Public Health England

ABS ASSOCIATION OF BREAST SURGERY

NHS Breast Screening Programme & Association of Breast Surgery

An audit of screen detected breast cancers for the year of screening April 2017 to March 2018

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Public Health England, Wellington House, 133-155 Waterloo Road, London SE1 8UG
Tel: 020 7654 8000 www.gov.uk/phe Twitter: @PHE_uk
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About PHE Screening

Screening identifies apparently healthy people who may be at increased risk of a disease or condition, enabling earlier treatment or better informed decisions. National population screening programmes are implemented in the NHS on the advice of the UK National Screening Committee (UK NSC), which makes independent, evidence-based recommendations to ministers in the four UK countries. The Screening Quality Assurance Service ensures programmes are safe and effective by checking that national standards are met.

PHE Screening, Wellington House, 133 to 155 Waterloo Road - London - SE1 8UG
www.gov.uk/topic/population-screening-programmes Twitter: @PHE_Screening
Blog: phescreening.blog.gov.uk. Prepared by: NHSBSP and ABS Breast Screening Audit Group. For queries relating to this document, please contact: phe.nhsbspabs@nhs.net

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Foreword

This publication represents the 23rd annual audit within the NHS Breast Screening Programme (NHSBSP) reporting on screening outcomes for April 2017 to March 2018 inclusive and delivery of adjuvant radiotherapy to women diagnosed with screen detected breast cancer between April 2016 and March 2017 inclusive.

The report shows that the NHSBSP continues to show improvement in the already high standards of care received by the overwhelming majority of women who take part in the screening programme. There are clear areas where previous variation in service delivery has decreased or disappeared. It is pleasing to see rising consistency of performance nationally but it is important that we maintain this trajectory of improvement year on year in order to provide the highest level of service for our patients. This annual report is an integral driver for continued improvement and its production is testament to the careful, diligent collection of data by staff in screening services throughout the UK. ABS and PHE wish to acknowledge with gratitude the contributions of these colleagues.

This year's report sees some changes from previous years. With the welcome reduction in previously seen variations within some aspects of service delivery, the audit is, and will be, looking at more qualitative aspects of the screening process. This has prompted a change in nomenclature from *key* performance indicators to *quality* performance indicators (QPIs). We hope that this will reinforce consideration of the quality of experience within the screening process in addition to complying with high technical standards.

We are conscious that there needs to be appropriate governance in place for audits. It is important to ensure that the responsibilities of individuals and organisations are clear and that opportunities to improve quality can be realised in a timely manner. To address this, we have included a document outlining how outliers identified in the QPIs should be managed. We hope that you find this helpful. The Association of Breast Surgery are working with partners in the field to provide clarity about the management of outliers across the range of national breast cancer data audits. We are pleased that we will all be working with the Care Quality Commission going forwards to ensure there is a single route for the follow up of outliers that have the potential to have a significant clinical impact on patients.

This year's audit also presents long term survival outcomes within the screening programme compared with symptomatic patients. Notwithstanding long debated nuances of studying survival data within screening programmes the headline figures presented will reassure all colleagues within the NHSBSP that the work they do has real benefit for the patients we serve.

There remain significant challenges for the NHSBSP, especially in relation to working with outdated information technology. There is significant background work being undertaken to see how the screening programme can rise to these challenges.

Additionally we continue to miss data from Scotland as the programme there migrates from one IT system to another and this is highly regrettable. We hope that there is resolution to this ongoing issue in the near future.

I would like to express my personal thanks to members of the multidisciplinary Screening Audit Steering Group who put extraordinary amounts of time and effort into the production of this report. They are listed below. I would also like to give special mention to Shan Cheung and Helen Price of PHE Screening whose skills and knowledge are integral to the delivery of the annual audit.

Mr Ashu Gandhi
Chair, NHS BSP & ABS Screening Audit Group

Acknowledgements

The 2017/18 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 NHSBSP and ABS Screening Audit Group:

Mr Ashu Gandhi, Chair of the UK NHSBSP & ABS Screening Audit Group, Consultant Surgeon, Manchester University Hospital NHS Foundation Trust.

Dr Pauline Carder, Consultant Histopathologist, Bradford Teaching Hospitals.

Ms Shan Cheung, National Audit Project QA Facilitator, Screening QA Service, PHE.

Dr Eleanor Cornford, Consultant Radiologist, Gloucestershire Hospitals.

Mr Giles Cunnick, Consultant Surgeon, Buckinghamshire Hospitals.

Dr Rahul Deb, Consultant Histopathologist, Royal Derby Hospital.

Prof. David Dodwell, Consultant Clinical Oncology, University of Oxford.

Mrs Jacquie Jenkins, National Programme Manager – Breast Screening, PHE.

Ms Olive Kearins, Head of QA (Midlands and East) and National Lead, Breast Screening QA, PHE.

Miss Helen Price, National Audit Project QA Officer, Screening QA Service, PHE.

Dr Nisha Sharma, Consultant Radiologist, Leeds Teaching Hospitals.

Mr Mark Sibbering, Member, Advisory Committee for Breast Cancer Screening Consultant Surgeon, Royal Derby Hospital.

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Clinical and administrative staff working in the NHS breast screening programme.

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Screening Quality Assurance Service Professional and Clinical Advisors in England and their Celtic country equivalents for the relevant disciplines.

PHE Screening Quality Assurance Service staff working in breast screening and their Celtic country equivalents.

PHE National Cancer Registration Analysis Service staff in the West Midlands who extracted adjuvant, survival and previous cancer data from the Cancer Analysis System.

The office staff of the Association of Breast Surgery for providing organisational support to the audit group.

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Executive summary

Cancer detection

Between 1 April 2017 and 31 March 2018, 2,320,655 women were screened by the UK NHSBSP in England, Northern Ireland and Wales. This is a slight decrease from the previous year as data from Scotland continues to be unavailable as the programme there migrates from one IT system to another. It is hoped that future iterations of the screening audit will be able to include Scottish data.

The cancer detection rate has remained stable in the last decade and this year's figure of over 8 women being diagnosed with cancer for every 1000 screened is broadly in line with the figure for the past 15 years. Of those women given a malignant diagnosis, 4 of every 5 were diagnosed with invasive lesions and 1 of 5 with preinvasive/microinvasive lesions.

Just over half of all diagnosed invasive cancers were less than 15mm in size. The cancer detection rate for these small invasive cancers (3.4 per 1,000 women screened) has also remained consistent over the past 15 years.

In England and Northern Ireland, 1,050 (5%) women diagnosed with breast cancer through screening had a previous breast cancer history recorded. 4 of every 5 of these women had a previous diagnosis of invasive cancer and the remainder non-invasive cancer.

Randomised age extension trial

This trial, which applies to 67 screening units in England only, is evaluating breast screening for women in the 47 to 49 and 71 to 73 years age groups. Over the 7 years of the trial the proportion of women diagnosed with cancer within the trial has risen:

- 47–49 years: 2.8% to 4.8%
- 71–73 years: 4.1% to 6.4%

Non-operative diagnosis

Non-operative diagnosis, for example, diagnosis by needle biopsy in an outpatient setting prior to therapeutic surgery, is the desired method of diagnosis and management for all breast cancers. It permits treatment discussions with the patient advised by the recommendation of a multidisciplinary team.

Pleasingly, almost all units exceeded both the acceptable and achievable standards for invasive cancers with 99% of women receiving a non-operative diagnosis.

Non-operative diagnosis for non-invasive cancers continues to present challenges. Nationally, 93% of women received their diagnosis non-operatively which exceeds the achievable standard for non-invasive malignancy. Eight screening services did not meet the acceptable standard of 85% (3 units fewer than 2016/17) and this should be a source of reflection for these units.

Number of assessment clinic visits

Screening units should strive, wherever possible, to keep the number of visits to the assessment clinic to a minimum as it is widely recognised that these visits can themselves provoke anxiety and concern amongst women. Audit data shows that only one assessment clinic visit is required to establish a definitive diagnosis in 9 of every 10 women with a screen detected malignancy.

Tumour characteristics

There were 3,792 non-invasive cancers (DCIS & LCIS) and 14,619 invasive breast cancers diagnosed (excluding previous cancer cases). Out of 3,548 DCIS cases that underwent surgical treatment, 36% of tumours were less than 15mm in diameter, 17% were larger than 40mm and a total of 63% were high nuclear grade.

Of 14,185 women who were diagnosed with invasive cancer and who underwent surgical treatment, 52% had an invasive tumour smaller than 15mm and 2% had a tumour larger than 50mm. Grade 1 tumours were noted in 25% and grade 3 tumours in 20% of women. The oestrogen receptor (ER) status was known for almost 100% of women with invasive cancer and the vast majority of these (91%) were ER positive. Similarly, HER2 receptor status was known for 99% of cases and in 11% of women were positive.

Surgical treatment

In total, 21% of women with non-invasive cancer underwent mastectomy. It would be clinically reasonable to consider sentinel node biopsy on this group of patients and 88% underwent this procedure.

A slightly lower figure for mastectomy, 17%, was seen in women with invasive disease. If we examine those women with invasive tumours below 15mm in size, 11% had mastectomy. The commonest reasons for this would be concomitant non-invasive disease extending beyond a size suitable for breast conservation or patient preference.

Importantly, lymph node status was known in 99% of women and 20% were found to be lymph node positive.

Proportionately, almost twice as many women undergoing mastectomy for non-invasive cancers underwent immediate breast reconstruction compared with those with invasive disease; 49% v 28% respectively.

Neo-adjuvant systemic therapy

A total of 1,047 women with invasive breast cancer received neo-adjuvant therapy of whom 61% received neo-adjuvant chemotherapy.

Surgical caseload

During 2017/18, 637 breast surgeons treated women with breast cancer from the NHSBSP. Of these 168 (26%) treated fewer than 10 screen detected cases during this audit year. These surgeons should ensure that over a 3 year audit cycle, they treat a total of 30 screen detected breast cancer patients.

Repeat operations

The incidence of repeat operations (defined as more than one operation needed to complete the primary cancer surgery on the breast) is 19% overall. It is much higher, 43%, in those 375 women who did not have a non-operative diagnosis. Women with a diagnosis of non-invasive cancer had a higher incidence of repeat surgery (21%) than those with a diagnosis of invasive cancer (17%).

The axilla

The practice of pre-operative ultrasound assessment of the axilla is now firmly established with 99% of women with a non-operative diagnosis of invasive cancer undergoing this investigation and 92% of those found to have an ultrasonagraphically abnormal node proceeding to needle biopsy. The positive predictive value of an abnormal axillary ultrasound scan was 48% and the negative predictive value 86%.

Adjuvant therapy

Due to changes in the audit process in England the quality of the adjuvant therapy data available for the audit period remains disappointing. As a result, the report can only reliably look at radiotherapy after breast conserving surgery for invasive disease.

For the 2016/17 timeframe (the adjuvant therapy audit trails the diagnosis and treatment audit by one year) only 50% of patients started their radiotherapy treatment within 60 days of final surgery. Whilst this is a 10% increase on last year it remains a source of concern that requires investigation and improvement.

Survival

Fifteen year survival figures for women diagnosed with cancer in the NHSBSP during 2002/03 are presented. These show an adjusted 15 year survival for all screen detected invasive cancers of 89.4%, compared to 70.5% for symptomatic cases. The 15 year survival is highest amongst smaller tumours (<15mm), grade 1 tumours, EPG and GPG NPI prognostic group tumours and node negative tumours.

Introduction

Aims and objectives

The 2017/18 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 practice in the period 1 April 2017 to 31 March 2018 and adjuvant therapy undertaken in the period 1 April 2016 to 31 March 2017. 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:

- Best Practice Guidelines for Surgeons in Breast Cancer Screening
  Association of Breast Surgery, 2018
- Early & Locally Advanced Breast Cancer: Diagnosis and Management. NICE Guideline 101, 2018
- NHS Breast Screening Programme: consolidated standards
  Public Health England, 2017

Organisation of the audit

The format of the audit was designed by the NHSBSP & ABS Screening Audit Group. The organisation of data collection, data evaluation and publication are described in Appendix 1.

Use of the audit data

The annual NHSBSP & ABS Breast Screening Audit data should be used to celebrate high-quality services not just to focus on those not meeting screening QA standards. Achievement of standards and delivery of high quality services should also be recorded and recognised as a tribute to dedicated professionals working within breast services.

Actions following receipt of the audit

At national level

The NHSBSP & ABS Breast Screening Audit data should be considered formally at meetings of the Clinical Professional Groups for Surgery, Radiology and Pathology.

This will provide opportunities to recognise areas of good practice and identify areas where breast screening performance could improve. Resultant recommendations for future modification of the audit including any suggested changes to quality performance indicators should be communicated to the Audit Group by the relevant disciplinary representatives.

At local/sub regional/regional/Celtic country level

The annual NHSBSP & ABS Breast Screening Audit data should be discussed locally at a multidisciplinary meeting of the lead clinicians as a minimum. SQAS staff and the relevant QA PCAs should take steps to acknowledge high quality performance of individual screening services in a variety of settings, such as programme boards. SQAS should disseminate the data locally therefore closing the audit loop.

Surgeons and local units are responsible for reviewing their own performance as outlined in the audit data. Instances where the data are found to be incorrect these should be corrected on the local National Breast Screening System and the audit group informed so that a decision regarding resubmission can be made.

A supportive document is included in appendix 3 to help services to act on performance outside the national norms for the QPIs. The responsibility of individual organisations with respect to following up these outliers is provided.

Your comments

The 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. We wish to continue this development process and your comments and suggestions are welcome.

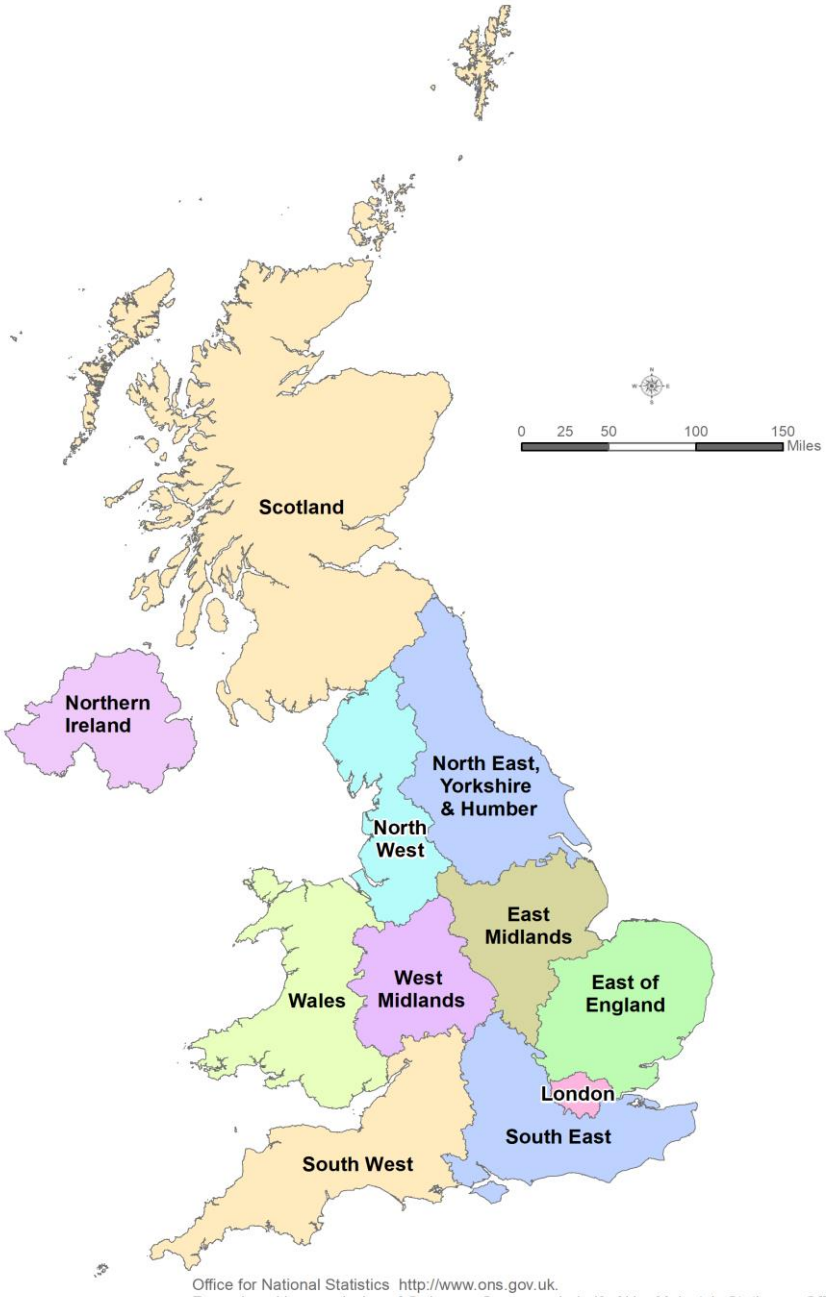
If you wish to communicate with us about the 2017/18 audit report or the development of future NHSBSP & ABS Breast Screening Audits please contact:

Mr. Ashu Gandhi
Chair, UK NHSBSP & ABS Screening Audit Group
c/o Association of Breast Surgery
The Royal College of Surgeons of England
35–43 Lincoln’s Inn Fields
London WC2A 3PE
Email: phe.nhsbspabs@nhs.net

Provision of data for the 2017/18 audit

The map below shows the areas covered by the 8 English QA sub regions and the breast screening information centres in Wales, Scotland and Northern Ireland. There are 4 QA regions in England, combining the sub regions outside of London:

- London
- Midlands and East (East Midlands, West Midlands and East of England)
- North (North West and North East Yorkshire & Humber)
- South (South West and South East)



Screening service participating in the 2017/18 audit

Screening Units Participating in the NHSBSP & ABS Audit						
Subregion or Celtic Country	Unit code	Unit Name	Women Screened	Total Cancers	Invasive Cancers	Non/Micro-invasive Cancers
East Midlands	CDN	Chesterfield/North Derby	17317	155	117	38
	CDS	Derby	35412	313	240	73
	CLE	Leicester	43808	341	282	59
	CLI	Lincolnshire	28515	261	208	53
	CNN	North Nottingham	10955	51	42	9
	CNO	Nottingham	31058	252	211	41
	KKE	Kettering	15106	117	102	15
	KMK	Milton Keynes	10980	98	85	13
	KNN	Northampton	15874	148	110	38
East of England	DCB	Cambridge & Huntingdon	19035	162	130	32
	DGY	Great Yarmouth & Waveney	8447	60	45	15
	DKL	King's Lynn	9905	95	75	20
	DNF	Norfolk & Norwich	22471	198	168	30
	DPT	Peterborough	13260	105	92	13
	DSU	East Suffolk	15702	109	86	22
	DSW	West Suffolk	11547	75	63	12
	ELD	Beds & Herts	58535	436	344	92
	FCO	Chelmsford & Colchester	33311	276	234	42
	FEP	West Essex (Epping)	12009	98	75	22
	FSO	South Essex	26010	202	172	30
London	EBA	North London	59090	515	387	127
	ECX	West London	46469	385	288	97
	FBH	Outer North East London	28488	225	177	48
	FLO	Central and East London	23721	178	135	43
	GCA	South East London	58304	453	367	86
	HWA	South West London	56436	490	383	107
North East, Yorkshire & Humber	AGA	Gateshead	32430	242	187	55
	ANE	Newcastle	38224	356	271	85
	ANT	North Tees	41948	291	218	73
	AWC	North Cumbria	14195	124	96	28
	BHL	Humberside	39464	270	220	50
	BHU	Pennine	41447	323	229	93
	BLE	Leeds Wakefield	40591	355	279	76
	BYO	North Yorkshire	36681	294	233	61
	CBA	Barnsley	12033	67	60	7
	CDO	Doncaster/Bassetlaw	17635	163	140	23
	CRO	Rotherham	10648	99	83	16
	CSH	Sheffield	21450	174	137	37
North West	NCH	Chester	10161	101	81	20
	NCR	Crewe	12948	116	89	27
	NLI	Liverpool	31442	281	221	60
	NMA	East Cheshire & Stockport	20663	161	136	25
	NWA	Warrington, Halton, St Helens & Knowsley	23775	216	165	51
	NWI	Wirral	15140	139	102	36
	PBO	Bolton	23775	200	158	42
	PLE	East Lancashire	20633	168	129	39
	PLN	North Lancashire & South Cumbria	36838	335	241	94
	PMA	Manchester	43419	362	290	72
	PWI	South Lancashire	27834	214	174	40

Screening Units Participating in the NHSBSP & ABS Audit						
Subregion or Celtic Country	Unit code	Unit Name	Women Screened	Total Cancers	Invasive Cancers	Non/Micro-invasive Cancers
South East	JBA	North & Mid Hants	20555	198	153	45
	JIW	Isle of Wight	6786	44	39	5
	JPO	Portsmouth	23134	209	161	48
	KHW	Aylesbury & Wycombe	21554	183	151	32
	KOX	Oxfordshire	24072	211	173	38
	KRG	West Berkshire	21604	151	121	30
	KWI	East Berkshire	18057	169	130	39
	GBR	Brighton	32429	287	214	73
	GCT1	Canterbury	27948	235	188	47
	GCT2	Maidstone	19028	180	130	50
	GCT3	Medway	24205	204	166	38
	HGU	Guildford	53776	514	380	134
	HWO	Worthing	31904	294	239	55
South West	JDO	Dorset	39777	407	318	89
	JSO	Southampton & Salisbury	29344	285	215	70
	JSW	Wiltshire	24921	222	182	40
	LAV	Avon	43049	418	321	97
	LCO	Cornwall	20431	186	143	43
	LED	North & East Devon	24962	210	172	38
	LGL	Gloucestershire	28831	242	192	50
	LPL	West Devon	23807	254	196	58
	LSO	Somerset	21460	142	124	18
	LTB	South Devon	12675	96	74	20
West Midlands	MBS	South Birmingham	14277	111	83	28
	MBD	City, Sandwell & Walsall	41007	301	236	65
	MCO	Warwickshire, Solihull & Coventry	44244	318	269	49
	MDU	Dudley & Wolverhampton	30995	284	223	61
	MHW	Hereford & Worcester	35762	324	264	60
	MSH	Shropshire	25040	208	161	47
	MST	North Staffordshire	27675	230	164	66
Northern Ireland	ZNE	Eastern	26770	213	176	37
	ZNI	Northern	14264	107	83	24
	ZNS	Southern	13392	113	98	15
	ZNW	Western	13664	104	84	20
Wales	WNM	North Wales	28367	263	219	44
	WSE	South Wales	55733	544	428	116
	WSW	West Wales	30017	306	257	49

Main and adjuvant audit data from Scotland is not available. Scotland provided survival audit data.

Quality performance indicators

Benchmarking individual breast screening services against key performance indicators (KPIs) has been a tool to assess the performance levels of service offered to women in the breast screening programme. Over the years the wide disparity seen in KPI values in all disciplines across differing breast screening units has narrowed considerably. For example, in tumour grade identification, non-operative diagnosis of cancers or re-excision operations there has been a decrease in the number of units failing to meet KPI targets over time. Thus, instituting KPIs (and local support and focus) has resulted in a welcome improvement in consistency of service offered to women in the NHSBSP. There is scope for further improvement and the annual screening audit is central to identifying and driving areas for ongoing advancement.

With time the screening audit has started examining more qualitative aspects of the breast screening pathway. To promote these aspects of the service this year's audit sees a change in nomenclature from Key Performance Indicators to *Quality* Performance Indicators (QPIs).

