five nodes examined in 2013/14 to ascertain the reason for this clinical practice.

Forty eight invasive cancers with a B5b (invasive) core biopsy, 48 invasive cancers with a B5a (non-invasive) core biopsy, six invasive cancers with a B5c non-operative diagnosis and 13 invasive cancers without a non-operative diagnosis had no axillary procedure recorded. It is possible that under some circumstances, (eg 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 to be inappropriate after multidisciplinary team discussion.

In 2013/14, 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 361 (46%) of these cancers had their axillary surgery at the first operation: of these, 91% had an SLNB, compared to 89% of those with axillary assessment at later operation. During the 3-year period 2011/12 to 2013/14, six units had significantly higher rates of axillary surgery at first operation for invasive cancers with a B5a (non-invasive) diagnosis. It is possible that these units are using predictive models to identify cases which are more likely to have invasion so that the appropriate surgery can be carried out at a single operation. However, compared with the UK average values, none of the outlier units had particularly high proportions of grade 3 cancers or cancers with a maximum diameter of 15mm or more. One of the high outlier units had a significantly higher

than average mastectomy rate for non-invasive cancers where limited axillary surgery would be appropriate.

In 2013/14, 32% of invasive cancers with a positive nodal status had a repeat operation to the axilla: 31% following an SLNB and 2% after an axillary operation which did not involve an SLNB. Overall in the UK, 95% of repeat operations on the axilla were carried out on invasive cancers with positive nodal status determined on the basis of an SLNB. This varied from zero in two units in South Central (one of which was small) to over 74% in a unit 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 an SLNB. Thirty six units had significantly higher rates of repeat axillary surgery and were 95% high outliers (29 were 99.7% high outliers), and 23 had significantly lower rates of repeat axillary surgery and were 95% low outliers (19 were 99.7% low outliers). Of the high outliers, two units (in North West and South West) had 40% or more invasive cancers with no biopsy after an abnormal axillary ultrasound in 2013/14, and four units [East of England (2) and Wales (2)] had more than 20% of cancers after no axillary ultrasound in 2013/14. 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 was unable to provide adjuvant therapy data. Of the 17,820 breast cancers detected in the UK (excluding Scotland) in 2012/13, 167 were not included in the adjuvant audit because the adjuvant data was not submitted. A further 770 cancers were excluded because of previous breast cancer diagnoses, leaving 16,885 (95%) for analysis. Eighty two percent of women with invasive cancer, 54% with micro-invasive cancer and 45% with non-invasive cancer had radiotherapy recorded; 26% of the women with invasive cancer and 10 women with non/micro-invasive cancer had chemotherapy recorded. Eighty two percent of women with invasive cancer and 9% 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.

In 2012/13, radiotherapy was the main adjuvant treatment for women with invasive cancer at all ages, followed by endocrine therapy; 77% of the 855 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 89% and 92%). A slightly smaller proportion of women in every age group treated with mastectomy received endocrine therapy (range 86% to 89%) compared with those who had breast conserving surgery. Ninety seven percent of women aged 50 to 65 with invasive cancer treated with breast conserving surgery received radiotherapy, and there was only a 1 percentage point decrease in the use of radiotherapy for women aged 71 and over. Only 36% 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 66% for women aged 56-58 and then fell to 50% for those aged older

than 70. Three percent of women with non/micro-invasive cancer treated with mastectomy had radiotherapy. The site(s) irradiated were not recorded. 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.

Chemotherapy was the least used adjuvant therapy; being recorded for only 20% of women with invasive cancer. Overall, a higher proportion of women treated with mastectomy than breast-conserving surgery received chemotherapy (45% compared with 23%) and this difference was evident in every age group. There was also a clear decrease in the use of chemotherapy with age in both treatment groups: with only 16% of women treated with breast conserving surgery aged 65-70 having chemotherapy recorded compared to 32% of women aged 49-55, and only 39% of women treated with mastectomy aged 65-70 having chemotherapy recorded compared to 55% of women aged 49-55. This may be because a higher proportion of younger women have more aggressive, fast growing cancers, but may also be indicative of a reluctance to prescribe chemotherapy to older women where the risk/benefit balance and clinical effectiveness are perceived to be less clear.

In 2012/13, 56% of women with invasive cancer received radiotherapy within 60 days of their final surgery and 93% within 90 days; 62 women had not received radiotherapy 200 days after their final surgery. In 2012/13, only 41% of women with invasive cancer and 37% of women with non/micro-invasive cancer had started their radiotherapy within 90 days of their first assessment visit, and 295 women (4%) with invasive cancer had not started radiotherapy after 200 days. In 2011/12, 47% of women with invasive cancer with radiotherapy recorded had started their radiotherapy within 90 days of their first assessment visit. In the Cancer Reform Strategy published in December 2007, a radiotherapy waiting time standard was introduced in England 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 time. 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’ of 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 2012/13, 96% of invasive cancers, 86% of micro-invasive cancers and 58% of non-invasive cancers treated with breast conserving surgery had adjuvant radiotherapy: 35% of invasive cancers and 3% of non-invasive cancers treated with mastectomy had adjuvant radiotherapy. Two percent of the conservatively treated invasive cancers which did not have radiotherapy

recorded were larger than 20mm in diameter, 18% were grade 3 and 19% were node positive. Of the latter, nine had only one positive node containing micro-metastases. One hundred and ninety five non-invasive cancers treated with breast conserving surgery without radiotherapy recorded were high cytonuclear grade and 14 were more than 40mm in diameter. Provided that the tumour margins were adequate, it may be acceptable for non-invasive cancers treated with breast conserving surgery not to receive adjuvant 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 discusses the relative risks and benefits. Regional QA reference centres should follow up the four units (London EBA, North East, Yorkshire & Humber BLE and BYO and North West PLN) that are high outliers for no radiotherapy recorded in 2012/13, and the unit in South East Coast (GBR) that has a high number of cancers with unknown radiotherapy recorded to ensure that all women have received appropriate treatment and to make sure that accurate data recording procedures are put in place.

Ninety one percent of the ER positive cancers with known endocrine therapy data were invasive and 9% non/micro-invasive: 345 (3%) ER positive invasive cancers did not have endocrine therapy recorded and 1,020 (8%) had no information on endocrine therapy. Of these 1,020 cancers, 637 were from East Midlands where cancer registration data provided the only source of endocrine therapy data. Eighteen (34%) ER negative PR positive invasive cancers had no or unknown endocrine therapy recorded and 75 ER negative cancers (5%) did have endocrine therapy recorded. Overall in 2012/13, 26% of ER positive non/micro-invasive cancers had endocrine therapy. This varied widely between units. The proportion of ER positive invasive cancers with NPI.3.4 with no or unknown endocrine therapy recorded also varied widely between units. 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 11 units (East of England ELD, East Midlands, CDN, CDS, CLE, CLI, CNN, CNO and KNN and South East Coast GBR) that are high outliers for ER positive invasive cancers with NPI >3.4 with unknown endocrine therapy recorded in 2012/13 to ensure that all women have received appropriate treatment and to make sure that accurate data recording procedures are put in place.

Thirty nine percent of women with node positive invasive cancers did not have chemotherapy recorded: 873 (31%) had no chemotherapy and 215 (8%) had unknown chemotherapy. Of the 1,088 node positive invasive cancers with no or unknown chemotherapy, 315 (29%) had micro-metastases, 44 (4%) were ER negative, 129 (12%) were grade 3 (17% of these had micro-metastases) and 45 (4%) were HER2 positive (22% of these had micro-metastases). Thirty two percent of women aged less than 65 with a node positive invasive cancer had no or unknown chemotherapy, compared to 53% of women aged 65 and above. In 2012/13, in six units 50% or more node positive invasive cancers with macro-metastases had no or unknown chemotherapy. Evidence is accumulating to suggest that adjuvant chemotherapy is not required for all node positive invasive breast cancers, and that this treatment may be of most benefit to women who

have node positive tumours with macro-metastases that are also grade 3 and/or ER negative and/or HER2 positive. In the UK (excluding Scotland) in 2012/13, 5.7% of node positive tumours with macro-metastases that were also grade 3 and/or ER negative and/or HER2 positive did not have chemotherapy recorded. Decisions regarding the provision of chemotherapy to node positive invasive cancers with macro-metastases should take into account the number of positive nodes, tumour size, 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 women with node positive grade 3 and/or ER-ve and/or HER2+ve invasive cancers with macro-metastases without chemotherapy recorded were treated appropriately. However, regional QA reference centres should follow up the unit in London (FBH) which is a high outlier for no chemotherapy recorded in 2011/12 and in 2012/13 and the unit in Scotland with no data for 2011/12 or 2012/13 to ensure that all women have received appropriate treatment and to make sure that accurate data recording procedures are in place.

Survival

Of the 16,592 cancers submitted to the survival audit for the period 1 April 2008 to 31 March 2009, 16,242 were eligible for inclusion in the analyses. Up to 31 March 2014, deaths were recorded for 847 (7%) women with invasive breast cancer: 50% were due to breast cancer, 19% to another type of cancer and 28% to non-cancer related causes. Death cause was unknown for 28 women (3%). There were 90 deaths (3%) in women with non-invasive breast cancer: nine were due to breast cancer, 42 to another type of cancer and 34 (38%) were non-cancer deaths.

The 5-year relative survival for 12,872 women with screen-detected invasive breast cancer who were screened in 2008/09 is 98.5%. Five-year relative survival has improved significantly from 93.7% in 1990/91. Women in North East, Yorkshire & Humber, North West and Scotland have statistically significantly lower survival rates (97.3%, 97.0% and 97.1% respectively) compared to the UK average. For the two English regions, these differences are still apparent after adjusting for regional variation in the life tables for the local population. After adjusting for local variation, the 5-year relative survival rate in Scotland is no longer significantly different from the UK average. Unit level 5-year relative survival for women screened in 2007/08 and 2008/09 varies from 94.1% in a unit in West Midlands to 102.3% in a unit in East of England. For six units, 5-year relative survival rates are statistically significantly lower than the national average. Two of these units are in West Midlands (94.1% and 94.8%), two in North East, Yorkshire & Humber (95.6% and 95.7%) one in London (94.9%) and one in Scotland (96.5%). Four units [London (2), South Central (1) and Northern Ireland (1)] have 5-year relative survival rates significantly higher than the national average.

The 5-year relative survival rate for women aged over 70 is 107.0%, which is significantly higher than that for women in the 50 to 64 age groups. In 2008/09, all patients aged over 70 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.

Five-year relative survival varies with invasive tumour characteristics: 100.6% for less than 15mm diameter tumours compared to 91.0% for tumours with a diameter greater than 50mm; 101.1% for grade 1 cancers compared to 92.6% for grade 3 cancers; and 100% for node negative cancers compared to 94% for node positive cancers. At 101.5% and 100.7% respectively for cancers in the EPG and GPG, 5-year relative survival is significantly better than that for MPG1, MPG2 and PPG cancers (99.4%, 94.7% and 82.3% respectively).

The 5-year relative survival rate for women with non-invasive breast cancer is significantly higher at 101.6% than for those with invasive breast cancer and the lower confidence interval 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.

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 2013/14 UK NHSBSP & ABS audit examines activities undertaken for the 2,447,675 women screened in England, Northern Ireland, Scotland and Wales between 1 April 2013 and 31 March 2014. Ninety three screening units in the UK are included. The number of women screened varied from 6,845 in a unit in South Central (where 62 cancers were detected) to 61,986 in a unit in Scotland (where 548 cancers were detected).

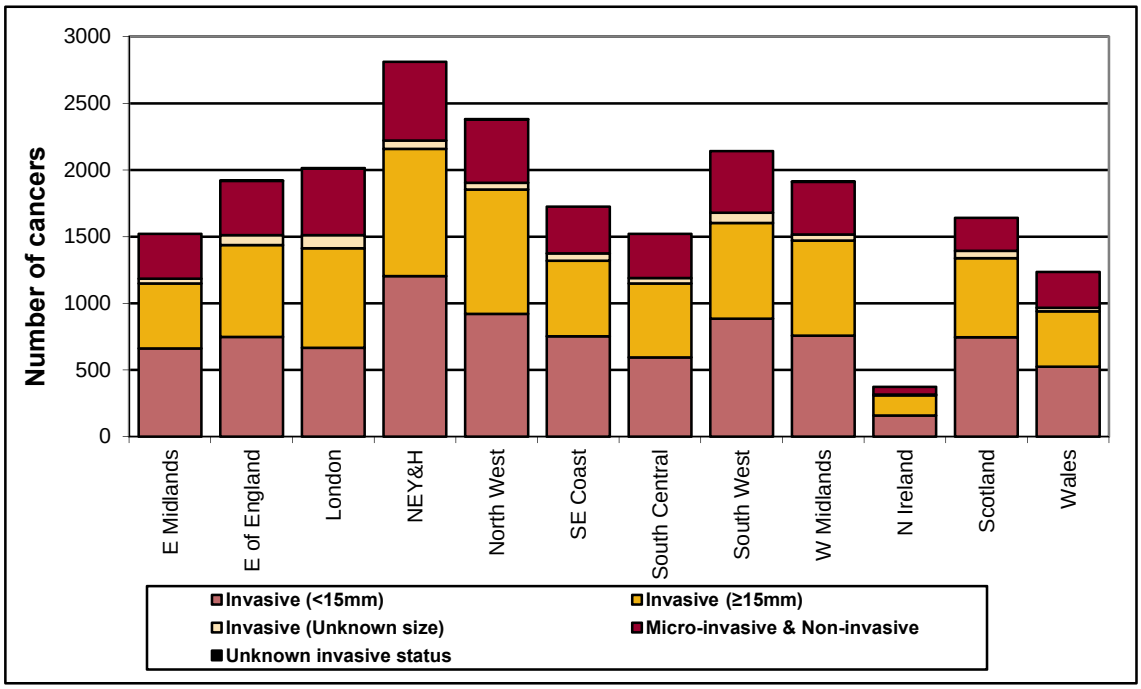

Figure 1 (Table 1): Variation in the number and invasive status of screen-detected breast cancers in each region and Celtic country contributing to the 2013/14 NHSBSP & ABS audit

In 2013/14, 21,195 cancers were detected in women of all ages, 16,768 (79%) were invasive, 4,276 (20%) non-invasive and 145 (1%) micro-invasive. The invasive status of six cancers was unknown. Figure 1 shows the number of cancers detected in each English region and in Northern Ireland, Scotland and Wales according to their invasive status.

The following 18-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 increase probably reflects the impact of the introduction of two views at incident screen. Between 2003/04 and 2010/11 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.

18-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
2013/14	16,768	8,626	4,421	21,195	2,447,675	6.9	3.5	1.8	8.7

* Data from Scotland are absent in 1998/99

Total and invasive cancer detection rates have increased steadily since 2010/11 with the continuing roll out of the randomised controlled trial age extension of the NHSBSP in England. In 2013/14, the number of women screened rose by 10% compared with 2010/11, and the number of cancers found increased by 19%. By 31 March 2014, 73/80 screening units in England had started to randomise women aged 47-49 and 71-73 for invitation to screening in addition to the core 50-70 age range.

The cancer detection rate in 2013/14 for all cancers was 8.7 per 1,000 women screened. This varied from 6.4 per 1,000 women screened in Northern Ireland to 10.6 per 1,000 women screened in Wales (Table 1). Invasive cancer detection rates varied between 5.4 per 1,000 women screened in Northern Ireland and 8.3 per 1,000 women screened in Wales. Non/micro-invasive cancer detection rates varied from 1.0 per 1,000 women screened in Northern Ireland to 2.3 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 UK cancer detection rate varied from 4.8 per 1,000 women screened in a unit screening 12,187 women to 11.4 per 1,000 women screened in a unit screening 32,034 women. For small invasive cancers (<15mm invasive size in diameter), the UK cancer detection rate was 3.5 per 1,000 women screened, varying between 2.0 per 1,000 women screened in a unit in Northern Ireland and 5.0 per 1,000 women screened in two units in Wales. Three screening units (in London, North East, Yorkshire & Humber and North West)

have had cancer detection rates for small (<15mm invasive size in diameter) cancers below 3.0 per 1,000 women screened every year throughout the 3-year period 2011/12 to 2013/14. Of these, two are small units each of which screened fewer than 14,000 women in 2013/14.

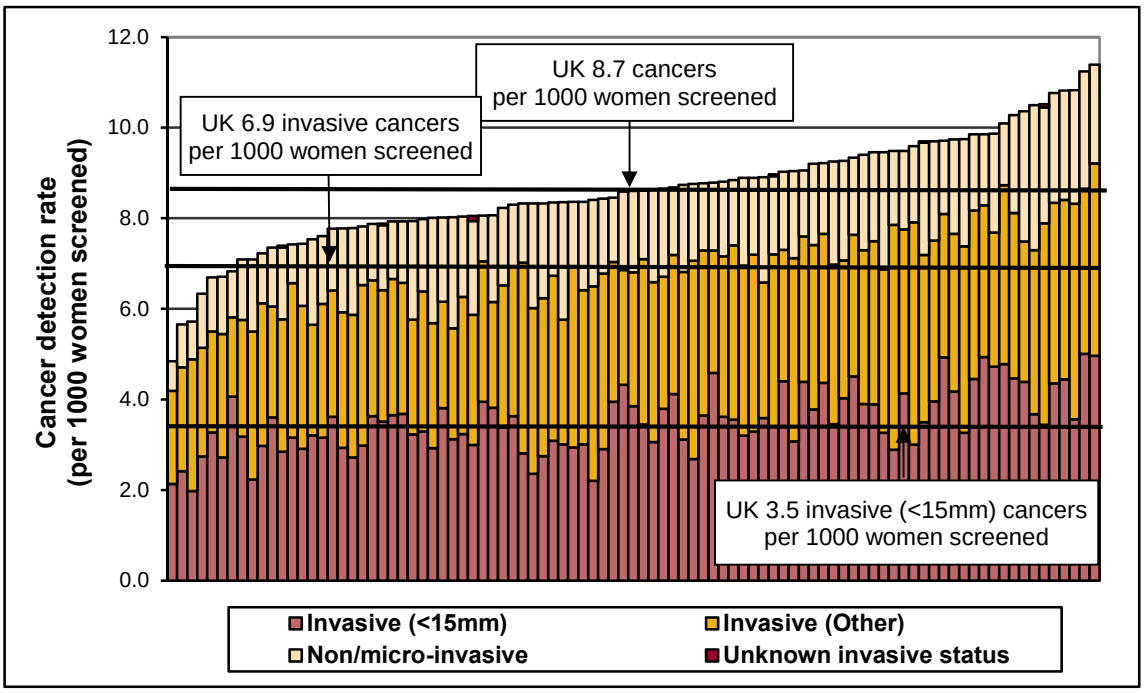

Figure 2: Variation with screening unit in cancer detection rates expressed as the number of cancers detected per 1,000 women screened

1.2 Age profile of women with screen-detected breast cancer

By 31 March 2014, 73 of the 80 screening units in England had started the randomised controlled trial age extension of the NHSBSP. The table below shows the continuing rise in the proportion of women screened in the age group 71-73 in 2013/14 compared with the previous two years, from 4.1% in 2010/11 to 4.5% in 2012/13 and 5.2% in 2013/14.

Age distribution of screen-detected breast cancers (%)

Age	2011/12	2012/13	2013/14
<47	0.3	0.4	0.4
47-49	4.3	5.4	5.4
50-64	60.5	58.3	55.5
65-70	26.8	27.3	28.3
71-73	4.1	4.5	5.2
74+	4.0	4.0	5.3
Total	**100**	**100**	**100**

Table 2 shows how the age at first offered screening appointment varied with UK region and country in 2013/14. In England, the proportion of cancers detected in women aged over 70

varied from 8.6% in West Midlands to 12.4% in South West. Northern Ireland, Scotland and Wales have no plans to implement the randomised controlled trial age extension. Table 2 demonstrates the relatively small proportion (2.9%) of cancers in Northern Ireland detected in women aged over 70. However, in Scotland and Wales in 2013/14, 8.9% and 9.4% of cancers respectively were detected in older women, and both of these values are only slightly lower than the England average of 10.4%. This indicates that relatively more women over the age of 70 are self referring for screening in Scotland and Wales compared with Northern Ireland.

1.3 Previous breast cancer

Information on previous cancers (excluding non-melanoma skin cancer) was requested from the English National Cancer Registration Service, the Welsh Cancer Intelligence & Surveillance Unit, the Information Services Division Scotland and the Northern Ireland Cancer Registry through regional QA reference centres. 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 purposes of the NHSBSP & ABS audit, additional cancer registrations were classified as previous cancers provided that they were diagnosed at least 100 days prior to the diagnosis of the screen-detected breast cancer.

1.3.1 Identification of previous breast cancers

Of the 21,195 women with screen-detected breast cancer who had a first offered screening appointment between 1 April 2013 and 31 March 2014 and were included in the main audit data, 20,630 (97%) could be matched to patients recorded by the UK cancer registries (Table 4). In Northern Ireland and Scotland, only 76% of cases could be matched because cancers diagnosed in 2014 were not registered at the time the matching took place. Of the 20,630 matched women, 2,590 (13%) had at least one previous cancer registered. The proportion of women with previous cancers varied from 8% in Northern Ireland to 15% in Scotland. Invasive breast cancer was the most common previous cancer registered (5%; 936 women) (Table 5). The second most common type of previous invasive cancer was gynaecological cancer (2%; 324 women). *In situ* cervical cancer was the most common type of previous non-invasive cancer (50%; 474 women). Because women with a previous breast cancer can also have other previous invasive and non-invasive cancers, the totals in Table 5 are not additive. Of the 20,630 matched women included in the main audit data, 1,156 (5.6%) had at least one breast cancer diagnosed prior to their screen-detected breast cancer. The proportion of women with previous breast cancers varied from 4.2% in Northern Ireland to 6.7% in South East Coast. Of the 1,156 women with previous breast cancers, 926 (80%) had previous micro-invasive/invasive breast cancers, 220 (19%) had previous non-invasive breast cancers and 10 had previous micro-invasive/invasive and non-invasive breast cancers.

1.3.2 Characteristics of previous breast cancers

Figure 3 shows for the screening years 2011/12, 2012/13 and 2013/14 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 breast 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 and older being 9.2%. The slightly younger cohort of the women with screen-detected cancers in Northern Ireland (only 2.9% are over the age of 70, Table 2) may be the reason for the relatively low proportion diagnosed with previous breast cancers (4.2% compared with 5.5% in the UK as a whole). This is because the longer the time period women continue to be screened after their first diagnosis of breast cancer, the more likely they are to have another primary tumour that is then detected by screening. In Northern Ireland, as fewer women are screened after the age of 70 when 9.2% of women have previous cancers, there are likely to be fewer women with previous breast cancers registered.

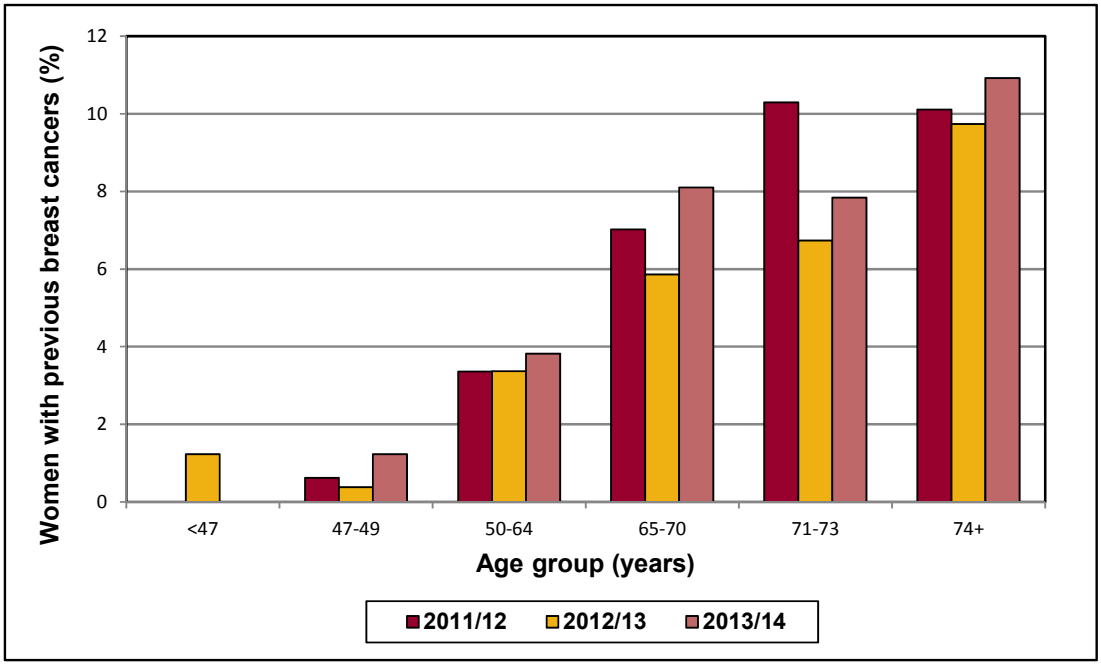

Figure 3: Variation with age in the proportion of women diagnosed with previous breast cancers

Age distribution of screen-detected breast cancers (%)			
Age	**2011/12**	**2013/14**	**2013/14**
<47	0.3	0.4	0.5
47-49	4.5	5.6	5.6
50-64	61.4	58.9	56.4
65-70	26.2	26.9	27.5
71-73	3.9	4.4	5.0
74+	3.7	3.8	5.0
Total	**100**	**100**	**100**

The preceding summary table shows the age distribution of new primary breast cancers detected via the UK 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 7.6% in 2011/12 to 10.0% in 2013/14.

1.3.3 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. This is the second year that women with a previous breast cancer have been excluded from the published main audit analyses. These women have also been excluded from the data for the previous years in the 3-year rolling data comparisons used for the Key Performance Indicators (KPIs). The main audit data for 2011/12 included in the 3-year comparisons therefore differ from those published in the 2012 and 2013 UK NHSBSP & ABS audit booklets. Main audit data for 2012/13 included in the 3-year comparisons also differ from those published in the 2014 UK NHSBSP & ABS audit booklet, because previous cancer data from Scotland which were not available in 2014 have been provided for this year's audit report.

KPI number and definition		Previous breast cancers?		p-value
		Yes	No	
Radiology				
R1a	Invasive cancers without pre-operative axillary ultrasound recorded	12.7%	12.3%	0.914
R1b	Invasive cancers with an abnormal axillary ultrasound without a needle biopsy recorded	6.9%	5.1%	0.674
R2	More than one assessment clinic visit	11.3%	13.0%	0.263
R3	Non-operative diagnosis of non-invasive cancers (excluding LCIS)	94.4%	90.2%	0.132
Pathology				
P1	Positive invasive cancer ER status	91.1%	91.8%	0.743
P2	Positive invasive cancer HER2 status	10.4%	9.9%	0.912
P3	Invasive cancer grade			0.013
	Grade 1 – invasive cancers	21.4%	25.4%	
	Grade 2 – invasive cancers	55.3%	54.1%	
	Grade 3 – invasive cancers	22.6%	19.8%	
Surgery				
S1a	Invasive cancers with an involved closest radial margin after breast conserving surgery with a repeat operation to the breast	90.3%	92.6%	0.895
S1b	Invasive cancers with a closest radial margin greater than 5mm after breast conserving surgery with a repeat operation to the breast	3.1%	1.9%	0.595
S2a	More than 5 nodes obtained from node negative invasive cancers (excluding cases with neo-adjuvant therapy)	10.0%	5.7%	0.000
S2b	Axillary node surgery performed on non-invasive cancers treated with breast conserving surgery	12.1%	6.5%	0.082
S3a	Mastectomy rates for non-invasive cancers	50.5%	23.3%	0.000
S3b	Immediate reconstruction for non-invasive cancers	68.5%	52.6%	0.007
Oncology				
O1	Invasive cancers treated with breast conserving surgery with no or unknown adjuvant radiotherapy	10.5%	3.6%	0.000
O2	ER positive invasive cancers with NPI >3.4 with no or unknown adjuvant endocrine therapy	5.0%	5.3%	0.995
O3	Node positive (with macro-metastases) invasive cancers which are Grade 3 and/or ER negative and/or HER2 positive with no or unknown adjuvant chemotherapy	43.2%	33.1%	0.169

The preceding table summarises for each KPI included in this year's audit, the values obtained for women in the 2013/14 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*
  - Invasive tumour grade - fewer Grade 1 invasive cancers (21.4% vs 25.4% and more Grade 3 cancers 22.6% vs 19.8%)
  - More than 5 nodes obtained from node negative invasive cancers - higher proportion with more than 5 nodes taken (10.0% vs 5.7%)
  - Mastectomy rate for non-invasive cancers - higher proportion with mastectomy (50.0% vs 23.3%)
  - Immediate reconstruction rate for non-invasive cancers treated by mastectomy - higher proportion with immediate reconstruction (68.5% vs 52.6%)
- *Adjuvant audit*
  - Breast conserving surgery with no radiotherapy – higher proportion without radiotherapy (10.5% vs 3.6%)

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.

Key findings

- Between 1 April 2013 and 31 March 2014, 2,447,675 women were screened by the UK NHSBSP in England, Northern Ireland, Scotland and Wales.
- Of the 21,195 cancers detected in women of all ages, 79% were invasive, 20% non-invasive and 1% micro-invasive. The invasive status of six cancers was unknown.
- The cancer detection rates for all cancers and for small invasive cancers (<15mm in diameter) were 8.7 and 3.5 per 1,000 women screened respectively.
- Three 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. Two of these screened fewer than 14,000 women annually.
- The proportion of cancers diagnosed in women aged 71-73 has increased from 4.1% in 2010/11 to 5.2% in 2013/14.
- Only 2.9% 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 2013/14 in these countries, 8.9% and 9.4% of cancers respectively were detected in these older women, which is slightly lower than the UK average of 10.4%.
- In 2013/14, 1,156 (6%) women had a previous breast cancer recorded; of these cancers, 80% were invasive/micro-invasive and 19% were non-invasive. The proportion of women with a previous breast cancer increased rapidly with age, the 3-year average for women aged 71 and older being 9.2%.
- 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 2011/12 included in these 3-year comparisons will differ from those published in the 2012 and 2013 UK NHSBSP & ABS audit booklets. Main audit data for 2012/13 included in the 3-year comparisons also differ from those published in the 2014 UK NHSBSP & ABS audit booklet because previous cancer data from Scotland, which were not available in 2014, have been provided for this year's audit report.

Key findings (cont)

- For some KPIs the values obtained for women with previous breast cancers are significantly different to those for women without a previous breast cancer.
- Women known to have had a previous breast cancer had fewer grade 1 invasive cancers (21.4% vs 25.4%) and more grade 3 cancers (22.6% vs 19.8%) and a higher proportion did not have adjuvant radiotherapy after breast conserving surgery for invasive cancer (10.5% vs 3.6%).
- A higher proportion of these women with non-invasive cancers had mastectomy treatment (50.0% vs 23.3%) and immediate reconstruction (68.5% vs 52.6%), and more than five nodes taken (10.0% vs 5.7%).
- It is therefore possible that the reason that some screening units were outliers in the main audit KPIs for 2011/12 could in part be due to the inclusion of women with previous breast cancers in the analyses.

Chapter 2: Diagnosis

2.1 Non-operative diagnosis

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 eight in 2013/14. These cancers are only included in Table 3. Eleven cancers diagnosed solely on the basis of a positive axillary biopsy are included in those with a non-operative diagnosis.

In 2013/14, 19,389 (97%) of the cancers detected in the UK NHSBSP were diagnosed non-operatively; 650 cancers did not have a non-operative diagnosis (Table 6). Over the last 18 years the non-operative diagnosis rate for the UK as a whole has risen from 63% in 1996/97 to 97% in 2013/14. This rise has been accompanied by an increase from 17% to 95% in the proportion of cancers diagnosed by B5 core biopsy alone.

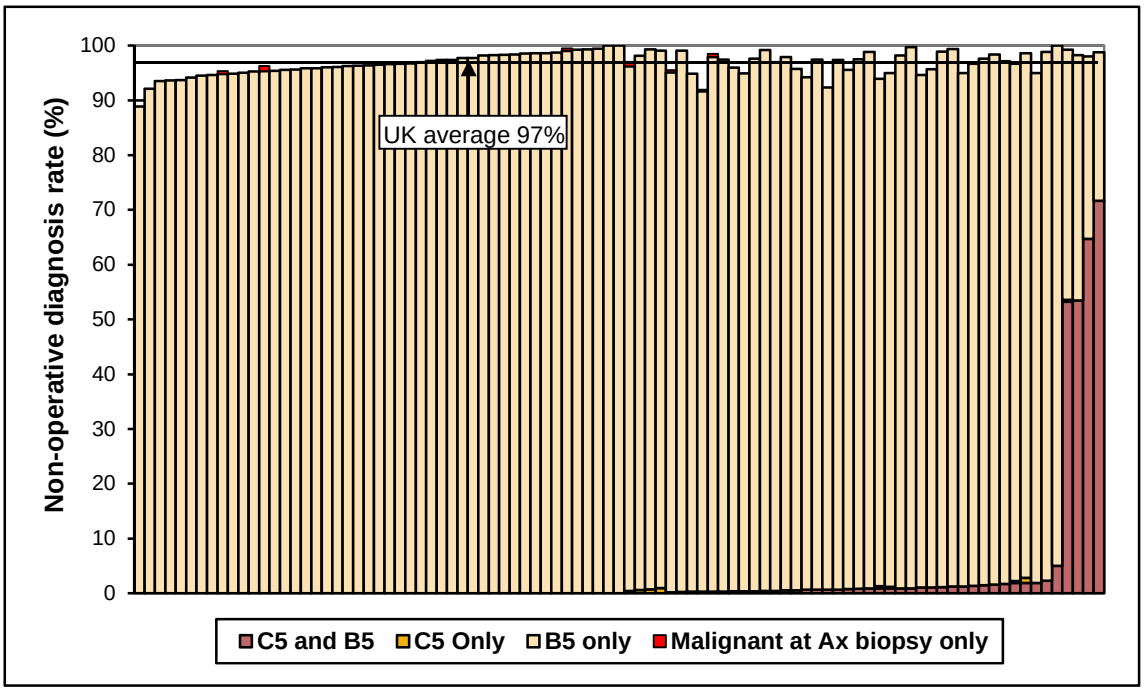

Figure 4: Variation between screening units in non-operative diagnosis rate and in the proportion of cancers detected by cytology alone, core biopsy alone or cytology and core biopsy as a percentage of cancers detected

Table 6 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 2013/14. 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 four units [Northern Ireland (3) and North East, Yorkshire & Humber (1)] more than 50% of cancers were diagnosed non-

operatively by both C5 cytology and B5 core biopsy. In all four units, the majority of women had cytology and core biopsy samples taken at a single assessment visit.

Key findings

- In 2013/14, 97% of cancers detected in the UK NHSBSP were diagnosed non-operatively; 650 cancers did not have a non-operative diagnosis.
- In the UK as a whole, only 11 cases had C5 cytology only diagnosis.
- In four units [Northern Ireland (3) and North East, Yorkshire & Humber (1)] 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 (ie 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 130 invasive cancers did not have a non-operative diagnosis (Table 7). All units met the 90% minimum standard and the 95% target standard. In 34 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 (ie 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 2013/14, the UK's non-operative diagnosis rate for all non-invasive cancers was 87%, 511 of the 4,056 non-invasive cancers did not have a non-operative diagnosis (Table 8). Figure 5 shows the variation between screening units in the proportion of non-invasive cancers with a non-operative diagnosis in 2013/14 including lobular carcinoma *in situ* (LCIS) (left hand graph)

and excluding LCIS (right hand graph). For most units the non-operative diagnosis rate for all non-invasive cancers is higher than the non-operative diagnosis rate for non-invasive cancers excluding LCIS. In 13 units the non-operative diagnosis rate without LCIS is lower than the rate for all non-invasive cancers.

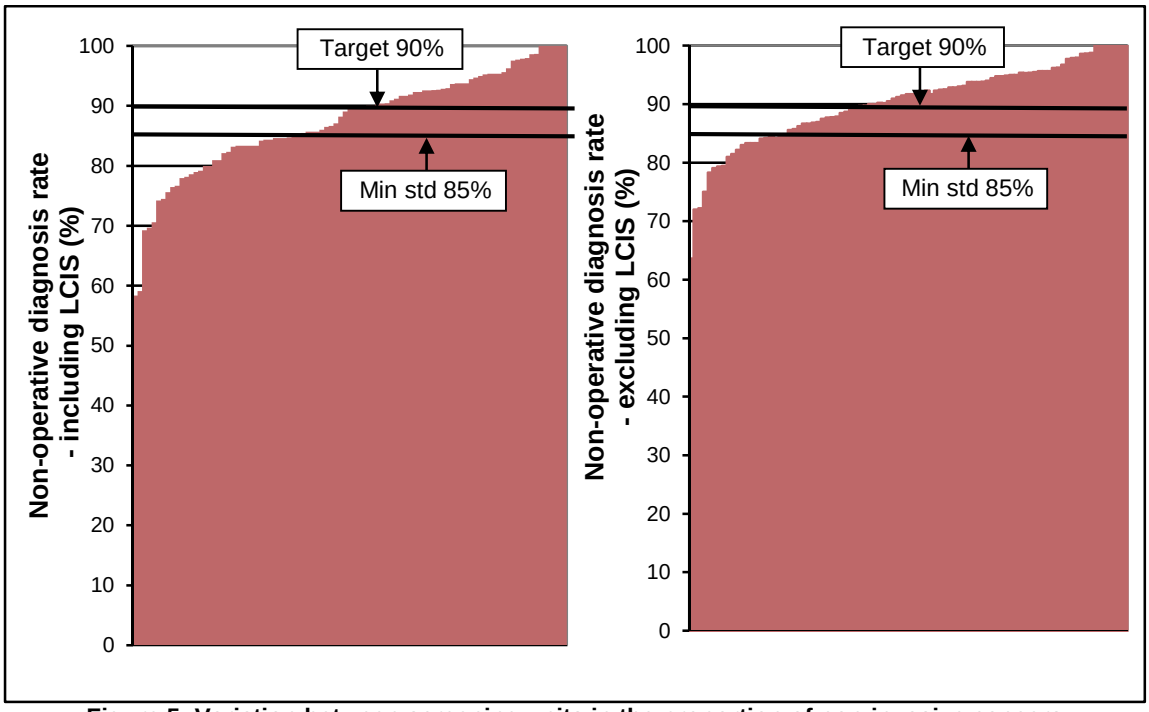

Figure 5: Variation between screening units in the proportion of non-invasive cancers with a non-operative diagnosis with LCIS (left) and without LCIS (right)

Only 41 units achieved the 90% non-operative diagnosis target for all non-invasive cancers (including LCIS). Thirty six units did not meet the 85% minimum standard. This has decreased slightly from 37 units in 2012/13. If cancers with LCIS alone in the surgical excision specimen are excluded, 21 units did not meet the 85% non-operative diagnosis minimum standard for non-invasive cancers. All of the latter units also did not meet the minimum standard for all non-invasive cancers.

For non-invasive cancers excluding LCIS, 18 units had an average non-operative diagnosis rate below 85% in the 3-year period 2011/12 to 2013/14. Figure 6 shows for this 3-year period, the variation between screening units in the proportion of non-invasive cancers excluding LCIS with a non-operative diagnosis. The dotted and dashed lines are the upper and lower control limits which represent the 95% and 99.7% confidence intervals of the average rate of 89.5% (solid line): seveb units are 95% low outliers [East of England (2), East Midlands (1), North West (1), South Central (1), South East Coast (1) and South West (1)]. The two East of England units are also 99.7% low outliers. One small unit in Northern Ireland which was not an outlier had a non-operative diagnosis rate for non-invasive cancers excluding LCIS below 80%.

In an equivalent control chart for all non-invasive cancers (not shown), 16 units are 95% low outliers and four are 99.7% low outliers. In eight of the nine units that are low outliers in this control chart and not in Figure 6, LCIS constitutes in excess of 12% of all non-invasive cancers compared with the UK average of 4.6%.

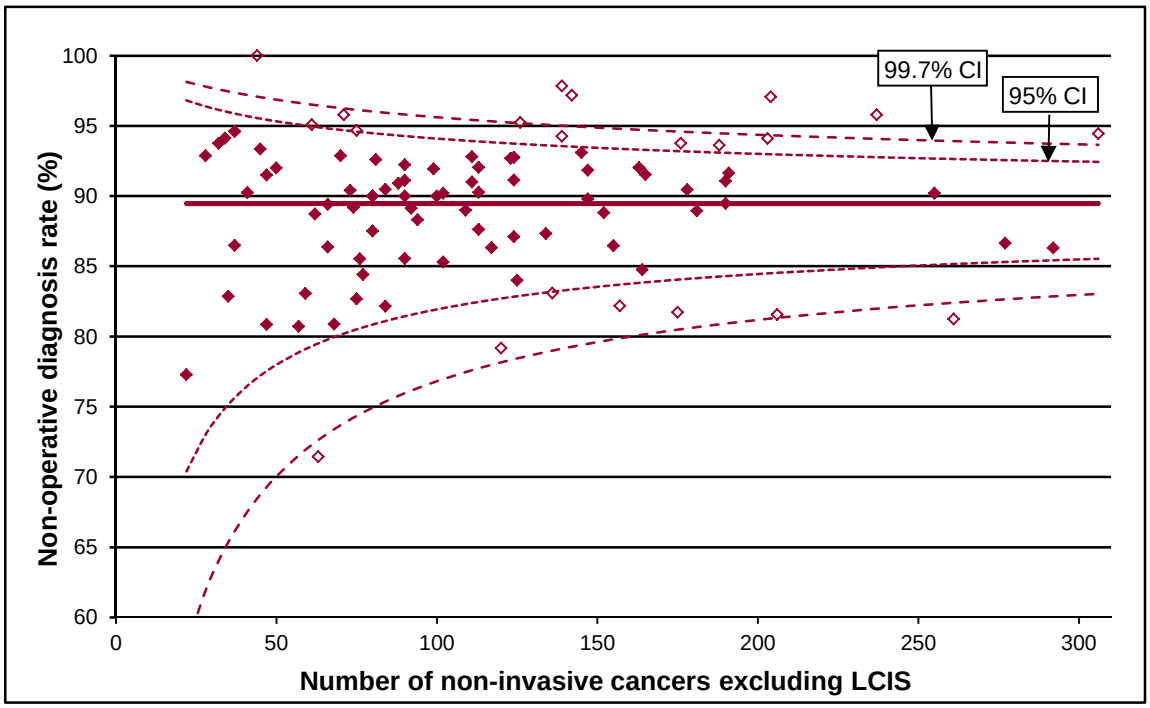

Figure 6: Variation between screening units in the proportion of non-invasive cancers with a non-operative diagnosis in the 3-year period 2011/12 to 2013/14. LCIS cases have been excluded. (Open diamonds represent units which lie outside the upper and lower control limits)

Radiology KPI R3	**Non-operative diagnosis for non-invasive cancers** 1-year low outlier units for non-operative diagnosis of non-invasive cancers (excluding LCIS)

UK screening units which were identified in the 2014 audit as 95% or 99.7% low outliers for the non-operative diagnosis of all non-invasive cancers in the 3-year period 2010/11 to 2012/13 were followed up by regional QA reference centres. In this year's audit, cancers confirmed after surgery to be LCIS were excluded from the analyses. The following table summarises the outcome of audits undertaken for the KPI used in 2014, and identifies 95% or 99.7% low outliers for the revised KPI in 2013/14.

Of the 13 units which were identified in the 2014 audit as 95% or 99.7% low outliers in 2012/13 for the non-operative diagnosis of all non-invasive cancers, five [East of England (2), East Midlands (1), South East Coast (1) and South Central (1)] are still 3-year low outliers (3 at 95% and 2 at 99.7%) in this year's audit, which examines non-invasive cancers excluding LCIS treated in 2013/14 and in the 3-year period 2011/12 to 2013/14. Two of the 13 units audited in 2014 (in East Midlands and South Central) are also 95% low outliers in 2013/14, the most recent year examined. The five units which are low outliers for the non-operative diagnosis of non-invasive cancers excluding LCIS are also 99.7% low outliers for the non-operative diagnosis of all non-invasive cancers (control chart not shown). Two units (both in East of England) have non-operative diagnosis rates for non-invasive cancers excluding LCIS below 80% in 2013/14. In this year's audit, two additional units (in North West and South West) are identified as 95% outliers in the 3-year period 2010/11 to 2012/13. The unit in North West is

also a 95% outlier in 2013/14 together with two other newly identified units (in South Central and Scotland) which are not 3-year outliers.

Regional QA reference centres should follow up the two units audited in 2014 (East Midlands CLE and South Central JPO) and three units identified in this year's audit (North West PLN, South Central JBA and Scotland Unit 5) that are low outliers for non-invasive cancers excluding LCIS treated in 2013/14 to ascertain the reason for this clinical practice. The two units in East of England (DKL and DPT) with non-operative diagnosis rates for non-invasive cancers excluding LCIS below 80% in 2013/14 should also be followed up together with the unit in South West (LAV) which is a 3-year outlier in 2010/11 to 2012/13 and has a non-operative diagnosis rate below the 85% minimum standard in 2013/14.

Region	Unit	Non-op diagnosis all non-invasive 3-year 2010/11-2012/13 (%)	Non-op diagnosis excl LCIS non-invasive 1-year 2013/14 No*.	Non-op diagnosis excl LCIS non-invasive 1-year 2013/14 (%)	Non-op diagnosis excl LCIS non-invasive 3-year 2011/12-2013/14 (%)	Non-op diagnosis all non-invasive 3-year 2011/12-2013/14 (%)	LCIS cases 3-year 2011/12-2013/14 No.	Outcome of QARC audit of units identified in 2014 report for follow up
Units audited in the 2014 report								
East Midlands	CLE	75.9	13	79.0	81.7	75.6	18	All valid explanations
East of England	DCB	71.1		90.0	82.7	73.0	14	High number of LCIS cases
East of England	DKL	74.5	5	72.2	80.9	72.2	7	Unit now has VAB
East of England	DPT	73.2		75.0	71.4	68.2		Majority B3 with no VAB. Review at QA visit
East of England	ELD	75.1	15	85.6	81.2	76.9	16	Under use of VAB and under-reporting as B4
East of England	FSO	79.1		91.2	82.1	81.2		Pathological review to be undertaken
London	ECX	77.8	9	87.7	89.5	76.7	37	Further investigation probably required
South East Coast	GBR	73.5	6	87.8	83.1	77.4	10	No VAB. Review at QA visit in 2015
South Central	JPO	74.0	10	78.3	79.2	75.2	9	VAB purchased, more cores recommended
South Central	KHW	64.5		90.9	83.1	71.0	10	High number of LCIS cases
South West	LED	79.0		94.0	92.0	79.3	22	No action required
West Midlands	MBW	79.9	6	90.5	89.0	80.2	26	All valid explanations, no VAB at the time
Northern Ireland	ZNS1	61.3		85.7	77.3	70.8		Appropriate practice on case review
Wales	WSW	74.9		95.4	84.8	84.2		No information available
New units identified in 2015								
North West	PLN	82.2	12	79.3	82.2	79.6	5	
South Central	JBA	82.9	8	63.6	80.9	78.6		
South West	LAV	82.3	16	83.0	81.6	79.2	10	Below 85% minimum standard in 2013/14
Scotland	Unit 5	88.8	7	72.0	85.5	82.9		
UK average		**85.7**	**378**	**90.2**	**89.5**	**86.4**	**519**	

99.7% low outlier
95% low outlier
Below 80% in 2013/14 but not an outlier

No* number without a non-operative diagnosis Blank in No. column = <5 cases
FSO was included as an outlier last year despite not being a low 95% outlier as the non-operative diagnosis rate was below 80%

Key findings

- The UK non-operative diagnosis rate for invasive cancers in 2013/14 was 99%; only 130 invasive cancers did not have a non-operative diagnosis. All units met the 90% minimum standard.
- The non-operative diagnosis rate for non-invasive cancers in 2013/14 was 87%; 511 non-invasive cancers did not have a non-operative diagnosis.

Key findings (cont)

- In 2013/14, 36 units did not meet the 85% minimum standard for the non-operative diagnosis of non-invasive cancers. If cases of LCIS are excluded, the non-operative diagnosis rate for 21 of these units was above 85%.
- In the 3-year period 2011/12 to 2013/14, 18 units had an average non-operative diagnosis rate for non-invasive cancers excluding LCIS below 85%, and 31 units had an average non-operative diagnosis rate for all non-invasive cancers below 85%. In control charts for this 3-year period, 16 units are 95% low outliers for all non-invasive cancers and seven units are also 95% low outliers for non-invasive cancers excluding LCIS.
- Regional QA reference centres should follow up the two units audited in 2014 (East Midlands CLE and South Central JPO) and three units identified in this year's audit (North West PLN, South Central JBA and Scotland Unit 5) that are low outliers for non-invasive cancers excluding LCIS treated in 2013/14 to ascertain the reason for this clinical practice. The two units in East of England (DKL and DPT) with non-operative diagnosis rates for non-invasive cancers excluding LCIS below 80% in 2013/14 should also be followed up together with the unit in South West (LAV) which is a 3-year outlier in 2010/11 to 2012/13 and has a non-operative diagnosis rate below the 85% minimum standard in 2013/14.

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 19,367 cancers with a B5 diagnosis, 4,399 (23%) were B5a (non-invasive) and 14,854 (77%) were B5b (invasive) at core biopsy. One hundred and fourteen cancers (1%) had invasive status B5c (not assessable or unknown) at core biopsy (Table 9); of these, 33 were in West Midlands. 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 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 4,399 cancers with a B5a (non-invasive) non-operative diagnosis, 69 had no surgery, 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 4,330 cancers with a B5a (non-invasive) non-operative diagnosis where a definitive invasive status was obtained at surgery, 3,287 (76%) were non-invasive, 115 (3%) were micro-invasive and 774 (18%) were invasive (Table 10). A further 154 (4%) had no residual malignant disease at surgery, but subsequent audit confirmed that a correct diagnosis of non-invasive cancer had been reported in the non-operative core biopsy.

Figure 7 shows for the 3-year period 2011/12 to 2013/14, 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 7 are the upper and lower control limits which represent the 95% and 99.7% confidence intervals of the average rate of 18% (solid line). Two units have a significantly higher proportion of B5a (non-invasive) cancers found to be invasive at surgery and are above the 95% upper control limit. Four units have a significantly lower proportion of B5a (Non-invasive) cancers found to be invasive at surgery and are below the 95% lower control limit. Of these, two units (in West Midlands and North East, Yorkshire & Humber) are below the 99.7% lower control limit. For three units (North West, South Central and Northern Ireland) (black squares in Figure 7), more than half of the B5a (non-invasive) cancers found to be invasive at surgery had an invasive size of at least 10mm.

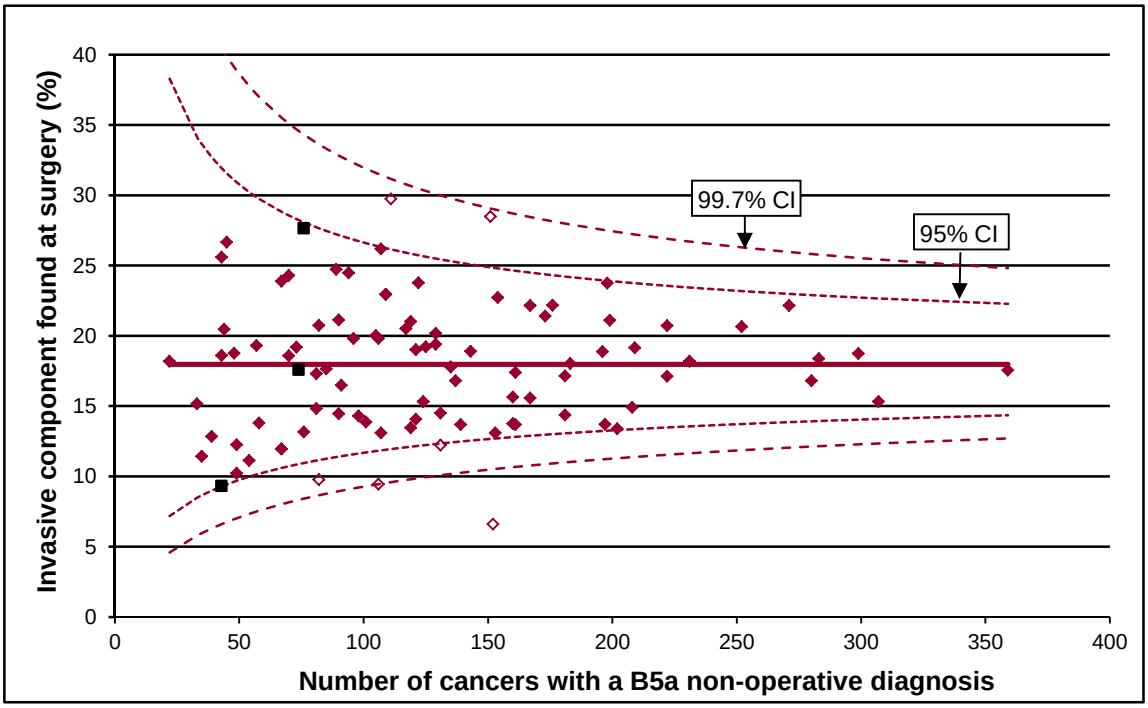

Figure 7: Variation between screening units in the proportion of cancers with a B5a (Non-invasive) non-operative diagnosis found to be invasive at surgery in the 3-year period 2011/12 to 2013/14
(Open diamonds represent units which lie outside the upper and lower control limits)
(Black squares represent units where over 50% of B5a (non-invasive) cancers found to be invasive at surgery had an invasive size of at least 10mm)

Of the 14,854 cancers with a B5b (invasive) non-operative diagnosis, 297 (2%) had no surgery recorded within the audit period, and four had unknown surgical treatment [London (3) and Scotland (1)]. Of the 297 cancers with no surgery recorded, 173 (58%) had neo-adjuvant therapy. In the UK as a whole, 98% of the remaining 14,553 cancers had surgical confirmation of invasive cancer (Table 11). One hundred and thirty one cancers with a B5b (Invasive) non-operative diagnosis were found to be non-invasive (115 cancers) or micro-invasive (16 cancers) with no associated invasive disease in the surgical specimen. For 126 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

four cancers had unknown histological status at surgery. Of these, two had surgery to the axilla only, and for two the histological status at surgery was not provided by North East, Yorkshire & Humber and Wales.

The proportion of cancers that had a B5a (Non-invasive) non-operative diagnosis which were found to be invasive after surgery has fallen by seven percentage points in the past 13 years; from 25% in 2000/01 to 18% in 2013/14. 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 1.8% in 2013/14. The absence of residual tumour in the surgical specimen is the main reason for this increase. This probably reflects also the wider use of vacuum assisted biopsy with larger volume cores within which small invasive tumours are fully excised at biopsy.

Key findings

- In 2013/14, 114 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. Two units have significantly higher proportions of B5a (non-invasive) cancers found to be invasive at surgery in the 3-year period 2010/11 to 2012/13 and in three units, more than half of these cancers had an invasive size of at least 10mm.
- One hundred and thirty one 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 126 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 clinic 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 20,039 women with screen-detected breast cancer diagnosed in the UK in 2013/14, 17,175 (86%) had one assessment clinic visit (Table 12). Of these, 16,786 (98%) had a B5/C5

non-operative diagnosis. Eleven percent (1,729 women) of all women with invasive cancer and 27% (1,102 women) of all women with non-invasive cancer had more than one assessment clinic visit.

In 2013/14 in nine units, more than 20% of all women had more than one assessment clinic visit and had a B5/C5 diagnosis result. In six of these units [North West (2), South East Coast (2) and South West (2)], more than 20% of women also had more than one assessment clinic visit in the 3-year period 2011/12 to 2013/14.

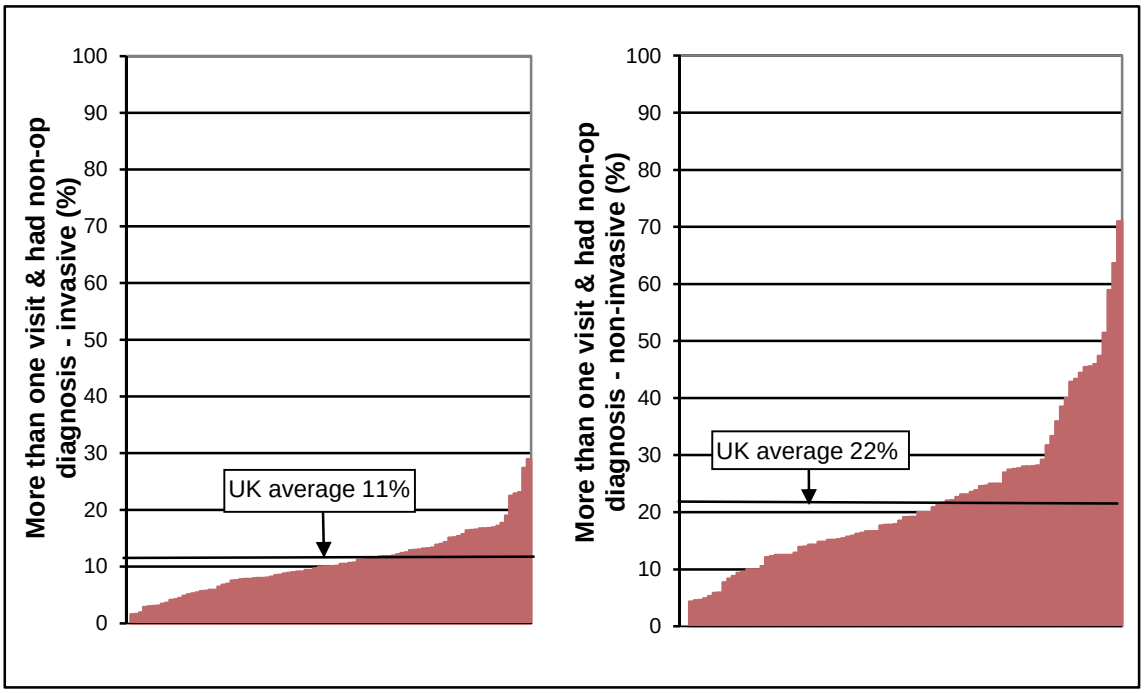

Figure 8: Variation between screening units in the proportion of women with a) invasive cancer and b) non-invasive cancer who had more than one assessment clinic visit

Figure 8 shows how the proportion of women with a non-operative diagnosis and more than one assessment clinic visit varied between screening units in 2013/14 for women with invasive (left hand graph) and non-invasive (right hand graph) cancers. Overall, 11% of women with an invasive cancer and 22% of women with a non-invasive cancer had more than one visit. In 2013/14, in 40 units more than 20% of women with non-invasive cancer had more than one visit compared to only five units for women with invasive cancer. All of the units with high repeat assessment clinic visits for invasive cancers had a higher proportion of repeat visits for non-invasive cancers.

Radiology KPI R2

Repeat assessment clinic visits
Units where more than 20% of women have more than one assessment clinic visit

Region	Unit	>20% repeat visits all cancers 1-year 2012/13 %	>20% repeat visits all cancers 1-year 2013/14 No.	>20% repeat visits all cancers 1-year 2013/14 %	>20% repeat visits invasive 1-year 2013/14 %	>20% repeat visits non-invasive 1-year 2013/14 %	Outcome of QARC audit of units identified in 2014 report for follow up
Units audited in the 2014 report							
NEYH	CDO	23.0	31	18.1	12.9	35.9	No further audit required
North West	NMA	31.7	34	18.1	11.9	44.4	Assessment clinic times changed
North West	NWI	38.5	55	36.7	28.9	63.6	Assessment clinic times changed
North West	NLI	23.0	65	23.9	22.9	25.0	All cases reviewed and valid reasons given
South East Coast	HWO	36.4	91	34.3	27.4	58.9	Moved in to new accomodation in 2014
South West	LCO	33.5	53	28.3	22.5	51.4	Assessment clinic times changed
South West	LPL	23.4	28	15.3	7.5	45.9	No information available
South West	LED	25.4	58	30.1	23.1	47.4	Assessment clinic times changed
South West	LAV	24.8	88	19.0	11.6	45.5	No information available
West Midlands	MBS	22.0	19	16.1	16.5	14.3	60% clinical concern
New units identified in 2015							
East Midlands	CDS	18.7	45	20.5	19.0	24.6	
East Midlands	KKE	19.4	27	20.9	14.3	43.3	
North West	PBO	13.9	37	20.1	17.7	27.5	
South East Coast	GCT2	17.8	38	27.9	15.4	71.0	
UK average		**12.5**	**2603**	**13.0**	**10.5**	**22.2**	

More than 20% repeat visits in 2013/14
More than 20% repeat visits in 2012/13

UK screening units which were identified in the 2014 audit as having more than 20% of women with more than one assessment clinic visit in 2012/13 were followed up by regional QA reference centres. The preceding table summarises the outcome of these audits and identifies units with high repeat assessment clinic visits for all cancers in 2013/14. Data for invasive and non-invasive cancers are also provided for information.

In this year's audit, of the 10 units audited in 2014, five [North West (2), South West (2) and South East Coast (1)] still have more than 20% of women in 2013/14 with more than one assessment clinic visit. Four additional units [East Midlands (2), South East Coast (1) and North West (1)] with high repeat visit rates are identified in 2013/14. For six of the nine units with high repeat visits for all cancers, the repeat rate for women with non-invasive cancers is in excess of 40%. Regional QA reference centres should follow up the five units audited in 2014 (North West NWI and NLI, South East Coast HWO, South West LCO and LED) and the four units identified in this year's audit (East Midlands CDS and KKE, North West PBO and South East Coast GCT2) where more than 20% of women with breast cancer (invasive or non-invasive) required more than one assessment clinic visit to ascertain the reason for this clinical 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 clinic visits. The analyses in Sections 2.2.1 – 2.2.3 are thus only for cancers diagnosed in England, Northern Ireland and Wales. Of the 18,474 women diagnosed with breast cancer in 2013/14, 18,459 had a needle biopsy at an assessment clinic visit. Of these, 753 (4%) did not have a

core/cytology result from their first visit (Table 13): 744 had their first core/cytology result from their second assessment visit and nine from their third or fourth visits. In four units [South East Coast (2) and South West (2)], over 20% of women had their first core/cytology result from their second or later assessment clinic visits. These four units are included among those to be audited as outliers for radiology KPI R2. Three hundred and sixty two invasive cancers (2%) and 384 non-invasive cancers (9%) had no core/cytology results from the first assessment clinic visit.

2.2.2 Multiple visits with cytology or core biopsy

Of the 17,860 women with a B5/C5 non-operative diagnosis result, the majority (93%) had only one assessment clinic visit where a core biopsy and/or cytology fine needle aspiration was performed. One thousand two hundred and twelve women (7%) had more than one visit involving a needle biopsy (Table 14). For women with a B5/C5 non-operative diagnosis, 725 (5%) with invasive cancer had more than one visit involving a needle biopsy, compared to 470 women (14%) with non-invasive cancer. Seventeen women with a B5/C5 non-operative diagnosis result and non-invasive cancer had three visits involving a needle biopsy. Figure 9 shows that in 21 units, over 20% of women with non-invasive cancer had more than one assessment clinic visit involving a needle biopsy and a non-operative diagnosis.

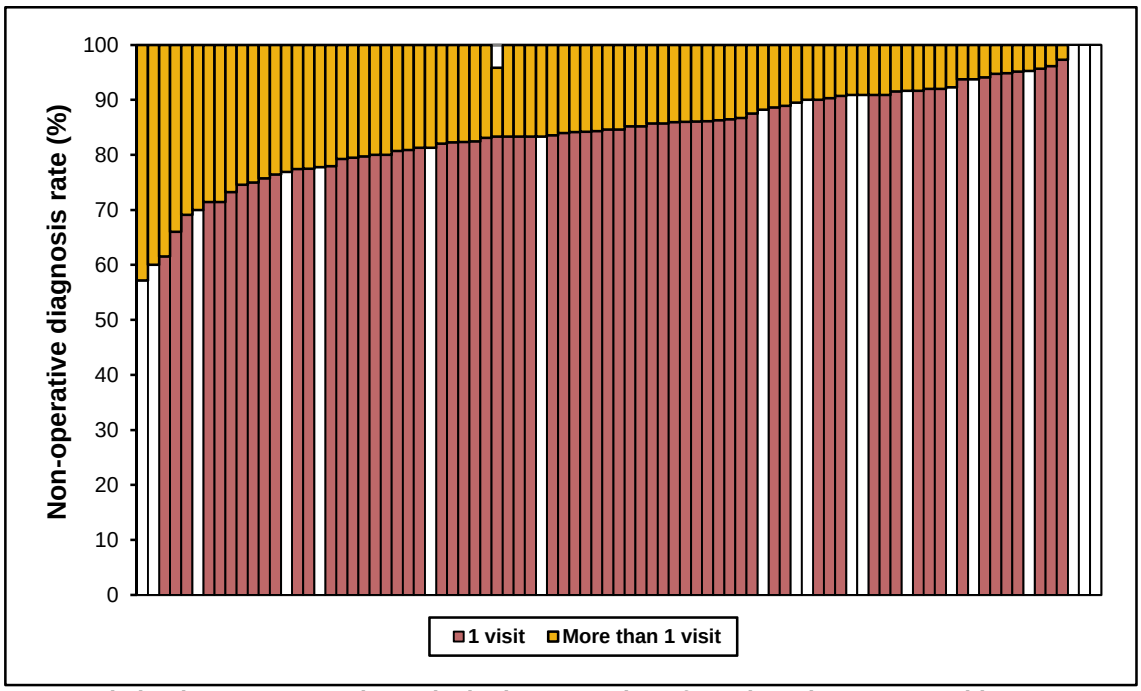

Figure 9: Variation between screening units in the proportion of non-invasive cancers with a non-operative diagnosis with one or more than one assessment clinic visit involving a needle biopsy
Data for Scotland are not available

Of the 771 women with invasive cancers with more than one assessment clinic visit involving a needle biopsy, 407 (53%) did not achieve a B5/C5 diagnosis after one visit and repeat needle biopsies were performed at a subsequent visit. Of these 407 cancers, a non-operative diagnosis was achieved for 89%, and 46 required an open diagnostic surgical biopsy. There were 364 (47%) invasive cancers where a B5/C5 diagnosis was

obtained at the first assessment clinic visit involving a needle biopsy but where repeat needle biopsies were performed at a subsequent visit in an attempt to upgrade to invasive disease, to confirm a C5 only diagnosis or to obtain tissue from a separate area for surgical planning.

Of the 607 non-invasive cancers with more than one assessment clinic visit involving a needle biopsy, 446 (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 446 cancers, a non-operative diagnosis was achieved for 309 (69%) and 137 (31%) required an open diagnostic surgical biopsy. Of these 309 non-invasive cancers, 107 (35%) had a B1/C1 or B2/C2 diagnosis at their first visit involving a needle biopsy and 202 (65%) had a B3/C3 or B4/C4 diagnosis (Table 15). For 161 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 18,459 women who had a definitive needle biopsy result, 772 (4%) were recalled for further investigations (only one lesion per woman was recorded in the audit). Four percent (618 women) of all women with invasive cancer and 4% (147 women) of all women with non-invasive cancer came back to an assessment clinic for other investigations (Table 16). These extra assessment clinic 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 20,039 women with breast cancer in 2013/14, 17,175 (86%) had one assessment clinic visit. Of these, 16,786 (98%) 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 visit.
- In nine units more than 20% of women required more than one assessment clinic visit and had a B5/C5 non-operative diagnosis result. In 40 units more than 20% of women with non-invasive cancer had more than one visit compared to only five units for women with invasive cancer.
- Regional QA reference centres should follow up the five units audited in 2014 (North West NWI and NLI, South East Coast HWO, South West LCO and LED) and the four units identified in this year's audit (East Midlands CDS and KKE, North West PBO and South East Coast GCT2) where more than 20% of women with breast cancer (invasive or non-invasive) required more than one assessment clinic visit to ascertain the reason for this clinical practice.
- Of the 18,474 women in England, Wales and Northern Ireland diagnosed in 2013/14, 18,459 had a needle biopsy at an assessment clinic visit. Of these, 753 (4%) did not have a core/cytology result from their first visit. In four units [South East Coast (2) and South West (2)], over 20% of women had their first needle biopsy result from second or later visits.
- One thousand two hundred and twelve women had at least one repeat visit involving a needle biopsy. In 21 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 407 invasive cancers and 446 non-invasive cancers where repeat needle biopsies were performed at a subsequent assessment clinic visit to obtain a B5/C5 diagnosis. There were 364 invasive cancers and 161 non-invasive cancers where a B5/C5 result was obtained at the first visit, but where a repeat needle biopsy was undertaken at a subsequent visit.
- Four percent of women with invasive cancer and 4% of 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

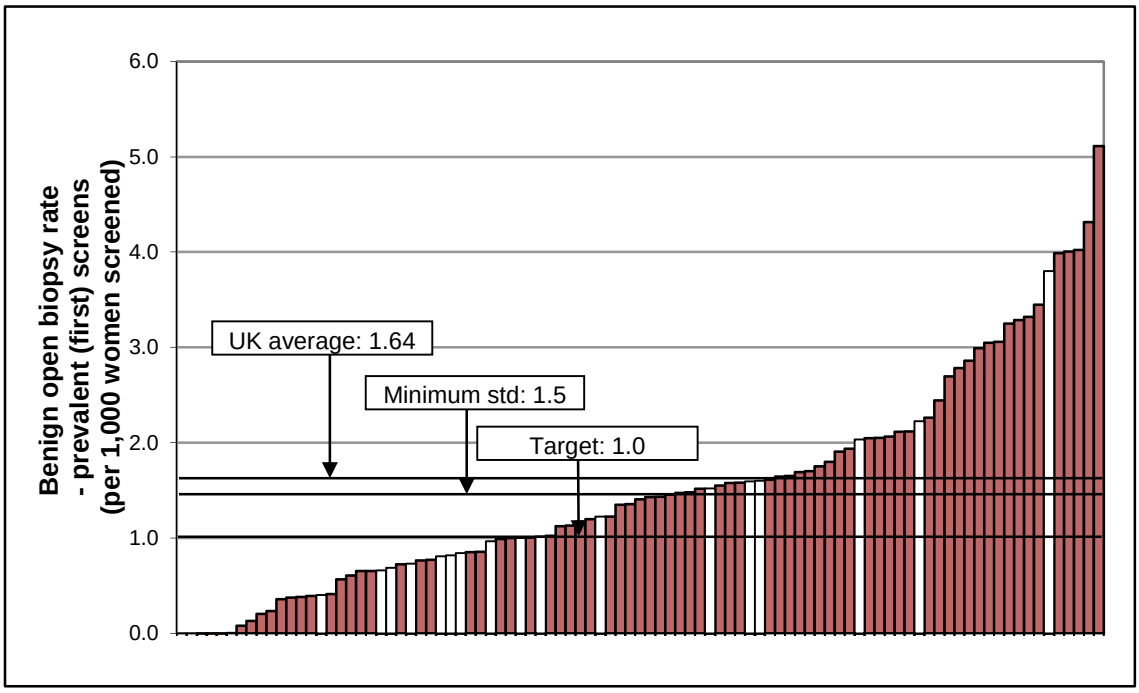

Figure 10: Variation between screening units in benign diagnostic open biopsy rates for prevalent (first) screens expressed as the number of diagnostic open biopsies undertaken per 1,000 women screened (The 17 smallest units are shown in white)

In 2013/14, 2,217 diagnostic open biopsies were performed. Of these 1,567 (71%) were benign and 650 (29%) were malignant. The UK prevalent (first screen) benign open biopsy rate was 1.64 per 1,000 women screened (Table 17), which is higher than the 1.5 per 1,000 women screened minimum standard. Only 35 units achieved the 1.0 per 1,000 women screened target, and 41 of the 93 UK units did not achieve the minimum standard for prevalent (first) screens (Figure 10). The UK incident (subsequent screen) benign open biopsy rate was 0.42 per 1,000 women screened (Table 17). At unit level, this rate varied from zero to 3.0 per 1,000 women screened. Three units (in East of England, South Central and South East Coast) did not achieve the minimum standard at either incident or prevalent screen.

In the UK as a whole, 650 malignant diagnostic open biopsies were performed in 2013/14. The malignant open biopsy rate was 0.27 per 1,000 women screened. This has fallen from 2.04 per 1,000 women screened in 1996/97, mirroring the rise in non-operative diagnosis rate from 63%

to 97%. Over the same 18-year period, the UK benign open biopsy rate has fallen from 1.50 per 1,000 women screened in 1996/97 to 0.68 per 1,000 women screened in 2013/14. The malignant open biopsy rate varied at unit level from zero in three units to 1.0 per 1,000 women screened in a unit in East of England. Table 18 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 five false positive core biopsies and no false positive cytology results 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 650 in 2013/14. Of the latter, 130 (20%) were invasive, 511 (79%) non-invasive and eight (1%) micro-invasive (Table 19). One further cancer had an unknown invasive status. As this case was a malignant phyllodes tumour, no invasive status was recorded and it was later confirmed to be cancer. All 650 cancers had surgery to the breast. Three hundred and sixty (55%) cancers had a diagnostic open biopsy and no further surgical treatment. Of these, one cancer was treated by mastectomy with axillary surgery as the first surgical treatment.

Tables 20 and 21 describe the non-operative history of cancers diagnosed by open biopsy. For 92% of invasive cancers diagnosed by open biopsy there had been unsuccessful attempts to obtain a non-operative diagnosis using core biopsy alone (Table 20). For non/micro-invasive cancers, the proportion of cases where non-operative diagnosis had been attempted with core biopsy alone was higher at 97% (Table 21). Tables 20 and 21 also show that, of the 130 invasive cancers diagnosed by open biopsy, three (2%) had no non-operative procedure recorded and that, of the 519 non/micro-invasive cancers diagnosed by open biopsy, two cancers had no non-operative procedure recorded.

Of the 130 invasive cancers diagnosed by open biopsy in 2013/14, six (5%) had an inadequate (C1) cytology sample or a normal (B1) core biopsy sample (Table 22). Ten (8%) had a benign result (B2/C2), 67 (52%) were lesions of uncertain malignant potential (B3) or were atypia and probably benign (C3), and a further 44 (34%) were cancers with suspicions of malignancy (B4/C4). Of the 519 non/micro-invasive cancers which had a malignant open biopsy in 2013/14, 133 (26%) had a B4 and/or C4 needle biopsy result and 366 (71%) had a B3/C3 non-operative result (Table 23). Of the 519 non/micro-invasive cancers which had a malignant open biopsy in 2013/14, 133 were lobular *in situ* neoplasia (LSIN)/LCIS. Of these, six (5%) had a B4 and/or C4 needle biopsy result and 125 (94%) had a B3/C3 non-operative result. In 2013/14, of the 434 cancers that were diagnosed as B3/C3 (one had unknown invasive status) and had an operation, 67 (15%) were found to be invasive at surgery and 125 (29%) 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 LSIN] 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, pleomorphic LCIS, atypical lobular hyperplasia, atypical ductal hyperplasia and flat epithelial atypia. The *Sloane Project* will still accept new cases of DCIS screened before 1 April 2012, but only if all data forms have been completed for the patient.

Key findings

- In 2013/14, 2,217 diagnostic open biopsies were performed. Of these 71% were benign and 29% were malignant.
- Benign open biopsy rates were 1.64 and 0.42 per 1,000 women screened for prevalent (first) and incident (subsequent) screens respectively. Only 35 screening units achieved the 1.0 per 1,000 women screened target, and 41 units did not achieve the minimum standard for prevalent (first) screens. Three units [in East of England, South Central and South East Coast] 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 0.27 per 1,000 women screened in 2013/14, mirroring the rise in the non-operative diagnosis rate from 63% to 97%. The malignant open biopsy rate varied at screening unit level from zero in three units to 1.0 per 1,000 women screened in a unit in East of England.
- The UK benign open biopsy rate has fallen over 18 years from 1.50 per 1,000 women screened in 1996/97 to 0.77 per 1,000 women screened in 2013/14.
- There were five false positive core biopsy cases recorded in 2013/14.
- Of the 130 invasive cancers diagnosed by open biopsy, three (2%) had no non-operative procedure recorded, and of the 519 non/micro-invasive cancers diagnosed by open biopsy, two had no non-operative procedure recorded.
- Forty four invasive cancers and 133 non/micro-invasive cancers diagnosed by malignant open biopsy had a B4/C4 needle biopsy result indicating suspicion of malignant disease. Sixty seven invasive cancers and 366 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 cancers 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 2013/14, of the 434 cancers that were diagnosed as B3/C3 and had an operation, 125 had only LCIS in the surgical specimen.
- The *Sloane Project* is actively collecting screen-detected cases of LCIS, pleomorphic LCIS, atypical lobular hyperplasia, atypical ductal hyperplasia and flat epithelial atypia. The *Sloane Project* will still accept new cases of DCIS screened before 1 April 2012, but only if all data forms have been completed for the patient.

Chapter 3: Tumour characteristics

The control charts in this chapter were generated using Wilson score confidence intervals as in the National Pathology Audit, but using 99.7% upper and lower outer control limits rather than 99.8% outer control limits. Another important difference between the two audits is that the National Pathology Audit only includes cancers diagnosed in England in 2011/12 to 2013/14 whereas the NHSBSP & ABS audit is UK wide. Where these methodological differences result in the identification of different outliers, this is noted in the text for each of the three pathology key performance indicators (KPIs). Details of the screening units identified in the 2014 audit as 99.7% high or low outliers in the 3-year period 2010/11 to 2012/13 were circulated to regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology after the 2014 Association of Breast Surgery annual meeting and were not published in last year's audit booklet.

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 0.5% in 2013/14; unknown size 11% in 2000/01 compared with 4% in 2013/14; unknown cytonuclear grade and unknown size 14% in 2000/01 compared with 4% in 2013/14 (Table 24). In 2013/14, non-invasive breast cancers diagnosed in women with previous breast cancers (220 cancers) were excluded from the main audit data. This has had little effect on data completeness. There were 183 non-invasive cases which had LCIS only at surgery in 2013/14. Of these, 178 were correctly recorded as cytonuclear grade not assessable and three as cytonuclear grade unknown. The size of 196 (5%) non-invasive cancers was recorded as not assessable (Table 25); 178 of these were LCIS and 18 were DCIS. A size was provided for two cases of LCIS.

Of the 178 surgically treated non-invasive cancers with unknown size (Table 24), 151 (85%) 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 20 surgically treated non-invasive cancers with unknown cytonuclear grade (Table 24), 13 (65%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen. Of the 197 non-invasive cancers with cytonuclear grade not assessable (Table 26), 178 (90%) were LCIS alone at surgery.

Figure 11 shows how the proportion of surgically treated non-invasive cancers with unknown cytonuclear grade and/or size varied between screening units in 2013/14. LCIS cases have been excluded. Thirty units had 100% complete data for cytonuclear grade and size, and only 5% (181 cancers) of all surgically treated non-invasive cancers had incomplete cytonuclear grade or/and size (Table 24). In 11 units, data incompleteness was greater than 10%.

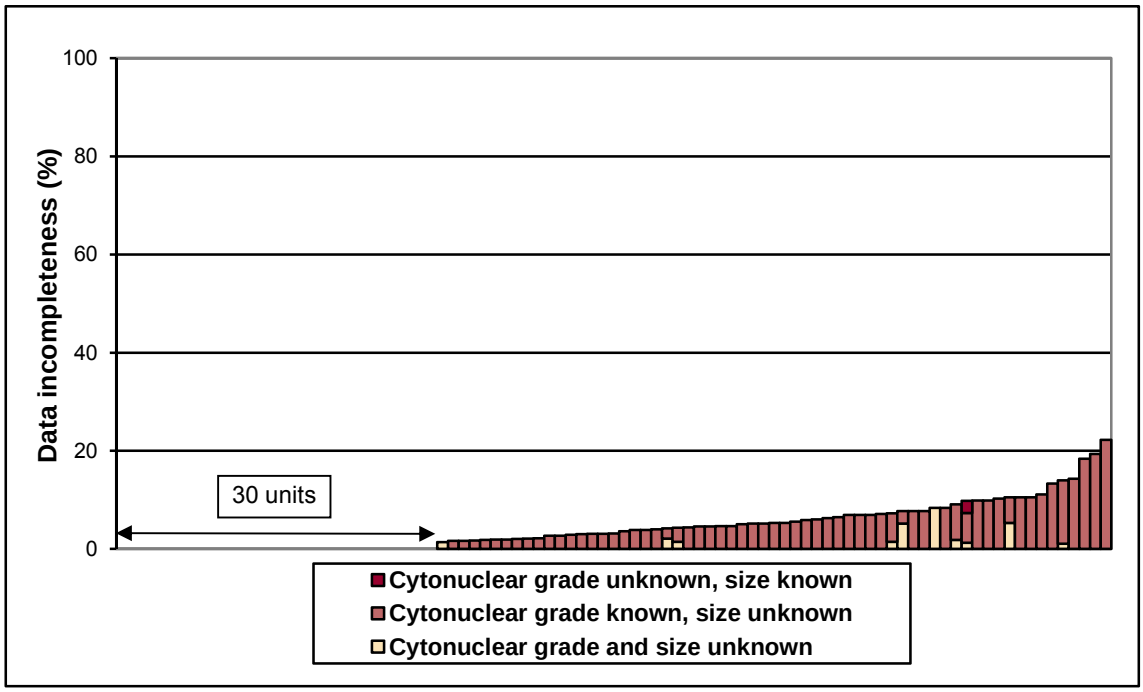

Figure 11: Variation between screening units in the incompleteness of cytonuclear grade and size data for non-invasive cancers (Cases with no surgery and LCIS cases are excluded)

3.1.2 Non-invasive cancer size and cytonuclear grade

In 2013/14, 36% of the 3,987 surgically treated non-invasive cancers were less than 15mm in diameter and 15% were larger than 40mm (Table 25). Figure 12 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 0% to 62%, and the proportion with a diameter greater than 40mm varied from 0% to 33%.

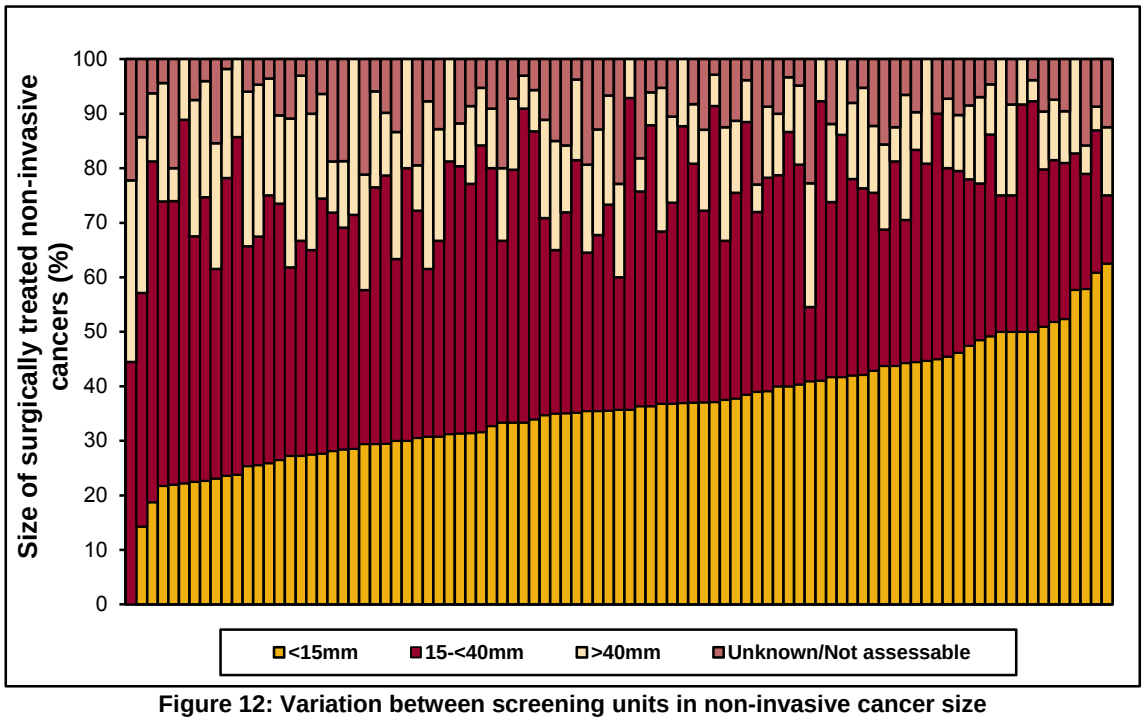

Figure 12: Variation between screening units in non-invasive cancer size (cases with no surgery and LCIS cases are excluded)

In 2013/14, in the UK as a whole, 57% of surgically treated non-invasive cancers were high cytonuclear grade (Table 26), 27% were intermediate cytonuclear grade and 10% were low cytonuclear grade. Figure 13 shows for each screening unit over the 3-year period 2011/12 to 2013/14, 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 of 57% (solid line).

There is considerable variation between screening units in the proportion of high cytonuclear grade non-invasive cancers, with 18 lying above the 95% upper control limit (13 above the 99.7% control limit) and 12 below the 95% lower control limit (four below the 99.7% control limit).

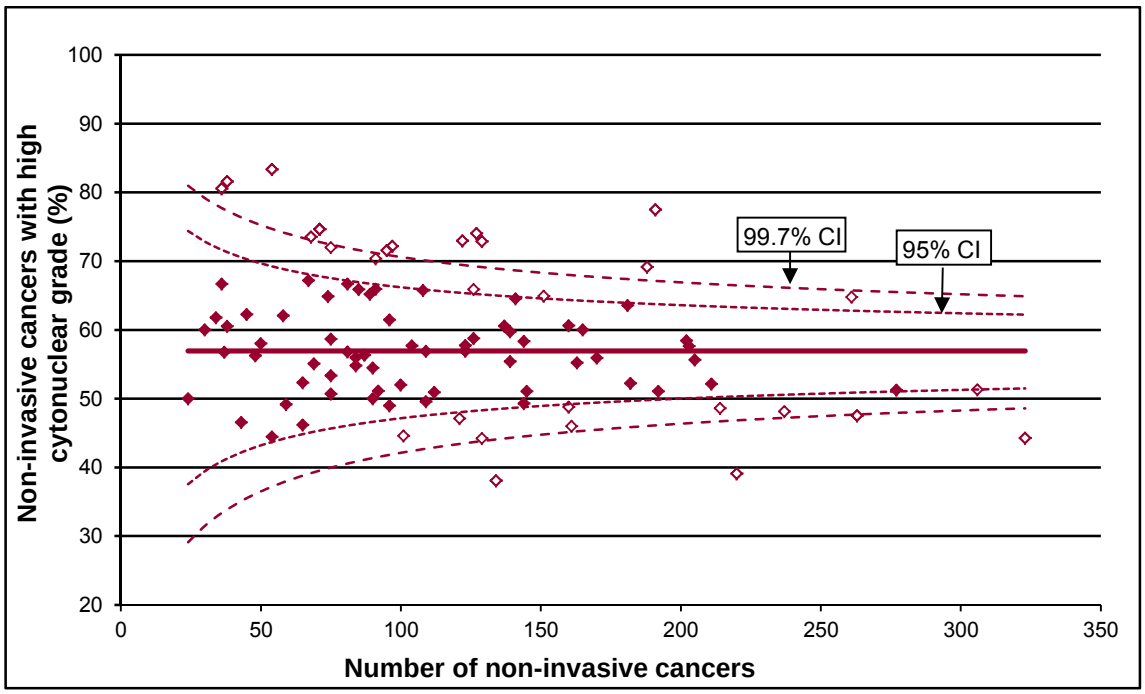

Figure 13: Variation between screening units in the proportion of non-invasive cancers with a high cytonuclear grade in (2011/12 to 2013/14) (Cases with no surgery are excluded) (Open diamonds represent units which lie outside the 95% upper and lower control limits)

The proportion of high cytonuclear grade cancers increased with non-invasive cancer size: from 45.6% of non-invasive cancers less than 15mm in diameter to 79.3% of non-invasive cancers greater than 40mm in diameter. There were 472 high cytonuclear grade non-invasive cancers with a diameter greater than 40mm and 661 high cytonuclear grade non-invasive cancers with a diameter less than 15mm.

3.2 Tumour size for invasive breast cancers

Of the 15,543 surgically treated invasive cancers, 4,018 (26%) had an invasive tumour diameter of less than 10mm and 8,148 (52%) had an invasive tumour diameter of less than 15mm. Only 274 cancers (2%) had an invasive tumour diameter greater than 50mm (Table 27). The whole tumour size is the maximum diameter of the whole tumour, including any DCIS component

which extends beyond the invasive lesion. In 2013/14, whole tumour size was not provided for 287 (2%) of surgically treated invasive cancers (Table 28). Five percent of the surgically treated invasive cancers in Wales (42 cases) did not have whole size recorded.

Key findings

- In 2013/14, 30 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 11 units, data incompleteness was greater than 10%.
- The size of 196 non-invasive cancers (5%) was not assessable; 178 of these were LCIS.
- Of the 197 non-invasive cancers with grade not assessable, 90% were LCIS alone at surgery.
- Of the 178 surgically treated non-invasive cancers with unknown size, 151 (85%) had a benign outcome at surgery with no evidence of non-invasive disease found in the surgical specimen.
- Of the 3,987 surgically treated non-invasive cancers, 36% were less than 15mm in diameter and 15% were larger than 40mm.
- Fifty seven percent of surgically treated non-invasive cancers were high cytonuclear grade, 27% were intermediate cytonuclear grade and 10% were low cytonuclear grade.
- Eighteen units had significantly higher and 12 units had significantly lower proportions of non-invasive cancers with a high cytonuclear grade than the national average of 57%.
- Fifty two percent of surgically treated cancers had an invasive tumour diameter of less than 15mm. For only 274 cases (2%) was the invasive tumour diameter greater than 50mm.
- The whole tumour size was not provided for 287 (2%) surgically treated invasive cancers.

3.3 Lymph node status

Screening guidelines recommend that invasive cancers should have axillary node assessment. Three hundred and forty one 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 46).

3.3.1 Availability of nodal dtatus for invasive cancers

In 2013/14, nodal status was known for 99% of surgically treated invasive cancers (Table 80). Nodal status was known for 100% of invasive cancers in 38 screening units, a decrease from 41 units in 2012/13. All screening units met the 90% minimum standard for axillary nodal assessment. A total of 123 invasive cancers were recorded as having no nodes obtained. Of these, four had the entire invasive tumour removed at core biopsy and one was non-invasive at surgery. ‘Previous axillary surgery, previous cancer with surgery to the 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 among the explanations provided. No explanations were provided for 44 cases.

3.3.2 Lymph node status for invasive cancers

In 2013/14, of the 15,416 invasive cancers with known nodal status, 3,382 (22%) had positive nodes (Table 82). The exclusion in 2013/14 of women with previous breast cancers (of whom 20% had positive nodes) 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 9% to 45% in individual screening units.

Of the 15,416 invasive cancers with nodes examined at surgery, 1,963 (13%) had one positive node at the first axillary operation. Of these, 1,836 (94%) had more detailed information of the type of single node positivity. Six hundred and forty six (35%) contained micro-metastases and 1,185 (65%) contained macro-metastases.

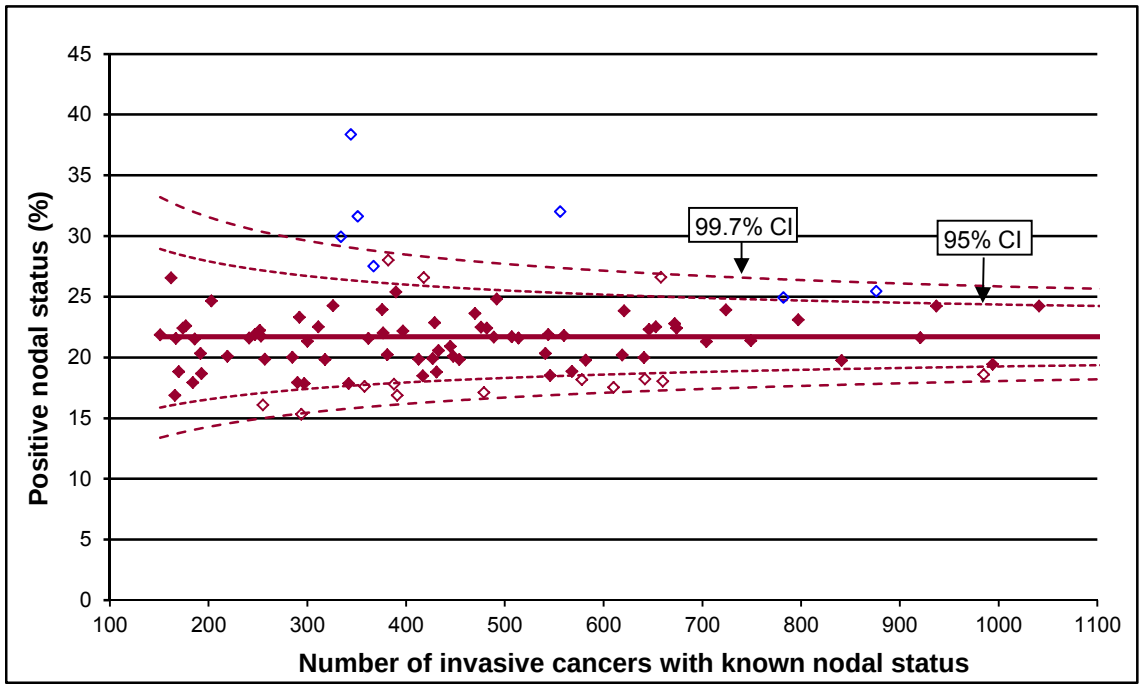

Figure 14: Variation between screening units in the proportion of invasive cancers with positive nodal status expressed as a percentage of cases with known nodal status (Open diamonds represent units which lie outside the 95% upper and lower control limits; open blue diamonds show high outlier units known to use intra-operative nodal assessment)

Figure 14 shows the variation in nodal status between screening units for the 3-year period 2011/12 to 2013/14. 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 of 21.7% (solid line). Ten units lie above the 95% upper control limit (four above the 99.7% upper control limit) and 12 below the 95% lower control limit (one below the 99.7% lower control limit). It would be interesting to determine whether this wide range of node positivity is related to differences in pathological handling (eg the number of levels or blocks taken, the total number of nodes examined and the use of immunohistochemistry and molecular techniques such as PCR).

Interestingly, seven of the 10 high outlier units (open blue diamonds in Figure 14) are served by hospitals known to use intra-operative nodal assessment which may lead to the identification of higher numbers of micro-metastases which would not normally warrant axillary treatment. Four of the seven units and two other units served by hospitals not known to use intra-operative nodal assessment had 25% or more micro-metastatic nodes compared with the UK average of 16%.

3.3.3 Availability of nodal status for non-invasive cancers

Sixty nine 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 38). 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 3,987 surgically treated non-invasive cancers, 27% had known nodal status (Table 87). Of the non-invasive cancers treated by mastectomy, 91% had known nodal status. Only 7% of non-invasive cancers treated with breast conserving surgery had known nodal status (Table 88). Of the 1,062 non-invasive cancers with known nodal status, 11 (1%) had positive nodal status recorded (Table 89), five after a mastectomy and six after breast conserving surgery.

Figure 15 shows the variation between screening units in 2013/14 in the proportion of cancers treated with breast conserving surgery or mastectomy with known nodal status. In 2013/14, the nodal status was known for more than 10% of non-invasive cancers treated by breast conserving surgery in 19 units (left hand graph in Figure 15) and for more than 30% of these cancers in two units (in East Midlands and Northern Ireland). Twelve screening units were 95% high outliers in a 3-year control chart for 2011/12 to 2013/14 (not shown); five units were 99.7% high outliers [North East, Yorkshire & Humber (2), East of England (1), London (1) and West Midlands (1)]. In 2013/14, the nodal status was known for 100% of non-invasive cancers treated by mastectomy in 44 units (right hand graph in Figure 15). Seven units were 95% low outliers in a 3-year control chart for 2011/12 to 2013/14 (not shown); one was a 99.7% low outlier.

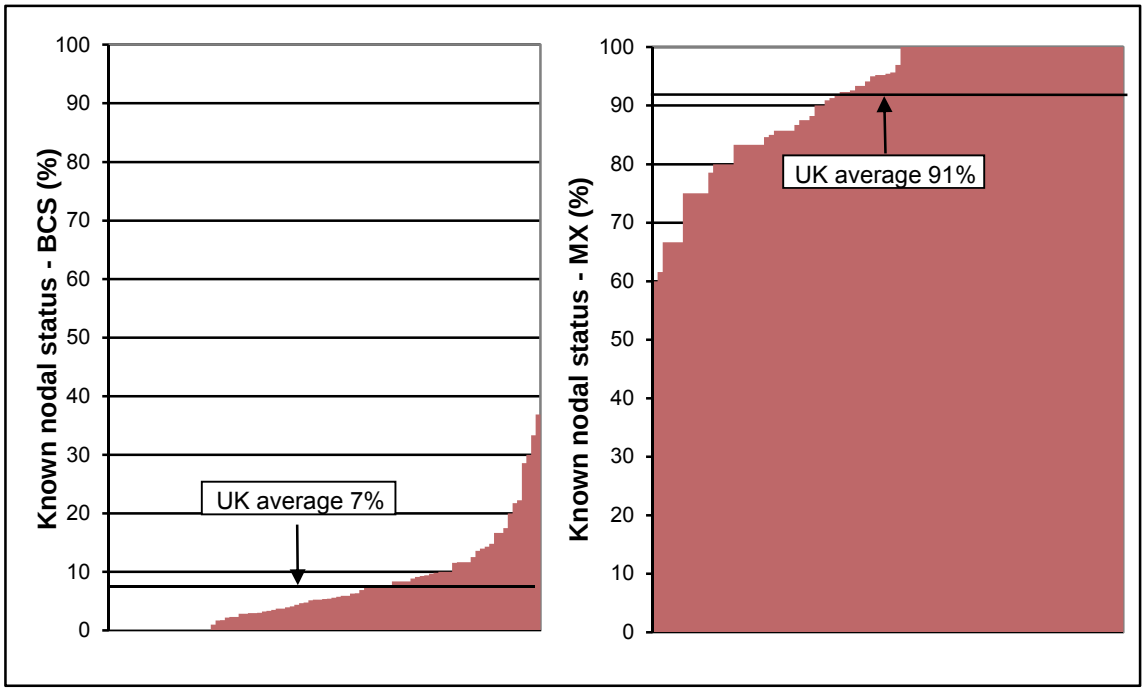

Figure 15: Variation between screening units in the proportion of non-invasive cancers treated with breast conserving surgery (BCS) (left) or mastectomy (right) with known nodal status

Key findings

- In the UK as a whole in 2013/14, 99% of surgically treated invasive cancers had known nodal status; 123 invasive cancers were recorded as having no nodes obtained. Twenty two percent of invasive cancers had positive nodes; this varied from 9% to 45% in individual units.
- For 15,416 invasive cancers nodes were examined at surgery and 1,963 (13%) had one positive node at the first axillary operation. Of these, 1,836 (94%) had more detailed information of the type of single node positivity, 646 contained micro-metastases and 1,185 macro-metastases.
- In the 3-year period 2011/12 to 2013/14, 10 units had an usually high and 12 units an unusually low proportion of positive nodes compared with the UK average of 21.7%. It would be interesting to determine whether this wide range of node positivity is related to differences in pathological handling (eg the number of levels or blocks taken, the total number of nodes examined and the use of immunohistochemistry and molecular techniques such as PCR).
- Seven of the 10 high outlier units are served by hospitals known to use intra-operative nodal assessment which may lead to the identification of higher numbers of micro-metastases which would not normally warrant axillary treatment. Four of these seven units and two other units served by hospitals not known to use intra-operative nodal assessment had 25% or more micro-metastatic nodes compared with the UK average of 16%.
- Of the 3,987 surgically treated non-invasive cancers, 27% had known nodal status; 91% 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 19 units and for more than 30% in two units.
- The nodal status was known for 100% of non-invasive cancers treated by mastectomy in 44 units and for less than 60% in two units.
- Of the 1,062 non-invasive cancers with known nodal status, 11 (1%) had positive nodal status recorded, five after a mastectomy and six after breast conserving surgery.

3.4 Grade of invasive cancers

Of the 15,543 invasive cancers which had surgery, 3,941 (25%) were grade 1, 8,412 (54%) grade 2 and 3,083 (20%) grade 3 (Table 29). Grade was not assessable for 45 cancers and grade was unknown for 62 cancers. The control charts in Figure 16 show the variation in the proportions of grade 1, 2 and 3 cancers recorded for individual screening units in the 3-year period 2011/12 to 2013/14. The 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 lines: grade 1 25%, grade 2 54% and grade 3 20%.

The 3-year control charts in Figure 16 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 chart, eight units are 99.7% high outliers. Of these, three [East of England (2) and West Midlands (1)] are also 99.7% low outliers in the grade 1 chart and two [South Central (1) and South East Coast (1)] are 99.7% low outliers in the grade 2 chart. Similarly, of the eight units which are 99.7% low outliers in the grade 3 chart, three [North West (2) and Wales (1)] are

99.7% high outliers in the grade 1 chart and one (in Wales) is a 99.7% high outlier in the grade 2 chart.

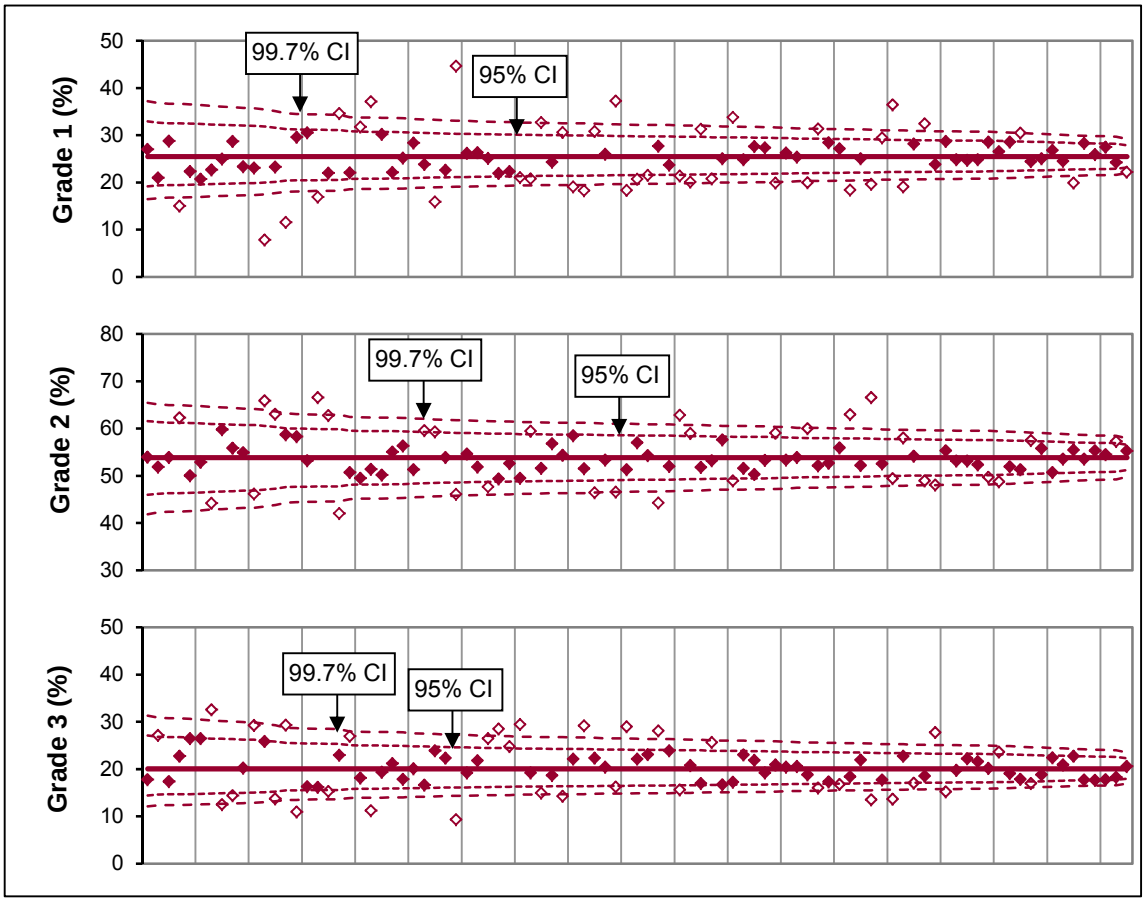

Figure 16: Variation between screening units in the grade of surgically treated invasive cancers in the 3-year period 2011/12 to 2013/14 (Open diamonds represent units which lie outside the 95% upper and lower control limits)

Pathology KPI P3

Invasive cancer grade
1-year and 3-year 99.7% high and low outlier units for invasive cancer grade

UK screening units which were identified in the 2014 audit as 99.7% high or low outliers for invasive cancer grade in the 3-year period 2010/11 to 2012/13 were followed up by regional QA reference centres in conjunction with pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology. The following table summarises the outcome of these audits and identifies 99.7% high or low outliers for invasive cancer grade in the 3-year period 2011/12 to 2013/14 and in 2013/14.

Of the 30 units identified in the 2014 audit as 99.7% high or low outliers for invasive cancer grade in the 3-year period 2010/11 to 2012/13, 21 were still 99.7% high or low outliers in the 3-year period 2011/12 to 2013/14, and four [Wales (2), East of England (1), North East and Yorkshire & Humber (1)] were 99.7% high or low outliers in 2013/14. In this year's audit, 12 additional units were identified as 99.7% high or low outliers in the 3-year period 2011/12 to 2013/14 and five (in East of England, North East, Yorkshire & Humber, South Central, South East Coast and West Midlands) were 99.7% high or low outliers in 2013/14. Because of the differing outer upper and lower control limits (99.8% and 99.7%) in the National Pathology Audit

and the UK NHSBSP & ABS audit, two English units in the table above (North West PBO and South West LPL) are not identified as 99.8% high or low outliers in the 3-year period 2011/12 to 2013/14 in the National Pathology Audit. Outlier units in Northern Ireland, Scotland and Wales are also not included in the National Pathology Audit. The nine units which are 99.7% high or low outliers for invasive cancer grade in 2011/12 to 2013/14 and in 2013/14 (four of which were audited in 2014 [East of England DSW, North East, Yorkshire & Humber CDO, Wales WNM and WSW] and five of which are newly identified in 2015 [East of England FSO, North East, Yorkshire & Humber BHU, South Central JIW, South East Coast GBR and West Midlands MAS] should be followed up by regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology.

Region	Unit	Grade 1 invasive 3-year 2010/11-2012/13 %	Grade 2 invasive 3-year 2010/11-2012/13 %	Grade 3 invasive 3-year 2010/11-2012/13 %	Grade 1 invasive 3-year 2011/12-2013/14 %	Grade 2 invasive 3-year 2011/12-2013/14 %	Grade 3 invasive 3-year 2011/12-2013/14 %	Outcome of QARC audit of units identified in 2014 report for follow up
Units audited in the 2014 report								
East Midlands	CLI	35.7	50.1	13.8	31.3	52.1	16.0	No further audit required
East of England	DGY	15.3	52.5	31.6	22.4	50.0	26.5	No further audit required
East of England	DNF	16.4	50.9	31.4	18.3	51.3	29.0	Internal audit being done after regional discussion
East of England	DPT	18.7	64.3	17.0	16.9	66.5	16.1	Internal audit being done after regional discussion
East of England	DSW	13.8	55.3	30.4	11.6	58.7	29.3	Internal audit being done after regional discussion
East of England	ELD	18.8	54.8	24.9	19.9	55.5	22.7	Internal audit being done after regional discussion
East of England	FCO	30.3	45.3	24.0	25.0	52.2	21.9	No further audit required
East of England	FEP	29.3	57.5	12.1	28.7	55.9	14.4	No further audit required
London	FBH	20.5	62.6	16.9	21.4	62.8	15.6	Audit to be repeated in 6 months
London	GCA	24.4	59.2	15.8	24.4	57.5	17.0	Audit in progress
NEYH	ANE	20.1	53.7	26.0	26.5	48.7	23.6	No further audit required
NEYH	ANT	17.4	55.3	27.1	19.1	58.0	22.8	Further audit undertaken, reviewed at QA visit
NEYH	BHL	30.2	53.6	15.7	29.4	52.5	17.7	No further audit required
NEYH	BLE	31.4	52.7	15.4	30.5	51.3	17.8	No further audit required
NEYH	CDO	18.0	59.6	21.7	15.9	59.3	23.9	Further audit undertaken, reviewed at QA visit
North West	NMA	36.2	47.0	16.8	37.2	46.5	16.2	Cases reviewed and no explanation found
North West	NWI	33.7	56.1	10.2	37.1	51.4	11.2	Cases reviewed, continuing to monitor
North West	PLE	48.0	43.7	8.3	44.6	46.1	9.3	Cases reviewed, education session held
South Central	KMK	26.3	40.7	32.3	22.7	44.2	32.6	Action planned and awaiting result
South Central	KOX	23.6	46.3	30.2	27.6	44.2	28.1	Review completed and practice changed
South East Coast	GCT1	19.6	61.5	17.7	19.9	60.0	18.8	Audit carried out, no further action required
South West	LGL	19.6	57.8	22.4	19.9	59.1	20.9	QA to monitor
South West	LTB	18.1	65.4	16.5	23.3	63.0	13.7	No further audit required
West Midlands	MDU	20.1	50.3	29.0	18.3	51.5	29.2	12 month reaudit planned
West Midlands	MHW	19.6	62.4	17.7	18.4	62.9	18.4	Workshop planned to align practice of 3 laboratories
Northern Ireland	ZNW1	8.4	66.3	25.2	7.8	65.9	25.9	Cases monitored. Remains under review
Scotland	Unit 2	21.8	49.1	29.1	21.1	49.5	29.5	No information available
Scotland	Unit 7	33.9	54.5	10.3	29.6	58.3	10.9	No information available
Wales	WNM	20.4	64.2	14.5	19.6	66.6	13.5	No information available
Wales	WSW	33.0	47.0	19.7	36.4	49.4	13.6	No information available
New units identified in 2015								
East of England	FSO	25.2	50.9	23.6	21.9	49.3	28.5	
London	ECX	29.6	53.0	16.6	28.7	55.3	15.2	
NEYH	BHU	30.8	48.6	20.2	32.4	48.9	18.5	
NEYH	CBA	25.3	55.2	16.2	25.0	60.0	12.5	
North West	NCR	32.2	44.9	22.9	34.6	42.0	23.0	
North West	PBO	29.3	49.8	20.5	30.8	46.4	22.3	
South Central	JIW	17.7	61.0	20.7	15.0	62.3	22.8	
South East Coast	GBR	23.8	51.0	24.5	23.8	48.0	27.7	
South West	LCO	31.6	52.4	15.4	30.6	54.3	14.3	
South West	LED	21.0	58.4	20.7	19.1	58.5	22.1	
South West	LPL	33.0	49.2	16.4	32.7	51.6	15.0	
West Midlands	MAS	31.9	50.6	17.3	33.8	49.0	17.2	
UK average		**25.6**	**53.5**	**20.4**	**25.5**	**53.9**	**20.0**	

1-year and 3-year 99.7% low outlier
3-year 99.7% low outlier
1-year and 3-year 99.7% high outlier
3-year 99.7% high outlier

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 four 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 16 will have affected the NPI groupings.

Although an NPI score was provided for 582 of the 690 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. An NPI score could not be calculated for 317 (2%) surgically treated invasive cancers with no known neo-adjuvant therapy (Table 30). Of these, 46 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 14,536 surgically treated invasive cancers with a known NPI score (excluding cancers with neo-adjuvant therapy), 21% were in the excellent prognostic group (EPG), 38% were in the good prognostic group (GPG), 36% were in moderate prognostic groups 1 and 2 (MPG1 and MPG2), and only 777 cancers (5%) were in the poor prognostic group (PPG) (Table 31). 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).

In Figure 17, the proportions of invasive cancers in each NPI group and with unknown NPI group for individual screening units are plotted in control charts. As in Figure 16, data for the same unit can be compared vertically across the four 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 averages, represented by the solid lines: EPG 21%, GPG 38%, MPG1+MPG2 34% and PPG 5%. The 3-year control charts in Figure 17 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, three units are 95% high outliers. Of these, two (in North West and London) are also 95% low outliers for EPG/GPG cancers. Similarly, eight of the 16 units which are 95% high outliers for EPG/GPG cancers are also 95% low outliers for PPG cancers.

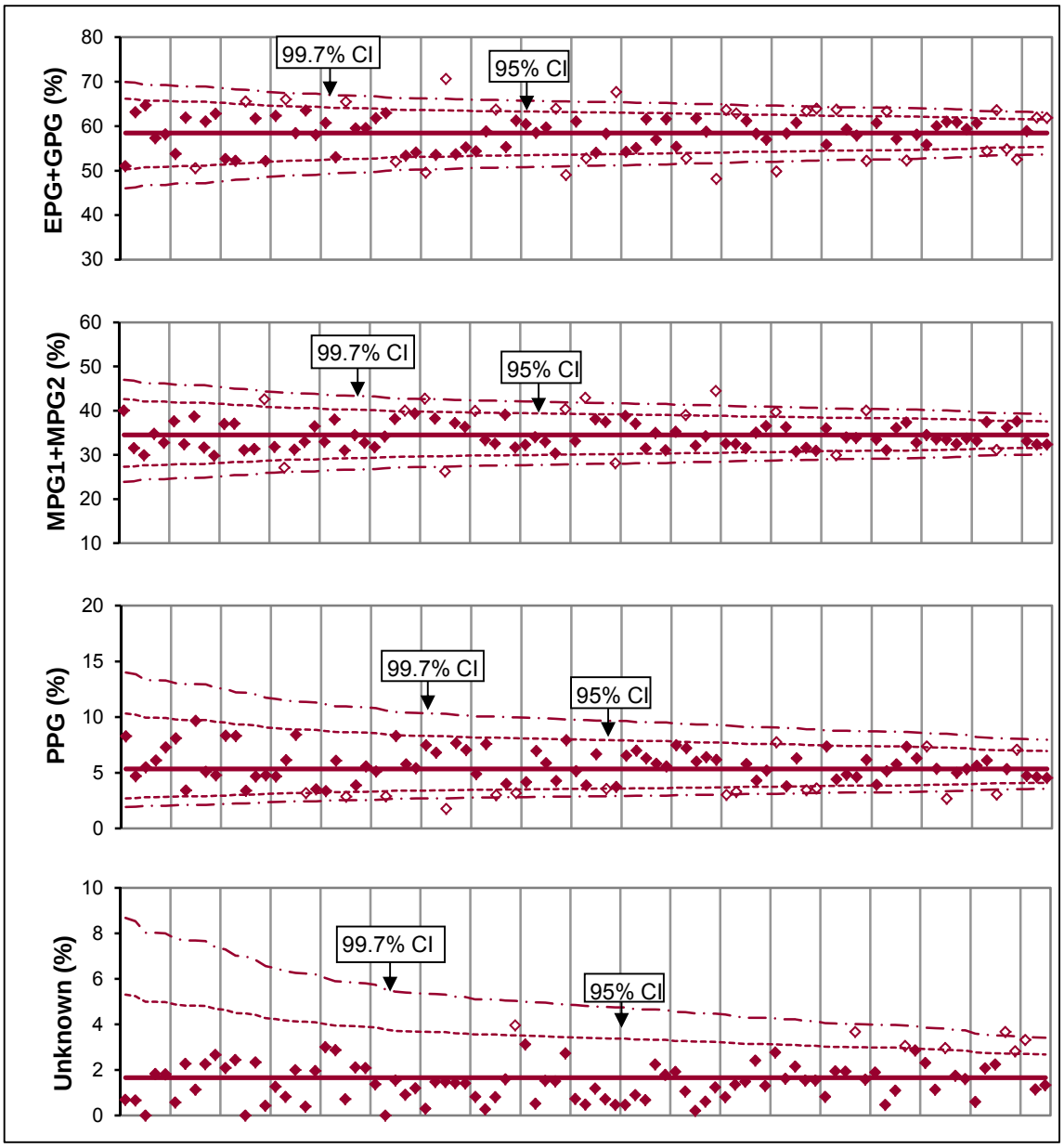

Figure 17: Variation between screening units in NPI groups for surgically treated invasive cancers in the 3-year period 2011/12 to 2013/14 – excluding cases with neo-adjuvant therapy (Open diamonds represent units which lie outside the 95% upper and lower control limits)

Key findings

- In the UK as a whole in 2013/14, 25% of invasive cancers were Grade 1, 54% Grade 2 and 20% Grade 3. Grade was not assessable for 45 cancers and unknown for 62 cancers.
- The nine units which are 99.7% high or low outliers for invasive cancer grade in 2011/12 to 2013/14 and in 2013/14 (four of which were audited in 2014 [East of England DSW, North East, Yorkshire & Humber CDO, Wales WNM and WSW] and five of which are newly identified in 2015 [East of England FSO, North East, Yorkshire & Humber BHU, South Central JIW, South East Coast GBR and West Midlands MAS]) should be followed up by regional QA reference centres, pathology QA co-ordinators and 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.
- Five hundred and eighty two surgically invasive cancers treated with neo-adjuvant therapy which had an NPI score recorded were excluded from the analyses as the scores provided may not have reflected the true tumour characteristics at diagnosis.

Key findings

- In 2013/14, of the 14,536 surgically treated invasive cancers with a known NPI score, 21% were in the excellent prognostic group, 38% in the good prognostic group), 36% in moderate prognostic groups 1 and 2 (MPG1 and MPG2) and 5% in the poor prognostic group (PPG).
- There are local variations in NPI group (not necessarily due to interpretation) which should be investigated. For example, in the PPG control chart, three units are 95% high outliers. Of these, two 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 not known for 53 (0.3%) invasive cancers included in the main audit (Table 32). Of these 53 cancers, nine were in a unit in East of England and 13 in a unit in Scotland. 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 cancers where the invasive focus is too small to be tested.

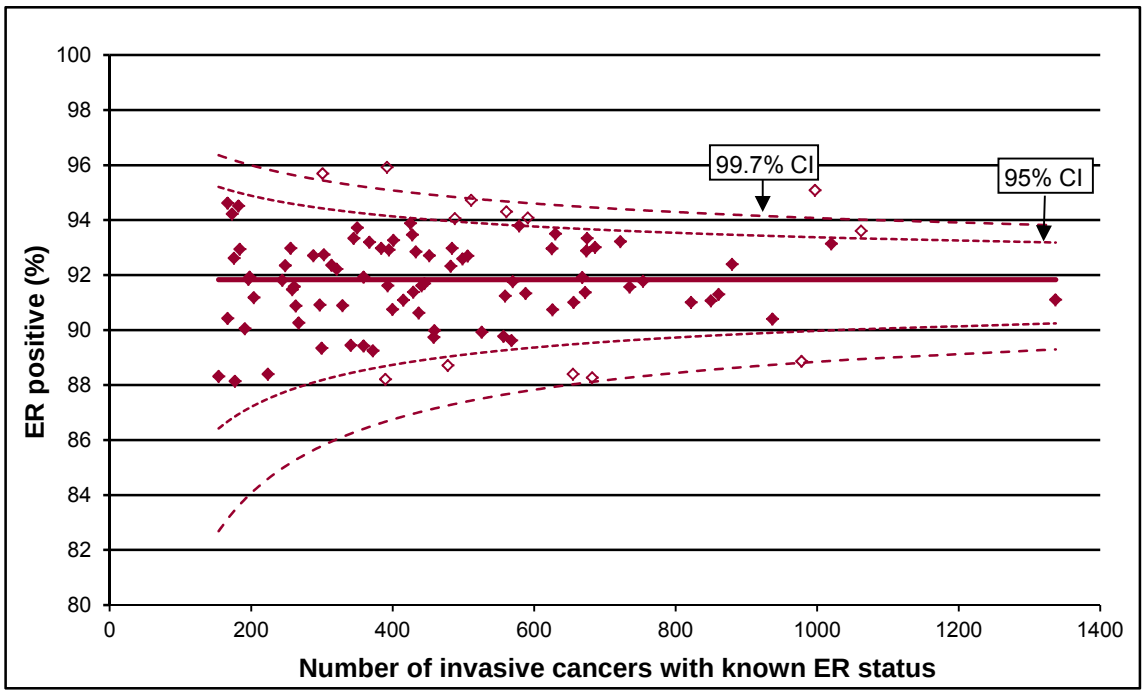

Figure 18: Variation between screening units in ER status for invasive cancers in the 3-year period 2011/12 to 2013/14 (Open diamonds represent units which lie outside the 95% upper and lower control limits)

In the UK as a whole in 2013/14, 14,490 (91%) of the 15,841 invasive cancers were ER positive (Table 32). Figure 18 shows for each screening unit over the 3-year period 2011/12 to 2013/14, 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 of 92% (solid line).

ER positivity for invasive cancers with known ER status varied widely between screening units. Eight units lie above the 95% upper control limit (three above the 99.7% upper control limit) and five below the 95% lower control limit (none below the 99.7% lower control limit).

Pathology KPI P1

Invasive cancers with positive ER status
1-year and 3-year 99.7% high and low outlier units for positive invasive cancer ER status

Region	Unit	ER +ve invasive 3-year 2010/11-2012/13 %	ER +ve invasive 1-year 2013/14 No*.	ER +ve invasive 1-year 2013/14 %	ER +ve invasive 3-year 2011/12-2013/14 %	Outcome of QARC audit of units identified in 2014 report for follow up
Units audited in the 2014 report						
East of England	FCO	95.1	18	92.0	94.1	Changes in practice implemented
NEYH	BHU	87.6	22	90.3	88.4	No further audit required
North West	PLE	95.2	12	90.2	93.3	No further audit required
South Central	KRG	95.4	13	90.2	93.0	Audit being undertaken
South West	LGL	95.1	13	92.0	94.7	No further audit required
South West	LPL	97.8	10	93.2	95.9	Awaiting results of reaudit
West Midlands	MBW	86.7	28	89.8	88.3	No further audit required
Scotland	Unit 1	95.6	23	93.6	95.1	No information available
New units identified in 2015						
East of England	DCB	94.9	7	93.2	95.7	Not an outlier in 2013/14
UK average		**91.6**	**1298**	**91.8**	**91.8**	

99.7% low outlier
95% low outlier
99.7% high outlier
95% high outlier

No* = Number of ER -ve cancers

Screening units which were identified in the 2014 audit as persistent 99.7% high or low outliers for positive invasive cancer ER status in the 3-year period 2010/11 to 2012/13 were followed up by regional QA reference centres in conjunction with pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology. The table above summarises the outcome of these audits and identifies 99.7% high or low outliers in the 3-year period 2011/12 to 2013/14 and in 2013/14. For units audited in 2014, the table also shows if they were 95% high or low outliers in 2011/12 to 2013/14.

Of the eight units which were identified in the 2014 audit as 99.7% high or low outliers for positive invasive cancer ER status in the 3-year period 2010/11 to 2012/13, two (in South West and Scotland) are still 99.7% high outliers in the 3-year period 2011/12 to 2013/14 and four (in East of England, North East, Yorkshire & Humber, South West and West Midlands) are 95% high or low outliers. None of the units is a high or low outlier in 2013/14. Because of the differing

population coverage in the National Pathology Audit and the UK NHSBSP & ABS audit (England and UK), the unit in Scotland in the table above is not identified as a high outlier in the National Pathology Audit. In this year's audit, one additional unit in East of England is identified as a 99.7% high outlier in the 3-year period 2011/12 to 2013/14, but this unit is not an outlier in 2013/14. There are therefore no 99.7% high or low outliers for positive invasive cancer ER status to be followed up by regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology.

3.6.2 PR status of invasive cancers

In 2013/14, PR status was known for 59% of invasive cancers (Table 33). Of the 9,386 invasive cancers with known PR status, 76% were positive. Of the 1,298 invasive cancers that were known to be ER negative, 86% had known PR status, 4% were PR positive and 82% were PR negative (Table 34).

3.6.3 HER2 status of invasive cancers

In 2013/14, all but 221 (1%) of the 15,841 invasive cancers included in the main audit (Table 35) had HER2 status data. At unit level, 24 units had complete HER2 status for all their invasive cancers while two units in East of England had 11% and 13% of cancers with unknown HER2 status. Of the 221 cases without a HER2 status, 41% had an invasive size of less than 10mm, 24% were grade 1 and 62% had negative nodal status (Table 36).

Of the 15,620 invasive cancers with known HER2 status in 2013/14, 10% were positive, 89% were negative and 1% were borderline. The method used to classify samples as borderline (immuno-histochemistry or fluorescent in-situ hybridisation) was not collected in the audit. HER2 positivity varied widely between screening units from 2% in a unit in East of England to 18% in a unit in East Midlands.

Figure 19 shows for each screening unit over the 3-year period 2011/12 to 2013/14, 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 of 10% (solid line). HER2 positivity for invasive cancers with known HER2 status varied widely between screening units. Five units lie above the 95% upper control limit (none above the 99.7% upper control limit) and six below the 95% lower control limit (one below the 99.7% lower control limit). In one unit in North West, 16% of invasive cancers were HER2 positive and in one unit in East of England only 5% were HER2 positive.

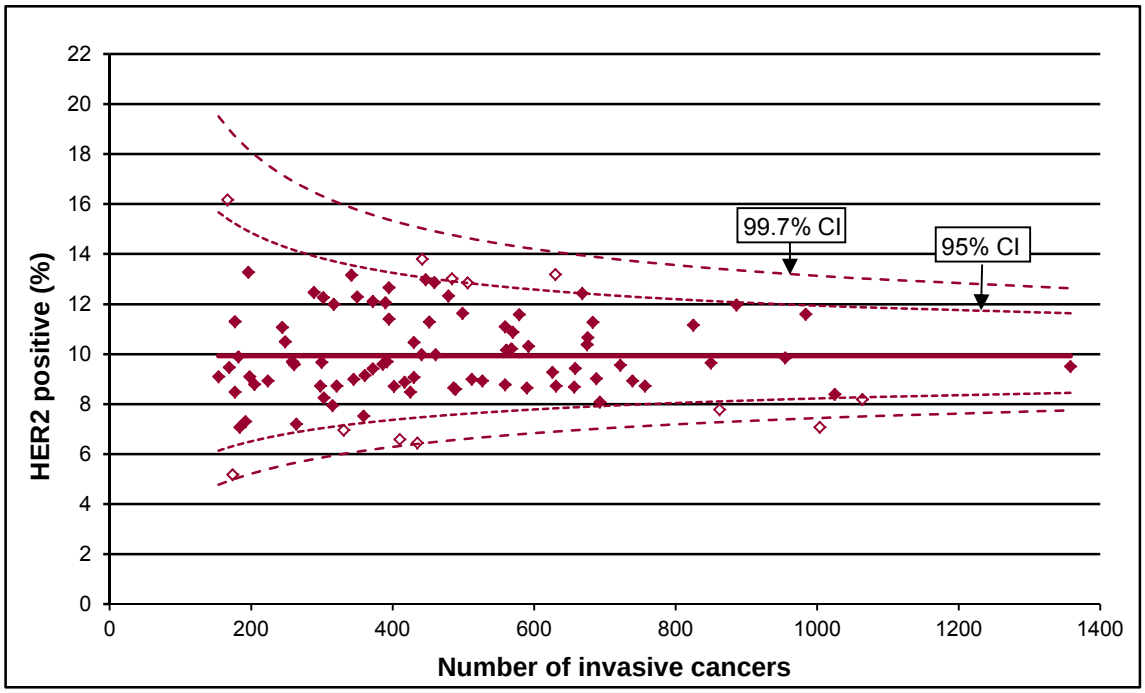

Figure 19: Variation between screening units in HER2 positivity for invasive cancers in the 3-year period 2011/12 to 2013/14 (open diamonds represent units which lie outside the 95% upper and lower control limits)

Pathology KPI P2

Invasive cancers with positive HER2 status
1-year and 3-year 99.7% high and low outlier units for positive invasive cancer HER2 status

Region	Unit	+ve HER2 status invasive 3-year 2010/11-2012/13 %	+ve HER2 status invasive 1-year 2013/14 No.	+ve HER2 status invasive 1-year 2013/14 %	+ve HER2 status invasive 3-year 2011/12-2013/14 %	Outcome of QARC audit of units identified in 2014 report for follow up
Units audited in the 2014 report						
East of England	FEP	5.1	7	10.4	7.3	New template, double scoring and 3-monthly audit
London	GCA	7.4	25	9.5	7.8	Audit in progress
NEYH	ANT	14.7	29	12.0	13.2	No further audit required
NEYH	BLE	6.4	29	11.7	8.7	No further audit required
North West	PWI	21.7	22	11.7	12.9	Data error - training given to admin team
South East Coast	HGU	7.2	41	10.8	8.2	Cases reviewed, no further work required
Northern Ireland	ZNE1	6.2	10	7.1	6.4	Cases monitored. Remains under review
Scotland	Unit 1	7.2	26	7.2	7.1	No information available
Scotland	Unit 5	15.5	9	6.7	13.8	No information available
No new units to audit in 2015						
UK average		**10.1**	**1572**	**9.9**	**9.9**	

99.7% low outlier
95% low outlier
99.7% high outlier
95% high outlier

Screening units which were identified in the 2014 audit as 99.7% high or low outliers for positive invasive cancer HER2 status in the 3-year period 2010/11 to 2012/13 were followed up by regional QA reference centres in conjunction with pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology. The table above summarises the outcome of

these audits and identifies 99.7% high or low outliers for positive invasive cancer HER2 status in the 3-year period 2011/12 to 2013/14 and in 2013/14. For units audited in 2014, the table also shows if they were 95% high outliers in 2011/12 to 2013/14.

Of the nine units which were identified in the 2014 audit as 99.7% high or low outliers for positive invasive cancer HER2 status in the 3-year period 2010/11 to 2012/13, one (in Scotland) is still a 99.7% low outlier in the 3-year period 2011/12 to 2013/14 and a 95% low outlier in 2013/14, and five (in London, North East, Yorkshire & Humber, South East Coast, Northern Ireland and Scotland) are 95% high or low outliers. Because of the differing population coverage in the National Pathology Audit and the UK NHSBSP & ABS audit (England and UK), the three outlier units in Northern Ireland and Scotland in the table below are not included in the National Pathology Audit. In this year's audit, no additional units were identified as 99.7% invasive cancer HER2 status high or low outliers in the 3-year period 2011/12 to 2013/14 or in 2013/14. There are therefore no 99.7% high or low outliers for positive invasive cancer HER2 status to be followed up by regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology.

3.6.4 Non/micro-invasive cancers

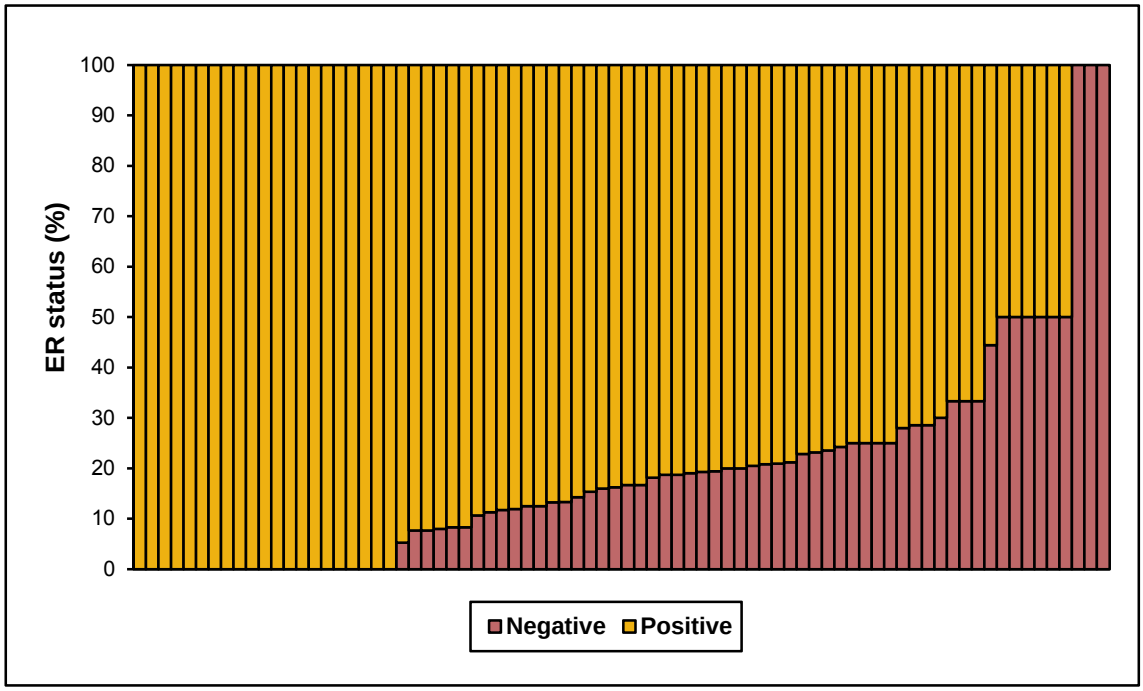

Figure 20: Variation between screening units in the ER status of non/micro-invasive cancers with known ER status (12 screening units have been excluded because they had 100% unknown ER status)

ER status was not known for 64% of non/micro-invasive cancers (Table 37). Of the non/micro-invasive cancers with known ER status, 82% were ER positive compared with 92% of invasive cancers with known ER status. PR status was known for 20% of non/micro-invasive cancers. This is a marked decrease from 2007/08 when PR status was known for 40% of non-invasive cancers. There was wide variation between screening units in the proportion of non/micro-invasive cancers with known ER status (from 0% in 15 units to 100% in 2 units), and in the

proportion of ER positive cancers in each unit (from 0% in 3 units to 100% in 21 units) (Figure 20). For 12 units, ER status was not recorded for any 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 International Breast Cancer Intervention (IBIS) DCIS 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 53 invasive cancers. Of the invasive cancers with known ER status, 91% were ER positive.
- There are no 99.7% high or low outliers for positive invasive cancer ER status to be followed up by regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology.
- PR status was known for 59% of invasive cancers: 76% were positive. Of the 1,298 invasive cancers that were known to be ER negative, 86% had known PR status; 4% were PR positive and 82% were PR negative.
- HER2 status data were available for 99% of invasive cancers. 24 units had complete HER2 status for all their invasive cancers while 2 units in East of England had 11% and 13% of cancers with unknown HER2 status.
- Of the invasive cancers with known HER2 status, 10% were positive, 89% were negative and 1% were borderline.
- There are no 99.7% high or low outliers for positive invasive cancer HER2 status to be followed up by regional QA reference centres, pathology QA co-ordinators and the National Co-ordinating Committee for Breast Pathology.
- ER status was not known for 64% of non/micro-invasive cancers; 82% 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 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 2013/14, 75% of the 4,056 non-invasive cancers were treated by breast conserving surgery, 23% by mastectomy and 69 cancers (2%) apparently received no surgery (Table 38). All 138 micro-invasive cancers received surgery, 64% had breast conserving surgery and 36% had a mastectomy (Table 39).

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 2013/14, 36% of the 3,987 non-invasive cases treated surgically were less than 15mm in diameter and 15% were larger than 40mm in diameter (Table 25). Of the 595 non-invasive cancers larger than 40mm in diameter, 122 (21%) were treated with breast conserving surgery (Table 40): 82% of these were high cytonuclear grade (see summary table). A further six non-invasive cancers with unknown size were treated with breast conserving surgery.

Number of non-invasive cancers treated with breast conserving surgery

Region	>40mm		Unknown size		Total*
	High cytonuclear grade (Table 41)	Unknown cytonuclear grade	High cytonuclear grade	Unknown cytonuclear grade (Table 42)	
N East, Yorks & Humber	6	0	0	0	6
East Midlands	6	0	0	0	6
East of England	14	0	0	0	14
London	11	0	0	0	11
South East Coast	9	0	0	0	9
South Central	9	0	0	0	9
South West	8	0	0	0	8
West Midlands	12	0	0	0	12
North West	10	0	1	0	11
Wales	4	0	0	0	4
Northern Ireland	0	0	0	0	0
Scotland	10	0	1	4	15
United Kingdom	**99**	**0**	**2**	**4**	**105**

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

Figure 21 shows how the mastectomy rate for non-invasive cancers varied between screening units in 2013/14. In the UK as a whole, 23% of non-invasive cancers were treated with a mastectomy. This varied from less than 10% in seven units [East of England (2), Scotland (2), North West (1), South East Coast (1) and West Midlands (1)], to 35% or more in 11 units [North East, Yorkshire & Humber (3), East Midlands (2), East of England (2), West Midlands (2), South West (1) and Scotland (1)].

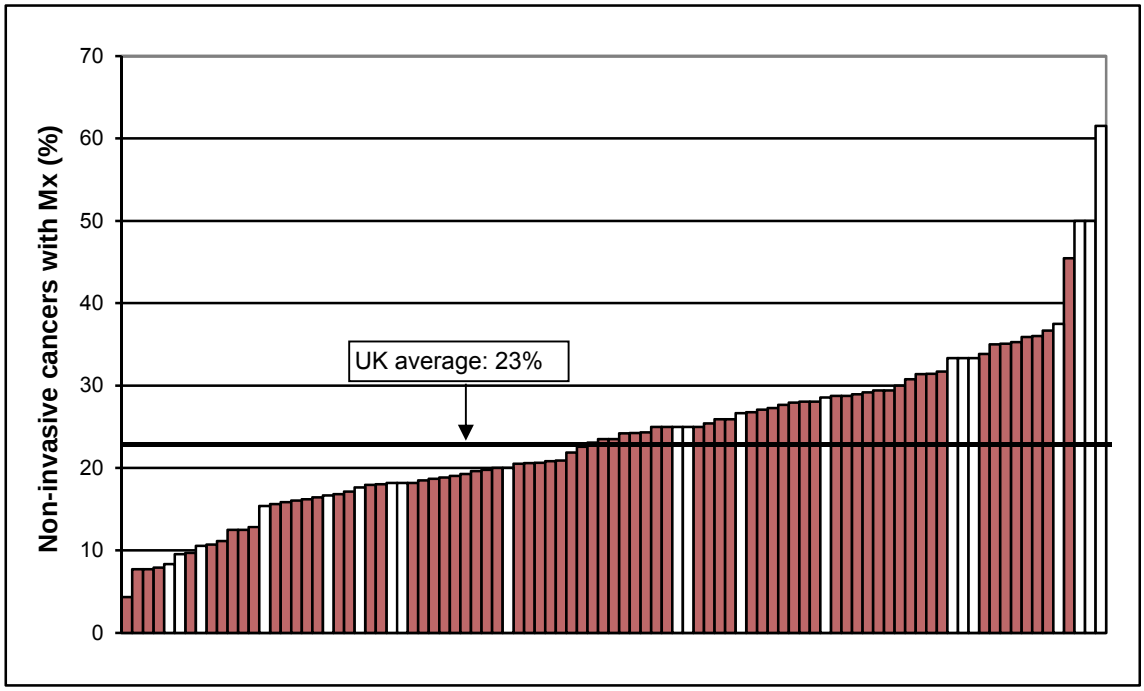

Figure 21: Variation between screening units in the mastectomy rate for non-invasive cancers (the 20 smallest units are highlighted in white)

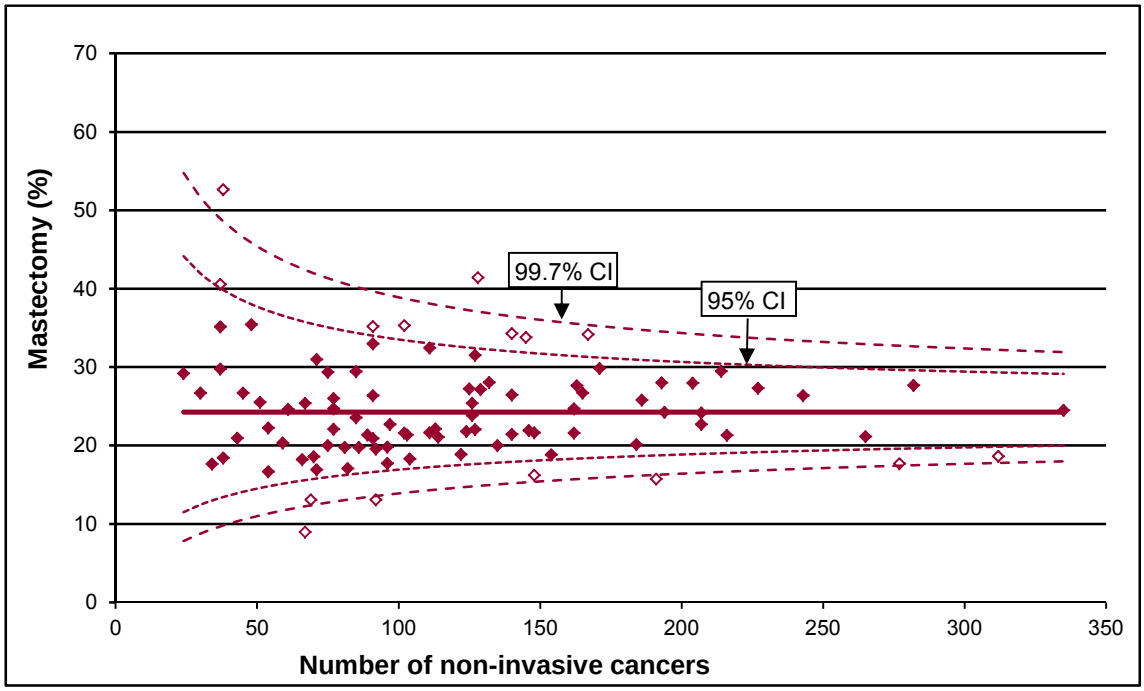

Figure 22: Variation between screening units in the mastectomy rate for non-invasive cancers in 2011/12 to 2013/14 (open diamonds represent units which lie outside the 95% upper and lower control limits)

Figure 22 shows the variation between screening units in the mastectomy rate for non-invasive cancers in the 3-year period 2011/12 to 2013/14. 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 24%.

Eight units have unusually high mastectomy rates: six are above the 95% control limit [North East, Yorkshire & Humber (2), East Midlands (1), East of England (1), North West (1) and South West (1)] and two (in North East, Yorkshire & Humber and East Midlands) are above the 99.7% control limit. Seven units have unusually low mastectomy rates: three (in South Central, South East Coast and Scotland) are below the 99.7% control limit and four (in East of England, South Central, South East Coast and Wales) are below the 95% control limit.

Surgery KPI S3a

Mastectomy for non-invasive cancers
1-year high outlier units for mastectomy rate for non-invasive cancers

Region	Unit	Mastectomy non-invasive 1-year 2013/14		Mastectomy non-invasive 3-year 2011/12-2013/14	
		No.	%	No.	%
New units identified in 2015					
East Midlands	CDS	20	35.1	53	41.4
East Midlands	CNN	5	50.0	15	40.5
East of England	DNF	11	36.7	32	35.2
NEYH	AGA	15	30.0	49	33.8
NEYH	ANE	24	35.3	57	27.9
NEYH	ANT	14	25.9	57	34.1
NEYH	CRO	8	61.5	20	52.6
North West	PBO	15	29.4	48	34.3
South West	LSO	15	45.5	36	35.3
Scotland	Unit 7	7	50.0	11	29.7
UK average		**946**	**23.3**	**2729**	**24.3**

99.7% high outlier
95% high outlier

This KPI has been used for the first time in this year's audit. It examines the proportion of non-invasive cancers treated with mastectomy in the 3-year period 2011/12 to 2013/14 and in 2013/14. The preceding summary table shows that four units [North East, Yorkshire & Humber (2), South West (1)] and Scotland (1)] are 95% high outliers for non-invasive cancer mastectomy rate in 2013/14. Of these units, 1 (in North East, Yorkshire & Humber) is also a 99.7% high outlier and 1 (in South West) is a 95% high outlier for non-invasive cancer mastectomy rate in the 3-year period 2011/12 to 2013/14. Five other units (in East Midlands, East of England, North East, Yorkshire & Humber and North West) are 95% high outliers and one unit (in East

Midlands) is a 99.7% high outlier in the 3-year period 2011/12 to 2013/14 but are not high outliers in 2013/14. Regional QA reference centres and regional QA surgeons should follow up the four units (London FBH, North East, Yorkshire & Humber ANE, North West PLN and Scotland Unit 7) that are high outliers for non-invasive cancer mastectomy rate in 2013/14 to ascertain the reason for this clinical practice.