Breast screening units will continue to be benchmarked against important clinical parameters but in future years quality parameters will also be assessed, for example, the presence of a specialist breast care nurse at the assessment clinic.

The discipline specific QPIs are considered and chosen by the multidisciplinary Screening Audit Group based on consideration of the key moments of a woman's journey through the breast screening, diagnostic and treatment processes. The QPIs may refer to, but are not limited to, the national consolidated standards for the NHSBSP (www.gov.uk/government/publications/breast-screening-consolidated-programme-standards). QPIs may vary annually or the Screening Audit Group may wish to return to previously examined topics to examine year on year data.

QPIs for the 2017/18 audit are presented below.

Identifying outlier performance

Statistical methods allow for the identification of services with outlier performance which is unlikely to occur by chance alone. There is a balance to be drawn between setting the confidence limits too narrowly, resulting in a higher chance of incorrectly identifying as outliers those whose performance is no worse than standard; and setting the limits too widely, with the risk that sub-standard performance may be missed.

Identification of a service as an 'outlier' is not in itself evidence of poor practice, rather a reason to investigate the possible reasons for outlier performance in more detail. Any

such investigation should be undertaken in a supportive and collaborative manner, so that best practice is ensured, and be fully documented. Issues of data quality are frequently the cause of outlying event rates.

Throughout the text, services that have not achieved or are outliers for a quality assurance (QA) standard or quality performance indicator are highlighted in text boxes. Services should use this information to instigate local investigation of their performance and to identify either errors in the data which should be fed back as previously outlined, factors which explain the performance demonstrated in the data or outlier performance which should be managed in line with their host trust clinical governance policies.

2017/18 quality performance indicators

Radiology

R1 Proportion of B3 diagnosed lesions eligible for VAE that proceed to surgery: <25% of B3 lesions eligible for VAE should be managed with surgical excision

R2 Recall to assessment rate at prevalent round (age 45-52*): >=10% identified as outliers.

*Celtic countries are not part of the Age X trial so provided data for age 50-52.

R3 Recall to assessment rate within high risk/family history patients: >=12% identified as outliers.

Pathology

P1 Invasive cancer grade: 1-year and 3-year 99.7% high and low outlier services for invasive cancer grade status.

P2a Invasive cancers with positive lymph node status: 1-year and 3-year 99.7% high and low outlier services for lymph node positivity, OSNA centres only.

P2b Invasive cancers with positive lymph node status: 1-year and 3-year 99.7% high and low outlier services for lymph node positivity, excluding OSNA centres.

P3 Lymphovascular invasion rates for invasive cancers: 1-year 99.7% high and low outlier services for lymphovascular invasion found in invasive cancers (excluding services with >10% unknown lymphovascular status)

Surgery

S1 Individual surgeon screening cancer caseload over a 3-year period

S2a Surgical examination of axillary lymph nodes: 3-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: 3-year high outlier units with cases of non-invasive cancers treated by breast conserving surgery that have any lymph nodes excised.

S3 Reconstruction for non-invasive cancers: 5-year low outlier units with immediate reconstruction following mastectomy for non-invasive cancer cases.

Oncology

O1 Radiotherapy after breast conserving surgery: 1-year 95% upper control limit outliers for patients with invasive cancer treated with breast conserving surgery with no adjuvant radiotherapy or unknown adjuvant radiotherapy excluding patients over 65, with an invasive tumour size of less than 20mm and an ER+, grade 1 or 2 cancer.

Radiology

Radiology QPI R1

Proportion of B3 diagnosed lesions which have open surgical biopsies.
<25% of B3 lesions eligible for Vacuum Assisted Excision (VAE) should be managed with surgical excision

In England, 2,963 women had B3 as the worst core biopsy result. Of these, 237 (8%) were upgraded to malignancy (B5b and B5a) after surgery. B3 lesions upgraded to B5a/B5b at VAE are excluded from this analysis.

There were 3,112 B3 lesions eligible for VAE, of which 928 (30%) had surgery. To be eligible for VAE fibroepithelial and stromal lesions were excluded from cases without atypia and papilloma lesions were excluded from cases with atypia. Please note that B3 lesions available for VAE counts lesions rather than women. Some cases had a B3 lesion with atypia and another without hence there being more B3 lesions eligible for VAE than women with B3 as the worst core biopsy result.

B3 cases can be divided into cases with and without atypia, of which there were 1,551 and 1,625 cases respectively.

Of 1,618 B3 cases without atypia, eligible for VAE (fibroepithelial and stromal lesions excluded):

- 1,167 (72.1%) had VAE only
- 451 (27.9%) had surgery
- 83 (5.1%) were upgraded to malignancy

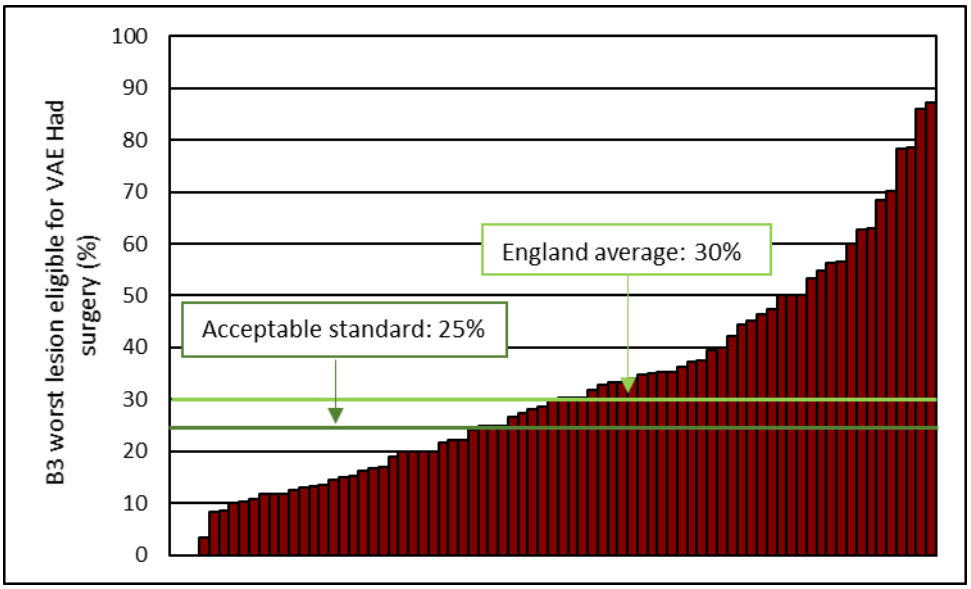
Of 1,494 B3 cases with atypia, eligible for VAE (papilloma lesions with atypia excluded):

- 1,017 (68.1%) had VAE only
- 477 (31.9%) had surgery
- 69 (11.3%) were upgraded to malignancy

This QPI only uses England data but it is hoped Celtic countries will be included in future audits.

This QPI uses a new dataset and is not robust enough to label units as outliers in this audit cycle. With the introduction of a new VAE code for the next audit cycle it is expected that the data will be strong enough to reflect clinical practice.

Figure 1: Percentage of women with B3 as their worst non-operative diagnosis, eligible for VAE who proceeded to have surgery



Radiology QPI R2

Recall to assessment at prevalent round (age 45-52):
Acceptable: less than 10% recall rate
Achievable: less than 7% recall rate

In England 835,028 women aged 45 to 52 and in Wales and Northern Ireland 78,181 women aged 50-52 were screened for the first time through NHSBSP in the 3-year period 2015 to 2018. Wales and Northern Ireland are not part of the Age Extension trial and so they have provided data for women aged 50 to 52.

- of these 913,209 women, 7.6% were recalled for assessment
- 33 of 86 services met the achievable target of less than 7% in 2015 to 2018
- 7 services did not meet the acceptable target and had a recall rate more than or equal to 10%

Outlier units in QPI R2
with prevalent recall rate (>=10%)

		2015-2018	2014-2017
Sub region	Unit	%	%
North West	NWI	13.1	14.6
North West	PBO	10.3	10.1
South West	JDO	10.9	10.2
South West	LAV	10.6	11.2
South West	LPL	10.7	12.0
West Midlands	MST	10.2	12.0
Northern Ireland*	ZNE	11.0	-
UK (excluding Scotland)		7.6	7.9

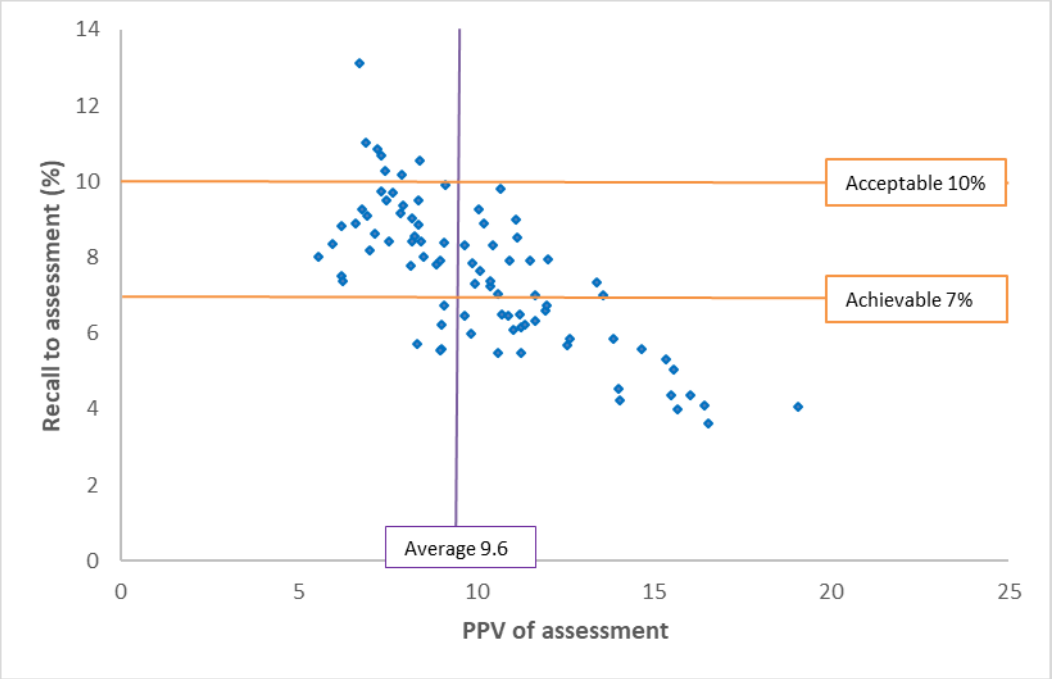
*Celtic countries are not part of the age extension trial and therefore only provided data for ages 50-52

To examine the relationship between recall to assessment rates and positive predictive value (PPV) of assessment, the proportion of women recalled for assessment and diagnosed with cancer (including those with open biopsy) was explored for women aged 45 to 52 at prevalent round (Figure 2).

- average PPV of assessment for UK excluding Scotland is 9.6%
- all 7 units with high recall to assessment rate have a PPV for assessment lower than average
- 28 of 33 services who met the achievable target have PPV higher than the average

There is a trend that units with a higher recall to assessment rate have a lower positive predictive value (PPV) for assessment. Therefore, the higher recall rate is not associated with a higher cancer detection rate. Units are advised to audit their recalls and see if measures can be put in place to reduce the number of benign lesions being recalled back to assessment.

Figure 2: Recall to assessment rate vs PPV of assessment (prevalent round age 45 to 52), using UK data excluding Scotland from the audit year 2015 to 2018



Radiology QPI R3

Recall to assessment rate within high risk/family history patients:
Acceptable: less than 12% recall rate
Achievable: less than 10% recall rate

Over the three-year period 2015 to 2018, 19 of the 84 services in England and Northern Ireland recalled more than or equal to 12% of their high risk women for assessment.

- as expected, recall rate and cancer detection rate in this group is higher than for the general population
- the average recall rate for England and Northern Ireland is 9.8%; range 0%-33%
- the cancer detection rate for England and Northern Ireland is 16.2 per 1000 screened; range 0 to 48.4 per 1000 screened
- the cancer detection rate for all non-high risk women is 8.5 per 1000 screened

As the number of women in this QPI is small it will take time to build up robust data on which reliable analysis can be undertaken.

Outlier units for QPI R3 - Recall rates of family history patients: 1 year outliers ≥12%

		2017/18	
Sub region	Unit	Number of high risk women screened	%
East Midlands	KMK	90	15.6
East Midlands	KNN	131	13.0
East of England	DCB	304	13.2
East of England	DGY	54	13.0
London	EBA	632	12.3
London	ECX	352	14.2
London	FBH	188	13.8
London	FLO	366	16.4
London	HWA	516	12.2
North West	NWI	91	15.4
North West	PLE	153	12.4
South East	HGU	511	16.0
South East	KHW	186	14.5
South East	KWI	173	16.2
South East	JIW	62	14.5
South East	JPO	228	14.0
South West	JSO	348	12.6
South West	LAV	178	17.4
South West	LPL	133	12.8
England and NI		18044	9.8

Pathology

Pathology QPI P1

Invasive cancer grade
One-year and 3-year 99.7% high and low outlier services for invasive cancer grade status.

Invasive cancer grade is a prognostic factor that plays an important role in pre and post-operative treatment planning. Of the 86 screening services in the UK (excluding Scotland), 11 services were outliers for this QPI, 3 of these services were outliers in the previous year's audit.

For Grade 1 tumours there were 5 low and 3 high outlier units.
For Grade 2 tumours there were 2 low and 1 high outlier units.
For Grade 3 tumours there were 3 low and 0 high outlier units.

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

Sub region	Unit	Grade 1 2017/18 %	Grade 1 3-year 2015-18 %	Grade 2 2017/18 %	Grade 2 3-year 2015-18 %	Grade 3 2017/18 %	Grade 3 3-year 2015-18 %
East Midlands	KKE	12.0	13.0	67.4	66.4	20.7	20.2
London	GCA	21.0	23.0	64.6	60.4	14.3	16.3
NEYH	ANE	36.5	34.7	44.2	44.5	19.3	20.2
NEYH	ANT	14.9	15.5	60.5	62.9	24.6	21.7
North West	NCH	12.5	14.4	69.4	61.0	18.1	24.6
North West	NMA	24.6	30.6	64.6	57.5	10.8	11.4
North West	PWI	39.0	38.2	49.4	49.3	11.6	12.3
South East	GCT2	33.6	30.0	56.0	57.3	9.5	12.2
South East	KRG	14.2	18.0	69.0	63.8	16.8	17.7
South West	JDO	15.8	19.5	65.4	58.1	18.2	20.9
South West	LSO	42.0	37.4	42.0	47.2	16.1	15.2
UK (excluding Scotland)		**24.2**	**24.5**	**56.1**	**55.0**	**19.3**	**19.2**

99.7% low outlier
99.7% high outlier

Pathology QPI P2a

Invasive cancers with positive lymph node status
One-year and 3-year 99.7% high and low outlier services for lymph node positivity, OSNA centres only.

This QPI looks at differences between screening services in axillary lymph node positivity rates. Part (a) looks exclusively at patients treated in hospitals using One Step Nucleic acid Amplification (OSNA) technique, or similar, to assess lymph nodes. Part (b) looks at all units using standard immunohistochemical assessment of lymph node status.

In the UK (excluding Scotland), 21 screening services (of 86) have performed OSNA for breast cancer patients in 2017/18 treating a total of 2,093 patients diagnosed with invasive cancer and who had axillary surgery. Of these patients, 21% had positive nodal status.

1 service was a low outlier.

Proportion of invasive cancers with positive lymph node status in services using OSNA technique

Sub-region	Unit	2017/18		3-year 2015 - 2018
		No.	%	%
South West	LAV	29	13.7	17.1
UK (excluding Scotland)		**442**	**21.1**	**23.6**

99.7% low outlier

99.7% high outlier

Pathology QPI P2b

Invasive cancers with positive lymph node status
One-year and 3-year 99.7% high and low outlier services for lymph node positivity, excluding OSNA centres.

This QPI looks at differences between screening services in axillary lymph node positivity rates. Part (b) excludes centres using One Step Nucleic acid Amplification (OSNA) technique, or similar. For OSNA centres, see part (a).

In the UK (excluding Scotland), 18% of patients that had invasive cancers treated and had an axillary operation in a hospital that did not use OSNA were found to have

positive nodes. This is statistically significantly lower than the 21% with positive nodes treated in a hospital that use OSNA (Pearson's chi-square test p-value=0.0011).

There were no outliers for this QPI.

Proportion of invasive cancers with positive lymph node status

Sub-region	Unit	2017/18		3-year 2015 - 2018
		No.	%	%
No Outliers				
UK (excluding Scotland)		**2185**	**18.3**	**19.1**

99.7% low outlier

99.7% high outlier

Pathology QPI P3

Lymphovascular invasion
One-year 99.7% high and low outlier services for lymphovascular invasion found in invasive cancers (excluding services with >10% unknown lymphovascular status)

Excluding neoadjuvant chemotherapy cases, 9% of surgically treated invasive cancer had no information on lymphovascular invasion. This figure varied between 0% (4 services) to 95% of cases with no lymphovascular invasion information (1 service). 21 services had at least 10% and 9 services had at least 20% of cases with no lymphovascular invasion data.

Services should ensure the lymphovascular invasion information is collected, as this is part of the minimum dataset and may contribute to management decisions.

Services with >20% of invasive cancer cases with unknown lymphovascular invasion status

Sub-region	Unit	2017/18	
		No.	%
East of England	DCB	32	30.8
East of England	DKL	59	95.2
London	EBA	76	23.6
London	GCA	83	27.2
NEYH	CRO	15	20.8
North West	PLN	52	23.3
South East	KWI	41	36.3
South West	JSW	89	55.3
Wales	WNM	61	28.6
UK (excluding Scotland)		**2185**	**8.6**

Services with 10-20% unknown lymphovascular invasion present

Sub-region	Unit	2017/18	
		No.	%
East Midlands	CLE	42	16.7
East Midlands	CNO	27	15.6
East of England	FSO	19	12.6
London	FLO	13	12.1
NEYH	AGA	18	10.4
NEYH	ANE	33	14.2
North West	NMA	17	13.7
North West	NWI	8	11.0
North West	PMA	45	17.9
South West	JBA	20	15.3
South West	JIW	<5	11.1
Wales	WSW	32	14.0
UK (excluding Scotland)		**2185**	**8.6**

Excluding neoadjuvant chemotherapy cases, 12% (range 2-30%) of surgically treated invasive cancers had lymphovascular invasion present.

The following table lists the outlier services who lie above the 99.7% upper or below the 99.7% lower control limits, and have less than 10% of cases with unknown lymphovascular invasion status.

Proportion of invasive cancers with lymphovascular invasion present

Sub-region	Unit	2017/18	
		No.	%
NEYH	CDO	7	5.3
South West	JPO	<5	2.3
South West	LAV	13	5.0
South West	LGL	39	23.6
South West	LSO	<5	4.1
Northern Ireland	ZNE	51	29.7
Northern Ireland	ZNS	26	28.3
UK (excluding Scotland)		**2185**	**18.3**

99.7% low outlier

99.7% high outlier

Surgery

Surgery QPI S1 **Individual surgeon screening cancer caseload over a 3 year period**

Published evidence [1-4] in peer reviewed journals indicates that patient outcomes for breast cancer care, including screening patients, is correlated with annual surgical caseload. The Association of Breast Surgery guidelines for screening unit surgeons therefore indicate that these surgeons should have an annual caseload of 10 screen detected cancers averaged over a 3 year period.

Between 2015-2018, audit data shows that 323 surgeons had an average annual caseload of less than 10 screen detected cancers. These surgeons treated 2,266 women across the UK (excluding Scotland).

Directors of breast screening may wish to review the surgical caseloads of the surgeons within their services to examine if the recommended annual number of cases is achieved. There may be valid reasons why this may not be the case e.g. maternity leave, illness etc.

8 Surgeons had an average caseload of over 100 screening detected cancers annually. These surgeons treated 2,314 women across the UK.

Annual screening surgical caseload per surgeon 2015-2018

Sub-region	Total surgeons	<10 cases		≥10 cases	
		No.	%	No.	%
East Midlands	62	16	25.8	46	74.2
East of England	82	32	39.0	50	61.0
London	127	72	56.7	55	43.3
N East, Yorks & Humber	99	35	35.4	64	64.6
North West	101	39	38.6	62	61.4
South East	102	34	33.3	68	66.7
South West	91	31	34.1	60	65.9
West Midlands	85	35	41.2	50	58.8
Northern Ireland	19	2	10.5	17	89.5
Scotland	51	19	37.3	32	62.7
Wales	29	8	27.6	21	72.4
UK	**848**	**323**	**38.1**	**525**	**61.9**

Proportion of women referred to surgeons according to annual caseload of surgeon 2015-2018

Sub-region	Total (Referred)	<10 cases		≥10 cases	
		No.	%	No.	%
East Midlands	5027	85	1.7	4942	98.3
East of England	5500	176	3.2	5324	96.8
London	6217	492	7.9	5725	92.1
N East, Yorks & Humber	8321	337	4.0	7984	96.0
North West	6864	263	3.8	6601	96.2
South East	7844	241	3.1	7603	96.9
South West	8174	233	2.9	7941	97.1
West Midlands	5567	279	5.0	5288	95.0
Northern Ireland	1535	33	2.1	1502	97.9
Scotland	1424	80	5.6	1344	94.4
Wales	3464	47	1.4	3417	98.6
UK	**59937**	**2266**	**3.8**	**57671**	**96.2**

Surgery QPI S2a

Surgical examination of axillary lymph nodes
3-year 95% high outlier services with more than 5 nodes obtained from node negative invasive cancers (excluding cases with neo-adjuvant therapy).

Unnecessary removal of excessive axillary lymph nodes can cause potentially avoidable morbidity for patients.

During 2015 to 2018, there were 9 services who were 95% high outliers of which 3 were higher than the 99.7% control limit. 8 of these services were outliers in the previous year's audit. These 9 services should examine their results and review areas for possible improvement. In these 9 services, 3 were 95% high outliers and 1 was a 99.7% high outlier in 2017/18.

Outlier units in QPI S2a and their proportion of node negative invasive cancers with more than 5 nodes obtained

Sub-region	Unit	3-year 2015-18		2017/18		Previous 2016/17
		No.	%	No.	%	%
East of England	DSW	12/166	7.2	<5	2.5	7.6
East of England	ELD	64/728	8.8	21/239	8.8	7.0
East of England	FCO	34/433	7.9	14/163	8.6	5.8
NEYH	ANT	33/535	6.2	6/156	3.8	5.3
South East	GBR	31/435	7.1	12/145	8.3	8.3
South East	GCT3	26/364	7.1	<5	1.8	3.3
South East	HGU	40/787	5.1	9/251	3.6	3.7
South East	KRG	15/231	6.5	<5	2.6	11.1
Wales	WNM	32/541	5.9	7/168	4.2	7.4
UK (excluding Scotland)		**1077/33830**	**3.2**	**307/10848**	**2.8**	**3.0**

99.7% high outlier

95% high outlier

Surgery QPI S2b

Surgical examination of axillary lymph nodes:
3-year high outlier units with cases of non-invasive cancers treated by breast conserving surgery that have any lymph nodes excised.

Unnecessary removal of excessive axillary lymph nodes can cause potentially avoidable morbidity for patients.

In 2015 to 2018 4 services were 95% high outliers for this QPI, one of which was higher than the 99.7% control limit. For the year 2017/18 1 of these 4 services was a 95% high outlier, this is the same service which is a 99.7% high outlier over 3 years.