Key findings

- 75% of non-invasive cancers were treated with breast conserving surgery and 69 apparently received no surgery.
- 105 potentially large, high cytonuclear grade non-invasive cancers were treated with breast conserving surgery.
  - Regional QA reference centres and regional QA surgeons should follow up the four units (London FBH, North East, Yorkshire & Humber ANE, North West PLN and Scotland Unit 7) that are high outliers for non-invasive cancer mastectomy rate in 2013/14 to ascertain the reason for this clinical practice.

4.2 Surgical treatment for invasive breast cancer

Of the 15,841 invasive breast cancers detected by the UK NHSBSP in 2013/14, 12,356 (78%) underwent breast conserving surgery and 3,183 (20%) had a mastectomy (Table 43). Mastectomy rates in individual screening units varied between 8% (one unit in Scotland with 360 cancers) and 35% (one unit in East Midlands with 62 cancers and one unit in Northern Ireland with 71 cancers) (Figure 23).

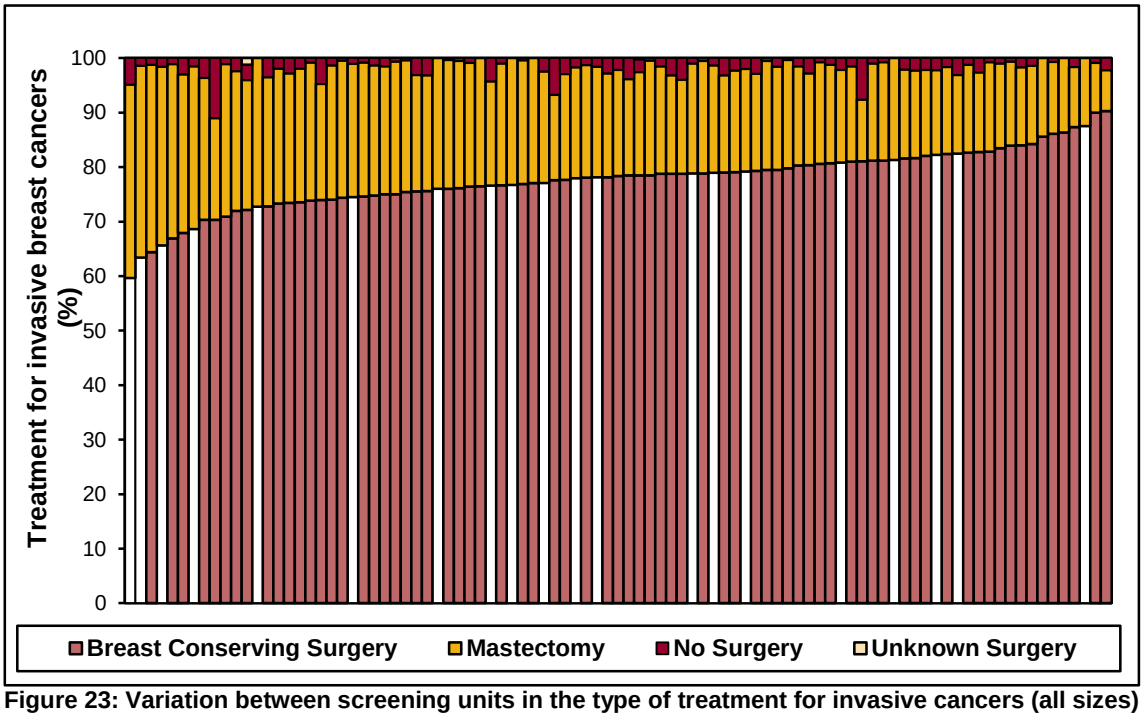

Figure 23: Variation between screening units in the type of treatment for invasive cancers (all sizes) (The 20 smallest units are highlighted in white)

Two hundred and ninety eight invasive cancers (2%) had no surgery recorded within the audit period, and treatment information was unavailable for four invasive cancers. Of the invasive

cancers with no surgery recorded during the audit period, 173 (58%) had neo-adjuvant therapy (see Section 4.4).

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 88% for cancers with an invasive tumour diameter greater than 50mm (Table 44). 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 2013/14.

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 83% for large cancers (whole tumour size >50mm) (Table 45). The following table shows how mastectomy rates in 2013/14 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 46). Thus, while only 7% of small (<15mm) cancers with whole tumour size <15mm were treated with a mastectomy, 83% 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 44)		Whole tumour size for cancers with invasive component <15mm (Table 46)	
	No.	Mastectomy Rate (%)	No.	Mastectomy Rate (%)
<15mm	1,037	13	408	7
15-≤20mm	637	18	107	12
>20-≤35mm	876	32	175	25
>35-≤50mm	315	59	165	60
>50mm	241	88	175	83

Figure 24 shows how the mastectomy rate for small invasive cancers with whole tumour size <15mm varied between screening units in 2013/14. Five units treated none of these cancers with mastectomy and in four units the mastectomy rate was 15% or more.

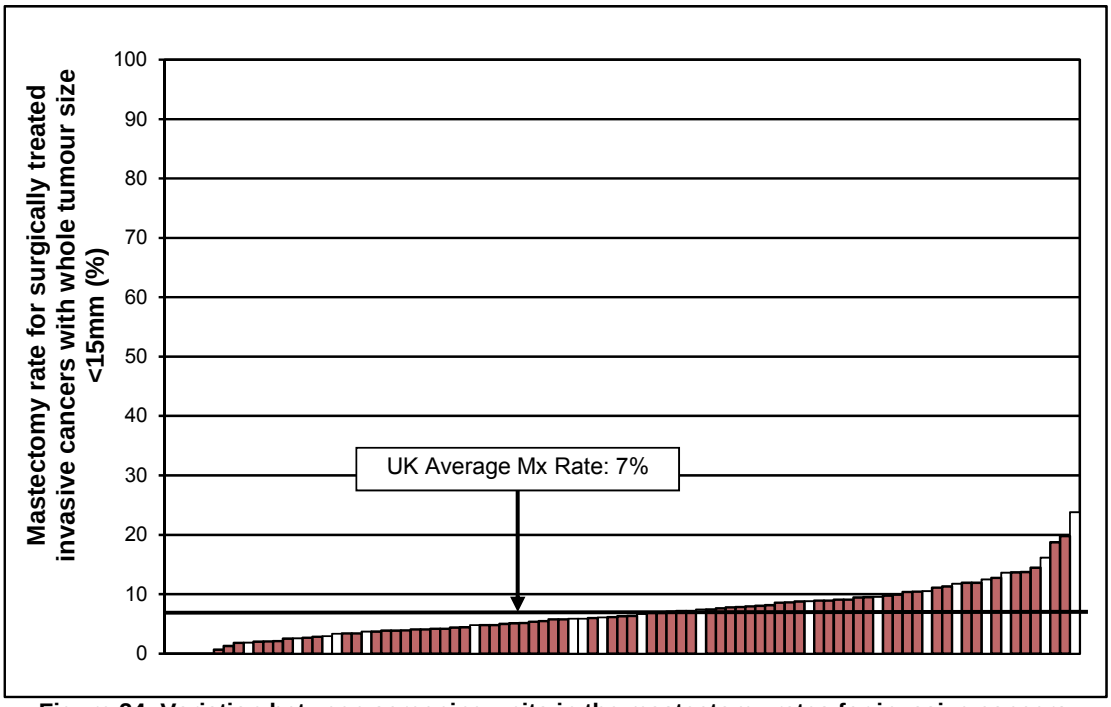

Figure 24: Variation between screening units in the mastectomy rates for invasive cancers with whole tumour size <15mm (The 20 smallest units are highlighted in white)

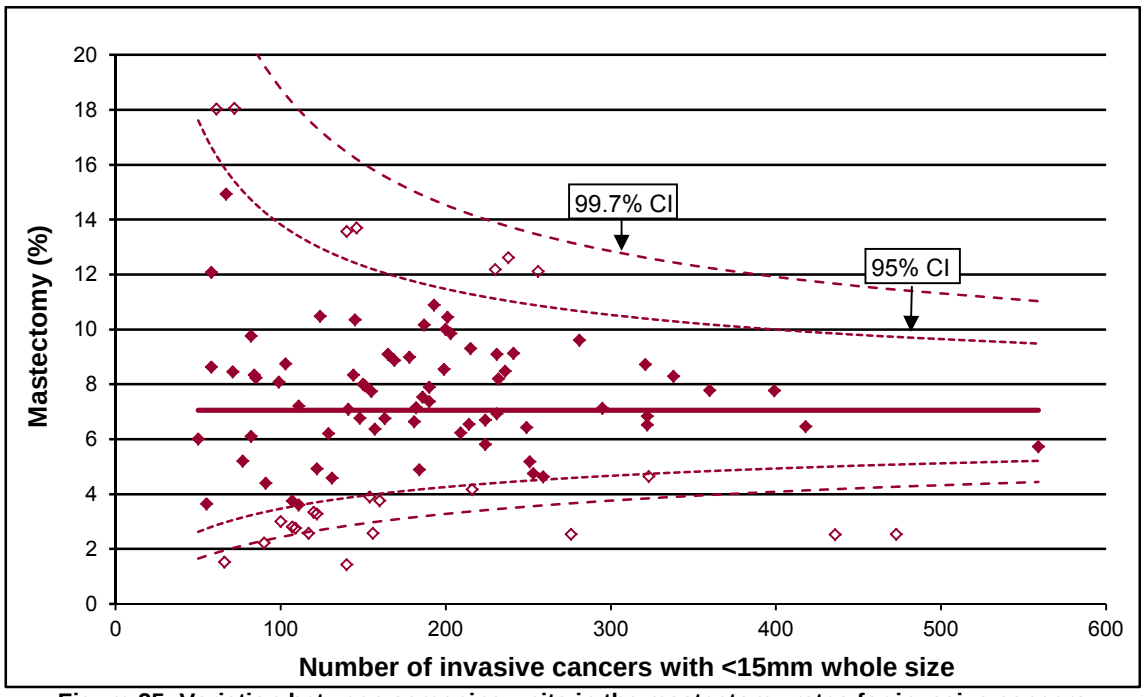

Figure 25: Variation between screening units in the mastectomy rates for invasive cancers with whole tumour size <15mm in 2011/12 to 2013/14 (open diamonds represent units which lie outside the 95% upper and lower control limits)

Figure 25 shows the variation between screening units in the mastectomy rate for invasive cancers with whole tumour size <15mm in the 3-year period 2011/12 to 2013/14. 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 7%.

Seven units have unusually high mastectomy rates above the 95% control limit [East Midlands (2), North East, Yorkshire & Humber (3), South Central (1) and Wales (1)]. Seventeen units have unusually low mastectomy rates: eight are below the 99.7% control limit [North East, Yorkshire & Humber (2), South East Coast (2), East Midlands (1), East of England (1), South West (1) and Scotland (1)] and nine are below the 95% control limit [East Midlands (2), South East Coast (1), South West (1), North East, Yorkshire & Humber (1), Scotland (1), South Central (1), East of England (1) and West Midlands (1)].

Mastectomy rates for invasive cancers with whole tumour size <15mm were the topic covered in surgical KPI S2 in last year's audit. The table below shows the outcome of the audits undertaken by QA reference centres of the 95% and 99.7% outlier units in the 3-year period 2010/11 to 2012/13 and in 2012/13. Of the 10 units audited last year, none have a high mastectomy rate for invasive cancers with whole tumour size <15mm in 2013/14 and two of the units (in East of England and North East, Yorkshire & Humber) are now low outliers for this KPI.

Region	Unit	Mx <15mm whole size 1-year 2012/13		Mx <15mm whole size 3-year 2010/11-2012/13	Mx <15mm whole size 1-year 2013/14		Outcome of QARC audit of units identified in 2014 report for follow up
		No.	%	%	No.	%	
Units audited in the 2014 report							
East of England	DNF	8	18.2	9.6		2.0	Valid explanations for all cases
East Midlands	CDN	7	15.2	9.6	5	11.9	Multi focal disease, patient choice
NEYH	BYO	6	10.0	11.7	5	7.0	Long travel distances for RT, patient choice
NEYH	ANT	11	13.4	9.0		1.3	Multi focal disease, extensive DCIS
South Central	KMK	5	20.8	16.9		13.6	Multi focal disease, co-morbidities (no RT)
South Central	KOX	10	17.2	10.6	7	13.7	Multi focal disease, previous breast cancers
South East Coast	HGU		1.9	3.4	5	2.7	Surgeons following national guidelines
West MIdlands	MBW	10	14.3	9.4	7	7.6	Valid clinical reasons + patient choice
Scotland	Unit 5	9	12.7	12.0	6	10.3	No information available
Wales	WNM	11	16.2	11.4	9	7.8	No information available
UK average		**401**	**7.1**	**7.6**	**414**	**6.8**	

99.7% low outlier
95% low outlier
99.7% high outlier
95% high outlier

No. = Number of invasive cases with Mx

Key findings

- In the UK as a whole, 78% of invasive breast cancers had breast conserving surgery.
- Two hundred and ninety eight invasive cancers (2%) had no surgery recorded within the audit period; of these 58% 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 2013/14.
- Only 7% of cancers with whole tumour size <15mm were treated with mastectomy compared to 83% 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 2011/12 to 2013/14, seven units have significantly higher mastectomy rates for small <15mm whole size cancers and 17 have significantly lower rates.

4.3 Immediate reconstruction following mastectomy

Overall, of the 20,039 cancers detected in 2013/14, 4,179 (21%) were treated with mastectomy. Of the latter cancers, 1,245 (30%) were recorded as having immediate reconstruction, 2,880 (69%) had no immediate reconstruction recorded, and for 54 (1%) it was unknown whether or not immediate reconstruction was performed (45 of these cases were from one unit in North East, Yorkshire & Humber) (Table 47).

The following summary table shows that, for all cancers, immediate reconstruction rates after a mastectomy have increased by 3 percentage points since 2011/12. In 2013/14 immediate reconstruction rates after mastectomy were almost twice as high for non/micro-invasive cancers (47%) as for invasive cancers (24%).

IMMEDIATE RECONSTRUCTION RATES FOR BREAST CANCER PATIENTS TREATED BY MASTECTOMY

Invasive Status	2011/12	2012/13	2013/14
Invasive	23%	24%	24%
Non/micro-invasive	42%	44%	47%
Overall	**27%**	**29%**	**30%**

Recorded immediate reconstruction rates for all cancers treated with mastectomy varied widely between screening units in 2013/14 (Figure 26). The highest rate was in a unit in North West, (59%) and in a West Midlands unit no immediate reconstructions were recorded.

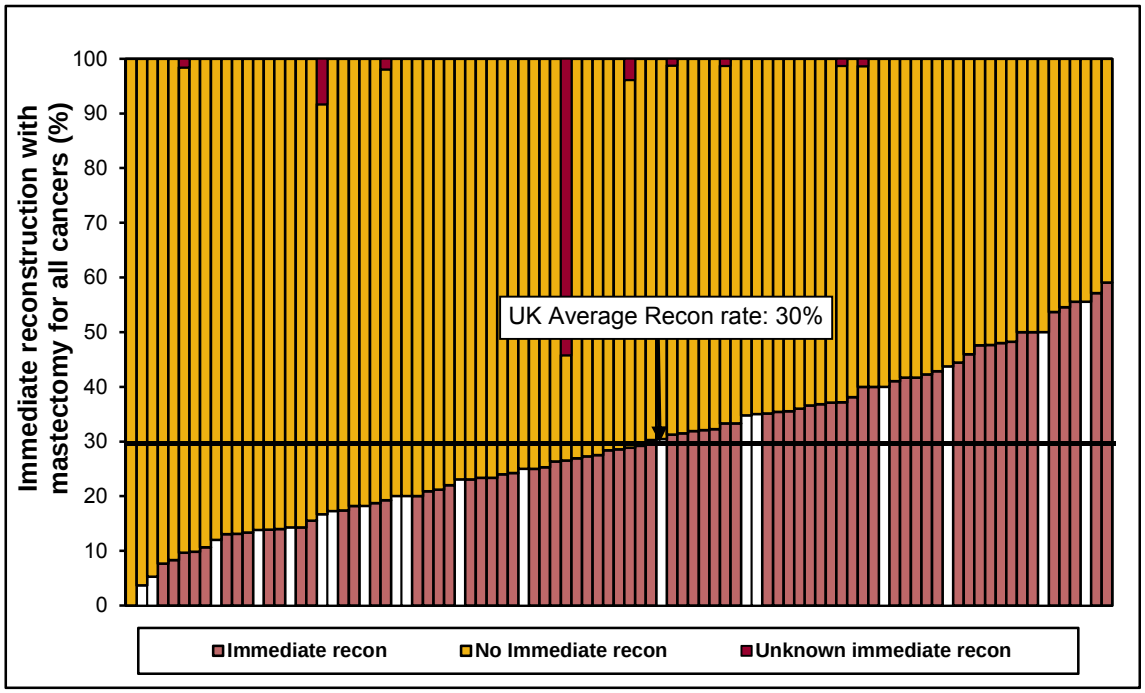

Figure 26: Variation between screening units in the proportion of all cancers in 2013/14 having immediate reconstruction following a mastectomy (the 19 smallest units are highlighted in white)

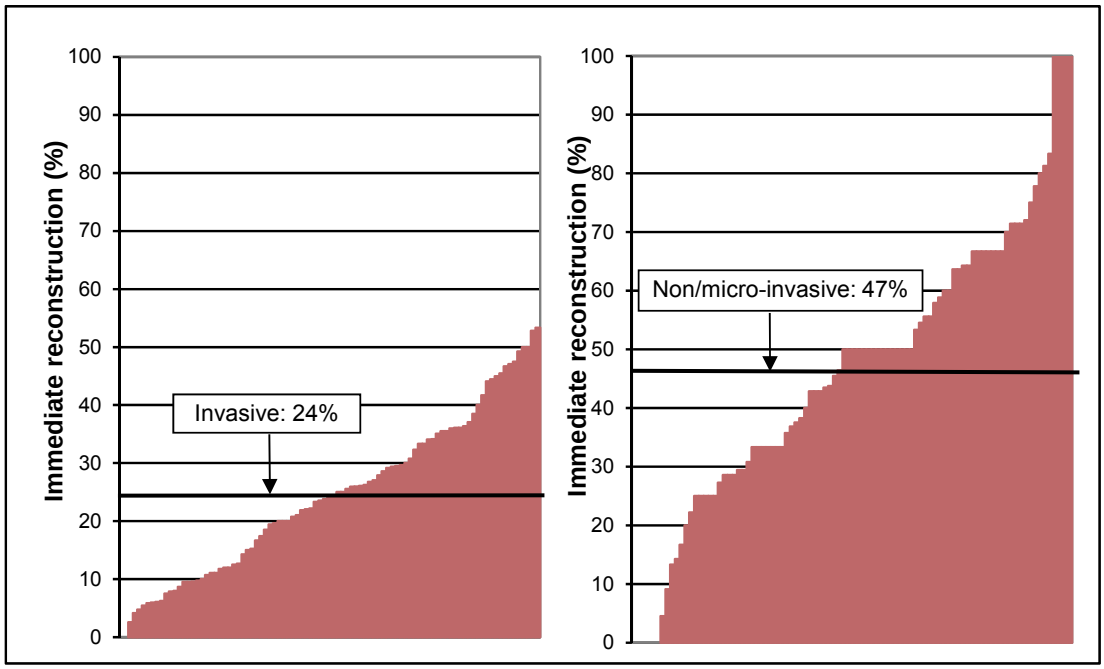

Figure 27: Variation between screening units in immediate reconstruction rates for invasive (left) and non/micro-invasive cancers (right)

Figure 27 shows the wide variation in recorded immediate reconstruction rates between screening units in 2013/14: rates for invasive cancers ranged from zero in two units [in East Midlands and Northern Ireland] to over 50% in two units [in West Midlands and South East Coast], and rates for non/micro-invasive cancers ranged from zero in six units [East of England (2), North East, Yorkshire & Humber (2), Northern Ireland (1) and South Central (1)] to over 70% in 14 units [North West (4), South East Coast (3), East of England (1), London (1), North East Yorkshire & Humber (1), Scotland (1), South Central (1), South West (1) and West Midlands (1)]. Immediate reconstruction rates were higher for non/micro-invasive cancers in the 79 units.

Figure 28 demonstrates the variation between screening units in the proportion of invasive cancers which had immediate reconstruction in the 3-year period 2011/12 to 2013/14. 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 immediate reconstruction rate (solid line). Immediate reconstruction rates which are outside the control limits are significantly lower (27 units) or higher (21 units) than the average rate of 24%.

Of the 27 units with unusually low immediate reconstruction rates, 19 are below the 99.7% control limit [North West (3), Northern Ireland (3), South Central (3), North East, Yorkshire & Humber (2), Wales (2), East Midlands (1), London (1), Scotland (1), South East Coast (1), South West (1) and West Midlands (1)] and eight are below the 95% control limit [South West (4), East of England (2), Scotland (1) and West Midlands (1)]. Of the 21 units with unusually high immediate reconstruction rates, 11 are above the 99.7% control limit [North East, Yorkshire & Humber (3), East of England (3), London (2), North West (1), South West (1) and West Midlands(1)] and 10 are above the 95% control limit [South East Coast (2), North West (2), West Midlands (2), London (1), South Central (1), North East, Yorkshire & Humber (1) and South West (1)].

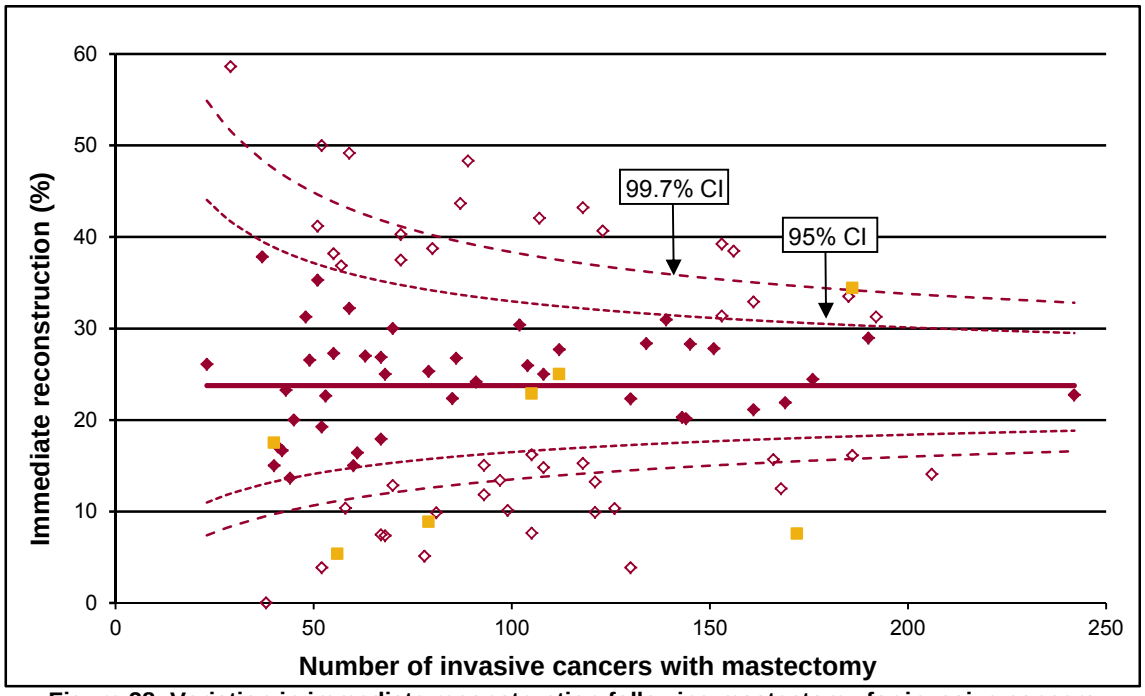

Figure 28: Variation in immediate reconstruction following mastectomy for invasive cancers in each screening unit in 2011/12 to 2013/14
Orange squares represent units which are 95% high outliers for small invasive (<15mm) cancer Mx rate
Black squares represent units which are 99.7% high outliers for small invasive (<15mm) cancer Mx rate
(Open diamonds represent units which lie outside the 95% upper and lower control limits)

The orange and black squares in Figure 28 represent units which are 95% or 99.7% high mastectomy rate outliers in Figure 25 for invasive cancers with whole tumour size <15mm. Three of these units (in East Midlands, North East, Yorkshire & Humber and Wales) are also 99.7% low outliers for immediate reconstruction for all invasive cancers in Figure 28. One of the units (in North East, Yorkshire & Humber) with a high mastectomy rate for small invasive cancers is also a 99.7% high outlier for immediate reconstruction for all invasive cancers in Figure 28. While a relatively high mastectomy rate may be acceptable for the latter unit where women have chosen to have immediate reconstruction, high mastectomy rates in units with lower than average immediate reconstruction rates warrant further examination to ensure that women were offered the appropriate treatment options.

Figure 29 demonstrates the variation between screening units in the proportion of non-invasive cancers which had immediate reconstruction in the 3-year period 2011/12 to 2013/14. 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 immediate reconstruction rate of 45% (solid line). Of the 13 units with unusually low immediate reconstruction rates, two (in South Central and Wales) are below the 99.7% control limit and 11 are below the 95% control limit [London (2), East Midlands (2), East of England (1), North West (1), Northern Ireland (1), Scotland (1), South East Coast (1), South Central (1) and West Midlands (1)]. Of the 17 units with unusually high immediate reconstruction rates, six are above the 99.7% control limit [North East, Yorkshire & Humber (2), North West (2), East of England (1) and West Midlands (1)] and 11 are above the 95% control limit [North East, Yorkshire & Humber (3), South East Coast (3), North West (1), South Central (1), East Midlands (1), East of England (1) and West Midlands (1)].

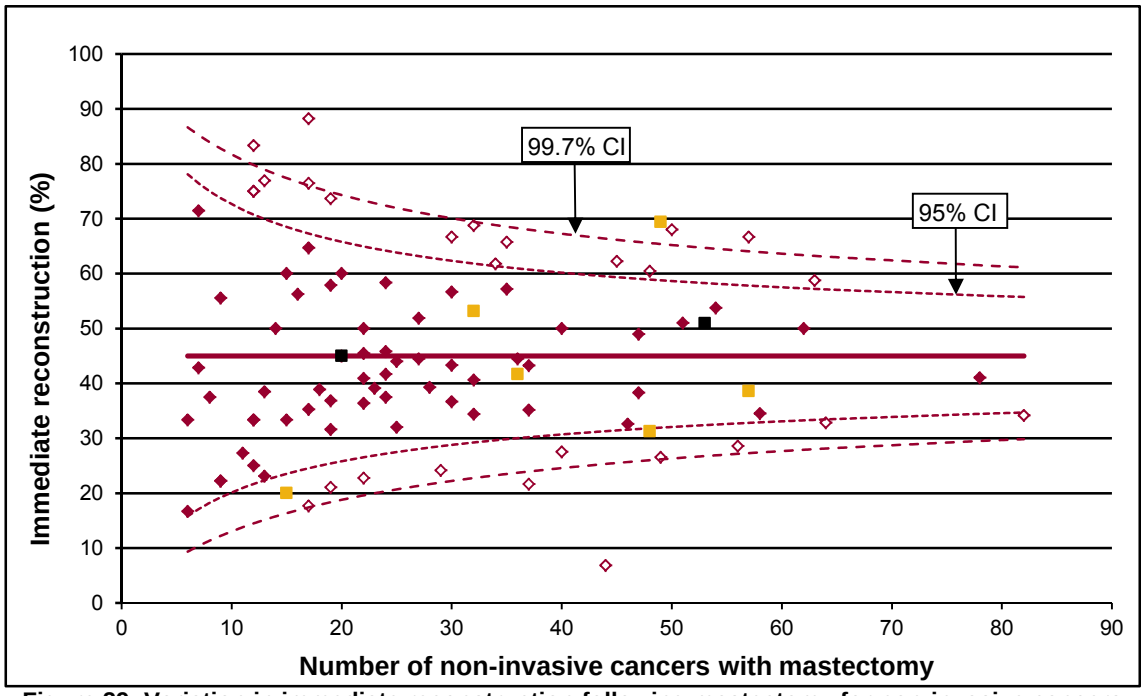

Figure 29: Variation in immediate reconstruction following mastectomy for non-invasive cancers in each screening unit in 2011/12 to 2013/14
Orange squares represent units which are 95% high outliers for non-invasive cancer Mx rate
Black squares represent units which are 99.7% high outliers for non-invasive cancer Mx rate
(open diamonds represent units which lie outside the 95% upper and lower control limits)

The orange and black squares in Figure 29 represent units which are 95% or 99.7% high mastectomy rate outliers in Figure 22 for non-invasive cancers. Two of these units (in East Midlands and North West) are also 95% low immediate reconstruction outliers for non-invasive cancers in Figure 29. One of the units (in North East, Yorkshire & Humber) with high mastectomy rates for non-invasive cancers is also a 99.7% high immediate reconstruction outlier for non-invasive cancers in Figure 29. Regional QA reference centres and regional QA surgeons should follow up the two units (East Midlands CNN and North West PBO) with high mastectomy rates and lower than average immediate reconstruction rates in the 3-year period 2011/12 to 2013/14 in order to ensure that women were offered the appropriate treatment options.

Surgery KPI S3b

Immediate reconstruction rates for non-invasive cancers
1-year low outlier units for immediate reconstruction rates for non-invasive cancers

This KPI has been used for the first time in this year's audit. It examines the proportion of non-invasive cancers treated with immediate reconstruction in the 3-year period 2011/12 to 2013/14 and in 2013/14. The following summary table shows the units that are 95% low outliers for immediate reconstruction in 2011/12 to 2013/14 and in 2013/14. The table also shows the mastectomy rates for non-invasive cancers in each of these units in 2011/12 to 2013/14 (see Figure 29) and in 2013/14 (see KPI S3a). Where blanks appear in the number columns, fewer than five non-invasive cancers in a unit had a mastectomy and/or immediate reconstruction.

Region	Unit	Mastectomy non-invasive 1-year 2013/14		Immediate reconstruction non-invasive 1-year 2013/14		Mastectomy non-invasive 3-year 2011/12-2013/14	Immediate reconstruction non-invasive 3-year 2011/12-2013/14
		No.	%	No*.	%	%	%
New units identified in 2015							
East Midlands	KKE	10	33.3	9	10.0	31.0	36.4
East Midlands	KNN	7	25.9	5	28.6	29.3	22.7
East Midlands	CDS	20	35.1	8	60.0	41.4	50.9
East Midlands	CNN	5	50.0		20.0	40.5	20.0
East of England	DGY	6	37.5	5	16.7	25.5	23.1
East of England	DSU		4.3		0.0	16.9	75.0
East of England	DSW	6	18.2	5	16.7	20.0	33.3
East of England	ELD	20	18.7	12	40.0	17.7	26.5
East of England	FEP		8.3		0.0	26.7	25.0
East of England	DNF	11	36.7		72.7	35.2	53.1
London	EBA	23	18.0	11	52.2	24.5	34.1
London	HWA	23	28.0	13	43.5	26.3	32.8
NEYH	AWC		10.5		0.0	20.3	33.3
NEYH	CBA		15.4		0.0	17.6	16.7
NEYH	AGA	15	30.0	5	66.7	33.8	69.4
NEYH	ANE	24	35.3	7	70.8	27.9	66.7
NEYH	ANT	14	25.9	5	64.3	34.1	38.6
NEYH	CRO	8	61.5		50.0	52.6	45.0
North West	PBO	15	29.4	11	26.7	34.3	31.3
South Central	JSO	8	20.5		50.0	31.5	27.5
South Central	KHW		12.5		0.0	13.0	22.2
South Central	KRG	15	26.8	13	13.3	28.0	21.6
South Central	KWI		10.7		0.0	9.0	33.3
South East Coast	HWO	9	16.1	6	33.3	18.8	24.1
South West	LSO	15	45.5	7	53.3	35.3	41.7
West Midlands	MSH	7	21.9	5	28.6	18.3	21.1
Northern Ireland	ZNI1		25.0		25.0	35.4	17.6
Northern Ireland	ZNS1		28.6		0.0	29.2	42.9
Scotland	Unit 8	17	19.8	12	29.4	21.1	28.6
Scotland	Unit 7	7	50.0	7	28.6	29.7	27.3
Wales	WSW	22	33.8	21	4.5	26.7	6.8
UK average		**946**	**23.3**	**498**	**47.4**	**24.3**	**45.0**

95% immediate reconstruction low outlier in 2011/12-2013/14
95% immediate reconstruction low outlier in 2013/14

95% mastectomy high outlier in 2011/12-2013/14
95% mastectomy high outlier in 2013/14

No. = Number with mastectomy
No* = Number without immediate reconstruction
Blank in No. or No*. columns = <5 cases

In 2013/14, 12 units were 95% low outliers for immediate reconstruction but only seven [East of England (2), East Midlands (1), South Central (1) and Wales (1)] had five or more cancers without immediate reconstruction. Two of these units (in South Central and Wales) were also 95% low immediate reconstruction outliers in the 3-year period 2011/12 to 2013/14. There were 11 units that were 95% low outliers for immediate reconstruction in the 3-year period 2011/12 to 2013/14 that were not 95% low outliers in 2013/14. Regional QA reference centres and regional

QA surgeons should follow up the five units (East Midlands KKE, East of England DGY and DSW, South Central KRG and Wales WSW) that were 95% low outliers and had five or more non-invasive cancers without immediate reconstruction in 2013/14 to ascertain the reason for this clinical practice. The two units (East Midlands CNN and North West PBO) with high mastectomy rates and lower than average immediate reconstruction rates for non-invasive cancers in the 3-year period 2011/12 to 2013/14 should also be followed up in order to ensure that women were offered the appropriate treatment options including access to immediate breast reconstruction.

Key findings

- Of the cancers treated with mastectomy in 2013/14, 30% were recorded as having immediate reconstruction. The highest immediate reconstruction rate was in a unit in North West (59%), and in one unit in West Midlands no immediate reconstructions were recorded.
- Immediate reconstruction rates after mastectomy were almost twice as high for non/micro-invasive cancers (47%) as for invasive cancers (24%).
- For invasive cancers treated with mastectomy, immediate reconstruction rates in 2013/14 varied from over 50% in two units to zero in two units. For non/micro-invasive cancers, immediate reconstruction rates varied from 70% in 14 units to zero in 6 units.
- In 2011/12 to 2013/14, 21 units had significantly higher immediate reconstruction rates for invasive cancers and 27 had significantly lower rates.
- Three units (in East Midlands, North East, Yorkshire & Humber and Wales) which are high mastectomy rate outliers for invasive cancers with whole tumour size <15mm are also 99.7% low immediate reconstruction outliers for all invasive cancers, and one unit (in North East, Yorkshire & Humber) with a high mastectomy rate for small invasive cancers is also a 99.7% high immediate reconstruction outlier for all invasive cancers.
- While a relatively high mastectomy rate may be acceptable for the latter units where women had chosen to have immediate reconstruction, high mastectomy rates in units with lower than average immediate reconstruction rates warrant further examination to ensure that women were offered the appropriate treatment options.
- Regional QA reference centres and regional QA surgeons should follow up the five units (East Midlands KKE, East of England DGY and DSW, South Central KRG and Wales WSW) that are 95% low outliers and have five or more non-invasive cancers without immediate reconstruction in 2013/14 to ascertain the reason for this clinical practice. The two units (East Midlands CNN and North West PBO) with high mastectomy rates and lower than average immediate reconstruction rates for non-invasive cancers in the 3-year period 2011/12 to 2013/14 should also be followed up to ensure that women were offered the appropriate treatment options.

4.4 Neo-adjuvant therapy

A total of 883 women received neo-adjuvant therapy in 2013/14 (Table 48). The 883 cancers treated with neo-adjuvant therapy included 863 invasive cancers (5% of all invasive cancers) and 20 non-invasive cancers. Of the 20 women with non-invasive cancer receiving neo-adjuvant therapy, two received neo-adjuvant chemotherapy and 18 received neo-adjuvant endocrine therapy.

Two hundred and ninety eight women with invasive breast cancer (2%) (Table 43) had no surgery recorded within the audit time period. Of these, 173 (58%) 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, 36% (31 cases) of whom had no surgery recorded. Of the women aged less than 50 years who had neo-adjuvant endocrine therapy recorded, 33% (3 cases) had no surgery recorded.

Use of neo-adjuvant therapies			
Age	**Chemotherapy**	**Trastuzumab**	**Endocrine therapy**
<50	5.8%	0.0%	1.1%
50 – 64	3.7%	0.4%	2.4%
65 – 70	1.5%	0.3%	3.0%
71+	0.8%	0.0%	5.0%

4.4.1 Neo-adjuvant endocrine therapy

Of the 457 breast cancers (2%) with neo-adjuvant endocrine therapy recorded (Table 49), 439 were invasive and 18 were non-invasive. One hundred and twenty four (27%) had no surgery recorded within the audit period, and 35 (8%) also had other neo-adjuvant therapy. Of the 457 cancers, 442 (97%) were ER and/or PR positive, 12 (3%) had unknown ER and PR status, and the remaining three (1%) were ER and PR negative. It was not known whether the endocrine receptor status was determined from the core biopsy or from resection specimens. Three hundred and twenty seven (72%) of the women who received neo-adjuvant endocrine therapy were diagnosed aged 60 or over.

4.4.2 Neo-adjuvant chemotherapy

Neo-adjuvant chemotherapy was recorded for 454 invasive breast cancers (3% of all invasive cancers diagnosed in 2013/14) (Table 50). Of the 454 invasive cancers for which neo-adjuvant chemotherapy was recorded, 65 (14%) did not have surgery recorded within the audit period. A further 76 (17%) had surgery, but no malignant component was found in the surgical specimen, indicating a complete pathological response had occurred.

Of the 454 invasive cancers treated with neo-adjuvant chemotherapy, the pre-treatment mammographic size was known for 305 (67%). Of these, 180 (40%) were larger than 20mm in diameter, and 125 (28%) were 20mm or less in diameter on mammography. Of the 454 invasive cancers, 266 (59%) had an abnormal axillary ultrasound result and 257 (57%) had an axillary needle biopsy. For 206 (80%) of those undergoing an axillary needle biopsy a C5/B5 result was recorded. Only 23 (5%) of the 454 invasive cancers treated with neo-adjuvant chemotherapy were grade 1 (at core and/or surgery) and 399 (88%) were grade 2 or 3. Six cancers were small (20mm or less), grade 1 and had a normal axillary ultrasound result. Of the 454 invasive

cancers, 204 (45%) had breast conserving surgery and 184 (41%) had a mastectomy. One hundred and fifty seven cancers (35%) were treated with a mastectomy at first operation: 16 (4%) after axilla only surgery and 11 (2%) after breast conserving surgery.

4.4.3 Neo-adjuvant trastuzumab

In the UK as a whole in 2013/14, 51 breast cancers (all invasive) were recorded as having received neo-adjuvant trastuzumab (Table 51). Of these, 49 were HER-2 positive, one was HER-2 negative and one had borderline HER-2 status. Of the 51 cancers treated with trastuzumab, 46 (90%) also had neo-adjuvant chemotherapy recorded and five (10%) also had neo-adjuvant endocrine therapy recorded.

Key findings

- A total of 883 women received neo-adjuvant therapy in 2013/14. Of these, 863 had invasive breast cancer and 20 had non-invasive breast cancer.
- Of the 298 women with invasive breast cancer who did not have surgery within the audit time period, 58% had neo-adjuvant therapy recorded.
- The use of neo-adjuvant endocrine therapy was highest in older women aged 71 years or more, 36% (31 cases) of whom had no surgery recorded.
- Of the 457 women (2%) with neo-adjuvant endocrine therapy recorded, 97% had cancers which were ER and/or PR positive, 3% had cancers with unknown ER and PR status, and 1% had cancers which were ER and PR negative; 124 (27%) women had no surgery and 72% were aged 60 years or over.
- Neo-adjuvant chemotherapy was recorded for 454 invasive cancers (3% of all invasive cancers diagnosed in 2013/14).
- 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.
- Fifty one women with invasive cancers recorded as having received neo-adjuvant trastuzumab. Of these only 46 (90%) 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, while 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 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 2013/14, 625 consultant breast surgeons treated women with breast cancers diagnosed through the UK NHSBSP. Of the 625 consultant surgeons included in the audit (Table 52), 75 treated women from more than one region and their overall caseload was allocated to only one region. Six hundred and twenty surgeons were identified by their unique GMC registration code and five surgeons were identified by their name. All five of these surgeons were in Scotland and have been assumed to be five individual surgeons for the purposes of the audit.

The 14-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 be consistently over 90% since 2004/05. In 2013/14, 83% of women were treated by surgeons with an annual caseload of more than 30 screen-detected cancers, and only 2% (490 women) were treated by surgeons with an annual caseload of fewer than 10 screen-detected cancers (Table 53). Of the 152 surgeons treating fewer than 10 screening cases per year (Table 56), 53 (35%) had a symptomatic caseload of more than 30 cases per year, 35 (23%) either joined or left the NHSBSP during 2012/13, 21 (14%) were plastic surgeons, 16 (11%) were in private practice, seven (5%) had other reasons and for 20 (13%) no information was provided.

14-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
2013/14	625	30	92	152	20

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

Combining the data submitted for the 2011/12, 2012/13 and 2013/14 NHSBSP & ABS audits, an annual average screening caseload could be calculated for 752 consultant surgeons who managed or treated patients with screen-detected breast cancers. Seven hundred and twenty one surgeons were identified by their unique GMC registration code. Of the remaining 31 surgeons, 16 were from Scotland and five were confirmed as overseas surgeons. Of these 31 surgeons, seven were identified by their name and 24 unidentified surgeons were assumed to be individual surgeons for the purposes of the audit. It is possible that these 31 surgeons may have been treating women in other parts of the UK and that their caseload is higher than that calculated. Of the 752 surgeons (Table 54), 161 (21%) surgeons treated patients from more than one region and their overall caseload was allocated to only one region.

Surgical caseload and number of women treated in 2011/12 to 2013/14				
Caseload	***Surgeons***		***Women treated***	
	No.	***%***	***No.***	***%***
<10	*256*	*34*	*1,763*	*3*
10-29	*189*	*25*	*11,143*	*19*
30-49	*185*	*25*	*21,698*	*37*
50-79	*107*	*14*	*19,809*	*34*
80-99	*9*	*1*	*2,385*	*4*
100+	*6*	*1*	*2,175*	*4*
Total	***752***	***100***	***58,973***	***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 2011/12 to 2013/14 and the number of women treated by surgeons in each caseload group. Of the 752 surgeons examined, 256 (34%) had a caseload of fewer than 10 screening cases per annum, but these surgeons treated only 3% of women. The six surgeons who had a caseload of more than 100 screening cases per year treated only 4% of women. It is possible that some of these women were not personally operated on by these very high caseload surgeons, and that their operations were performed by associate specialists or trainees under consultant surgeon direction.

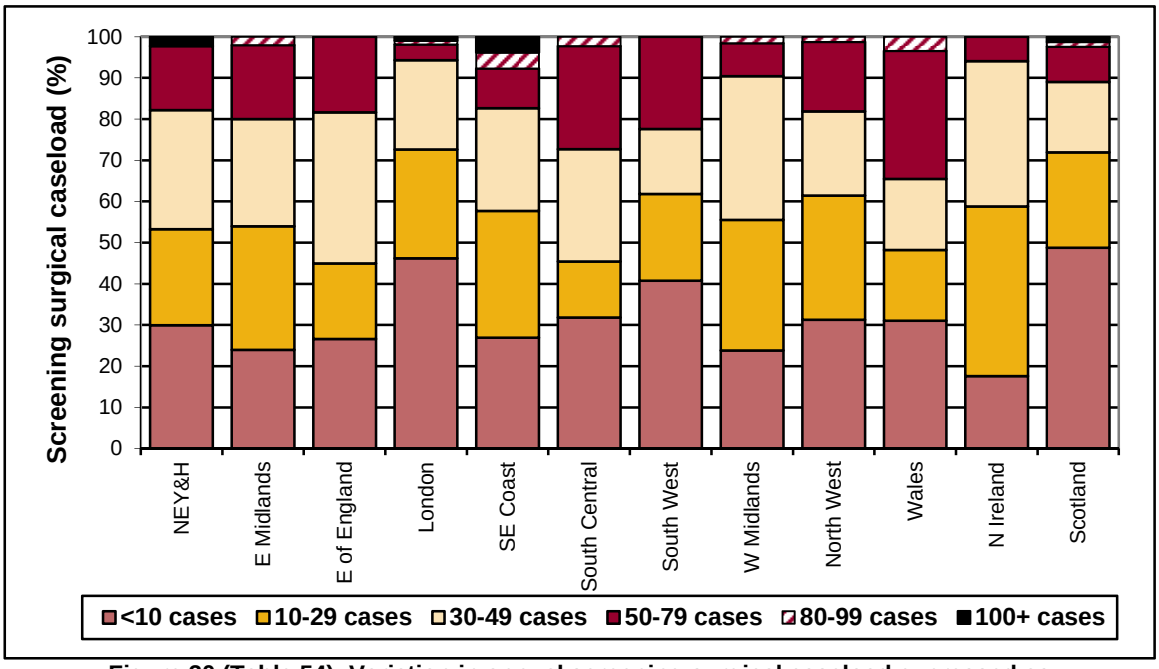

Figure 30 (Table 54): Variation in annual screening surgical caseload expressed as number of cases per surgeon (3-year data 2011/12 to 2013/14)

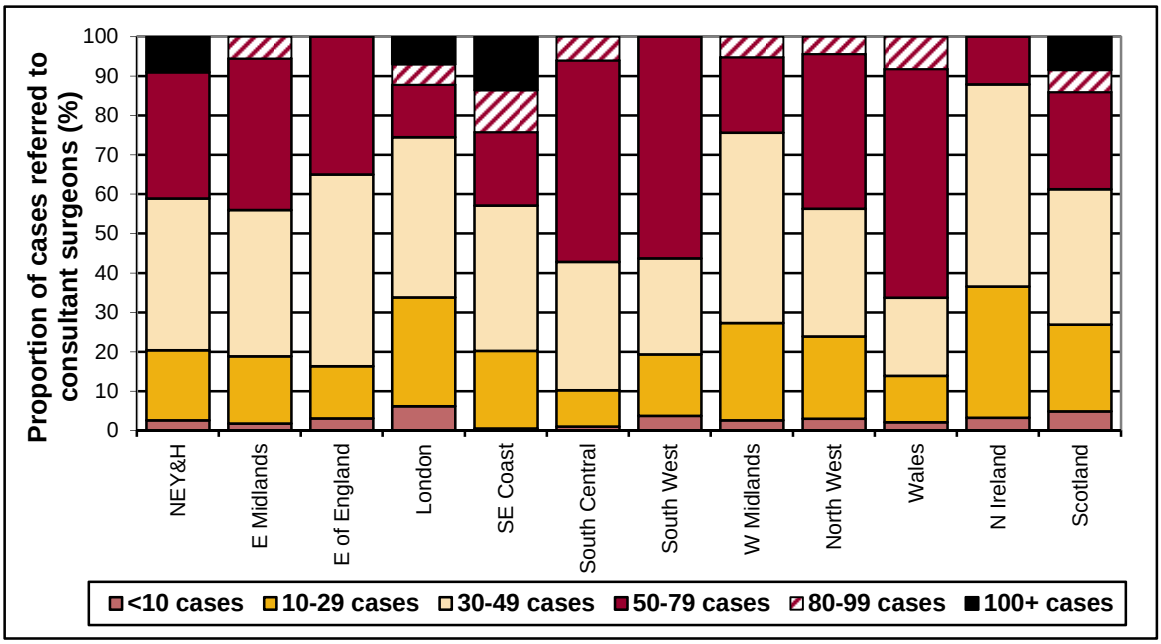

Figure 31 (Table 55): Variation in the proportion of women treated by surgeons with differing screening caseloads (3-year data 2011/12 to 2013/14)

The variation in screening surgical caseload in each region in the 3-year period 2011/12 to 2013/14 is shown in Figure 30. The highest proportions of surgeons with a screening caseload of fewer than 10 screening cases per annum were in Scotland (49%) and London (46%). Surgical specialisation was highest in Northern Ireland, where only three surgeons (18%) treated fewer than 10 screening cases per annum. Figure 31 shows the variation in the proportion of women treated by surgeons with differing average annual screening caseloads in the 3-year period 2011/12 to 2013/14. In Scotland and London, 5% (240 cases) and 6% (344 cases) of women respectively were treated by surgeons with an average annual screening caseload of fewer than 10 cases (Table 55).

A list of six 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 32.

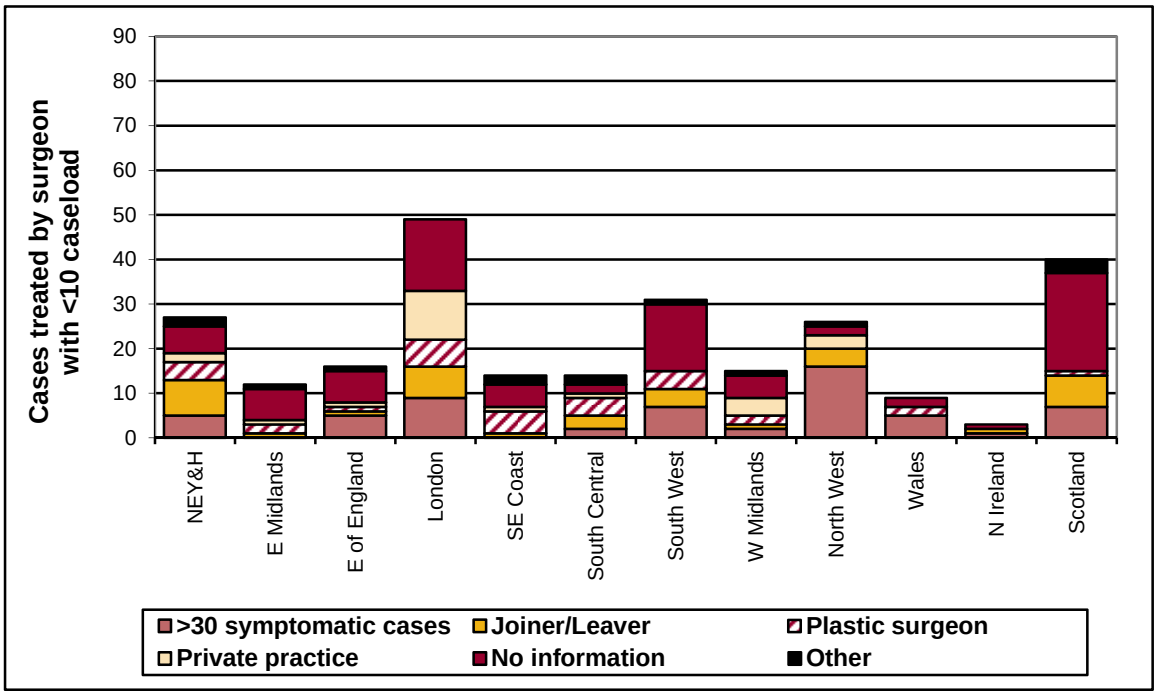

Figure 32 (Table 57): Explanations provided for surgeons treating fewer than 10 screening cases per annum (3-year data 2011/12 to 2013/14)

Of the 256 surgeons in the UK with an average annual screening caseload of fewer than 10 cases per annum in the 3-year period 2011/12 to 2013/14, 59 (23%) treated more than 30 symptomatic breast cancers each year during this period and 38 (15%) either joined or left the NHSBSP during the 3-year period (Table 57). Other reasons (plastic surgeon, private practice) were given for 55 surgeons (21%). Eleven (46%) of the 24 surgeons who had an average annual screening caseload of fewer than 10 cases due to private practice were in London. For 14 surgeons who treated a total of 52 women, a reason other than one of the six listed reasons was provided. There was no information provided to explain the low average annual screening caseload recorded for 90 surgeons who treated a total of 870 women. Twenty two (24%) of these surgeons were in Scotland, 16 (18%) were in London and 15 (17%) were in South West (Table 57).

Key findings

- In 2013/14, 625 consultant breast surgeons treated women diagnosed in the UK NHSBSP.
- Ninety two percent of women were treated by a surgeon with a screening caseload of at least 20 cases.
- One hundred and fifty two surgeons treated fewer than 10 screen-detected cases.
- Of the 152 surgeons treating fewer than 10 screening cases per year, 53 (35%) had a symptomatic caseload of more than 30 cases per year and 35 (23%) either joined or left the NHSBSP during 2013/14.
- Combining the data submitted for the 3-year period 2011/12 to 2013/14, 256 surgeons (34%) had an annual average caseload of fewer than 10 cases and six 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 (49%) and London (46%).
- Surgical specialisation was highest in Northern Ireland, where only three surgeons treated fewer than 10 screening cases per year.
- During the period 2011/12 to 2013/14, of the 256 low caseload surgeons, 23% treated more than 30 symptomatic breast cancers each year, and 15% either joined or left the NHSBSP.
- Eleven of the 24 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 90 surgeons treating a total of 870 women in the 3-year period 2011/12 to 2013/14. Twenty two of these surgeons were in Scotland.

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 cases with a non-operative diagnosis is the same as the total number of operations. It should also be noted that attempting axillary surgery does not necessarily mean that axillary lymph nodes are harvested successfully. Conversely, incidental axillary lymph nodes can be obtained during a mastectomy or breast conserving surgery procedure.

In the UK as a whole, 4,424 (22%) of the 19,668 surgically treated breast cancers (with known invasive status) had more than one operation; 3,372 invasive cancers (22%) and 1,052 non/micro-invasive cancers (26%) had more than one operation (Table 58).

Table 59 shows the repeat operation rates in each region for the 649 surgically treated breast cancers (with known invasive status) that did not have a non-operative diagnosis. Although the overall repeat operation rate for these cancers was 45% (289 cases), repeat operations for cancers without a non-operative diagnosis formed only 7% of the total repeat operations. Of the 130 invasive cancers without a non-operative diagnosis, 111 (85%) had a repeat operation. Only 34% (178 cases) of the 519 non/micro-invasive cancers without a non-operative diagnosis had a repeat operation.

Of the remaining 360 surgically treated breast cancers (with known invasive status) without a non-operative diagnosis which had only one operation, one had a mastectomy alone. A further 359 had breast conserving surgery; 305 (85%) of these had clear margins (tumour removed no further operation), 52 (14%) had involved or unknown margin status and two had no residual tumour found at surgery. Of the 52 cancers with involved or unknown margin status, 23 (44%) had LCIS only and therefore had no further surgery. Twenty nine cancers were not LCIS and had no further surgery despite the margins being involved or of unknown status. None of these 29 cancers received neo-adjuvant therapy, and 21 were treated 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 19,021 surgically treated cancers with a non-operative diagnosis, 4,135 (22%) underwent more than one therapeutic operation. This is the same as the repeat operation rate for all surgically treated cancers (with known invasive status). Twenty one percent of the 15,413 surgically treated invasive cancers with a non-operative diagnosis (3,261 cancers) and 24% of the 3,606 surgically treated non/micro-invasive cancers with a non-operative diagnosis (874 cancers) underwent more than one therapeutic operation.

Of the 15,711 invasive cancers with a non-operative diagnosis, 12,724 were initially treated by therapeutic breast conserving surgery. Of these, 22% had repeat therapeutic operations (Table 60): 225 cancers had three operations and 19 had more than three operations. Of the 2,854 non/micro-invasive cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery, 27% had repeat therapeutic operations (Table 61). Of these, 90 had three operations and 13 had more than three operations. Regional QA reference centres and QA surgeons should follow up the 19 invasive and 13 non/micro-invasive cancers with more than three therapeutic operations to determine the reason for this unusual clinical practice.

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.

Repeat operations			
Cohort	**All cases**	**Repeat operations**	**% with repeat operations**
All surgically treated cancers	**20,039**	**4,425**	**22**
Invasive (Table 58)	15,543	3,372	22
Non/micro-invasive (Table 58)	4,125	1,052	26
Surgically treated cancers without a non-operative diagnosis	**650**	**290**	**45**
Invasive (Table 59)	130	111	85
Non/micro-invasive (Table 59)	519	178	34
Surgically treated cancers with a non-operative diagnosis	**19,021**	**4,135**	**22**
Invasive (Section 6.2)	15,413	3,261	21
Non/micro-invasive (Section 6.2)	3,606	874	24
Invasive - B5b (Table 62)	14,552	2,746	19
Invasive - C5 only no B5 (Table 63)	8	2	25
Invasive - B5a (Table 64)	778	489	63
Non/micro-invasive - B5a (Table 65)	3,552	862	24
Invasive - initially treated with BCS (Table 60)	12,724	2,765	22
Non/micro-invasive - initially treated with BCS (Table 61)	2,854	772	27

Invasive cancers with a B5b core biopsy diagnosis had the lowest proportion of repeat operations (19%). 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 (63%).

Overall, 3,402 (79%) of the 4,330 surgically treated cancers with a B5a (non-invasive) core biopsy result (Table 10) were confirmed following surgery to be non/micro-invasive and 774 (18%) were identified as having invasive disease. Ninety eight percent (14,292) of the 14,553 cancers with a B5b (invasive) core biopsy result (Table 11) 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 239 B5b (invasive) cancers with a first operation involving only the axilla (Figure 33), 224 (94%) used an SLNB procedure and for three of the seven cases where the only operation was to the axilla, an SLNB procedure was used. Forty seven (20%) of the 239 B5b (Invasive) cancers with a first operation involving only the axilla had neo-adjuvant therapy and two of these had no further surgery. However, surgery might have taken place after the audit data submission. 199 (83%) of the 239 B5b (Invasive) cancers had a subsequent mastectomy and 135 of these had immediate reconstruction.

Key findings

- Overall, 22% (4,424) of surgically treated breast cancers had more than one operation.
- Eighty five percent of invasive cancers and 34% of non/micro-invasive cancers without a non-operative diagnosis had a repeat operation. Although the overall repeat operation rate for the 649 surgically treated cancers (with known invasive status) without a non-operative diagnosis was 45%, repeat operations for cancers without a non-operative diagnosis formed only 7% of the total repeat operations.
- Twenty nine cancers without a non-operative diagnosis, which were not LCIS, had no further surgery despite the margins being involved or of unknown status. Twenty one of these cancers were treated in Scotland, where margin data were not available.
- Overall, 22% (4,135) of surgically treated breast cancers with a non-operative diagnosis had more than one operation; 21% of invasive cancers and 24% of non/micro-invasive cancers with a non-operative diagnosis had a repeat therapeutic operation.
- Thirteen cancers with a non-operative diagnosis and initially treated by therapeutic breast conserving surgery had more than three therapeutic operations.
- The repeat operation rate was 24% for non/micro-invasive cancers with a B5a (non-invasive) core biopsy and 19% for invasive cancers with a B5b (invasive) core biopsy. Invasive cancers with a B5a (non-invasive) core biopsy had the highest repeat operation rate (63%).

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 33 shows the flow chart for cancers with a B5b (invasive) core biopsy, Figure 34 for non/micro-invasive cancers with a B5a (Non-invasive) core biopsy and Figure 35 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.

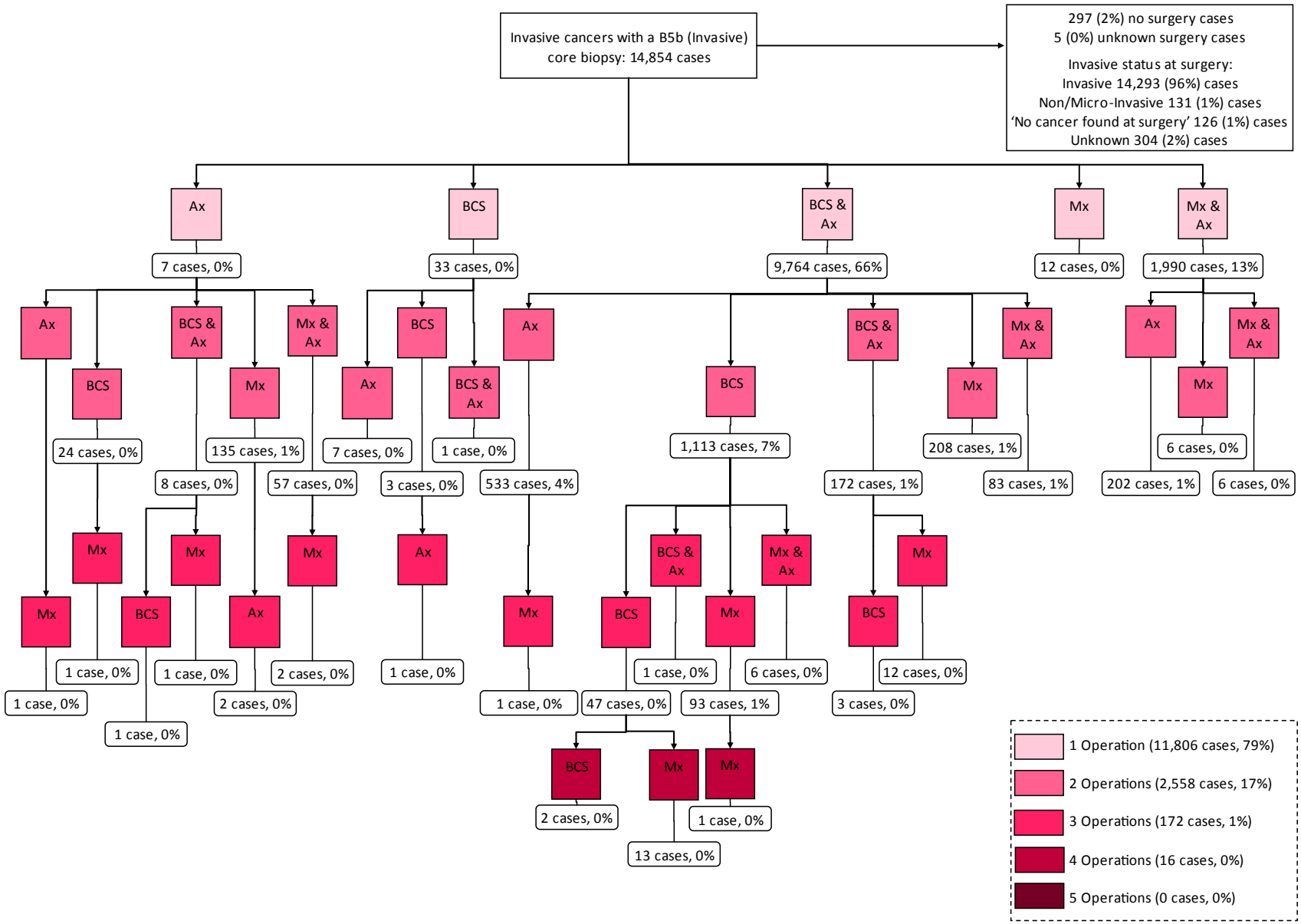

Figure 33: Sequence of operations for invasive cancers with a B5b (invasive) core biopsy

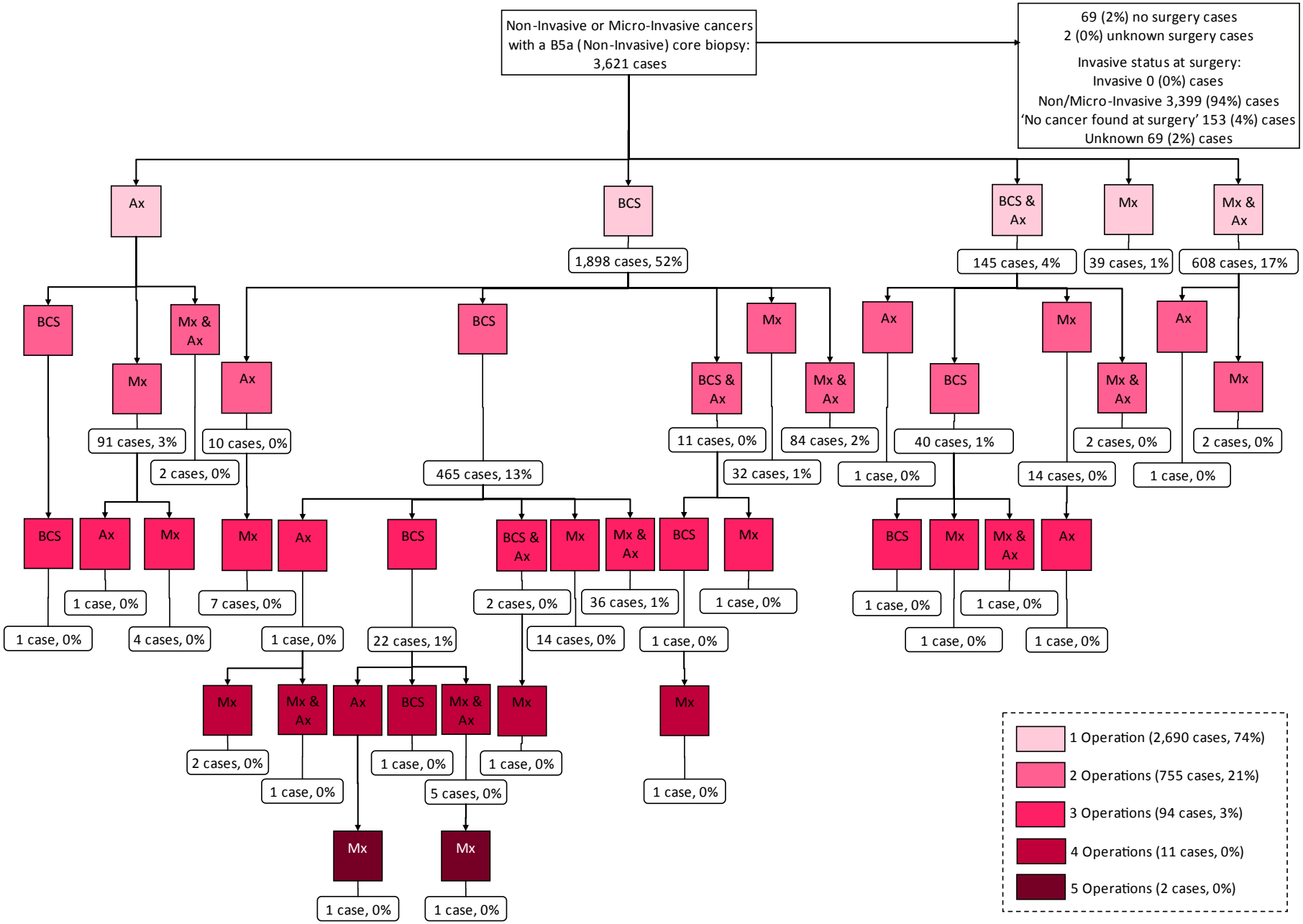

Figure 34: Sequence of operations for non/micro-invasive cancers with a B5a (non-invasive) core biopsy

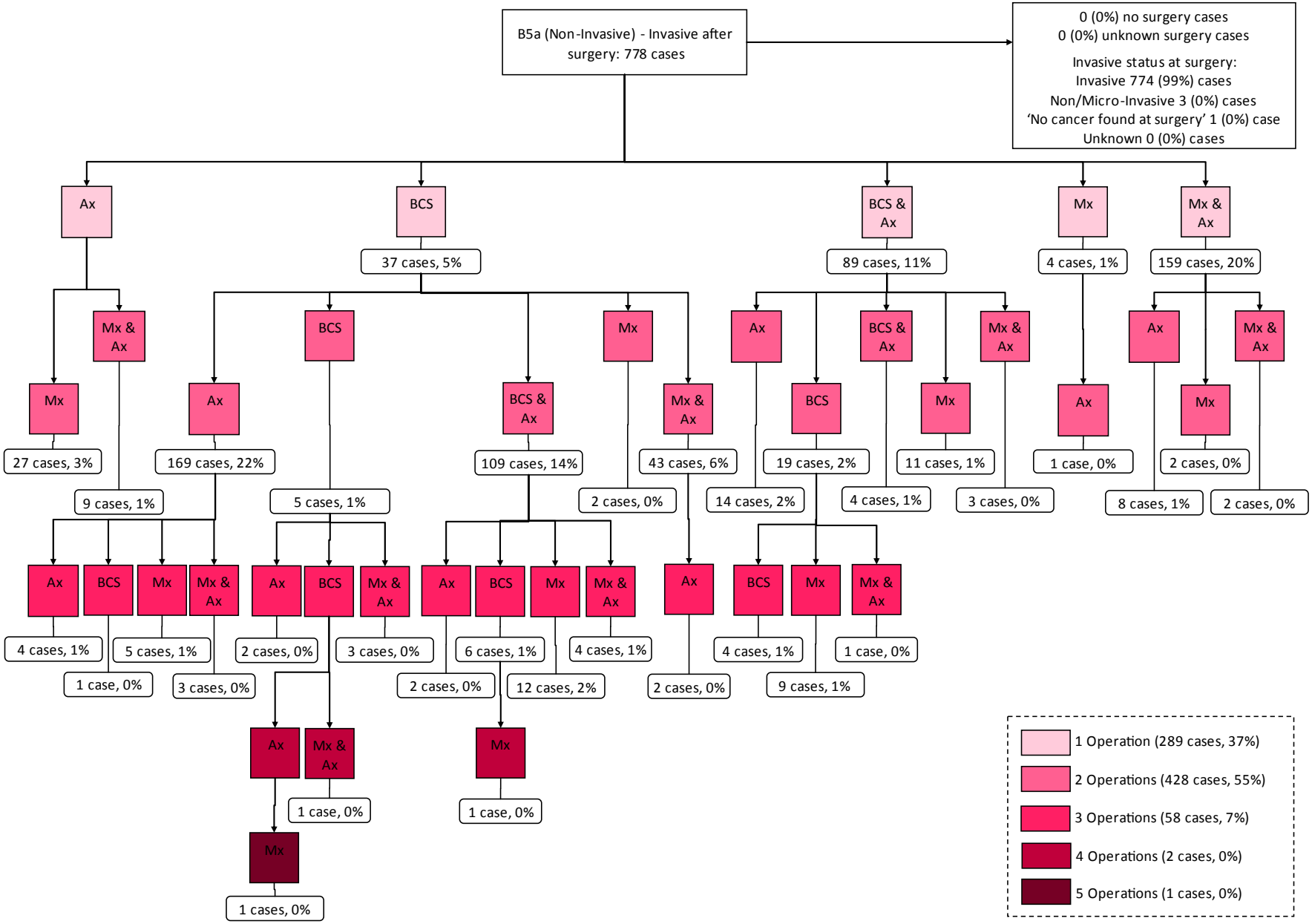

Figure 35: Sequence of operations for cancers with a B5a (non-invasive) core biopsy determined to be invasive after surgery

6.4 Repeat surgery to clear margins

In the UK as a whole, 18% 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; 13% had repeat breast conserving surgery (Table 66) and 5% had their initial breast conserving surgery converted to a mastectomy (Table 67).

Repeat operation rates to clear margins (breast conserving surgery or mastectomy) were higher for non/micro-invasive cancers than for invasive cancers (24% compared to 16%). Repeat operation rates for non/micro-invasive cancers varied between screening units from 7% in two units (in East Midlands and Scotland), to 53% in a unit in West Midlands. Repeat operation rates for invasive cancers varied between screening units from 5% in a unit in North East, Yorkshire & Humber to 31% in a unit in East of England.

The following summary table shows for cancers with various non-operative diagnoses, the proportion initially treated with breast conserving surgery that had repeat breast conserving surgery to clear margins. In the UK as a whole, 11% of invasive cancers with a B5b (invasive) non-operative diagnosis had repeat breast conserving surgery to clear margins. 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 (27%).

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	1,343	11	1	13	152	27	544	19
Initially treated with breast conserving surgery but went on to have mastectomy	417	3	2	25	101	18	205	7

In the UK as a whole, 3% of invasive cancers with a B5b (invasive) non-operative diagnosis, initially treated with breast conserving surgery, 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 2013/14, 13% of all cancers with a non-operative diagnosis had repeat breast conserving surgery (Table 66). The proportion of all cancers having repeat breast conserving surgery varied widely between screening units (Figure 36). Seven units (four of which were

small) had repeat rates above 20%, and for 25 units (three of which were small) the rate was below 10%.

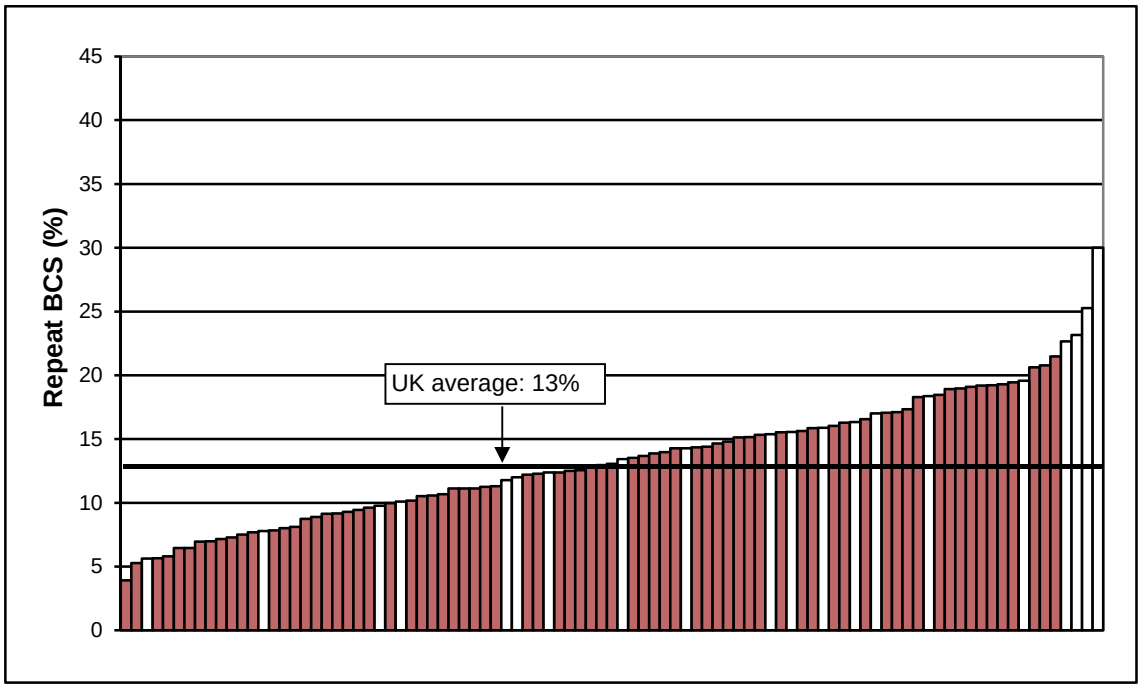

Figure 36: Variation between screening units in the proportion of cancers with a non-operative diagnosis which were initially treated with breast conserving surgery and had repeat breast conserving surgery to clear margins (the 20 smallest units are highlighted in white)

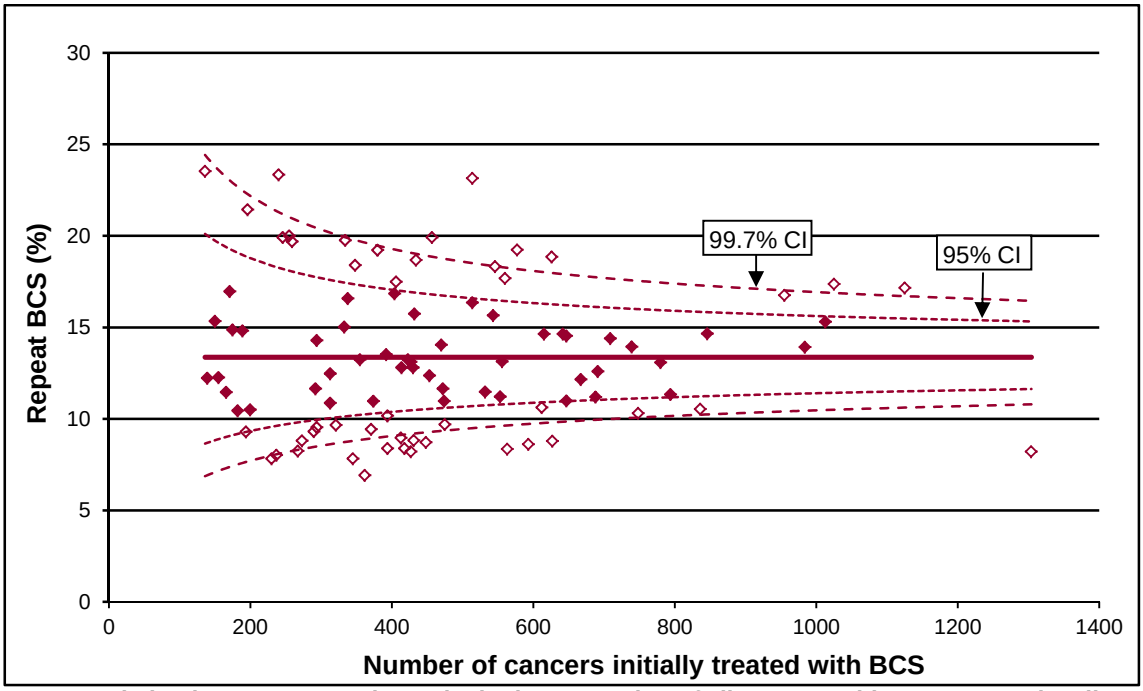

Figure 37: Variation between screening units in the proportion of all cancers with a non-operative diagnosis initially treated with breast conserving surgery that had repeat breast conserving surgery to clear margins in 2011/12 to 2013/14 (open diamonds represent units which lie outside the 95% upper and lower control limits)

Figure 37 shows how the proportion of all cancers initially treated with breast conserving surgery that had repeat breast conserving surgery varied between screening units over the 3-year period 2011/12 to 2013/14. 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 13% (solid line). Twenty units have repeat rates above the 95% upper control limit (seven of these are above the 99.7% control limit), and 26 units have rates below the 95% lower control limit (15 of these are below the 99.7% control limit).

For non/micro-invasive cancers nine units are 95% high outliers for repeat breast conserving surgery (none of these are 99.7% high outliers) and 10 units are 95% low outliers (two of these are 99.7% low outliers) (control chart not shown). For invasive cancers, 17 units are 95% high outliers for repeat breast conserving surgery (seven of these are 99.7% high outliers) and 23 units are 95% low outliers (16 of these are 99.7% low outliers) (control chart not shown). Five units [South West (3) and South East Coast (2)] are 95% high outliers in both control charts and three units (in Scotland, North West and North East, Yorkshire & Humber) are low outliers in both control charts.

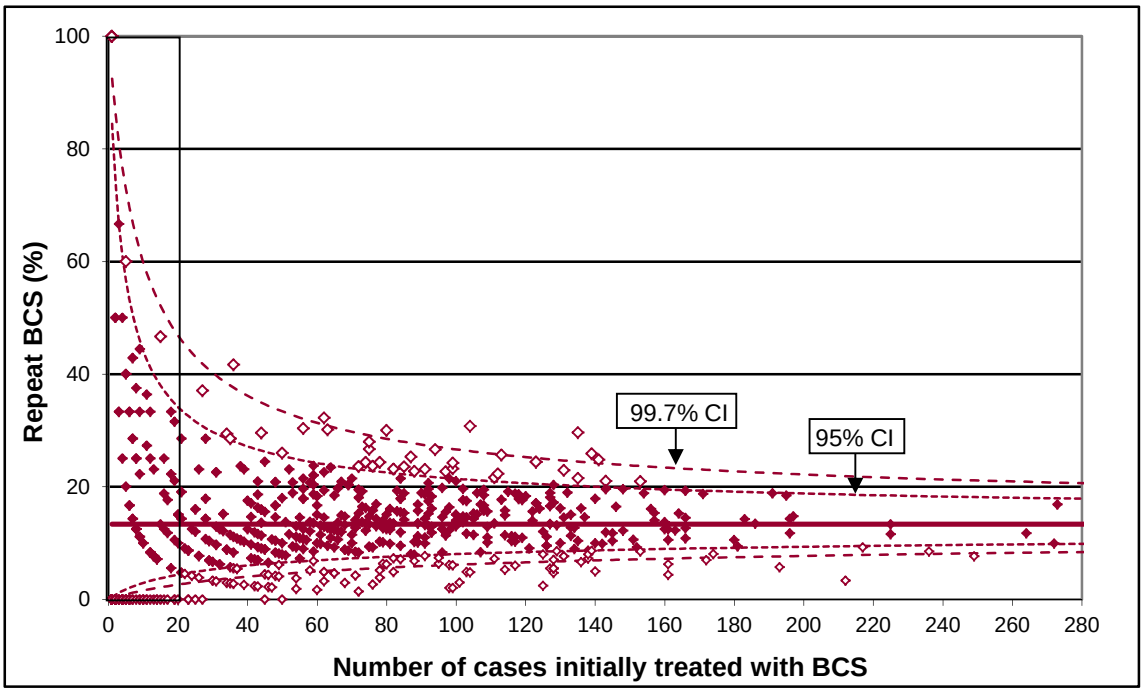

Figure 38: Variation between surgeons in the proportion of all cancers initially treated with breast conserving surgery that had repeat breast conserving surgery to clear margins in 2011/12 to 2013/14 (open diamonds represent surgeons who lie outside the 95% upper and lower control limits)

Figure 38 shows the variation between surgeons in the proportion of all cancers with a non-operative diagnosis, which were initially treated with therapeutic breast conserving surgery that had repeat breast conserving surgery to clear margins over the 3-year period 2011/12 to 2013/14. The dotted and dashed lines in Figure 38 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 cancers with breast conserving surgery over the 3-year period are shaded. Of the 663 surgeons, 496 have 20 or more cancers with initial breast conserving surgery. Of these, 38 have repeat rates above the 95% upper control limit and of these, seven are above the 99.7% upper control limit. Ninety surgeons have repeat rates below the 95% lower control limit and of these, 57 are below the 99.7% lower control limit.

6.4.2 Breast conserving surgery converted to mastectomy

In the UK as a whole in 2013/14, 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 67). Conversion rates to mastectomy were higher for non/micro-invasive cancers than for invasive cancers (7% compared to 4%).

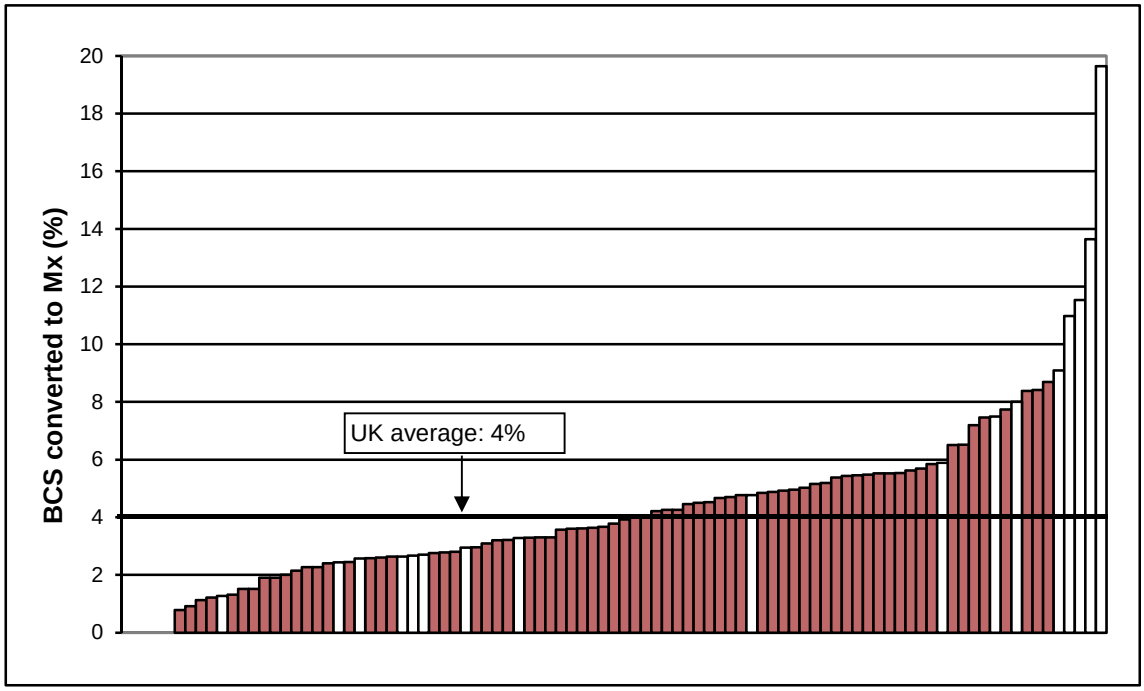

Figure 39: Variation between screening units in the proportion of invasive cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy (the 17 smallest units are highlighted in white)

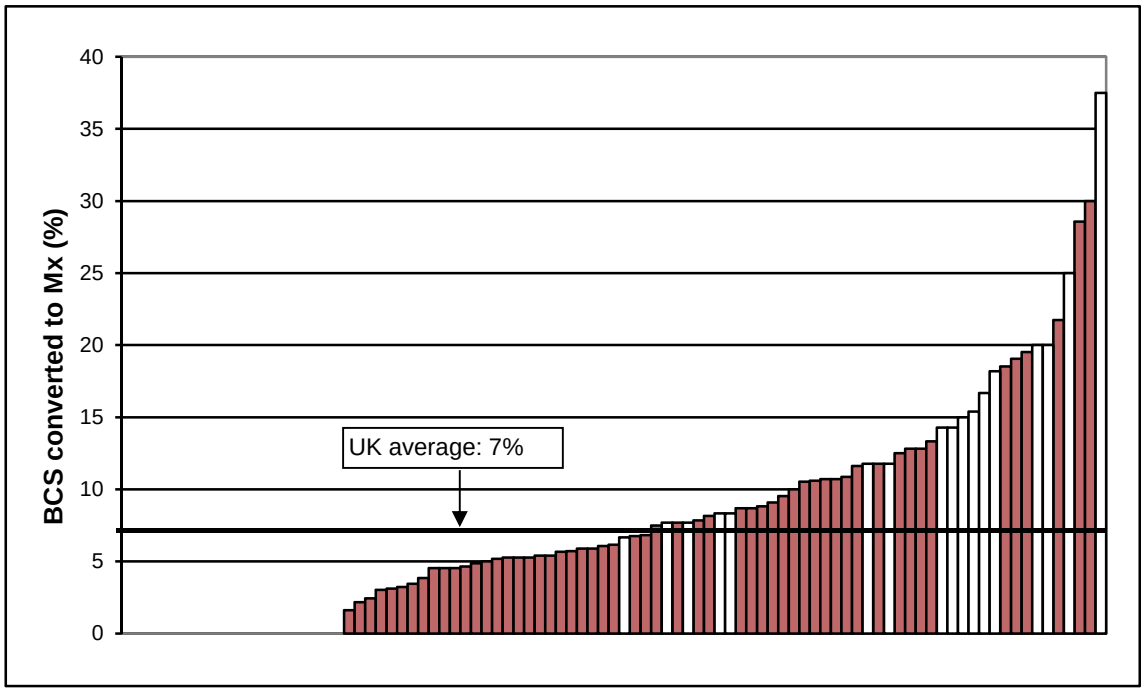

Figure 40: Variation between screening units in the proportion of non/micro-invasive cancers which were initially treated with breast conserving surgery and which were eventually converted to a mastectomy (the 17 smallest units are highlighted in white)

Figure 39 and Figure 40 show, for invasive cancers and non/micro-invasive cancers, respectively, how conversion rates to mastectomy varied between screening units in 2013/14. For non/micro-invasive cancers, conversion rates to mastectomy varied from 38% (3/8) in a small unit in North East, Yorkshire & Humber to zero in 21 units in the whole of the UK. For invasive cancers, conversion rates to mastectomy varied from 20% (11/56) in one small unit in Northern Ireland to zero in five units of the 95 units in the UK.

6.4.3 Mastectomy at first operation and breast conserving 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%. Non/micro-invasive cancers with a B5a (non-invasive) core biopsy had an initial mastectomy rate of 18%. Five percent (736 cancers) of all cancers with a non-operative diagnosis had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent operation, and 89% (333 cancers) of the 380 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 (18% 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 (7% compared to 4%). The proportion of non/micro-invasive cancers with a non-operative diagnosis that had initial surgery only to the axilla converted to a mastectomy at a subsequent operation was also higher than for invasive cancers (99% compared to 84%).

Key findings

- Eighteen percent of all cancers with a non-operative diagnosis, initially treated with breast conserving surgery, had a repeat operation; 13% 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 (24% compared to 16%).
- Repeat operation rates for non/micro-invasive cancers varied between screening units from 7% in two units (in East Midlands and Scotland) to 53% in a unit in West Midlands. Repeat operation rates for invasive cancers varied between screening units from 5% in a unit in North East, Yorkshire & Humber to 31% in a screening unit in East of England.
- Conversion rates to mastectomy were higher for non/micro-invasive cancers than for invasive cancers (7% compared to 4%).
- Eleven 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 seven 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 2011/12 to 2013/14, 20 screening units and 38 surgeons had high repeat breast conserving surgery rates. Twenty six screening units and 90 surgeons had low repeat breast conserving surgery operation rates.
- 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.

Key findings (cont)

- For non/micro-invasive cancers, conversion rates to mastectomy varied from 38% in one small unit in North East, Yorkshire & Humber to zero in 21 units. For invasive cancers, conversion rates to mastectomy varied from 20% in one small unit in Northern Ireland to zero in five units.
- Sixteen percent of all cancers with a non-operative diagnosis had an initial therapeutic mastectomy at the first operation, and 5% had initial therapeutic breast conserving surgery converted to a mastectomy at a subsequent operation.
- For cancers with a non-operative diagnosis, the initial therapeutic mastectomy rate was higher for non/micro-invasive cancers than for invasive cancers (18% 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 (7% compared to 4%)

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. In 2013/14, of the 18,475 breast cancers in England, Northern Ireland and Wales, 17,841 had surgery to the breast and were found to be malignant (invasive or non/micro-invasive) at surgery. Of these, 93% had complete margin data for all operations (Table 68).

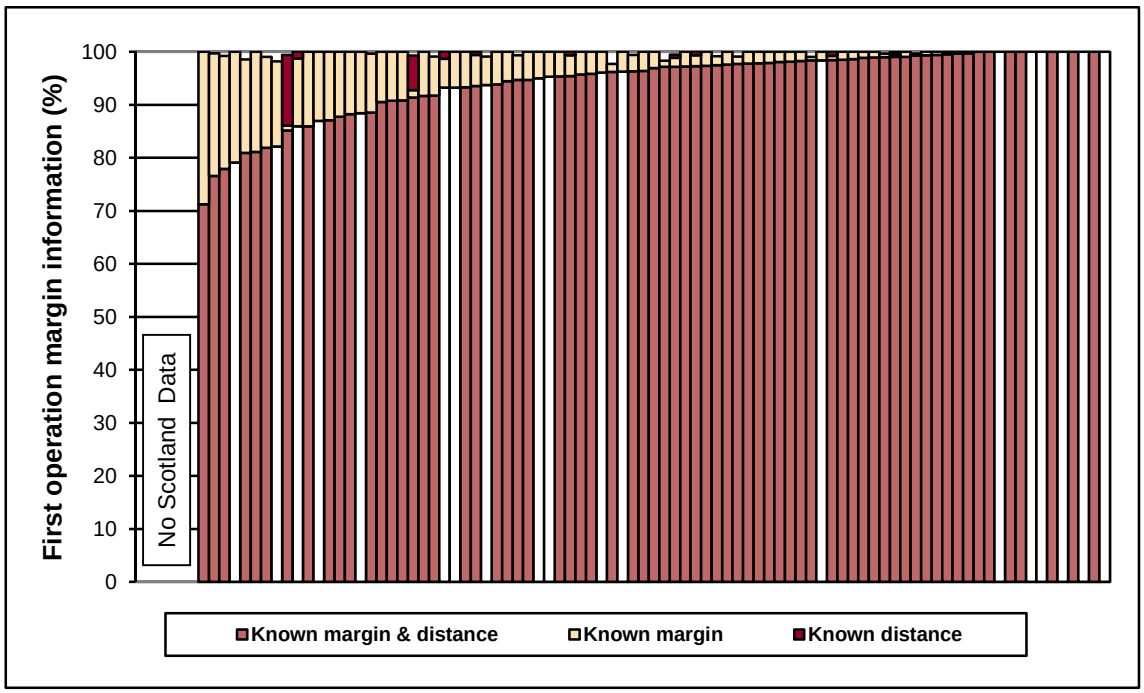

Figure 41: Variation between screening units in the proportion of cancers with known margin information at first operation (The 19 smallest units are highlighted in white)

Of the 17,461 cancers with malignancy found in the breast at the first operation, 99% had information on whether or not the radial margin was clear, and 95% had the margin distance recorded (this represents a 2% increase from 2012/13). Ninety four per cent of cancers had information on whether or not the radial margin was clear and on margin distance: this varied from 100% in 16 units to 71% in a unit in East Midlands (Figure 41).

Of 17,841 cancers with surgery to the breast which were invasive or non/micro-invasive at surgery, 13,957 were treated with breast conserving surgery. Of these, 99% (13,750 cancers) were recorded as having clear margins at their final operation. The final margin status was recorded as unknown for a further 45 cancers. One hundred and sixty two cancers (1%) were recorded as not having had clear margins at the final operation (Table 69). Of the 3,884 cancers treated with a mastectomy (Table 70), 3,795 (98%) had clear margins recorded at the final operation, 20 (1%) had the final margin status recorded as unknown and 69 (2%) were recorded as not having had clear margins at the final operation.

In the UK (excluding Scotland) in 2013/14, 93% of invasive cancers with an involved closest radial margin had a repeat operation to the breast. This proportion varied widely between screening units (Figure 42); from 100% in 48 units to only 56% in a unit in North West. In seven units the proportion of invasive cancers with an involved closest radial margin that had a repeat operation to the breast was less than 80% [North West (2), East of England (1), London (1), North East, Yorkshire & Humber (1), South East Coast (1), and Northern Ireland (1)]. Two of these units (in North West and London) also had fewer than 80% of invasive cancers with an involved closest radial margin with a repeat operation to the breast in the 3-year period 2011/12 to 2013/14.

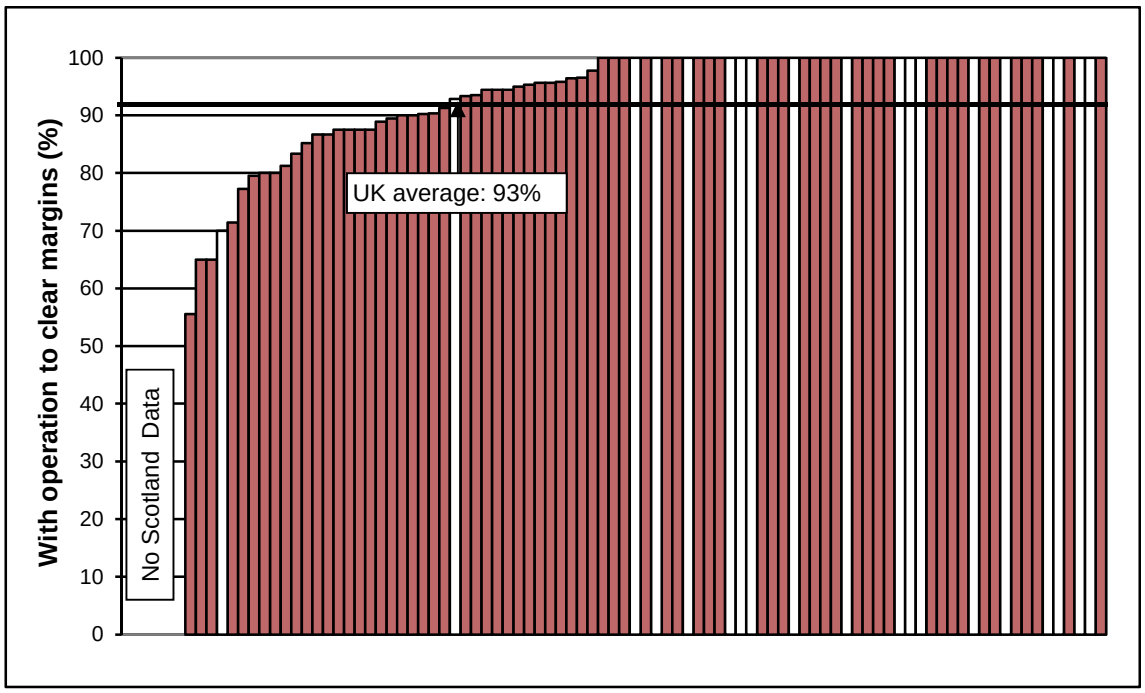

Figure 42: Variation between screening units in the proportion of invasive cancers with an involved closest radial margin with a repeat operation to the breast (The 19 smallest units are highlighted in white)

Surgery KPI S1a

Repeat operations for involved margins
Units with less than 80% of invasive cancers with an involved closest radial margin after breast conserving surgery with a repeat operation to the breast

Region	Unit	>80% with involved margin with repeat breast surgery invasive 1-year 2013/14		>80% with involved margin with repeat breast surgery invasive 3-year 2011/12-2013/14	
		No*.	%	No*.	%
New units identified in 2015					
East Midlands	CDN		80.0		80.0
East of England	DSU		71.4		90.0
London	FBH	7	65.0	20	57.4
London	FLO		100.0	19	67.8
London	HWA		85.2	33	63.3
London	ECX		83.3	19	74.7
NEYH	ANE	7	65.0	9	83.0
North West	NWA		55.6	6	78.6
North West	PLN	5	77.3	7	84.4
South East Coast	GCT1	9	79.5	19	84.6
South East Coast	HWO		86.7	37	51.3
South East Coast	GBR		87.5	11	78.4
Northern Ireland	ZNI1		70.0		81.8
UK average		**100**	**92.6**	**355**	**91.3**

Less than 80% with repeat breast surgery 2013/14

Less than 80% with repeat breast surgery 2011/12-2013/14

No* number without repeat breast surgery

Blank in No*. column = <5 cases

This KPI has been used for the first time in this year's audit. No data were provided for Scotland. The KPI examines the proportion of invasive cancers with an involved closest radial margin after breast conserving surgery which had a repeat operation to the breast in the 3-year period 2011/12 to 2013/14 and in 2013/14. The preceding summary table shows that in 2013/14 eight units do not meet the KPI standard. Only four of these units (in London, North East, Yorkshire & Humber, North West and South East Coast) have five or more cancers without repeat breast surgery in 2013/14. The unit in London also does not meet the KPI standard in the 3-year period 2011/12 to 2013/14. In the 3-year period 2011/12 to 2013/14, there are five additional units with fewer than 80% of invasive cancers with an involved margin with a repeat operation to the breast which do meet the KPI standard in 2013/14. Regional QA reference centres and regional QA surgeons should follow up the four units (London FBH, North East, Yorkshire & Humber ANE, North West PLN and South East Coast GCT1) with fewer than 80% of invasive cancers with an involved closest radial margin after breast conserving surgery with a repeat operation to the breast in 2013/14 and with five or more cancers without repeat breast surgery in 2013/14 to ascertain the reason for this clinical practice.

In the UK (excluding Scotland) in 2013/14, 2% of invasive cancers with a closest radial margin greater than 5mm had a repeat operation to the breast. This proportion varied widely between screening units (Figure 43); from zero in 51 units to 19% in a unit in Northern Ireland. In seven units the proportion of invasive cancers with an involved closest radial margin that had a repeat operation to the breast of more than 5% [North West (3), North East, Yorkshire & Humber (1), South Central (1), South West (1) and Northern Ireland (1)]. Five of these units [North West (3),

North East, Yorkshire & Humber (1) and Northern Ireland (1)] had more than 5% of invasive cancers with a closest radial margin greater than 5mm with a repeat operation to the breast in the 3-year period 2011/12 to 2013/14.

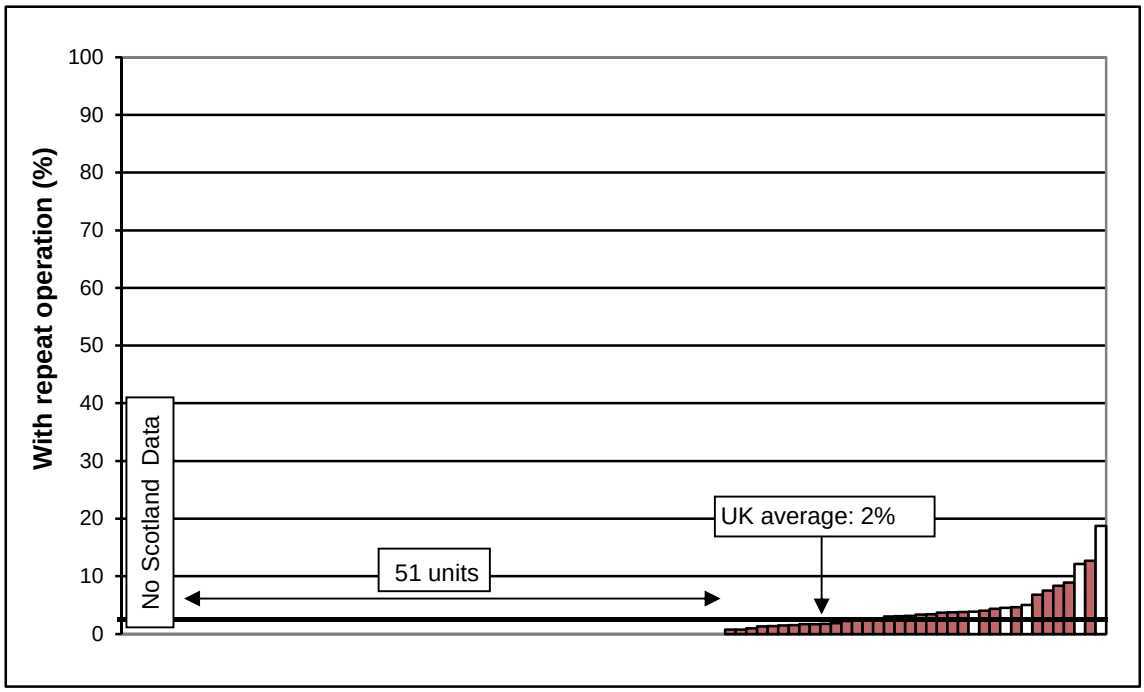

Figure 43: Variation between screening units in the proportion of cancers with an involved closest radial margin with a repeat operation to the breast (the 5 smallest units are highlighted in white)

Surgery KPI S1b

Repeat operations for close margins
Units with more than 5% of invasive cancers with a closest radial margin greater than 5mm after breast conserving surgery with a repeat operation to the breast

Region	Unit	More than 5% with >5mm margin with repeat breast surgery invasive 1-year No.	1-year %	More than 5% with >5mm margin with repeat breast surgery invasive 3-year No.	3-year %
New units identified in 2015					
London	GCA		3.4	11	5.6
NEYH	AGA	8	8.9	13	5.5
NEYH	CRO		0.0		6.7
North West	NWA		6.8	7	6.6
North West	NCH		12.1	9	10.8
North West	PMA	8	12.7	10	6.7
South Central	JBA		8.3	5	4.5
South Central	KMK		4.5	9	12.7
South West	LED		7.5		4.8
South West	LAV		0.0	9	5.9
Northern Ireland	ZNI1		18.8	8	14.0
UK average		**85**	**1.9**	**262**	**2.1**

More than 5% with repeat breast surgery 2013/14
More than 5% with repeat breast surgery 2011/12-2013/14

Blank in No. column = <5 cases

This KPI has been used for the first time in this year's audit. No data were provided for Scotland. The KPI examines the proportion of invasive cancers with a closest involved radial margin greater than 5mm after breast conserving surgery with a repeat operation to the breast in the 3-year period 2011/12 to 2013/14 and in 2013/14. The preceding summary table shows that in 2013/14, seven units [North West (3), North East, Yorkshire & Humber (1), South Central (1), South West (1) and Northern Ireland (1)] do not meet the KPI standard. Five of these units also do not meet the KPI standard in the 3-year period 2011/12 to 2013/14. Only two units (in North East, Yorkshire & Humber and North West) have five or more cancers with repeat breast surgery in 2013/14. In the 3-year period 2011/12 to 2013/14, there are four additional units with more than 5% of invasive cancers with a closest radial margin greater than 5mm with a repeat operation to the breast which do meet the KPI standard in 2013/14. Regional QA reference centres and regional QA surgeons should follow up the seven units (North East, Yorkshire & Humber AGA, North West NWA, NCH and PMA, South Central JBA, South West LED, and Northern Ireland ZNI1) with more than 5% of invasive cancers with a closest radial margin greater than 5mm with a repeat operation to the breast in 2013/14 to ascertain the reason for this clinical practice.

Key findings

- Of the 18,475 invasive or non/micro-invasive cancers which had surgery to the breast, 93% 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 95% had the margin distance recorded.
- Of the 13,957 cancers treated with breast conserving surgery, 99% were recorded as having clear margins at their final operation.
- Of the 3,884 cancers treated with a mastectomy, 98% were recorded as having clear margins at their final operation.
- 162 cancers treated with breast conserving surgery and 69 cancers treated with a mastectomy were recorded as not having had clear margins at the final operation.
- In the UK (excluding Scotland) in 2013/14, 93% of invasive cancers with an involved closest radial margin had a repeat operation to the breast. This varied from 100% in 48 units to only 56% in a unit in North West.
- Regional QA reference centres and regional QA surgeons should follow up the four units (London FBH, North East, Yorkshire & Humber ANE, North West PLN and South East Coast GCT1) with fewer than 80% of invasive cancers with an involved closest radial margin after breast conserving surgery with a repeat operation to the breast in 2013/14 and with five or more cancers without repeat breast surgery in 2013/14 to ascertain the reason for this clinical practice.
- In the UK (excluding Scotland) in 2013/14, 2% of invasive cancers with a closest radial margin greater than 5mm had a repeat operation to the breast. This varied from zero in 51 units to 19% in a unit in Northern Ireland.
- Regional QA reference centres and regional QA surgeons should follow up the seven units (North East, Yorkshire & Humber AGA, North West NWA, NCH and PMA, South Central JBA, South West LED, and Northern Ireland ZNI1) with more than 5% of invasive cancers with a closest radial margin greater than 5mm with a repeat operation to the breast in 2013/14 to ascertain the reason for this clinical practice.

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 15,543 surgically treated invasive cancers included in the audit, 15,416 (99%) had known nodal status (Table 80); 3,382 (22%) were node positive (Table 82) and 641 were known to only have micro-metastases. Of the 2,907 invasive cancers confirmed to be node positive on surgery, 668 (23%) had positive nodes diagnosed pre-operatively by means of needle biopsy (Table 77). Overall node positivity was 6% lower for the 12,627 invasive cancers without a confirmed axillary biopsy before surgery (Table 78).

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, Northern Ireland and Wales for a total of 18,474 cancers are included in this section. Ninety percent of cancers (16,557) had a record of an axillary ultrasound at assessment, compared to only 87% in 2012/13 and 77% in 2011/12. Of these, 13,899 (84%) were confirmed after surgery to have an invasive cancer, 102 (1%) a micro-invasive cancer, 2,552 (15%) a non-invasive cancer and a further four cancers had no confirmed invasive status. Thus, 96% of patients with invasive cancer (Table 71), 80% with micro-invasive cancer and 67% with non-invasive cancer had axillary ultrasound recorded.

Of the 2,469 invasive cancers with an abnormal axillary ultrasound result recorded (Table 72), 1,154 were node positive at surgery giving a positive predictive value of an abnormal ultrasound (lymph node was equivocal, suspicious or abnormal) of 49%. Of the 11,430 invasive cancers with a normal axillary ultrasound result, which went on to have axillary surgery (Table 72), 1,909 (17%) had positive nodes at surgery (ie the negative predictive value of normal ultrasound was 83%).

7.1.1 Axillary ultrasound and axillary biopsy for invasive cancers

Overall in 2013/14, 18% of invasive cancers with axillary ultrasound had an abnormal axillary ultrasound result (Table 72). The proportion of invasive cancers with an axillary result recorded and with a normal or abnormal ultrasound result varied widely between screening units (Figure 44). In two units (in East of England and Wales), 15% or more invasive cancers did not have

axillary ultrasound recorded in 2013/14. In the Welsh unit, 48 cancers had no ultrasound recorded. In the East of England unit, for 77 cancers it was not known whether or not ultrasound was performed and six cancers had no ultrasound recorded. The use of pre-operative ultrasound has improved markedly with time. In the 3-year period 2011/12-2013/14, 22 units had 15% or more invasive cancers with no axillary ultrasound performed, mainly because of very high values in 2011/12.

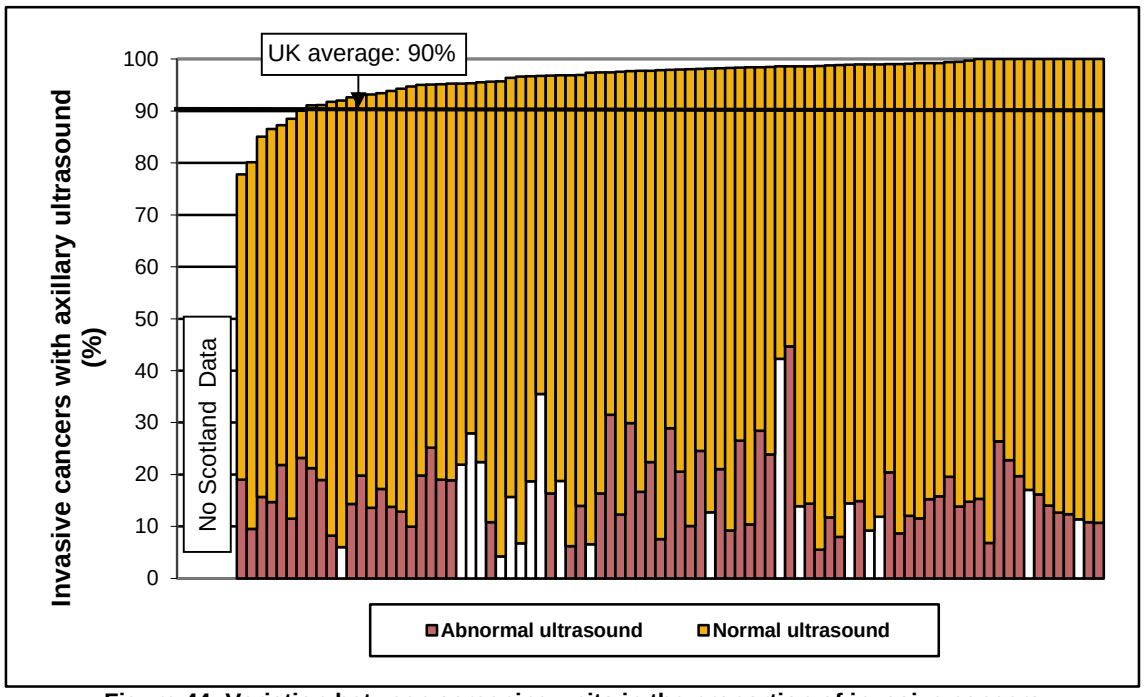

Figure 44: Variation between screening units in the proportion of invasive cancers with abnormal and normal axillary ultrasound results
Data for Scotland are not available
(19 of the 20 smallest units are highlighted in white)

Of the 2,469 invasive cancers with an abnormal ultrasound result, 2,342 (95%) had needle biopsy or cytological assessment of the axillary nodes (Table 73). For 124 invasive cancers an abnormal ultrasound result was apparently not followed up with a needle biopsy and for 137 invasive cancers a needle biopsy was performed despite a normal ultrasound result (Table 75).

Figure 45 shows how the proportion of invasive cancers with an abnormal ultrasound where no needle biopsy was recorded varied between screening units in 2013/14. For 11 units [South Central (4), North West (4), West Midlands (2) and South West (1)] 15% or more invasive cancers had no needle biopsy recorded after an abnormal ultrasound. Five of these units [South Central (2), South West (1), North West (1) and West Midlands (1)] had 30% or more invasive cancers with no needle biopsy recorded after an abnormal ultrasound in the 3-year period 2011/12-2013/14.

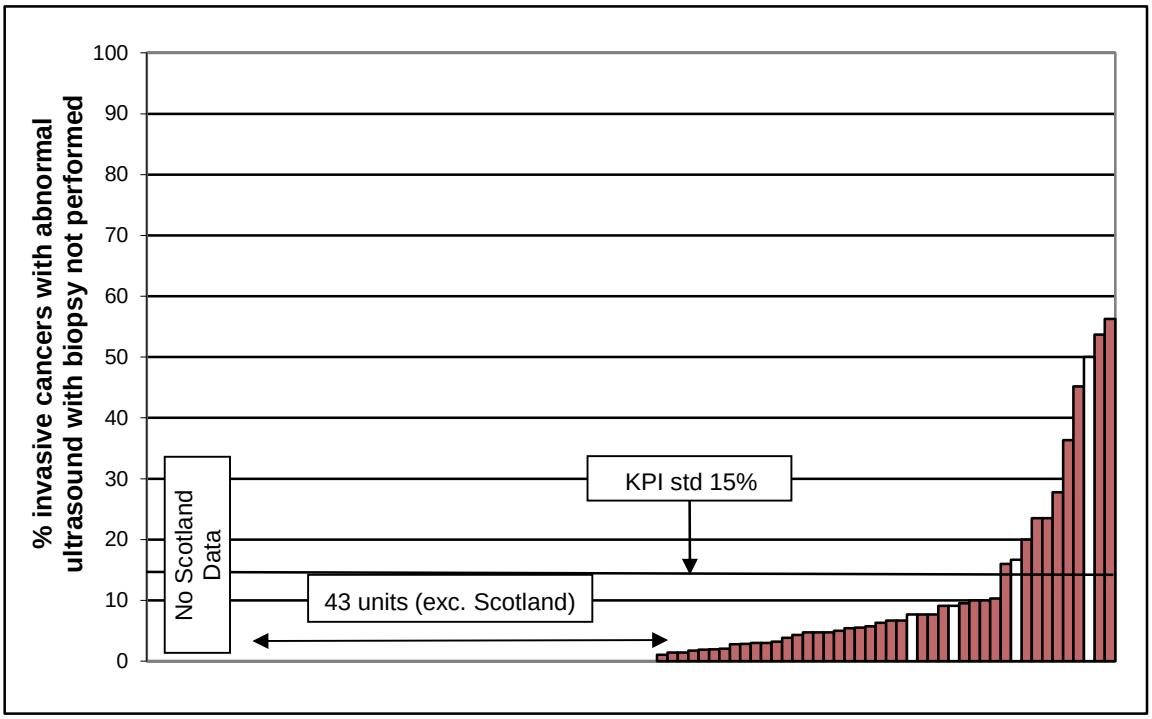

Figure 45: Variation between screening units in the proportion of invasive cancers with an abnormal axillary ultrasound with unknown/no axillary biopsy performed Data for Scotland are not available (9 of the 20 smallest units are highlighted in white)

Radiology KPIs R1a & 1b

Non-operative staging of the axilla
Units with 15% or more invasive cancers without pre-operative axillary ultrasound recorded
Units with 15% or more invasive cancers with an abnormal axillary ultrasound without a needle biopsy recorded

Screening units in the UK (excluding Scotland) which were identified in the 2014 audit with more than 20% of invasive cancers with no pre-operative ultrasound recorded (KPI R1a) and/or more than 40% of invasive cancers with an abnormal axillary ultrasound and no needle biopsy recorded (KPI R1b) in 2012/13 were followed up by regional QA reference centres. The following table summarises the outcome of these audits and identifies units in which more than 15% of invasive cancers had no pre-operative ultrasound recorded (KPI R1a) and/or more than 15% of invasive cancers had an abnormal axillary ultrasound and no needle biopsy recorded (KPI R1b) in 2013/14. The cut off points for both KPIs were reduced to 15% in this year's audit.

In this year's KPI R1a audit, of the five units which had more than 20% of invasive cancers with no pre-operative ultrasound recorded in 2012/13, two (in East of England and Wales) still have 15% or more invasive cancers with no pre-operative ultrasound recorded in 2013/14. The East of England unit has 77 cancers with unknown ultrasound recorded and the Welsh unit has 48 cancers with no ultrasound recorded. No additional units which do not met the modified KPI standard in 2013/14 were identified, but one unit in Wales (WSW) with 14.9% of invasive cancers without a pre-operative ultrasound had 27 invasive cancers with no pre-operative ultrasound recorded and 15 invasive cancers with unknown pre-operative ultrasound. In this year's KPI R1b audit, of the 12 units which had more than 40% of invasive cancers with an abnormal axillary ultrasound and no needle biopsy recorded in 2012/13, five do not meet the

modified KPI in 2013/14. Only two of these units (in North West and South West) have five or more invasive cancers with more than 15% of invasive cancers with an abnormal axillary ultrasound and no needle biopsy recorded in 2013/14. The unit in the North West has 29 cancers with no needle biopsy after an abnormal ultrasound recorded. Six additional units which do not meet the modified KPI standard in 2013/14 were identified. Only two of these (in North West and South Central) have five or more cancers with more than 15% of invasive cancers with an abnormal axillary ultrasound and no needle biopsy recorded in 2013/14. Regional QA reference centres should follow up the two units (East of England ELD and Wales WNM) with 15% or more invasive cancers with no pre-operative ultrasound recorded in 2013/14, the unit in Wales (WSW) with 42 invasive cancers without a pre-operative axillary ultrasound recorded in 2013/14 and the four units (North West NWA and PBO, South Central KHW and South West JSW) with 15% or more invasive cancers with an abnormal pre-operative axillary ultrasound with no needle biopsy recorded in 2013/14 to ascertain the reason for this clinical practice.

Region	Unit	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 %	15% or more pre-op ax u/s unknown or not done invasive 2013/14 No	U	%	15% or more no needle after abnormal pre-op ax u/s invasive 2013/14 No	U	%	Outcome of QARC audit of units identified in 2014 report for follow up
Units audited in the 2014 report										
East of England	ELD	28.0	1.5	6	77	22.2			1.4	New policy to US micro-calcification alone
NEYH	CRO	20.0	0.0			1.8			0.0	No further audit required
North West	NWA	13.2	52.2			1.6	29	0	53.7	Suitable clinical explanations provided
South Central	KOX	17.1	61.5	5		3.0			0.0	Axillary US results not recorded
South Central	KWI	32.1	33.3			2.2			6.7	Data recording issues
South Central	JIW	2.7	75.0			4.3			50.0	No ax biopsy - all node +ve cancers had clearance
South Central	KMK	7.3	69.2			3.1			16.7	Data recording issues
South Central	KRG	9.2	61.5			0.8			0.0	Data recording issues
South West	LED	16.9	100.0	11	0	8.2			9.1	Data recording issues
South West	JSW	5.1	60.0			1.7	9	0	56.3	Awaiting results of further audit
South West	LGL	15.3	56.2	5	0	3.1			10.0	No further audit required
South West	LSO	4.5	81.8			1.6			7.7	No further audit required
West Midlands	MDU	16.3	77.8			0.0			4.3	Data recording issues
West Midlands	MSH	0.9	42.9			0.0			36.4	Nodes too near vessels to biopsy, CT scan
Northern Ireland	ZNW1	0.0	69.2			4.7			0.0	Data collection error. Nodes investigated by FNA
Wales	WNM	29.7	0.0	48	0	19.8			0.0	No information available
Wales	WSW	24.4	0.0	27	15	14.9			0.0	No information available
New units identified in 2015										
North West	PBO	2.8	6.3			1.5	14		45.2	
North West	PLN	4.5	22.2	0	10	4.3			16.0	
North West	PMA	17.2	22.2			1.3			23.5	
South Central	JSO	3.4	15.0			0.0			23.5	
South Central	KHW	6.4	15.8	8		6.1	5	0	27.8	
West Midlands	MST	4.4	3.8	5		5.0			20.0	
UK average		**7.2**	**9.5**	**619**		**4.3**	**127**		**5.1**	

15% or more Ax U/S unknown or not done 2013/14
20% or more Ax U/S unknown or not done 2012/13

15% or more Ax bx unknown or not done 2013/14
40% or more Ax bx unknown or not done 2012/13

No = Number with no U/S recorded U = Number with unknown U/S recorded Blank in No. column = <5 cases

7.1.2 Worst axillary ultrasound result for invasive cancers

Of the 2,342 invasive cancers with an abnormal ultrasound result which had an axillary node biopsy, 939 (40%) had a C5/B5 axillary biopsy, 1,202 (51%) had C2/B2 to C4/B4 axillary biopsies and 201 (9%) had an inadequate or normal axillary biopsy sample (C1/B1) (Table 74). There was wide variation between screening units in the worst axillary biopsy result recorded for invasive cancers with an abnormal axillary ultrasound result (Figure 46). In eight units [South Central (2), South West (2), London (1), North East, Yorkshire & Humber (1), North West (1) and West Midlands(1)] more than 20% of invasive cancers had C1/B1 recorded as the worst axillary biopsy result. Of the eight units with more than 20% C1/B1 results, two (in South Central and North West) also had more than 15% of invasive cancers with no axillary biopsy recorded after an abnormal ultrasound in 2013/14 (Figure 45).

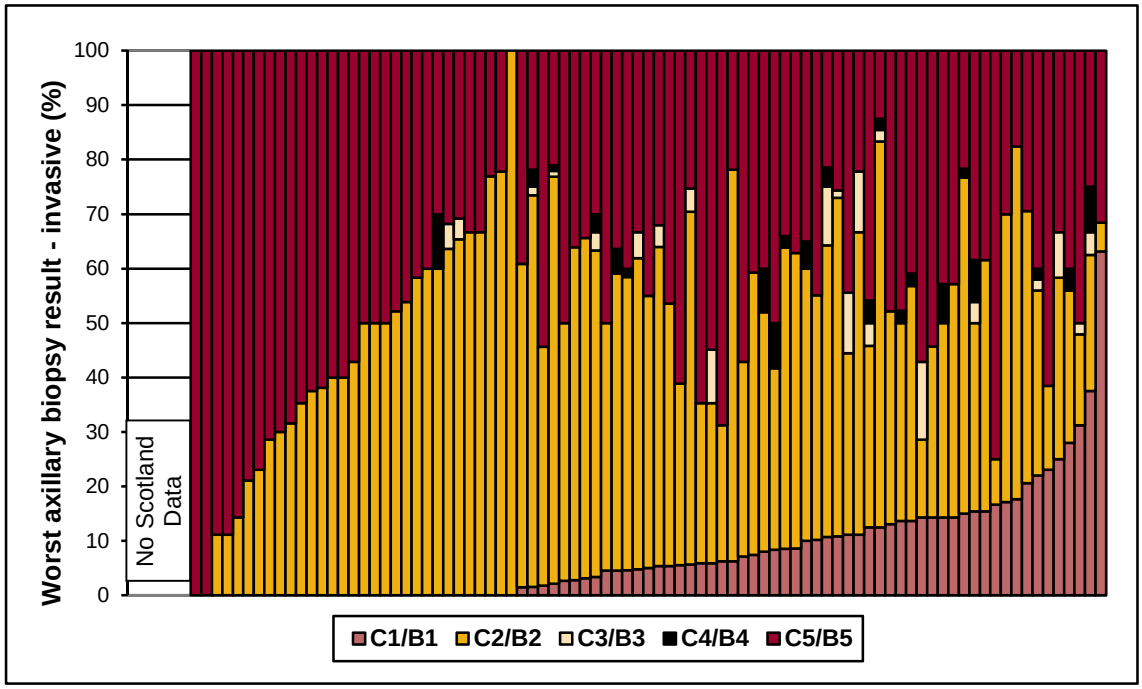

Figure 46: Variation between screening units in the worst axillary biopsy result for invasive cancers with an abnormal axillary ultrasound result – data for Scotland are not available

Of the 137 invasive cancers with a normal ultrasound result which had an axillary node biopsy, 21 (15%) had a C5/B5 axillary biopsy, 99 (72%) had C2/B2 axillary biopsy, and 15 (11%) had an inadequate or normal axillary biopsy sample (C1/B1) (Table 75). Of the 939 invasive cancers with a B5/C5 axillary biopsy with abnormal ultrasound and the 21 invasive cancers with a C5/B5 axillary biopsy with normal ultrasound, 699 and 18 respectively had no or unknown neo-adjuvant therapy recorded and had axillary surgery. Of these, 668 were node positive at surgery, giving an overall positive predictive value of a C5/B5 of 95% (Table 76).

Of the 699 invasive cancers with a C5/B5 result and abnormal ultrasound and the 18 invasive cancers with a C5/B5 result and normal ultrasound which had no or unknown neo-adjuvant therapy recorded and had axillary surgery, 34 (5%) had false positive results, ie were found to be node negative at surgery and 15 (2%) had unknown nodal statuses. It is possible that the axilla was over-treated for these 49 cancers, 16 of which had axillary clearance. Of the 1,431

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, 313 (22%) had positive nodes at surgery. Axillary biopsy thus did not accurately identify positive nodes for these invasive cancers.

7.1.3 Worst axillary ultrasound result for node positive invasive cancers

Of the 3,116 invasive cancers in England, Northern Ireland and Wales with positive nodal status (excluding cases with neo-adjuvant therapy and no axillary assessment at surgery), 63 (2%) had a C1/B1 axillary biopsy, 226 (7%) had a C2/B2 axillary biopsy, 11 had a C3/B3 axillary biopsy, 14 had a C4/B4 axillary biopsy and 668 (21%) had a C5/B5 axillary biopsy (Table 79). For three units (in South Central, East Midlands and West Midlands) more than 20% of node positive invasive cancers with an axillary biopsy recorded had C1/B1 recorded as the worst axillary biopsy result. In eight units [South West (3), North West (2), East of England (1), North East, Yorkshire & Humber (1) and South East Coast (1)] C2/B2 was the worst axillary biopsy result recorded for more than 35% of node positive invasive cancers and in three units (in South West, London and West Midlands) a C3/B3 result was the worst result recorded for more than 10% of node positive invasive cancers.

Key findings

- Of the 15,543 surgically treated invasive cancers included in the audit, 99% had known nodal status. Of these, 3,382 (22%) were node positive and 641 were known to only have micro-metastases. Of the 2,907 invasive cancers without neo-adjuvant therapy recorded that were confirmed to be node positive on surgery, 668 (23%) had positive nodes diagnosed pre-operatively by means of needle biopsy.
- In the UK (excluding Scotland), 90% of cancers had a record of an axillary ultrasound at assessment, 84% were confirmed to be invasive after surgery and 15% non-invasive. Ninety six percent of invasive cancers and 67% of non-invasive cancers had axillary ultrasound recorded. These are considerable improvements from 2012/13.
- Of the 2,469 invasive breast cancers with an abnormal axillary ultrasound result recorded, 1,154 were node positive at surgery giving a positive predictive value of an abnormal ultrasound of 49%.
- Of the 11,430 invasive cancers with a normal axillary ultrasound result recorded which had axillary assessment during surgery, 1,909 (17%) had positive nodes found after surgery (ie the negative predictive value of normal ultrasound was 83%).
- In 2013/14, 18% of invasive cancers with axillary ultrasound had an abnormal axillary ultrasound result recorded; 95% had a subsequent needle biopsy of cytological assessment of the axillary nodes.
- For 124 invasive cancers an abnormal ultrasound result was apparently not followed up with a needle biopsy and, for 137 invasive cancers, a needle biopsy was performed despite a normal ultrasound result.
- Regional QA reference centres should follow up the two units (East of England ELD and Wales WNM) with 15% or more invasive cancers with no pre-operative ultrasound recorded in 2013/14, and the four units (North West NWA and PBO, South Central KHW and South West JSW) with 15% or more invasive cancers with an abnormal pre-operative axillary ultrasound with no needle biopsy recorded in 2013/14 to ascertain the reason for this clinical practice.
- Of the 939 invasive cancers with a C5/B5 diagnosis with abnormal ultrasound and the 21 invasive cancers with a C5/B5 diagnosis with normal ultrasound, 699 and 18 respectively had no or unknown neo-adjuvant therapy recorded and had axillary surgery. Of these, 668 were node positive at surgery, giving an overall positive predictive value of a C5/B5 of 95%.

Key findings (cont)

- Of the 699 invasive cancers with a C5/B5 result and abnormal ultrasound and the 18 invasive cancers with a C5/B5 results and normal ultrasound which had no or unknown neo-adjuvant therapy recorded and had axillary surgery, 34 (5%) had false positive results, ie were found to be node negative at surgery. It is possible that the axilla was over-treated for these 49 cancers, 16 of which had axillary clearance.
- Of the 1,431 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, 313 (22%) had positive nodes at surgery. Axillary biopsy thus did not accurately identify positive nodes for these invasive cancers.
- Of the 3,116 invasive cancers with positive nodal status (excluding cases with neo-adjuvant therapy and no axillary assessment at surgery), 63 (2%) had a C1/B1 axillary biopsy, 226 (7%) had a C2/B2 axillary biopsy, 11 had a C3/B3 axillary biopsy, 14 had a C4/B4 axillary biopsy and 668 (21%) had a C5/B5 axillary biopsy.

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 2013/14, of the 15,425 invasive cancers with axillary surgery 13,676 (89%) had a SLNB (Table 81). Of the 117 invasive breast cancers with axillary surgery that did not have a non-operative diagnosis, 22 had axillary surgery at the first operation and 21 of these had a SLNB. The overall use of SLNB has increased by two percentage points since 2012/13.

Figure 47 shows how the use of SLNB for invasive cancers having axillary surgery varied between screening units in 2013/14. In 51 units, over 90% of invasive cancers which had axillary surgery had a SLNB. In 8 units 20% or more invasive cancers having axillary surgery did not have a SLNB, and in 2 of these (1 in East of England and 1 in West Midlands) 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. Figure 47 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 [East of England (3), East Midlands (2), North East, Yorkshire & Humber (1), North West (1), South Central (1) South West (1) and Northern Ireland (1)] blue dye only was used for more than 30% of invasive cancers with axillary surgery in 2013/14. The unit in North East, Yorkshire & Humber used SLNB to stage fewer than 70% of invasive cancers with axillary surgery in 2013/14.

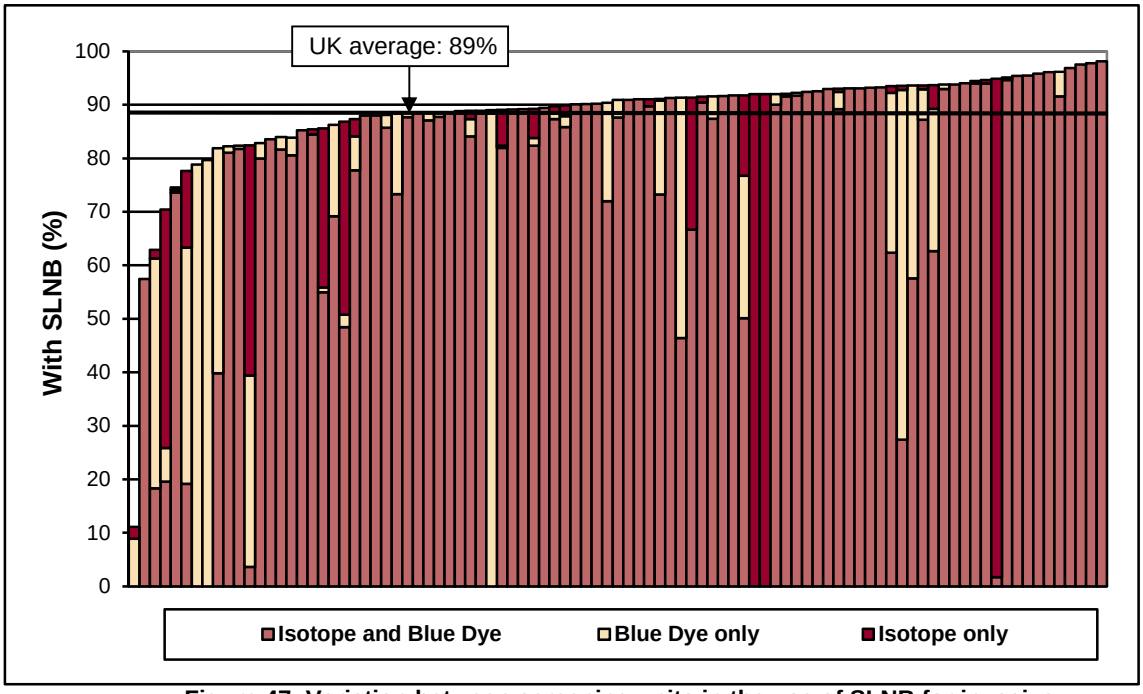

Figure 47: Variation between screening units in the use of SLNB for invasive breast cancers with axillary surgery

The use of SLNB for axillary staging was included as a surgical KPI in the 2014 audit. The table below shows the outcome of the audits undertaken by QA reference centres in units which did not meet KPI S1a which stated that 70% or more invasive cancers with axillary surgery should have a SLNB and KPI S1b which stated that fewer than 30% of SLNB procedures should be carried out using blue dye only.

Region	Unit	<70% with SLNB invasive 2012/13		>30% blue dye only invasive 2012/13		SLNB invasive 2013/14		Blue dye only invasive 2013/14		Outcome of QARC audit of units identified in 2014 report for follow up
		No*.	%	No.	%	No*.	%	No.	%	
Units audited in the 2014 report										
East Midlands	CNN	10	81.1	41	95.3	12	79.7	47	79.7	Business case for probe + refresher training
East of England	DGY	43	38.6	23	85.2	40	11.1		8.9	Reviewing use of isotope
East of England	DSU	22	78.0	78	100.0	25	78.8	93	78.8	No licence
East of England	DSW	8	90.1	73	100.0	10	89.0	81	89.0	No licence
East of England	ELD	57	82.4	84	31.5	50	86.2	62	17.1	No licence
East of England	FSO	6	94.6	92	87.6	8	93.5	81	65.3	Consultants in training
London	HWA	36	81.1	86	55.8	34	86.8	6	2.3	Data errors + 1 hospital has changed practice
NEYH	ANT	129	34.2	55	82.1	89	62.9	103	42.9	Dual SLNB started in March 2014
North West	NWA	53	63.2	62	68.1	42	77.7	83	44.1	Surgeon retired. Practice changed
South Central	KMK	32	52.2		0.0	8	87.3		6.3	Policy changed. Private patients have blue dye only
South Central	KOX	18	88.5	42	30.2	10	93.7	42	26.6	No information available
South Central	KRG	63	49.6		0.0	21	84.0		2.3	Data entry issues. QARC following up audit
South Central	KWI	6	92.4	35	47.9	8	93.6	45	36.0	Data entry issue. New procedure in place
South East Coast	GBR	85	60.8	13	9.8	71	70.4	15	6.3	1 Hospital was late adopter of SLNB
South East Coast	HGU	30	91.2	236	75.6	33	91.1	65	17.6	Data errors in 2012/13, now resolved
West Midlands	MSH	50	54.5		0.0	43	57.4		0.0	Change in practice from October 2014
Northern Ireland	ZNE1	14	91.0	64	45.4	25	81.9	58	42.0	Business case submitted for on site isotope use
Scotland	Unit 7	59	19.2		0.0	9	91.3		0.0	No information available
UK average		**1913**	**86.6**	**1299**	**9.1**	**1749**	**88.7**	**1313**	**8.5**	

<70% with SLNB
>30% with blue dye only

No*. = Number of invasive cases without SLNB Blank in No. or No*. Columns = <5 cases

In last year's audit, eight units had less than 70% of invasive cancers with axillary surgery with a SLNB in 2012/13. Of these, three (East of England DGY, North East, Yorkshire & Humber ANT and West Midlands MSH) still did not meet KPI S1a in 2013/14. Two of these units changed their practice at the very end of (North East, Yorkshire & Humber) or after (West Midlands MSH) the 2013/14 audit period, which will not be reflected in the 2013/14 data. The East of England QA reference centre and QA surgeon should follow up unit DGY to ascertain the progress it has made towards ensuring that at least 70% of invasive cancers with axillary surgery have a SLNB.

In last year's audit, 13 units had more than 30% of invasive cancers with axillary surgery with a SLNB carried out with blue dye only in 2012/13. Of these, eight [East of England DSU, DSW and FSO, East Midlands CNN, North East, Yorkshire & Humber ANT, North West NWA, South Central KWI and Northern Ireland ZNE1) still did not meet KPI S1b in 2013/14. The unit in North East, Yorkshire & Humber changed practice at the end of the 2013/14 audit period and this will not be reflected in the 2013/14 data. QA reference centres and QA surgeons should follow up the other seven units (East of England DSU, DSW and FSO, East Midlands CNN, North West NWA, South Central KWI and Northern Ireland ZNE1) to ascertain the progress they have made towards ensuring that no more than 30% of invasive cancers with axillary surgery have a SLNB involving blue dye only.

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 four nodes decreased from 10.6% in 1996/97 to 4.8% in 2003/04. Because of the introduction of SLNB, this has risen since 2005/06, reaching 66% in 2013/14 (10,185 out of 15,416 cancers). When invasive cancers which had a SLNB are excluded, this figure falls to 6% (97 out of 1,746 cancers).

In the UK in 2013/14, 94% of the 1,749 invasive breast cancers which either did not have a SLNB procedure or where the type of nodal procedure was unknown, had four or more nodes taken (Table 83). Figure 48 shows that 28 units achieved the 100% target that all invasive cancers without a SLNB or with an unknown nodal procedure should have at least four nodes

obtained: 41 units did not achieve the 90% minimum standard, an increase from 16 units in 2012/13. The median number of nodes taken in an SLNB procedure carried out on invasive cancers was two compared with 12 for other nodal procedures.

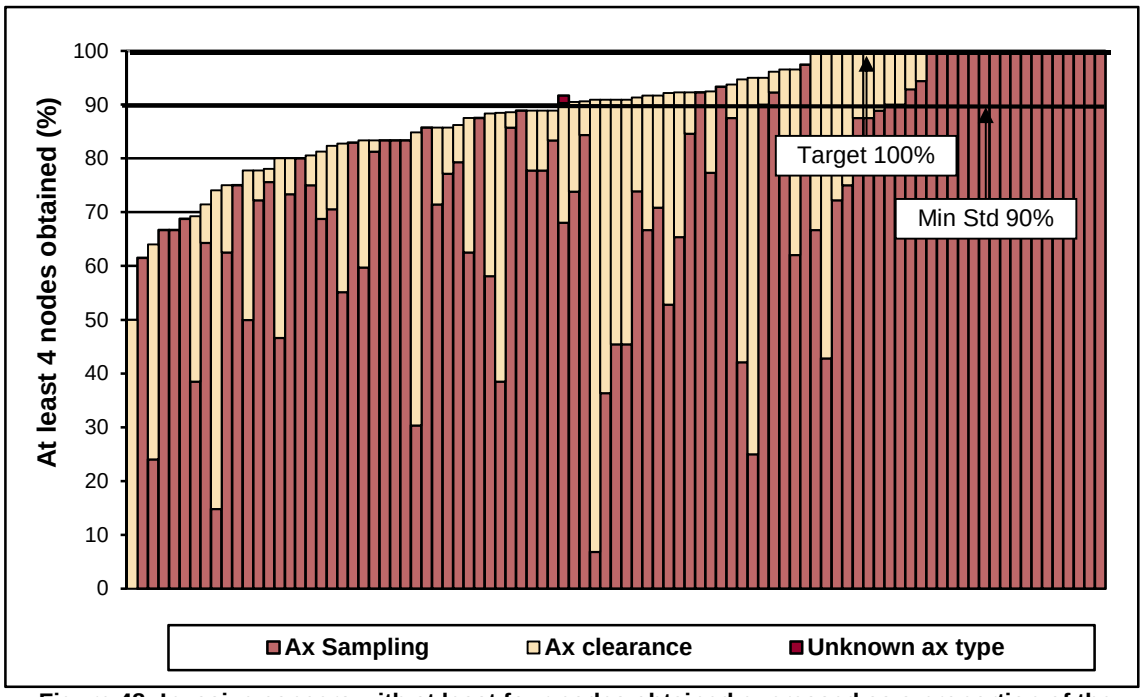

Figure 48: Invasive cancers with at least four nodes obtained expressed as a proportion of the invasive cancers without a sentinel node procedure

Of the 15,416 invasive breast cancers with known nodal status, 3,382 (22%) had positive nodes (Table 82). Of these, 641 (19%) were known to have micro-metastases rather than macro-metastases. Table 84 shows that the proportion of cancers with positive nodal status (16%) was lower for cancers that underwent an SLNB procedure compared with cancers which did not have an SLNB procedure (66%). This could be due to the selection of women for axillary sampling or clearances 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 2,227 invasive cancers which had their positive nodal status determined from an SLNB procedure, 1,041 (47%) had a subsequent axillary procedure (Table 85). A further 560 (25%) had four or more nodes taken in the single axillary operation, which indicates that other nodes were taken as well as the sentinel node at this time. The remaining 626 (28%) cases had fewer than four nodes taken in a single axillary operation.

Of the 15,543 surgically treated invasive breast cancers, 15,416 (99%) had known nodal status and 127 (1%) had unknown nodal status (Table 80). Of the 15,416 invasive cancers with known nodal status, 10,185 (66%) had their nodal status determined on the basis of one, two or three nodes (Table 86). Of the 15,416 invasive cancers with known nodal status, 9,448 (61%) had their negative nodal status determined on the basis of one, two or three nodes using an SLNB procedure. Eighty six cancers (1%) had their negative nodal status determined on the basis of one, two or three nodes without an SLNB procedure, and 651 (4%) had their positive nodal status determined on the basis of one, two or three nodes using any type of nodal procedure.

Therefore, 864 (6%) invasive cancers with known nodal status may have had insufficient nodal information to provide a full diagnostic work-up. Of the 651 invasive cancers that had their positive nodal status determined on the basis of one, two or three nodes, 640 were determined on the basis of an SLNB procedure and 11 without an SLNB procedure. Of these 640 cancers, 626 (98%) had no subsequent axillary procedure(s) recorded (Table 85).

Figure 49 shows how the proportion of invasive cancers with unknown nodal status and with negative nodal status determined on the basis of fewer than four nodes varied between screening units. Of the 651 cancers with positive nodal status determined on the basis of one, two or three nodes using any type of nodal procedure, 15 (2%) had further axillary surgery, and of the remaining 636 cancers with only one axillary operation, 350 (55%) were known to have had micro-metastases and therefore further axillary surgery may not have been appropriate.

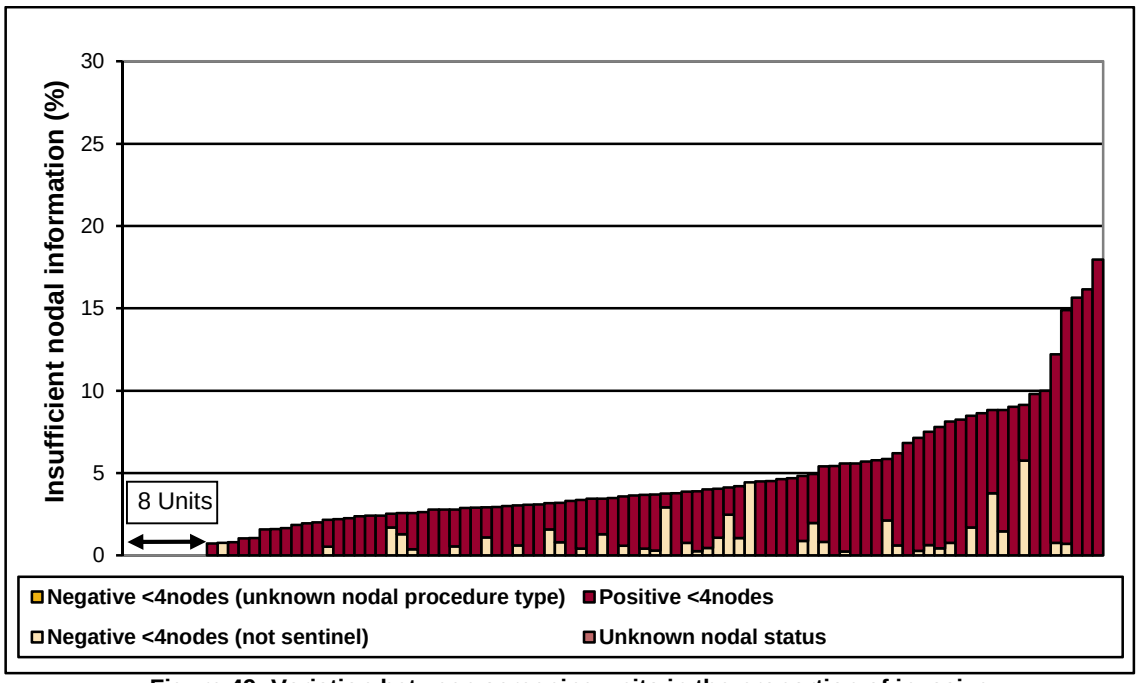

Figure 49: Variation between screening units in the proportion of invasive cancers which may have had insufficient nodal information

Since the publication of the results of the Z11 Trial and the International Breast Cancer Study Group (IBSCG) study, decisions on systemic therapy are increasingly being made on the basis of the available axillary staging (which may include fewer than four nodes) and on tumour grade, size and biomarker information rather than subjecting women to possibly unnecessary axillary clearance. Under these circumstances, the remaining 286 invasive cancers with positive nodal status (without known micro-metastases) determined on the basis of one, two or three nodes using any type of nodal procedure and only one axillary operation (226 (79%) 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. Although radiotherapy treatment is recorded in the audit, the site(s) irradiated (breast/chest wall with/without axilla or other regional nodes) are not recorded. It is therefore not possible to investigate this further.