Outlier units in QPI S2b and their proportion of non-invasive cancers treated by breast conserving surgery which have had lymph nodes excised

Sub-region	Unit	3-year 2015-18				2017/18	
		No of patients*.	%	Mean no. of nodes removed	Range	No.	%
East Midlands	CDN	9/63	14.3	2.3	1-3	<5	8.3
East of England	DNF	10/58	17.2	2.2	1-3	<5	19.0
London	FBH	13/113	11.5	2.2	1-4	<5	0.0
South West	JSW	15/80	18.8	2.3	1-7	6/23	26.1
UK (excluding Scotland)		446/8682	5.1			139/2830	4.9

99.7% high outlier

95% high outlier

*numerator = number of patients with non-invasive cancer having BCS and lymph node excision, denominator = total number of patients having BCS for non-invasive disease

Surgery QPI S3

Reconstruction for non-invasive cancers
Five-year low outlier units with immediate reconstruction following mastectomy for non-invasive cancer cases.

The decision on whether to proceed with immediate breast reconstruction following mastectomy for non-invasive cancers, e.g. ductal carcinoma in situ (DCIS) is multifactorial. Therefore, it is not appropriate to have a target figure for this QPI. However, it is reasonable to expect most screening units to fall between 3 standard deviations of the mean figure for the UK (excluding Scotland). Outlying units are not inevitably practicing suboptimal surgery but may wish to reflect on their practice to establish the reason for their numbers. Over the 5 year period of 2013 to 2018, 13 services were low outliers, 3 at the 99.7% confidence level. In 2017/18, 3 of the 13 services are outliers for this QPI, 2 of which were lower than the 99.7% control limit.

Reconstruction rates following mastectomy for DCIS (5 years), units lower than the 95% lower control limit

Sub-region	Unit	5 year 2013/14-2017/18		2017/18	
		No.	%	No.	%
East Midlands	CNN	6/20	30.0	<5	100.0
East Midlands	KKE	13/41	31.7	<5	33.3
East of England	DSW	6/21	28.6	<5	50.0
London	EBA	49/124	39.5	<5	6.9
London	FBH	18/53	34.0	<5	0.0
North West	PBO	26/67	38.8	<5	33.3
Northern Ireland	ZNS	<5	15.4	<5	100.0
South East	GCT1	21/59	35.6	<5	22.2
South East	KRG	14/39	35.9	<5	60.0
South West	LPL	10/39	25.6	<5	40.0
Wales	WNM	16/49	32.7	7/12	58.3
Wales	WSW	36/115	31.3	7/14	50.0
West Midlands	MSH	19/57	33.3	<5	33.3
UK (excluding Scotland)		**2259/4426**	**51.0**	**404/807**	**50.1**

99.7% low outlier

95% low outlier

The transition of data collection for London to the model of a centralised Hub identified anomalies around data collection. Further updated data and information is available.

Oncology

Oncology QPI O1

Radiotherapy after breast conserving surgery
One-year 95% upper control limit outliers for patients with invasive cancer treated with breast conserving surgery with no adjuvant radiotherapy or unknown adjuvant radiotherapy excluding patients over 65 years, with an invasive tumour size of less than 20mm and an ER+, grade 1 or 2 cancer

Adjuvant radiotherapy is accepted as an essential part of treatment for the majority of women with invasive breast cancers treated by breast conserving surgery. In the 86 screening services in the UK (excluding Scotland), 10 services were outliers for this QPI, three of which were outside the 99.7% control limit.

Patients over 65 years with an invasive tumour size of less than 20mm, ER positive and grade 1 or 2 were excluded from this cohort as they have a very low absolute risk of local recurrence as per NICE guidelines [5]

Radiotherapy after breast conserving surgery: 1-year 95%-control limit outliers for patients with invasive cancer treated with breast conserving surgery with no or unknown adjuvant radiotherapy excluding patients over 65 years, with an invasive tumour size of less than 20mm and an ER+, grade 1 or 2 cancer.

Sub-region	Unit	2016/17		3-year 2014-17	Previous 2015/16
		No.	%	%	%
East of England	ELD	29	12.2	11.4	12.4
London	EBA	32	13.9	16.4	21.1
London	ECX	22	13.3	15.2	22.0
South East	GBR	15	13.4	13.1	15.7
South East	GCT2	17	15.9	7.7	1.3
South East	HGU	33	13.3	14.5	17.3
South East	KHW	19	21.1	15.9	17.1
South East	KOX	17	17.0	12.8	10.6
South West	JSW	14	13.2	18.3	32.3
West Midlands	MAS	13	13.0	10.1	11.8
UK (excluding Scotland)		**588**	**6.4**	**6.7**	**6.8**

99.7% high outlier
95% high outlier

Summary table of QPI outliers

Sub region - Service	Radiology			Pathology							Surgery				Oncology	Total outlier topics
	R1	R2	R3	P1	P1-G1	P1-G2	P1-G3	P2a	P2b	P3	S1	S2a	S2b	S3	O1	
East Midlands – CDN													Y			1
East Midlands – CDS																0
East Midlands – CLE																0
East Midlands – CLI																0
East Midlands – CNN														Y		1
East Midlands – CNO																0
East Midlands – KKE				Y	Y									Y		2
East Midlands – KMK			Y													1
East Midlands – KNN			Y													1
East of England – DCB			Y													1
East of England – DGY			Y													1
East of England – DKL																0
East of England – DNF													Y			1
East of England – DPT																0
East of England – DSU																0
East of England – DSW												Y		Y		2
East of England – ELD												Y			Y	2
East of England – FCO												Y				1
East of England – FEP																0
East of England – FSO																0
London – EBA			Y											Y	Y	3
London – ECX			Y												Y	2
London – FBH			Y										Y	Y		3
London – FLO			Y													1
London – GCA				Y		Y										1
London – HWA			Y													1
NEYH – AGA																0
NEYH – ANE				Y	Y	Y										1
NEYH – ANT				Y	Y							Y				2
NEYH – AWC																0
NEYH – BHL																0
NEYH – BHU																0
NEYH – BLE																0
NEYH – BYO																0
NEYH – CBA																0
NEYH – CDO										Y						1
NEYH – CRO																0
NEYH – CSH																0
North West – NCH				Y	Y											1
North West – NCR																0
North West – NLI																0
North West – NMA				Y			Y									1
North West – NWA																0
North West – NWI		Y	Y													2

Sub region - Service	Radiology			Pathology							Surgery				Oncology	Total outlier topics
	R1	R2	R3	P1	P1-G1	P1-G2	P1-G3	P2a	P2b	P3	S1	S2a	S2b	S3	O1	
North West – PBO		Y												Y		2
North West – PLE			Y													1
North West – PLN																0
North West – PMA																0
North West – PWI				Y	Y		Y									1
South East – JBA																0
South East – JIW			Y													1
South East – JPO			Y							Y						2
South East – KHW			Y												Y	2
South East – KOX															Y	1
South East – KRG				Y	Y							Y		Y		3
South East – KWI			Y													1
South East – GBR												Y			Y	2
South East - GCT1														Y		1
South East - GCT2				Y			Y								Y	2
South East - GCT3												Y				1
South East - HGU			Y									Y			Y	3
South East - HWO																0
South West - JDO		Y		Y	Y											2
South West – JSO			Y													1
South West - JSW													Y		Y	2
South West - LAV		Y	Y					Y		Y						4
South West - LCO																0
South West - LED																0
South West - LGL										Y						1
South West - LPL		Y	Y											Y		3
South West - LSO				Y	Y	Y				Y						2
South West - LTB																0
West Midlands - MAS															Y	1
West Midlands - MBS																0
West Midlands - MBD																0
West Midlands - MCO																0
West Midlands - MDU																0
West Midlands - MHW																0
West Midlands - MSH														Y		1
West Midlands - MST		Y														1
Northern Ireland - ZNE1		Y								Y						2
Northern Ireland - ZNI1																0
Northern Ireland - ZNS1										Y				Y		2
Northern Ireland - ZNW1																0
Wales - WNM												Y		Y		2
Wales - WSE																0
Wales - WSW														Y		1
United Kingdom		**7**	**19**	**11**	**8**	**3**	**3**	**1**	**0**	**7**	**0**	**9**	**4**	**13**	**10**	**81**

Audit results

Cancer detection

2,320,655 women were screened by the NHS BSP between April 2017 & March 2018.

Data is included for 86 screening services across England, Wales and Northern Ireland. No data was available from the Scottish screening services due to an IT system migration. It is anticipated that this issue will be resolved for future annual screening audits.

Table 1: Annual number and rates of cancers detected from the inception of the NHSBSP and ABS audit

23-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
1995/96	5,496	-	1,332	6,857	-	-	-	-	-
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
2014/15*	16,231	8,435	4,378	20,613	2,414,795	6.7	3.5	1.8	8.5
2015/16*	17,081	8,916	4,382	21,466	2,503,938	6.9	3.6	1.8	8.7
2016/17*	15,880	8,288	4,161	20,049	2,387,040	6.7	3.5	1.7	8.4
2017/18*	15,484	7,891	4,125	19,616	2,320,655	6.7	3.4	1.8	8.5

* Data from Scotland are absent in 1998/99, 2016/17 and 2017/18. West of Scotland screening service data are absent in 2014/15. East of Scotland screening service data are absent in 2015/16.

19,616 breast cancers were detected in women of all ages:

- this includes women with a previous breast cancer diagnosis
- 15,484 (78.9%) invasive
- 3,965 (20.2%) non-invasive
- 160 (0.8%) micro-invasive
- 7 cancers - invasive status unknown

UK cancer detection rates (excluding Scotland):

- all cancers: 8.5 per 1,000 women screened
- small invasive cancers: 3.4 per 1,000 women screened (<15mm in diameter)

6 screening services had cancer detection rates below 3.0 per 1,000 women screened for small invasive cancers (<15mm) each year throughout the period 2015–18; 5 of these units are also significant low outliers in 2017/18 at 95% confidence level. 4 of them screened more than 15,000 women in 2017/18.

Randomised controlled Age Extension trial in the NHSBSP

This trial is evaluating breast screening for women aged 47 to 49, and 71 to 73 years in England. As of 31 March 2018, 66 of 79 screening services in England have participated in the trial. The proportion of cancers diagnosed in the age groups increased as follows from 2010/11 to 2017/18:

- 47–49 years: 2.8% to 4.8%
- 71–73 years: 4.1% to 6.4%

The Age Extension trial is ongoing and results that may inform decision making regarding implementation of breast screening in these age groups are not expected until the 2020s. There is currently no equivalent trial in Northern Ireland and Wales.

Previous breast cancer history

Women diagnosed with screen detected breast cancer in England were checked to see if they had a previous breast cancer diagnosis.

1,050 (5%) women had at least one previous breast cancer recorded:

- 80% had previous invasive/micro-invasive breast cancer
- 22% had previous non-invasive breast cancer

- the proportion of women with a previous breast cancer increased with age, the proportion for women aged >64 years being 8%
- as Wales and Northern Ireland did not provide previous cancer data, women with previous breast cancer could not be excluded from their analysis

Women with a previous breast cancer history are included in the numbers for the cancer detection, diagnostic open biopsies and surgical caseload sections of the report [pages 39, 44, 55]. However, they have been excluded from some analyses where previous surgery and/or treatment may confound this year's audit figures.

Diagnosis

Non-operative diagnosis

The data below **exclude** women with a previous diagnosis of breast cancer.

Quality Objective	**To ensure that the majority of cancers receive a non-operative tissue diagnosis of cancer**
Acceptable Standard	**≥90% of all invasive cancers should have a non-operative pathological diagnosis** **≥85% of all non-invasive cancers should have a non-operative pathological diagnosis**
Achievable Standard	**≥95% of all invasive cancers should have a non-operative pathological diagnosis** **≥90% of all non-invasive cancers should have a non-operative pathological diagnosis**

(NHS Breast Screening Programme consolidated standards, Public Health England, April 2017)

Of 18,566 cancers detected in women of all ages (excluding previous cancers):

- 98% had a confirmed non-operative diagnosis by needle biopsy
- 2% did not have a non-operative diagnosis (n=381)
- 3 cases had C5 cytology only to achieve a non-operative diagnosis

14,619 were invasive cancers:

- 99% had a confirmed non-operative diagnosis by needle biopsy
- all services met the 90% acceptable standard
- all services met the 95% achievable standard

3,695 were non-invasive cancers (excluding 97 cases of Lobular Carcinoma in Situ (LCIS)):

- 93% had a confirmed non-operative diagnosis by needle biopsy
- 8 services did not meet the 85% acceptable standard
- 21 services did not meet the 90% achievable standard

Core biopsy and surgical outcome:

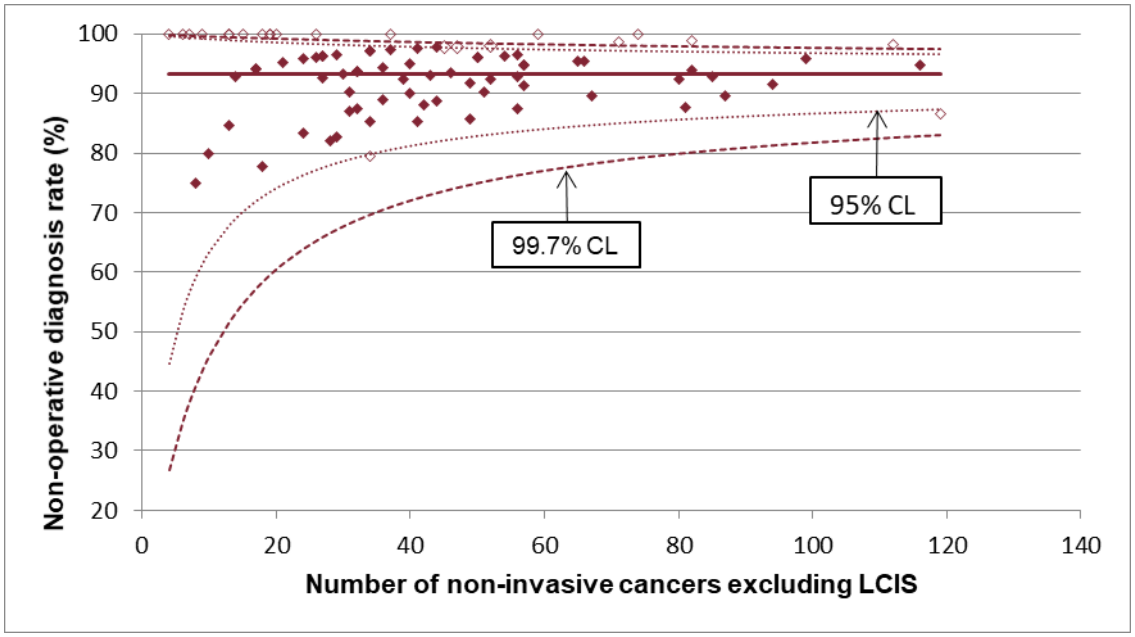
In 2017/18, 80 (0.4%) cancers had a malignant but B5c categorisation at core biopsy, (i.e. the invasive status was either not assessable or unknown), final diagnoses in these 80 patients were

- 37 = invasive cancer
- 39 = non-invasive cancer
- 1 = microinvasive cancer
- 3 = unknown

739 (18%) of 4,195 cases diagnosed as non-invasive (B5a) on diagnostic core biopsy were upgraded from non-invasive to invasive cancer at surgery

133 (1%) of 12,525 cancers diagnosed as B5b (invasive) on non-operative diagnostic biopsy (excluding cases which had neo-adjuvant therapy) were found to have non-invasive or micro-invasive cancer with no associated invasive disease following surgery. The likely causes of this are either that the invasive focus was removed by the core biopsy or incorrect interpretation of the core biopsy as showing invasive disease. These cases require additional audit by the units involved.

Figure 3: Screening service variation in non-operative diagnosis rate of non-invasive cancers (excluding LCIS) (2017/18)



For the 3-year period 2015 to 2018, 5 services had a non-operative diagnosis rate for non-invasive cancers (excluded LCIS) below 85%, compared with 17 services for 2014-17 period.

Number of assessment clinic visits

It is possible that the drive to improve non-operative diagnosis performance could inadvertently result in increased anxiety, with women having to return to assessment clinic for repeated diagnostic tests before receiving a definitive diagnosis:

Of 18,566 women diagnosed with screen detected breast cancer in the UK (excluding Scotland):

- 16,903 (91%) had one assessment clinic visit to obtain the first malignant diagnosis on the breast
- 18,118 (98%) obtained the first malignant diagnosis on the breast within 2 assessment clinic visits

677 (5%) of women with invasive cancer and 593 (16%) of women with non-invasive had more than one visit to obtain a malignant diagnosis

In 2017/18, there were 1000 (7%) invasive cancers and 335 (12%) non-invasive cancers where a malignant needle biopsy result (either B5 core biopsy or C5 cytology) was obtained at the first visit, but where a repeat needle biopsy was undertaken at a subsequent visit usually to aid surgical planning.

Diagnostic open biopsies

The data below **includes** women with a previous diagnosis of breast cancer.

Quality Objective	**To minimise unnecessary surgery**
Acceptable Standard	**<15 per 10,000 prevalent screen (1.5 per 1,000)** **<10 per 10,000 incident screen (1.0 per 1,000)**
Achievable Standard	**<10 per 10,000 prevalent screen (1.0 per 1,000)** **<7.5 per 10,000 incident screen (0.75 per 1,000)**

(NHS Breast Screening Programme consolidated standards, Public Health England, April 2017)

In 2017/18, 1,281 diagnostic open biopsies were performed. Of these:

- 69% were benign
- 31% were malignant

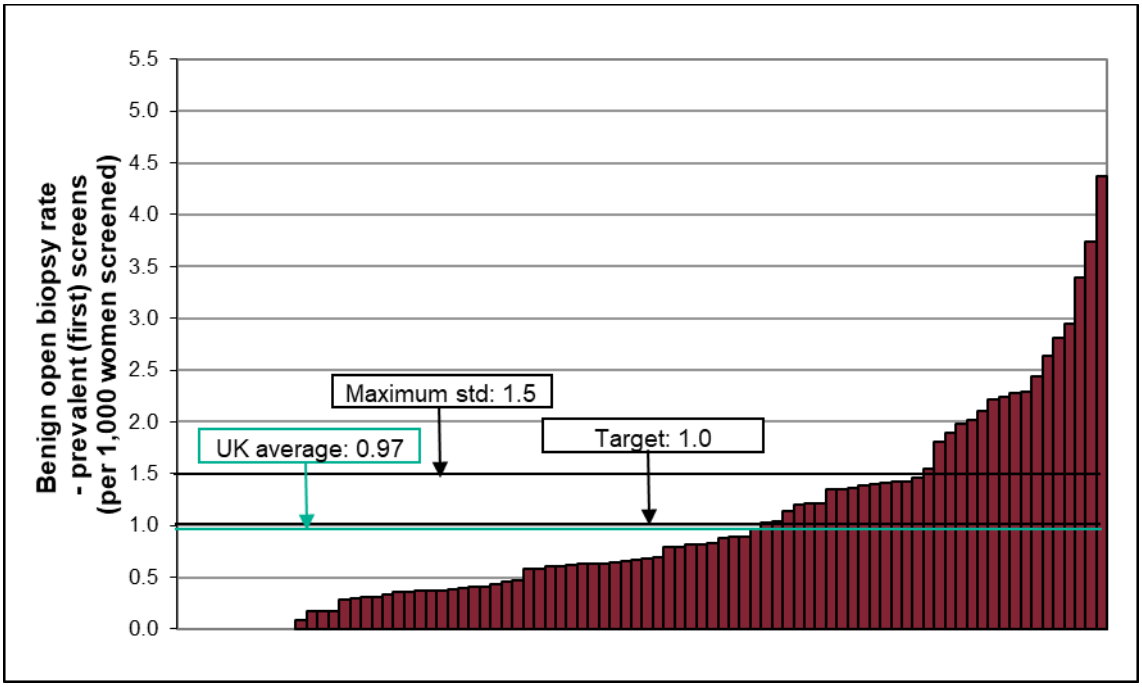
Benign open biopsies (n=878)

The overall benign biopsy rate has fallen from 1.5 per 1,000 women screened in 1996/97 to 0.4 per 1,000 screened in the current year. This reflects the improvement in non-operative diagnosis. The exact benign biopsy rates for this year's audit are:

- 0.97 per 1,000 for prevalent (first) screens
- 0.28 per 1,000 for incident (subsequent) screens

For prevalent (first) screens, 54 services achieved the target standard of 1.0 per 1,000 women, but 17 services performed more biopsies than the maximum standard of 1.5 per 1,000 women (Figure 4).

Figure 4: Variation between screening services in benign diagnostic open biopsy rates for prevalent (first) screens expressed as the number of diagnostic open biopsies undertaken per 1,000 women screened (2017/18)



For incident (subsequent screens after the first one) screens, 84 services achieved the achievable standard of 0.75 per 1,000 women, and 1 service performed more biopsies than the maximum standard of 1.0 per 1,000 women.

Malignant open biopsies (n=403)

The overall malignant open biopsy rate has fallen from 2.04 per 1,000 women screened in 1996/97 to 0.17 per 1,000 in the current year. Of the cases undergoing a malignant open biopsy

81 were invasive cancers:

- 29 had a suspicious needle biopsy result (either B4 core biopsy or C4 cytology).
- 39 had an equivocal needle biopsy result (either B3 core biopsy or C3 cytology).
- 9 cases were B2/C2, 3 were B1/C1, 1 had no non-operative diagnosis results

319 were non-invasive/micro-invasive:

- 98 had a suspicious (B4/C4) needle biopsy result
- 210 had an equivocal (B3/C3) needle biopsy result
- 7 cases were B2/C2, 0 were B1/C1 and 4 had no non-operative diagnosis

Of 250 cancers which had B3/C3 as the worst non-operative results, 52 (21%) had only LCIS in the surgical specimen.

Tumour characteristics

The data below **exclude** women with a previous diagnosis of breast cancer.

Non-invasive cancers (n=3,792)

- 3,695 (97%) were Ductal Carcinoma in Situ (DCIS)
- 97 (3%) were Lobular Carcinoma in Situ (LCIS) only at surgery

Ductal Carcinoma in Situ (n=3,695)

- 3,548 (96%) underwent surgical treatment

Size:

- of these, 94% had complete information on size
- 36% were less than 15mm in diameter
- 17% were larger than 40mm
- for 5 cases the size was not assessable
- in 195 cases (5%) no evidence of DCIS was found in the surgical specimen. In these cases, the DCIS was presumably removed on the diagnostic needle biopsy
- each of these cases must be reviewed by the screening services involved

Grade:

- of those undergoing surgery, 99% had complete information on grade
- 63% were high nuclear grade
- 28% were intermediate nuclear grade
- 8% were low nuclear grade
- For 9 cases grade was not assessable

In 2017/18, 9 services had significantly higher and 5 services had significantly lower proportions of high nuclear grade DCIS than the national average of 63% (95% confidence intervals).

Nodal status:

Axillary staging surgery is not routinely recommended for patients having treatment for DCIS alone. It may rarely be considered in patients at high risk of occult invasive disease, for example, cases with microinvasion.

864 (24%) of the 3,548 surgically treated cases of DCIS had known nodal status:

- 90% of women with DCIS treated with mastectomy had known nodal status
- 5% of women with DCIS treated with breast conserving surgery had known nodal status
- 13 had positive nodal status recorded (11 mastectomy, 2 breast conserving surgery). The screening services involved in these 13 cases should review each case to establish the cause of this discrepancy

In 2017/18, nodal status was known for more than 10% of DCIS treated by breast conserving surgery in 16 services and for more than 20% in 5 services. Nodal status was known for 100% of cases of DCIS treated by mastectomy in 48 services and for less than 60% in 1 service.

The proportion of DCIS with ER status varied widely between services from 0 to 100%. 83% of DCIS cases with known ER status were ER positive. Progesterone receptor (PR) status was known for 16% of cases.

Lobular Carcinoma in Situ only at surgery (n=97)

- 48 (49%) had a B3 as the worst non-operative diagnosis
- 44 (45%) had a B5a non-operative diagnosis
- 94 (96%) were treated with breast conserving surgery
- 3 were treated with mastectomy (2 B5a and 1 B3 on core biopsy)
- 3 cases had 2 or more operations to the breast
- 4 cases had axillary operations (2 B5a, 1 B5C and 1 B3 on core biopsy)

Invasive cancer (n=14,619)

- 14,185 invasive cancers (97%) were surgically treated

Size:

- 7,421 (52%) had an invasive tumour diameter < 15mm
- 330 (2%) had an invasive tumour diameter > 50mm
- whole tumour size was not provided for 642 (5%) cancers

Grade:

- 25% grade 1
- 55% grade 2
- 20% grade 3
- grade was not assessable for 29 cancers and unknown for 23 cancers

There were 11 services which were 99.7% high or low outliers for invasive cancer grade for the 2017/18 audit and also over the period 2015 to 2018 (Pathology QPI P1- page 27). However, as these data are at service as opposed to laboratory level this may not truly reflect individual laboratory performance.

Nodal status:

- 14,037 (99%) had known nodal status (148 cases unknown)
- overall, including all screening services, 19% were node positive (n=2,627)
- the rates of node positivity varied from 8% to 34% in individual services
- Of the 14,048 that had axillary surgery, 1,626 (12%) had one positive node at the first axillary operation:
  - 586 (36%) contained micrometastasis
  - 1016 (62%) contained macrometastasis

In services using molecular assays (e.g. OSNA) for sentinel node assessment, there was one service which was a low outlier (99.7% C.I.) for positive nodal status for 2017/18 and 2015 to 2018. For the services without OSNA, no service was an outlier for positive nodal status (Pathology QPI P2a and P2b respectively - page 28)

It is known from previous audit that, for nodal status, a number of high outlier services are served by hospitals using molecular methods for nodal assessment, with higher rates of positive nodes containing micrometastases.

Nottingham Prognostic Index

The Nottingham Prognostic Index (NPI) may be used to estimate the prognosis of surgically treated invasive breast cancers. For surgically treated invasive cancers (with no neoadjuvant therapy) the NPI could be calculated for 13,719 (97%). Of these:

- 20% were in the excellent prognostic group (EPG)
- 39% in the good prognostic group (GPG)
- 36% in the moderate prognostic group (MPG)
- 5% in the poor prognostic group (PPG)

The NPI was unknown for 466 cases. 17 screening services had over 5% of cases with unknown Nottingham Prognostic Index.
During 2017/18, 1 service was a 95% high outlier for poor prognosis (PPG) cancers, 7 services were 95% low outliers for excellent/good prognosis (EPG/GPG) cancers.

Receptor status

Of the 14,619 invasive cancers, ER status was unknown for 38 cases.

Of the 14,581 invasive cancers with known ER status, 91% were ER positive.

Progesterone receptor PR status was known for 8,863 (61%) of invasive cancers:
- 77% were positive

Of the 1,274 invasive cancers with negative ER status:
- 82% had known PR status
- 4% were PR positive

HER2 status data were available for 99% (14,448 cases) of invasive cancers
- 31 services had complete HER2 status for all their invasive cancers
- of the invasive cancers with known HER2 status:
    - 11% were positive
    - 87% were negative
    - 2% were borderline on immunohistochemistry. Borderline cases will usually undergo fluorescence in situ hybridization (FISH) testing

Surgical treatment

The data below **exclude** women with a previous diagnosis of breast cancer.

Type of surgery

3,792 non-invasive cancers (including LCIS):

- 2,838 (75%) treated with breast conserving surgery
- 807 (21%) treated with mastectomy
- 147 had no surgery recorded within the audit period

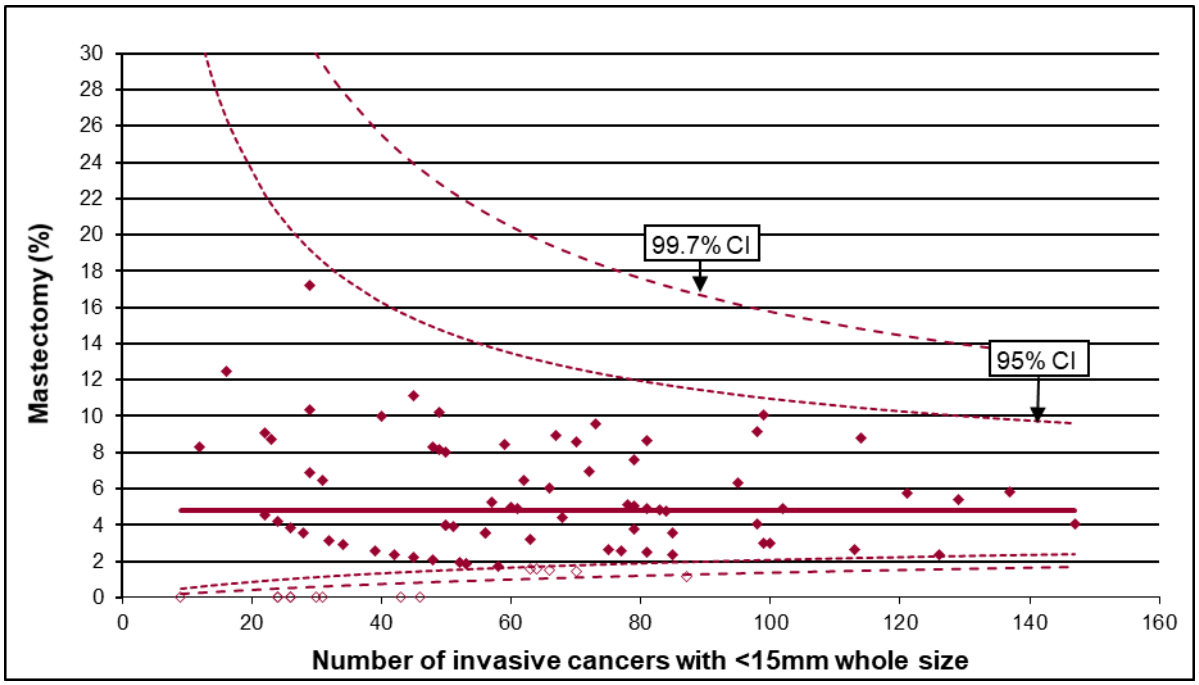
14,619 invasive breast cancers:

- 11,669 (80%) of patients had breast conserving surgery (10 had axillary surgery only)
- 2,516 (17%) had mastectomy
- 434 (3%) had no surgery recorded within the audit period
    - 51% of these women had neo-adjuvant therapy

Small (<15mm invasive size) invasive cancers (n= 7,422)

- 11% had mastectomy

Figure 5: Screening service variation in proportion of mastectomies for whole tumour size <15mm (2017/18)



Whole tumour size refers to size of invasive component plus size of surrounding non-invasive component:

- 5% of surgically treated cancers with whole tumour size <15mm were treated with mastectomy (Figure 5)
- 77% of small invasive (<15mm) cancers, but with whole tumour diameter >50mm due to surrounding non-invasive disease, were treated with mastectomy
- the presence of non-invasive disease which extends beyond the invasive lesion appears to account for a proportion of the mastectomies performed on small invasive cancers

Immediate breast reconstruction

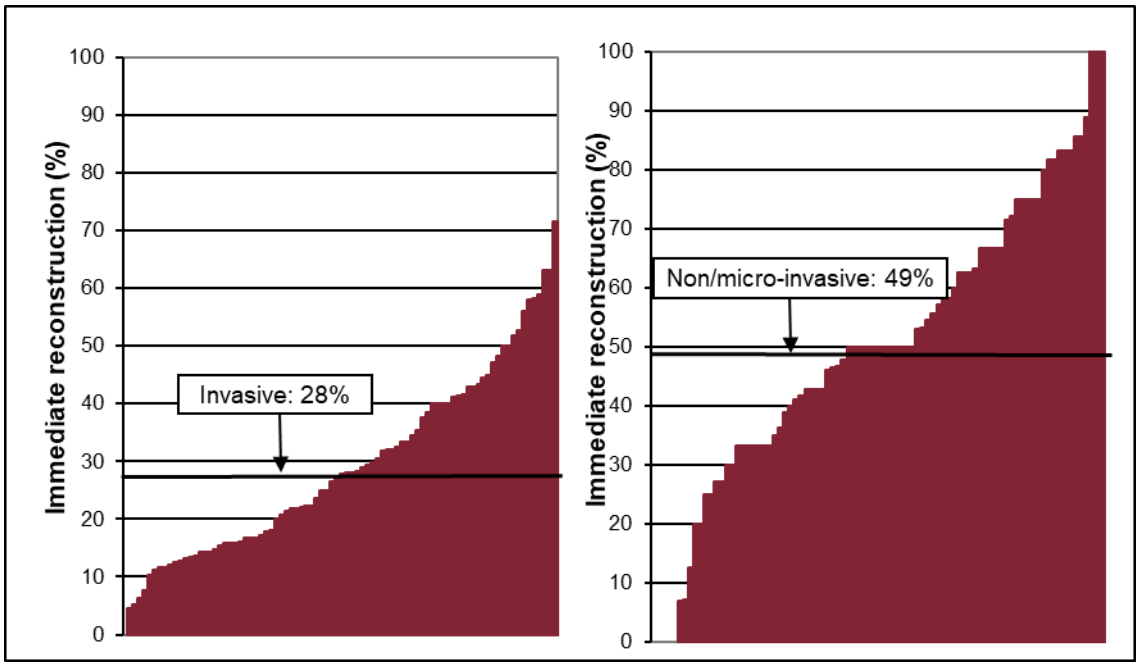
- immediate reconstruction was recorded for 33% of cases undergoing mastectomy
- immediate reconstruction rates after mastectomy were almost twice as high for micro/non-invasive cancers (49%) compared to invasive cancers (28%)
- for the most recent 3 years, the national picture on the percentage of cases having an immediate reconstruction has been stable

IMMEDIATE RECONSTRUCTION RATES FOR BREAST CANCER PATIENTS TREATED BY MASTECTOMY						
Invasive status	**2012/13**	**2013/14**	**2014/15**	**2015/16**	**2016/17**	**2017/18**
Invasive	24%	24%	27%	27%	27%	28%
Non/micro-invasive	44%	47%	54%	52%	50%	49%
Overall	**29%**	**30%**	**34%**	**33%**	**33%**	**33%**

Table 2. Rate of mastectomies with immediate reconstruction by invasive status

- for invasive cancers, breast service immediate reconstruction rates varied from 0 to 71% (Figure 6)
- for non/micro-invasive cancers, breast service immediate reconstruction rates varied 0 to 100%

Figure 6: Variation between screening services in immediate reconstruction rates for invasive (left) and non/micro-invasive cancers (right) (2017/18)



Neo-adjuvant systemic therapy

1,075 women received neo-adjuvant systemic therapy:

- 1,047 (98%) had invasive breast cancer
- 27 (1%) had non-invasive breast cancer; 26 were recorded to have neo-adjuvant endocrine therapy; 1 was recorded to have neo-adjuvant chemotherapy and trastuzumab (patient had involved lymph nodes)
- 1 had breast cancer of unrecorded invasive status with involved lymph nodes

54% of the 434 women with invasive breast cancer who did not have surgery up to the end of the follow up period had neo-adjuvant therapy recorded (Appendix 1)

Neo-adjuvant endocrine therapy was used in 453 (2%) of 18,566 women:

- 146 (32%) of these 453 women had no surgery in the audit period
- 96% had cancers that were ER and/or PR positive
- 6 cancers were recorded to be ER and PR negative
- 427 was prescribed for women with invasive cancers; 26 was for non-invasive cancers

There were 600 women older than 75 years diagnosed with breast cancer by the screening programme during 2017/18:

- 64 of these 600 women had neo-adjuvant endocrine treatment
    - of these 64 women, 27 had surgery within the follow-up period

Neo-adjuvant chemotherapy is recorded for 645 (4%) of 14,619 invasive cancers

- in this group, there were 212 cases (33%) that were 20mm or smaller on ultrasound, 25 cases which were grade 1 and 407 (63%) cases did not have a B5 or C5 lymph node biopsy result.
- 84 women with invasive cancer were recorded as having received neo-adjuvant trastuzumab
    - of these, 6 women (7%) had no neo-adjuvant chemotherapy recorded

Surgical caseload

Quality Objective	**To ensure specialist surgical care**
Outcome Measure	**Each surgeon involved in the NHSBSP should maintain a surgical caseload of at least 10 screen-detected cancers per year, averaged over a 3 year period. It is expected that surgeons with low caseloads should be able to demonstrate an annual surgical workload of at least 30 treated breast cancers (screen-detected and symptomatic).**

(Best practise guidelines for surgeons in breast cancer screening, Association of breast surgery, January 2018)

In 2017/18, 637 breast surgeons treated women diagnosed in the NHSBSP:

- amongst women who attended their screening appointment in the screening round 2017/18, there were 168 surgeons who treated fewer than 10 patients with screen detected breast cancer (Table 49 of Appendix 4)

From April 2015 to March 2018, 848 surgeons treated women diagnosed in the NHSBSP:

- 323 surgeons (38%) had an annual average caseload of fewer than 10 cases
- the highest proportions of surgeons with a screening caseload of fewer than 10 screening cases per year were in London (57%), West Midlands (41%), East of England (39%) and North West (39%)

Repeat operations

The data below **exclude** women with a previous diagnosis of breast cancer.

Quality objective	**To minimise the number of therapeutic operations in women undergoing breast conservation surgery for an invasive cancer**
Original Acceptable standard	**> 95% of patients should have 3 or fewer operations**
Original Achievable standard	**100% of patients should have 3 or fewer operations**

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

3,332 (19%) surgically treated breast cancers had 2 or more operations

Of 375 surgically treated breast cancers that were diagnosed by open surgical biopsy (i.e. **without** a non-operative diagnosis):

- 161 (43%) had more than one operation; this includes further breast or axillary surgery
- 76% of invasive cancers and 35% of non/micro-invasive cancers without a non-operative diagnosis had a repeat operation
- repeat operations for cancers without a non-operative diagnosis formed only 5% of all repeat operations

Of 17,608 surgically treated breast cancers **with** a non-operative diagnosis:

- 3,171 (18%) had more than one operation; this includes further breast or axillary surgery
- 17% of invasive cancers and 21% of non/micro-invasive cancers had more than one operation
- 39 cases (0.2% of surgically treated cancers with a non-operative diagnosis) initially treated by breast conserving surgery had more than 3 therapeutic operations

743 invasive cancers had B5a (non-invasive) as the worst core biopsy result:

- the repeat operation rate was 56%
- 352 (47%) had the first axillary operation performed at the repeat operation

Of the 11,942 women who had breast conserving surgery as the first operation for an invasive cancer:

- the repeat operation rate was 18% (any type of operations)
- the breast repeat operation rate was 14% (n=1,636)
- 11,922 (99.8%) had 3 or fewer breast operations

In 2017/18, all screening services have achieved the >95% acceptable standard for 3 or fewer operations, and 70 screening services achieved the 100% target.

Of 8,818 surgically treated invasive cancers without non-invasive component (whole tumour size = invasive size), excluding neo-adjuvant treatment cases:

- 7,714 had breast conserving surgery as the first operation; of which 733 (10%) had a repeat operation to the breast

Of 3,010 non-invasive cancers initially treated by breast conserving surgery, 715 (24%) had a repeat breast operation to obtain clear margins.

Of 2,719 women who had non-invasive cancers with a non-operative diagnosis and initially treated by breast conserving surgery:

- 593 (22%) had margin distance less than 1mm or a reached margin with unknown distance at the first operation; Of these 106 (18%) had no re-excision

Axilla

The data below **exclude** women with a previous diagnosis of breast cancer.

Non-operative assessment

Quality objective	**To increase the non-operative diagnosis of axillary node metastases**
Achievable 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**

NHS breast screening programme, Clinical guidance for breast cancer screening assessment, NHSBSP publication number 49, 4th ed. 2016

A total of 13,754 cancers in the UK (excluding Scotland) had a non-operative diagnosis of invasive cancer on breast core biopsy (B5b), including cases having neoadjuvant chemotherapy but excluding cases with previous cancer:

13,642 (99%) had an axillary ultrasound recorded:

- 11,566 (85%) had a normal ultrasound result
- 2,076 (15%) had an abnormal ultrasound result
    - 1,905 (92%) cases with an abnormal axillary ultrasound had a biopsy of an axillary node

851 (6%) women with a non-operative diagnosis of the invasive cancer in the breast also had a non-operative confirmation of axillary lymph node metastasis.

Of the 2,627 invasive cancers with proven axillary metastasis postoperatively, 26% (683) had non-operative confirmation of axillary lymph node metastasis preoperatively.

1,731 invasive cancers cases had an abnormal axillary ultrasound (excluding neo-adjuvant therapy cases):

- 1,674 had axillary surgery and 809 had one or more positive node obtained, giving a positive predictive value (probability of being node positive) of an abnormal ultrasound of 48%. At service level, positive predictive value ranged from 0% to 100%

11,629 of all invasive cancers cases (based on final invasive status) had a normal axillary ultrasound (excluding neo-adjuvant therapy cases):

- 11,371 had axillary surgery and 9,797 had only negative nodes obtained, giving a negative predictive value (probability of being node negative) of a normal ultrasound of 86%. At service level, negative predictive value ranged from 74% to 98%

Axillary surgery

Quality Objective	**To ensure adequate staging of the axilla in patients with invasive breast cancer**
Acceptable 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**
Achievable 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**

(NHS Breast Screening Programme consolidated standards, Public Health England, April 2017)

In 2017/18 in the UK (excluding Scotland), of the 14,185 surgically treated invasive cancers:

- 14,048 (99%) had an axillary operation
- 14,037 (99%) had known nodal status
- 148 cases had unknown nodal status
- 16 cases had an axillary operation but the nodal status is unknown
    - All had no nodes harvested
- 49 cases had < 4 nodes obtained from sampling or clearance without sentinel lymph node biopsy (SLNB)

Of the 14,037 invasive cancers with known nodal status:

- 2,627 (19%) were node positive
- 594(4%) were known to only have micro-metastases

Quality Objective

Perform minimal surgery, rather than lymph node clearance, to stage the axilla for people with invasive breast cancer and no evidence of lymph node involvement on ultrasound or a negative ultrasound-guided needle biopsy. Sentinel lymph node biopsy (SLNB) is the preferred technique.

Perform SLNB using the dual technique with isotope and blue dye.

(Early and locally advanced breast cancer: diagnosis and management, NICE guidelines [NG101] Published July 2018)

12,970 (91%) surgically treated invasive cancers had sentinel lymph node biopsy (SLNB):

- median number of nodes taken was 2
- 1,845 (14%) were node positive
- 84% used isotope and blue dye
- 10% used isotope only
- 5% used blue dye only

1,079 (8%) surgically treated invasive cancers had sampling or clearance without SLNB:

- 782 (72%) were node positive
- The median nodes taken was 13

Of 14,037 invasive cancers with known nodal status:

- 13,372 (95%) had 1 axillary operation
    - 168 had a SLNB and sampling at the same operation
    - 191 had a SLNB and clearance at the same operation (including OSNA centres)
- of the 196 cases which had sampling without SLNB, median: 5 nodes taken
- of the 881 cases which had clearance without SLNB, median:15 nodes taken
- 660 (5%) had 2 or more axillary operations
    - 97% had positive nodes at the first axillary operation

Of 14,619 invasive cancers:

- 22 cases had no nodes harvested at the first axillary operation
    - 6 had a repeat axillary operation

Of 13,372 surgically treated invasive cancers without neo-adjuvant therapy:

- 10,848 were node negative; Of these, 307 (3%) had more than 5 nodes examined

In the 2015/18 period, 9 services were 95% high outliers in having more than 5 nodes examined from node negative invasive cancers. Of these, 3 are also 99.7% high outliers. (Surgery QPI S2a – page 32)

Of the 148 surgically treated **micro-invasive cancers**:

- 94 (64%) had known nodal status
    - 98% treated with mastectomy had known nodal status
    - 45% treated with breast conserving surgery had known nodal status

Of the 3,548 surgically treated **non-invasive cancers** (LCIS cases excluded):

- 864 (25%) had known nodal status
    - 90% treated with mastectomy had known nodal status
    - 5% treated with breast conserving surgery had known nodal status
    - 13 had positive nodal status recorded
- 847 (24%) had sentinel lymph node biopsy:
- 88% of those treated with a mastectomy had SLNB
    - 6 cases had mastectomy and axillary clearance

Of the 2,744 non-invasive cancers treated with breast conserving surgery (LCIS excluded):

- 138 (5%) had axillary operations

Adjuvant Therapy

The adjuvant audit data for 2016/17 is obtained from the Cancer Analysis System (CAS) held by Public Health England (PHE). The sources for CAS include basic cancer registration data, the radiotherapy dataset (RTDS), the national chemotherapy database (SACT) and the Cancer Outcomes and Services Dataset (COSD). Adjuvant audit data was obtained manually for Northern Ireland and Wales. Scotland were unable to provide any adjuvant audit data.

For England, data completeness is approximately 22-39% for systemic therapy in invasive cancers and 87-96% for radiotherapy after breast conserving surgery (BCS) in invasive cancers, but lower after BCS for DCIS. The only area where data completeness is sufficient to conduct meaningful audit is radiotherapy after BCS for invasive disease.

The tables in Appendix 5 provide data for adjuvant therapies but the audit along with the associated outlier management is confined solely to the use of radiotherapy after breast conserving surgery.

As in previous years, the audit reports the number of patients who had a prior diagnosis of any cancer. This is around 13% of the total. Around a half of this group had a prior breast cancer and clearly previous surgical and adjuvant therapy will affect adjuvant therapy decisions for the screen-detected index breast cancer. There is a decreased use of adjuvant radiotherapy in this group.

Time to radiotherapy is variable and it is clear that some services continue to struggle to provide timely adjuvant radiotherapy. Of the 8,111 patients with invasive cancer who had radiotherapy after an operation (excluding cases with chemotherapy):

- 50% of patients started their radiotherapy treatment within 60 days of final surgery; ranging from 0% in a service with 14 cases to 95% in a service with 20 cases
- only 10 services had at least 80% of their patients starting their radiotherapy treatment within 60 days of final surgery
- 93% started their radiotherapy treatment within 90 days of final surgery; ranging from 65% in a service with 71 cases to more than 95% in 43 services

3 services are outside the 99.7% control limits and another 7 are outside 95% control limits for no or unknown radiotherapy after BCS for invasive disease (Oncology QPI O1 – page 36). These services need to review their data handling to identify whether the apparent low use of radiotherapy is a data problem or a governance concern. Most of these services have previously recorded lower than expected radiotherapy use.