Key findings

- The proportion of invasive breast cancers for which nodal status was recorded based on the examination of fewer than four nodes decreased from 10.6% in 1996/97 to 4.8% in 2003/04. This rose to 66% in 2013/14 because of the introduction of SLNB. When invasive cancers that had an SLNB are excluded, this figure falls to 6%.
- The median number of nodes taken in an SLNB procedure carried out on invasive cancers was two compared with 12 for other nodal procedures.
- Of the 15,425 invasive cancers with axillary surgery in 2013/14, 13,676 (89%) had an SLNB: the blue dye only technique was used for 9% of invasive cancers with axillary surgery. The use of SLNB has increased by two percentage points since 2012/13.
- The East of England QA reference centre and QA surgeon should follow up unit DGY to ascertain the progress it has made towards ensuring that at least 70% of invasive cancers with axillary surgery have an SLNB.
- QA reference centres and QA surgeons should follow up the other seven units (East of England DSU, DSW and FSO, East Midlands CNN, North West NWA, South Central KWI and Northern Ireland ZNE1) to ascertain the progress they have made towards ensuring that no more than 30% of invasive cancers with axillary surgery have an SLNB involving blue dye only
- Of the 15,543 surgically treated invasive cancers, 127 had unknown nodal status and 86 had their negative nodal status determined on the basis of one, two or three nodes without an SLNB procedure.
- Of the 1,749 invasive breast cancers, which either did not have an SLNB procedure or where the type of nodal procedure was unknown, 94% had four or more nodes taken; 41 screening units did not achieve the 90% four or more nodes minimum standard.
- Of the 15,416 invasive cancers with known nodal status, 3,382 (22%) had positive nodes. The proportion of cases with positive nodal status (16%) was lower for cancers which underwent an SLNB procedure compared with cancers which did not have an SLNB procedure (66%). 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 651 cancers with positive nodal status determined on the basis of one, two or three nodes using any type of nodal procedure, 636 only had one axillary operation. Of these, 350 (55%) were known to have had micro-metastases and 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 four nodes), rather than subjecting women to unnecessary axillary clearance. Under these circumstances, the remaining 286 cancers with positive nodes and only one axillary operation (79% 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. Although radiotherapy treatment is recorded in the audit, the site(s) irradiated (breast/chest wall with/without axilla or other regional nodes) are not recorded. It is therefore not possible to investigate this further.

7.4 Node negative invasive cancers – number of nodes obtained

With the introduction of pre-operative nodal assessment and SLNB and the known negative consequences of removing large numbers of axillary nodes (eg lymphoedema), it is not acceptable to obtain large numbers of nodes from women with node negative invasive cancers. In 2013/14 in the UK as a whole, 5.7% of node negative invasive cancers had more than five nodes examined. Figure 50 shows how this varied between screening units. In six units [North

West (2), East of England (1), North East, Yorkshire & Humber (1) and South East Coast (1)] more than 15% of node negative cancers had more than five nodes examined.

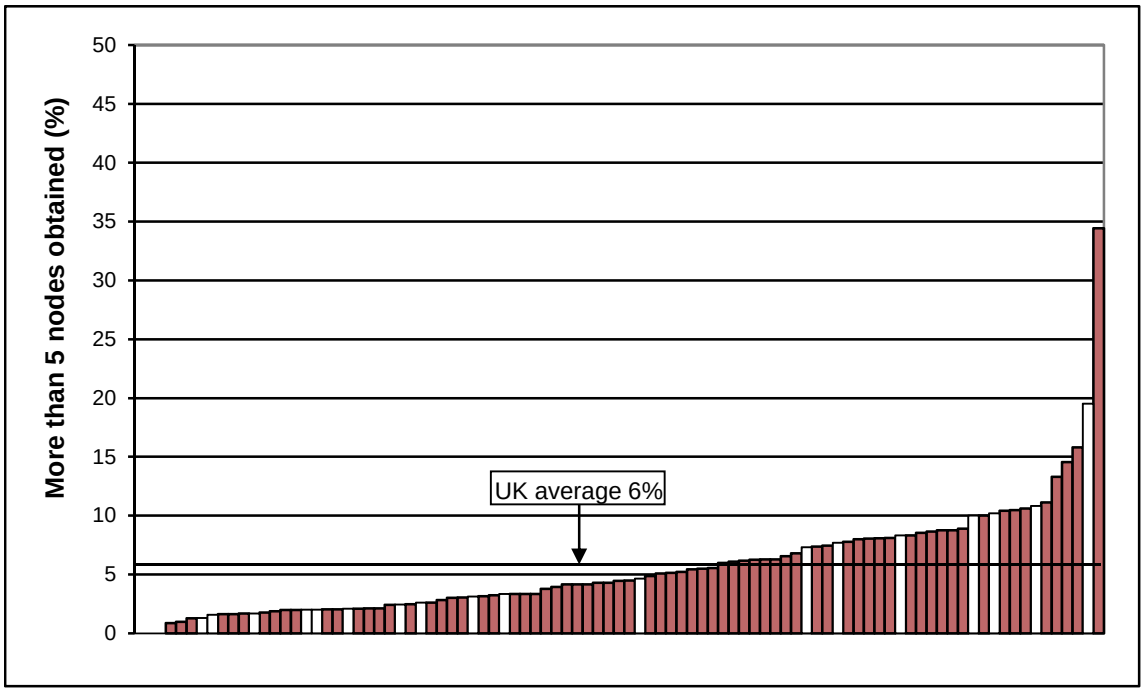

Figure 50: Variation between screening units in the proportion of node negative invasive cancers which have more than five nodes examined
(the 20 smallest units are highlighted in white)

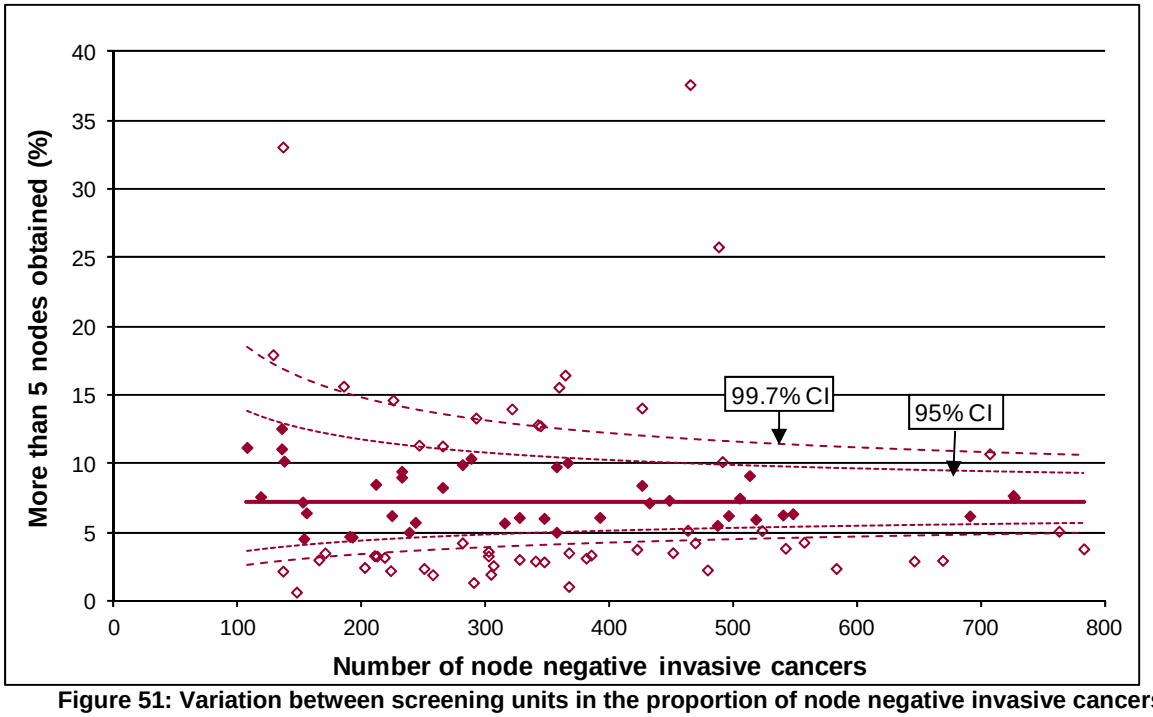

Figure 51: Variation between screening units in the proportion of node negative invasive cancers with more than five nodes taken in the 3-year period 2011/12 to 2013/14
(open diamonds represent units which lie outside the 95% upper and lower control limits)
(cancers with neo-adjuvant therapy have been excluded)

The variation between screening units in the proportion of node negative invasive cancers with more than five nodes examined in the 3-year period 2011/12 to 2013/14 is examined in the control chart in Figure 51 in which 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 7.3% (solid line). Seventeen units had significantly higher proportions with more than five nodes examined and were 95% high outliers. Thirteen of these units [East Midlands (2), East of England (2), North West (2), South Central (2), North East, Yorkshire & Humber (1), South East Coast (1), South West (1), West Midlands (1) and Northern Ireland (1)] were also 99.7% high outliers. Of the 13 99.7% high outlier units, three (in North East, Yorkshire & Humber, South Central and South East Coast) had more than 25% of node negative invasive cancers with more than five nodes examined in 2011/12 to 2013/14.

Surgery KPI S2a

Surgical examination of axillary lymph nodes
1-year high outlier units with more than five nodes obtained from node negative invasive cancers (excluding cases with neo-adjuvant therapy)

Region	Unit	More than 5 nodes -ve invasive 1-year 2013/14		More than 5 nodes -ve invasive 3-year 2011/12-2013/14	
		No.	%	No.	%
Units identified in 2015					
East Midlands	CNN	8	19.5	23	18.0
East Midlands	CLI	11	8.5	60	14.1
East of England	ELD	24	8.8	76	10.7
East of England	FSO	7	7.4	30	11.3
East of England	DSU	4	4.3	33	14.7
East of England	DSW	7	10.0	29	15.7
London	ECX	19	10.6	50	10.2
NEYH	CDO	8	8.1	28	11.4
NEYH	ANT	63	34.4	175	37.6
North West	NWA	19	13.3	60	16.5
North West	PWI	17	11.1	56	15.6
Northern Ireland	ZNE1	8	7.8	44	12.9
South Central	KMK	1	2.0	45	33.1
South Central	KOX	5	3.9	44	12.8
South East Coast	GBR	25	14.5	126	25.8
South West	JSW	18	15.8	45	14.0
West Midlands	MSH	9	10.5	39	13.4
UK average		**667**	**5.7**	**2388**	**7.3**

99.7% high outlier
95% high outlier

Blank in No. column = <5 cases

This KPI has been used for the first time in this year's audit. It examines the proportion of node negative invasive cancers (excluding those treated with neo-adjuvant therapy) with more than five nodes examined in the 3-year period 2011/12 to 2013/14 and in 2013/14. The preceding summary table shows that in 2013/14 five units are 95% high outliers [North West (2), East Midlands (1), London (1) and South West (1)] and two units (in North East, Yorkshire & Humber and South East Coast) are 99.7% high outliers. Six of these seven units are also 99.7% high

outliers in the 3-year period 2011/12 to 2013/14 and one is a 95% high outlier. In the 3-year period 2011/12 to 2013/14, there are 10 other high outlier units (3 at 95% and 7 at 99.7%) which are not high outliers in 2013/13. Regional QA reference centres and regional QA surgeons should follow up the seven high outlier units (East Midlands CNN, London ECX, North East, Yorkshire & Humber ANT, North West NWA and PWI, South East Coast GBR and South West JSW) with high proportions of node negative invasive cancers (excluding those treated with neo-adjuvant therapy) with more than five nodes examined in 2013/14 to ascertain the reason for this clinical practice.

Key findings

- In the UK as a whole in 2013/14, 5.7% of node negative invasive cancers had more than five nodes examined.
- Regional QA reference centres and regional QA surgeons should follow up the seven high outlier units (East Midlands CNN, London ECX, North East, Yorkshire & Humber ANT, North West NWA and PWI, South East Coast GBR and South West JSW) with high proportions of node negative invasive cancers (excluding those treated with neo-adjuvant therapy) with more than five nodes examined in 2013/14 to ascertain the reason for this clinical practice.

7.5 Micro-invasive and non-Invasive cancers – sentinel lymph node biopsy and nodal status

Of the 138 surgically treated micro-invasive cancers, 95 (69%) had known nodal status. Forty eight (96%) of the 50 micro-invasive cancers treated by mastectomy and 47 of 88 (53%) micro-invasive cancers treated with breast conserving surgery had known nodal status. Two of the 95 micro-invasive cancers with known nodal status (in South Central and South West) had positive nodal status recorded.

In the UK as a whole the median numbers of nodes taken for non-invasive cancers undergoing breast conserving surgery or mastectomy were both two (Table 92). The maximum numbers of nodes taken for non-invasive cancers treated with breast conserving surgery or mastectomy were 12 and 17 respectively. Eleven non-invasive cancers treated with mastectomy had their nodal status determined on the basis of an axillary clearance. Fourteen non-invasive cancers had more than 10 nodes taken.

Eleven non-invasive cancers had positive nodal status recorded (Table 89) 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. Eight of these cancers had an SLNB procedure [London (3), North West (3), North East, Yorkshire & Humber (1) and South Central (1)] and four had axillary clearance procedures [London (2), North West (1) and North East Yorkshire & Humber (1)]. Of the eight non-invasive cancers which had their positive nodal status determined from an SLNB procedure, two (in North West and London) had a subsequent axillary procedure in the same operation or in a subsequent operation.

Of the 3,987 surgically treated non-invasive cancers, 27% had known nodal status and 73% had no nodes obtained (Table 87). Ninety one 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 88). Of the 1,062 non-invasive cancers with known nodal status, 11 (1%) had positive nodal status recorded (Table 89).

7.5.1 Non-invasive cancers treated with mastectomy

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. In the UK as a whole in 2013/14, 91% of non-invasive cancers treated with mastectomy had known nodal status, and 94% of these had their nodal status determined on the basis of an SLNB (Table 90). There was wide variation between screening units in the use of SLNB for non-invasive cancers treated with mastectomy (Figure 52). In 30 units where the nodal status was known for all cancers, the status was always determined by an SLNB, while in one unit in East of England where the nodal status was known for all cancers, the status was always determined by axillary sampling. The median number of nodes taken in an SLNB procedure carried out on non-invasive cancers treated with mastectomy was two compared with four for other nodal procedures.

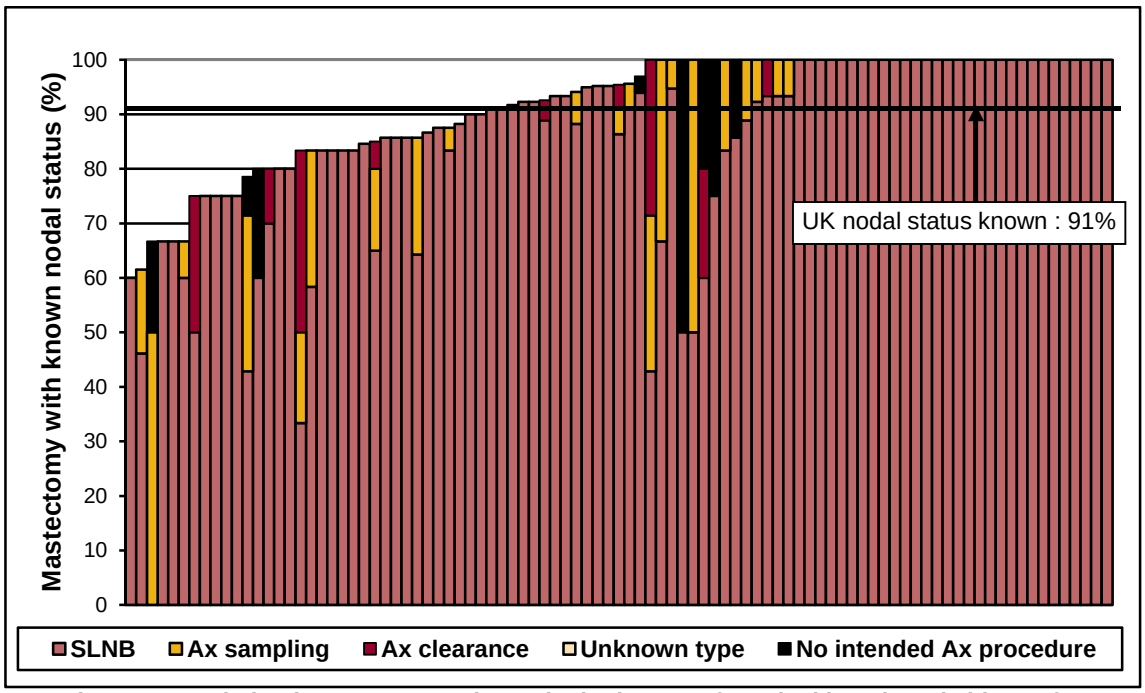

Figure 52: Variation between screening units in the use of sentinel lymph node biopsy for non-invasive cancers with known nodal status treated with a mastectomy

7.5.2 Non-invasive cancers treated with breast conserving surgery

Because the risk of axillary nodal metastasis is extremely low in screen-detected lesions where a final (post-operative) diagnosis of DCIS is made, the routine determination of nodal status for non-invasive cancers treated with breast conserving surgery is not recommended by either the National Institute for Health and Care Excellence or the ABS. Two hundred (7%) non-invasive

cancers treated with breast conserving surgery had known nodal status, and 97% of these had their nodal status determined on the basis of an SLNB (Tables 88 and 91). 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. The median number of nodes taken in an SLNB procedure carried out on non-invasive cancers treated with breast conserving surgery was two compared with four for other nodal procedures (4 cancers).

Figure 53 shows that compared with non-invasive cancers treated with mastectomy, variation in practice between screening units was less marked for non-invasive cancers, with most units using an SLNB axillary procedure. Twenty four units had no non-invasive cancers with axillary surgery and 27 units did not use SLNB for their non-invasive cancers. In seven units [East Midlands (2), East of England (2), Northern Ireland (2) and North West (1)] 20% or more non-invasive cancers had axillary surgery.

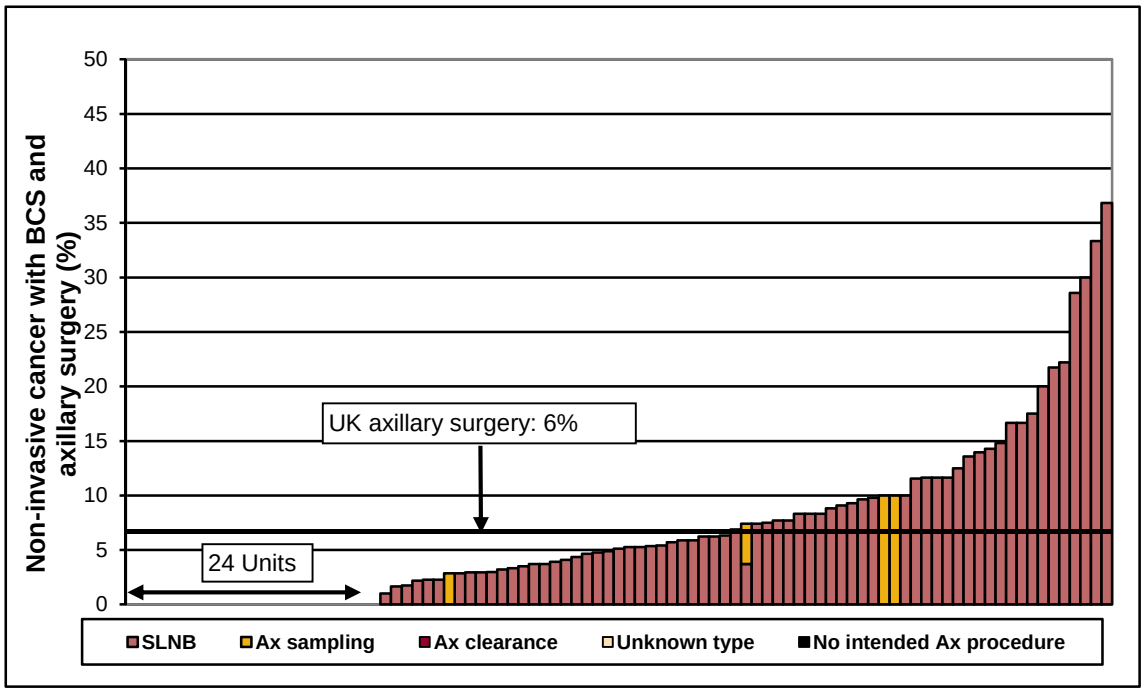

Figure 53: Variation between screening units in the use of sentinel lymph node biopsy for non-invasive cancers treated with axillary surgery and breast conserving surgery

The variation between screening units in the proportion of non-invasive cancers treated with breast conserving surgery which had axillary surgery in the 3-year period 2011/12 to 2013/14 is examined in the control chart in Figure 54 in which 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 6.9% (solid line). Seven units [East Midlands (2), East of England (2), West Midlands (2) and London (1)] had significantly higher proportions of non-invasive cancers with known nodal status and were 95% high outliers. The unit in London was also a 99.7% high outlier.

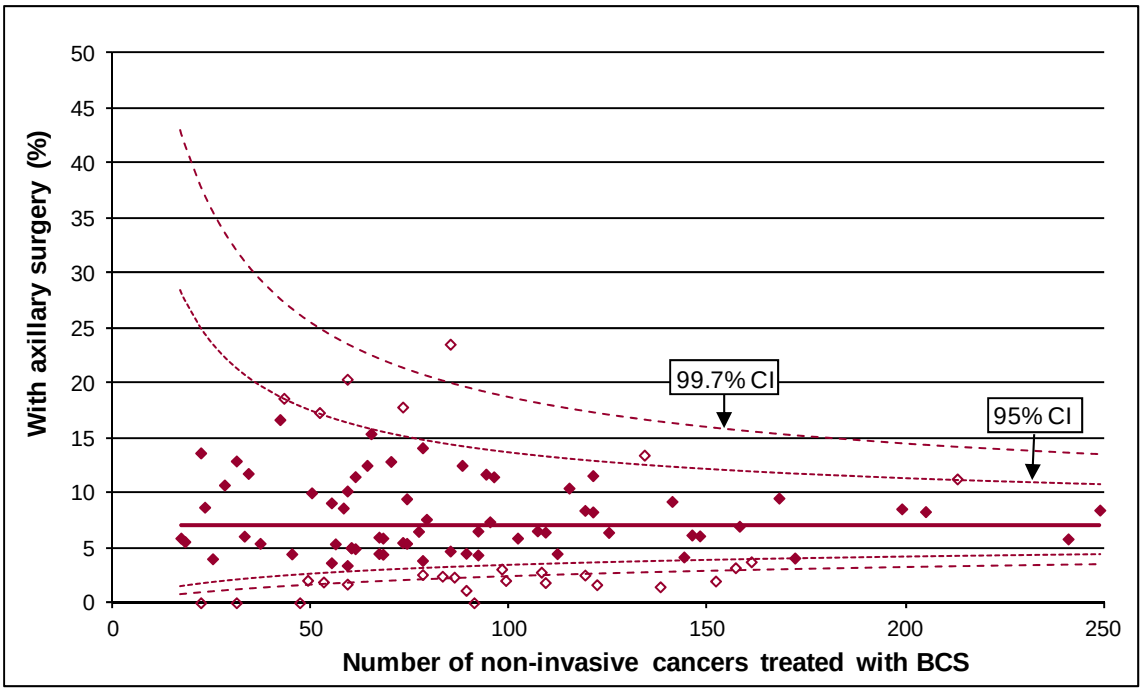

Figure 54: Variation between screening units in the proportion of non-invasive cancers with known nodal status in the 3-year period 2011/12 to 2013/14 (open diamonds represent units which lie outside the 95% upper and lower control limits)

Surgery KPI S2b

Surgical examination of axillary lymph nodes
1-year high outliers for axillary node surgery performed on non-invasive cancers treated with breast conserving surgery

Region	Unit	Known nodal status non-invasive 1-year 2013/14		Known nodal status non-invasive 3-year 2011/12-2013/14	
		No.	%	No.	%
Units identified in 2015					
East Midlands	KNN	7	36.8	9	17.3
East Midlands	CDN		28.6	8	18.6
East of England	DNF		5.3	12	20.3
East of England	ELD	11	13.6	24	11.3
London	FBH	7	17.5	20	23.5
London	GCA	10	16.7	13	9.2
West Midlands	MCO	5	9.8	18	13.4
West Midlands	MDU		6.3	13	17.8
UK average		**196**	**6.4**	**579**	**6.9**

99.7% high outlier
95% high outlier

Blank in No. column = <5 cases

This KPI has been used for the first time in this year's audit. It examines the proportion of non-invasive cancers with known nodal status in the 3-year period 2011/12 to 2013/14 and in

2013/14. The preceding summary table shows that two units (in East Midlands and London) are 95% high outliers with high proportions of non-invasive cancers with known nodal status in 2013/14. The East Midlands unit is also a 95% high outlier in the 3-year period 2011/12 to 2013/14. Five additional units are 95% high outliers [East of England (2), West Midlands (2) and East Midlands (1)] in the 3-year period 2011/12 to 2013/14. Another unit in London is a 99.7% high outlier in this 3-year period. Regional QA reference centres and regional QA surgeons should follow up the two units (East Midlands KNN and London GCA) with high proportions of non-invasive cancers with known nodal status in 2013/14 to ascertain the reason for this clinical practice.

7.6 Invasive cancers with no axillary surgery recorded

Of the 15,543 surgically treated invasive cancers, 123 did not have nodes taken at surgery (Table 80). Forty eight invasive cancers with a B5b (invasive) non-operative diagnosis had no axillary procedure recorded; 11 were in Scotland (nine in one unit) and seven in South West. Forty eight 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. Six invasive cancers with a B5c non-operative diagnosis and 13 invasive cancers without a non-operative diagnosis had no surgery to the axilla. It is possible that under some circumstances, (eg 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 to be inappropriate after multidisciplinary team discussion.

Key findings

- Of the 138 surgically treated micro-invasive cancers, 69% had known nodal status; 96% of those treated by mastectomy and 53% of those treated with breast conserving surgery.
- Twenty seven percent of non-invasive cancers had known nodal status. 91% of non-invasive cancers treated with mastectomy had known nodal status, compared with 7% of those treated with breast conserving surgery.
- The maximum numbers of nodes taken for non-invasive cancers treated with breast conserving surgery or mastectomy were 12 and 17 respectively.
- Of the 1,062 non-invasive cancers with known nodal status, 11 had positive nodal status.
- Ninety four percent of non-invasive cancers treated with a mastectomy and 97% of those treated with breast conserving surgery had their nodal status determined on the basis of an SLNB.
- Eleven non-invasive cancers treated with mastectomy had their nodal status determined on the basis of an axillary clearance.
- The median number of nodes taken in an SLNB procedure carried out on non-invasive cancers treated with mastectomy was two compared with four for other nodal procedures.
- Because the risk of axillary nodal metastasis is extremely low in screen-detected lesions where a final (post-operative) diagnosis of DCIS is made, the routine determination of nodal status for non-invasive cancers treated with breast conserving surgery is not recommended by either the National Institute for Health and Care Excellence or the ABS.
- Of the 200 non-invasive cancers treated with breast conserving surgery that had known nodal status 97% had their nodal status determined on the basis of an SLNB.
- The median number of nodes taken in an SLNB procedure carried out on non-invasive cancers treated with breast conserving surgery was two compared with four for other nodal procedures (four cancers).

Key findings (cont)

- Regional QA reference centres and regional QA surgeons should follow up the seven high outlier units (East Midlands CNN, London ECX, North East, Yorkshire & Humber ANT, North West NWA and PWI, South East Coast GBR and South West JSW) with high proportions of node negative invasive cancers (excluding those treated with neo-adjuvant therapy) with more than five nodes examined in 2013/14 to ascertain the reason for this clinical practice.
- Forty eight invasive cancers with a B5b (invasive) core biopsy, 48 invasive cancers with a B5a (non-invasive) core biopsy, six invasive cancers with a B5c non-operative diagnosis and 13 invasive cancers without a non-operative diagnosis had no axillary procedure recorded.
- It is possible that under some circumstances, (eg 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 to be inappropriate after multidisciplinary team discussion.

7.7 Repeat operations involving the axilla

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

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

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

Scenario 2: Additional therapeutic nodal procedure(s):

- insufficient number of nodes harvested at first operation
- therapeutic clearance of nodes when a large number of nodes at the first operation are positive
- clearance of nodes following a positive SLNB procedure

Overall in 2013/14 (Table 93), 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 nine B5b (Invasive) cancers had axillary surgery at a repeat operation. All eight invasive cancers diagnosed by C5 cytology only had axillary surgery at the first operation.

7.8 Axillary surgery for B5a (non-invasive) cancers found to be Invasive at surgery

Of the 778 invasive cancers with a B5a (non-invasive) non-operative diagnosis, 94% had axillary surgery; 46% (361 cancers) at the first operation and 47% (369 cancers) at a repeat operation (Table 93). Of the cancers with axillary assessment at first operation, 328 (91%) had SLNB performed, compared to 328 (89%) of the cancers 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 46 units to 50% in a unit in South West (Figure 55).

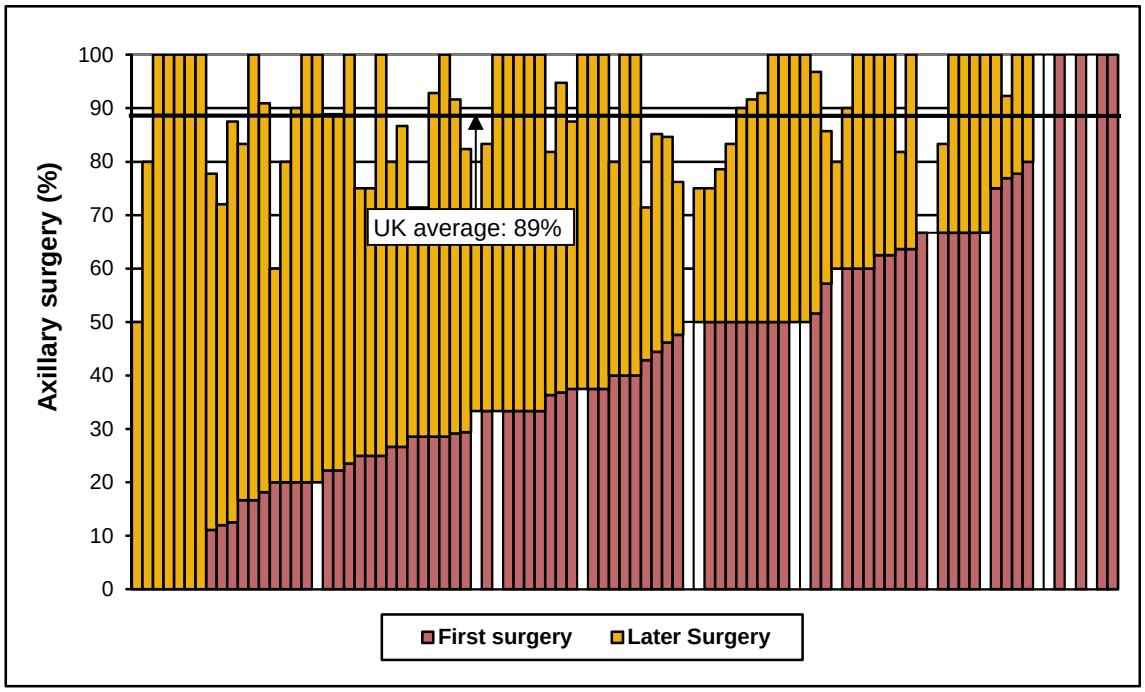

Figure 55: Variation between screening units in the proportion of invasive cancers with a B5a (non-invasive) non-operative diagnosis having axillary surgery at first and repeat operations (4 units were excluded as they had no B5a to invasive cancers) (15 of the 20 smallest units are highlighted in white)

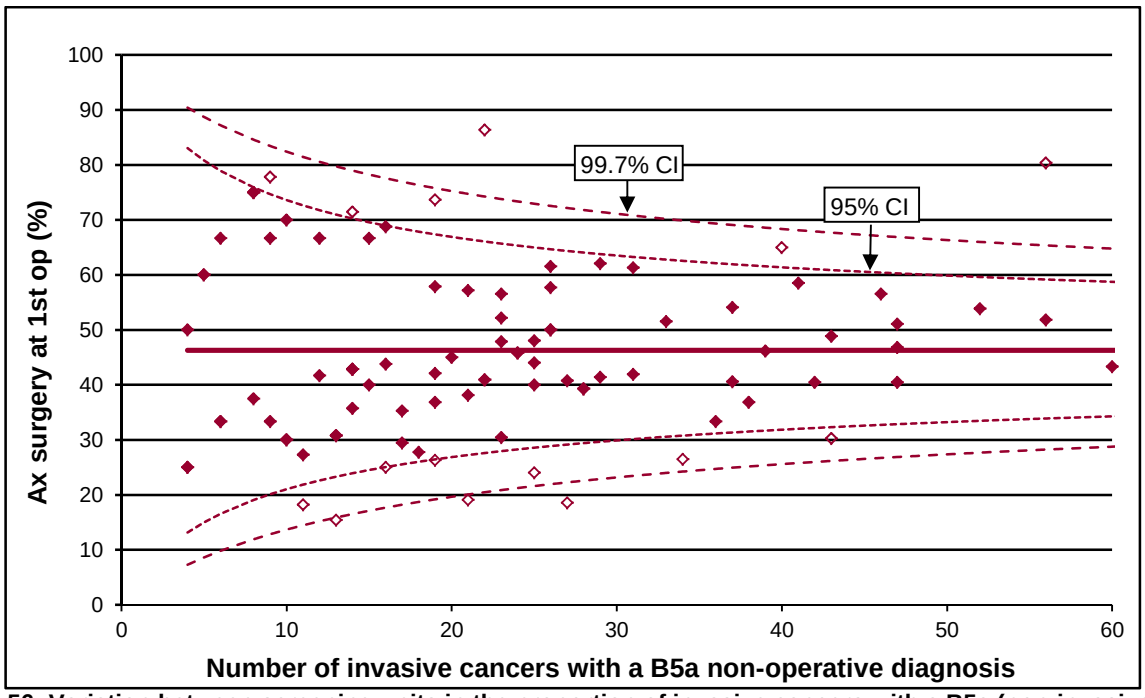

Figure 56: Variation between screening units in the proportion of invasive cancers with a B5a (non-invasive) non-operative diagnosis having axillary surgery at first operation in the 3-year period 2011/12 to 2013/14 (open diamonds represent units which lie outside the 95% upper and lower control limits)

In the 3-year period 2011/12 to 2013/14, 530 (24%) invasive cancers with a B5a (non-invasive) non-operative diagnosis had a mastectomy at first operation and 1,537 (71%) 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 2011/12-2013/14 is examined in the control chart in Figure 56 in which 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 46.3% (solid line). Six units [Scotland (2), East of England (1), London (1), South West (1) and West Midlands (1)] lie above the 95% upper control limit. The 2 Scottish units also lie above the 99.7% upper control limit. It is possible that the high outlier units are using predictive models to identify cancers which are more likely to have invasion so that the appropriate surgery can be carried out at a single operation. However, compared with the UK average values, none of the outliers had particularly high proportions of Grade 3 cancers or cancers with a maximum diameter of 15mm or more. Of the 6 high outlier units, 1 in East of England, had a significantly higher than average mastectomy rate for non-invasive cancers in the 3-year period 2011/12 to 2013/14 (Figure 22) where limited axillary surgery would be appropriate.

Key findings

- In 2013/14 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 361 (46%) of these cancers had their axillary surgery at the first operation; of these, 91% had SLNB performed, compared to 89% of those with axillary assessment at later operation.
- During the 3-year period 2011/12 to 2013/14, 6 screening units had significantly higher rates of axillary surgery at first operation for invasive cancers with a B5a (Non-invasive) diagnosis.
- It is possible that the high outliers are using predictive models to identify cases which are more likely to have invasion so that the appropriate surgery can be carried out at a single operation. However, compared with the UK average values, none of the outliers had particularly high proportions of Grade 3 cancers or cancers with a maximum diameter of 15mm or more
- One of the high outlier units had a significantly higher than average mastectomy rate for non-invasive cancers where limited axillary surgery would be appropriate.

7.9 Repeat operations after a positive SLNB

Another reason for performing repeat operations to the axilla is if the positive nodal status has been determined on the basis of a SLNB. 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 International Breast Cancer study Group (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, 31% 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 (Table 94). Ninety five percent of repeat operations were carried out after a SLNB. Sixty two percent of the node positive cancers had macro-metastases, 11% had micro-metastases, 0.1% had isolated tumour cells and for 25%, the type of metastases was unknown.

The proportion of repeat operations to the axilla varied widely between screening units for invasive cancers with positive nodal status Figure 57, from none in 2 units in South Central (1 of

which was small) to 74% in a unit 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.

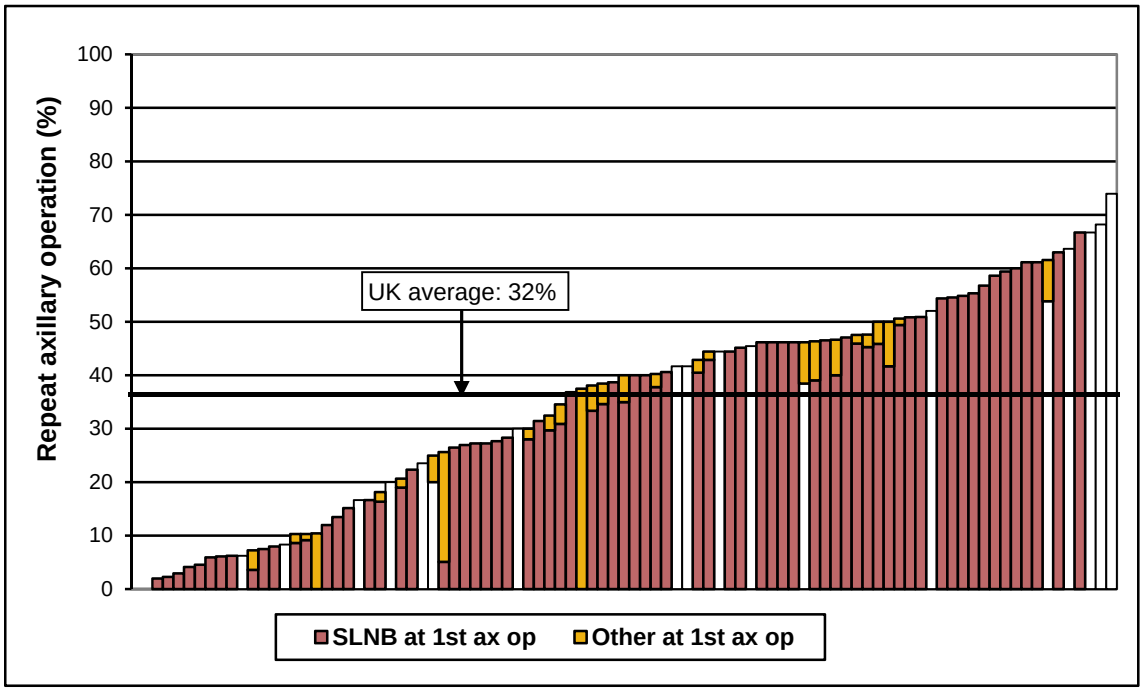

Figure 57: Variation between screening units in repeat axillary operations for invasive cancers with positive nodal status
(18 of the smallest units are highlighted in white)

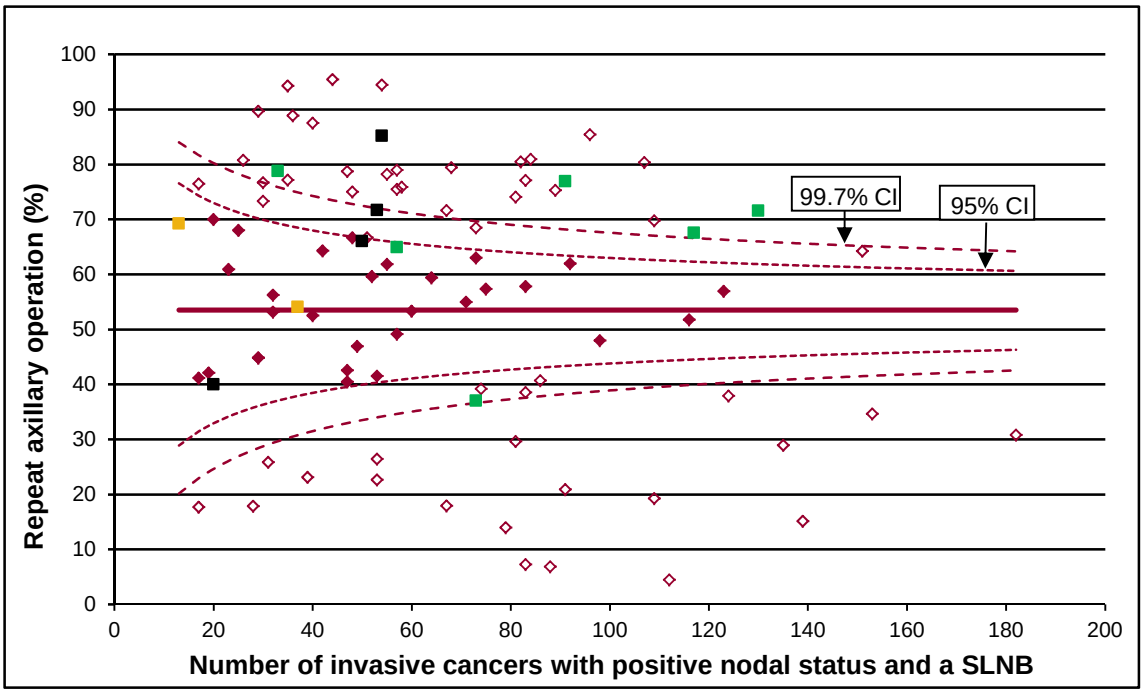

Figure 58: Variation between screening units in repeat axillary operations for invasive cancers with positive nodal status determined on the basis of a SLNB in the 3-year period 2011/12 to 2013/14
(Open diamonds represent units which lie outside the 95% upper and lower control limits)
Green squares represent units where 20% or more invasive cancers had no axillary ultrasound in 2013/14
Black squares represent units with 40% or more invasive cancers with no needle biopsy after an abnormal axillary ultrasound in 2013/14
Orange squares represent units where 40% or more invasive cancers did not have a SLNB in 2013/14

The variation between screening units in the 3-year period 2011/12-2013/14 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 58 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) (53.5%). Thirty six units had significantly higher rates of repeat axillary surgery and were 95% high outliers (and 29 of these units were also 99.7% high outliers), and 23 had significantly lower rates of repeat axillary surgery and were 95% low outliers (19 of these units were also 99.7% low outliers).

Green squares represent the 6 units where 20% or more invasive cancers had no axillary ultrasound in 2013/14 (Figure 44). Four of these units [East of England (2) and Wales (2)] have a significantly higher proportion of invasive cancers with a repeat axillary operation. It is therefore possible that in these units fewer women could have had a repeat operation if pre-operative axillary ultrasound had been undertaken. Black squares represent the 4 units with 40% or more invasive cancers with no needle biopsy after an abnormal axillary ultrasound in 2013/14 (Figure 45). Two of these units (in North West and South West) have a significantly higher proportion of invasive cancers with a repeat axillary operation. It is therefore possible that in these units fewer women could have had a repeat operation if a needle biopsy had been taken after an abnormal pre-operative axillary ultrasound. Orange squares represent the 2 units where 40% or more invasive cancers did not have a SLNB in 2013/14 (Figure 47).

Key findings

- In 2013/14, 32% invasive cancers with a positive nodal status had a repeat operation to the axilla; 31% following a SLNB and 2% after an axillary operation which did not involve a SLNB.
- Overall in the UK, 95% 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 74% in a unit 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 six units had significantly higher rates of repeat axillary surgery and were 95% high outliers (29 were 99.7% high outliers), and 23 had significantly lower rates of repeat axillary surgery and were 95% low outliers (19 were 99.7% low outliers).
- Of the high outliers, 2 units in North West and South West had 40% or more invasive cancers with no biopsy after an abnormal axillary ultrasound in 2013/14 and 4 units [East of England (2) and Wales (2)] had more than 20% of cancers had no axillary ultrasound in 2013/14. 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 2012 and 31 March 2013, 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 2014, allowing a minimum of 12 months follow up. Scotland did not provide adjuvant audit data in this year's audit (2012/13 data) or in last year's audit (2011/12 data).

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 from the adjuvant audit data analysis.

8.1 Previous cancers

Of the 17,655 women offered a screening appointment between April 2012 and March 2013 whose data was submitted to the adjuvant audit, 16,754 (95%) could be matched to patients recorded by the UK cancer registries (Table 95). Of these 16,754 women, 2,045 (12%) had at least one previous cancer registered and 770 (5%) had a previous breast cancer registered: 618 had previous invasive/micro-invasive breast cancers and 163 had previous non-invasive breast cancers (Table 96). Of the 13,896 matched women with invasive breast cancer and 3,605 matched women with non-invasive breast cancer included in the adjuvant audit data, 607 (4%) and 157 (4%) respectively had previous breast cancers registered.

8.2 Data completeness for the adjuvant therapy audit

The 2014 UK NHSBSP & ABS audit reported tumour characteristics and primary treatment data for 17,820 screen-detected breast cancers in England, Northern Ireland and Wales. When data for these cancers were requested for inclusion in this year's adjuvant therapy audit, seven additional cancers that were not included in the 2012/13 main audit were identified, and five cancers were found not to be breast cancer. Of the 17,822 breast cancers which were thus eligible for inclusion in the adjuvant therapy audit, a further 770 were excluded because of previous breast cancer diagnoses (Table 98), 155 cases from Northern Ireland were excluded because surgeons did not give approval to include their cases, 11 cases in South East Coast

were excluded because surgical permission was not sought from outside region surgeons and one local surgeon did not respond to audit queries, and one case was excluded because the woman refused to allow her data to be used.

Following the exclusions described above, 16,885 breast cancers (95%) were eligible for inclusion in the adjuvant therapy audit (Table 98). Of these, 13,289 (79%) were invasive cancers, 3,448 (20%) were non-invasive and 136 (1%) were micro-invasive (Table 117). In the UK as a whole, data completeness for radiotherapy, chemotherapy and endocrine therapy was 95%, 86% and 88% respectively, and 93% of cases had complete radiotherapy, chemotherapy and endocrine therapy data (Tables 101, 103 and 105).

The adjuvant therapy data sent to English screening units for surgical validation was created using extracts from the English Cancer Analysis System (CAS) which were obtained in July 2014 and January 2015 and an extract of the National Radiotherapy Dataset (RTDS) which was obtained in February 2015. Radiotherapy data were derived by combining CAS data and the RTDS dataset. Adjuvant therapy data for the East Midlands were obtained solely from the CAS and the RTDS, and did not undergo surgical validation. Overall, only 3% of the East Midlands cases had complete adjuvant therapy data, compared to 90% in the other regions (Table 99). This difference arises because cancer registries record ‘unknown’ in the cancer registry treatment record unless confirmation is received that adjuvant treatment has or has not been given. In most screening units, cases without adjuvant treatment in the CAS were confirmed during the surgical verification process as not having had adjuvant therapy. These units therefore have a higher level of data completeness than East Midlands units.

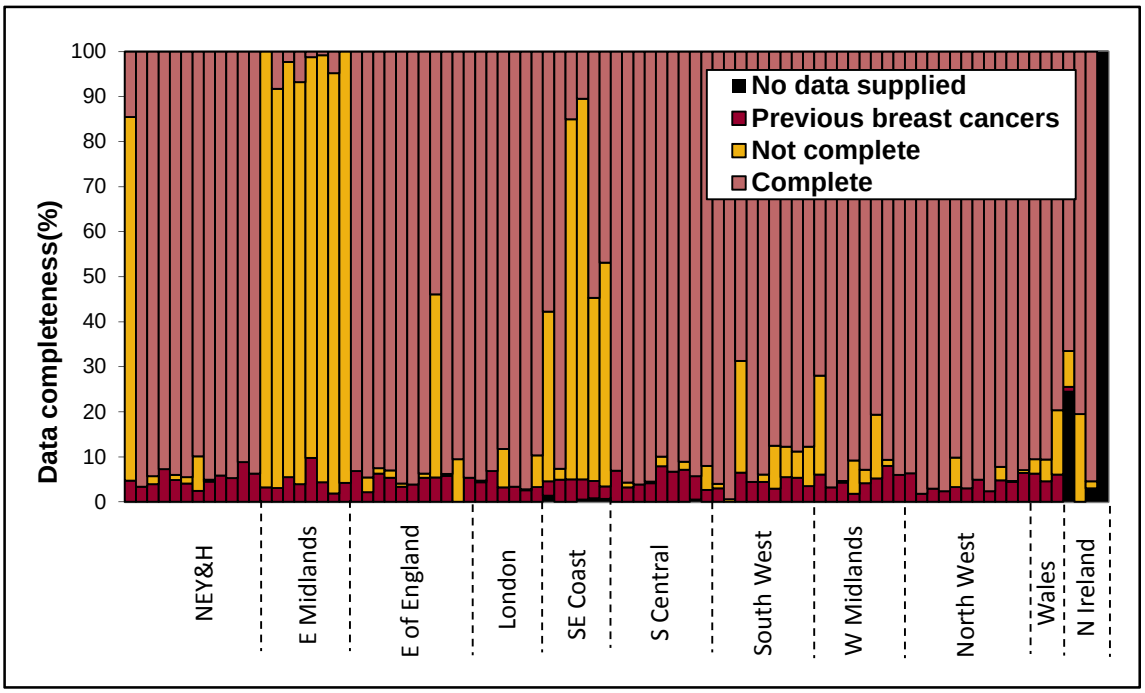

Figure 59: Variation between regions and screening units in adjuvant therapy data completeness
No adjuvant therapy data were provided for Scotland

Figure 59 shows the completeness of adjuvant therapy data in each screening unit in each English region and in Northern Ireland and Wales in 2012/13. Tables 101, 103 and 105 show

the completeness of radiotherapy, chemotherapy and endocrine therapy in each region. In the East Midlands, 25% of cancers had unknown radiotherapy (Table 101) and all eight screening units had more than 20% of cancers with unknown radiotherapy. However, 75% of cancers in the East Midlands had radiotherapy compared to 74% in the other regions and 0.83% more cancers were recorded as having been treated with radiotherapy in the East Midlands in 2012/13 compared with 2011/12. It was therefore decided that East Midlands radiotherapy data would be included in national and unit level adjuvant radiotherapy analyses.

In the East Midlands, 83% of cancers had unknown chemotherapy (Table 103) and all eight screening units had more than 70% of cancers with unknown chemotherapy. However, 17% of East Midlands cancers had chemotherapy recorded compared to 20% in the other regions, and only 0.99% fewer cancers were recorded as having been treated with chemotherapy in the East Midlands in 2012/13 compared with 2011/12. It was therefore decided that East Midlands chemotherapy data would be included in national and unit level adjuvant chemotherapy analyses.

In the East Midlands, 72% of cancers had unknown endocrine therapy (Table 105) and all eight screening units had more than 45% of cancers with unknown endocrine therapy. Furthermore, only 28% of East Midlands cancers had endocrine therapy recorded compared to 70% in the other regions, and 41% fewer cancers were recorded as having received endocrine therapy in the East Midlands in 2012/13 compared with 2011/12. It was nevertheless decided that East Midlands data would be included in national and unit level adjuvant endocrine therapy analyses.

8.3 Adjuvant therapy

In general, as expected, women with invasive breast cancer received more adjuvant therapy than women with non/micro-invasive breast cancer. Of all women with breast cancer, 12,502 (74%) had radiotherapy recorded and 4,383 were recorded as having had no or unknown radiotherapy by the audit cut off date (Table 101). Eighty two percent of women with invasive cancer, 54% with micro-invasive cancer and 45% with non-invasive cancer had radiotherapy recorded (Table 100). Twenty six percent of women with invasive cancer and 10 (0.3%) with non/micro-invasive cancer (one micro-invasive and nine non-invasive) had adjuvant chemotherapy recorded (Table 102). (Regional QA reference centres were asked to check whether the latter finding was correct before submitting the data for national collation).

Eighty two percent of women with invasive cancer and 9% of women with non/micro-invasive cancer received endocrine therapy (Table 104). This difference reflects the relatively low proportion of non/micro-invasive cancers known to be ER positive (31% compared with 90% for invasive cancers), and differing opinions regarding the benefit of endocrine therapy in women with non-invasive cancer. Some women with non-invasive cancer may have received endocrine therapy as part of a clinical trial. Thirty five (12%) of the women with breast cancer who did not have surgery recorded (Table 106) and 40 (17%) of the 386 women with invasive cancer who did not have surgery, had chemotherapy recorded (Table 107).

Figures 60 and 61 show how the level of adjuvant therapy recorded for women with invasive and non/micro-invasive cancers varied with age for 10,695 women treated with breast conserving surgery and for 3,005 women treated with mastectomy. Chemotherapy recorded for women with non-invasive cancer has been excluded because the numbers are small (nine cases) and the accuracy of the data is questionable. Overall, radiotherapy was the main adjuvant therapy for women with invasive cancer at all ages, followed by endocrine therapy. Seventy seven percent of the 855 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 89% and 92% (see Figure 60). A slightly smaller proportion of women in every age group treated with mastectomy received endocrine therapy (range 86% to 89% (see Figure 61)).compared with those who had breast conserving surgery.

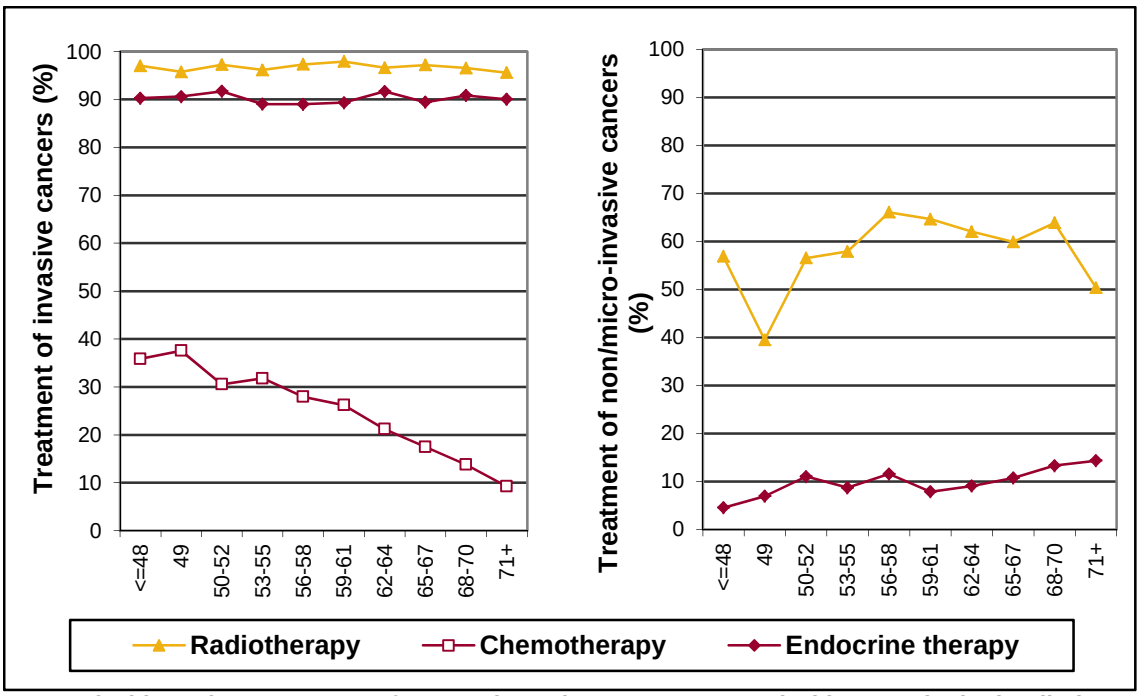

Figure 60 (Table 108) : Percentage of women in each age group treated with BCS who had radiotherapy, chemotherapy and endocrine therapy recorded, for cases with complete adjuvant data
No adjuvant therapy data were provided for Scotland

Ninety seven percent of women aged 50 to 64 years with invasive cancer treated with breast conserving surgery received radiotherapy, and there was only a one percentage point decrease in the use of radiotherapy for women aged 71 and over. Overall, only 36% 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 40% in women aged 52 and below to around 32% in women aged 71 and older) (Figure 61). The site(s) irradiated (breast/chest wall with/without axilla or other regional nodes) were not recorded in the audit.

For women with non/micro-invasive cancer treated by breast conserving surgery, the use of radiotherapy peaked at 66% for women aged 56-58 years and then fell to 50% for those aged older than 70 (Figure 60). Three percent of women with non/micro-invasive cancer treated with mastectomy had radiotherapy. The indication for post mastectomy radiotherapy 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.

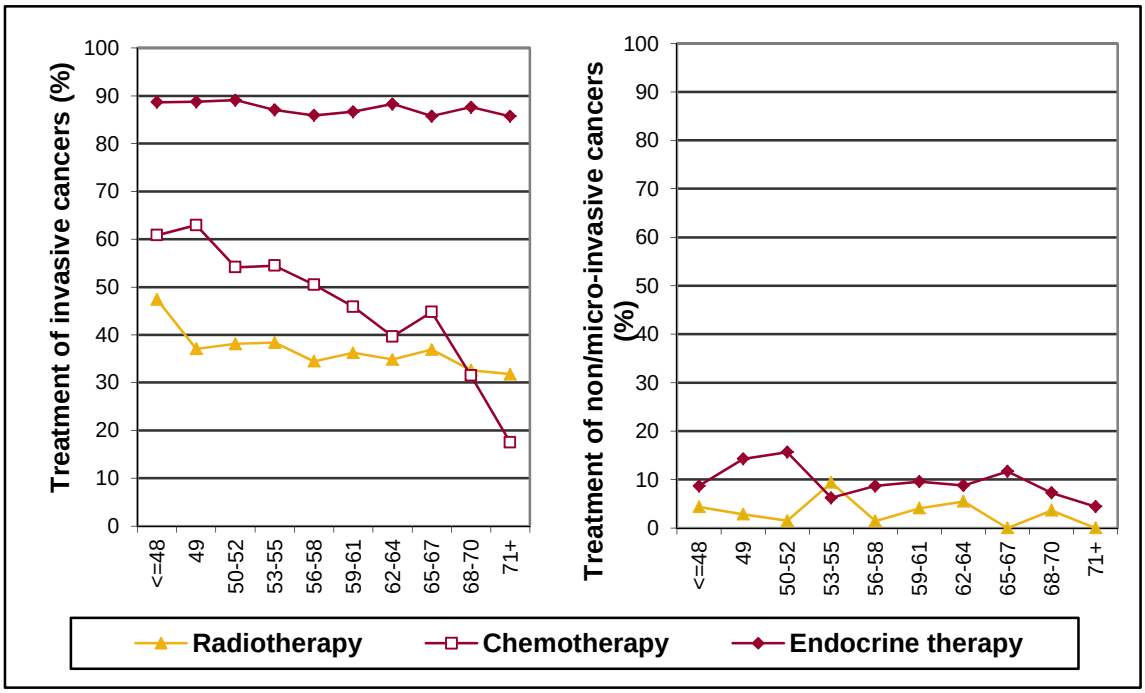

Figure 61 (Table 109): Percentage of women in each age group treated with mastectomy who had radiotherapy, chemotherapy and endocrine therapy recorded, for cases with complete adjuvant data
No adjuvant therapy data were provided for Scotland

Chemotherapy was the least used adjuvant therapy; being recorded for only 20% of women with invasive cancer (Table 102). 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 undergoing breast conserving surgery received chemotherapy (45% compared with 23%) and this difference was evident in every age group. There was also a clear decrease in the use of chemotherapy with age in both treatment groups: with only 16% of women treated with breast conserving surgery aged 65-70 having chemotherapy recorded compared to 32% of women aged 49-55, and only 39% of women treated with mastectomy aged 65-70 having chemotherapy recorded compared to 55% of women aged 49-55. 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.

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% (6,072 women) receiving this treatment combination (Figure 62). 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.

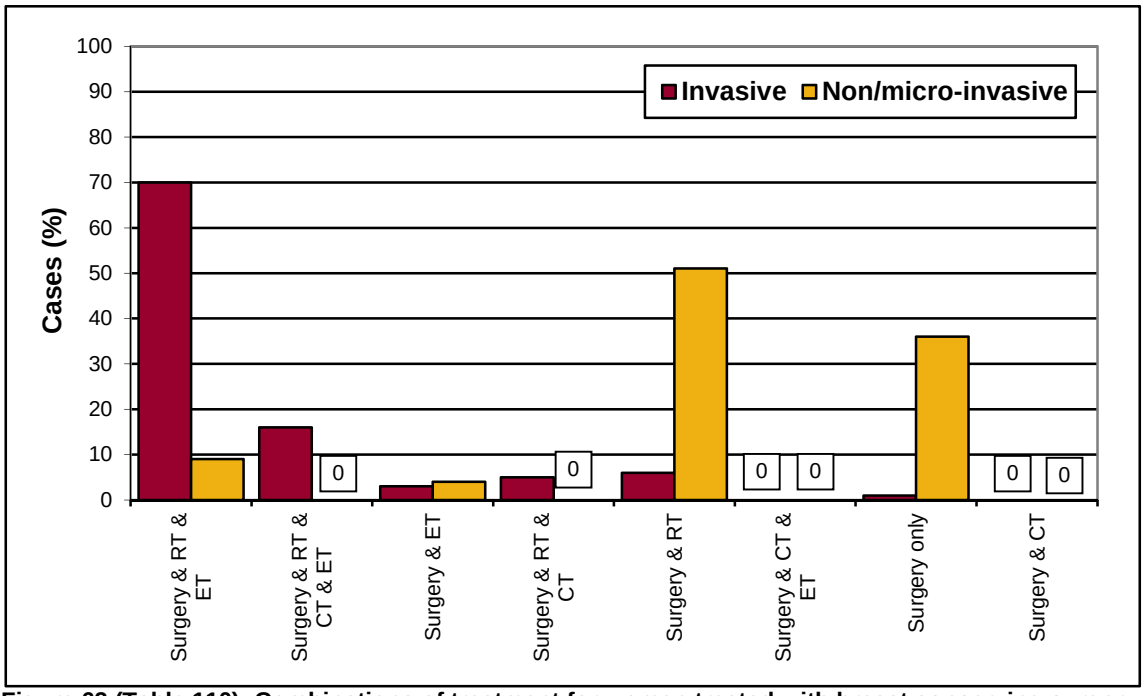

Figure 62 (Table 110): Combinations of treatment for women treated with breast conserving surgery, expressed as a percentage of cases with complete adjuvant therapy data
No adjuvant therapy data were provided for Scotland

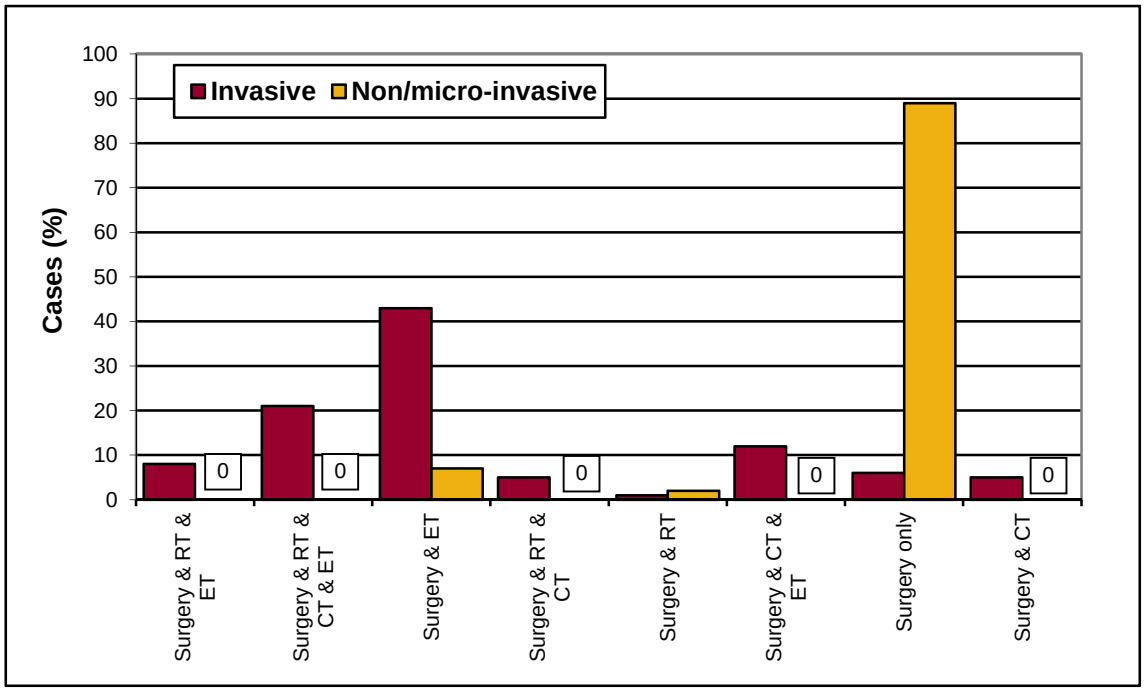

Figure 63 (Table 110): Combinations of treatment for women treated with mastectomy, expressed as a percentage of cases with complete adjuvant therapy data
No adjuvant therapy data were provided for Scotland

Surgery (ST) and endocrine therapy (ET) was the most common treatment pattern for women with invasive breast cancer treated with mastectomy, with 43% (931 women) receiving this treatment combination (Figure 63). Eighty nine percent of women with non/micro-invasive cancer treated with mastectomy had surgery alone.

Key findings

- Of the 17,820 breast cancers detected in 2012/13, 167 were not included in the adjuvant audit because the adjuvant data were not submitted. A further 770 cancers were excluded because of previous breast cancer diagnoses, leaving 16,885 (95%) for analysis.
- Eighty two percent of women with invasive cancer, 54% with micro-invasive cancer and 45% with non-invasive cancer had radiotherapy recorded: 26% of the women with invasive cancer and 10 women with non/micro-invasive cancer had chemotherapy recorded.
- Eighty two percent of women with invasive cancer and 9% 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.
- In 2012/13, radiotherapy therapy was the main adjuvant therapy for women with invasive cancer at all ages, followed by endocrine therapy: 77% of the 855 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 89% and 92%).
- A slightly smaller proportion of women in every age group treated with mastectomy received endocrine therapy (range 86% to 89%) compared with those who had breast conserving surgery.
- Ninety seven percent of women aged 50 to 65 with invasive cancer treated with breast conserving surgery received radiotherapy, and there was only a one percentage point decrease in the use of radiotherapy for women aged 71 and over. Overall, only 36% of women treated with mastectomy had radiotherapy, and there was a gradual decrease in the use of radiotherapy with age. 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 66% for women aged 56-58 and then fell to 50% for those aged older than 70. Three percent of women with non/micro-invasive cancer treated with mastectomy had radiotherapy. The site(s) irradiated were not recorded.
- 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.
- Chemotherapy was the least used adjuvant therapy; being recorded for only 20% of women with invasive cancer. Overall, a higher proportion of women treated with mastectomy received chemotherapy (45% compared with 23%) and this difference was evident in every age group. There was also a clear decrease in the use of chemotherapy with age in both treatment groups. 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.

8.4 Waiting time for radiotherapy

Tables 111 to 114 show the regional variation in the cumulative percentages of women with breast cancer recorded as having radiotherapy within 14, 30, 60, 90, 120 and 200 days of their final surgery or first assessment clinic visit. Women who received adjuvant chemotherapy, two women who had neo-adjuvant radiotherapy recorded and six who had intra-operative radiotherapy were excluded.

In Figure 64, 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 England, Northern Ireland and Wales as a whole, 56% of women with invasive cancer received radiotherapy within 60 days of their final surgery and 93% within 90 days. The former is three percentage points lower than in 2011/12. Sixty two women had not received radiotherapy within 200 days of their final surgery. The right hand graph in Figure 64 shows that 41% of women with invasive cancer and 37% of women with non-invasive cancer with radiotherapy recorded had started their radiotherapy within 90 days of their first assessment clinic visit, and that 295 women (4%) with invasive cancer and 48 women (3%) with non-invasive cancer had not started radiotherapy even after 200 days. In 2011/12, 47% of women with invasive cancer with radiotherapy recorded had started their radiotherapy within 90 days of their first assessment clinic visit.

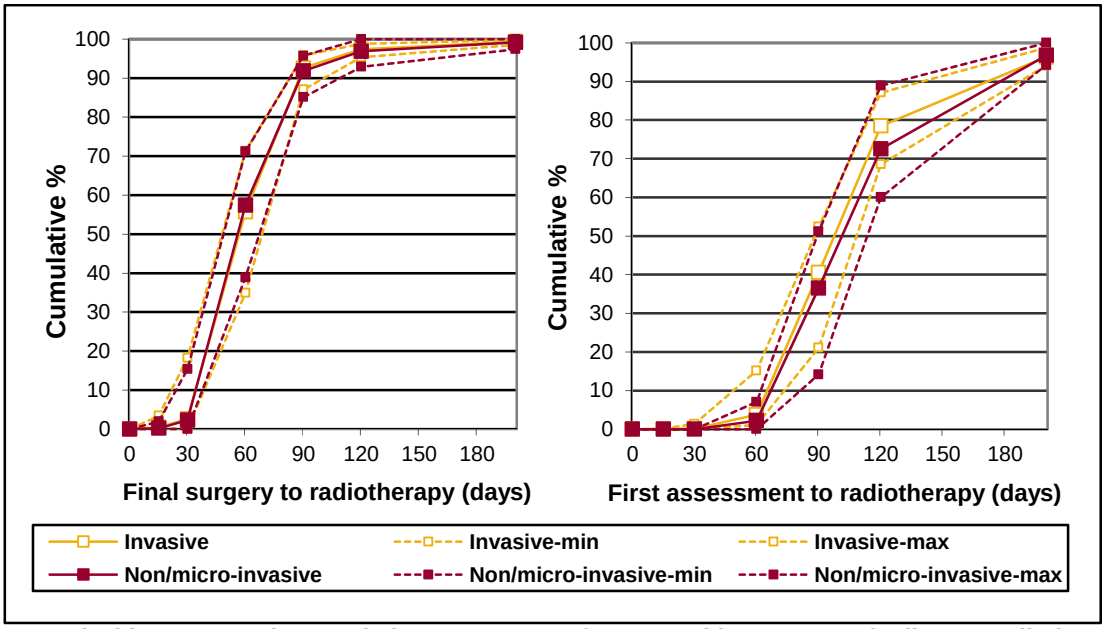

Figure 64 (Table 111 to 114): Cumulative percentage of women with surgery and adjuvant radiotherapy, who had radiotherapy recorded up to 200 days after final surgery (left) and first assessment (right) No adjuvant therapy data were provided for Scotland

Table 115 shows the median number of days from final surgery to radiotherapy in each English region and in Northern Ireland and Wales 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 (63 days) and Wales (65 days). In the UK (excluding Scotland) as a whole, the median number of days from final surgery to radiotherapy was 57 days for invasive cancers and 56 days for non-invasive cancers.

In the *Cancer Reform Strategy* published in December 2007, a radiotherapy waiting time standard was introduced in England 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. In the UK (excluding Scotland) as a whole, only 36%

of the women who had breast conserving surgery (without adjuvant chemotherapy) had radiotherapy within 52 days of their final operation (Table 116). This is lower than in 2011/12 (40%) and 2010/11 (39%). Figure 65 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 95% to 0%.