Survival

UK NHSBSP data for women with breast cancers detected between 1 April 2002 and 31 March 2003 were combined with England, Wales, Scotland and Northern Ireland data to analyse breast cancer survival. Date definitions are slightly different between England and Celtic countries because of system requirements. The England cohort was based on the diagnosis date recorded in English Cancer Analysis System (CAS) whereas the Celtic countries cohort was based on the screening date in the Wales, Scotland and Northern Ireland breast screening programmes. The dates of diagnosis and death were subsequently collected from the Welsh, Northern Ireland and Scottish Cancer Registries.

In addition to screen-detected cancers, information regarding symptomatic cancer patients diagnosed between 1 April 2002 and 31 March 2003 was collected from England CAS. Symptomatic data was not available from Celtic countries. In this document, symptomatic breast cancer is defined as a breast cancer which was not diagnosed through NHSBSP. These cancers may/may not have symptoms, and may be diagnosed through private screening programmes.

Any deaths were recorded up to the study end date of 31 March 2018, enabling survival for periods of up to 15 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 and cause of death were obtained from cancer registries and the Office for National Statistics (ONS).

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, sex and country. The cumulative relative survival is defined 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 cumulative 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 UK Government Actuary Department. Individual life tables for England, Wales, Northern Ireland and Scotland were obtained 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 in log scale. These are presented in brackets following the relative survival rate. Relative survival curves were tested for statistically significant differences using

likelihood ratio tests for inequality. Relative survival was calculated, using the statistical package STATA.

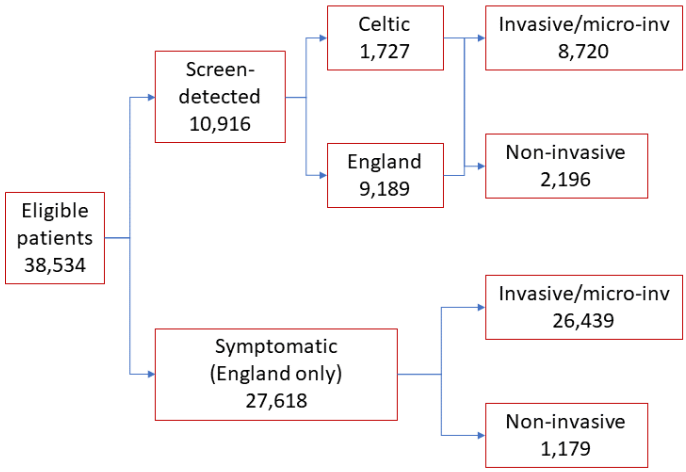
Results

Data on 39,873 patients were collected. After exclusion of 1,339 cases because of (a) symptomatic patients from Celtic Countries (these cases were not registered within the Cancer Analysis System), (b) history of previous breast cancer, and (c) unknown invasive status, 38,534 cases were eligible for analysis.

Of these, 10,916 were screen-detected and 27,618 symptomatic breast cancer patients.
In England, of the 36,807 eligible cases, 9,189 (25%) were screen-detected breast cancer patients.

Only data from screen-detected cancer patients were available from the Celtic countries information teams.

Figure 7: Survival audit cohort



In 2002/03, the NHSBSP invited women aged between 49 and 65 for screening mammography. Of the 38,534 eligible patients, 17,601 patients were aged 49 to 65 at diagnosis. Of these, 9,315 (53%) had screen-detected invasive and non-invasive breast cancer in 02/03.

Table 3 Number of deaths as on 31 March 2018 for invasive and micro-invasive breast cancers diagnosed between April 2002 and March 2003 (UK, all ages). Percentage is based on the total patients.

	Breast cancer deaths	Overall deaths	Total
Screen-detected [1]	924 (11%)	2306 (26%)	8720
Symptomatic[2]	8462 (32%)	15650 (59%)	26439

[1]all UK cases; [2]England only cases

Table 4 Number of deaths as on 31 March 2018 for non-invasive breast cancers diagnosed between April 2002 and March 2003 (UK, all ages). Percentage is based on the total patients.

	Breast cancer deaths	Overall deaths	Total patients
Screen-detected[1]	56 (3%)	354 (16%)	2196
Symptomatic[2]	47 (4%)	297 (25%)	1179

[1]all UK cases; [2]England only cases

Table 5 Number of deaths as on 31 March 2018 for invasive and micro-invasive breast cancers for patients aged 49 to 65 at diagnosis in 2002/03, UK

	Breast cancer death	Overall death	Total patients
Screen-detected[1]	779 (11%)	1728 (23%)	7392
Symptomatic[2]	2172 (28%)	3081 (39%)	7837

[1]all UK cases; [2]England only cases

Table 6 Number of deaths as on 31 March 2018 for non-invasive breast cancers for patients aged 49 to 65 at diagnosis, UK

	Breast cancer deaths	Overall deaths	Total patients
Screen-detected[1]	51 (3%)	258 (13%)	1923
Symptomatic[2]	7 (2%)	52 (12%)	449

[1]all UK cases; [2]England only cases

Relative survival analysis

Analysis excludes 603 patients in whom date of diagnosis recorded in cancer registry is the same as date of death. These cases are likely to be death certificate only (DCO) cases. For DCO cases, the diagnosis date recorded in cancer registry is the date when the cancer is found, usually at autopsy. Thus, their true “diagnosis date” and hence the survival time is unknown.

15-year relative survival for all patients with breast cancer in this 02/03 cohort is 73.0% (95% CI: 72.3%, 73.7%).

For 17,536 patients aged 49 to 65, their 15-year relative survival rate is 82.5% (81.7%, 83.3%). For screen-detected breast cancer patients in this age group,15-year relative

survival rate is 91.6% (90.6%, 92.5%), compared to 72.2% (71.0%, 73.4%) for symptomatic breast cancer patients in the same age group.

The following table shows the survival rate by invasive status.

Table 7 15-year relative survival rate (%) by invasive status for patients aged 49-65 at diagnosis

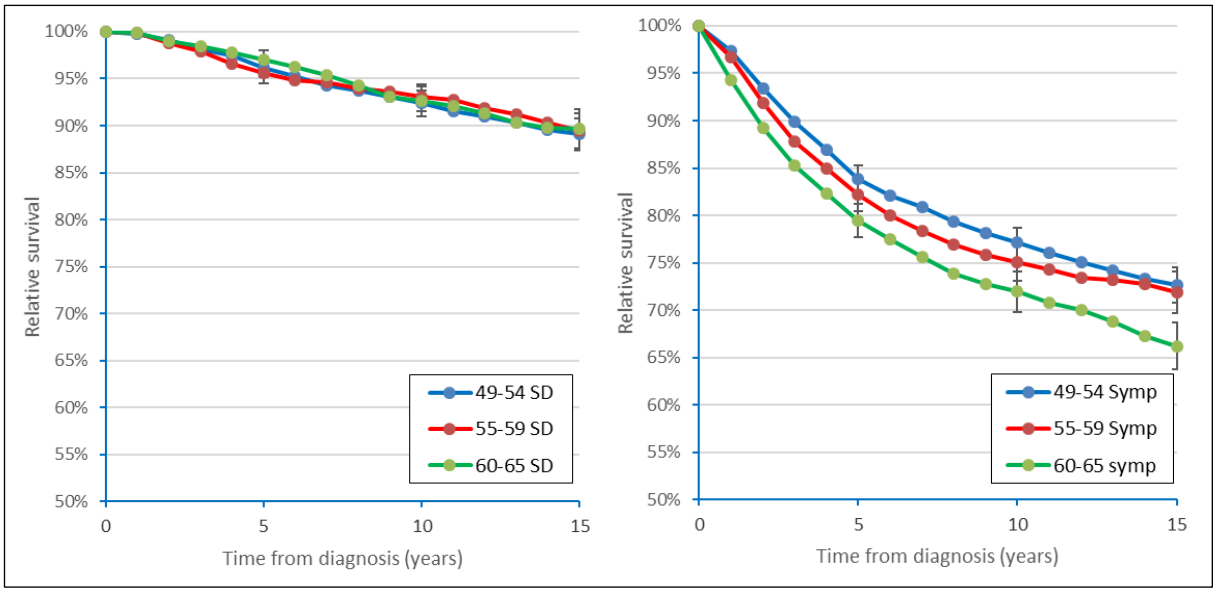
	Screen-detected	Symptomatic
Invasive	89.5% (88.3%, 90.6%)	70.8% (69.5%, 72.0%)
Micro-invasive	96.1% (85.9%, 102.9%)	88.6% (68.8%, 100.5%)
Non-invasive	99.6% (97.8%, 101.2%)	101.5% (97.8%, 104.5%)

Regionally, screen-detected invasive breast cancer patients in North East, Yorkshire & Humber have statistically significant lower survival and those in the South East a statistically significant higher 15-year relative survival compared to the UK (Appendix 6 - Table 117).
Screen-detected cancer patients in all regions have a higher 15-year relative survival rate compared to the symptomatic invasive cancer patients in England as a whole (70.5%).

For screening patients, the 15-year relative survival does not differ by age (Appendix 6 - Table 118). For symptomatic cancer patients, the 15-year relative survival decreases with increasing age.

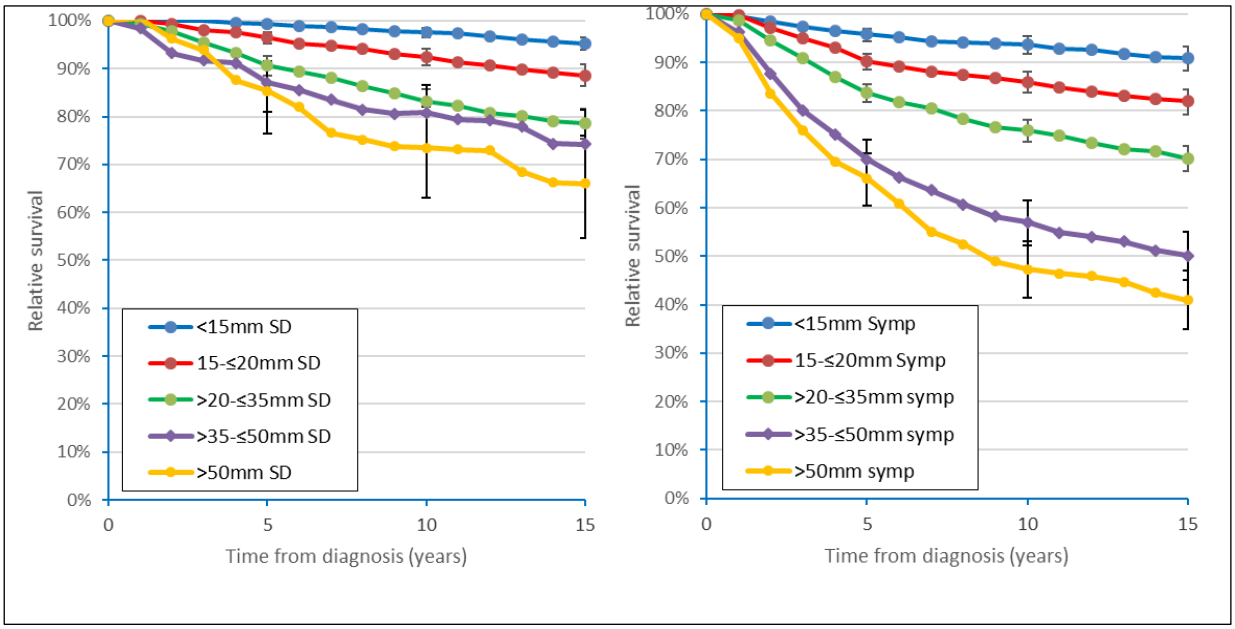
Compared to symptomatic breast cancer patients, screening patients have higher survival in all age groups (Figure 8).

Figure 8: Relative survival rate and 95% confidence intervals of invasive cancer patients by age at diagnosis and route of presentation; Screen Detected (SD) or Symptomatic (symp)



Screen-detected breast cancer patients have higher 15-year relative survival rate compared to symptomatic cancer patients in all size, grade and nodal status groups, (Appendix 6 - Tables 119-121). Differences in survival between NPI groups for these two cohorts of patients are presented in Appendix 6 - Table 122.

Figure 9: Relative survival rate and 95% confidence intervals of invasive cancer patients by invasive size and route of presentation; Screen Detected (SD) or Symptomatic (symp)



Appendix 1: Organisation of the audit

The format of the audit was designed by the UK NHSBSP & ABS Screening Audit Group.

Organisation of data collection

The audit includes:

- the main audit: women that were offered a screening appointment in the period 1 April 2017 to 31 March 2018, followed up until November 2018
- the adjuvant therapy audit: women that were offered a screening appointment in the period 1 April 2016 to 31 March 2017, followed up until March 2018
- the survival audit: women screened during the period 1 April 2002 to 31 March 2003, followed up until March 2018

The responsibility for English regional and Celtic country data collection for the main audit was devolved to breast screening services in England and screening information centres in the Celtic countries. Data for the adjuvant and survival audit are obtained from the Cancer Analysis System within Public Health England (PHE). The format of the audits was designed by the UK NHSBSP & ABS Screening Audit Group and was subject to comment from surgery, radiology and pathology Professional and Clinical Advisors (PCAs) and Senior QA advisors in order to ensure that, as far as possible, ambiguities were eliminated. Guidance notes and data collection forms can be requested from: phe.nhsbspabs@nhs.net.

Data analyses were carried out by audit staff within SQAS. Control charts with Wilson-score control limits are used in this audit report to demonstrate the differences in proportions between screening units. For the survival audit, 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.

Unit level data

Data for 86 screening units were included in the 2017/18 NHSBSP & ABS Breast Screening Audit. No data was received from Scotland.

Responsibility for data collection

In England, breast screening services extracted the NHSBSP & ABS audit data from the National Breast Screening System (NBSS) and uploaded it on to the Breast Screening Information System (BSIS). Data quality was ensured by completing data validation checks within BSIS. In the Celtic countries, information centre staff were responsible for ensuring that data was collected from their breast screening units and submitted to the West Midlands SQAS for collation.

All data, excluding that from Celtic countries, was then downloaded from BSIS by the West Midlands SQAS Office for collation and assessment. Further checks and data evaluation were undertaken prior to analysis.

Publication of audit data

The NHSBSP & ABS 2017/18 Breast Screening Audit is published in electronic format (pdf) only. Once published, the booklet will be available to download from the Association of Breast Surgery website: www.associationofbreastsurgery.org.uk.

Referencing this document

This document should be cited in the following way: ‘An audit of screen-detected breast cancers for the year of screening April 2017 to March 2018’, NHSBSP & ABS, May 2019.

Appendix 2: References

(1) de Camargo Cancela M, Comber H, Sharp L. Hospital and surgeon caseload are associated with risk of re-operation following breast-conserving surgery. *Breast Cancer Res Treat*. 2013 Aug;140(3):535-44. doi: 10.1007/s10549-013-2652-5. Epub 2013 Jul 28.

(2) Ingram DM, McEvoy SP, Byrne MJ, Fritschi L, Joseph DJ, Jamrozik K. Surgical caseload and outcomes for women with invasive breast cancer treated in Western Australia. *Breast*. 2005 Feb;14(1):11-7.

(3) Staradub VL, Rademaker AW, Morrow M. Factors influencing outcomes for breast conservation therapy of mammographically detected malignancies. *J Am Coll Surg*. 2003 Apr;196(4):518-24.

(4) Sainsbury R, Haward B, Rider L, Johnston C, Round C. Influence of clinician workload and patterns of treatment on survival from breast cancer. *Lancet*. 1995 May 20;345(8960):1265-70.

(5) National Institute for Health and Care Excellence (2018) Early and locally advanced breast cancer: diagnosis and management (NICE guideline 101). Available at: www.nice.org.uk/guidance/ng101

Appendix 3: Interim Quality Performance Indicators - outlier definitions and management

Background

The NHS Breast Screening Programme in collaboration with the Association of Breast Surgery undertake this annual audit of the of women with screen detected breast cancer. The audit covers and accordingly collects and presents back a large body of data. Each year the audit steering group identifies quality performance indicators (QPIs) for the core professional groups incorporated within the audit. This document details the use and follow up requirements of any outliers identified through this process.

Although the audit covers the UK this process applies only to providers working within England. All QPI data in this year's audit report is presented on screening service level, except QPI S1 which is presented at surgeon level.

Funnel plots are used as a method to compare individual service performance to the UK average for some QPIs. Control limits are calculated using the Wilson-score method at 95% and/or 99.7% confidence level. A '95% high outlier service' is a service whose data point lies above the 95% upper control limit in a funnel plot. A high outlier service has a significantly higher proportion/rate compared to the UK average at 95% confidence levels.

The lists of outlier services are released to the representatives of 4 disciplines -- radiology, pathology, surgery and oncology represented on the audit steering group. The representatives bring the relevant outlier list to their professional group for discussion.

The Regional Screening QA Service (SQAS) will inform their local services/individuals when they have been identified as an outlier following the national analysis. The responsibility for action and follow up rests with the responsible provider organisation.

Radiology

R1 Women with a B3 non-operative diagnosis to the breast that proceed to surgery

Please note:
Accurate recording of this data during this audit cycle was variable across the country. Due to this the following outlier management process will not be invoked for outliers identified in the 2017/2018 audit report. This year's data provides a benchmark for improvement in future audits.

Outlier definition

More than 25% of B3 lesions suitable for VAE were referred for surgery (B3 lesions where surgery is recommended e.g. fibroepithelial lesions, papilloma with atypia and spindle cell lesions are excluded from analysis).

Rationale

Vacuum assisted excision (VAE) enables the removal of most B3 lesions without the need for open surgical biopsy. This less invasive procedure should be utilised where clinically appropriate. If a service does not have the capability to offer VAE in house, referral arrangements should be put in place[1].

Data and calculation

Data is extracted from the national breast screening system (NBSS) using a purpose built crystal report. In this year's audit report proportions are calculated using 2017/18 and 2016/17 data.

Denominator: Count of women who had B3 non-operative diagnosis as the worst core biopsy result on the breast.
Numerator: Count of women who had B3 non-operative diagnosis as the worst core biopsy result on the breast and had an open surgical biopsy to the breast.
Statistical analysis: The data will be presented in a funnel plot relative to the mean for England. An outlier is a data point outside the 95% control limit.

How to investigate outliers

Outliers will not be investigated in this audit cycle for this QPI. The data for the QPI is gathered to establish baseline VAE activity in the UK to help the development of outlier definitions in future audits.

When robust data are available the Director of Breast Screening (DoBS) in an outlier service will be informed in writing by their local Screening QA Service (SQAS) that their performance for the audit period represents a variation that cannot be explained by chance alone.
The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

- the screening office should provide the DoBS with a list of all cases
- the DoBS should audit all B3 lesions and confirm the accuracy of the data
- there should be analysis of why >25% of eligible B3 lesions suitable for VAE were referred for surgery
- this audit should be made available to SQAS and commissioners
- the programme board meeting may be a useful forum to discuss the findings and agree any action plans to ensure this KPI is met in the subsequent audit

R2 Recall for assessment rate for prevalent screen (aged 45-52) only

Outlier definition

Services where the proportion of recall for assessment rate for the prevalent (first) screen is over 10%.

Rationale

According to national standards the prevalent recall rate should ideally be less than 7% but 10% or less is acceptable. A recall rate greater than 10% will lead to an increased number of women being recalled for assessment. The aim of this quality indicator is to reduce the distress of women who are recalled for assessment but are not subsequently diagnosed with cancer. Data shows that a higher recall rate does not necessarily equate to a higher cancer detection rate.

Data and calculation

Data comes from KC62 Table A. Proportions are calculated using single year and 3 year rolling data, from:
Denominator: count of women who were aged 45 to 52 (inclusive) and were screened at their prevalent round.
Numerator: count of women who were aged 45 to 52 (inclusive), were screened at their prevalent round and had been referred to assessment clinic.

Proportions are calculated and displayed by screening service.

How to investigate outliers

The DoBS in an outlier service will be informed in writing by their local SQAS of their performance for the audit.

The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

- the screening office should provide the screening director with a list of all cases recalled to be assessed where cancer was not diagnosed
- services with high recall rates should audit their recalls
- the audit should lead to measures being put in place to reduce the number of benign lesions being recalled back for assessment.
- the DoBS or audit lead should decide how best to share this data with all film readers and ensure clear learning objectives are identified and implemented
- the programme board and lead commissioner should be informed of the audit findings and resulting action plan

This QPI should not be looked at in isolation.

R3 Recall for assessment rate in high risk/family history patients

Outlier definition

Services where the proportion of recall for assessment rate is over 12%

Rationale

To reduce the distress of women identified as being at high risk of breast cancer who are recalled for assessment but are not subsequently diagnosed with cancer

Data and calculation

Data comes from KC62 Table U. Proportions are calculated using 3 year rolling data from:

Denominator: Count of high risk/family history women screened.
Numerator: Count of high risk/family history women screened and referred for assessment.

Proportions are calculated and displayed by screening service.

How to investigate outliers

The DoBS in an outlier service will be informed in writing by their local SQAS of their performance for the audit.

The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

The screening office should provide the DoBS with a list of all cases.
The DoBS should audit cases recalled with a benign outcome.

The outcomes of the audit should be shared with all film readers and clear learning objectives identified.

The programme board and lead commissioner should be informed of the audit findings and resulting action plan.

A re-audit should be performed to ensure this has been effective in reducing recall rates.

If the audit identifies errors in the data recorded on NBSS these should be corrected as soon as possible and the method for updating NBSS for these cases reviewed and amended as indicated.

Pathology

P1 Invasive cancer grade

Outlier definition

A 99.7% high outlier service using one-year and 3-year data or a 99.7% low outlier service using one-year and 3-year data.

Rationale

Histological grade is a key factor in the decision-making process regarding optimal treatment.

Data and calculation

Data was extracted from the national breast screening system (NBSS) using the BASOX standard report.

The proportion for each grade is calculated relative to the total number of surgically treated cancers. For example, the proportion of Grade 1 invasive cancers is calculated from:

Denominator: Count of surgically treated invasive cancer patients in the study period, excluding patients with a known previous breast cancer.
Numerator: Count of surgically treated invasive cancer patients with Grade 1 cancer, excluding patients with a known previous breast cancer.

Proportions are calculated and displayed by screening service.

How to investigate outliers

The director of breast screening (DoBS) in an outlier service will be informed in writing by their local SQAS that their performance for the audit period represents a variation that cannot be explained by chance alone.

The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

The DoBS should inform the lead breast screening pathologist(s). Where the service is supported by multiple laboratories the lead in each should be informed.

The screening office should provide the laboratory/laboratories with a list of cases and the grade recorded on NBSS with identifiers that enable identification in the respective laboratory system(s).

The lead Pathologist(s) should confirm the accuracy of the final grade data recorded on NBSS as the first step. If the data are inaccurate this should be immediately reported so that the revised grading proportions can be recalculated.

If the issue persists at the data checking stage then further local investigation is required. The format of the investigation should be locally agreed and in line with the trust clinical governance requirements.

If the pathology service is provided by multiple laboratories, the data for each laboratory should be checked by the service to assess whether it is all or only one laboratory which is an outlier over the period. Caution should be applied when working with small numbers, data from additional time periods may be required.

All identified laboratories demonstrating this outlier data should be identified and the pathology lead for the screening service should work with lead pathologists at all

relevant laboratories to agree a plan to investigate the reasons for the potential outlier status.

The plan could include reviewing grading criteria, microscope calibration and fixation processes and procedures, confirming compliance with current guidance and updating where necessary.