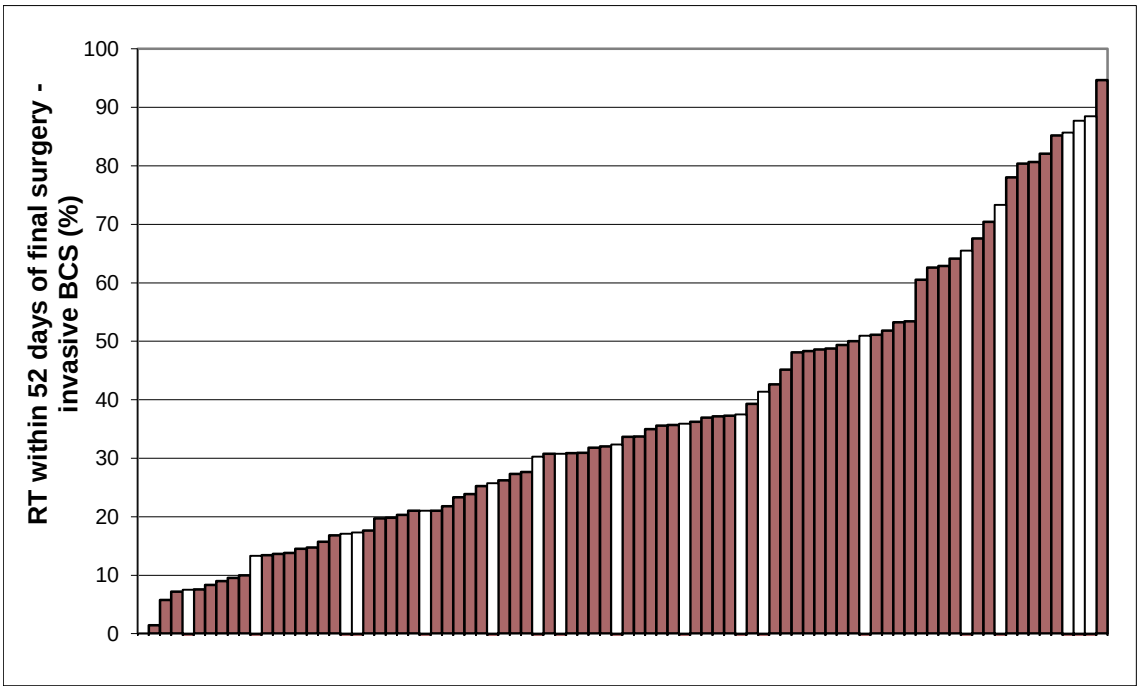

Figure 65: Variation between screening units in the proportion of women with invasive cancer who received radiotherapy within 52 days of their final surgery (18 of the 20 smallest units are highlighted in white) No adjuvant therapy data were provided for Scotland and one unit in Northern Ireland

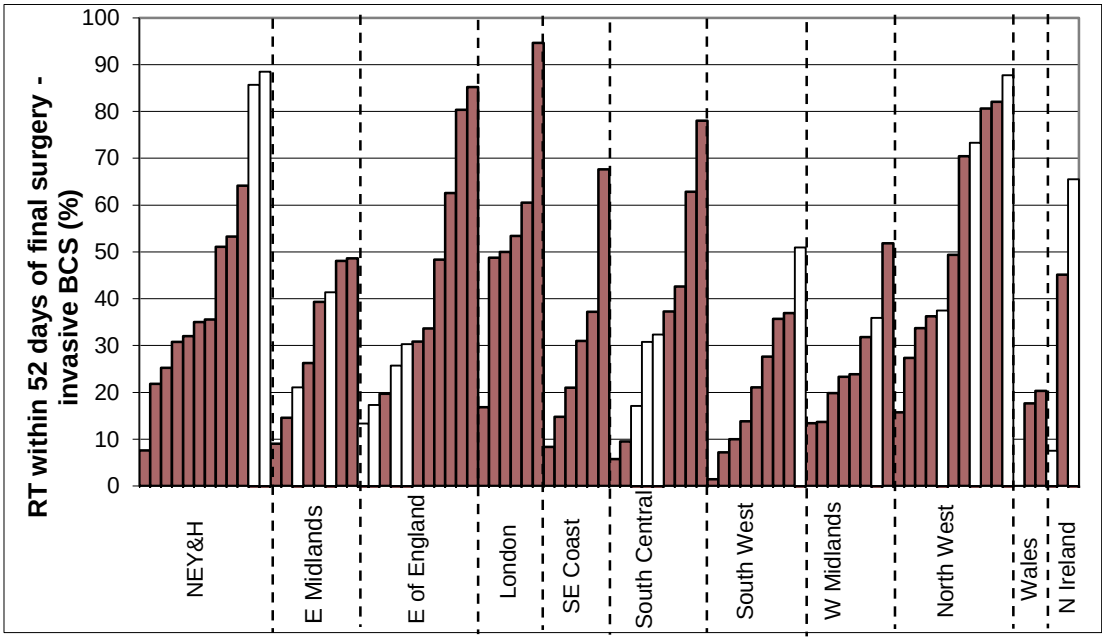

Figure 66: In-region variation between screening units in the proportion of women with invasive cancer who received radiotherapy within 52 days of their final surgery (18 of the 20 smallest units are highlighted in white) No adjuvant therapy data were provided for Scotland

Difficulties with radiotherapy waiting times appear to exist in most but not all of the screening units in all English regions and in Northern Ireland and Wales (Figure 66). 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 time. 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' of the radiotherapy to the actual start date. This may explain whether the overall delay results from delays in the first clinic consultation or in organising the radiotherapy planning scan and treatment.

Key findings

- In 2012/13, 56% of women with invasive cancer received radiotherapy within 60 days of their final surgery and 93% within 90 days: 62 women had not received radiotherapy 200 days after their final surgery.
- Only 41% of women with invasive cancer and 37% of women with non/micro-invasive cancer had started their radiotherapy within 90 days of their first assessment visit, and 295 women (4%) with invasive cancer had not started radiotherapy after 200 days. In 2011/12, 47% of women with invasive cancer with radiotherapy recorded had started their radiotherapy within 90 days of their first assessment visit.
- In the *Cancer Reform Strategy* published in December 2007, a radiotherapy waiting time standard was introduced in England 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 time. It will be important to note when a woman was first seen by a clinical oncologist after surgery, and the time delay from '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

Of the 16,885 eligible breast cancers, 79% were invasive, 1% micro-invasive and 20% non-invasive (Table 117). Seventy seven percent (10,294) of the invasive cancers were treated with breast conserving surgery (Table 118). Of these, 375 (4%) did not have adjuvant radiotherapy recorded (unknown or confirmed no radiotherapy) (Table 119). Forty two percent of non-

invasive cancers (Table 121) and 14% of micro-invasive cancers treated with breast conserving surgery did not have radiotherapy recorded.

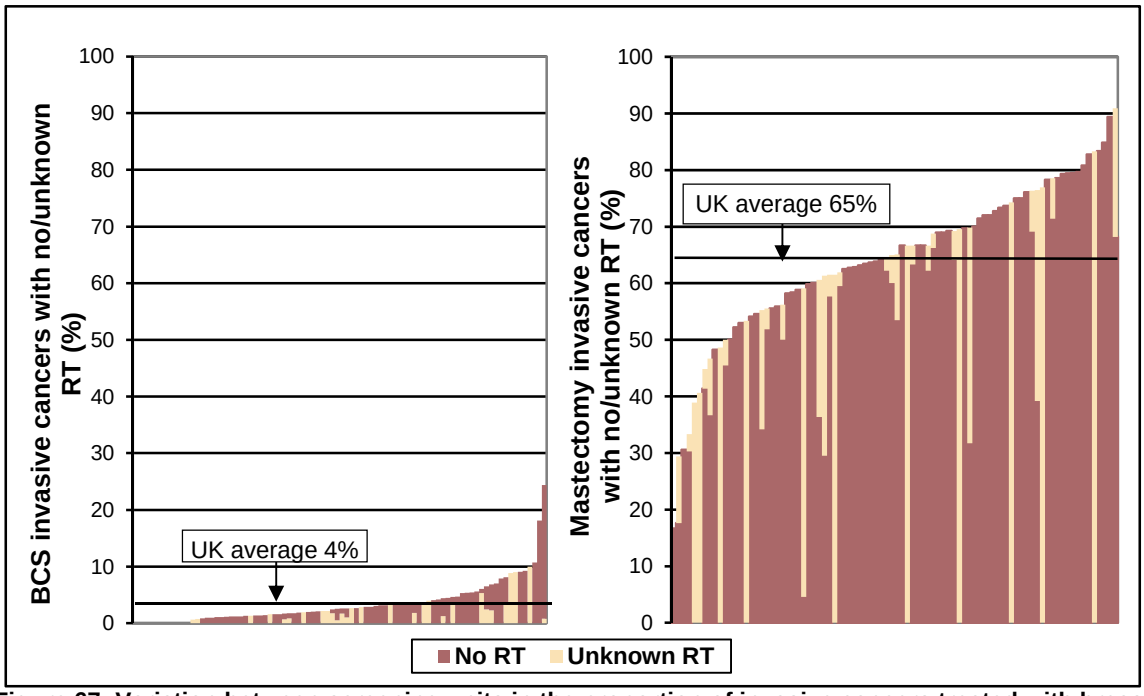

Figure 67: Variation between screening units in the proportion of invasive cancers treated with breast conserving surgery (left) and mastectomy (right) that have no or unknown radiotherapy recorded. No adjuvant therapy data was provided for Scotland

In 2012/13 the proportion of invasive cancers treated with breast conserving surgery or mastectomy that received radiotherapy varied widely between screening units (Figure 67). The left hand graph in Figure 67 shows that overall, 4% of invasive breast cancers treated with breast conserving surgery either did not have radiotherapy (271 cancers) or it was not known whether or not radiotherapy had been given (104 cancers). The proportion of invasive cancers with no radiotherapy recorded varied from 0% in 27 units to more than 6% in seven units [North East, Yorkshire & Humber (2), East of England (1), London (1), North West (1), South Central (1) and South West (1)]. The proportion of invasive cancers with unknown radiotherapy varied from 0% in 57 units to more than 5% in four units [East of England (2), East Midlands (1) and South East Coast (1),].

Overall in 2012/13, 2% of the invasive cancers (nine cancers) treated with breast conserving surgery which had no or unknown radiotherapy were larger than 20mm in diameter, 18% (67 cancers) were Grade 3 and 19% (73 cancers) were node positive (Table 120). Of the 73 node positive cancers, 34 (47%) had only one positive node and of these, nine had only micro-metastases.

The right hand graph in Figure 67 shows that 65% of the invasive cancers treated with mastectomy did not receive radiotherapy. This varied from 17% in a unit in East of England to 91% in a unit in West Midlands. 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.

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 2,540 non-invasive cancers treated with breast conserving surgery, 1,059 (42%) did not have a confirmed adjuvant radiotherapy record (Table 121). This varied from 0% in one unit in North East, Yorkshire & Humber to 97% in a unit in South West.

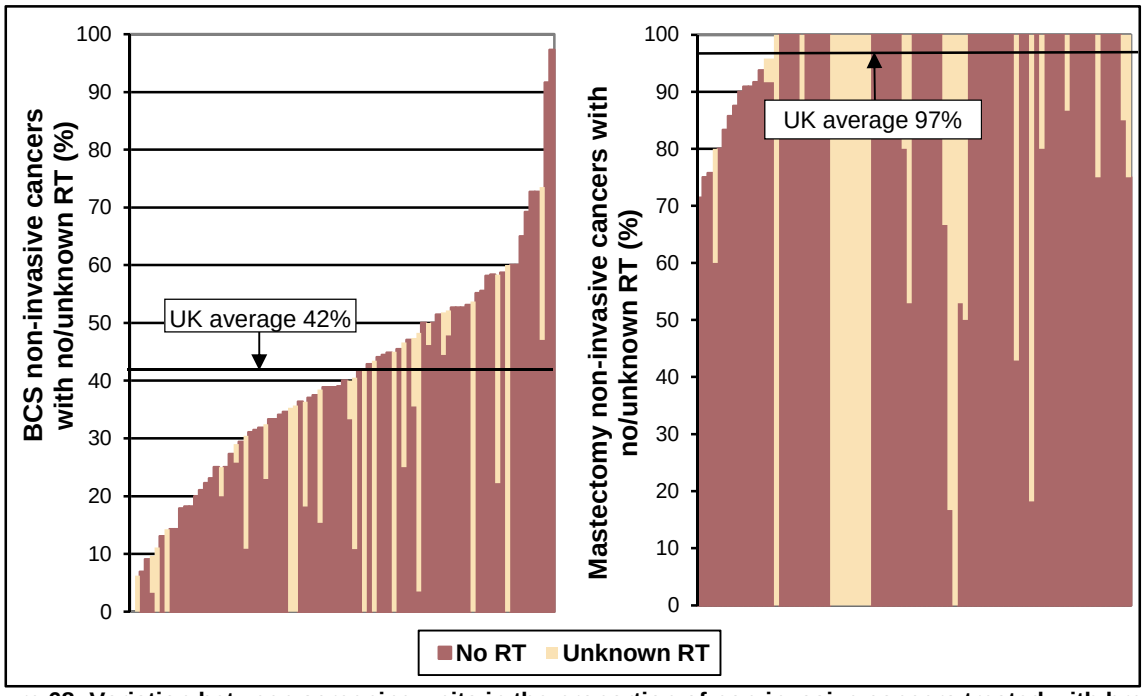

Figure 68: Variation between screening units in the proportion of non-invasive cancers treated with breast conserving surgery (left) and mastectomy (right) that have no/unknown radiotherapy recorded. No adjuvant therapy data were provided for Scotland

As expected, and as with invasive cancers, non-invasive cancers which had a mastectomy (97%) (right hand graph in Figure 68) were less likely to receive radiotherapy than those which had breast conserving surgery (42%) (left hand graph in Figure 68). Twenty three non-invasive cancers treated with mastectomy had radiotherapy recorded (nine of which were in London). For 174 non-invasive cancers treated with mastectomy, it was not known whether or not radiotherapy was given.

The significance of the variation between screening units in the proportion of invasive cancers treated with breast conserving surgery that did not have radiotherapy or had unknown radiotherapy over the 3-year period 2010/11 to 2012/13 is examined in the control chart in Figure 69 in which 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 3.2% (solid line). Women with previous breast cancers (770 in 2012/13) and women treated with axillary surgery only (22 in 2012/13) have been excluded for all three years. Thirteen units lie above the 95% upper control limit (eight above the 99.7% control limit) and had significantly lower rates of radiotherapy.

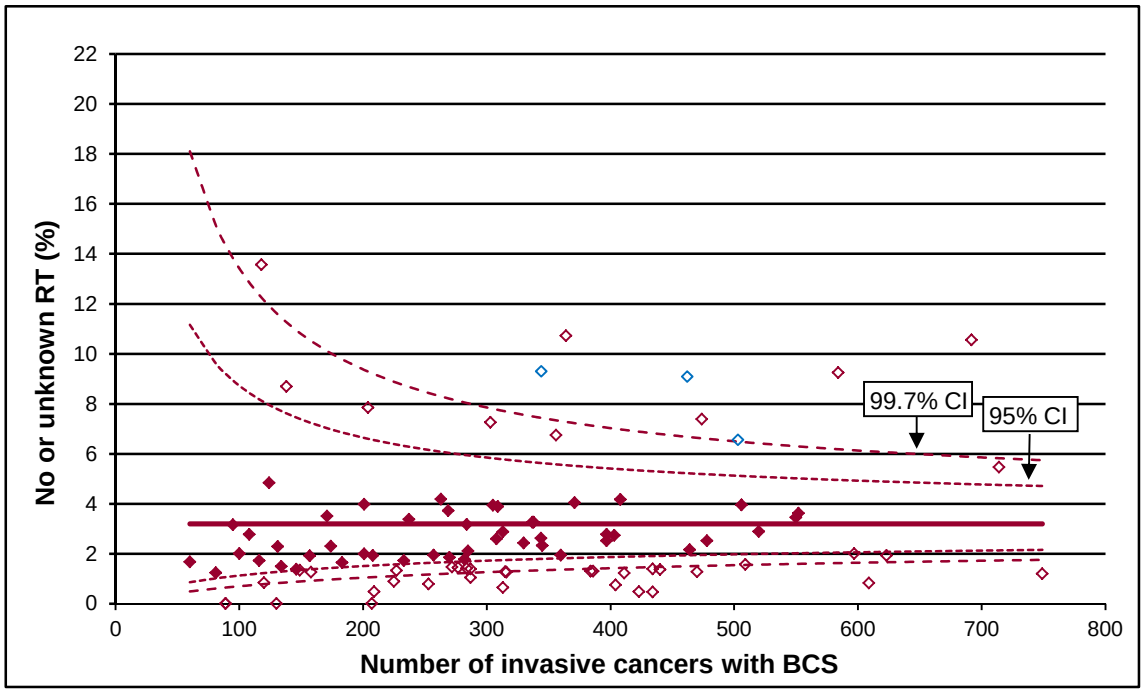

Figure 69: Variation between screening units in the proportion of invasive cancers treated with breast conserving surgery that have no or unknown radiotherapy (2010/11 to 2012/13)
(open diamonds represent units which lie outside the 95% upper and lower control limits)
(high outliers with blue open diamonds have 5% or more cancers with unknown RT)
No adjuvant therapy data were provided for Scotland

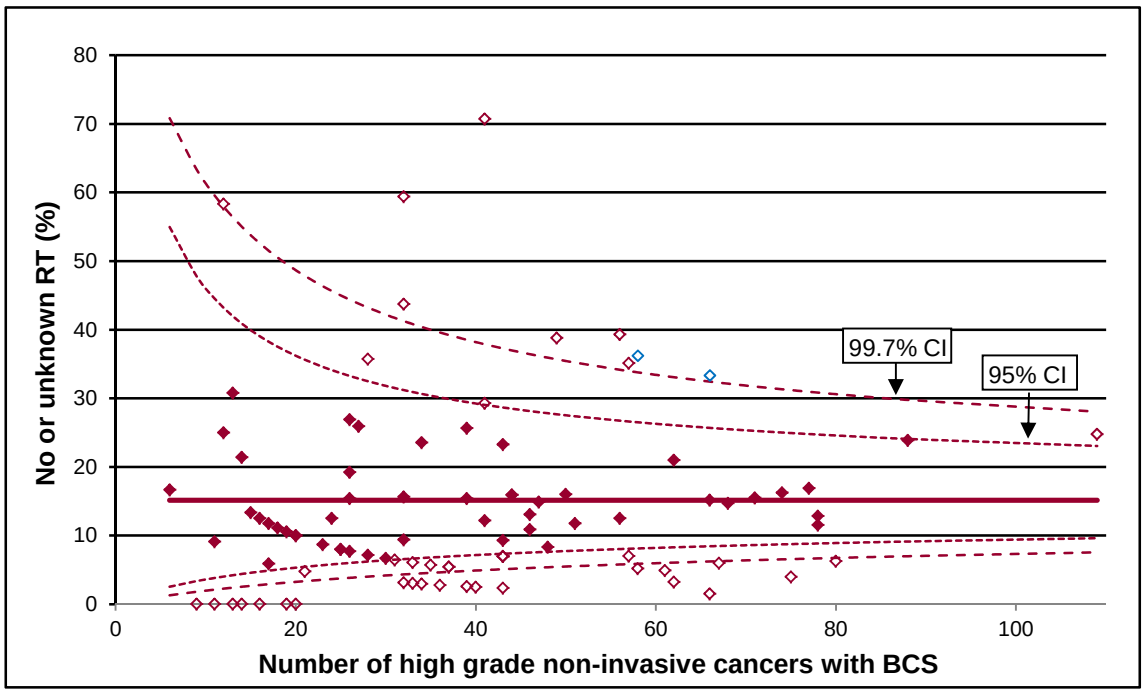

Figure 70: Variation with screening unit in the proportion of high grade non-invasive cancers treated with breast conserving surgery that did not receive radiotherapy in 2010/11 to 2012/13
(open diamonds represent units which lie outside the 95% upper and lower control limits)
(high outliers with blue open diamonds had more than 25% of cancers with unknown radiotherapy)
No adjuvant therapy data was provided for Scotland

In 2012/13, 1,059 non-invasive cancers treated with breast conserving surgery had no or unknown radiotherapy recorded; 18% of these (195 cancers) were high cytonuclear grade (Table 122) and 14 (1%) were more than 40mm in diameter (Table 123). 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 2010/11 to 2012/13 is examined in the control chart in Figure 70, in which 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 (solid line) (15.1%). Twelve units [South West (5), South Central (3), South East Coast (2), North East, Yorkshire & Humber (1) and West Midlands (1)] have significantly higher proportions of cancers with no or unknown radiotherapy (nine are above the 99.7% upper control limit). Two units in South West have more than 25% of high grade non-invasive cancers with unknown radiotherapy (blue open diamonds in Figure 70).

Provided that the tumour margins were adequate, it may be acceptable for non-invasive cancers treated with breast conserving surgery not to receive adjuvant 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.

Oncology KPI O1

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

Region	Unit	No or unknown RT after BCS invasive 1-year 2011/12 %	No or unknown RT after BCS invasive 1-year 2012/13 No RT	U RT	%	No or unknown RT after BCS invasive 3-year 2010/11-2012/13 %	Outcome of QARC audit of units identified in 2014 report for follow up
Units audited in the 2014 report							
East of England	DSW	11.8	0	0	0.0	1.9	Data not available from treating hospital
London	FBH	12.0	8		6.5	9.3	Unit to be more proactive in data collection
South East Coast	HGU	37.3	7		2.4	5.5	No information available
South East Coast	HWO	24.1	0	7	4.0	6.6	No information available
South West	LGL	100.0			0.6	1.8	Cases audited. QA to monitor
New units identified in 2015							
NEYH	BLE	2.3	14	0	7.9	3.6	
NEYH	BYO	1.6	30		24.4	10.7	
London	EBA	4.6	50	0	18.1	10.5	
North West	PLN	2.4	14	0	9.1	7.4	
South East Coast	GBR	7.9	0	10	9.1	9.1	
UK average		**5.3**	**264**	**104**	**3.6**	**3.2**	

99.7% high outlier
95% high outlier

No RT = Number with no radiotherapy recorded
U RT = Unknown radiotherapy recorded

Blank in No. columns = <5 cases

Screening units which were identified in the 2014 audit as 95% or 99.7% high outliers for invasive cancers treated with breast conserving surgery with no or unknown radiotherapy recorded in 2011/12 were followed up by regional QA reference centres. The preceding table summarises the outcome of these audits and identifies 95% or 99.7% high outliers in 2012/13. Scotland did not contribute adjuvant therapy data in 2011/12 and 2012/13.

Of the five units which were identified in the 2014 audit as 95% or 99.7% high outliers in 2011/12, three [South East Coast (2) and London (1)] are still 3-year high outliers in this year's audit, which examines invasive cancers treated in the 3-year period 2010/11 to 2012/13. None of these units are high outliers in 2012/13, the most recent year examined. In this year's audit, five new units [North East, Yorkshire & Humber (2), London (1), North West (1) and South East Coast (1)] are identified as 95% or 99.7% high outliers in 2012/13. Four of these units are also 99.7% high outliers in the 3-year period 2010/11 to 2012/13, and four have high numbers of cancers with no radiotherapy recorded in 2013/14. Regional QA reference centres should follow up the four units (London EBA, North East, Yorkshire & Humber BLE and BYO and North West PLN) that are high outliers for no radiotherapy recorded in 2012/13, and the unit in South East Coast (GBR) that has a high number of cancers with unknown radiotherapy recorded to ensure that all women have received appropriate treatment and to make sure that accurate data recording procedures are put in place.

Key findings

- In 2012/13, 96% of invasive cancers, 86% of micro-invasive cancers and 58% of non-invasive cancers treated with breast conserving surgery had adjuvant radiotherapy.
- Thirty five percent of invasive cancers and 3% of non-invasive cancers treated with mastectomy had adjuvant radiotherapy.
- Two percent of the conservatively treated invasive cancers which did not have radiotherapy recorded were larger than 20mm in diameter, 18% were grade 3 and 19% were node positive.
- Of the latter, nine had only one positive node containing micro-metastases.
- One hundred and ninety five non-invasive cancers with breast conserving surgery without radiotherapy recorded were high cytonuclear grade and 14 were more than 40mm in diameter.
- Provided that the tumour margins were adequate, it may be acceptable for non-invasive cancers treated with breast conserving surgery not to receive adjuvant 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.
- Regional QA reference centres should follow up the four units (London EBA, North East, Yorkshire & Humber BLE and BYO and North West PLN) that are high outliers for no radiotherapy recorded in 2012/13, and the unit in South East Coast (GBR) that has a high number of cancers with unknown radiotherapy recorded to ensure that all women have received appropriate treatment and to make sure that accurate data recording procedures are put in place.

8.5.2 ER status and 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 may be as important as the fact of knowing that endocrine therapy was given, but this information is 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 16,885 breast cancer patients included in the adjuvant therapy analysis for England, Northern Ireland and Wales, 13,207 (78%) were ER positive, 1,367 (8%) ER negative and for 2,311 (14%) either the ER status was not tested or the ER status was unknown (Table 124). Eighteen (34%) ER negative, PR positive invasive cancers had no or unknown endocrine therapy recorded (Table 128) and 75 ER negative cancers (5%) did have endocrine therapy recorded (Table 129). Thirty six (48%) of the latter were PR positive invasive cancers.

Ninety one percent of the ER positive cancers with known endocrine therapy data were invasive and 9% non/micro-invasive (Table 125). Three hundred and forty five (3%) ER positive invasive cancers did not have endocrine therapy recorded and 1,020 (8%) had no information on endocrine therapy (Table 126). Of these 1,020 cancers, 637 were from East Midlands where cancer registration data provided the only source of endocrine therapy data.

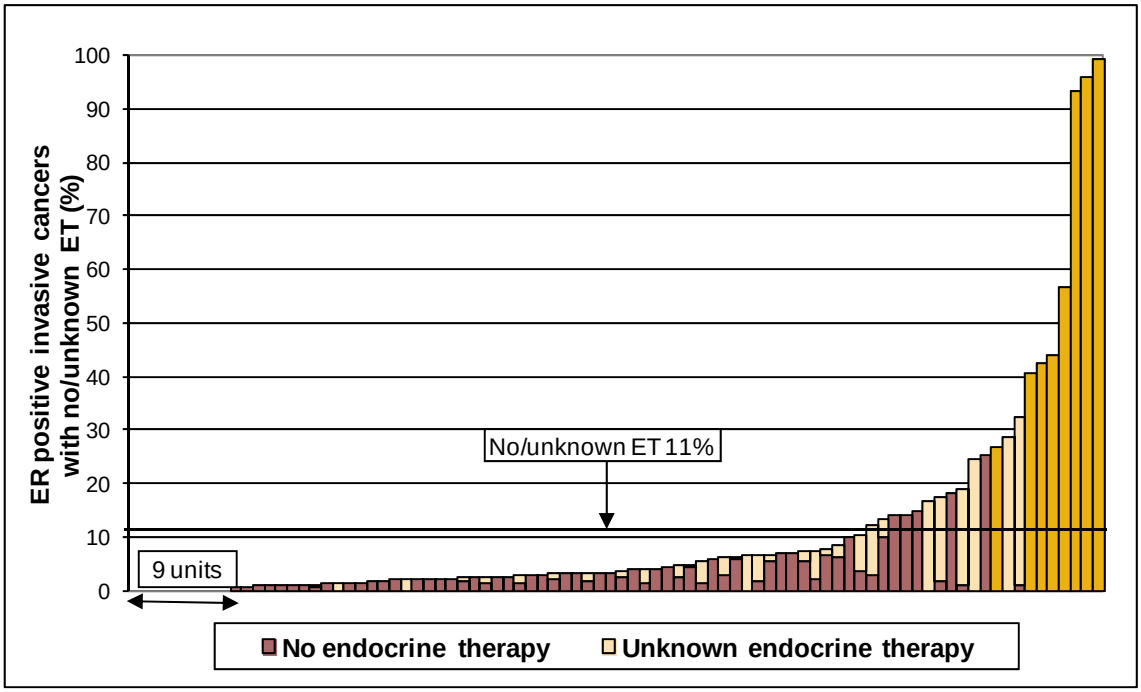

Figure 71: Variation between screening units in the proportion of ER positive, invasive cancers that have no or unknown endocrine therapy recorded. East Midlands units are highlighted in golden brown No adjuvant therapy data were provided for Scotland

Figure 71 shows the proportion of ER positive invasive cancers in each screening unit which had no or unknown endocrine therapy recorded in 2012/13. This varied from no cancers in nine units to 32% in a unit in East of England and over 40% in seven East Midlands units (highlighted in golden brown in Figure 64) where cancer registration data provided the only source of endocrine therapy data. Overall, 239 (18%) of the ER positive invasive cancers that had no/unknown endocrine therapy were grade 3, 294 (22%) were node positive and 82 (6%)

were larger than 20mm in diameter (Table 127). Figure 72 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 2012/13. This varied from no cancers in 28 units to over 40% in seven East Midlands units (highlighted in golden brown in Figure 65) where cancer registration data provided the only source of endocrine therapy data.

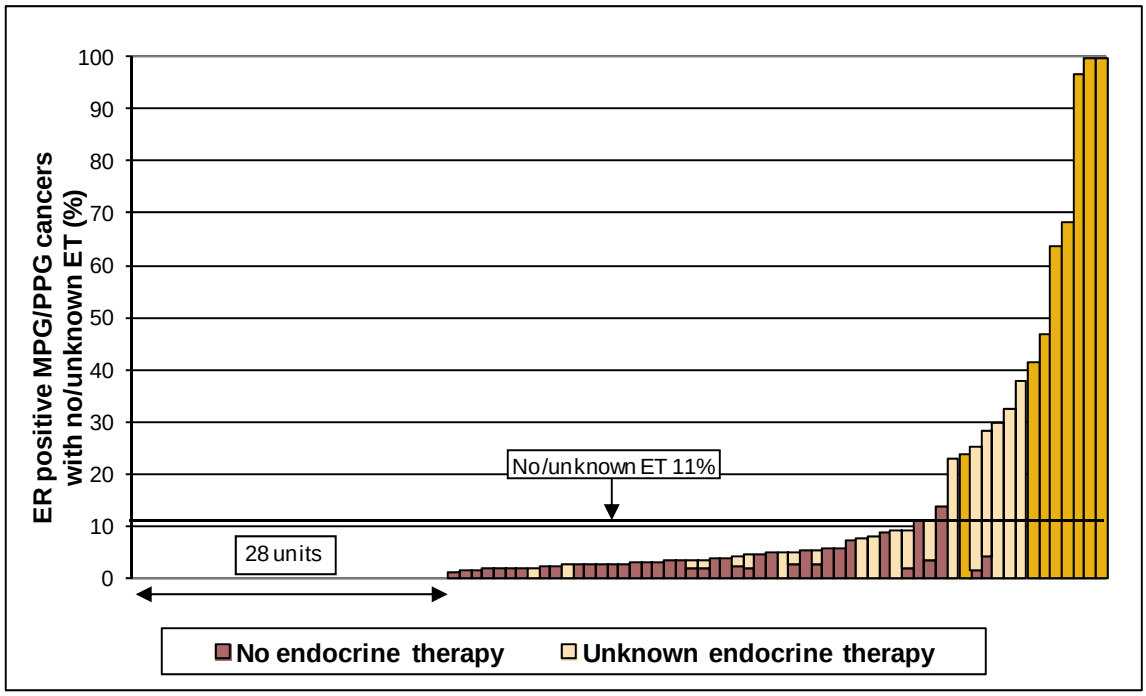

Figure 72: Variation between screening units in the proportion of ER positive, invasive cancers with NPI >3.4 that have no or unknown endocrine therapy recorded. East Midlands units are highlighted in golden brown. No adjuvant therapy data were provided for Scotland

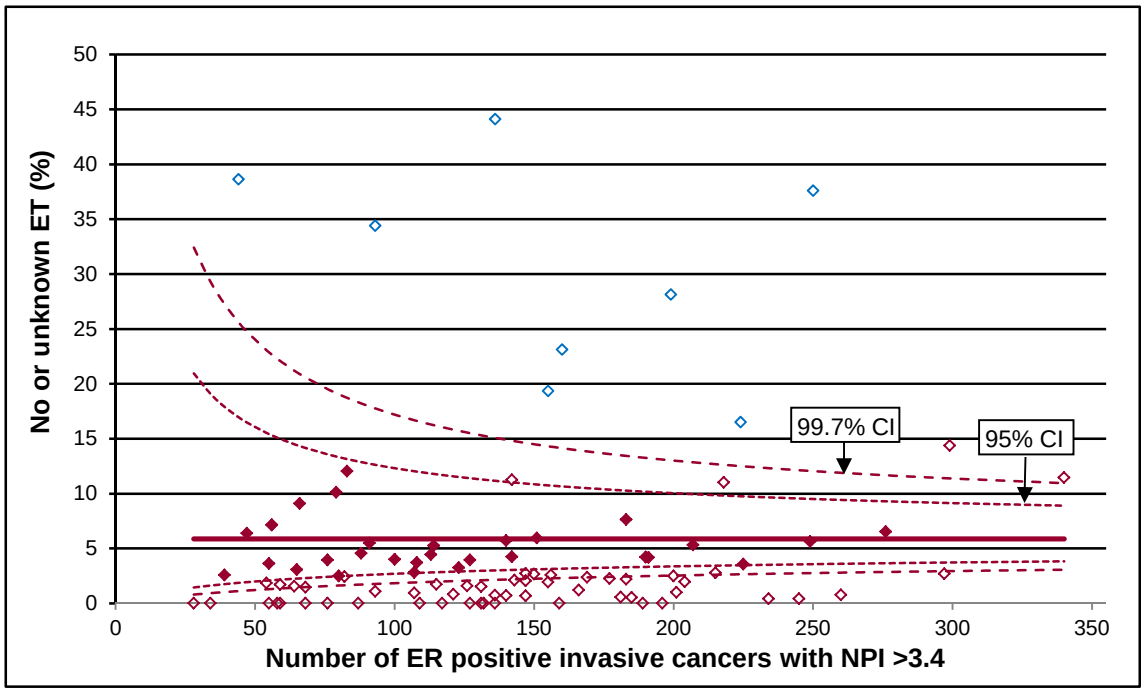

Figure 73: Variation with screening unit in the proportion of ER positive invasive cancers with NPI >3.4 that did not receive endocrine therapy in 2010/11 to 2012/13
(open diamonds represent units that lie outside the 95% upper and lower control limits)
(units with blue open diamonds had more than 30% of cancers with unknown endocrine therapy in 2012/13)
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 2010/11 to 2012/13 is examined in the control chart in Figure 73 in which 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). Twelve units lie above the 95% control limit (10 above the 99.7% control limit), and eight of the latter units have more than 30% of cancers with unknown endocrine therapy in 2012/13. Six of the 10 99.7% high outlier units are in East Midlands, and another East Midlands unit is a 99.7% high outlier in 2012/13 alone.

Oncology KPI O2

Endocrine therapy for ER positive invasive cancers
1-year high outlier units for ER positive invasive cancers with NPI >3.4 with no or unknown adjuvant endocrine therapy recorded

Region	Unit	No or unknown ET invasive ER +ve NPI >3.4 1-year 2011/12 %	No or unknown ET ER +ve NPI >3.4 invasive 1-year 2012/13 No ET	U ET	%	No or unknown ET +ve NPI >3.4 invasive 3-year 2010/11-2012/13 %	Outcome of QARC audit of units identified in 2014 report for follow up
Units audited in the 2014 report							
East of England	DSW	15.6	0	0	0.0	4.5	Data not available from treating hospital
London	EBA	14.3	15	0	10.7	11.5	Data errors, appropriate treatment
North West	NWA	17.1			1.5	6.0	No information available
South East Coast	HGU	29.9	0	35	29.7	14.4	No information available
South East Coast	HWO	25.6	0	28	32.2	16.5	No information available
South West	LGL	100.0			4.6	2.7	Awaiting results of further audit
West Midlands	MCO	20.0			0.9	6.5	88% data error
New units identified in 2015							
East of England	ELD	38.7	0	40	37.7	37.6	
East Midlands	CDN	0.0	0	10	41.7	12.0	
East Midlands	CDS	0.0	0	37	68.5	23.1	
East Midlands	CLE	1.1	0	55	64.0	28.1	
East Midlands	CLI	0.0	0	30	46.9	19.4	
East Midlands	CNN	7.5	0	15	100.0	38.6	
East Midlands	CNO	4.4	0	57	100.0	44.1	
East Midlands	KNN	1.2	0	31	96.9	34.4	
South East Coast	GBR	3.9	22		25.0	11.0	
UK average		**6.2**	**72**	**430**	**10.6**	**7.1**	

99.7% high outlier
95% high outlier

No ET = Number with no endocrine therapy recorded
U ET = Unknown endocrine therapy recorded
Blank in No. columns = <5 cases

Screening units that were identified in the 2014 audit as 95% or 99.7% high outliers for ER positive invasive cancers with NPI >3.4 with no or unknown endocrine therapy recorded in 2011/12 were followed up by regional QA reference centres. The preceding table summarises

the outcome of these audits and identifies persistent 95% or 99.7% high outliers in the 3-year period 2010/11 to 2012/13 and in 2012/13. Scotland did not contribute adjuvant therapy data in 2011/12 and 2012/13.

Of the seven units identified in the 2014 audit as 95% or 99.7% high outliers in 2011/12, three are still 3-year high outliers in this year's audit which examines invasive cancers treated in the 3-year period 2010/11 to 2012/13. Of these three units, two units in South East Coast are also 99.7% high outliers in 2012/13, the most recent year examined. In this year's audit, nine additional units are identified as 99.7% high outliers in 2012/13. Seven of these units are in East Midlands. All nine units have high levels of unknown endocrine therapy rather than no endocrine therapy recorded. 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 11 units (East of England ELD, East Midlands, CDN, CDS, CLE, CLI, CNN, CNO and KNN and South East Coast GBR) that are high outliers for ER positive invasive cancers with NPI >3.4 with unknown endocrine therapy recorded in 2012/13 to ensure that all women have received appropriate treatment and to make sure that accurate data recording procedures are put in place.

'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 2012/13, 26% of ER positive non/micro-invasive cancers (289 cancers) had endocrine therapy (Table 130). The use of endocrine therapy for ER positive non/micro-invasive cancers varied widely between screening units from 0% in 31 units to 100% in three units [South East Coast (1), South Central (1) and West Midlands (1)].

Key findings

- Ninety one percent of the ER positive cancers with known endocrine therapy data were invasive and 9% non/micro-invasive: 345 (3%) ER positive invasive cancers did not have endocrine therapy recorded and 1,020 (8%) had no information on endocrine therapy. Of these 1,020 cancers, 637 were from East Midlands where cancer registration data provided the only source of endocrine therapy data.
- Eighteen (34%) ER negative PR positive invasive cancers had no or unknown endocrine therapy recorded and 75 ER negative cancers (5%) did have endocrine therapy recorded.
- Overall in 2012/13, 26% of ER positive non/micro-invasive cancers had endocrine therapy. This varied widely between units.
- The proportion of ER positive invasive cancers with NPI>3.4 with no or unknown endocrine therapy recorded also varied widely between units.
- 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 11 units (East of England ELD, East Midlands, CDN, CDS, CLE, CLI, CNN, CNO and KNN and South East Coast GBR) that are high outliers for ER positive invasive cancers with NPI>3.4 with unknown endocrine therapy recorded in 2012/13 to ensure that all women have received appropriate treatment and to make sure that accurate data recording procedures are put in place.

8.5.3 Node positive invasive cancers and chemotherapy

In 2012/13, of the 16,885 eligible cancers, 2,807 (17%) were node positive invasive cancers and, of these, 873 (31%) had no chemotherapy and 215 (8%) had unknown chemotherapy recorded (Table 131). Of the 1,088 node positive invasive cancers with no or unknown chemotherapy recorded, 315 (29%) had micro-metastases, 44 (4%) were ER negative (Table 132), 129 (12%) were grade 3 (17% of these had micro-metastases) and 45 (4%) were HER-2 positive (22% of these had micro-metastases).

Five hundred and ninety one of the 1,088 cancers were diagnosed in women aged less than 65. These 591 cancers accounted for only 32% of all the node positive invasive cancers in women in this age group. In contrast, in women aged 65 and above, the 497 cases with no or unknown chemotherapy recorded constituted 53% of all node positive invasive cancers. In women aged less than 65, 31% of node positive invasive cancers with no or unknown chemotherapy recorded were known to have micro-metastases compared with 27% in women aged 65 and older.

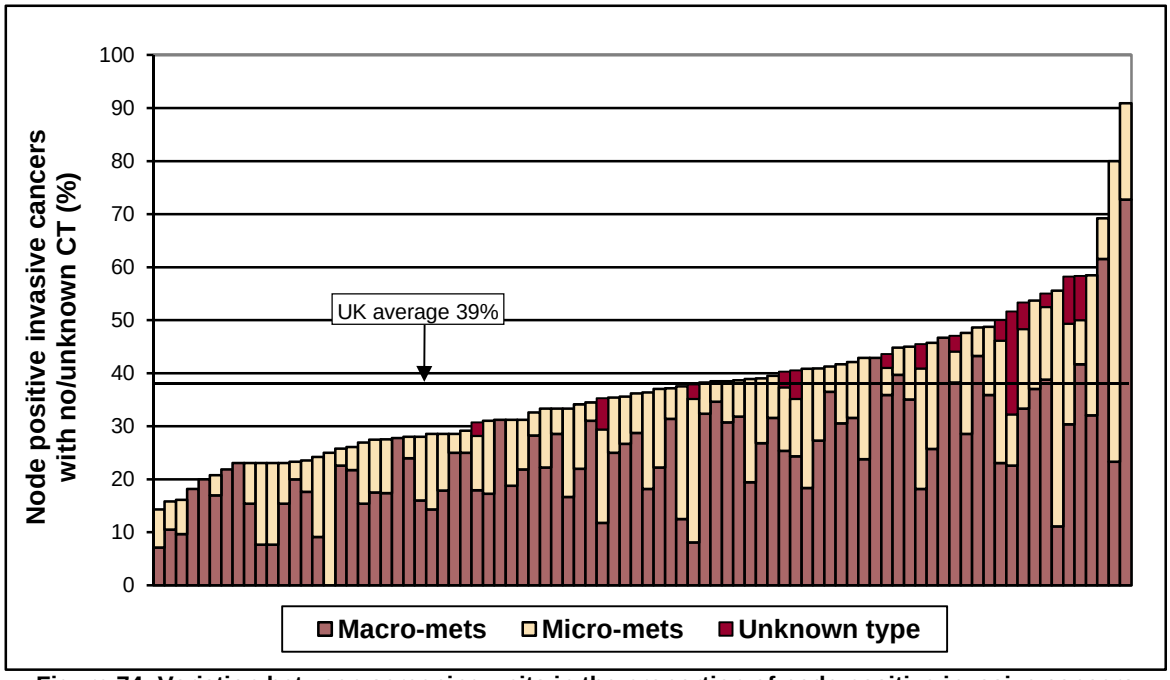

Figure 74: Variation between screening units in the proportion of node positive invasive cancers (macro and micro-metastases) that have no/unknown chemotherapy recorded
No adjuvant therapy data were provided for Scotland

Figure 74 shows in each screening unit in 2012/13, the proportion of node positive invasive breast cancers with macro- and micro-metastases which had no or unknown chemotherapy recorded. In six units, 50% or more of the node positive invasive breast cancers had no or unknown chemotherapy. When the significance of the variation between screening units in the proportion of node positive invasive cancers with macro-metastases which had no or unknown chemotherapy over the 3-year period 2010/11 to 2012/13 is examined in a control chart (Figure 75) in which 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 29% (solid line),

eight units are high 95% outliers (2 are high 99.7% outliers) and 12 are low 95% outliers (5 are low 99.7% outliers).

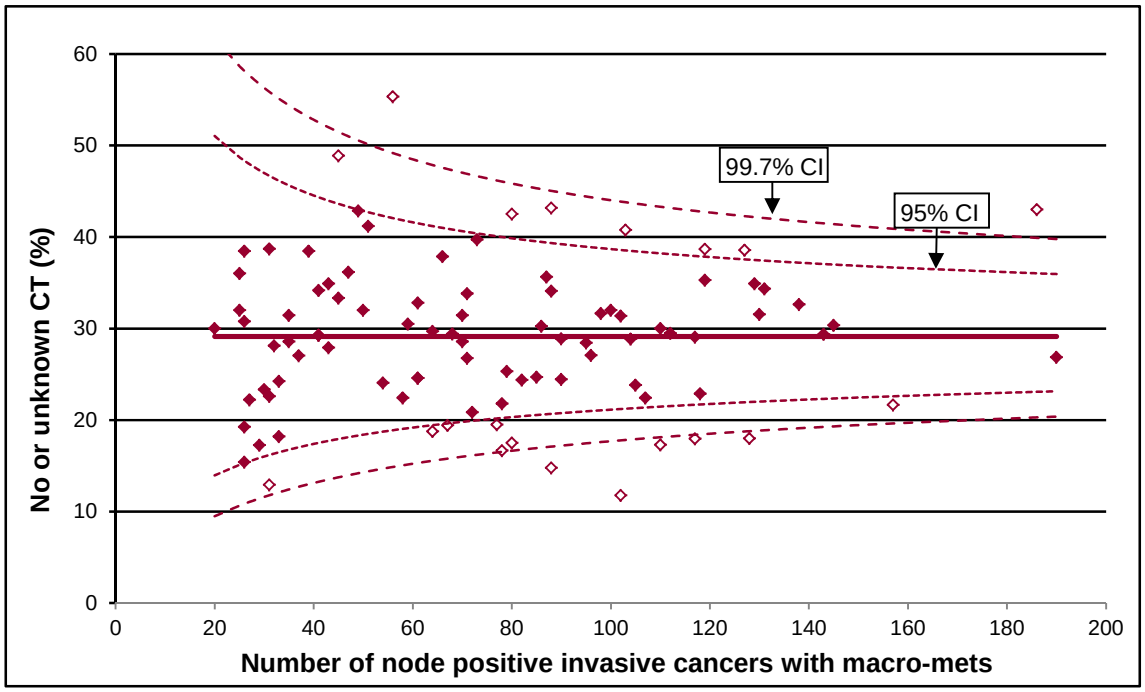

Figure 75: Variation between screening units in the proportion of node positive invasive cancers with macro-metastases that did not receive chemotherapy in 2010/11 to 2012/13 (open diamonds represent units which lie outside the 95% upper and lower control limits) No adjuvant therapy data were provided for Scotland

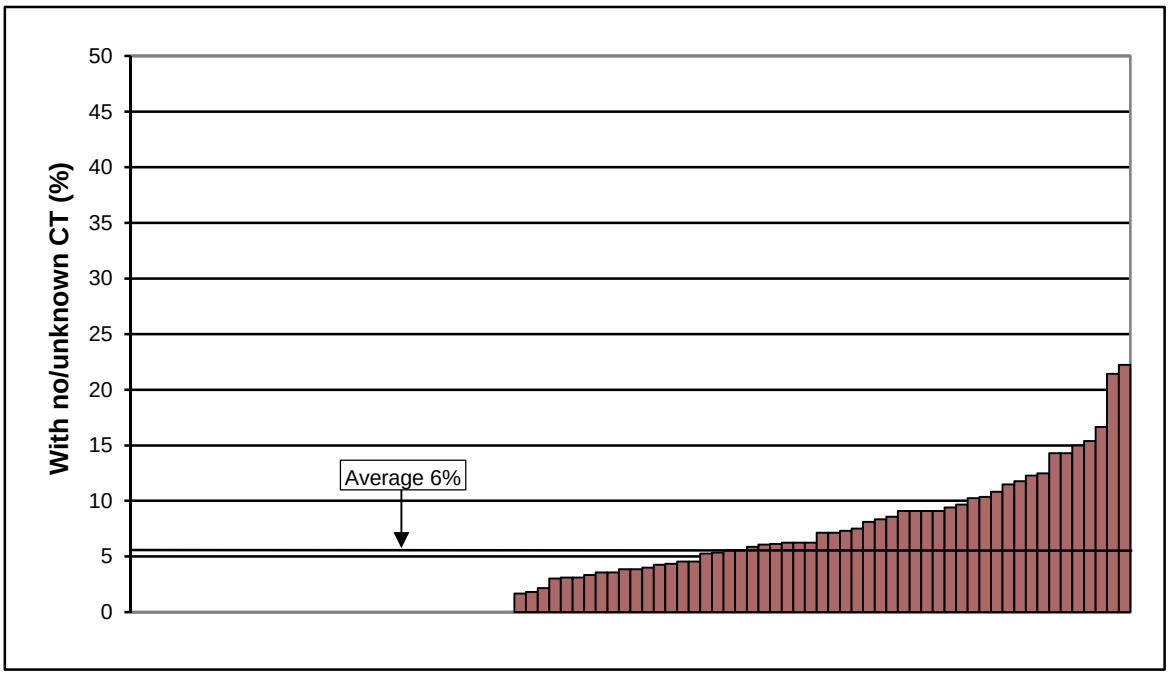

Figure 76: Variation between screening units in the proportion of node positive invasive cancers with macro-metastases that were grade 3 and/or ER negative and/or HER2 positive that have no/unknown chemotherapy recorded. No adjuvant therapy data were provided for Scotland.

Evidence is accumulating to suggest that adjuvant chemotherapy is not required for all node positive invasive breast cancers, and that this treatment may be of most benefit to women who

have node positive tumours with macro-metastases that are also grade 3 and/or ER negative and/or HER2 positive. In the UK (excluding Scotland) in 2012/13, 5.7% of node positive tumours with macro-metastases that were also grade 3 and/or ER negative and/or HER2 positive did not have chemotherapy recorded. Figure 76 shows how this proportion varied between screening units. In 14 units, 10% or more of the node positive grade 3, ER negative and/or HER2 positive invasive breast cancers had no or unknown chemotherapy recorded and in two units (in East Midlands and London) more than 20% of these tumours had no or unknown chemotherapy recorded.

When the significance of the variation between screening units in the proportion of node positive invasive cancers with macro-metastases which are grade 3 and/or ER negative and/or HER2 positive and had no or unknown chemotherapy over the 3-year period 2010/11 to 2012/13 is examined in the control chart in Figure 77 in which 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 (solid line) (4.6%), two units in East of England and London are high 95% outliers and 19 are low 95% outliers (of these, 14 are low 99.7% outliers).

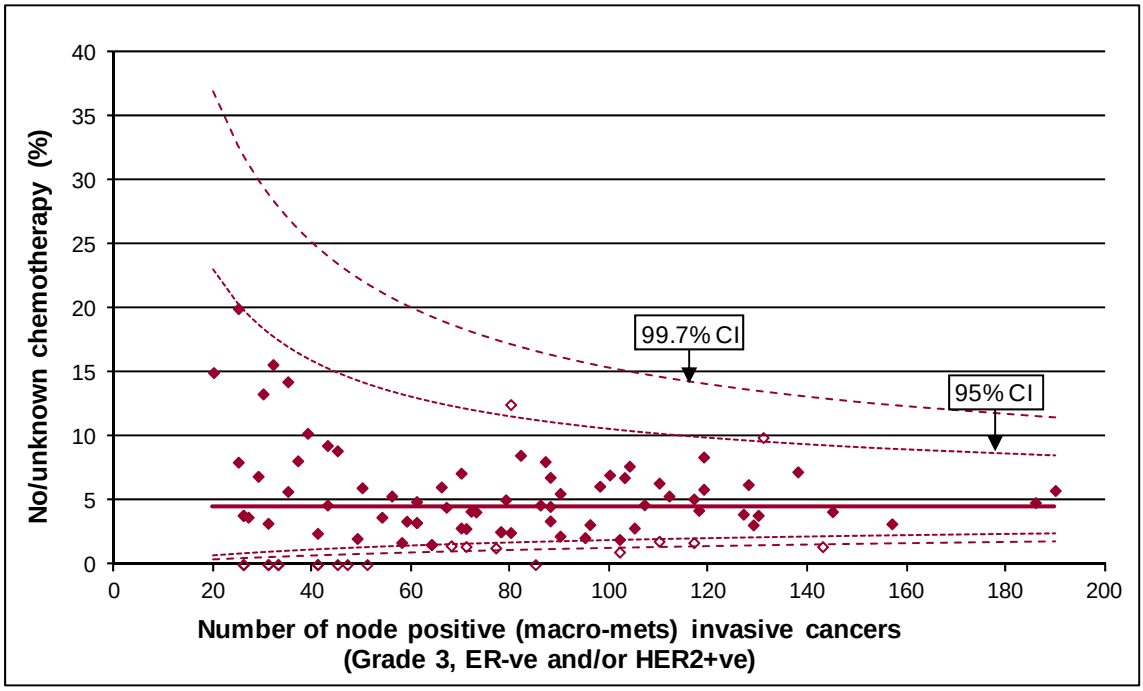

Figure 77: Variation between screening units in the proportion of node positive invasive cancers with macro-metastases that were grade 3 and/or ER –ve and/or HER2 positive that did not receive chemotherapy in 2010/11 to 2012/13 (open diamonds represent units which lie outside the 95% upper and lower control limits) No adjuvant therapy data were provided for Scotland

Oncology KPI O3

Chemotherapy for node positive grade 3 and/or ER-ve and/or HER2 +ve invasive cancers
1-year high outlier units for node positive (macro-metastases) grade 3 and/or ER-ve and/or HER2+ve invasive cancers with no or unknown adjuvant chemotherapy recorded

Region	Unit	All node +ve no/unknown CT invasive 1-year 2011/12	Node +ve Grade 3/ER-ve/HER2+ve no/unknown CT invasive 1-year 2011/12 %	Node +ve Grade 3/ER-ve/HER2+ve no/unknown CT invasive 1-year 2012/13 No CT	U CT	%	Node +ve Grade 3/ER-ve/HER2+ve no/unknown CT invasive 3-year 2010/11-2012/13 %	Outcome of QARC audit of units identified in 2014 report for follow up
Units audited in the 2014 report								
South East Coast	HGU	54.9	1.6		7	11.5	4.8	No information available
South West	LGL	100.0	0.0			3.0	3.3	Awaiting further audit results
South West	LTB	60.0	0.0	0	0	0.0	3.2	No further audit required
North West	PLE	57.9	0.0	0	0	0.0	5.4	Pathological under-grading
Scotland*	Unit 1	-	-			-	3.4	No information available
New units identified in 2015								
East of England	ELD	22.7	9.1		5	*9.1*	*9.9*	
London	FBH	37.0	22.2	6	0	21.4	12.5	
UK average		**30.5**	**3.6**	**85**	**47**	**5.7**	**4.6**	

99.7% high outlier
95% high outlier

No CT = Number with no chemotherapy recorded
U CT = Unknown chemotherapy recorded

Blank in No. columns = <5 cases

* Scotland did not provide adjuvant audit data for 2011/12 or 2012/13
However, Unit 1 was included as an outlier in the 2014 report as it was a high 3-year outlier

Screening units which were identified in the 2014 audit as 95% or 99.7% high outliers for node positive invasive cancers with macro-metastases with no or unknown chemotherapy recorded in 2011/12 were followed up by regional QA reference centres. The preceding table summarises the outcome of these audits and identifies 95% or 99.7% high outliers for this year's more specific audit which examines node positive grade 3 and/or ER-ve and/or HER2+ve invasive cancers with macro-metastases with no or unknown chemotherapy recorded in 2010/11 to 2012/13 and in 2012/13. Scotland did not contribute adjuvant therapy data in 2011/12 and 2012/13.

Of the four English units which were identified in the 2014 audit as 95% or 99.7% high outliers in 2011/12, none are 1-year or 3-year high outliers for node positive grade 3 and/or ER-ve and/or HER2+ve invasive cancers with macro-metastases with no or unknown chemotherapy recorded treated in the 3-year period 2010/11 to 2012/13 and in 2013/14. The performance of one unit in Scotland in 2010/11 to 2012/13 and in 2012/13 is not known because Scottish adjuvant therapy data were not submitted. In this year's audit, one new unit in London (FBH) is identified as a 95% high outlier in the 3-year period 2010/11 to 2012/13 and in 2012/13. The unit has six cancers with no chemotherapy recorded in 2012/13. Another unit in East of England (ELD) is a 95% high outlier in the 3-year period 2010/11 to 2012/13, but not in 2012/13. In 2012/13 this unit has five cancers with unknown or no chemotherapy recorded.

Decisions regarding the provision of chemotherapy to node positive invasive cancers with macro-metastases should take into account the number of positive nodes, tumour size, 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 women with node positive grade 3 and/or ER-ve and/or HER2+ve invasive cancers with macro-metastases without chemotherapy recorded were treated appropriately. However, regional QA reference centres should follow up the unit in London (FBH) which is a high outlier for no chemotherapy recorded in 2011/12 and in 2012/13 and the unit in Scotland with no data for 2011/12 or 2012/13 to ensure that all women have received appropriate treatment and to make sure that accurate data recording procedures are in place.

Key findings

- Thirty nine percent of women with node positive invasive cancers did not have chemotherapy recorded: 873 (31%) had no chemotherapy and 215 (8%) had unknown chemotherapy.
- Of the 1,088 node positive invasive cancers with no or unknown chemotherapy, 315 (29%) had micro-metastases, 44 (4%) were ER negative, 129 (12%) were grade 3 (17% of these had micro-metastases) and 45 (4%) were HER2 positive (22% of these had micro-metastases).
- Thirty two percent of women aged less than 65 with a node positive invasive cancer had no or unknown chemotherapy, compared to 53% of women aged 65 and above.
- In 2012/13, in six units 50% or more of node positive invasive cancers with macro-metastases had no or unknown chemotherapy.
- Evidence is accumulating to suggest that adjuvant chemotherapy is not required for all node positive invasive breast cancers, and that this treatment may be of most benefit to women who have node positive tumours with macro-metastases that are also grade 3, ER negative and/or HER2 positive.
- In the UK (excluding Scotland) in 2012/13, 5.7% of node positive tumours with macro-metastases that were also grade 3 and/or ER negative and/or HER2 positive did not have chemotherapy recorded.
- Decisions regarding the provision of chemotherapy to node positive invasive cancers with macro-metastases should take into account the number of positive nodes, tumour size, 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 women with node positive grade 3 and/or ER-ve and/or HER2+ve invasive cancers with macro-metastases without chemotherapy recorded were treated appropriately. However, regional QA reference centres should follow up the unit in London (FBH) which is a high outlier for no chemotherapy recorded in 2011/12 and in 2012/13 and the unit in Scotland with no data for 2011/12 or 2012/13 to ensure that all women have received appropriate treatment and to make sure that accurate data recording procedures are in place.

Chapter 9: Survival analysis

UK NHSBSP data for women with breast cancers detected by screening from 1 April 2008 to 31 March 2009 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 2014, 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 16,914 breast cancers detected by screening between 1 April 2008 and 31 March 2009 were submitted to the survival audit. Of these, 672 cancers (4%) were excluded for one of the following reasons, leaving 16,242 eligible cases for inclusion in the survival audit:

- unknown invasive status (7 cases)
- case not registered by the cancer registries or registered with an unknown diagnosis date (239 cases)
- screen-detected cancer not confirmed to be the first primary breast cancer (426 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.

Data completeness for the 2008/09 survival audit							
	Not registered		Cases not confirmed to be primary breast cancers		Eligible cases		Total number of cases
Region	No.	%	No.	%	No.	%	
East Midlands	19	1	38	3	1,300	96	1,357
East of England	27	2	48	3	1,608	95	1,684
London	30	2	26	2	1,399	96	1,455
N East, Yorks & Humber	29	1	52	2	2,286	96	2,369
North West	35	2	43	2	1,692	96	1,771
South East Coast	29	2	25	2	1,295	96	1,350
South Central	17	1	31	3	1,106	96	1,154
South West	23	2	37	3	1,387	96	1,447
West Midlands	21	1	28	2	1,410	97	1,460
Northern Ireland	0	0	4	1	352	99	357
Scotland	7	0	58	4	1,451	96	1,516
Wales	2	0	36	4	956	96	994
United Kingdom	**239**	**1.4**	**426**	**3**	**16,242**	**96**	**16,914**

The diagnosis date recorded at the cancer registries 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 (531 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 2014, deaths were recorded for 847 (7%) of the 12,872 women with invasive breast cancer. Fifty percent of the deaths were recorded as being due to breast cancer, 19% to another type of cancer and 28% to non-cancer related causes. Death cause was unknown for 28 women (3%). There were variations in the proportions of women with invasive cancer recorded as dying from each cause of death in each UK NHSBSP English region and Celtic country (Table 133); with the proportion of breast cancer deaths varying from 40% in North West to 59% in Northern Ireland.

There were four deaths (4%) recorded among the 111 women with micro-invasive breast cancer detected by screening in 2008/09 (Table 134). Two of these were from breast cancer and two were non-cancer deaths. Of the 90 deaths (3%) in the 3,259 women with non-invasive breast cancer, nine (10%) were recorded as being due to breast cancer, 42 (47%) due to another type of cancer and 34 (38%) were non-cancer deaths (Table 135).

9.4 Regional and screening unit variation in 5-year relative survival rates

For 12,872 women with invasive breast cancer diagnosed by screening in 2008/09, the overall 5-year relative survival rate is 98.5%. Figure 78 shows the variation in 5-year survival between UK NHSBSP English regions and Celtic countries. Women in North East, Yorkshire & Humber, North West and Scotland have statistically significantly lower survival rates (97.3%, 97.0% and 97.1% respectively) compared to the UK average 5-year relative survival rate of 98.5%. For the two English regions, these differences are still apparent after adjusting for regional variation in the life tables for the local population (Table 136). After adjusting for local variation, the 5-year relative survival rate in Scotland is no longer significantly different from the UK average.

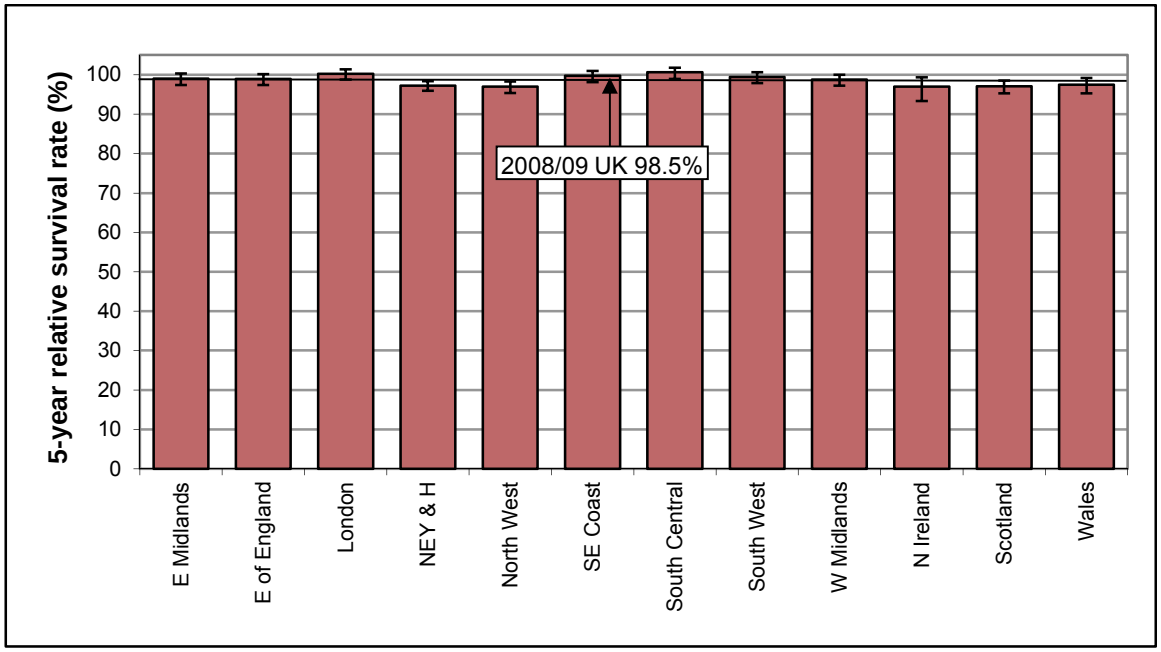

Figure 78 (Table 136): Regional variation in 5-year relative survival for women with invasive breast cancer who were screened in 2008/09

Figure 79 shows how 5-year relative survival varies between screening units for screen-detected breast cancers diagnosed in 2007/08 and 2008/09. The 5-year relative survival rates for some units have large confidence intervals, which reflect the small numbers of eligible invasive cancers (overall range 83 to 805). For six units where the upper confidence interval does not reach the line representing the UK average, 5-year relative survival rates are statistically significantly lower than the national average of 98.5%. Two of these screening units are in West Midlands (94.1% and 94.8%), two in North East, Yorkshire & Humber (95.6% and 95.7%), one in London (94.9%) and one in Scotland (96.5%). Four screening units [London (2), South Central (1) and Northern Ireland (1)] have 5-year relative survival rates significantly higher than the national average. Because UK life tables were used in the analyses, these survival differences may be due to variations in life expectancy between areas in the UK.

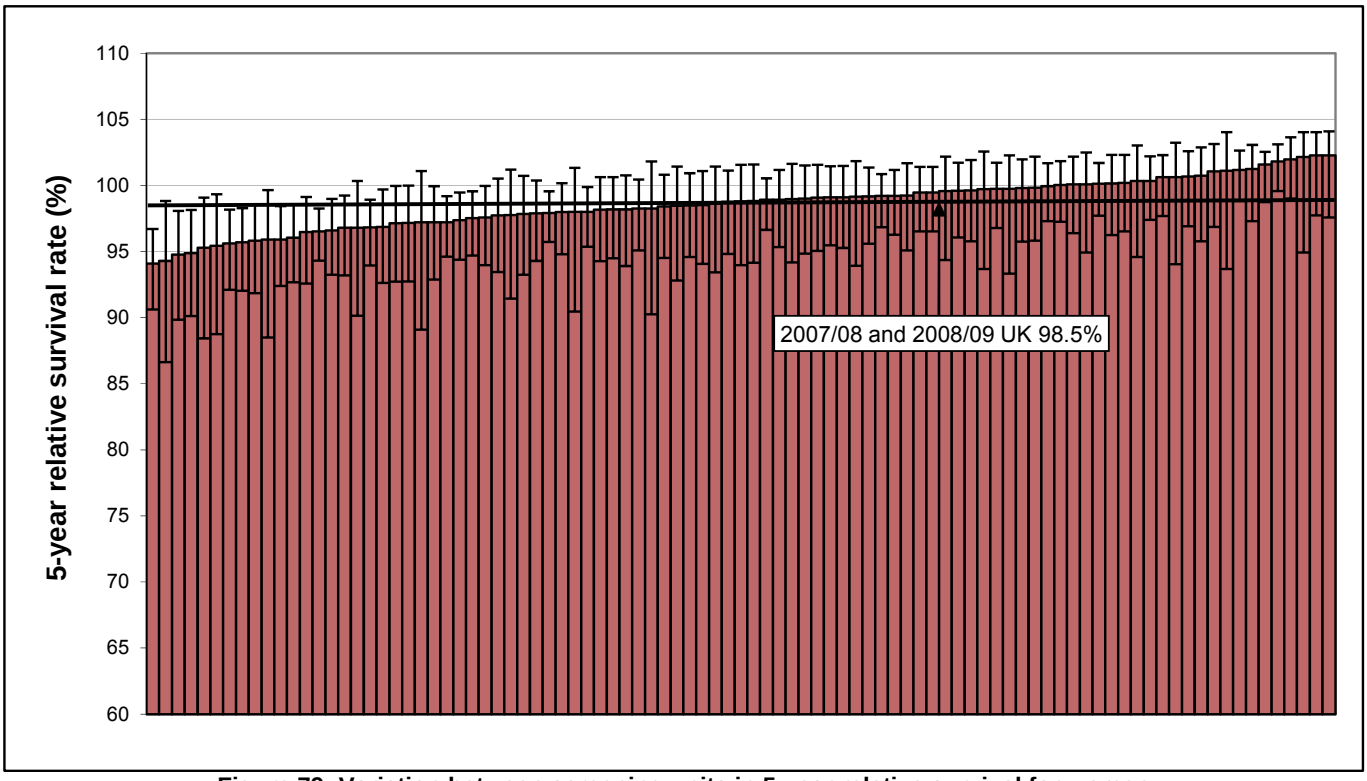

Figure 79: Variation between screening units in 5-year relative survival for women with invasive breast cancer who were screened in 2007/08 and 2008/09

9.5 Variation in 5-year relative survival with tumour characteristics

The summary table on page 157 shows the characteristics of the 16,242 screen-detected breast cancers included in the 2008/09 survival analysis cohort. Of these, 12,872 (79%) were invasive, 93% of which were diagnosed in women aged 50-70. Of the 12,872 invasive cancers, 76% were less than or equal to 20mm in diameter, 79% were grade 1 or grade 2, 77% were node negative, 57% were in the excellent (EPG) and good (GPG) prognostic groups and only 6% were in the poor prognostic group (PPG). These proportions are similar to those recorded in last year's audit of screen-detected cancers diagnosed in 2007/08.

9.5.1 Variation in relative survival with invasive status

The overall 5-year relative survival rate for women with breast cancer screened in 2008/09 is 99.1%. For women with invasive breast cancer, the 5-year relative survival rate is 98.5%, and for those with non-invasive breast cancer it is significantly higher at 101.6% 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 is also over 100% but this is not significantly different to the rate for women with invasive breast cancer because of the wide confidence intervals caused by the very small numbers of micro-invasive cancers.

Parameter		Cancers included in each analysis group 2008/09	
		Number	%
Invasive status	Invasive	12,872	79
	Non-invasive	3,259	20
	Micro-invasive	111	1
	Total	**16,242**	**100**
Age group (invasive cancers only)	<50	155	1
	50-52	1,683	13
	53-55	1,211	9
	56-58	1,527	12
	59-61	2,039	16
	62-64	2,073	16
	65-67	1,794	14
	68-70	1,595	12
	71+	795	6
Invasive cancer size	<15mm	6,766	53
	15-≤20mm	3,059	24
	>20-≤35mm	2,187	17
	>35-≤50mm	461	4
	>50mm	228	2
	Unknown	171	1
Invasive grade	Grade 1	3,345	26
	Grade 2	6,781	53
	Grade 3	2,629	20
	Not assessable	42	0
	Unknown	75	1
Nodal status (invasive cancers only)	Negative	9,850	77
	Positive	2,763	21
	Unknown	259	2
NPI group (invasive cancers only)	EPG	2,698	21
	GPG	4,590	36
	MPG1	3,045	34
	MPG2	1,372	11
	PPG	783	6
	Unknown	384	3

5-year relative survival (%) and 95% confidence intervals 2008/09 cohort	
Invasive	98.5 (98.1,98.9)
Micro-invasive	101.9 (96.1,103.9)
Non-invasive	101.6 (100.9,102.1)
Overall	**99.1 (98.8,99.5)**

At 99.1% the overall 5-year relative survival rate for women with screen-detected cancers in the 2008/09 cohort is significantly higher than the 94.8% relative survival rate reported for the 1990/91 cohort in the 2011 UK NHSBSP & ABS audit booklet (see table below which

summarises 5-year, 10-year, 15-year and 20-year relative survival rates for women in the 1990/91 cohort and is taken from the 2011 booklet).

Relative survival (%) and 95% confidence intervals 1991/92 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 2008/09. 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 – Dec 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)
Mar 2008 – Apr 2009	12,872	98.5 (98.1,98.9)

9.5.2 Variation in relative survival with age for invasive breast cancers

Figure 80 shows the variation with age at diagnosis in the 5-year relative survival rates for women with invasive breast cancers diagnosed in 2008/09. Women with invasive cancer in the screening age range (50 to 70) have survival rates ranging from 96.9% to 99.2%. The 5-year relative survival rate for women aged over 70 is 107.0%, which is significantly higher than that for women in the 50 to 64 age groups. In 2008/09, all patients aged over 70 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-referred women may be from a more affluent socio-economic group and therefore have better overall health than the general population as a whole.

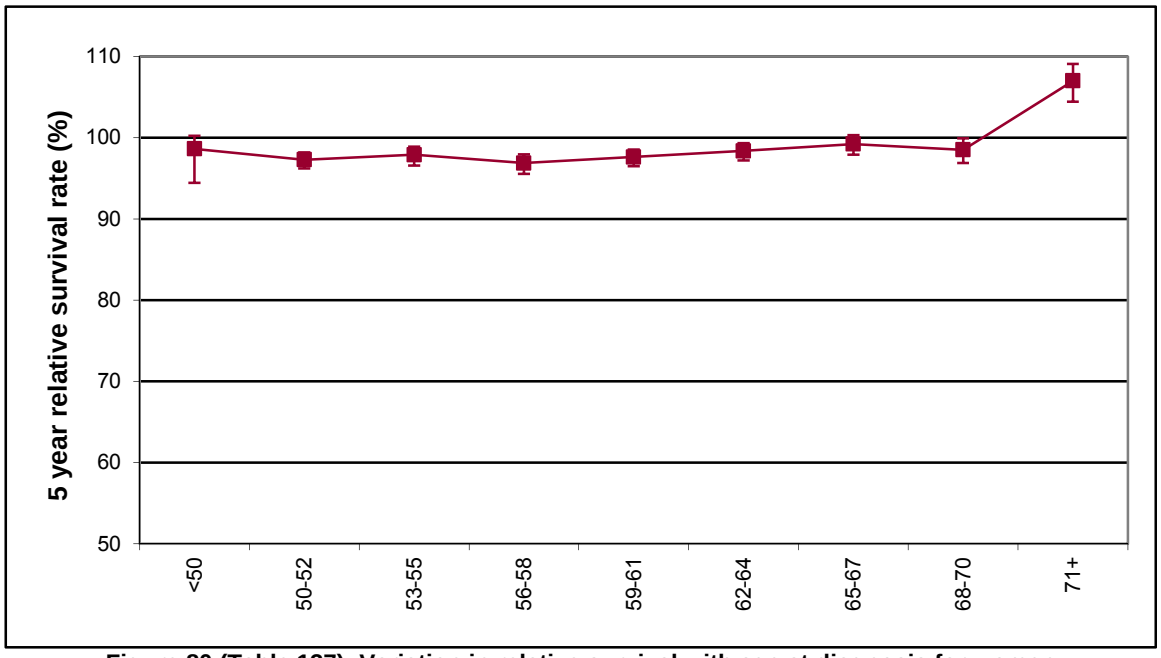

Figure 80 (Table 137): Variation in relative survival with age at diagnosis for women with invasive breast cancer who were screened in 2008/09

9.5.3 Variation in relative survival with invasive tumour size, grade and nodal status

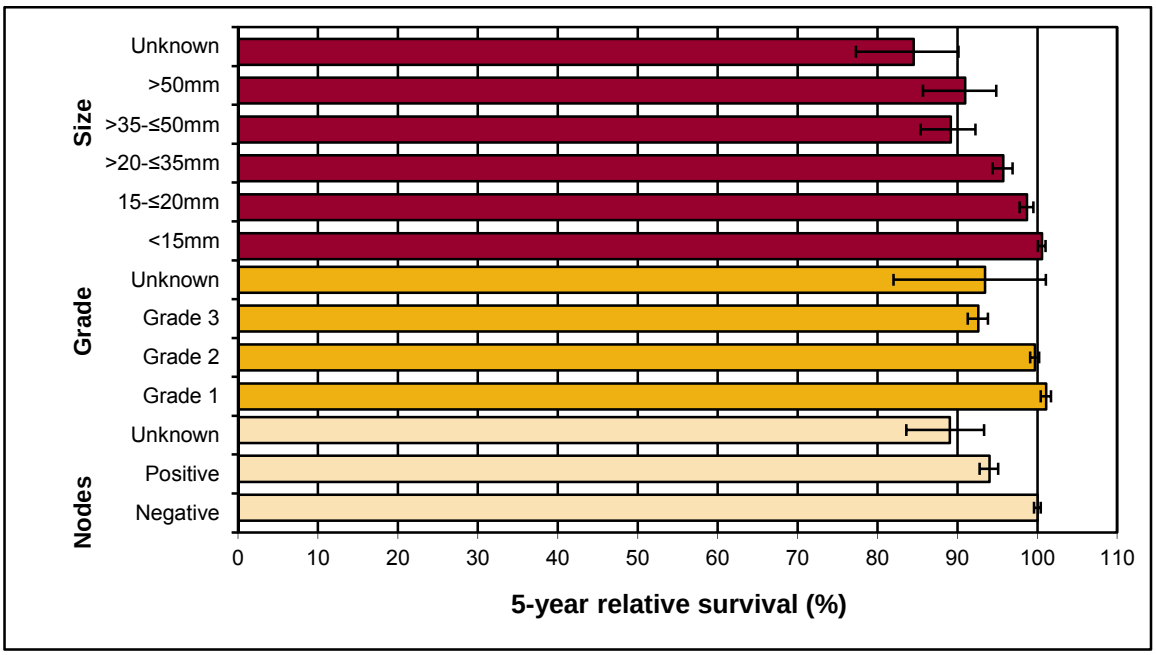

Figure 81 (Tables 138 to 140): Variation in 5-year relative survival rates with invasive tumour size, invasive grade and nodal status for women with invasive breast cancer who were screened in 2008/09

Although 5-year survival is relatively good for all women with screen-detected breast cancer, it is dependent on the characteristics of the tumour detected. Thus, the 5-year relative survival

rate for women with a small invasive breast cancer (<15mm diameter) is 100.6% (Table 138 and Figure 81), while for women with a large invasive breast cancer (>50mm diameter) it is only 91.0%. Similarly, the 5-year survival rate for women with a grade 1 invasive breast cancer is 101.1% but only 92.6% for women with a grade 3 cancer (Table 139). Finally, while the 5-year relative survival rate for women with positive nodal status is 94.0%, it is 100.0% for women with negative nodal status (Table 140).

9.5.4 Variation in relative survival of invasive cancers with NPI group

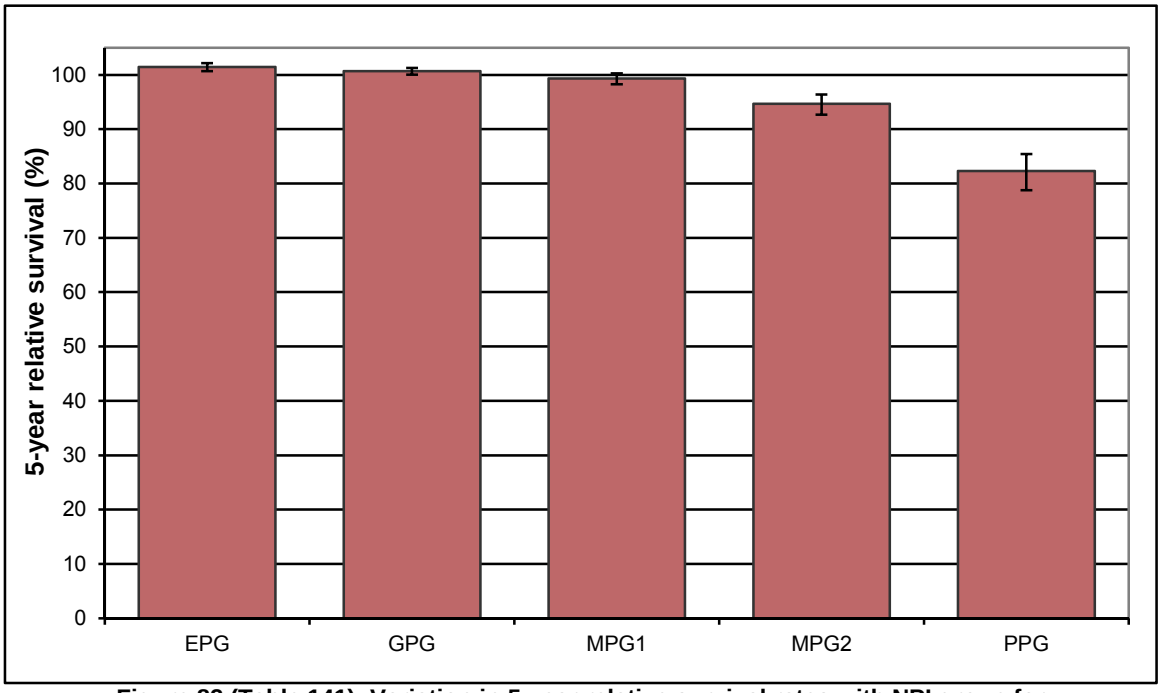

Figure 82 (Table 141): Variation in 5-year relative survival rates with NPI group for women with invasive breast cancer who were screened in 2008/09

At 101.5% and 100.7% respectively, the 5-year relative survival rates for women with invasive breast cancers in the excellent prognostic group (EPG), good prognostic group (GPG) (Table 141 and Figure 82), are 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) is significantly lower 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 poor prognostic group (PPG) at 94.7% and 82.3% respectively are significantly lower than those for all of the other prognostic groups.

Key findings

- Of the 16,592 cancers submitted to the survival audit for the period 1 April 2008 to 31 March 2009, 16,242 were eligible for inclusion in the analyses.
- Up to 31 March 2014, deaths were recorded for 847 (7%) women with invasive breast cancer: 50% were due to breast cancer, 19% to another type of cancer and 28% to non-cancer related causes. Death cause was unknown for 28 women (3%).
- There were 90 deaths (3%) in women with non-invasive breast cancer, nine were due to breast cancer, 42 to another type of cancer and 34 (38%) were non-cancer deaths.

Key findings (cont)

- The 5-year relative survival for 12,872 women with screen-detected invasive breast cancer who were screened in 2008/09 is 98.5%. Five-year relative survival has improved significantly from 93.7% in 1990/91.
- Women in North East, Yorkshire & Humber, North West and Scotland have statistically significantly lower survival rates (97.3%, 97.0% and 97.1% respectively) compared to the UK average. For the two English regions, these differences are still apparent after adjusting for regional variation in the life tables for the local population. After adjusting for local variation, the 5-year relative survival rate in Scotland is no longer significantly different from the UK average.
- Unit level 5-year relative survival for women screened in 2007/08 and 2008/09 varies from 94.1% in a unit in the West Midlands to 102.3% in a unit in East of England. For six units, 5-year relative survival rates are statistically significantly lower than the national average. Two of these screening units are in West Midlands (94.1% and 94.8%), two in North East, Yorkshire & Humber (95.6% and 95.7%) one in London (94.9%) and onw in Scotland (96.5%). Four screening units [London (2), South Central (1) and Northern Ireland (1)] have 5-year relative survival rates significantly higher than the national average.
- The 5-year relative survival rate for women aged over 70 is 107.0%, which is significantly higher than that for women in the 50 to 64 age groups. In 2008/09, all patients aged over 70 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-referred women may be from a more affluent socio-economic group and therefore have better overall health than the general population as a whole.
- Five-year relative survival varies with invasive tumour characteristics: 100.6% for less than 15mm diameter tumours compared to 91.0% for tumours with a diameter greater than 50mm; 101.1% for grade 1 cancers compared to 92.6% for grade 3 cancers; 100% for node negative cancers compared to 94% for node positive cancers.
- At 101.5% and 100.7% respectively for cancers in the excellent prognostic group (EPG), good prognostic group (GPG), 5-year relative survival is significantly better than that for moderate prognostic group 1 (MPG1) cancers (99.4%) and for moderate prognostic group 2 (MPG2) and the poor prognostic roup (PPG) cancers (94.7% and 82.3% respectively).
- The 5-year relative survival rate for women with non-invasive breast cancer is significantly higher at 101.6% than for those with invasive breast cancer and the lower confidence interval 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.

Appendix A: Timetable of events

NHSBSP and ABS AUDIT OF SCREEN-DETECTED BREAST CANCERS FOR THE YEAR OF SCREENING 1 APRIL 2013 - 31 MARCH 2014

AUDIT TIMETABLE	
Date	**Event**
5 Sept 2014 (Friday)	**Deadline for receipt of survival audit data excluding CR data at the WMQARC.**
8 – 12 Sept 2014	QARCs to ensure that an appropriate member of staff is available to respond to any queries from the WMQARC regarding the survival audit.
23 Sept 2014	National audit training day
7 Nov 2014	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.*
10 Nov 14– 5 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.
1 Dec 2014 (Monday)	**Deadline for return of Previous Cancer sheet in adjuvant audit (PID including additional cases) and Patient sheet in main audit**
7 Jan 2015 (Wednesday)	**Deadline for receipt of main and adjuvant audit data at the WMQARC.**
8 – 16 Jan 2015	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.
30 Jan 2015	**Deadline for submission of follow-up report at the WMQARC.**
20 Feb 2015	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.*
12 Mar 2015	Draft audit booklet emailed to Audit Steering Group for comment.
26 May 2015	Deadline for receipt of the audit booklet at the printers.
15 – 16 June 2015	2015 ABS conference (Bournemouth).
16 June 2015	Wash-up meeting (Bournemouth).

Appendix B: Main audit data form

NHSBSP & ABS AUDIT OF WOMEN WITH SCREEN-DETECTED BREAST CANCERS DETECTED FOLLOWING INVITATION BETWEEN 1 APRIL 2013 AND 31 MARCH 2014

PLEASE SUPPLY DATA FOR WOMEN OF ALL AGES WITH SCREEN-DETECTED BREAST CANCERS WITH FIRST OFFERED APPOINTMENT FROM 1 APRIL 2013 - 31 MARCH 2014 INCLUSIVE ACCORDING TO THE REGIONAL BOUNDARIES EXTANT AT 1 APRIL 2014

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 the remaining data by the regional QA co-ordinator to the WMQARC is 7 January 2015

****

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 2013/14. If bilateral or multiple cancers have been detected, the KC62 software selects the worst prognosis cancer. The same rules should be applied for the audit. All data for bilateral cases should be taken from the cancer included in the KC62.

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

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

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

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

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

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

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

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

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

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

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

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

Invasive status coding rules:

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

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

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

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

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

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

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

Reasons for low caseload: An explanation is required for consultant surgeons who have screening caseload <10 in 2013/14. 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:

Mr Sam Read
Data Administrator
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NHSBSP & ABS BREAST SCREENING AUDIT 2013/14

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

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

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

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

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

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

For each operation (visit to theatre) – intended surgery, ignoring reconstruction, enter the most appropriate from the following list (C=Conservation surgery, M=Mastectomy, AX=Axillary procedure, C+AX, M+AX, NS=No surgery, U=Unknown)
Conservation surgery can be wide local excision (WLE), repeat excision, localisation biopsy etc
(e.g. a diagnostic open biopsy 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 (MIM), macrometastasis or metastasis (MET).

Axilla assessment type *(SD,SI,SX,AY,AC,AX,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 2013/14	Left NHSBSP 2013/14	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 2012 AND 31 MARCH 2013

PLEASE SUPPLY DATA FOR WOMEN OF ALL AGES WITH SCREEN-DETECTED BREAST CANCER WITH FIRST OFFERED SCREENING APPOINTMENT FROM 1 APRIL 2012 TO 31 MARCH 2013 INCLUSIVE ACCORDING TO THE REGIONAL BOUNDARIES EXTANT FROM 1 APRIL 2014

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 7 January 2015

DEFINITIONS AND GUIDANCE NOTES

Audit cut-off date: If a woman has not received radiotherapy or chemotherapy or hormonal therapy before 31 March 2014 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 2012/13 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 2012 to 31 March 2013. 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.

Queries

Any queries about the adjuvant audit should be directed to:

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NHSBSP & ABS ADJUVANT THERAPY AUDIT - TO BE COMPLETED FOR ALL CANCERS WITH DATE OF FIRST OFFERED APPOINTMENT FROM 1 APRIL 2012 TO 31 MARCH 2013 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 2012 TO 31 MARCH 2013 INCLUSIVE

	To aid data collection by the consultant surgeon.			*Data from 2012/13 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 2012 TO 31 MARCH 2013 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 31/03/14, N = No therapy given before 31/03/14, 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:**

Appendix D: Survival audit data collection sheet

NHSBSP & ABS SURVIVAL AUDIT FOR SCREEN-DETECTED BREAST CANCER PATIENTS WHO WERE SCREENED BETWEEN 1 APRIL 2008 AND 31 MARCH 2009

The completed spreadsheets should be submitted by the Breast Screening QA Reference Centre to the West Midlands QA Reference Centre by 5th September 2014.

Aim:

To combine death information recorded by cancer registries with NHS Breast Screening Programme (NHSBSP) data, recorded from 1 April 2008 to 31 March 2009, 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 2008 and 31 March 2009 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.

Information from cancer registry will be collected by the West Midlands QA Reference Centre.

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.

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 2008 and 31 March 2009, 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 VALIDATION

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

Check 1 (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 2 (Invasive size)	If the invasive size is incorrect or not in numerical format, the check will flag up as 'Size-Wrong data type'
Check 3 (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:

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Colmore Row
Birmingham
B3 2PW

Tel: 0121 214 9183

phe.nhsbspabs@nhs.net

SURVIVAL AUDIT: SCREENING OFFICE DATA FOR PATIENT SCREENED IN 2008/09

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)

Appendix E: Main audit data tables (1 - 94)

DATA FROM THE 2012/13 AUDIT OF SCREEN-DETECTED BREAST CANCERS IN WOMEN ALL AGES FOR THE PERIOD 1 APRIL 2013 – 31 MARCH 2014

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	2222	79	1205	43	19	1	571	20	0	0	2812	100	339380	1.7	6.5	3.6
East Midlands	1186	78	663	44	8	1	326	21	0	0	1520	100	183325	1.8	6.5	3.6
East of England	1510	79	749	39	23	1	386	20	2	0	1921	100	237855	1.7	6.3	3.1
London	1512	75	667	33	19	1	481	24	1	0	2013	100	246694	2.0	6.1	2.7
South East Coast	1374	80	753	44	7	0	343	20	0	0	1724	100	187590	1.9	7.3	4.0
South Central	1189	78	594	39	10	1	322	21	0	0	1521	100	166723	2.0	7.1	3.6
South West	1678	78	886	41	10	0	453	21	0	0	2141	100	239393	1.9	7.0	3.7
West Midlands	1517	79	759	40	11	1	383	20	1	0	1912	100	217789	1.8	7.0	3.5
North West	1904	80	920	39	22	1	453	19	2	0	2381	100	268254	1.8	7.1	3.4
Wales	967	78	526	43	3	0	265	21	0	0	1235	100	117054	2.3	8.3	4.5
Northern Ireland	316	84	159	43	3	1	55	15	0	0	374	100	58779	1.0	5.4	2.7
Scotland	1393	85	745	45	10	1	238	15	0	0	1641	100	184839	1.3	7.5	4.0
United Kingdom	**16768**	**79**	**8626**	**41**	**145**	**1**	**4276**	**20**	**6**	**0**	**21195**	**100**	**2447675**	**1.8**	**6.9**	**3.5**

Table 2 : Age at first offered screening appointment

Region	<50		50-64		65-70		71-75		76+		Total	>70	
	No.	%	No.	%	No.	%	No.	%	No.	%		No.	%
N East, Yorks & Humber	193	7	1564	56	779	28	195	7	81	3	2812	276	9.8
East Midlands	115	8	802	53	418	28	124	8	61	4	1520	185	12.2
East of England	172	9	981	51	544	28	126	7	98	5	1921	224	11.7
London	112	6	1219	61	509	25	111	6	62	3	2013	173	8.6
South East Coast	102	6	957	56	458	27	131	8	76	4	1724	207	12.0
South Central	85	6	850	56	423	28	105	7	58	4	1521	163	10.7
South West	164	8	1062	50	649	30	181	8	85	4	2141	266	12.4
West Midlands	103	5	1066	56	565	30	125	7	53	3	1912	178	9.3
North West	152	6	1304	55	659	28	191	8	75	3	2381	266	11.2
Wales	22	2	700	57	403	33	69	6	41	3	1235	110	8.9
Northern Ireland	12	3	239	64	112	30	9	2	2	1	374	11	2.9
Scotland	0	0	1017	62	469	29	97	6	58	4	1641	155	9.4
United Kingdom	**1232**	**6**	**11761**	**55**	**5988**	**28**	**1464**	**7**	**750**	**4**	**21195**	**2214**	**10.4**

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	2657	1	0.04
East Midlands	1431	1	0.07
East of England	1812	0	0.00
London	1904	0	0.00
South East Coast	1609	0	0.00
South Central	1421	0	0.00
South West	2027	2	0.10
West Midlands	1813	1	0.06
North West	2264	0	0.00
Wales	1174	0	0.00
Northern Ireland	362	0	0.00
Scotland	1565	0	0.00
United Kingdom	**20039**	**5**	**0.02**

Table 4: 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	2812	2812	100	363	13	2449	87
East Midlands	1520	1519	100	191	13	1328	87
East of England	1921	1921	100	228	12	1693	88
London	2013	1995	99	195	10	1800	90
South East Coast	1724	1716	100	217	13	1499	87
South Central	1521	1515	100	213	14	1302	86
South West	2141	2140	100	275	13	1865	87
West Midlands	1912	1906	100	240	13	1666	87
North West	2381	2380	100	303	13	2077	87
Wales	1235	1191	96	149	13	1042	87
Northern Ireland	374	284	76	23	8	261	92
Scotland	1641	1251	76	193	15	1058	85
United Kingdom	**21195**	**20630**	**97**	**2590**	**13**	**18040**	**87**

Table 5: 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	2812	363	119	38	16	6	56	38	119
East Midlands	1519	191	73	24	8	6	27	18	46
East of England	1921	228	85	28	13	11	28	25	56
London	1995	195	89	22	11	13	17	20	42
South East Coast	1716	217	95	23	15	16	22	21	42
South Central	1515	213	78	17	13	11	23	25	66
South West	2140	275	93	38	18	11	34	21	79
West Midlands	1906	240	80	28	14	12	26	20	77
North West	2380	303	101	58	17	14	46	16	69
Wales	1191	149	48	17	6	3	17	13	51
Northern Ireland	284	23	11	3	5	1	2	1	0
Scotland	1251	193	64	28	7	4	17	12	78
United Kingdom	**20630**	**2590**	**936**	**324**	**143**	**108**	**315**	**230**	**725**
% of previous cancers	**-**	**100**	**36**	**13**	**6**	**4**	**12**	**9**	**28**
% of matched	**100**	**13**	**5**	**2**	**1**	**1**	**2**	**1**	**4**

Table 6 : Non-operative diagnosis rate												
	Total	C5 only		C5 & B5		B5 only		Positive axillary biopsy only		Non-operative diagnosis		No non-operative diagnosis	
Region	cancers	No	%	No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	2657	1	0	148	6	2449	92	2	0	2600	98	57	2
East Midlands	1431	1	0	3	0	1388	97	1	0	1393	97	38	3
East of England	1812	1	0	8	0	1724	95	0	0	1733	96	79	4
London	1904	0	0	13	1	1830	96	1	0	1844	97	60	3
South East Coast	1609	0	0	1	0	1543	96	0	0	1544	96	65	4
South Central	1421	0	0	3	0	1354	95	0	0	1357	95	64	5
South West	2027	5	0	11	1	1938	96	1	0	1955	96	72	4
West Midlands	1813	1	0	4	0	1738	96	4	0	1747	96	66	4
North West	2264	2	0	16	1	2186	97	0	0	2204	97	60	3
Wales	1174	0	0	2	0	1133	97	2	0	1137	97	37	3
Northern Ireland	362	0	0	185	51	172	48	0	0	357	99	5	1
Scotland	1565	0	0	12	1	1506	96	0	0	1518	97	47	3
United Kingdom	**20039**	**11**	**0**	**406**	**2**	**18961**	**95**	**11**	**0**	**19389**	**97**	**650**	**3**

Table 7 : Non-operative diagnosis rate (invasive cancers)												
	Total	C5 only		C5 & B5		B5 only		Positive axillary biopsy only		Non-operative diagnosis		No non-operative diagnosis	
Region	cancers	No	%	No	%	No	%	No	%	No	%	No	%
N East, Yorks & Humber	2099	1	0	143	7	1938	92	2	0	2084	99	15	1
East Midlands	1119	0	0	3	0	1112	99	1	0	1116	100	3	0
East of England	1422	0	0	8	1	1397	98	0	0	1405	99	17	1
London	1429	0	0	13	1	1403	98	1	0	1417	99	12	1
South East Coast	1277	0	0	1	0	1264	99	0	0	1265	99	12	1
South Central	1110	0	0	3	0	1098	99	0	0	1101	99	9	1
South West	1582	4	0	10	1	1554	98	1	0	1569	99	13	1
West Midlands	1445	1	0	4	0	1423	98	4	0	1432	99	13	1
North West	1812	2	0	15	1	1782	98	0	0	1799	99	13	1
Wales	919	0	0	1	0	908	99	2	0	911	99	8	1
Northern Ireland	304	0	0	182	60	121	40	0	0	303	100	1	0
Scotland	1323	0	0	12	1	1297	98	0	0	1309	99	14	1
United Kingdom	**15841**	**8**	**0**	**395**	**2**	**15297**	**97**	**11**	**0**	**15711**	**99**	**130**	**1**

Table 8 : 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	539	0	0	5	1	493	91	498	92	41	8
East Midlands	304	1	0	0	0	269	88	270	89	34	11
East of England	369	0	0	0	0	308	83	308	83	61	17
London	457	0	0	0	0	411	90	411	90	46	10
South East Coast	325	0	0	0	0	272	84	272	84	53	16
South Central	303	0	0	0	0	248	82	248	82	55	18
South West	435	1	0	1	0	374	86	376	86	59	14
West Midlands	356	0	0	0	0	305	86	305	86	51	14
North West	429	0	0	1	0	382	89	383	89	46	11
Wales	252	0	0	1	0	222	88	223	88	29	12
Northern Ireland	55	0	0	2	4	49	89	51	93	4	7
Scotland	232	0	0	0	0	200	86	200	86	32	14
United Kingdom	**4056**	**2**	**0**	**10**	**0**	**3533**	**87**	**3545**	**87**	**511**	**13**

Table 9 : 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	2597	624	24	1960	75	13	1
East Midlands	1391	314	23	1061	76	16	1
East of England	1732	398	23	1326	77	8	0
London	1843	507	28	1327	72	9	0
South East Coast	1544	340	22	1198	78	6	0
South Central	1357	312	23	1041	77	4	0
South West	1949	453	23	1490	76	6	0
West Midlands	1742	366	21	1343	77	33	2
North West	2202	471	21	1717	78	14	1
Wales	1135	277	24	858	76	0	0
Northern Ireland	357	67	19	288	81	2	1
Scotland	1518	270	18	1245	82	3	0
United Kingdom	**19367**	**4399**	**23**	**14854**	**77**	**114**	**1**

Table 10 : B5a (Non-invasive) core biopsy: histological status of surgical specimen												
	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	111	18	16	3	466	75	27	4	0	0	620	100
East Midlands	44	14	5	2	250	82	7	2	0	0	306	100
East of England	76	20	16	4	285	74	10	3	0	0	387	100
London	85	17	15	3	372	75	26	5	0	0	498	100
South East Coast	61	18	7	2	262	78	5	1	0	0	335	100
South Central	58	19	7	2	229	75	11	4	0	0	305	100
South West	72	16	10	2	353	79	14	3	0	0	449	100
West Midlands	62	17	6	2	275	76	18	5	0	0	361	100
North West	75	16	19	4	343	74	25	5	0	0	462	100
Wales	51	19	3	1	212	77	8	3	0	0	274	100
Northern Ireland	14	21	2	3	49	74	1	2	0	0	66	100
Scotland	65	24	9	3	191	72	2	1	0	0	267	100
United Kingdom	**774**	**18**	**115**	**3**	**3287**	**76**	**154**	**4**	**0**	**0**	**4330**	**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 11 : B5b (Invasive) core biopsy: histological status of surgical specimen												
	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1900	98	3	0	17	1	10	1	1	0	1931	100
East Midlands	1030	99	0	0	6	1	5	0	0	0	1041	100
East of England	1266	98	0	0	17	1	11	1	1	0	1295	100
London	1235	97	0	0	12	1	22	2	0	0	1269	100
South East Coast	1146	98	0	0	17	1	11	1	0	0	1174	100
South Central	1001	99	0	0	4	0	9	1	0	0	1014	100
South West	1425	98	0	0	16	1	15	1	0	0	1456	100
West Midlands	1298	98	4	0	12	1	13	1	0	0	1327	100
North West	1672	98	6	0	5	0	15	1	0	0	1698	100
Wales	833	98	1	0	3	0	7	1	2	0	846	100
Northern Ireland	282	99	1	0	2	1	1	0	0	0	286	100
Scotland	1204	99	1	0	4	0	7	1	0	0	1216	100
United Kingdom	**14292**	**98**	**16**	**0**	**115**	**1**	**126**	**1**	**4**	**0**	**14553**	**100**

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

Table 12 : Number of assessment visits for each patient

	0		1		2		3+		Unknown		Total		Repeat (2+) visit	
Region	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
N East, Yorks & Humber	0	0	2289	86	340	13	28	1	0	0	2657	100	368	14
East Midlands	0	0	1191	83	223	16	17	1	0	0	1431	100	240	17
East of England	0	0	1634	90	171	9	7	0	0	0	1812	100	178	10
London	0	0	1588	83	295	15	21	1	0	0	1904	100	316	17
South East Coast	0	0	1296	81	283	18	30	2	0	0	1609	100	313	19
South Central	0	0	1213	85	198	14	10	1	0	0	1421	100	208	15
South West	0	0	1648	81	342	17	37	2	0	0	2027	100	379	19
West Midlands	0	0	1539	85	252	14	22	1	0	0	1813	100	274	15
North West	0	0	1907	84	318	14	39	2	0	0	2264	100	357	16
Wales	0	0	1051	90	115	10	8	1	0	0	1174	100	123	10
Northern Ireland	0	0	320	88	38	10	4	1	0	0	362	100	42	12
Scotland	0	0	1499	96	66	4	0	0	0	0	1565	100	66	4
United Kingdom	**0**	**0**	**17175**	**86**	**2641**	**13**	**223**	**1**	**0**	**0**	**20039**	**100**	**2864**	**14**

Table 13 : 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	2589	98	64	2	1	0	2654	100	65	2
East Midlands	1387	97	43	3	0	0	1430	100	43	3
East of England	1768	98	43	2	0	0	1811	100	43	2
London	1833	96	67	4	2	0	1902	100	69	4
South East Coast	1455	90	153	10	1	0	1609	100	154	10
South Central	1386	98	35	2	0	0	1421	100	35	2
South West	1832	90	191	9	2	0	2025	100	193	10
West Midlands	1778	98	30	2	1	0	1809	100	31	2
North West	2170	96	93	4	1	0	2264	100	94	4
Wales	1151	98	21	2	1	0	1173	100	22	2
Northern Ireland	357	99	4	1	0	0	361	100	4	1
Scotland	-	-	-	-	-	-	-	-	-	-
United Kingdom	**17706**	**96**	**744**	**4**	**9**	**0**	**18459**	**100**	**753**	**4**

*Excluded cases from Scotland

Table 14 : 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	1987	95	95	5	2082	428	86	70	14	498	2431	94	167	6	2598
East Midlands	1048	94	67	6	1115	223	83	47	17	270	1277	92	115	8	1392
East of England	1352	96	53	4	1405	280	91	28	9	308	1651	95	82	5	1733
London	1340	95	76	5	1416	361	88	50	12	411	1715	93	128	7	1843
South East Coast	1211	96	54	4	1265	234	86	38	14	272	1451	94	93	6	1544
South Central	1027	93	74	7	1101	195	79	53	21	248	1227	90	130	10	1357
South West	1501	96	67	4	1568	329	88	47	13	376	1839	94	115	6	1954
West Midlands	1350	95	78	5	1428	259	85	46	15	305	1617	93	126	7	1743
North West	1701	95	98	5	1799	334	87	49	13	383	2056	93	148	7	2204
Wales	864	95	45	5	909	189	85	34	15	223	1054	93	81	7	1135
Northern Ireland	285	94	18	6	303	43	84	8	16	51	330	92	27	8	357
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**13666**	**95**	**725**	**5**	**14391**	**2875**	**86**	**470**	**14**	**3345**	**16648**	**93**	**1212**	**7**	**17860**

*Excluded cases from Scotland

Table 15 : 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	437	88	16	3	27	5	10	2	8	2	498
East Midlands	233	86	4	1	19	7	7	3	7	3	270
East of England	290	94	4	1	6	2	3	1	5	2	308
London	378	92	11	3	15	4	4	1	3	1	411
South East Coast	247	91	5	2	8	3	12	4	0	0	272
South Central	220	89	9	4	10	4	4	2	5	2	248
South West	354	94	9	2	5	1	6	2	2	1	376
West Midlands	275	90	10	3	11	4	4	1	5	2	305
North West	354	92	8	2	9	2	8	2	4	1	383
Wales	202	91	4	2	9	4	1	0	7	3	223
Northern Ireland	46	90	0	0	3	6	1	2	1	2	51
Scotland	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**3036**	**91**	**80**	**2**	**122**	**4**	**60**	**2**	**47**	**1**	**3345**

*Excluded cases from Scotland

Table 16 : 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	110	5	1986	95	2096	20	4	519	96	539	130	5	2524	95	2654
East Midlands	55	5	1063	95	1118	17	6	287	94	304	72	5	1358	95	1430
East of England	34	2	1387	98	1421	10	3	359	97	369	45	2	1766	98	1811
London	67	5	1361	95	1428	32	7	425	93	457	102	5	1800	95	1902
South East Coast	63	5	1214	95	1277	11	3	314	97	325	74	5	1535	95	1609
South Central	28	3	1082	97	1110	4	1	299	99	303	32	2	1389	98	1421
South West	62	4	1518	96	1580	16	4	419	96	435	78	4	1947	96	2025
West Midlands	84	6	1357	94	1441	17	5	339	95	356	101	6	1708	94	1809
North West	95	5	1717	95	1812	17	4	412	96	429	115	5	2149	95	2264
Wales	10	1	908	99	918	1	0	251	100	252	11	1	1162	99	1173
Northern Ireland	10	3	294	97	304	2	4	52	96	54	12	3	349	97	361
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**618**	**4**	**13887**	**96**	**14505**	**147**	**4**	**3676**	**96**	**3823**	**772**	**4**	**17687**	**96**	**18459**

*Excluded cases from Scotland

Table 17 : Status of diagnostic open biopsies

	Benign biopsy rate		Malignant biopsy rate
Region	**Prevalent**	**Incident**	
N East, Yorks & Humber	0.74	0.22	0.17
East Midlands	1.19	0.36	0.21
East of England	1.31	0.28	0.33
London	2.10	0.45	0.24
South East Coast	2.50	0.77	0.35
South Central	2.12	0.56	0.38
South West	2.01	0.40	0.30
West Midlands	2.09	0.45	0.30
North West	1.54	0.41	0.22
Wales	2.72	0.64	0.32
Northern Ireland	1.22	0.37	0.09
Scotland	1.11	0.32	0.25
United Kingdom	**1.64**	**0.42**	**0.27**

Table 18 : 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	0	0.00
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	0	0.00
North West	0	0.00	2	0.75
Wales	0	0.00	1	0.85
Northern Ireland	0	0.00	0	0.00
Scotland	0	0.00	2	1.08
United Kingdom	**0**	**0.00**	**5**	**0.20**

Table 19 : 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	57	15	26	1	2	41	72	0	0
East Midlands	38	3	8	1	3	34	89	0	0
East of England	79	17	22	1	1	61	77	0	0
London	60	12	20	2	3	46	77	0	0
South East Coast	65	12	18	0	0	53	82	0	0
South Central	64	9	14	0	0	55	86	0	0
South West	72	13	18	0	0	59	82	0	0
West Midlands	66	13	20	2	3	51	77	0	0
North West	60	13	22	0	0	46	77	1	2
Wales	37	8	22	0	0	29	78	0	0
Northern Ireland	5	1	20	0	0	4	80	0	0
Scotland	47	14	30	1	2	32	68	0	0
United Kingdom	**650**	**130**	**20**	**8**	**1**	**511**	**79**	**1**	**0**

Table 20 : Non-operative history for invasive cancers with malignant open biopsy									
	Total malignant open biopsies	No non-operative procedures		Cytology only		Core biopsy only		Both cytology and core biopsy	
Region		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	15	1	7	0	0	13	87	1	7
East Midlands	3	0	0	0	0	3	100	0	0
East of England	17	1	6	1	6	15	88	0	0
London	12	0	0	0	0	12	100	0	0
South East Coast	12	0	0	0	0	10	83	2	17
South Central	9	0	0	0	0	9	100	0	0
South West	13	1	8	1	8	11	85	0	0
West Midlands	13	0	0	0	0	12	92	1	8
North West	13	0	0	0	0	13	100	0	0
Wales	8	0	0	1	13	7	88	0	0
Northern Ireland	1	0	0	0	0	0	0	1	100
Scotland	14	0	0	0	0	14	100	0	0
United Kingdom	**130**	**3**	**2**	**3**	**2**	**119**	**92**	**5**	**4**

Table 21 : Non-operative history for micro/non-invasive cancers with malignant open biopsy									
	Total malignant open biopsies	No non-operative procedures		Cytology only		Core biopsy only		Both cytology and core biopsy	
Region		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	42	0	0	0	0	41	98	1	2
East Midlands	35	0	0	1	3	34	97	0	0
East of England	62	0	0	1	2	61	98	0	0
London	48	1	2	0	0	47	98	0	0
South East Coast	53	0	0	0	0	52	98	1	2
South Central	55	0	0	1	2	54	98	0	0
South West	59	0	0	0	0	59	100	0	0
West Midlands	53	0	0	0	0	53	100	0	0
North West	46	0	0	1	2	39	85	6	13
Wales	29	0	0	0	0	29	100	0	0
Northern Ireland	4	1	25	0	0	2	50	1	25
Scotland	33	0	0	0	0	32	97	1	3
United Kingdom	**519**	**2**	**0**	**4**	**1**	**503**	**97**	**10**	**2**

Table 22 : Highest cytology and core biopsy result prior to malignant diagnostic open biopsies (invasive cancers)											
	Total malignant open biopsies	No non-operative procedures		C4, B4 or both		C3, B3 or both		C2, B2 or both		C1, B1 or both	
Region		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	15	1	7	3	20	10	67	0	0	1	7
East Midlands	3	0	0	1	33	1	33	1	33	0	0
East of England	17	1	6	6	35	9	53	1	6	0	0
London	12	0	0	3	25	8	67	1	8	0	0
South East Coast	12	0	0	3	25	6	50	1	8	2	17
South Central	9	0	0	4	44	5	56	0	0	0	0
South West	13	1	8	6	46	4	31	2	15	0	0
West Midlands	13	0	0	4	31	8	62	1	8	0	0
North West	13	0	0	4	31	7	54	2	15	0	0
Wales	8	0	0	2	25	4	50	0	0	2	25
Northern Ireland	1	0	0	1	100	0	0	0	0	0	0
Scotland	14	0	0	7	50	5	36	1	7	1	7
United Kingdom	**130**	**3**	**2**	**44**	**34**	**67**	**52**	**10**	**8**	**6**	**5**

Table 23 : Highest cytology and core biopsy result prior to malignant diagnostic open biopsies (micro/non-invasive cancers)											
	Total malignant open biopsies	No non-operative procedures		C4, B4 or both		C3, B3 or both		C2, B2 or both		C1, B1 or both	
Region		No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	42	0	0	17	40	23	55	1	2	1	2
East Midlands	35	0	0	12	34	22	63	0	0	1	3
East of England	62	0	0	14	23	46	74	2	3	0	0
London	48	1	2	9	19	37	77	1	2	0	0
South East Coast	53	0	0	11	21	41	77	1	2	0	0
South Central	55	0	0	13	24	39	71	2	4	1	2
South West	59	0	0	17	29	42	71	0	0	0	0
West Midlands	53	0	0	17	32	35	66	1	2	0	0
North West	46	0	0	11	24	34	74	1	2	0	0
Wales	29	0	0	3	10	23	79	3	10	0	0
Northern Ireland	4	1	25	0	0	3	75	0	0	0	0
Scotland	33	0	0	9	27	21	64	2	6	1	3
United Kingdom	**519**	**2**	**0**	**133**	**26**	**366**	**71**	**14**	**3**	**4**	**1**

Table 24 : Data completeness for surgically treated non-invasive cancers							
	Unknown cytonuclear grade		Unknown size		Unknown cytonuclear grade and/or size		Total with surgery
Region	No.	%	No.	%	No.	%	No.
N East, Yorks & Humber	5	1	32	6	32	6	535
East Midlands	0	0	7	2	7	2	296
East of England	0	0	12	3	12	3	358
London	5	1	24	5	24	5	448
South East Coast	0	0	5	2	5	2	320
South Central	1	0	12	4	12	4	296
South West	1	0	19	4	19	4	431
West Midlands	1	0	19	5	19	5	351
North West	0	0	27	6	27	6	420
Wales	0	0	11	4	11	4	249
Northern Ireland	0	0	1	2	1	2	54
Scotland	7	3	9	4	12	5	229
United Kingdom	**20**	**0.5**	**178**	**4**	**181**	**5**	**3987**

Table 25 : Size of surgically treated non-invasive cancers												
	<15mm		15-≤40mm		>40 mm		Size not assessable		Size unknown		Total non-invasive with surgery	
Region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	185	35	213	40	87	16	18	3	32	6	535	100
East Midlands	89	30	139	47	52	18	9	3	7	2	296	100
East of England	143	40	135	38	46	13	22	6	12	3	358	100
London	151	34	174	39	69	15	30	7	24	5	448	100
South East Coast	140	44	106	33	44	14	25	8	5	2	320	100
South Central	102	34	119	40	47	16	16	5	12	4	296	100
South West	145	34	180	42	55	13	32	7	19	4	431	100
West Midlands	124	35	129	37	58	17	21	6	19	5	351	100
North West	165	39	155	37	59	14	14	3	27	6	420	100
Wales	93	37	107	43	35	14	3	1	11	4	249	100
Northern Ireland	18	33	22	41	9	17	4	7	1	2	54	100
Scotland	93	41	91	40	34	15	2	1	9	4	229	100
United Kingdom	**1448**	**36**	**1570**	**39**	**595**	**15**	**196**	**5**	**178**	**4**	**3987**	**100**

Table 26 : 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	294	55	177	33	41	8	18	3	5	1	535	100
East Midlands	182	61	74	25	31	10	9	3	0	0	296	100
East of England	210	59	94	26	33	9	21	6	0	0	358	100
London	243	54	124	28	46	10	30	7	5	1	448	100
South East Coast	193	60	69	22	33	10	25	8	0	0	320	100
South Central	174	59	73	25	31	10	17	6	1	0	296	100
South West	231	54	134	31	33	8	32	7	1	0	431	100
West Midlands	199	57	82	23	46	13	23	7	1	0	351	100
North West	241	57	121	29	44	10	14	3	0	0	420	100
Wales	121	49	84	34	41	16	3	1	0	0	249	100
Northern Ireland	28	52	15	28	8	15	3	6	0	0	54	100
Scotland	163	71	48	21	9	4	2	1	7	3	229	100
United Kingdom	**2279**	**57**	**1095**	**27**	**396**	**10**	**197**	**5**	**20**	**1**	**3987**	**100**

Table 27 : 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	570	28	561	27	467	23	350	17	49	2	43	2	30	1	2070	100
East Midlands	303	28	325	30	221	20	192	17	36	3	10	1	12	1	1099	100
East of England	349	25	353	25	339	24	241	17	61	4	16	1	32	2	1391	100
London	301	22	331	24	324	24	294	21	64	5	23	2	37	3	1374	100
South East Coast	370	30	333	27	260	21	204	16	40	3	25	2	21	2	1253	100
South Central	273	25	280	26	249	23	216	20	32	3	22	2	11	1	1083	100
South West	404	26	432	28	368	24	236	15	37	2	34	2	37	2	1548	100
West Midlands	339	24	384	27	353	25	233	16	61	4	31	2	27	2	1428	100
North West	420	23	451	25	462	26	323	18	77	4	34	2	26	1	1793	100
Wales	250	28	258	28	194	21	143	16	34	4	14	2	14	2	907	100
Northern Ireland	69	23	85	28	68	23	60	20	10	3	6	2	4	1	302	100
Scotland	370	29	337	26	288	22	232	18	30	2	16	1	22	2	1295	100
United Kingdom	**4018**	**26**	**4130**	**27**	**3593**	**23**	**2724**	**18**	**531**	**3**	**274**	**2**	**273**	**2**	**15543**	**100**

Table 28 : 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	328	16	486	23	483	23	491	24	136	7	118	6	28	1	2070	100
East Midlands	183	17	278	25	233	21	270	25	70	6	41	4	24	2	1099	100
East of England	209	15	308	22	354	25	341	25	107	8	54	4	18	1	1391	100
London	174	13	268	20	319	23	376	27	125	9	83	6	29	2	1374	100
South East Coast	227	18	315	25	276	22	275	22	72	6	54	4	34	3	1253	100
South Central	156	14	253	23	255	24	261	24	76	7	68	6	14	1	1083	100
South West	252	16	367	24	399	26	348	22	97	6	63	4	22	1	1548	100
West Midlands	227	16	350	25	347	24	296	21	113	8	68	5	27	2	1428	100
North West	287	16	411	23	453	25	429	24	124	7	71	4	18	1	1793	100
Wales	158	17	218	24	188	21	200	22	60	7	41	5	42	5	907	100
Northern Ireland	43	14	64	21	68	23	86	28	22	7	17	6	2	1	302	100
Scotland	230	18	313	24	315	24	302	23	69	5	37	3	29	2	1295	100
United Kingdom	**2474**	**16**	**3631**	**23**	**3690**	**24**	**3675**	**24**	**1071**	**7**	**715**	**5**	**287**	**2**	**15543**	**100**

Table 29 : Grade of surgically treated invasive cancers												
	Grade 1		Grade 2		Grade 3		Not assessable		Unknown		Total	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	565	27	1100	53	394	19	7	0	4	0	2070	100
East Midlands	294	27	592	54	208	19	2	0	3	0	1099	100
East of England	295	21	766	55	312	22	10	1	8	1	1391	100
London	343	25	759	55	265	19	2	0	5	0	1374	100
South East Coast	317	25	663	53	266	21	4	0	3	0	1253	100
South Central	261	24	589	54	230	21	0	0	3	0	1083	100
South West	362	23	887	57	290	19	3	0	6	0	1548	100
West Midlands	368	26	739	52	310	22	7	0	4	0	1428	100
North West	520	29	935	52	328	18	5	0	5	0	1793	100
Wales	257	28	514	57	132	15	0	0	4	0	907	100
Northern Ireland	58	19	155	51	87	29	1	0	1	0	302	100
Scotland	301	23	713	55	261	20	4	0	16	1	1295	100
United Kingdom	**3941**	**25**	**8412**	**54**	**3083**	**20**	**45**	**0**	**62**	**0**	**15543**	**100**

Table 30 : Data completeness for surgically treated invasive cancers (excluding cases with neo-adjuvant therapy)

Region	Unknown invasive size		Unknown nodal status		Unknown grade		Unknown NPI*		Total invasive
	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	26	1.3	12	0.6	4	0.2	40	2.0	2021
East Midlands	9	0.8	3	0.3	2	0.2	13	1.2	1068
East of England	21	1.6	11	0.8	7	0.5	39	3.0	1308
London	23	1.8	18	1.4	1	0.1	39	3.0	1297
South East Coast	10	0.8	11	0.9	2	0.2	23	1.9	1190
South Central	5	0.5	2	0.2	2	0.2	8	0.8	1036
South West	23	1.6	15	1.0	4	0.3	37	2.6	1447
West Midlands	21	1.5	8	0.6	0	0.0	31	2.3	1357
North West	22	1.3	10	0.6	4	0.2	36	2.1	1741
Wales	6	0.7	10	1.1	3	0.3	17	1.9	887
Northern Ireland	4	1.3	2	0.7	1	0.3	6	2.0	300
Scotland	9	0.7	16	1.3	9	0.7	28	2.3	1201
United Kingdom	**179**	**1.2**	**118**	**0.8**	**39**	**0.3**	**317**	**2.1**	**14853**

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

Table 31 : NPI Group of surgically treated invasive cancers (with known NPI excluding cases with neo-adjuvant therapy)

Region	EPG		GPG		MPG1		MPG2		PPG		Total with known NPI	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	444	22	777	39	472	24	171	9	117	6	1981	100
East Midlands	240	23	390	37	266	25	108	10	51	5	1055	100
East of England	228	18	514	41	319	25	144	11	64	5	1269	100
London	255	20	452	36	325	26	147	12	79	6	1258	100
South East Coast	240	21	455	39	283	24	122	10	67	6	1167	100
South Central	202	20	386	38	257	25	123	12	60	6	1028	100
South West	273	19	577	41	363	26	135	10	62	4	1410	100
West Midlands	296	22	465	35	343	26	160	12	62	5	1326	100
North West	392	23	610	36	434	25	163	10	106	6	1705	100
Wales	201	23	351	40	193	22	94	11	31	4	870	100
Northern Ireland	52	18	96	33	84	29	35	12	27	9	294	100
Scotland	231	20	489	42	269	23	133	11	51	4	1173	100
United Kingdom	**3054**	**21**	**5562**	**38**	**3608**	**25**	**1535**	**11**	**777**	**5**	**14536**	**100**

Table 32 : ER status (invasive cancers)

Region	Positive		Negative		Not done or Unknown		Total
	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1930	92	163	8	6	0	2099
East Midlands	1024	92	94	8	1	0	1119
East of England	1302	92	107	8	13	1	1422
London	1278	89	148	10	3	0	1429
South East Coast	1171	92	105	8	1	0	1277
South Central	1033	93	76	7	1	0	1110
South West	1462	92	116	7	4	0	1582
West Midlands	1324	92	118	8	3	0	1445
North West	1665	92	145	8	2	0	1812
Wales	847	92	70	8	2	0	919
Northern Ireland	279	92	23	8	2	1	304
Scotland	1175	89	133	10	15	1	1323
United Kingdom	**14490**	**91**	**1298**	**8**	**53**	**0**	**15841**

Table 33 : PgR status (invasive)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	427	20	212	10	1460	70	2099
East Midlands	317	28	102	9	700	63	1119
East of England	305	21	140	10	977	69	1422
London	946	66	279	20	204	14	1429
South East Coast	723	57	186	15	368	29	1277
South Central	643	58	170	15	297	27	1110
South West	681	43	184	12	717	45	1582
West Midlands	586	41	194	13	665	46	1445
North West	1308	72	319	18	185	10	1812
Wales	395	43	157	17	367	40	919
Northern Ireland	182	60	57	19	65	21	304
Scotland	643	49	230	17	450	34	1323
United Kingdom	**7156**	**45**	**2230**	**14**	**6455**	**41**	**15841**

Table 34 : 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	128	79	29	18	163
East Midlands	0	0	66	70	28	30	94
East of England	5	5	69	64	33	31	107
London	4	3	134	91	10	7	148
South East Coast	6	6	86	82	13	12	105
South Central	6	8	65	86	5	7	76
South West	5	4	73	63	38	33	116
West Midlands	6	5	105	89	7	6	118
North West	7	5	137	94	1	1	145
Wales	0	0	65	93	5	7	70
Northern Ireland	2	9	18	78	3	13	23
Scotland	3	2	120	90	10	8	133
United Kingdom	**50**	**4**	**1066**	**82**	**182**	**14**	**1298**

Table 35 : HER-2 status for invasive cancers									
	Positive		Negative		Borderline		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	207	10	1855	88	12	1	25	1	2099
East Midlands	113	10	995	89	2	0	9	1	1119
East of England	137	10	1219	86	15	1	51	4	1422
London	156	11	1237	87	26	2	10	1	1429
South East Coast	133	10	1103	86	9	1	32	3	1277
South Central	104	9	972	88	20	2	14	1	1110
South West	173	11	1390	88	7	0	12	1	1582
West Midlands	156	11	1256	87	4	0	29	2	1445
North West	183	10	1538	85	77	4	14	1	1812
Wales	82	9	831	90	3	0	3	0	919
Northern Ireland	25	8	271	89	5	2	3	1	304
Scotland	103	8	1201	91	0	0	19	1	1323
United Kingdom	**1572**	**10**	**13868**	**88**	**180**	**1**	**221**	**1**	**15841**

Table 36 : 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	25	13	52	6	24	18	72
East Midlands	9	4	44	1	11	5	56
East of England	51	19	37	12	24	31	61
London	10	5	50	7	70	6	60
South East Coast	32	14	44	9	28	21	66
South Central	14	4	29	4	29	5	36
South West	12	6	50	1	8	8	67
West Midlands	29	12	41	8	28	21	72
North West	14	7	50	3	21	12	86
Wales	3	1	33	1	33	3	100
Northern Ireland	3	0	0	0	0	0	0
Scotland	19	5	26	2	11	7	37
United Kingdom	**221**	**90**	**41**	**54**	**24**	**137**	**62**

Table 37 : ER status (micro/non-invasive cancers)							
	Positive		Negative		Not done or Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	205	37	53	9	300	54	558
East Midlands	62	20	18	6	232	74	312
East of England	59	15	17	4	313	80	389
London	148	31	28	6	299	63	475
South East Coast	153	46	19	6	160	48	332
South Central	42	14	11	4	258	83	311
South West	165	37	41	9	239	54	445
West Midlands	50	14	10	3	307	84	367
North West	264	59	52	12	134	30	450
Wales	16	6	2	1	237	93	255
Northern Ireland	29	50	6	10	23	40	58
Scotland	60	25	17	7	165	68	242
United Kingdom	**1253**	**30**	**274**	**7**	**2667**	**64**	**4194**

Table 38 : Treatment for non-invasive breast cancers										
	Conservation surgery		Mastectomy		No surgery		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	385	71	150	28	4	1	0	0	539	100
East Midlands	205	67	91	30	8	3	0	0	304	100
East of England	282	76	76	21	11	3	0	0	369	100
London	341	75	107	23	9	2	0	0	457	100
South East Coast	260	80	60	18	5	2	0	0	325	100
South Central	231	76	65	21	7	2	0	0	303	100
South West	328	75	103	24	4	1	0	0	435	100
West Midlands	270	76	81	23	5	1	0	0	356	100
North West	327	76	93	22	9	2	0	0	429	100
Wales	182	72	67	27	3	1	0	0	252	100
Northern Ireland	39	71	15	27	1	2	0	0	55	100
Scotland	191	82	38	16	3	1	0	0	232	100
United Kingdom	**3041**	**75**	**946**	**23**	**69**	**2**	**0**	**0**	**4056**	**100**

Table 39 : Treatment for micro-invasive breast cancers										
	Conservation surgery		Mastectomy		No surgery		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	11	58	8	42	0	0	0	0	19	100
East Midlands	5	63	3	38	0	0	0	0	8	100
East of England	9	45	11	55	0	0	0	0	20	100
London	12	67	6	33	0	0	0	0	18	100
South East Coast	7	100	0	0	0	0	0	0	7	100
South Central	6	75	2	25	0	0	0	0	8	100
South West	8	80	2	20	0	0	0	0	10	100
West Midlands	6	55	5	45	0	0	0	0	11	100
North West	12	57	9	43	0	0	0	0	21	100
Wales	2	67	1	33	0	0	0	0	3	100
Northern Ireland	3	100	0	0	0	0	0	0	3	100
Scotland	7	70	3	30	0	0	0	0	10	100
United Kingdom	**88**	**64**	**50**	**36**	**0**	**0**	**0**	**0**	**138**	**100**

Table 40 : Treatment for non-invasive breast cancers size >40mm								
	Conservation surgery		Mastectomy		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	7	8	80	92	0	0	87	100
East Midlands	9	17	43	83	0	0	52	100
East of England	15	33	31	67	0	0	46	100
London	19	28	50	72	0	0	69	100
South East Coast	12	27	32	73	0	0	44	100
South Central	11	23	36	77	0	0	47	100
South West	10	18	45	82	0	0	55	100
West Midlands	12	21	46	79	0	0	58	100
North West	12	20	47	80	0	0	59	100
Wales	5	14	30	86	0	0	35	100
Northern Ireland	0	0	9	100	0	0	9	100
Scotland	10	29	24	71	0	0	34	100
United Kingdom	**122**	**21**	**473**	**79**	**0**	**0**	**595**	**100**

Table 41 : Treatment of high cytonuclear grade non-invasive cancers (>40mm)								
	Conservation surgery		Mastectomy		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	6	9	62	91	0	0	68	100
East Midlands	6	14	36	86	0	0	42	100
East of England	14	36	25	64	0	0	39	100
London	11	22	39	78	0	0	50	100
South East Coast	9	24	29	76	0	0	38	100
South Central	9	23	30	77	0	0	39	100
South West	8	21	31	79	0	0	39	100
West Midlands	12	24	37	76	0	0	49	100
North West	10	22	36	78	0	0	46	100
Wales	4	16	21	84	0	0	25	100
Northern Ireland	0	0	7	100	0	0	7	100
Scotland	10	33	20	67	0	0	30	100
United Kingdom	**99**	**21**	**373**	**79**	**0**	**0**	**472**	**100**

Table 42 : Treatment of non-invasive cancers with unknown cytonuclear grade and unknown size (benign surgery cases excluded)								
	Conservation surgery		Mastectomy		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	0	-	0	-	0	-	0	-
East Midlands	0	-	0	-	0	-	0	-
East of England	0	-	0	-	0	-	0	-
London	0	-	0	-	0	-	0	-
South East Coast	0	-	0	-	0	-	0	-
South Central	0	-	0	-	0	-	0	-
South West	0	-	0	-	0	-	0	-
West Midlands	0	-	0	-	0	-	0	-
North West	0	-	0	-	0	-	0	-
Wales	0	-	0	-	0	-	0	-
Northern Ireland	0	-	0	-	0	-	0	-
Scotland	4	100	0	0	0	0	4	100
United Kingdom	**4**	**100**	**0**	**0**	**0**	**0**	**4**	**100**

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

Table 43 : Treatment for invasive breast cancers										
	Conservation surgery		Mastectomy		No Surgery		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1636	78	434	21	29	1	0	0	2099	100
East Midlands	837	75	262	23	20	2	0	0	1119	100
East of England	1134	80	257	18	31	2	0	0	1422	100
London	1083	76	288	20	55	4	3	0	1429	100
South East Coast	1005	79	248	19	24	2	0	0	1277	100
South Central	840	76	243	22	27	2	0	0	1110	100
South West	1279	81	269	17	34	2	0	0	1582	100
West Midlands	1113	77	315	22	17	1	0	0	1445	100
North West	1420	78	373	21	19	1	0	0	1812	100
Wales	695	76	212	23	12	1	0	0	919	100
Northern Ireland	232	76	70	23	2	1	0	0	304	100
Scotland	1082	82	212	16	28	2	1	0	1323	100
United Kingdom	**12356**	**78**	**3183**	**20**	**298**	**2**	**4**	**0**	**15841**	**100**

Table 44 : Mastectomy rate with invasive tumour size										
	<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	165	15	89	19	104	30	30	61	40	93
East Midlands	106	17	52	24	68	35	23	64	10	100
East of England	76	11	51	15	67	28	40	66	13	81
London	97	15	55	17	76	26	32	50	22	96
South East Coast	77	11	47	18	71	35	22	55	23	92
South Central	86	16	41	16	72	33	21	66	20	91
South West	97	12	50	14	66	28	18	49	30	88
West Midlands	81	11	74	21	88	38	33	54	28	90
North West	98	11	85	18	110	34	46	60	28	82
Wales	70	14	41	21	60	42	25	74	10	71
Northern Ireland	23	15	11	16	20	33	8	80	6	100
Scotland	61	9	41	14	74	32	17	57	11	69
United Kingdom	**1037**	**13**	**637**	**18**	**876**	**32**	**315**	**59**	**241**	**88**

Table 45 : Mastectomy rate with whole tumour size										
	<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	62	8	57	12	124	25	89	65	97	82
East Midlands	51	11	36	15	89	33	40	57	36	88
East of England	26	5	34	10	78	23	68	64	46	85
London	27	6	39	12	85	23	61	49	71	86
South East Coast	33	6	36	13	77	28	43	60	46	85
South Central	32	8	37	15	71	27	43	57	55	81
South West	37	6	51	13	77	22	49	51	53	84
West Midlands	32	6	58	17	90	30	61	54	58	85
North West	44	6	61	13	131	31	68	55	63	89
Wales	34	9	35	19	65	33	32	53	30	73
Northern Ireland	7	7	7	10	29	34	12	55	15	88
Scotland	29	5	31	10	76	25	39	57	27	73
United Kingdom	**414**	**7**	**482**	**13**	**992**	**27**	**605**	**56**	**597**	**83**

Table 46 : Mastectomy rate for <15mm invasive cancers by whole tumour size										
	Whole Size <15mm		Whole size 15-≤20mm		Whole size >20-≤35mm		Whole size >35-≤50mm		Whole size >50mm	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	62	8	13	11	23	21	34	71	33	79
East Midlands	50	11	7	10	21	36	13	59	15	88
East of England	25	5	6	7	17	27	15	65	13	87
London	27	6	11	17	18	24	17	53	24	89
South East Coast	32	6	10	13	8	17	13	62	13	93
South Central	32	8	8	15	15	35	8	42	22	81
South West	35	6	16	16	22	26	12	52	12	80
West Midlands	32	6	10	14	14	33	12	55	12	86
North West	44	6	9	12	18	27	13	68	14	93
Wales	34	9	10	20	6	17	8	57	8	62
Northern Ireland	6	6	2	13	6	30	5	63	4	80
Scotland	29	5	5	6	7	13	15	68	5	63
United Kingdom	**408**	**7**	**107**	**12**	**175**	**25**	**165**	**60**	**175**	**83**

Table 47 : Immediate reconstruction with mastectomy (all cancers)								
	Immediate reconstruction		No immediate reconstruction		Unknown		Total mastectomies	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	215	36	375	63	2	0	592	100
East Midlands	102	29	254	71	0	0	356	100
East of England	104	30	195	57	45	13	344	100
London	139	35	262	65	0	0	401	100
South East Coast	101	33	204	66	3	1	308	100
South Central	82	26	228	74	0	0	310	100
South West	117	31	256	68	1	0	374	100
West Midlands	117	29	284	71	0	0	401	100
North West	156	33	318	67	1	0	475	100
Wales	51	18	228	81	1	0	280	100
Northern Ireland	13	15	71	84	1	1	85	100
Scotland	48	19	205	81	0	0	253	100
United Kingdom	**1245**	**30**	**2880**	**69**	**54**	**1**	**4179**	**100**

Table 48 : Any neo-adjuvant therapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	59	2	2598	98	0	0	2657
East Midlands	57	4	1374	96	0	0	1431
East of England	99	5	1713	95	0	0	1812
London	117	6	1787	94	0	0	1904
South East Coast	68	4	1541	96	0	0	1609
South Central	62	4	1359	96	0	0	1421
South West	121	6	1906	94	0	0	2027
West Midlands	83	5	1730	95	0	0	1813
North West	66	3	2198	97	0	0	2264
Wales	28	2	1146	98	0	0	1174
Northern Ireland	2	1	360	99	0	0	362
Scotland	121	8	1444	92	0	0	1565
United Kingdom	**883**	**4**	**19156**	**96**	**0**	**0**	**20039**

Table 49 : Neo-adjuvant endocrine therapy							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	26	1	2631	99	0	0	2657
East Midlands	33	2	1398	98	0	0	1431
East of England	41	2	1771	98	0	0	1812
London	46	2	1858	98	0	0	1904
South East Coast	32	2	1577	98	0	0	1609
South Central	19	1	1402	99	0	0	1421
South West	64	3	1963	97	0	0	2027
West Midlands	49	3	1764	97	0	0	1813
North West	40	2	2224	98	0	0	2264
Wales	17	1	1157	99	0	0	1174
Northern Ireland	1	0	361	100	0	0	362
Scotland	89	6	1476	94	0	0	1565
United Kingdom	**457**	**2**	**19582**	**98**	**0**	**0**	**20039**

Table 50 : Neo-adjuvant chemotherapy for invasive cancers							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	34	2	2065	98	0	0	2099
East Midlands	24	2	1095	98	0	0	1119
East of England	59	4	1363	96	0	0	1422
London	75	5	1354	95	0	0	1429
South East Coast	36	3	1241	97	0	0	1277
South Central	41	4	1069	96	0	0	1110
South West	62	4	1520	96	0	0	1582
West Midlands	39	3	1406	97	0	0	1445
North West	31	2	1781	98	0	0	1812
Wales	14	2	905	98	0	0	919
Northern Ireland	1	0	303	100	0	0	304
Scotland	38	3	1285	97	0	0	1323
United Kingdom	**454**	**3**	**15387**	**97**	**0**	**0**	**15841**

Table 51 : Neo-adjuvant Traztuzumab							
	Had treatment		Did not have treatment		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	3	0	2654	100	0	0	2657
East Midlands	0	0	1431	100	0	0	1431
East of England	7	0	1805	100	0	0	1812
London	9	0	1895	100	0	0	1904
South East Coast	3	0	1606	100	0	0	1609
South Central	3	0	1418	100	0	0	1421
South West	3	0	2024	100	0	0	2027
West Midlands	8	0	1805	100	0	0	1813
North West	6	0	2258	100	0	0	2264
Wales	2	0	1172	100	0	0	1174
Northern Ireland	0	0	362	100	0	0	362
Scotland	7	0	1558	100	0	0	1565
United Kingdom	**51**	**0**	**19988**	**100**	**0**	**0**	**20039**

Table 52 : Annual screening surgical caseload per surgeon (2013/14)														
	Total	<10 cases		10-29 cases		30-49 cases		50-79 cases		80-99 cases		100+ cases		
Region	surgeons	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	Median
N East, Yorks & Humber	75	16	21	17	23	24	32	11	15	4	5	3	4	35
East Midlands	39	6	15	7	18	14	36	8	21	4	10	0	0	39
East of England	54	11	20	11	20	16	30	15	28	1	2	0	0	36
London	89	32	36	27	30	19	21	9	10	1	1	1	1	16
South East Coast	43	9	21	13	30	8	19	8	19	3	7	2	5	29
South Central	37	9	24	2	5	11	30	11	30	3	8	1	3	41
South West	60	14	23	15	25	12	20	16	27	2	3	1	2	34
West Midlands	55	8	15	14	25	20	36	11	20	2	4	0	0	34
North West	73	21	29	17	23	17	23	12	16	5	7	1	1	28
Wales	24	4	17	5	21	2	8	7	29	5	21	1	4	54
Northern Ireland	15	2	13	6	40	7	47	0	0	0	0	0	0	27.0
Scotland	61	20	33	20	33	13	21	5	8	2	3	1	2	21
United Kingdom	**625**	**152**	**24**	**154**	**25**	**163**	**26**	**113**	**18**	**32**	**5**	**11**	**2**	**30**

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 (2012/13)													
	Total (referred)	<10 cases		10-29 cases		30-49 cases		50-79 cases		80-99 cases		100+ cases	
Region		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2799	47	2	390	14	991	35	704	25	345	12	322	12
East Midlands	1520	20	1	153	10	544	36	468	31	335	22	0	0
East of England	1911	28	1	223	12	634	33	930	49	89	5	7	0
London	1970	101	5	431	22	729	37	479	24	79	4	151	8
South East Coast	1716	28	2	313	18	342	20	543	32	258	15	232	14
South Central	1521	23	2	44	3	413	27	671	44	277	18	93	6
South West	2140	45	2	283	13	504	24	1030	48	169	8	109	5
West Midlands	1894	33	2	290	15	771	41	632	33	168	9	0	0
North West	2373	82	3	339	14	661	28	760	32	428	18	103	4
Wales	1235	11	1	119	10	93	8	479	39	428	35	105	9
Northern Ireland	371	3	1	131	35	237	64	0	0	0	0	0	0
Scotland	1639	69	4	409	25	530	32	312	19	178	11	141	9
United Kingdom	**21089**	**490**	**2**	**3125**	**15**	**6449**	**31**	**7008**	**33**	**2754**	**13**	**1263**	**6**

Table 54 : Annual screening surgical caseload per surgeon (2010/11-2012/13)														
		<10 cases		10-29 cases		30-49 cases		50-79 cases		80-99 cases		100+ cases		
Region	Total surgeons	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	Median
N East, Yorks & Humber	90	27	30	21	23	26	29	14	16	0	0	2	2	78.5
East Midlands	50	12	24	15	30	13	26	9	18	1	2	0	0	83.0
East of England	60	16	27	11	18	22	37	11	18	0	0	0	0	95.0
London	106	49	46	28	26	23	22	4	4	1	1	1	1	38.0
South East Coast	52	14	27	16	31	13	25	5	10	2	4	2	4	73.0
South Central	44	14	32	6	14	12	27	11	25	1	2	0	0	94.0
South West	76	31	41	16	21	12	16	17	22	0	0	0	0	54.0
West Midlands	63	15	24	20	32	22	35	5	8	1	2	0	0	84.0
North West	83	26	31	25	30	17	20	14	17	1	1	0	0	67.0
Wales	29	9	31	5	17	5	17	9	31	1	3	0	0	94.0
Northern Ireland	17	3	18	7	41	6	35	1	6	0	0	0	0	70.0
Scotland	82	40	49	19	23	14	17	7	9	1	1	1	1	31.5
United Kingdom	**752**	**256**	**34**	**189**	**25**	**185**	**25**	**107**	**14**	**9**	**1**	**6**	**1**	**69.0**

Table 55 : Proportion of women referred to consultant surgeons according to annual caseload of surgeon (2010/11-2012/13)													
	Total (referred)	<10 cases		10-29 cases		30-49 cases		50-79 cases		80-99 cases		100+ cases	
Region		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	7801	207	3	1385	18	3005	39	2499	32	0	0	705	9
East Midlands	4427	79	2	755	17	1646	37	1701	38	246	6	0	0
East of England	5370	167	3	712	13	2611	49	1880	35	0	0	0	0
London	5557	344	6	1533	28	2262	41	739	13	292	5	387	7
South East Coast	4911	26	1	970	20	1809	37	918	19	520	11	668	14
South Central	4230	41	1	392	9	1379	33	2164	51	254	6	0	0
South West	5769	216	4	898	16	1410	24	3245	56	0	0	0	0
West Midlands	5321	141	3	1310	25	2572	48	1022	19	276	5	0	0
North West	6438	196	3	1343	21	2084	32	2535	39	280	4	0	0
Wales	3007	65	2	354	12	596	20	1746	58	246	8	0	0
Northern Ireland	1246	41	3	415	33	639	51	151	12	0	0	0	0
Scotland	4896	240	5	1076	22	1685	34	1209	25	271	6	415	8
United Kingdom	**58973**	**1763**	**3**	**11143**	**19**	**21698**	**37**	**19809**	**34**	**2385**	**4**	**2175**	**4**

Table 56 : 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	3	1	3	3
East Midlands	6	1	0	1	1	0	3	0
East of England	11	5	0	2	1	0	3	0
London	32	11	6	1	4	9	1	0
South East Coast	9	1	1	3	2	0	2	0
South Central	9	2	2	0	2	2	1	0
South West	14	4	3	1	3	0	2	1
West Midlands	8	2	0	2	2	2	0	0
North West	21	14	3	0	0	2	1	1
Wales	4	2	0	0	2	0	0	0
Northern Ireland	2	1	0	1	0	0	0	0
Scotland	20	8	1	4	1	0	4	2
United Kingdom	**152**	**53**	**18**	**17**	**21**	**16**	**20**	**7**

Table 57 : 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	27	5	3	5	4	2	6	2
East Midlands	12	0	1	0	2	1	7	1
East of England	16	5	1	0	1	1	7	1
London	49	9	6	1	6	11	16	0
South East Coast	14	0	1	0	5	1	5	2
South Central	14	2	3	0	4	1	2	2
South West	31	7	4	0	4	0	15	1
West Midlands	15	2	0	1	2	4	5	1
North West	26	16	3	1	0	3	2	1
Wales	9	5	0	0	2	0	2	0
Northern Ireland	3	1	1	0	0	0	1	0
Scotland	40	7	2	5	1	0	22	3
United Kingdom	**256**	**59**	**25**	**13**	**31**	**24**	**90**	**14**

Table 58 : 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	2070	425	21	554	140	25
East Midlands	1099	231	21	304	66	22
East of England	1391	382	27	378	101	27
London	1374	284	21	466	122	26
South East Coast	1253	289	23	327	87	27
South Central	1083	191	18	304	87	29
South West	1548	329	21	441	109	25
West Midlands	1428	342	24	362	102	28
North West	1793	375	21	441	111	25
Wales	907	212	23	252	61	24
Northern Ireland	302	74	25	57	10	18
Scotland	1295	238	18	239	56	23
United Kingdom	**15543**	**3372**	**22**	**4125**	**1052**	**26**

Table 59 : 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	15	14	93	42	13	31
East Midlands	3	2	67	35	20	57
East of England	17	12	71	62	21	34
London	12	10	83	48	14	29
South East Coast	12	10	83	53	14	26
South Central	9	9	100	55	22	40
South West	13	10	77	59	9	15
West Midlands	13	11	85	53	19	36
North West	13	13	100	46	18	39
Wales	8	7	88	29	18	62
Northern Ireland	1	1	100	4	0	0
Scotland	14	12	86	33	10	30
United Kingdom	**130**	**111**	**85**	**519**	**178**	**34**