The programme board and lead commissioner should be informed of the audit findings and resulting action plan.

Establish whether individual consultants vary in their patterns of reporting (refer to Royal College of Pathologists' audit template on the RCPath website as necessary).

If indicated a pathology review should include a minimum of three pathologists involved in the service (including the lead and deputy pathologist).
A review should reflect the outlier area concerned. For example, if the service is a grade 1 high outlier review all grade 1s; if the service is a low grade 1 outlier the review should include a list of grade 2 cases as these may be downgraded to grade 1.

Any changes of grade accepted by three pathologists should be discussed by the local multi-disciplinary team (MDT) to assess whether any changes to treatment regime are required. Duty of candour should be applied if indicated.

P2 Lymph node positivity

Outlier definition

A 99.7% high outlier service using one-year and 3-year data or a 99.7% low outlier service using one-year and 3-year data.

Rationale

Lymph node status influences the management of women with invasive breast cancer triggering consideration of further surgery and/or systemic therapy as well as further diagnostic tests.

Data and calculation

Data was extracted from NBSS using the BASOX standard report. The data is split by patients based on whether they had their first operation in a hospital which offers or does not offer OSNA. Proportions are calculated from:

Denominator: Count of invasive cancer patients who had axillary operation, excluding patients with a known previous breast cancer.
Numerator: Count of invasive cancer patients who had axillary operation and had positive nodal status, excluding patients with a known previous breast cancer.
Proportions are calculated and displayed by screening service.

How to investigate outliers

The director of breast screening (DoBS) in an outlier service will be informed in writing by their local SQAS that their performance for the audit period represents a variation that cannot be explained by chance alone.

The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

The DoBS should inform the lead breast screening pathologist(s). Where the service is supported by multiple laboratories the lead in each should be informed.

The screening office should provide the laboratory/laboratories with a list of cases and the lymph node status recorded on NBSS with identifiers that enable identification in the respective laboratory system(s).

The lead Pathologist(s) should confirm the accuracy of the final lymph node status data recorded on NBSS as the first step. If the data are inaccurate this should be immediately reported so that the revised proportions can be recalculated.

The lead Pathologist(s) should confirm whether their status as a OSNA laboratory has been correctly recorded. If inaccurate this should be immediately reported so that the data can be recalculated within the correct context.

If the issue persists at the data checking stage then further local investigation is required. The format of the investigation should be locally agreed and in line with the trust clinical governance requirements.

Case reviews should include note of the type of surgical specimen received and how this has been communicated to the pathologist, e.g. whether it is clear to the pathologist if the surgeon has performed a sentinel node, axillary sample or an axillary clearance procedure.

The pathology services should review their compliance with current guidance for lymph node cut-up and reporting protocols and update these where necessary[2].

For approach to auditing sentinel lymph nodes the lead pathologist should refer to the Royal College of Pathologists' audit template ("Cookbook") (see RCPath. website).

If the pathology service undertakes intraoperative molecular testing, e.g. OSNA, they should review compliance with current manufacturer's guidance for lymph node handling and reporting of results (including compliance with recommended quality assurance measures as per ISO15189).

Consider whether individual laboratories vary in their pattern of laboratory handling; e.g. H&E levels as routine, use of immunohistochemistry.

Consider whether individual laboratories or consultants vary in their patterns of reporting; in this setting option for further investigation include reviewing approaches to the interpretation of guidelines for classification of nodal deposits as isolated tumour cell clusters (ITCs), micrometastasis or macrometastasis.

Consider whether variation in the use of neoadjuvant chemotherapy and the approach to pathological examination in this context may have a bearing on the identification and recording of node positivity.

If a pathology review is conducted, a minimum of three pathologists should be involved (including the lead breast pathologist for the centre).

Particular consideration should be given to the reason for outlier status and this targeted in any review (i.e. low outlier versus high outlier).

The programme board and lead commissioner should be informed of the audit findings and resulting action plan.

A slide review, if undertaken, should be performed on sections anonymised for patients' details. Review should include assessment of the extent of node sampling including whether the approach to block taking is minimum or ideal standard as well as histological confirmation of the presence or absence of nodal disease and its classification as macrometastasis, micrometastasis or ITCs.

A change of nodal status may potentially alter patient management. It is prudent, therefore, if considering such a review, to target relatively recent, rather than historical, cases.

Any diagnostic discrepancies of possible clinical relevance identified at slide review should be referred to the relevant Trust management. Duty of candour should be applied if indicated.

If, after a slide review has been undertaken there are changes to nodal status in a significant number of cases, double reporting as normal practice should be considered for a limited period.

After completion of the review of outlier status, ongoing (e.g. monthly) audit by the service for a limited period is encouraged. SQAS should be kept informed of these results.

P3 Lymphovascular invasion (LVI) for invasive cancers

Outlier definition

A 99.7% high outlier service or a 99.7% low outlier service using one-year data.

Rationale

The existence of LVI may help identify who is at increased risk for axillary lymph node and distant metastasis and is a predictor of local recurrence. Therefore, it is important that this information is routinely included in reports.

Data and calculation

Data was extracted from NBSS using the BASOX standard report. Proportions are calculated from:

Denominator: Count of invasive cancer patients, excluding patients with a known previous breast cancer
Numerator: Count of invasive cancer patients where lymphovascular invasion was found in any operation, excluding patients with a known previous breast cancer
Proportions are calculated and displayed by screening service.

How to investigate outliers

The director of breast screening (DoBS) in an outlier service will be informed in writing by their local SQAS that their performance for the audit period represents a variation that cannot be explained by chance alone.
The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

The DoBS should inform the lead breast screening pathologist(s). Where the service is supported by multiple laboratories the lead in each should be informed.

The screening office should provide the laboratory/laboratories with a list of cases and the LVI status recorded on NBSS with identifiers that enable identification in the respective laboratory system(s).

The lead Pathologist(s) should confirm the accuracy of the final LVI data recorded on NBSS as the first step. If the data are inaccurate this should be immediately reported so that the revised proportions can be recalculated.

If the issue persists at the data checking stage then further local investigation is required. The format of the investigation should be locally agreed and in line with the trust clinical governance requirements. Some areas that could be explored include:

Review of laboratory processes to ensure surgical resection specimens are fixed in a timely manner including review of arrangements for transport of specimens from theatres and specimen handling/fixation on receipt. Consideration should be given to theatre scheduling, laboratory opening times, staffing levels and training.

Consideration of whether there have been any changes in laboratory service provision e.g. outsourcing which may potentially have affected fixation processes e.g. vacuum packing for transportation.

The pathology services should review their compliance with current guidance for specimen fixation protocols and update these where necessary[2].

Consider whether individual laboratories vary in their pattern of laboratory handling; and reporting e.g. use of immunohistochemistry.

Consider whether individual laboratories or consultants vary in their patterns of reporting including variation in use of the “possible lymphovascular invasion” category.

Consider whether variation in the use of neoadjuvant chemotherapy and the approach to pathological examination e.g. extent of block taking in this context may have a bearing on the identification and recording of lymphovascular invasion.

If a pathology review is conducted, a minimum of three pathologists should be involved (including the lead breast pathologist for the centre and the regional PCA pathologist if required).

Particular consideration should be given to the reason for outlier status and this targeted in any review (i.e. low outlier versus high outlier).

The programme board and lead commissioner should be informed of the audit findings and resulting action plan.

A slide review, if undertaken, should be performed on sections anonymised for patients' details. Review should include compliance with guidelines and assessment of the extent of sampling to include whether the approach to block taking is compliant with guidelines[2].

Any diagnostic discrepancies of possible clinical relevance identified at slide review should be referred to the relevant Trust management. Duty of candour should be undertaken if indicated.

If, after a slide review has been undertaken, there are changes to lymphovascular space invasion in a significant number of cases, double reporting as normal practice should be considered for a limited period.

After completion of the review of outlier status, ongoing (e.g. monthly) audit by the service for a limited period is encouraged. SQAS should be kept informed of these results.

Surgery

S1 Screening cancer caseload

Outlier definition

Consultant surgeons that had managed less than an average of 10 cases of screen detected breast cancer per year over a 3-year period

Rationale

Surgeons should have a minimum caseload to maintain/improve standards

Data and calculation

Surgeon data was extracted from NBSS using the BASOX standard report. In this analysis, the surgeon recorded as undertaking the first operation is collated for a 3-year period.
The average annual caseload is displayed for individual surgeons. Where a surgeon has operated on women from more than one screening unit these are collated to give a final caseload.
The analysis counts clients and not tumours or operations. Proportions are calculated and displayed by surgeon.

How to investigate outliers

The director of breast screening (DoBS) in an outlier service will be informed in writing by their local SQAS that their performance for the audit period represents a variation that cannot be explained by chance alone.

The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

The DoBS should inform the appropriate lead breast screening surgeon(s) to conduct the review of the outlier surgeon's data.

The screening office should provide the lead surgeon with a list of cases and the allocated responsible surgeon recorded on NBSS with identifiers that enable identification in the respective operating system(s). The GMC numbers used for the surgeons should also be provided.

The lead surgeon(s) should confirm the accuracy of the data recorded on NBSS. If the data is inaccurate this should be immediately reported so that the revised caseload can be recalculated.

If the issue persists at the data checking stage then the DoBS and the Screening Lead Surgeon should meet with the surgeon involved to discuss a remedial action plan which should be supportive and constructive. This plan should be shared with relevant trust management.

The programme board and lead commissioner should be informed of the audit findings and remedial action.

Co-operation in this remedial action is expected from the surgeon(s) involved. Failure to co-operate should be escalated internally using internal systems and processes.

Progress on the remedial action should be assessed regularly, documented and shared with SQAS.

S2 Management of the axilla

S2a Cases with more than 5 axillary nodes obtained from node negative invasive cancers

Outlier definition

A 95% high outlier unit taking more than 5 axillary lymph nodes in a node negative patient using 3-year data.

Rationale

Unnecessary removal of excessive axillary lymph nodes in patients with a node negative axilla can cause potentially avoidable morbidity.

Data and calculation

Data was extracted from NBSS using the BASOX standard report. Proportions are calculated from:

Denominator: Count of invasive cancer patients with negative nodal status, excluding patients with a known previous breast cancer and patients with known neo-adjuvant therapy
Numerator: Count of invasive cancer patients with negative nodal status and had more than 5 nodes obtained, excluding patients with a known previous breast cancer and patients with known neo-adjuvant therapy
Proportions are calculated and displayed by service.

How to investigate outliers

The director of breast screening (DoBS) in an outlier service will be informed in writing by their local SQAS that their performance for the audit period represents a variation that cannot be explained by chance alone.
The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

The DoBS should confirm to SQAS copying in the relevant lead surgeon(s) that the inappropriately high node yields are not a surrogate marker for service level issues (e.g. lack of access to radio-isotope for sentinel node mapping).

In the absence of any service level issues, the DoBS should inform the appropriate lead breast screening surgeon(s) to conduct the review of the relevant cases to investigate the root cause (individual surgeon or global within the surgical department).

The screening office should provide the lead surgeon with a list of cases with more than 5 nodes obtained from node negative invasive cancers recorded on NBSS with identifiers that enable identification in the respective operating system(s). The GMC numbers used for the surgeons should also be provided.

The lead surgeon(s) should confirm the accuracy of the data recorded on NBSS as the first step. If the data are inaccurate this should be immediately reported so that the revised proportions can be recalculated.

If the issue persists at the data checking stage then the DoBS and the Screening Lead Surgeon should meet with the surgeon(s) involved to discuss a remedial action plan which should be supportive and constructive.

The programme board and lead commissioner should be informed of the audit findings and remedial action.

Examples of remedial action may include observed surgery or retraining. This plan should be shared with relevant trust management.

Co-operation in this remedial action is expected from the surgeon(s) involved. Failure to co-operate should be escalated internally using internal systems and processes.

Progress on the remedial action should be assessed regularly, documented and shared with SQAS.

In rare cases, serious concerns may require escalation. This would be an example of a metric that could be escalated to the Care Quality Commission (CQC). This would involve the transfer of service and surgeon identifiable data but not patient identifiable data to the CQC.

S2b Cases of non-invasive cancers treated by breast conserving surgery that have any lymph nodes excised

Outlier definition

A 95% high outlier unit excising axillary lymph nodes in women diagnosed with non-invasive cancer treated with breast conserving surgery using 3-year data.

Rationale

Removal of axillary lymph nodes in patients with non-invasive disease undergoing a breast conserving procedure is not indicated and can cause potentially avoidable morbidity. Surgical screening guidance recommends that in the presence of suspected invasion (e.g. mass lesion with B5a core biopsy) repeat biopsies should be performed of the suspected lesion. Proceeding directly to sentinel node biopsy is not indicated in B5a cases undergoing breast conserving surgery.

Data and calculation

Data was extracted from NBSS using the BASOX standard report. Proportions are calculated from:

Denominator: Count of non-invasive cancer patients treated by breast conserving surgery, excluding patients with a known previous breast cancer
Numerator: Count of non-invasive cancer patients treated by breast conserving surgery and have lymph nodes excised, excluding patients with a known previous breast cancer
Proportions are calculated and displayed by service.

How to investigate outliers

The director of breast screening (DoBS) in an outlier service will be informed in writing by their local SQAS that their performance for the audit period represents a variation that cannot be explained by chance alone.

The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

The DoBS should inform the appropriate lead breast screening surgeon(s) to conduct the investigation.

The screening office should provide the lead surgeon with a list of cases and the allocated responsible surgeon recorded on NBSS with identifiers that enable identification in the respective operating system(s). The GMC numbers used for the surgeons should also be provided.

The lead surgeon(s) should confirm the accuracy of the data recorded on NBSS as the first step. If the data are inaccurate this should be immediately reported so that the revised proportions can be recalculated.

If the issue persists at the data checking stage then the DoBS and the Screening Lead Surgeon should meet with the surgeon involved to agree a remedial action plan.

Examples of remedial action may include observed surgery or retraining. This plan should be shared with relevant trust management.

The programme board and lead commissioner should be informed of the audit findings and remedial action.

Co-operation in this remedial action is expected from the surgeon(s) involved. Failure to co-operate should be escalated internally using internal systems and processes.

Progress on the remedial action should be assessed regularly, documented and shared with SQAS.

In rare cases, serious concerns may require escalation. This would be an example of a metric that could be escalated to the Care Quality Commission (CQC). This would involve the transfer of service and surgeon identifiable data but not patient identifiable data to the CQC.

S3 Reconstruction after mastectomy for non-invasive cancers

Outlier definition

The decision on whether to proceed with immediate breast reconstruction following mastectomy for non-invasive cancers, eg ductal carcinoma in situ (DCIS) is multifactorial. Therefore, it is not appropriate to have a target figure for this QPI. However, it is reasonable to expect most screening units to fall between 3 standard deviations of the mean figure for the nation.

Rationale

NICE guidelines state that women having a mastectomy should be offered an immediate or delayed breast reconstruction, unless they have significant comorbidities that rule out reconstructive surgery.

Data and calculation

Data was extracted from NBSS using the BASOX standard report. Proportions are calculated and displayed by screening service.

Denominator: Count of non-invasive cancer patients treated by mastectomy, excluding patients with a known previous breast cancer.
Numerator: Count of non-invasive cancer patients treated by mastectomy and had immediate reconstruction, excluding patients with a known previous breast cancer.

How to investigate outliers

The director of breast screening (DoBS) in an outlier service will be informed in writing by their local SQAS that their performance for the audit period represents a variation that cannot be explained by chance alone.

The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

The DoBS should confirm to SQAS, copying in the lead screening surgeon(s), that there are no service level issues preventing discussion of breast reconstruction with patients (e.g. lack of access to breast reconstruction surgeons or facilities).

In the absence of service level issues, the DoBS should inform the appropriate lead breast screening surgeon(s) to conduct the investigation.

The screening office should provide the lead surgeon with a list of cases and the allocated responsible surgeon recorded on NBSS with identifiers that enable identification in the respective operating system(s). The GMC numbers used for the surgeons should also be provided.

The lead Surgeon(s) should confirm the accuracy of the data recorded on NBSS as the first step. If the data is inaccurate this should be immediately reported so that the revised proportions can be recalculated.

The case review will involve evaluation of each patient's notes to assess if there is documented evidence that breast reconstruction was discussed with the patient, or whether a documented reason for not discussing this option is provided (e.g. co-morbidity, tumour biology).

The results of the case review should be discussed between the Lead Surgeon and the DoBS. There should be consideration whether there is an individual surgical element or multiple surgeons contributing to the outlier status. In the latter case the lead surgeon and the DoBS should meet with the involved surgeons.

Subsequent remedial actions may include, for example, retraining or communication skills training. This plan should be shared with relevant trust management.

Co-operation in this remedial action is expected from the surgeon(s) involved. Failure to co-operate should be escalated internally using internal systems and processes.

Progress on the remedial action should be assessed regularly, documented and shared with SQAS.

In rare cases, serious concerns may require escalation. This would be an example of a metric that could be escalated to the Care Quality Commission (CQC). This would involve the transfer of service and surgeon identifiable data but not patient identifiable data to the CQC.

Oncology

O1 No radiotherapy given after breast conserving surgery to patients with invasive cancer excluding patients aged >65 years, with T1, N0, G1/2, ER+ cancer.

Outlier definition

A 95% high outlier service using 1-year data are not receiving radiotherapy following breast conserving surgery for invasive disease.

Rationale

Adjuvant radiotherapy is recommended treatment for the majority of women with invasive breast cancers treated by breast conserving surgery.

Data and calculation

Adjuvant data collection is usually 1 year behind the main audit data collection. This allows longer follow-up time for the adjuvant treatment. For example, the 2017/18 audit report contains analysis of adjuvant data from the 2016/17 audit period with follow-up up to June 2018. The patient and tumour information were extracted from NBSS using BASOX standard report. This information was then matched to the cancer records in the Cancer Analysis System (CAS) database and adjuvant treatment data was extracted from the CAS database. Radiotherapy data comes from cancer registry, Cancer Outcomes and Services Dataset (COSD), Radiotherapy Treatment Dataset (RTDS), Cancer Waiting Times (CWT), and Hospital Episode Statistics (HES) data sets.

Proportions are calculated and displayed by screening service.

Denominator: Count of invasive cancer patients treated by breast conserving surgery, excluding patients >65 years of age, with T1, N0, G1/2 and ER+ cancer or patients with previous breast cancer.

Numerator: Count of invasive cancer patients treated by breast conserving surgery and had no radiotherapy treatment or unknown if she had radiotherapy treatment, excluding patients >65 years of age, with T1, N0, G1/2 and ER+ cancer or patients with previous breast cancer.

How to investigate outliers

The director of breast screening (DoBS) in an outlier service will be informed in writing by their local SQAS that their performance for the audit period represents a variation that cannot be explained by chance alone.

The lead commissioner will be informed at the appropriate time point so that this item can be discussed within the appropriate programme board setting and any barriers to this aspect of the service identified and addressed.

The DoBS should inform the appropriate MDT Lead to lead the investigation.

The screening office should provide the MDT lead with a list of cases and the allocated responsible surgeon recorded on NBSS with identifiers that enable identification in the MDT recording system(s).

If the service is a hub and spoke model the data should be sent to the relevant MDT leads at the spoke sites.

The MDT Lead(s) should confirm the accuracy of the data recorded on NBSS as the first step. This could be that radiotherapy was given or that the patient had a mastectomy. If the data is inaccurate this should be immediately reported so that the revised proportions can be recalculated.

The MDT lead should conduct an audit to establish why radiotherapy was not administered in cases clinically requiring this adjuvant treatment.

If the further investigation identifies that the level of treatment was inadequate and unjustifiable then the trust management should be informed and Duty of candour should be applied where indicated.

The results of the case review should be discussed by the relevant MDT. Changes to local protocols should be agreed as indicated.

After changes to internal protocols, ongoing (e.g. monthly) audit by the MDT for 12 months is required.

Progress should be assessed regularly, documented and shared with SQAS and commissioners via the programme boards.

In rare cases, serious concerns may require escalation. This would be an example of a metric that could be escalated to the Care Quality Commission (CQC). This would involve the transfer of service and trust level data but not patient identifiable data to the CQC.

References

1. Clinical guidance for breast cancer screening assessment, NHSBSP publication number 49, Nov 2016

2. Pathology reporting of breast disease. NHSBSP Publication No 58. January 2005

Appendix 4: Main audit data tables (1 - 90)

DATA FROM THE 2017/18 AUDIT OF SCREEN-DETECTED BREAST CANCERS IN WOMEN ALL AGES FOR THE PERIOD 1 APRIL 2017 – 31 MARCH 2018

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

Sub-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.	%				
East Midlands	1397	80	759	44	13	1	326	19	0	0	1736	100	209025	1.6	6.7	3.6
East of England	1484	82	782	43	25	1	305	17	2	0	1816	100	230232	1.4	6.4	3.4
London	1737	77	744	33	7	0	501	22	1	0	2246	100	272508	1.9	6.4	2.7
N East, Yorks & Humber	2153	78	1177	43	23	1	581	21	1	0	2758	100	346746	1.7	6.2	3.4
North West	1786	78	900	39	24	1	482	21	1	0	2293	100	266628	1.9	6.7	3.4
South East	2245	78	1132	39	26	1	608	21	0	0	2879	100	325052	2.0	6.9	3.5
South West	1937	79	1017	41	23	1	500	20	2	0	2462	100	269257	1.9	7.2	3.8
West Midlands	1400	79	669	38	14	1	362	20	0	0	1776	100	219000	1.7	6.4	3.1
Northern Ireland	441	82	245	46	1	0	95	18	0	0	537	100	68090	1.4	6.5	3.6
Wales	904	81	466	42	4	0	205	18	0	0	1113	100	114117	1.8	7.9	4.1
United Kingdom	**15484**	**78.9**	**7891**	**40**	**160**	**0.8**	**3965**	**20.2**	**7**	**0**	**19616**	**100**	**2320655**	**1.8**	**6.7**	**3.4**

Table 2: Breast cancer cases by age at first offered screening appointment

Sub-region	<50		50-64		65-70		71-75		76+		Total	>70	
	No.	%	No.	%	No.	%	No.	%	No.	%		No.	%
East Midlands	85	5	944	54	476	27	164	9	67	4	1736	231	13
East of England	60	3	968	53	576	32	132	7	80	4	1816	212	12
London	150	7	1298	58	584	26	159	7	55	2	2246	214	10
N East, Yorks & Humber	145	5	1536	56	766	28	229	8	82	3	2758	311	11
North West	150	7	1244	54	640	28	187	8	72	3	2293	259	11
South East	160	6	1558	54	796	28	255	9	110	4	2879	365	13
South West	136	6	1302	53	707	29	220	9	97	4	2462	317	13
West Midlands	103	6	972	55	513	29	139	8	49	3	1776	188	11
Northern Ireland	10	2	354	66	141	26	22	4	10	2	537	32	6
Wales	21	2	660	59	310	28	62	6	60	5	1113	122	11
United Kingdom	**1020**	**5**	**10836**	**55**	**5509**	**28**	**1569**	**8**	**682**	**3**	**19616**	**2251**	**11**

Table 3: Number of cases with previous cancers

Sub-region	Total cases	Total pt matched	% matched	Had previous cancers		No previous cancers	
				No.	%	No.	%
East Midlands	1737	1737	100	215	12	1522	88
East of England	1817	1817	100	237	13	1580	87
London	2266	2253	99	236	10	2017	90
NEYH	2760	2760	100	379	14	2381	86
North West	2300	2300	100	288	13	2012	87
South East	2885	2881	100	337	12	2544	88
South West	2462	2460	100	315	13	2145	87
West Midlands	1780	1778	100	227	13	1551	87
England	**18007**	**17986**	**100**	**2234**	**12**	**15752**	**88**

* Celtic countries did not supply previous cancer data in 17/18. All Wales and Northern Ireland cases are included in the analysis.