Table 60 : 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	1356	80	308	18	29	2	3	0	0	0	1696	100	340	20
East Midlands	678	77	182	21	17	2	0	0	0	0	877	100	199	23
East of England	846	73	291	25	18	2	3	0	0	0	1158	100	312	27
London	882	80	205	19	13	1	1	0	0	0	1101	100	219	20
South East Coast	792	76	226	22	18	2	4	0	0	0	1040	100	248	24
South Central	713	82	140	16	15	2	2	0	0	0	870	100	157	18
South West	1028	79	242	19	24	2	2	0	0	0	1296	100	268	21
West Midlands	879	77	242	21	26	2	1	0	0	0	1148	100	269	23
North West	1174	80	267	18	28	2	1	0	0	0	1470	100	296	20
Wales	537	74	172	24	14	2	0	0	0	0	723	100	186	26
Northern Ireland	190	74	59	23	7	3	0	0	0	0	256	100	66	26
Scotland	883	81	187	17	16	1	2	0	1	0	1089	100	205	19
United Kingdom	**9958**	**78**	**2521**	**20**	**225**	**2**	**19**	**0**	**1**	**0**	**12724**	**100**	**2765**	**22**

Table 61 : 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	289	72	90	23	18	5	2	1	0	0	399	100	110	28
East Midlands	146	76	43	22	3	2	0	0	0	0	192	100	46	24
East of England	185	73	62	24	7	3	0	0	0	0	254	100	69	27
London	247	74	77	23	9	3	2	1	0	0	335	100	88	26
South East Coast	164	71	61	26	7	3	0	0	0	0	232	100	68	29
South Central	135	69	53	27	7	4	0	0	0	0	195	100	60	31
South West	212	71	69	23	11	4	5	2	0	0	297	100	85	29
West Midlands	178	71	60	24	7	3	4	2	0	0	249	100	71	29
North West	236	74	76	24	7	2	0	0	0	0	319	100	83	26
Wales	125	75	35	21	6	4	0	0	0	0	166	100	41	25
Northern Ireland	32	76	8	19	2	5	0	0	0	0	42	100	10	24
Scotland	133	76	35	20	6	3	0	0	0	0	174	100	41	24
United Kingdom	**2082**	**73**	**669**	**23**	**90**	**3**	**13**	**0**	**0**	**0**	**2854**	**100**	**772**	**27**

Table 62 : 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	1600	83	311	16	20	1	0	0	1931	100	331	17
East Midlands	846	81	181	17	14	1	0	0	1041	100	195	19
East of England	971	75	309	24	15	1	0	0	1295	100	324	25
London	1045	82	214	17	10	1	3	0	1272	100	224	18
South East Coast	940	80	217	18	17	1	0	0	1174	100	234	20
South Central	868	86	131	13	15	1	0	0	1014	100	146	14
South West	1185	81	251	17	20	1	0	0	1456	100	271	19
West Midlands	1045	79	260	20	20	2	0	0	1325	100	280	21
North West	1382	81	292	17	24	1	0	0	1698	100	316	19
Wales	669	79	164	19	12	1	1	0	846	100	176	21
Northern Ireland	222	78	58	20	6	2	0	0	286	100	64	22
Scotland	1028	85	170	14	15	1	1	0	1214	100	185	15
United Kingdom	**11801**	**81**	**2558**	**18**	**188**	**1**	**5**	**0**	**14552**	**100**	**2746**	**19**

Table 63 : Number of therapeutic operations of invasive cancers with C5 only (no B5) cytology non-op result												
	1		2		3+		Unknown		Total		Repeat (2+) rate	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	1	100	0	0	0	0	0	0	1	100	0	0
East Midlands	0	-	0	-	0	-	0	-	0	-	0	-
East of England	0	-	0	-	0	-	0	-	0	-	0	-
London	0	-	0	-	0	-	0	-	0	-	0	-
South East Coast	0	-	0	-	0	-	0	-	0	-	0	-
South Central	0	-	0	-	0	-	0	-	0	-	0	-
South West	4	100	0	0	0	0	0	0	4	100	0	0
West Midlands	0	0	1	100	0	0	0	0	1	100	1	100
North West	1	50	0	0	1	50	0	0	2	100	1	50
Wales	0	-	0	-	0	-	0	-	0	-	0	-
Northern Ireland	0	-	0	-	0	-	0	-	0	-	0	-
Scotland	0	-	0	-	0	-	0	-	0	-	0	-
United Kingdom	**6**	**75**	**1**	**13**	**1**	**13**	**0**	**0**	**8**	**100**	**2**	**25**

Table 64 : 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	37	33	62	56	12	11	0	0	111	100	74	67
East Midlands	14	31	28	62	3	7	0	0	45	100	31	69
East of England	30	39	40	53	6	8	0	0	76	100	46	61
London	36	42	44	52	5	6	0	0	85	100	49	58
South East Coast	17	28	39	64	5	8	0	0	61	100	44	72
South Central	22	38	33	57	3	5	0	0	58	100	36	62
South West	25	35	40	56	7	10	0	0	72	100	47	65
West Midlands	24	38	32	50	8	13	0	0	64	100	40	63
North West	31	41	38	51	6	8	0	0	75	100	44	59
Wales	23	45	26	51	2	4	0	0	51	100	28	55
Northern Ireland	5	36	8	57	1	7	0	0	14	100	9	64
Scotland	25	38	38	58	3	5	0	0	66	100	41	62
United Kingdom	**289**	**37**	**428**	**55**	**61**	**8**	**0**	**0**	**778**	**100**	**489**	**63**

Table 65 : 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	382	75	106	21	21	4	0	0	509	100	127	25
East Midlands	216	83	42	16	3	1	0	0	261	100	45	17
East of England	233	75	71	23	7	2	0	0	311	100	78	25
London	306	74	95	23	12	3	0	0	413	100	107	26
South East Coast	201	73	66	24	7	3	0	0	274	100	73	27
South Central	183	74	57	23	7	3	0	0	247	100	64	26
South West	279	74	79	21	19	5	0	0	377	100	98	26
West Midlands	216	73	71	24	10	3	0	0	297	100	81	27
North West	296	76	84	22	7	2	0	0	387	100	91	24
Wales	180	81	37	17	6	3	0	0	223	100	43	19
Northern Ireland	42	81	8	15	2	4	0	0	52	100	10	19
Scotland	156	78	39	19	6	3	0	0	201	100	45	22
United Kingdom	**2690**	**76**	**755**	**21**	**107**	**3**	**0**	**0**	**3552**	**100**	**862**	**24**

Table 66 : Repeat BCS (all cancers) with initial BCS and a non-operative diagnosis			
Region	All cancers with initial BCS (with non-op diagnosis)	Repeat BCS	
		No	%
N East, Yorks & Humber	2095	235	11
East Midlands	1069	137	13
East of England	1413	229	16
London	1436	199	14
South East Coast	1272	180	14
South Central	1065	139	13
South West	1593	215	13
West Midlands	1397	197	14
North West	1790	195	11
Wales	889	131	15
Northern Ireland	298	36	12
Scotland	1263	162	13
United Kingdom	**15580**	**2055**	**13**

Table 67 : Converted to mastectomy (all cancers) with initial BCS and a non-operative diagnosis			
Region	All cancers with initial BCS (with non-op diagnosis)	Converted to Mx	
		No	%
N East, Yorks & Humber	2095	116	6
East Midlands	1069	59	6
East of England	1413	67	5
London	1436	62	4
South East Coast	1272	66	5
South Central	1065	49	5
South West	1593	60	4
West Midlands	1397	70	5
North West	1790	86	5
Wales	889	46	5
Northern Ireland	298	28	9
Scotland	1263	27	2
United Kingdom	**15580**	**736**	**5**

Table 68 : 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	2582	2479	96	103
East Midlands	1390	1210	87	180
East of England	1745	1568	90	177
London	1788	1633	91	155
South East Coast	1564	1439	92	125
South Central	1367	1306	96	61
South West	1956	1867	95	89
West Midlands	1758	1702	97	56
North West	2194	2090	95	104
Wales	1140	986	86	154
Northern Ireland	357	315	88	42
Scotland	-	-	-	-
United Kingdom	**17841**	**16595**	**93**	**1246**

*Excluded cases from Scotland

Table 69 : Margin information of final operations for cases treated by BCS							
	Total cases with surgery	Margin clear		Margin not clear		Margin unknown	
Region		No.	%	No.	%	No.	%
N East, Yorks & Humber	1992	1948	98	23	1	21	1
East Midlands	1037	1032	100	3	0	2	0
East of England	1405	1392	99	13	1	0	0
London	1394	1369	98	21	2	4	0
South East Coast	1260	1231	98	28	2	1	0
South Central	1062	1035	97	21	2	6	1
South West	1583	1572	99	9	1	2	0
West Midlands	1364	1341	98	21	2	2	0
North West	1724	1710	99	12	1	2	0
Wales	864	855	99	7	1	2	0
Northern Ireland	272	265	97	4	1	3	1
Scotland	-	-	-	-	-	-	-
United Kingdom	**13957**	**13750**	**99**	**162**	**1**	**45**	**0**

*Excluded cases from Scotland

Table 70 : Margin information of final operations for cases treated by mastectomy							
	Total cases with surgery	Margin clear		Margin not clear		Margin unknown	
Region		No.	%	No.	%	No.	%
N East, Yorks & Humber	590	575	97	7	1	8	1
East Midlands	353	349	99	4	1	0	0
East of England	340	336	99	1	0	3	1
London	394	387	98	7	2	0	0
South East Coast	304	292	96	12	4	0	0
South Central	305	296	97	9	3	0	0
South West	373	366	98	6	2	1	0
West Midlands	394	380	96	12	3	2	1
North West	470	464	99	3	1	3	1
Wales	276	272	99	2	1	2	1
Northern Ireland	85	78	92	6	7	1	1
Scotland	-	-	-	-	-	-	-
United Kingdom	**3884**	**3795**	**98**	**69**	**2**	**20**	**1**

*Excluded cases from Scotland

Table 71 : Axillary ultrasound record for invasive cancers							
	Had axillary ultrasound		Did not have axillary ultrasound		Unknown		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	2008	96	56	3	35	2	2099
East Midlands	1109	99	10	1	0	0	1119
East of England	1319	93	23	2	80	6	1422
London	1346	94	27	2	56	4	1429
South East Coast	1269	99	5	0	3	0	1277
South Central	1087	98	7	1	16	1	1110
South West	1492	94	39	2	51	3	1582
West Midlands	1421	98	19	1	5	0	1445
North West	1765	97	19	1	28	2	1812
Wales	794	86	110	12	15	2	919
Northern Ireland	289	95	9	3	6	2	304
Scotland*	-	-	-	-	-	-	-
United Kingdom	**13899**	**96**	**324**	**2**	**295**	**2**	**14518**

*Scotland did not supply any axillary ultrasound information

Table 72 : Axillary ultrasound result for invasive cancers					
	Normal		Abnormal		Total
Region	No.	%	No.	%	
N East, Yorks & Humber	1528	76	480	24	2008
East Midlands	888	80	221	20	1109
East of England	1104	84	215	16	1319
London	1075	80	271	20	1346
South East Coast	1123	88	146	12	1269
South Central	918	84	169	16	1087
South West	1276	86	216	14	1492
West Midlands	1178	83	243	17	1421
North West	1462	83	303	17	1765
Wales	652	82	142	18	794
Northern Ireland	226	78	63	22	289
Scotland*	-	-	-	-	-
United Kingdom	**11430**	**82**	**2469**	**18**	**13899**

*Excluded cases from Scotland

Table 73 : 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	474	99	6	1	0	0	480
East Midlands	220	100	1	0	0	0	221
East of England	211	98	4	2	0	0	215
London	267	99	4	1	0	0	271
South East Coast	143	98	3	2	0	0	146
South Central	152	90	16	9	1	1	169
South West	195	90	21	10	0	0	216
West Midlands	226	93	17	7	0	0	243
North West	249	82	52	17	2	1	303
Wales	142	100	0	0	0	0	142
Northern Ireland	63	100	0	0	0	0	63
Scotland*	-	-	-	-	-	-	-
United Kingdom	**2342**	**95**	**124**	**5**	**3**	**0**	**2469**

*Excluded cases from Scotland

Table 74 : Worst axillary biopsy result for invasive cancer cases with an abnormal axillary ultrasound result											
	C1/B1		C2/B2		C3/B3		C4/B4		C5/B5		Total
Region	No.	%	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	25	5	286	60	3	1	5	1	155	33	474
East Midlands	9	4	124	56	4	2	1	0	82	37	220
East of England	16	8	99	47	0	0	0	0	96	45	211
London	22	8	109	41	6	2	1	0	129	48	267
South East Coast	17	12	54	38	1	1	4	3	67	47	143
South Central	19	13	64	42	5	3	3	2	61	40	152
South West	32	16	88	45	2	1	1	1	72	37	195
West Midlands	28	12	100	44	3	1	1	0	94	42	226
North West	22	9	119	48	4	2	7	3	97	39	249
Wales	10	7	75	53	3	2	1	1	53	37	142
Northern Ireland	1	2	27	43	1	2	1	2	33	52	63
Scotland*	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**201**	**9**	**1145**	**49**	**32**	**1**	**25**	**1**	**939**	**40**	**2342**

*Excluded cases from Scotland

Table 75 : 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	25	3	75	0	0	0	0	0	0	4
East Midlands	0	-	0	-	0	-	0	-	0	-	0
East of England	0	0	1	100	0	0	0	0	0	0	1
London	1	8	9	69	1	8	0	0	2	15	13
South East Coast	1	14	6	86	0	0	0	0	0	0	7
South Central	2	25	3	38	0	0	0	0	3	38	8
South West	3	15	17	85	0	0	0	0	0	0	20
West Midlands	0	0	2	50	0	0	0	0	2	50	4
North West	2	5	24	60	0	0	1	3	13	33	40
Wales	1	20	3	60	0	0	0	0	1	20	5
Northern Ireland	4	11	31	89	0	0	0	0	0	0	35
Scotland*	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**15**	**11**	**99**	**72**	**1**	**1**	**1**	**1**	**21**	**15**	**137**

*Excluded cases from Scotland

Table 76 : 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	5	20	40	14	0	0	4	80	125	96
East Midlands	3	33	23	19	1	50	0	0	62	98
East of England	4	29	19	20	0	-	0	-	51	96
London	6	29	22	21	3	50	1	100	79	92
South East Coast	9	53	10	18	1	100	3	75	43	96
South Central	5	26	12	20	0	0	1	50	42	95
South West	11	34	26	29	1	100	0	-	44	98
West Midlands	7	27	12	13	2	67	0	0	65	97
North West	7	29	37	27	1	25	4	50	89	93
Wales	5	45	14	19	2	67	0	0	40	93
Northern Ireland	1	20	10	18	0	0	1	100	28	93
Scotland*	-	-	-	-	-	-	-	-	-	-
United Kingdom	**63**	**31**	**225**	**19**	**11**	**41**	**14**	**58**	**668**	**95**

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

Table 77 : 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	415	125	30
East Midlands	230	62	27
East of England	252	51	20
London	274	79	29
South East Coast	270	43	16
South Central	237	42	18
South West	314	44	14
West Midlands	282	65	23
North West	384	89	23
Wales	177	40	23
Northern Ireland	72	28	39
Scotland	-	-	-
United Kingdom	**2907**	**668**	**23**

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

Table 78 : Nodal positivity for invasive cancers without neo-adjuvant therapy and without/with unknown pre-op axillary assessment			
	Total without/unknown pre-op ax	Positive nodal status	
Region		No	%
N East, Yorks & Humber	1566	241	15
East Midlands	871	141	16
East of England	1137	178	16
London	1059	163	15
South East Coast	1059	204	19
South Central	906	177	20
South West	1267	232	18
West Midlands	1165	196	17
North West	1463	245	17
Wales	746	116	16
Northern Ireland	204	32	16
Scotland	1184	209	18
United Kingdom	**12627**	**2134**	**17**

*Excluded cases with neo-adjuvant therapy

Table 79 : Axillary biopsy results for invasive cancers with positive nodal status											
Region	C1/B1		C2/B2		C3/B3		C4/B4		C5/B5		Invasive cases with positive nodal status
	No.	%	No.	%	No.	%	No.	%	No.	%	
N East, Yorks & Humber	5	3	40	23	0	0	4	2	125	72	415
East Midlands	3	3	23	26	1	1	0	0	62	70	230
East of England	4	5	19	26	0	0	0	0	51	69	252
London	6	5	22	20	3	3	1	1	79	71	274
South East Coast	9	14	10	15	1	2	3	5	43	65	270
South Central	5	8	12	20	0	0	1	2	42	70	237
South West	11	13	26	32	1	1	0	0	44	54	314
West Midlands	7	8	12	14	2	2	0	0	65	76	282
North West	7	5	38	27	1	1	4	3	89	64	384
Wales	5	8	14	23	2	3	0	0	40	66	177
Northern Ireland	1	3	10	25	0	0	1	3	28	70	72
Scotland*	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**63**	**2**	**226**	**7**	**11**	**0**	**14**	**0**	**668**	**21**	**3116**

*Excluded cases from Scotland

Table 80 : 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	2070	2056	99	0	0	14	1	0	0
East Midlands	1099	1096	100	0	0	3	0	0	0
East of England	1391	1380	99	0	0	11	1	0	0
London	1374	1353	98	0	0	18	1	3	0
South East Coast	1253	1242	99	0	0	11	1	0	0
South Central	1083	1080	100	0	0	3	0	0	0
South West	1548	1533	99	0	0	15	1	0	0
West Midlands	1428	1420	99	0	0	8	1	0	0
North West	1793	1782	99	0	0	11	1	0	0
Wales	907	897	99	0	0	9	1	1	0
Northern Ireland	302	300	99	0	0	2	1	0	0
Scotland	1295	1277	99	0	0	18	1	0	0
United Kingdom	**15543**	**15416**	**99**	**0**	**0**	**123**	**1**	**4**	**0.0**

Table 81 : 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	1775	86	281	14	0	0	2056	100
East Midlands	990	90	106	10	0	0	1096	100
East of England	1203	87	178	13	0	0	1381	100
London	1214	90	139	10	0	0	1353	100
South East Coast	1086	87	158	13	0	0	1244	100
South Central	985	91	95	9	0	0	1080	100
South West	1405	92	130	8	0	0	1535	100
West Midlands	1250	88	172	12	0	0	1422	100
North West	1606	90	176	10	0	0	1782	100
Wales	804	90	94	10	0	0	898	100
Northern Ireland	254	85	46	15	0	0	300	100
Scotland	1104	86	174	14	0	0	1278	100
United Kingdom	**13676**	**89**	**1749**	**11**	**0**	**0**	**15425**	**100**

Table 82 : Nodal status of invasive cancers with known status					
	Total known nodal status	Positive		Negative	
Region		No.	%	No.	%
N East, Yorks & Humber	2056	437	21	1619	79
East Midlands	1096	242	22	854	78
East of England	1380	292	21	1088	79
London	1353	306	23	1047	77
South East Coast	1242	291	23	951	77
South Central	1080	262	24	818	76
South West	1533	348	23	1185	77
West Midlands	1420	305	21	1115	79
North West	1782	400	22	1382	78
Wales	897	183	20	714	80
Northern Ireland	300	74	25	226	75
Scotland	1277	242	19	1035	81
United Kingdom	**15416**	**3382**	**22**	**12034**	**78**

Table 83 : Number of nodes taken for invasive cases without SLNB/ with unknown nodal procedure type									
	Total with axillary surgery	0 node obtained		1,2,3 nodes obtained		≥4nodes obtained		Unknown	
Region		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	281	0	0	26	9	255	91	0	0
East Midlands	106	0	0	2	2	104	98	0	0
East of England	178	1	1	4	2	173	97	0	0
London	139	0	0	6	4	133	96	0	0
South East Coast	158	1	1	20	13	137	87	0	0
South Central	95	0	0	2	2	93	98	0	0
South West	130	0	0	10	8	120	92	0	0
West Midlands	172	1	1	10	6	161	94	0	0
North West	176	0	0	8	5	168	95	0	0
Wales	94	0	0	4	4	90	96	0	0
Northern Ireland	46	0	0	0	0	46	100	0	0
Scotland	174	2	1	4	2	168	97	0	0
United Kingdom	**1749**	**5**	**0**	**96**	**5**	**1648**	**94**	**0**	**0**

Table 84 : Nodal status of invasive cancers with/without SLNB								
	With SLNB				Without SLNB			
	Positive		Negative		Positive		Negative	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	272	15	1503	85	165	59	116	41
East Midlands	162	16	828	84	80	75	26	25
East of England	187	16	1016	84	105	59	72	40
London	193	16	1021	84	113	81	26	19
South East Coast	206	19	879	81	85	54	72	46
South Central	200	20	785	80	62	65	33	35
South West	262	19	1141	81	86	66	44	34
West Midlands	205	16	1044	84	100	58	71	41
North West	266	17	1340	83	134	76	42	24
Wales	110	14	692	86	73	78	22	23
Northern Ireland	37	15	217	85	37	80	9	20
Scotland	127	12	977	88	115	66	58	33
United Kingdom	**2227**	**16**	**11443**	**84**	**1155**	**66**	**591**	**34**

Table 85 : Number of nodes obtained for invasive cancers with positive nodal status determined from SLNB										
	1-<4 nodes obtained					4+ nodes obtained				
	1 Ax op		2+ Ax ops		Total	1 Ax op		2+ Ax ops		Total
Region	No.	%	No.	%		No.	%	No.	%	
N East, Yorks & Humber	62	98	1	2	63	72	34	137	66	209
East Midlands	51	100	0	0	51	26	23	85	77	111
East of England	33	100	0	0	33	34	22	120	78	154
London	65	97	2	3	67	46	37	80	63	126
South East Coast	45	98	1	2	46	71	44	89	56	160
South Central	64	100	0	0	64	105	77	31	23	136
South West	82	100	0	0	82	69	38	111	62	180
West Midlands	49	98	1	2	50	33	21	122	79	155
North West	72	99	1	1	73	57	30	136	70	193
Wales	28	97	1	3	29	11	14	70	86	81
Northern Ireland	2	100	0	0	2	10	29	25	71	35
Scotland	73	91	7	9	80	26	55	21	45	47
United Kingdom	**626**	**98**	**14**	**2**	**640**	**560**	**35**	**1027**	**65**	**1587**

Table 86 : Status of invasive cases with <4 nodes obtained													
	Total with nodes obtained	Nodal status determined on basis of <4 nodes		Positive sentinel procedure(s)		Positive (Other)		Negative sentinel procedure(s)		Negative (Other)		Unknown status	
Region		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2056	1277	62.1	63	3.1	2	0.1	1188	58	24	1.2	0	0
East Midlands	1096	688	62.8	51	4.7	0	0.0	635	58	2	0.2	0	0
East of England	1380	845	61.2	33	2.4	0	0.0	808	59	4	0.3	0	0
London	1353	909	67.2	67	5.0	0	0.0	836	62	6	0.4	0	0
South East Coast	1242	783	63.0	46	3.7	4	0.3	717	58	16	1.3	0	0
South Central	1080	763	70.6	64	5.9	0	0.0	697	65	2	0.2	0	0
South West	1533	1083	70.6	82	5.3	1	0.1	991	65	9	0.6	0	0
West Midlands	1420	910	64.1	50	3.5	2	0.1	850	60	8	0.6	0	0
North West	1782	1209	67.8	73	4.1	0	0.0	1128	63	8	0.4	0	0
Wales	897	626	69.8	29	3.2	1	0.1	592	66	4	0.4	0	0
Northern Ireland	300	184	61.3	2	0.7	0	0.0	182	61	0	0.0	0	0
Scotland	1277	908	71.1	80	6.3	1	0.1	824	65	3	0.2	0	0
United Kingdom	**15416**	**10185**	**66**	**640**	**4.2**	**11**	**0.1**	**9448**	**61**	**86**	**0.6**	**0**	**0**

Table 87 : Availability of lymph node status for surgically treated 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	535	145	27	0	0	390	73	0	0
East Midlands	296	101	34	0	0	195	66	0	0
East of England	358	99	28	0	0	259	72	0	0
London	448	124	28	0	0	324	72	0	0
South East Coast	320	73	23	0	0	247	77	0	0
South Central	296	71	24	0	0	225	76	0	0
South West	431	117	27	0	0	314	73	0	0
West Midlands	351	90	26	0	0	261	74	0	0
North West	420	103	25	0	0	317	75	0	0
Wales	249	78	31	0	0	171	69	0	0
Northern Ireland	54	16	30	0	0	38	70	0	0
Scotland	229	45	20	0	0	184	80	0	0
United Kingdom	**3987**	**1062**	**27**	**0**	**0**	**2925**	**73**	**0**	**0**

Table 88 : 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	14	4	385	131	87	150
East Midlands	13	6	205	88	97	91
East of England	31	11	282	68	89	76
London	26	8	341	98	92	107
South East Coast	17	7	260	56	93	60
South Central	9	4	231	62	95	65
South West	26	8	328	91	88	103
West Midlands	18	7	270	72	89	81
North West	19	6	327	84	90	93
Wales	14	8	182	64	96	67
Northern Ireland	3	8	39	13	87	15
Scotland	10	5	191	35	92	38
United Kingdom	**200**	**7**	**3041**	**862**	**91**	**946**

Table 89 : Nodal status of non-invasive cancers					
Region	Total known nodal status	Positive		Negative	
		No.	%	No.	%
N East, Yorks & Humber	145	3	2	142	98
East Midlands	101	0	0	101	100
East of England	99	0	0	99	100
London	124	4	3	120	97
South East Coast	73	0	0	73	100
South Central	71	1	1	70	99
South West	117	0	0	117	100
West Midlands	90	0	0	90	100
North West	103	3	3	100	97
Wales	78	0	0	78	100
Northern Ireland	16	0	0	16	100
Scotland	45	0	0	45	100
United Kingdom	**1062**	**11**	**1**	**1051**	**99**

Table 90 : 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	79	9	6	1	0.7	0	0.0	2	1.3	150	131	91
East Midlands	84	92	3	3	0	0.0	0	0.0	1	1.1	91	88	95
East of England	55	72	6	8	2	2.6	0	0.0	5	6.6	76	68	81
London	93	87	4	4	1	0.9	0	0.0	0	0.0	107	98	95
South East Coast	55	92	0	0	1	1.7	0	0.0	0	0.0	60	56	98
South Central	59	91	2	3	1	1.5	0	0.0	0	0.0	65	62	95
South West	84	82	5	5	2	1.9	0	0.0	0	0.0	103	91	92
West Midlands	68	84	2	2	2	2.5	0	0.0	0	0.0	81	72	94
North West	82	88	2	2	0	0.0	0	0.0	0	0.0	93	84	98
Wales	61	91	1	1	1	1.5	0	0.0	1	1.5	67	64	95
Northern Ireland	13	87	0	0	0	0.0	0	0.0	0	0.0	15	13	100
Scotland	33	87	2	5	0	0.0	0	0.0	0	0.0	38	35	94
United Kingdom	**806**	**85**	**36**	**4**	**11**	**1.2**	**0**	**0.0**	**9**	**1.0**	**946**	**862**	**94**

Table 91 : 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	13	3	1	0	0	0.0	0	0.0	0	0.0	385	14	93
East Midlands	13	6	0	0	0	0.0	0	0.0	0	0.0	205	13	100
East of England	29	10	2	1	0	0.0	0	0.0	0	0.0	282	31	94
London	26	8	0	0	0	0.0	0	0.0	0	0.0	341	26	100
South East Coast	17	7	0	0	0	0.0	0	0.0	0	0.0	260	17	100
South Central	8	3	1	0	0	0.0	0	0.0	0	0.0	231	9	89
South West	24	7	0	0	0	0.0	0	0.0	2	0.6	328	26	92
West Midlands	17	6	0	0	0	0.0	0	0.0	1	0.4	270	18	94
North West	19	6	0	0	0	0.0	0	0.0	0	0.0	327	19	100
Wales	14	8	0	0	0	0.0	0	0.0	0	0.0	182	14	100
Northern Ireland	3	8	0	0	0	0.0	0	0.0	0	0.0	39	3	100
Scotland	10	5	0	0	0	0.0	0	0.0	0	0.0	191	10	100
United Kingdom	**193**	**6**	**4**	**0**	**0**	**0.0**	**0**	**0.0**	**3**	**0.1**	**3041**	**200**	**97**

Table 92 : Mean, median & maximum number of nodes obtained (non-invasive cancers)

Region	Total known nodal status	Conservation			Mastectomy		
		Mean	Median	Maximum	Mean	Median	Maximum
N East, Yorks & Humber	145	2	1.5	12	3	2	14
East Midlands	101	2	2	5	3	2	9
East of England	99	2	2	4	3	2	17
London	124	3	2	7	3	2	16
South East Coast	73	2	2	6	3	2	12
South Central	71	2	2	3	2	2	14
South West	117	2	1	5	3	2	14
West Midlands	90	2	2	6	2	2	7
North West	103	2	1	5	2	2	13
Wales	78	2	1.5	4	3	2	8
Northern Ireland	16	2	2	2	3	2	9
Scotland	45	2	2	5	2	2	11
United Kingdom	**1062**	**2**	**2**	**12**	**3**	**2**	**17**

Table 93 : 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	1931	100	1923	100	2	0	1	100	1	100	0	0	111	94	40	36	64	58
East Midlands	1041	100	1041	100	0	0	0	-	0	-	0	-	45	96	14	31	29	64
East of England	1295	100	1292	100	1	0	0	-	0	-	0	-	76	93	43	57	28	37
London	1269	100	1262	99	2	0	0	-	0	-	0	-	85	88	43	51	32	38
South East Coast	1174	100	1169	100	1	0	0	-	0	-	0	-	61	98	25	41	35	57
South Central	1014	100	1013	100	0	0	0	-	0	-	0	-	58	97	27	47	29	50
South West	1456	100	1449	100	0	0	4	100	4	100	0	0	72	93	30	42	37	51
West Midlands	1325	100	1323	100	0	0	1	100	1	100	0	0	64	97	33	52	29	45
North West	1698	100	1694	100	0	0	2	100	2	100	0	0	75	93	34	45	36	48
Wales	846	99	841	99	0	0	0	-	0	-	0	-	51	92	24	47	23	45
Northern Ireland	286	100	285	100	0	0	0	-	0	-	0	-	14	100	5	36	9	64
Scotland	1213	99	1199	99	3	0	0	-	0	-	0	-	66	92	43	65	18	27
United Kingdom	**14548**	**100**	**14491**	**100**	**9**	**0**	**8**	**100**	**8**	**100**	**0**	**0**	**778**	**94**	**361**	**46**	**369**	**47**

Table 94 : 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	138	32	4	1	437	142	97
East Midlands	84	35	3	1	242	87	97
East of England	120	41	7	2	292	127	94
London	82	27	2	1	306	84	98
South East Coast	90	31	1	0	291	91	99
South Central	31	12	1	0	262	32	97
South West	109	31	5	1	348	114	96
West Midlands	123	40	3	1	305	126	98
North West	135	34	6	2	400	141	96
Wales	71	39	2	1	183	73	97
Northern Ireland	25	34	0	0	74	25	100
Scotland	28	12	24	10	242	52	54
United Kingdom	**1036**	**31**	**58**	**2**	**3382**	**1094**	**95**

Appendix F: Adjuvant therapy data tables (95 – 132)

ADJUVANT THERAPY AUDIT WITH TUMOUR DATA
FROM THE 2012/13 AUDIT OF SCREEN-DETECTED BREAST CANCERS
*Scotland have not submitted any adjuvant cases in 2012/13

Table 95: Number of cases with previous cancers							
	Total submitted cases	Total pt matched	% matched	Had previous cancers		No previous cancers	
Region				No.	%	No.	%
N East, Yorks & Humber	2549	2546	100	320	13	2226	87
East Midlands	1496	1443	96	196	14	1247	86
East of England	1790	1788	100	212	12	1576	88
London	1909	1493	78	157	11	1336	89
South East Coast	1624	1438	89	163	11	1275	89
South Central	1454	1285	88	185	14	1100	86
South West	1861	1859	100	230	12	1629	88
West Midlands	1692	1642	97	176	11	1466	89
North West	2036	2035	100	248	12	1787	88
Wales	956	939	98	116	12	823	88
Northern Ireland	288	286	99	42	15	244	85
Scotland	-	-	-	-	-	-	-
United Kingdom	**17655**	**16754**	**95**	**2045**	**12**	**14709**	**88**

Table 96: Type of previous cancers									
			Invasive/micro-invasive*					Non-invasive*	
Region	Total matched	Total previous cancers	Breast	Gynae-cological	Bowel	Haema-tological	Other	Breast	Other
N East, Yorks & Humber	2546	320	91	35	17	11	45	24	113
East Midlands	1443	196	55	24	9	10	34	12	59
East of England	1788	212	66	18	12	8	23	22	68
London	1493	157	63	13	7	10	17	14	38
South East Coast	1438	163	52	26	8	11	18	13	42
South Central	1285	185	64	23	4	9	32	14	51
South West	1859	230	58	21	19	11	41	20	79
West Midlands	1642	176	62	21	8	7	18	15	52
North West	2035	248	70	47	14	6	55	11	55
Wales	939	116	36	13	9	8	19	16	23
Northern Ireland	286	42	1	1	2	1	4	2	37
Scotland	-	-	-	-	-	0	0	0	0
United Kingdom	**16754**	**2045**	**618**	**242**	**109**	**92**	**306**	**163**	**617**
% of previous cancers	**-**	**100**	**30**	**12**	**5**	**4**	**15**	**8**	**30**
% of matched	**100**	**12**	**4**	**1**	**1**	**1**	**2**	**1**	**4**

* a patient can have more than one previous cancer

Table 97: Adjuvant treatment of cases with previous breast cancers							
	Women with previous breast cancers	Had RT		Had CT		Had ET	
Region		No.	%	No.	%	No.	%
N East, Yorks & Humber	115	48	42	19	17	77	67
East Midlands	66	22	33	9	14	6	9
East of England	88	44	50	11	13	59	67
London	76	36	47	13	17	53	70
South East Coast	63	27	43	9	14	36	57
South Central	77	28	36	11	14	53	69
South West	76	33	43	16	21	57	75
West Midlands	76	38	50	19	25	56	74
North West	80	22	28	13	16	54	68
Wales	51	18	35	7	14	31	61
Northern Ireland	2	0	0	0	0	2	100
Scotland	-	-	-	-	-	-	-
United Kingdom	**770**	**316**	**41**	**127**	**16**	**484**	**63**

Table 98 : 2012/13 cases supplied to the NHSBSP adjuvant audit									
	Total Cancers	No data supplied		Excluded cases		Total Eligible		Complete data*	
Region		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2549	0	0	115	5	2434	95	2207	87
East Midlands	1496	0	0	66	4	1430	96	49	3
East of England	1790	0	0	88	5	1702	95	1497	84
London	1909	0	0	76	4	1833	96	1793	94
South East Coast	1635	11	1	63	4	1561	95	830	51
South Central	1455	1	0	77	5	1377	95	1362	94
South West	1861	0	0	76	4	1785	96	1646	88
West Midlands	1692	0	0	76	4	1616	96	1509	89
North West	2036	0	0	80	4	1956	96	1934	95
Wales	956	0	0	51	5	905	95	837	88
Northern Ireland	443	155	35	2	0	286	65	254	57
Scotland	-	-	-	-	-	-	-	-	-
United Kingdom	**17822**	**167**	**1**	**770**	**4**	**16885**	**95**	**13918**	**78**

* cases which are eligible and with complete RT, CT and HT data

Table 99 : Data completeness for adjuvant therapy									
	Total Eligible	Complete RT		Complete CT		Complete ET		Complete RT, CT & ET	
Region		No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	2434	2380	98	2251	92	2340	96	2207	91
East Midlands	1430	1067	75	247	17	401	28	49	3
East of England	1702	1625	95	1532	90	1535	90	1497	88
London	1833	1825	100	1802	98	1809	99	1793	98
South East Coast	1561	1371	88	970	62	1148	74	830	53
South Central	1377	1370	99	1369	99	1369	99	1362	99
South West	1785	1718	96	1696	95	1718	96	1646	92
West Midlands	1616	1597	99	1520	94	1568	97	1509	93
North West	1956	1949	100	1951	100	1943	99	1934	99
Wales	905	866	96	849	94	853	94	837	92
Northern Ireland	286	276	97	261	91	255	89	254	89
Scotland	-	-	-	-	-	-	-	-	-
United Kingdom	**16885**	**16044**	**95**	**14448**	**86**	**14939**	**88**	**13918**	**82**

Table 100 : Radiotherapy														
	Invasive							Non-invasive						
	RT		No RT		Unknown RT		Invasive total	RT		No RT		Unknown RT		Non-invasive total
Region	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	
N East, Yorks & Humber	1539	81	326	17	25	1	1890	235	45	262	50	28	5	525
East Midlands	930	83	0	0	190	17	1120	129	44	0	0	167	56	296
East of England	1101	81	203	15	53	4	1357	177	53	133	40	23	7	333
London	1113	78	300	21	5	0	1418	156	40	234	60	3	1	393
South East Coast	1056	85	83	7	101	8	1240	144	47	77	25	86	28	307
South Central	871	80	205	19	6	1	1082	107	38	172	61	1	0	280
South West	1183	84	189	13	31	2	1403	148	40	183	50	36	10	367
West Midlands	1092	85	177	14	11	1	1280	148	46	166	52	7	2	321
North West	1249	81	281	18	5	0	1535	170	42	233	58	2	0	405
Wales	589	81	124	17	10	1	723	72	40	79	44	29	16	180
Northern Ireland	198	82	36	15	7	3	241	18	44	22	54	1	2	41
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**10921**	**82**	**1924**	**14**	**444**	**3**	**13289**	**1504**	**44**	**1561**	**45**	**383**	**11**	**3448**

Table 101 : Radiotherapy							
	Overall						
	RT		No RT		Unknown RT		Overall total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1782	73	598	25	54	2	2434
East Midlands	1067	75	0	0	363	25	1430
East of England	1287	76	338	20	77	5	1702
London	1279	70	546	30	8	0	1833
South East Coast	1207	77	164	11	190	12	1561
South Central	988	72	382	28	7	1	1377
South West	1340	75	378	21	67	4	1785
West Midlands	1247	77	350	22	19	1	1616
North West	1427	73	522	27	7	0	1956
Wales	662	73	204	23	39	4	905
Northern Ireland	216	76	60	21	10	3	286
Scotland	-	-	-	-	-	-	-
United Kingdom	**12502**	**74**	**3542**	**21**	**841**	**5**	**16885**

Table 102 : Chemotherapy														
	Invasive							Micro/non-invasive						
	CT		No CT		Unknown CT		Invasive total	CT		No CT		Unknown CT		Micro/non-invasive total
Region	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	
N East, Yorks & Humber	462	24	1298	69	130	7	1890	0	0	491	90	53	10	544
East Midlands	246	22	0	0	874	78	1120	1	0	0	0	309	100	310
East of England	335	25	901	66	121	9	1357	1	0	294	85	49	14	344
London	407	29	990	70	21	1	1418	2	0	401	97	10	2	413
South East Coast	296	24	509	41	435	35	1240	0	0	164	52	154	48	318
South Central	311	29	766	71	5	0	1082	3	1	288	98	3	1	294
South West	322	23	1028	73	53	4	1403	1	0	345	90	36	9	382
West Midlands	368	29	834	65	78	6	1280	2	1	314	94	18	5	334
North West	412	27	1120	73	3	0	1535	0	0	418	100	2	0	420
Wales	179	25	517	72	27	4	723	0	0	153	84	29	16	182
Northern Ireland	59	24	170	71	12	5	241	0	0	32	74	11	26	43
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**3397**	**26**	**8133**	**61**	**1759**	**13**	**13289**	**10**	**0**	**2900**	**81**	**674**	**19**	**3584**

Table 103 : Chemotherapy							
	Overall						
	CT		No CT		Unknown CT		Overall total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	462	19	1789	74	183	8	2434
East Midlands	247	17	0	0	1183	83	1430
East of England	336	20	1196	70	170	10	1702
London	410	22	1392	76	31	2	1833
South East Coast	297	19	673	43	591	38	1561
South Central	314	23	1055	77	8	1	1377
South West	323	18	1373	77	89	5	1785
West Midlands	371	23	1149	71	96	6	1616
North West	412	21	1539	79	5	0	1956
Wales	179	20	670	74	56	6	905
Northern Ireland	59	21	202	71	25	9	286
Scotland	-	-	-	-	-	-	-
United Kingdom	**3410**	**20**	**11038**	**65**	**2437**	**14**	**16885**

Table 104 : 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	1656	88	205	11	29	2	1890	26	5	453	83	65	12	544
East Midlands	399	36	0	0	721	64	1120	2	1	0	0	308	99	310
East of England	1126	83	113	8	118	9	1357	14	4	281	82	49	14	344
London	1181	83	228	16	9	1	1418	53	13	345	84	15	4	413
South East Coast	922	74	50	4	268	22	1240	47	15	128	40	143	45	318
South Central	991	92	87	8	4	0	1082	26	9	264	90	4	1	294
South West	1234	88	143	10	26	2	1403	12	3	329	86	41	11	382
West Midlands	1119	87	125	10	36	3	1280	17	5	305	91	12	4	334
North West	1361	89	169	11	5	0	1535	105	25	307	73	8	2	420
Wales	637	88	65	9	21	3	723	10	5	141	77	31	17	182
Northern Ireland	207	86	20	8	14	6	241	2	5	25	58	16	37	43
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**10833**	**82**	**1205**	**9**	**1251**	**9**	**13289**	**314**	**9**	**2578**	**72**	**692**	**19**	**3584**

Table 105 : Endocrine Therapy							
	Overall						
	ET		No ET		Unknown ET		Overall total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	1682	69	658	27	94	4	2434
East Midlands	401	28	0	0	1029	72	1430
East of England	1140	67	395	23	167	10	1702
London	1235	67	574	31	24	1	1833
South East Coast	969	62	179	11	413	26	1561
South Central	1017	74	352	26	8	1	1377
South West	1246	70	472	26	67	4	1785
West Midlands	1137	70	431	27	48	3	1616
North West	1466	75	477	24	13	1	1956
Wales	647	71	206	23	52	6	905
Northern Ireland	210	73	45	16	31	11	286
Scotland	-	-	-	-	-	-	-
United Kingdom	**11150**	**66**	**3789**	**22**	**1946**	**12**	**16885**

Table 106 : 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	4	16	25	1422	76	1864	356	65	545
East Midlands	7	21	34	830	77	1077	230	72	319
East of England	6	18	33	977	80	1221	304	68	448
London	5	7	68	979	74	1331	295	68	434
South East Coast	3	12	25	889	78	1136	315	79	400
South Central	4	17	24	770	75	1032	214	67	321
South West	2	8	26	1027	78	1322	311	71	437
West Midlands	1	6	16	944	79	1189	302	73	411
North West	2	6	32	1117	76	1472	308	68	452
Wales	1	8	13	501	76	656	160	68	236
Northern Ireland	0	0	4	157	75	210	59	82	72
Scotland	-	-	-	-	-	-	-	-	-
United Kingdom	**35**	**12**	**300**	**9613**	**77**	**12510**	**2854**	**70**	**4075**

Table 107 : 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	2	9	22	305	21	1450	155	37	418
East Midlands	9	28	32	163	19	847	74	31	241
East of England	5	19	27	201	21	970	129	36	360
London	6	13	46	275	27	1023	126	36	349
South East Coast	4	19	21	195	22	902	97	31	317
South Central	3	15	20	223	27	824	85	36	238
South West	2	11	19	212	20	1048	108	32	336
West Midlands	1	8	12	244	26	955	123	39	313
North West	5	19	27	270	23	1159	137	39	349
Wales	3	33	9	102	19	537	74	42	177
Northern Ireland	0	0	3	37	21	174	22	34	64
Scotland	-	-	-	-	-	-	-	-	-
United Kingdom	**40**	**17**	**238**	**2227**	**23**	**9889**	**1130**	**36**	**3162**

Table 108 : Women in each age group treated with conservation surgery who had adjuvant therapy recorded							
	Invasive				Non/micro-invasive		
	Radiotherapy	Chemotherapy	Endocrine Therapy	Number of	Radiotherapy	Endocrine Therapy	Number of
Age group	%	%	%	cancers	%	%	cancers
<=48	97	36	90	237	57	5	109
49	96	38	91	213	40	7	86
50-52	97	31	92	956	57	11	343
53-55	96	32	89	812	58	9	240
56-58	97	28	89	902	66	12	224
59-61	98	26	89	1023	65	8	215
62-64	97	21	92	1312	62	9	274
65-67	97	17	89	1326	60	11	297
68-70	97	14	91	1103	64	13	180
71+	96	9	90	704	50	14	139
Total	**97**	**23**	**90**	**8588**	**59**	**10**	**2107**

* with completed data only

Table 109 : 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	47	61	89	97	4	9	46
49	37	63	89	89	3	14	35
50-52	38	54	89	349	1	16	134
53-55	38	54	87	224	9	6	64
56-58	34	50	86	206	1	9	69
59-61	36	46	87	218	4	10	73
62-64	35	40	88	333	5	9	91
65-67	37	45	86	344	0	12	77
68-70	33	31	88	267	4	7	55
71+	32	17	86	189	0	4	45
Total	**36**	**45**	**87**	**2316**	**3**	**10**	**689**

* with completed data only

Table 110 : 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	6072	70	152	9	233	8	2	0
Surgery & RT & CT & ET	1500	16	0	0	505	21	0	0
Surgery & ET	139	3	62	4	931	43	66	7
Surgery & RT & CT	404	5	3	0	78	5	0	0
Surgery & RT	344	6	1094	51	22	1	20	2
Surgery & CT & ET	38	0	0	0	353	12	2	0
Surgery only	71	1	795	36	97	6	597	89
Surgery & CT	20	0	1	0	97	5	2	0
Total	**8588**	**100**	**2107**	**100**	**2316**	**100**	**689**	**100**

Table 111 : 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	1	0	10	1	687	59	1093	94	1133	97	1162	100	56
East Midlands	1	0	5	1	391	54	677	94	702	97	719	99	58
East of England	0	0	7	1	497	60	779	94	810	98	820	99	55
London	27	3	145	18	566	71	727	92	757	95	788	99	49
South East Coast	0	0	6	1	393	51	717	93	750	97	765	99	60
South Central	1	0	9	1	323	53	565	93	595	98	605	99	59
South West	2	0	9	1	375	42	799	89	878	98	895	100	63
West Midlands	0	0	4	1	360	47	707	92	742	97	757	99	61
North West	1	0	11	1	643	71	873	96	900	99	909	100	52
Wales	0	0	0	0	143	35	357	87	400	98	406	99	65
Northern Ireland	3	2	4	3	91	62	137	93	145	99	146	99	56
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**36**	**0**	**210**	**3**	**4469**	**56**	**7431**	**93**	**7812**	**97**	**7972**	**99**	**57**

Table 112 : 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	2	1	146	62	224	96	231	99	234	100	55
East Midlands	0	0	1	1	66	52	118	92	126	98	127	99	57.5
East of England	0	0	2	1	108	63	154	90	166	97	171	100	55
London	3	2	24	15	111	71	142	91	146	94	152	97	50
South East Coast	0	0	0	0	56	40	120	85	131	93	139	99	63
South Central	0	0	0	0	64	60	100	94	103	97	106	100	56
South West	0	0	1	1	72	49	134	91	145	98	146	99	62
West Midlands	0	0	0	0	74	51	128	88	140	97	144	99	60
North West	0	0	2	1	119	71	160	95	164	98	167	99	51
Wales	0	0	2	3	26	40	62	95	64	98	64	98	63
Northern Ireland	0	0	0	0	7	39	17	94	18	100	18	100	65
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**3**	**0**	**34**	**2**	**849**	**57**	**1359**	**92**	**1434**	**97**	**1468**	**99**	**56**

Table 113 : 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	2	0	25	2	540	46	965	83	1140	98	93
East Midlands	0	0	0	0	11	2	308	42	585	80	693	95	94
East of England	0	0	1	0	36	4	423	51	678	82	798	96	90
London	0	0	5	1	121	15	399	50	632	79	751	94	90.5
South East Coast	0	0	0	0	10	1	163	21	535	69	743	96	106
South Central	1	0	1	0	23	4	235	38	479	78	597	97	98
South West	1	0	1	0	10	1	221	25	616	69	846	94	105
West Midlands	0	0	0	0	15	2	292	38	610	79	739	96	98
North West	0	0	0	0	33	4	465	51	783	86	898	98	90
Wales	0	0	0	0	5	1	140	34	306	75	405	99	99
Northern Ireland	0	0	2	1	13	9	77	52	128	87	144	98	90
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**2**	**0**	**12**	**0**	**302**	**4**	**3263**	**41**	**6317**	**78**	**7754**	**96**	**96**

Table 114 : 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	112	48	194	83	231	99	91
East Midlands	0	0	0	0	0	0	40	31	91	71	126	98	101
East of England	0	0	0	0	4	2	86	50	135	79	168	98	90
London	0	0	0	0	11	7	72	46	112	72	147	94	92
South East Coast	0	0	0	0	0	0	20	14	85	60	133	94	112
South Central	0	0	0	0	1	1	30	28	72	68	103	97	106.5
South West	0	0	0	0	0	0	24	16	91	61	140	95	111
West Midlands	0	0	0	0	4	3	44	30	103	71	141	97	105
North West	0	0	0	0	10	6	86	51	135	80	162	96	89.5
Wales	0	0	0	0	0	0	21	32	39	60	63	97	110
Northern Ireland	0	0	0	0	1	6	6	33	16	89	18	100	101.5
Scotland	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**0**	**0**	**0**	**0**	**33**	**2**	**541**	**37**	**1073**	**73**	**1432**	**97**	**101**

Table 115: Median days from final surgery to radiotherapy for women with invasive breast cancer			
Region	**Median**	**First quartile**	**Third quartile**
N East, Yorks & Humber	56	48	67
East Midlands	58	50	70
East of England	55	47	67
London	49	34	63
South East Coast	60	50	70
South Central	59	48	71
South West	63	54	74
West Midlands	61	52.25	72
North West	52	45	63
Wales	65	56	77
Northern Ireland	56	49	68
Scotland	-	-	-
United Kingdom	**57**	**48**	**69**

Table 116 : Invasive cancer patients who had breast conserving surgery and received radiotherapy within 52 days of their final surgery			
	Within 52 days		**Total invasive with BCS**
Region	**No**	**%**	
North, Yorks & Humber	436	39	1119
East Midlands	219	32	691
East of England	349	43	807
London	436	58	754
South East Coast	213	29	738
South Central	215	37	582
South West	201	23	874
West Midlands	184	25	737
North West	450	51	883
Wales	52	13	400
Northern Ireland	50	38	131
Scotland	-	-	-
United Kingdom	**2805**	**36**	**7716**

Table 117 : Invasive status of cancers										
	Invasive		**Micro-invasive**		**Non-invasive**		**Unknown**		**Total**	
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
N East, Yorks & Humber	1890	78	19	1	525	22	0	0	2434	100
East Midlands	1120	78	14	1	296	21	0	0	1430	100
East of England	1357	80	11	1	333	20	1	0	1702	100
London	1418	77	20	1	393	21	2	0	1833	100
South East Coast	1240	79	11	1	307	20	3	0	1561	100
South Central	1082	79	14	1	280	20	1	0	1377	100
South West	1403	79	15	1	367	21	0	0	1785	100
West Midlands	1280	79	13	1	321	20	2	0	1616	100
North West	1535	78	15	1	405	21	1	0	1956	100
Wales	723	80	2	0	180	20	0	0	905	100
Northern Ireland	241	84	2	1	41	14	2	1	286	100
Scotland	-	-	-	-	-	-	-	-	-	-
United Kingdom	**13289**	**79**	**136**	**1**	**3448**	**20**	**12**	**0**	**16885**	**100**

Table 118 : Treatment of invasive cancers										
	Conservation surgery		Mastectomy		No Surgery		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1459	77	409	22	22	1	0	0	1890	100
East Midlands	871	78	217	19	32	3	0	0	1120	100
East of England	1046	77	282	21	27	2	2	0	1357	100
London	1078	76	293	21	46	3	1	0	1418	100
South East Coast	1002	81	217	18	21	2	0	0	1240	100
South Central	806	74	256	24	20	2	0	0	1082	100
South West	1128	80	256	18	19	1	0	0	1403	100
West Midlands	991	77	276	22	13	1	0	0	1280	100
North West	1180	77	328	21	27	2	0	0	1535	100
Wales	555	77	159	22	9	1	0	0	723	100
Northern Ireland	178	74	60	25	3	1	0	0	241	100
Scotland	-	-	-	-	-	-	-	-	-	-
United Kingdom	**10294**	**77**	**2753**	**21**	**239**	**2**	**3**	**0**	**13289**	**100**

Table 119 : Radiotherapy for invasive cancers treated by conservation surgery						
	Radiotherapy		No/unknown radiotherapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	1396	96	63	4	1459	100
East Midlands	843	97	28	3	871	100
East of England	1010	97	36	3	1046	100
London	996	92	82	8	1078	100
South East Coast	968	97	34	3	1002	100
South Central	783	97	23	3	806	100
South West	1091	97	37	3	1128	100
West Midlands	975	98	16	2	991	100
North West	1146	97	34	3	1180	100
Wales	541	97	14	3	555	100
Northern Ireland	170	96	8	4	178	100
Scotland	-	-	-	-	-	-
United Kingdom	**9919**	**96**	**375**	**4**	**10294**	**100**

Table 120 : Invasive cancers treated by conservation surgery with no/unknown radiotherapy							
		>20mm		Grade 3		Nodal status positive	
Region	Total	No	%	No	%	No	%
North, Yorks & Humber	63	1	2	9	14	9	14
East Midlands	28	0	0	4	14	5	18
East of England	36	0	0	10	28	4	11
London	82	3	4	15	18	27	33
South East Coast	34	0	0	3	9	5	15
South Central	23	1	4	4	17	6	26
South West	37	1	3	8	22	3	8
West Midlands	16	1	6	3	19	5	31
North West	34	1	3	6	18	3	9
Wales	14	1	7	3	21	4	29
Northern Ireland	8	0	0	2	25	2	25
Scotland	-	-	-	-	-	-	-
United Kingdom	**375**	**9**	**2**	**67**	**18**	**73**	**19**

Table 121 : Radiotherapy for non-invasive cancers treated by conservation surgery						
	Radiotherapy		No/unknown radiotherapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	234	62	141	38	375	100
East Midlands	129	64	74	36	203	100
East of England	176	72	70	28	246	100
London	147	55	121	45	268	100
South East Coast	143	57	106	43	249	100
South Central	106	51	101	49	207	100
South West	144	50	142	50	286	100
West Midlands	147	62	90	38	237	100
North West	167	55	136	45	303	100
Wales	72	52	66	48	138	100
Northern Ireland	16	57	12	43	28	100
Scotland	-	-	-	-	-	-
United Kingdom	**1481**	**58**	**1059**	**42**	**2540**	**100**

Table 122 : 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	32	23	59	42	31	22	16	11	3	2	141	100
East Midlands	5	7	43	58	17	23	9	12	0	0	74	100
East of England	4	6	22	31	15	21	29	41	0	0	70	100
London	28	23	44	36	29	24	19	16	1	1	121	100
South East Coast	30	28	37	35	18	17	17	16	4	4	106	100
South Central	28	28	40	40	19	19	13	13	1	1	101	100
South West	32	23	62	44	30	21	18	13	0	0	142	100
West Midlands	13	14	43	48	21	23	12	13	1	1	90	100
North West	15	11	72	53	35	26	10	7	4	3	136	100
Wales	6	9	33	50	25	38	2	3	0	0	66	100
Northern Ireland	2	17	2	17	4	33	4	33	0	0	12	100
Scotland	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**195**	**18**	**457**	**43**	**244**	**23**	**149**	**14**	**14**	**1**	**1059**	**100**

Table 123 : 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	74	52	34	24	2	1	15	11	16	11	141	100
East Midlands	43	58	9	12	0	0	9	12	13	18	74	100
East of England	25	36	10	14	0	0	29	41	6	9	70	100
London	45	37	30	25	8	7	18	15	20	17	121	100
South East Coast	58	55	19	18	1	1	17	16	11	10	106	100
South Central	59	58	24	24	1	1	12	12	5	5	101	100
South West	83	58	30	21	2	1	19	13	8	6	142	100
West Midlands	56	62	9	10	0	0	12	13	13	14	90	100
North West	80	59	29	21	0	0	11	8	16	12	136	100
Wales	39	59	18	27	0	0	2	3	7	11	66	100
Northern Ireland	7	58	0	0	0	0	4	33	1	8	12	100
Scotland	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	**569**	**54**	**212**	**20**	**14**	**1**	**148**	**14**	**116**	**11**	**1059**	**100**

Table 124 : ER status of all cases								
	ER Positive		ER Negative		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1888	78	219	9	327	13	2434	100
East Midlands	1109	78	101	7	220	15	1430	100
East of England	1332	78	114	7	256	15	1702	100
London	1382	75	157	9	294	16	1833	100
South East Coast	1210	78	119	8	232	15	1561	100
South Central	1048	76	100	7	229	17	1377	100
South West	1433	80	146	8	206	12	1785	100
West Midlands	1224	76	128	8	264	16	1616	100
North West	1649	84	207	11	100	5	1956	100
Wales	684	76	51	6	170	19	905	100
Northern Ireland	248	87	25	9	13	5	286	100
Scotland	-	-	-	-	-	-	-	-
United Kingdom	**13207**	**78**	**1367**	**8**	**2311**	**14**	**16885**	**100**

Table 125 : Invasive status of ER positive cases										
	Invasive		Micro-invasive		Non-invasive		Unknown		Total	
Region	No.	%	No.	%	No.	%	No.	%	No.	%
N East, Yorks & Humber	1723	91	7	0	158	8	0	0	1888	100
East Midlands	1030	93	2	0	77	7	0	0	1109	100
East of England	1252	94	4	0	76	6	0	0	1332	100
London	1266	92	13	1	103	7	0	0	1382	100
South East Coast	1089	90	6	0	115	10	0	0	1210	100
South Central	993	95	8	1	47	4	0	0	1048	100
South West	1282	89	8	1	143	10	0	0	1433	100
West Midlands	1170	96	5	0	48	4	1	0	1224	100
North West	1384	84	9	1	256	16	0	0	1649	100
Wales	670	98	1	0	13	2	0	0	684	100
Northern Ireland	221	89	1	0	26	10	0	0	248	100
Scotland	-	-	-	-	-	-	-	-	-	-
United Kingdom	**12080**	**91**	**64**	**0**	**1062**	**8**	**1**	**0**	**13207**	**100**

Table 126 : Endocrine therapy for ER positive invasive cancers								
	Endocrine therapy		No endocrine therapy		Unknown endocrine therapy		Total	
Region	No	%	No	%	No	%	No	%
North, Yorks & Humber	1639	95	76	4	8	0	1723	100
East Midlands	393	38	0	0	637	62	1030	100
East of England	1117	89	37	3	98	8	1252	100
London	1165	92	99	8	2	0	1266	100
South East Coast	880	81	3	0	206	19	1089	100
South Central	981	99	9	1	3	0	993	100
South West	1229	96	42	3	11	1	1282	100
West Midlands	1114	95	29	2	27	2	1170	100
North West	1355	98	29	2	0	0	1384	100
Wales	635	95	19	3	16	2	670	100
Northern Ireland	207	94	2	1	12	5	221	100
Scotland	-	-	-	-	-	-	-	-
United Kingdom	**10715**	**89**	**345**	**3**	**1020**	**8**	**12080**	**100**

Table 127 : 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	84	4	5	9	11	10	12
East Midlands	637	41	6	111	17	151	24
East of England	135	3	2	27	20	21	16
London	101	4	4	20	20	16	16
South East Coast	209	23	11	42	20	65	31
South Central	12	0	0	5	42	5	42
South West	53	1	2	6	11	6	11
West Midlands	56	1	2	6	11	6	11
North West	29	1	3	6	21	4	14
Wales	35	2	6	5	14	7	20
Northern Ireland	14	2	14	2	14	3	21
Scotland	-	-	-	-	-	-	-
United Kingdom	**1365**	**82**	**6**	**239**	**18**	**294**	**22**

Table 128 : Endocrine therapy for ER negative, PR positive invasive cancers						
	Endocrine therapy		No/unknown endocrine therapy		Total	
Region	No.	%	No.	%	No.	%
N East, Yorks & Humber	6	86	1	14	7	100
East Midlands	2	100	0	0	2	100
East of England	3	50	3	50	6	100
London	8	100	0	0	8	100
South East Coast	3	38	5	63	8	100
South Central	5	100	0	0	5	100
South West	4	44	5	56	9	100
West Midlands	1	25	3	75	4	100
North West	3	100	0	0	3	100
Wales	0	-	0	-	0	-
Northern Ireland	0	0	1	100	1	100
Scotland	-	-	-	-	-	-
United Kingdom	**35**	**66**	**18**	**34**	**53**	**100**

Table 129 : Endocrine therapy for all ER negative cancers								
	Endocrine therapy		No endocrine therapy		Unknown endocrine therapy		Total	
Region	No	%	No	%	No	%	No	%
North, Yorks & Humber	18	8	163	74	38	17	219	100
East Midlands	6	6	0	0	95	94	101	100
East of England	7	6	88	77	19	17	114	100
London	14	9	143	91	0	0	157	100
South East Coast	4	3	68	57	47	39	119	100
South Central	10	10	90	90	0	0	100	100
South West	5	3	123	84	18	12	146	100
West Midlands	4	3	113	88	11	9	128	100
North West	6	3	194	94	7	3	207	100
Wales	1	2	46	90	4	8	51	100
Northern Ireland	0	0	21	84	4	16	25	100
Scotland	-	-	-	-	-	-	-	-
United Kingdom	**75**	**5**	**1049**	**77**	243	**18**	**1367**	**100**

Table 130 : 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	23	14	111	67	31	19	165	100
East Midlands	1	1	0	0	78	99	79	100
East of England	11	14	63	79	6	8	80	100
London	48	41	64	55	4	3	116	100
South East Coast	41	34	43	36	37	31	121	100
South Central	26	47	28	51	1	2	55	100
South West	12	8	112	74	27	18	151	100
West Midlands	14	26	36	68	3	6	53	100
North West	104	39	156	59	5	2	265	100
Wales	7	50	5	36	2	14	14	100
Northern Ireland	2	7	16	59	9	33	27	100
Scotland	-	-	-	-	-	-	-	-
United Kingdom	**289**	**26**	**634**	**56**	**203**	**18**	**1126**	**100**

Table 131 : Chemotherapy for node positive invasive cancers							
	CT		No CT		Unknown CT		Total
Region	No.	%	No.	%	No.	%	
N East, Yorks & Humber	251	64	136	35	7	2	394
East Midlands	119	57	0	0	91	43	210
East of England	169	67	69	27	16	6	254
London	197	55	157	44	2	1	356
South East Coast	152	55	43	16	80	29	275
South Central	173	63	99	36	1	0	273
South West	154	57	114	42	3	1	271
West Midlands	185	68	80	29	8	3	273
North West	199	63	118	37	0	0	317
Wales	89	64	43	31	6	4	138
Northern Ireland	31	67	14	30	1	2	46
Scotland	-	-	-	-	-	-	-
United Kingdom	**1719**	**61**	**873**	**31**	**215**	**8**	**2807**

Table 132 : Node positive invasive cancers with no/unknown chemotherapy									
		Micro-met		ER negative		Grade 3		HER-2 positive	
Region	Total	No	%	No	%	No	%	No	%
North, Yorks & Humber	143	31	22	8	6	14	10	4	3
East Midlands	91	27	30	4	4	13	14	6	7
East of England	85	20	24	1	1	9	11	3	4
London	159	35	22	12	8	26	16	10	6
South East Coast	123	29	24	4	3	20	16	7	6
South Central	100	44	44	2	2	10	10	5	5
South West	117	38	32	4	3	9	8	4	3
West Midlands	88	29	33	3	3	14	16	4	5
North West	118	41	35	3	3	7	6	1	1
Wales	49	15	31	3	6	6	12	1	2
Northern Ireland	15	6	40	0	0	1	7	0	0
Scotland	-	-	-	-	-	-	-	-	-
United Kingdom	**1088**	**315**	**29**	**44**	**4**	**129**	**12**	**45**	**4**

Appendix G: Survival analysis data tables (133-141)

DATA OBTAINED FROM THE SURVIVAL AUDIT OF SCREEN-DETECTED BREAST CANCERS FOR CANCER PATIENTS SCREENED BETWEEN 1 APRIL 2008 AND 31 MARCH 2009

Table 133 : Cause of death of eligible invasive cancers with death before 31/03/2014											
	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**Total**
N East, Yorks & Humber	83	57	28	19	35	24	0	0	146	8	1838
East Midlands	29	50	17	29	11	19	1	2	58	6	1033
East of England	45	53	17	20	20	24	3	4	85	7	1233
London	25	49	4	8	16	31	6	12	51	5	1093
South East Coast	23	43	13	24	13	24	5	9	54	5	1007
South Central	19	51	7	19	11	30	0	0	37	4	875
South West	31	49	14	22	18	29	0	0	63	6	1088
West Midlands	36	47	15	20	25	33	0	0	76	7	1155
North West	41	40	22	21	38	37	2	2	103	8	1351
Wales	28	50	5	9	20	36	3	5	56	8	736
Northern Ireland	10	59	1	6	1	6	5	29	17	6	281
Scotland	51	50	19	19	28	28	3	3	101	9	1182
United Kingdom	**421**	**50**	**162**	**19**	**236**	**28**	**28**	**3**	**847**	**7**	**12872**

Table 134 : Cause of death of eligible micro-invasive cancers with death before 31/03/2014											
	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**Total**
N East, Yorks & Humber	0	-	0	-	0	-	0	-	0	0	16
East Midlands	0	-	0	-	0	-	0	-	0	0	14
East of England	0	0	0	0	1	100	0	0	1	11	9
London	0	-	0	-	0	-	0	-	0	0	1
South East Coast	0	-	0	-	0	-	0	-	0	0	15
South Central	1	100	0	0	0	0	0	0	1	10	10
South West	0	-	0	-	0	-	0	-	0	0	12
West Midlands	1	100	0	0	0	0	0	0	1	8	13
North West	0	-	0	-	0	-	0	-	0	0	12
Wales	0	-	0	-	0	-	0	-	0	0	3
Northern Ireland	0	-	0	-	0	-	0	-	0	0	1
Scotland	0	0	0	0	1	100	0	0	1	20	5
United Kingdom	**2**	**50**	**0**	**0**	**2**	**50**	**0**	**0**	**4**	**4**	**111**

Table 135 : Cause of death of eligible non-invasive cancers with death before 31/03/2014											
	Breast cancer		Other cancer		Non-cancer		Unknown		Total deaths		
Region	No.	%	No.	%	No.	%	No.	%	No.	%	Total
N East, Yorks & Humber	3	21	6	43	5	36	0	0	14	3	432
East Midlands	2	25	3	38	3	38	0	0	8	3	253
East of England	1	11	3	33	5	56	0	0	9	2	366
London	0	0	2	29	5	71	0	0	7	2	305
South East Coast	1	9	8	73	0	0	2	18	11	4	273
South Central	0	0	1	50	0	0	1	50	2	1	221
South West	0	0	4	44	5	56	0	0	9	3	287
West Midlands	0	0	3	100	0	0	0	0	3	1	242
North West	1	8	5	42	4	33	2	17	12	4	329
Wales	0	0	3	60	2	40	0	0	5	2	217
Northern Ireland	0	-	0	-	0	-	0	-	0	0	70
Scotland	1	10	4	40	5	50	0	0	10	4	264
United Kingdom	**9**	**10**	**42**	**47**	**34**	**38**	**5**	**6**	**90**	**3**	**3259**

Table 136 : 5-year relative survival by region – primary invasive cancers only		
Region	**Un-adjusted**	**Adjusted**
N East, Yorks & Humber	97.3 (95.9,98.4)	97.1 (95.8,98.2)
East Midlands	99.0 (97.4,100.3)	98.9 (97.2,100.2)
East of England	98.9 (97.4,100.2)	98.8 (97.2,100.0)
London	100.2 (98.8,101.3)	100.1 (98.6,101.2)
South East Coast	99.7 (98.1,101.0)	99.6 (98.0,100.8)
South Central	100.6 (99.0,101.8)	100.4 (98.8,101.6)
South West	99.4 (97.9,100.7)	99.3 (97.7,100.5)
West Midlands	98.8 (97.2,100.0)	98.6 (97.1,99.9)
North West	97.0 (95.4,98.3)	96.8 (95.2,98.1)
Wales	97.5 (95.3,99.2)	97.8 (95.6,99.5)
Northern Ireland	97.0 (93.3,99.3)	97.2 (93.5,99.5)
Scotland	97.1 (95.3,98.5)	98.2 (96.4,99.7)
United Kingdom	**98.5 (98.1,98.9)**	**98.5 (98.1,98.9)**

Table 137 : 5-year relative survival by age for primary invasive cancers		
Age	**Un-adjusted**	**Adjusted**
<50	98.6 (94.4,100.2)	98.6 (94.4,100.2)
50-52	97.3 (96.2,98.2)	97.3 (96.2,98.2)
53-55	97.9 (96.6,98.9)	97.9 (96.6,98.9)
56-58	96.9 (95.6,97.9)	96.9 (95.6,97.9)
59-61	97.6 (96.5,98.6)	97.6 (96.5,98.6)
62-64	98.4 (97.2,99.3)	98.4 (97.2,99.3)
65-67	99.2 (97.9,100.3)	99.2 (97.9,100.3)
68-70	98.5 (96.9,99.9)	98.5 (96.9,99.9)
71+	107.0 (104.4,109.1)	107.1 (104.5,109.1)
All invasive cancers	**98.5 (98.1,98.9)**	**98.5 (98.1,98.9)**

Table 138 : 5-year relative survival by invasive tumor size for primary invasive cancers		
Size	**Un-adjusted**	**Adjusted**
<15mm	100.6 (100.0,101.0)	100.6 (100.0,101.0)
15-≤20mm	98.7 (97.8,99.5)	98.7 (97.8,99.5)
>20-≤35mm	95.7 (94.4,96.9)	95.8 (94.4,96.9)
>35-≤50mm	89.2 (85.4,92.3)	89.2 (85.4,92.3)
>50mm	91.0 (85.7,94.8)	91.0 (85.7,94.8)
Unknown	84.5 (77.3,90.1)	84.6 (77.4,90.2)
All invasive cancers	**98.5 (98.1,98.9)**	**98.5 (98.1,98.9)**

Table 139 : 5-year relative survival by invasive grade for primary invasive cancers		
Grade	**Un-adjusted**	**Adjusted**
Grade 1	101.1 (100.4,101.7)	101.1 (100.4,101.7)
Grade 2	99.7 (99.1,100.2)	99.7 (99.1,100.2)
Grade 3	92.6 (91.3,93.8)	92.6 (91.3,93.8)
Not assessable	93.5 (78.8,99.7)	93.4 (78.7,99.6)
Unknown	85.7 (74.3,93.3)	85.9 (74.5,93.5)
All invasive cancers	**98.5 (98.1,98.9)**	**98.5 (98.1,98.9)**

Table 140 : 5-year relative survival by nodal status for primary invasive cancers		
Nodal status	**Un-adjusted**	**Adjusted**
Positive	94.0 (92.8,95.1)	94.0 (92.8,95.1)
Negative	100.0 (99.6,100.4)	100.0 (99.6,100.4)
Unknown	89.1 (83.6,93.3)	89.1 (83.6,93.3)
All invasive cancers	**98.5 (98.1,98.9)**	**98.5 (98.1,98.9)**

Table 141 : 5-year relative survival by NPI prognostic group for primary invasive cancers		
NPI group	**Un-adjusted**	**Adjusted**
EPG	101.5 (100.7,102.1)	101.5 (100.7,102.1)
GPG	100.7 (100.1,101.3)	100.7 (100.1,101.3)
MPG1	99.4 (98.5,100.1)	99.4 (98.5,100.1)
MPG2	94.7 (92.9,96.2)	94.7 (92.9,96.2)
PPG	82.3 (79.1,85.1)	82.3 (79.1,85.1)
Unknown	91.6 (87.5,94.8)	91.6 (87.5,94.8)
All invasive cancers	**98.5 (98.1,98.9)**	**98.5 (98.1,98.9)**