Table 4: Type of previous cancers									
			Invasive/micro-invasive					Non-invasive	
Sub-region	Total matched	Total previous cancers	Breast	Gynae-cological	Bowel	Haema-tological	Other	Breast	Other
East Midlands	1737	215	88	21	15	12	33	24	47
East of England	1817	237	87	19	21	9	28	35	55
London	2253	236	89	27	10	12	29	22	59
NEYH	2760	379	138	49	22	9	48	37	113
North West	2300	288	116	26	18	10	37	26	81
South East	2881	337	142	29	18	12	40	31	87
South West	2460	315	104	37	16	17	42	34	84
West Midlands	1778	227	74	23	11	5	29	25	87
England	**17986**	**2234**	**838**	**231**	**131**	**86**	**286**	**234**	**613**
% of previous cancers	**-**	**100**	**38**	**10**	**6**	**4**	**13**	**10**	**27**
% of matched	**100**	**12**	**5**	**1**	**1**	**0**	**2**	**1**	**3**

* Celtic countries did not supply previous cancer data in 17/18. All Wales and Northern Ireland cases are included in the analysis.

Table 5: Non-operative diagnosis rate												
		C5 only		C5 & B5		B5 only		Positive axillary biopsy only		Non-operative diagnosis		No non-operative diagnosis	
Sub-region	Total cancers	No	%	No	%	No	%	No	%	No	%	No	%
East Midlands	1625	0	0	6	0	1590	98	1	0	1597	98	28	2
East of England	1696	0	0	0	0	1661	98	2	0	1663	98	33	2
London	2136	0	0	3	0	2106	99	1	0	2110	99	26	1
N East, Yorks & Humber	2592	0	0	2	0	2556	99	1	0	2559	99	33	1
North West	2153	1	0	7	0	2098	97	1	0	2107	98	46	2
South East	2708	0	0	3	0	2621	97	1	0	2625	97	83	3
South West	2325	0	0	4	0	2243	96	1	0	2248	97	77	3
West Midlands	1681	0	0	0	0	1648	98	1	0	1649	98	32	2
Northern Ireland	537	2	0	275	51	252	47	0	0	529	99	8	1
Wales	1113	0	0	0	0	1098	99	0	0	1098	99	15	1
United Kingdom	**18566**	**3**	**0**	**300**	**2**	**17873**	**96**	**9**	**0**	**18185**	**98**	**381**	**2**

Table 6: Non-operative diagnosis rate (invasive cancers)													
		C5 only		C5 & B5		B5 only		Positive axillary biopsy only		Non-operative diagnosis		No non-operative diagnosis	
Sub-region	Total cancers	No	%	No	%	No	%	No	%	No	%	No	%
East Midlands	1307	0	0	6	0	1295	99	1	0	1302	100	5	0
East of England	1391	0	0	0	0	1382	99	1	0	1383	99	8	1
London	1644	0	0	3	0	1636	100	1	0	1640	100	4	0
N East, Yorks & Humber	2010	0	0	2	0	1998	99	1	0	2001	100	9	0
North West	1672	1	0	7	0	1655	99	1	0	1664	100	8	0
South East	2102	0	0	3	0	2088	99	1	0	2092	100	10	0
South West	1821	0	0	4	0	1803	99	1	0	1808	99	13	1
West Midlands	1327	0	0	0	0	1319	99	1	0	1320	99	7	1
Northern Ireland	441	2	0	262	59	175	40	0	0	439	100	2	0
Wales	904	0	0	0	0	896	99	0	0	896	99	8	1
United Kingdom	**14619**	**3**	**0**	**287**	**2**	**14247**	**97**	**8**	**0**	**14545**	**99**	**74**	**1**

Table 7: Non-operative diagnosis rate (non-invasive cancers)											
	Total cancers	C5 only		C5 & B5		B5 only		Non-operative diagnosis		No non-operative diagnosis	
Sub-region		No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	305	0	0	0	0	283	93	283	93	22	7
East of England	279	0	0	0	0	254	91	254	91	25	9
London	485	0	0	0	0	463	95	463	95	22	5
N East, Yorks & Humber	560	0	0	0	0	538	96	538	96	22	4
North West	459	0	0	0	0	422	92	422	92	37	8
South East	580	0	0	0	0	508	88	508	88	72	12
South West	483	0	0	0	0	422	87	422	87	61	13
West Midlands	341	0	0	0	0	317	93	317	93	24	7
Northern Ireland	95	0	0	13	14	76	80	89	94	6	6
Wales	205	0	0	0	0	198	97	198	97	7	3
United Kingdom	**3792**	**0**	**0**	**13**	**0**	**3481**	**92**	**3494**	**92**	**298**	**8**

Table 8: Invasive status of the diagnostic core biopsy							
	Total Cancers with B5	B5a (Non-invasive)		B5b (Invasive)		B5c (Micro-invasive, Not Assessable or Unknown)	
Sub-region		No.	%	No.	%	No.	%
East Midlands	1596	335	21	1257	79	4	0
East of England	1661	351	21	1298	78	12	1
London	2109	556	26	1547	73	6	0
N East, Yorks & Humber	2558	651	25	1894	74	13	1
North West	2105	527	25	1574	75	4	0
South East	2624	649	25	1966	75	9	0
South West	2247	529	24	1704	76	14	1
West Midlands	1648	372	23	1263	77	13	1
Northern Ireland	527	110	21	415	79	2	0
Wales	1098	259	24	836	76	3	0
United Kingdom	**18173**	**4339**	**24**	**13754**	**76**	**80**	**0**

Table 9: B5a (Non-invasive) core biopsy: histological status of surgical specimen												
	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	43	13	12	4	261	80	10	3	0	0	326	100
East of England	75	22	23	7	225	66	18	5	0	0	341	100
London	89	17	6	1	374	73	42	8	1	0	512	100
N East, Yorks & Humber	101	16	20	3	480	75	33	5	3	0	637	100
North West	86	17	20	4	385	74	29	6	0	0	520	100
South East	120	19	25	4	462	73	22	3	1	0	630	100
South West	97	19	18	4	369	72	26	5	0	0	510	100
West Midlands	48	13	12	3	289	81	10	3	0	0	359	100
Northern Ireland	22	21	1	1	77	75	3	3	0	0	103	100
Wales	58	23	4	2	194	75	1	0	0	0	257	100
United Kingdom	**739**	**18**	**141**	**3**	**3116**	**74**	**194**	**5**	**5**	**0**	**4195**	**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 10: B5b (Invasive) core biopsy: histological status of surgical specimen												
	Invasive		Micro-invasive		Non-invasive		No residual tumour		Unknown		Total with surgery	
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	1193	97	0	0	8	1	17	1	7	1	1225	100
East of England	1208	96	4	0	20	2	22	2	6	0	1260	100
London	1359	96	1	0	23	2	27	2	4	0	1414	100
N East, Yorks & Humber	1807	97	2	0	27	1	15	1	4	0	1855	100
North West	1488	96	0	0	23	1	36	2	1	0	1548	100
South East	1860	97	2	0	20	1	32	2	4	0	1918	100
South West	1589	97	1	0	26	2	26	2	4	0	1646	100
West Midlands	1196	97	1	0	11	1	22	2	8	1	1238	100
Northern Ireland	401	99	0	0	2	0	3	1	1	0	407	100
Wales	795	97	0	0	7	1	14	2	0	0	816	100
United Kingdom	**12896**	**97**	**11**	**0**	**167**	**1**	**214**	**2**	**39**	**0**	**13327**	**100**

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

Table 11: Number of assessment visits for each patient														
	0		1		2		3+		Unknown		Total		Repeat (2+) visit	
Sub-region	No	%	No	%	No	%	No	%	No	%	No	%	No	%
East Midlands	0	0	1333	82	251	15	41	3	0	0	1625	100	292	18
East of England	0	0	1515	89	161	9	20	1	0	0	1696	100	181	11
London	0	0	1811	85	295	14	30	1	0	0	2136	100	325	15
N East, Yorks & Humber	0	0	2217	86	333	13	42	2	0	0	2592	100	375	14
North West	0	0	1802	84	313	15	38	2	0	0	2153	100	351	16
South East	0	0	2312	85	368	14	28	1	0	0	2708	100	396	15
South West	0	0	1886	81	373	16	66	3	0	0	2325	100	439	19
West Midlands	0	0	1398	83	254	15	29	2	0	0	1681	100	283	17
Northern Ireland	0	0	475	88	55	10	7	1	0	0	537	100	62	12
Wales	0	0	1010	91	91	8	12	1	0	0	1113	100	103	9
United Kingdom	**0**	**0**	**15759**	**85**	**2494**	**13**	**313**	**2**	**0**	**0**	**18566**	**100**	**2807**	**15**

Table 12: The assessment visit with the earliest core/cytology result										
	1		2		3+		Total		First core/cyt at 2+ visit	
Sub-region	No	%	No	%	No	%	No	%	No	%
East Midlands	1535	95	88	5	0	0	1623	100	88	5
East of England	1642	97	51	3	1	0	1694	100	52	3
London	2032	95	104	5	0	0	2136	100	104	5
N East, Yorks & Humber	2524	97	66	3	2	0	2592	100	68	3
North West	2073	96	77	4	1	0	2151	100	78	4
South East	2594	96	113	4	0	0	2707	100	113	4
South West	2167	93	154	7	2	0	2323	100	156	7
West Midlands	1634	97	46	3	0	0	1680	100	46	3
Northern Ireland	532	99	5	1	0	0	537	100	5	1
Wales	1104	99	9	1	0	0	1113	100	9	1
United Kingdom	**17837**	**96**	**713**	**4**	**6**	**0**	**18556**	**100**	**719**	**4**

Table 13: 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+		
Sub-region	**No**	**%**	**No**	**%**	**Total**	**No**	**%**	**No**	**%**	**Total**	**No**	**%**	**No**	**%**	**Total**
East Midlands	1220	94	81	6	1301	231	82	52	18	283	1460	91	136	9	1596
East of England	1345	97	37	3	1382	225	89	29	11	254	1593	96	68	4	1661
London	1591	97	48	3	1639	410	89	53	11	463	2008	95	101	5	2109
N East, Yorks & Humber	1933	97	67	3	2000	458	85	80	15	538	2409	94	149	6	2558
North West	1565	94	98	6	1663	353	84	69	16	422	1936	92	170	8	2106
South East	1992	95	99	5	2091	447	88	61	12	508	2462	94	162	6	2624
South West	1717	95	90	5	1807	355	84	67	16	422	2088	93	159	7	2247
West Midlands	1254	95	65	5	1319	273	86	44	14	317	1536	93	112	7	1648
Northern Ireland	415	95	24	5	439	73	82	16	18	89	489	92	40	8	529
Wales	862	96	34	4	896	163	82	35	18	198	1029	94	69	6	1098
United Kingdom	**13894**	**96**	**643**	**4**	**14537**	**2988**	**86**	**506**	**14**	**3494**	**17010**	**94**	**1166**	**6**	**18176**

Table 14: 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		
Sub-region	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**Total**
East Midlands	253	89	10	4	14	5	3	1	3	1	283
East of England	235	93	2	1	14	6	2	1	1	0	254
London	425	92	6	1	25	5	4	1	3	1	463
N East, Yorks & Humber	483	90	8	1	29	5	8	1	10	2	538
North West	381	90	10	2	17	4	6	1	8	2	422
South East	472	93	9	2	19	4	5	1	3	1	508
South West	376	89	18	4	14	3	4	1	10	2	422
West Midlands	293	92	5	2	9	3	2	1	8	3	317
Northern Ireland	80	90	1	1	5	6	1	1	2	2	89
Wales	181	91	5	3	11	6	0	0	1	1	198
United Kingdom	**3179**	**91**	**74**	**2**	**157**	**4**	**35**	**1**	**49**	**1**	**3494**

Table 15: Any further visits after core/cytology biopsy result															
	Invasive					Non-Invasive					Overall				
	Further visit		No further visit			Further visit		No further visit			Further visit		No further visit		
Sub-region	**No**	**%**	**No**	**%**	**Total**	**No**	**%**	**No**	**%**	**Total**	**No**	**%**	**No**	**%**	**Total**
East Midlands	58	4	1248	96	1306	15	5	289	95	304	73	4	1550	96	1623
East of England	53	4	1337	96	1390	6	2	273	98	279	61	4	1633	96	1694
London	87	5	1557	95	1644	44	9	441	91	485	132	6	2004	94	2136
N East, Yorks & Humber	124	6	1886	94	2010	30	5	530	95	560	156	6	2436	94	2592
North West	90	5	1581	95	1671	19	4	440	96	459	109	5	2042	95	2151
South East	74	4	2027	96	2101	38	7	542	93	580	114	4	2593	96	2707
South West	121	7	1699	93	1820	28	6	454	94	482	149	6	2174	94	2323
West Midlands	102	8	1224	92	1326	21	6	320	94	341	124	7	1556	93	1680
Northern Ireland	15	3	426	97	441	0	0	95	100	95	15	3	522	97	537
Wales	18	2	886	98	904	3	1	202	99	205	21	2	1092	98	1113
United Kingdom	**742**	**5**	**13871**	**95**	**14613**	**204**	**5**	**3586**	**95**	**3790**	**954**	**5**	**17602**	**95**	**18556**

Table 16: Status of diagnostic open biopsies			
	Benign biopsy rate		Malignant biopsy rate
Sub-region	Prevalent	Incident	
East Midlands	0.63	0.20	0.13
East of England	0.66	0.17	0.14
London	0.95	0.31	0.10
N East, Yorks & Humber	0.41	0.18	0.10
North West	0.91	0.25	0.17
South East	1.62	0.44	0.26
South West	1.50	0.37	0.29
West Midlands	0.86	0.31	0.15
Northern Ireland	1.28	0.42	0.12
Wales	0.91	0.24	0.13
United Kingdom	**0.97**	**0.28**	**0.16**

Table 17: Invasive status of malignant diagnostic open biopsies									
	Total malignant open biopsies	Invasive		Micro-invasive		Non-invasive		Status unknown	
Sub-region		No.	%	No.	%	No.	%	No.	%
East Midlands	28	5	18	1	4	22	79	0	0
East of England	33	8	24	0	0	25	76	0	0
London	26	4	15	0	0	22	85	0	0
N East, Yorks & Humber	33	9	27	1	3	22	67	1	3
North West	46	8	17	1	2	37	80	0	0
South East	83	10	12	1	1	72	87	0	0
South West	77	13	17	1	1	61	79	2	3
West Midlands	32	7	22	1	3	24	75	0	0
Northern Ireland	8	2	25	0	0	6	75	0	0
Wales	15	8	53	0	0	7	47	0	0
United Kingdom	**381**	**74**	**19**	**6**	**2**	**298**	**78**	**3**	**1**

Table 18: 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	
Sub-region		No.	%	No.	%	No.	%	No.	%
East Midlands	5	0	0	0	0	4	80	1	20
East of England	8	0	0	0	0	8	100	0	0
London	4	0	0	0	0	4	100	0	0
N East, Yorks & Humber	9	0	0	0	0	9	100	0	0
North West	8	0	0	0	0	8	100	0	0
South East	10	0	0	0	0	10	100	0	0
South West	13	1	8	0	0	12	92	0	0
West Midlands	7	0	0	1	14	6	86	0	0
Northern Ireland	2	0	0	0	0	1	50	1	50
Wales	8	0	0	0	0	8	100	0	0
United Kingdom	**74**	**1**	**1**	**1**	**1**	**70**	**95**	**2**	**3**

Table 19: 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	
Sub-region		No.	%	No.	%	No.	%	No.	%
East Midlands	23	1	4	0	0	21	91	1	4
East of England	25	0	0	0	0	25	100	0	0
London	22	0	0	0	0	20	91	2	9
N East, Yorks & Humber	23	0	0	0	0	23	100	0	0
North West	38	1	3	0	0	36	95	1	3
South East	73	0	0	0	0	72	99	1	1
South West	62	1	2	0	0	58	94	3	5
West Midlands	25	0	0	0	0	25	100	0	0
Northern Ireland	6	0	0	0	0	3	50	3	50
Wales	7	0	0	0	0	7	100	0	0
United Kingdom	**304**	**3**	**1**	**0**	**0**	**290**	**95**	**11**	**4**

Table 20: 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	
Sub-region		No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	5	0	0	1	20	2	40	2	40	0	0
East of England	8	0	0	4	50	3	38	1	13	0	0
London	4	0	0	2	50	1	25	1	25	0	0
N East, Yorks & Humber	9	0	0	4	44	4	44	0	0	1	11
North West	8	0	0	3	38	3	38	2	25	0	0
South East	10	0	0	0	0	10	100	0	0	0	0
South West	13	1	8	5	38	7	54	0	0	0	0
West Midlands	7	0	0	2	29	4	57	1	14	0	0
Northern Ireland	2	0	0	0	0	1	50	0	0	1	50
Wales	8	0	0	4	50	2	25	1	13	1	13
United Kingdom	**74**	**1**	**1**	**25**	**34**	**37**	**50**	**8**	**11**	**3**	**4**

Table 21: 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	
Sub-region		No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	23	1	4	6	26	14	61	2	9	0	0
East of England	25	0	0	10	40	14	56	1	4	0	0
London	22	0	0	6	27	16	73	0	0	0	0
N East, Yorks & Humber	23	0	0	7	30	15	65	1	4	0	0
North West	38	1	3	10	26	26	68	1	3	0	0
South East	73	0	0	11	15	62	85	0	0	0	0
South West	62	1	2	24	39	36	58	1	2	0	0
West Midlands	25	0	0	12	48	13	52	0	0	0	0
Northern Ireland	6	0	0	4	67	2	33	0	0	0	0
Wales	7	0	0	3	43	4	57	0	0	0	0
United Kingdom	**304**	**3**	**1**	**93**	**31**	**202**	**66**	**6**	**2**	**0**	**0**

Table 22: Data completeness for surgically treated non-invasive cancers							
	Unknown cytonuclear grade		Unknown size		Unknown cytonuclear grade and/or size		Total with surgery
Sub-region	No.	%	No.	%	No.	%	No.
East Midlands	4	1	12	4	13	4	295
East of England	1	0	20	7	21	8	270
London	12	3	47	11	47	11	440
N East, Yorks & Humber	4	1	39	7	39	7	546
North West	2	0	31	7	31	7	453
South East	8	1	25	4	25	4	558
South West	2	0	29	6	29	6	464
West Midlands	1	0	11	3	12	4	328
Northern Ireland	0	0	2	2	2	2	88
Wales	1	0	4	2	5	2	203
United Kingdom	**35**	**1.0**	**220**	**6**	**224**	**6**	**3645**

Table 23: Size of surgically treated non-invasive cancers												
	<15mm		15-≤40mm		>40 mm		Size not assessable		Size unknown		Total non-invasive with surgery	
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	119	40	119	40	40	14	5	2	12	4	295	100
East of England	98	36	112	41	35	13	5	2	20	7	270	100
London	126	29	176	40	81	18	10	2	47	11	440	100
N East, Yorks & Humber	190	35	198	36	106	19	13	2	39	7	546	100
North West	141	31	197	43	74	16	10	2	31	7	453	100
South East	189	34	230	41	84	15	30	5	25	4	558	100
South West	167	36	192	41	55	12	21	5	29	6	464	100
West Midlands	133	41	123	38	55	17	6	2	11	3	328	100
Northern Ireland	39	44	34	39	11	13	2	2	2	2	88	100
Wales	58	29	95	47	46	23	0	0	4	2	203	100
United Kingdom	**1260**	**35**	**1476**	**40**	**587**	**16**	**102**	**3**	**220**	**6**	**3645**	**100**

Table 24: Cytonuclear grade of surgically treated non-invasive cancers												
	High		Intermediate		Low		Not assessable		Unknown		Total non-invasive with surgery	
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	175	59	90	31	21	7	5	2	4	1	295	100
East of England	169	63	72	27	22	8	6	2	1	0	270	100
London	263	60	122	28	33	8	10	2	12	3	440	100
N East, Yorks & Humber	329	60	154	28	44	8	15	3	4	1	546	100
North West	283	62	116	26	42	9	10	2	2	0	453	100
South East	322	58	149	27	49	9	30	5	8	1	558	100
South West	292	63	119	26	29	6	22	5	2	0	464	100
West Midlands	223	68	79	24	19	6	6	2	1	0	328	100
Northern Ireland	49	56	22	25	15	17	2	2	0	0	88	100
Wales	126	62	59	29	17	8	0	0	1	0	203	100
United Kingdom	**2231**	**61**	**982**	**27**	**291**	**8**	**106**	**3**	**35**	**1**	**3645**	**100**

Table 25: Invasive size of surgically treated invasive breast cancers																
	<10mm		10-<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm		Unknown		Total	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	333	26	368	29	268	21	224	18	37	3	26	2	18	1	1274	100
East of England	340	25	390	29	288	21	219	16	59	4	29	2	27	2	1352	100
London	346	23	357	24	355	23	303	20	62	4	42	3	46	3	1511	100
N East, Yorks & Humber	567	29	524	27	415	21	325	16	53	3	40	2	46	2	1970	100
North West	378	23	464	28	379	23	281	17	59	4	41	2	42	3	1644	100
South East	530	26	532	26	468	23	372	18	70	3	49	2	32	2	2053	100
South West	485	28	464	26	400	23	297	17	54	3	28	2	35	2	1763	100
West Midlands	314	24	318	24	323	25	248	19	41	3	37	3	20	2	1301	100
Northern Ireland	125	29	120	28	81	19	69	16	19	4	13	3	6	1	433	100
Wales	241	27	225	25	181	20	150	17	37	4	25	3	25	3	884	100
United Kingdom	**3659**	**26**	**3762**	**27**	**3158**	**22**	**2488**	**18**	**491**	**3**	**330**	**2**	**297**	**2**	**14185**	**100**

Table 26: Whole size of surgically treated invasive breast cancers																
	<10mm		10-<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm		Unknown		Total	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	203	16	315	25	282	22	280	22	88	7	52	4	54	4	1274	100
East of England	191	14	330	24	295	22	300	22	97	7	59	4	80	6	1352	100
London	211	14	268	18	353	23	394	26	120	8	95	6	70	5	1511	100
N East, Yorks & Humber	333	17	467	24	446	23	438	22	122	6	105	5	59	3	1970	100
North West	238	14	388	24	371	23	360	22	117	7	87	5	83	5	1644	100
South East	310	15	428	21	475	23	487	24	146	7	116	6	91	4	2053	100
South West	273	15	398	23	409	23	413	23	118	7	76	4	76	4	1763	100
West Midlands	179	14	264	20	312	24	318	24	76	6	76	6	76	6	1301	100
Northern Ireland	81	19	113	26	81	19	89	21	39	9	26	6	4	1	433	100
Wales	134	15	179	20	178	20	210	24	66	7	68	8	49	6	884	100
United Kingdom	**2153**	**15**	**3150**	**22**	**3202**	**23**	**3289**	**23**	**989**	**7**	**760**	**5**	**642**	**5**	**14185**	**100**

Table 27: Grade of surgically treated invasive cancers												
	Grade 1		Grade 2		Grade 3		Not assessable		Unknown		Total	
Sub-**region**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	321	25	727	57	226	18	0	0	0	0	1274	100
East of England	309	23	743	55	286	21	12	1	2	0	1352	100
London	349	23	882	58	277	18	1	0	2	0	1511	100
N East, Yorks & Humber	507	26	1100	56	360	18	0	0	3	0	1970	100
North West	433	26	928	56	279	17	1	0	3	0	1644	100
South East	486	24	1140	56	417	20	9	0	1	0	2053	100
South West	425	24	994	56	336	19	3	0	5	0	1763	100
West Midlands	275	21	762	59	263	20	1	0	0	0	1301	100
Northern Ireland	87	20	231	53	113	26	1	0	1	0	433	100
Wales	243	27	453	51	181	20	1	0	6	1	884	100
United Kingdom	**3435**	**24**	**7960**	**56**	**2738**	**19**	**29**	**0**	**23**	**0**	**14185**	**100**

Table 28: Data completeness for surgically treated invasive cancers (excluding cases with neo-adjuvant therapy)									
	Unknown invasive size		Unknown nodal status		Unknown grade		Unknown NPI*		Total invasive
Sub-region	No.	%	No.	%	No.	%	No.	%	
East Midlands	12	1.0	6	0.5	0	0.0	18	1.5	1205
East of England	23	1.9	10	0.8	2	0.2	39	3.1	1239
London	33	2.3	26	1.8	2	0.1	59	4.1	1434
N East, Yorks & Humber	31	1.6	11	0.6	3	0.2	41	2.1	1907
North West	29	1.9	8	0.5	2	0.1	37	2.4	1540
South East	25	1.3	18	0.9	1	0.1	49	2.5	1931
South West	27	1.6	23	1.4	2	0.1	52	3.1	1657
West Midlands	9	0.8	5	0.4	0	0.0	14	1.2	1196
Northern Ireland	5	1.2	8	1.9	1	0.2	13	3.0	427
Wales	10	1.2	22	2.6	5	0.6	32	3.8	836
United Kingdom	**204**	**1.5**	**137**	**1.0**	**18**	**0.1**	**354**	**2.6**	**13372**

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

Table 29: NPI Group of surgically treated invasive cancers (with known NPI excluding cases with neo-adjuvant therapy)												
	EPG		GPG		MPG1		MPG2		PPG		Total with known NPI	
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	264	22	478	40	293	25	117	10	35	3	1187	100
East of England	241	20	472	39	322	27	122	10	43	4	1200	100
London	248	18	552	40	342	25	168	12	65	5	1375	100
N East, Yorks & Humber	414	22	737	39	456	24	179	10	80	4	1866	100
North West	330	22	618	41	369	25	124	8	62	4	1503	100
South East	372	20	744	40	482	26	202	11	82	4	1882	100
South West	331	21	669	42	391	24	138	9	76	5	1605	100
West Midlands	211	18	484	41	308	26	130	11	49	4	1182	100
Northern Ireland	73	18	163	39	97	23	58	14	23	6	414	100
Wales	193	24	303	38	175	22	81	10	52	6	804	100
United Kingdom	**2677**	**21**	**5220**	**40**	**3235**	**25**	**1319**	**10**	**567**	**4**	**13018**	**100**

Table 30: ER status (invasive cancers)							
	Positive		Negative		Not done or Unknown		Total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	1182	90	116	9	9	1	1307
East of England	1271	91	116	8	4	0	1391
London	1495	91	144	9	5	0	1644
N East, Yorks & Humber	1836	91	167	8	7	0	2010
North West	1514	91	155	9	3	0	1672
South East	1898	90	199	9	5	0	2102
South West	1681	92	139	8	1	0	1821
West Midlands	1217	92	108	8	2	0	1327
Northern Ireland	400	91	41	9	0	0	441
Wales	813	90	89	10	2	0	904
United Kingdom	**13307**	**91**	**1274**	**9**	**38**	**0.3**	**14619**

Table 31: PgR status (invasive)							
	Positive		Negative		Not done or Unknown		Total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	481	37	160	12	666	51	1307
East of England	687	49	207	15	497	36	1391
London	1017	62	237	14	390	24	1644
N East, Yorks & Humber	364	18	190	9	1456	72	2010
North West	999	60	308	18	365	22	1672
South East	1287	61	352	17	463	22	2102
South West	670	37	194	11	957	53	1821
West Midlands	682	51	209	16	436	33	1327
Northern Ireland	214	49	73	17	154	35	441
Wales	382	42	150	17	372	41	904
United Kingdom	**6783**	**46**	**2080**	**14**	**5756**	**39**	**14619**

Table 32: PgR status of invasive cancers with negative ER status							
	Positive		Negative		Not done or Unknown		Total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	5	4	78	67	33	28	116
East of England	2	2	95	82	19	16	116
London	5	3	112	78	27	19	144
N East, Yorks & Humber	5	3	124	74	38	23	167
North West	4	3	124	80	27	17	155
South East	14	7	180	90	5	3	199
South West	8	6	79	57	52	37	139
West Midlands	3	3	94	87	11	10	108
Northern Ireland	2	5	34	83	5	12	41
Wales	2	2	77	87	10	11	89
United Kingdom	**50**	**4**	**997**	**78**	**227**	**18**	**1274**

Table 33: HER-2 status for invasive cancers									
	Positive		Negative		Borderline		Not done or Unknown		Total
Sub-region	No.	%	No.	%	No.	%	No.	%	
East Midlands	146	11	1125	86	19	1	17	1	1307
East of England	153	11	1175	84	27	2	36	3	1391
London	224	14	1337	81	69	4	14	1	1644
N East, Yorks & Humber	203	10	1769	88	9	0	29	1	2010
North West	165	10	1464	88	37	2	6	0	1672
South East	206	10	1847	88	25	1	24	1	2102
South West	208	11	1574	86	12	1	27	1	1821
West Midlands	158	12	1146	86	11	1	12	1	1327
Northern Ireland	44	10	393	89	2	0	2	0	441
Wales	95	11	795	88	10	1	4	0	904
United Kingdom	**1602**	**11**	**12625**	**86**	**221**	**2**	**171**	**1**	**14619**

Table 34: Size, grade and nodal status for invasive cancers with HER2 testing not done or unknown							
	Total HER2 unknown/not done	<10mm invasive size		Grade 1		Negative nodal status	
Sub-region		No	%	No	%	No	%
East Midlands	17	6	35	3	18	8	47
East of England	36	14	39	9	25	20	56
London	14	10	71	6	43	8	57
N East, Yorks & Humber	29	20	69	7	24	22	76
North West	6	3	50	0	0	4	67
South East	24	16	67	4	17	18	75
South West	27	14	52	5	19	18	67
West Midlands	12	7	58	6	50	10	83
Northern Ireland	2	0	0	0	0	2	100
Wales	4	2	50	1	25	3	75
United Kingdom	**171**	**92**	**54**	**41**	**24**	**113**	**66**

Table 35: ER status (micro/non-invasive cancers)							
	Positive		Negative		Not done or Unknown		Total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	15	5	4	1	299	94	318
East of England	48	16	11	4	244	81	303
London	159	32	26	5	306	62	491
N East, Yorks & Humber	122	21	23	4	436	75	581
North West	220	46	52	11	208	43	480
South East	146	24	25	4	435	72	606
South West	233	46	65	13	204	41	502
West Midlands	15	4	2	1	337	95	354
Northern Ireland	19	20	3	3	74	77	96
Wales	12	6	3	1	194	93	209
United Kingdom	**989**	**25**	**214**	**5**	**2737**	**69**	**3940**

Table 36: Treatment for non-invasive breast cancers										
	Conservation surgery		Mastectomy		No surgery		Unknown		Total	
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	230	75	65	21	10	3	0	0	305	100
East of England	214	77	56	20	9	3	0	0	279	100
London	325	67	115	24	45	9	0	0	485	100
N East, Yorks & Humber	418	75	128	23	14	3	0	0	560	100
North West	349	76	104	23	6	1	0	0	459	100
South East	453	78	105	18	22	4	0	0	580	100
South West	377	78	87	18	19	4	0	0	483	100
West Midlands	254	74	74	22	13	4	0	0	341	100
Northern Ireland	71	75	17	18	7	7	0	0	95	100
Wales	147	72	56	27	2	1	0	0	205	100
United Kingdom	**2838**	**75**	**807**	**21**	**147**	**4**	**0**	**0**	**3792**	**100**

Table 37: Treatment for micro-invasive breast cancers										
	Conservation surgery		Mastectomy		No surgery		Unknown		Total	
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	11	85	2	15	0	0	0	0	13	100
East of England	16	67	8	33	0	0	0	0	24	100
London	4	67	2	33	0	0	0	0	6	100
N East, Yorks & Humber	10	48	11	52	0	0	0	0	21	100
North West	14	67	7	33	0	0	0	0	21	100
South East	17	65	9	35	0	0	0	0	26	100
South West	11	58	8	42	0	0	0	0	19	100
West Midlands	10	77	3	23	0	0	0	0	13	100
Northern Ireland	1	100	0	0	0	0	0	0	1	100
Wales	2	50	2	50	0	0	0	0	4	100
United Kingdom	**96**	**65**	**52**	**35**	**0**	**0**	**0**	**0**	**148**	**100**

Table 38: Treatment for non-invasive breast cancers size >40mm								
	Conservation surgery		Mastectomy		Unknown		Total	
Sub-region	No.	%	No.	%	No.	%	No.	%
East Midlands	17	43	23	58	0	0	40	100
East of England	14	40	21	60	0	0	35	100
London	25	31	56	69	0	0	81	100
N East, Yorks & Humber	26	25	80	75	0	0	106	100
North West	18	24	56	76	0	0	74	100
South East	25	30	59	70	0	0	84	100
South West	15	27	40	73	0	0	55	100
West Midlands	19	35	36	65	0	0	55	100
Northern Ireland	3	27	8	73	0	0	11	100
Wales	15	33	31	67	0	0	46	100
United Kingdom	**177**	**30**	**410**	**70**	**0**	**0**	**587**	**100**

Table 39: Treatment of high cytonuclear grade non-invasive cancers (>40mm)								
	Conservation surgery		Mastectomy		Unknown		Total	
Sub-region	No.	%	No.	%	No.	%	No.	%
East Midlands	7	30	16	70	0	0	23	100
East of England	8	30	19	70	0	0	27	100
London	17	28	43	72	0	0	60	100
N East, Yorks & Humber	21	26	60	74	0	0	81	100
North West	12	20	47	80	0	0	59	100
South East	19	31	42	69	0	0	61	100
South West	11	24	34	76	0	0	45	100
West Midlands	16	33	33	67	0	0	49	100
Northern Ireland	3	27	8	73	0	0	11	100
Wales	8	24	25	76	0	0	33	100
United Kingdom	**122**	**27**	**327**	**73**	**0**	**0**	**449**	**100**

Table 40: Treatment for invasive breast cancers										
	Conservation surgery		Mastectomy		No Surgery		Unknown		Total	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	1062	81	212	16	33	3	0	0	1307	100
East of England	1090	78	262	19	39	3	0	0	1391	100
London	1237	75	274	17	133	8	0	0	1644	100
N East, Yorks & Humber	1656	82	314	16	40	2	0	0	2010	100
North West	1331	80	313	19	28	2	0	0	1672	100
South East	1713	81	340	16	49	2	0	0	2102	100
South West	1493	82	270	15	58	3	0	0	1821	100
West Midlands	1059	80	242	18	26	2	0	0	1327	100
Northern Ireland	335	76	98	22	8	2	0	0	441	100
Wales	693	77	191	21	20	2	0	0	904	100
United Kingdom	**11669**	**80**	**2516**	**17**	**434**	**3**	**0**	**0**	**14619**	**100**

Table 41: Mastectomy rate with invasive tumour size										
	<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	56	8	48	18	60	27	21	57	20	77
East of England	79	11	49	17	68	31	37	63	26	90
London	81	12	48	14	82	27	25	40	32	76
N East, Yorks & Humber	107	10	63	15	71	22	27	51	35	88
North West	94	11	59	16	76	27	35	59	35	85
South East	124	12	53	11	84	23	31	44	40	82
South West	88	9	50	13	81	27	26	48	22	79
West Midlands	69	11	47	15	60	24	30	73	28	76
Northern Ireland	29	12	15	19	28	41	13	68	11	85
Wales	66	14	33	18	42	28	19	51	22	88
United Kingdom	**793**	**11**	**465**	**15**	**652**	**26**	**264**	**54**	**271**	**82**

Table 42: Mastectomy rate with whole tumour size										
	<15mm		15-≤20mm		>20-≤35mm		>35-≤50mm		>50mm	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	21	4	34	12	54	19	44	50	36	69
East of England	25	5	32	11	76	25	55	57	49	83
London	25	5	35	10	87	22	46	38	65	68
N East, Yorks & Humber	33	4	44	10	87	20	49	40	89	85
North West	38	6	37	10	77	21	56	48	76	87
South East	27	4	41	9	88	18	65	45	91	78
South West	29	4	33	8	84	20	56	47	56	74
West Midlands	23	5	31	10	55	17	44	58	59	78
Northern Ireland	14	7	10	12	27	30	27	69	20	77
Wales	21	7	24	13	47	22	28	42	55	81
United Kingdom	**256**	**5**	**321**	**10**	**682**	**21**	**470**	**48**	**596**	**78**

Table 43: 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	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	21	4	9	12	5	8	12	46	5	45
East of England	25	5	8	9	11	16	18	67	14	82
London	25	5	12	13	17	25	9	30	16	62
N East, Yorks & Humber	33	4	8	7	17	18	14	45	35	83
North West	38	6	7	8	9	14	15	48	20	91
South East	27	4	14	11	19	19	26	62	33	83
South West	29	4	10	8	11	11	18	64	19	76
West Midlands	23	5	8	10	17	26	7	39	12	75
Northern Ireland	12	6	2	11	6	29	6	75	3	50
Wales	21	7	6	10	11	27	8	53	15	83
United Kingdom	**254**	**5**	**84**	**10**	**123**	**18**	**133**	**52**	**172**	**77**

Table 44: Immediate reconstruction with mastectomy (all cancers)								
	Immediate reconstruction		No immediate reconstruction		Unknown		Total mastectomies	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	85	30	193	69	1	0	279	100
East of England	122	37	204	63	0	0	326	100
London	82	21	308	79	1	0	391	100
N East, Yorks & Humber	174	38	278	61	1	0	453	100
North West	169	40	255	60	0	0	424	100
South East	150	33	302	67	2	0	454	100
South West	119	33	246	67	0	0	365	100
West Midlands	107	34	211	66	1	0	319	100
Northern Ireland	28	24	87	76	0	0	115	100
Wales	92	37	157	63	0	0	249	100
United Kingdom	**1128**	**33**	**2241**	**66**	**6**	**0**	**3375**	**100**

Table 45: Any neo-adjuvant therapy							
	Had treatment		Did not have treatment		Unknown		Total
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	
East Midlands	93	6	1532	94	0	0	1625
East of England	146	9	1550	91	0	0	1696
London	137	6	1999	94	0	0	2136
N East, Yorks & Humber	94	4	2498	96	0	0	2592
North West	126	6	2027	94	0	0	2153
South East	134	5	2574	95	0	0	2708
South West	139	6	2186	94	0	0	2325
West Midlands	124	7	1557	93	0	0	1681
Northern Ireland	15	3	522	97	0	0	537
Wales	67	6	1046	94	0	0	1113
United Kingdom	**1075**	**6**	**17491**	**94**	**0**	**0**	**18566**

Table 46: Neo-adjuvant endocrine therapy							
	Had treatment		Did not have treatment		Unknown		Total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	27	2	1598	98	0	0	1625
East of England	76	4	1620	96	0	0	1696
London	40	2	2096	98	0	0	2136
N East, Yorks & Humber	40	2	2552	98	0	0	2592
North West	63	3	2090	97	0	0	2153
South East	56	2	2652	98	0	0	2708
South West	68	3	2257	97	0	0	2325
West Midlands	37	2	1644	98	0	0	1681
Northern Ireland	8	1	529	99	0	0	537
Wales	38	3	1075	97	0	0	1113
United Kingdom	**453**	**2**	**18113**	**98**	**0**	**0**	**18566**

Table 47: Neo-adjuvant chemotherapy for invasive cancers							
	Had treatment		Did not have treatment		Unknown		Total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	72	6	1235	94	0	0	1307
East of England	73	5	1318	95	0	0	1391
London	98	6	1546	94	0	0	1644
N East, Yorks & Humber	54	3	1956	97	0	0	2010
North West	68	4	1604	96	0	0	1672
South East	80	4	2022	96	0	0	2102
South West	74	4	1747	96	0	0	1821
West Midlands	89	7	1238	93	0	0	1327
Northern Ireland	7	2	434	98	0	0	441
Wales	30	3	874	97	0	0	904
United Kingdom	**645**	**4**	**13974**	**96**	**0**	**0**	**14619**

Table 48: Neo-adjuvant Traztuzumab							
	Had treatment		Did not have treatment		Unknown		Total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	2	0	1623	100	0	0	1625
East of England	9	1	1687	99	0	0	1696
London	2	0	2134	100	0	0	2136
N East, Yorks & Humber	9	0	2583	100	0	0	2592
North West	10	0	2143	100	0	0	2153
South East	12	0	2696	100	0	0	2708
South West	10	0	2315	100	0	0	2325
West Midlands	21	1	1660	99	0	0	1681
Northern Ireland	1	0	536	100	0	0	537
Wales	9	1	1104	99	0	0	1113
United Kingdom	**85**	**0**	**18481**	**100**	**0**	**0**	**18566**

Table 49: Annual screening surgical caseload per surgeon (2017/18)														
		<10 cases		10-29 cases		30-49 cases		50-79 cases		80-99 cases		100+ cases		
Sub-region	Total surgeons	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	Median
East Midlands	51	9	18	13	25	20	39	9	18	0	0	0	0	31
East of England	65	17	26	19	29	21	32	6	9	1	2	1	2	27
London	91	41	45	16	18	23	25	9	10	0	0	2	2	18
N East, Yorks & Humber	78	15	19	19	24	26	33	15	19	0	0	3	4	32
North West	88	25	28	26	30	26	30	10	11	1	1	0	0	26
South East	84	22	26	24	29	19	23	12	14	4	5	3	4	28
South West	77	16	21	23	30	24	31	12	16	2	3	0	0	29
West Midlands	62	15	24	19	31	17	27	10	16	1	2	0	0	27
Northern Ireland	18	4	22	4	22	8	44	2	11	0	0	0	0	31
Wales	23	4	17	3	13	4	17	9	39	1	4	2	9	53
United Kingdom	**637**	**168**	**26**	**166**	**26**	**188**	**30**	**94**	**15**	**10**	**2**	**11**	**2**	**29**

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

Table 50: Proportion of women referred to surgeons according to annual caseload of surgeon (2017/18)													
	Total (referred)	<10 cases		10-29 cases		30-49 cases		50-79 cases		80-99 cases		100+ cases	
Sub-region		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	1693	33	2	320	19	801	47	539	32	0	0	0	0
East of England	1766	45	3	361	20	816	46	355	20	88	5	101	6
London	2064	141	7	300	15	873	42	502	24	1	0	247	12
N East, Yorks & Humber	2702	39	1	404	15	984	36	924	34	0	0	351	13
North West	2259	57	3	534	24	951	42	622	28	95	4	0	0
South East	2804	63	2	480	17	771	27	761	27	345	12	384	14
South West	2398	42	2	457	19	983	41	727	30	188	8	1	0
West Midlands	1735	37	2	404	23	613	35	592	34	89	5	0	0
Northern Ireland	537	27	5	73	14	311	58	126	23	0	0	0	0
Wales	1113	13	1	49	4	163	15	573	51	99	9	216	19
United Kingdom	**19071**	**497**	**3**	**3382**	**18**	**7266**	**38**	**5721**	**30**	**905**	**5**	**1300**	**7**

Table 51: Explanations for surgeons with screening caseload less than 10 cases (2017/18)								
Sub-region	Number surgeons with screening caseload <10	Sympto matic caseload >30 pa*	Joined NHSBSP	Left NHSBSP	Plastic surgeon	Private practice	No information /data errors	Other reasons
East Midlands	9	0	1	1	2	0	5	0
East of England	17	2	0	2	4	2	7	0
London	41	1	1	3	7	16	12	1
N East, Yorks & Humber	15	0	4	1	2	0	3	5
North West	25	8	0	3	4	8	1	1
South East	22	3	1	2	2	3	4	7
South West	16	3	1	1	3	1	4	3
West Midlands	15	0	0	2	8	0	4	1
Northern Ireland	4	0	0	0	0	0	4	0
Wales	4	0	0	0	0	0	4	0
United Kingdom	**168**	**17**	**8**	**15**	**32**	**30**	**48**	**18**

*pa= per annum

Table 52: Annual screening surgical caseload per surgeon (2015/16-2017/18)														
		<10 cases		10-29 cases		30-49 cases		50-79 cases		80-99 cases		100+ cases		3 years
Sub-region	Total surgeons	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	median
East Midlands	62	16	26	19	31	18	29	8	13	1	2	0	0	85
East of England	82	32	39	21	26	21	26	6	7	2	2	0	0	49
London	127	72	57	23	18	21	17	9	7	1	1	1	1	22
N East, Yorks & Humber	99	35	35	20	20	29	29	12	12	2	2	1	1	78
North West	101	39	39	27	27	27	27	8	8	0	0	0	0	65
South East	102	34	33	24	24	29	28	11	11	1	1	3	3	78
South West	91	31	34	24	26	20	22	16	18	0	0	0	0	76
West Midlands	85	35	41	23	27	16	19	10	12	1	1	0	0	47
Northern Ireland	19	2	11	10	53	5	26	2	11	0	0	0	0	78
Scotland*	51	19	37	15	29	10	20	5	10	0	0	2	4	16
Wales	29	8	28	4	14	5	17	10	34	1	3	1	3	131
United Kingdom	**848**	**323**	**38**	**210**	**25**	**201**	**24**	**97**	**11**	**9**	**1**	**8**	**1**	**58**

*No data were submitted from Scotland for 16/17 and 17/18 audit. Median of Scottish cases is calculated using caseload from the 15/16 audit.

Table 53: Proportion of women referred to surgeons according to annual caseload of surgeon (2015/16-2017/18)													
	Total (referred)	<10 cases		10-29 cases		30-49 cases		50-79 cases		80-99 cases		100+ cases	
Sub-region		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	5027	85	2	1277	25	2027	40	1379	27	259	5	0	0
East of England	5500	176	3	1223	22	2552	46	1035	19	508	9	6	0
London	6217	492	8	1365	22	2296	37	1456	23	262	4	346	6
N East, Yorks & Humber	8321	337	4	1404	17	3438	41	2283	27	538	6	321	4
North West	6864	263	4	1787	26	3169	46	1644	24	1	0	0	0
South East	7844	241	3	1373	18	3140	40	1955	25	261	3	874	11
South West	8174	233	3	1824	22	2730	33	3217	39	0	0	170	2
West Midlands	5567	279	5	1382	25	1922	35	1715	31	269	5	0	0
Northern Ireland	1535	33	2	619	40	556	36	327	21	0	0	0	0
Scotland*	1424	80	6	318	22	386	27	344	24	0	0	296	21
Wales	3464	47	1	207	6	591	17	2031	59	287	8	301	9
United Kingdom	**59937**	**2266**	**4**	**12779**	**21**	**22807**	**38**	**17386**	**29**	**2385**	**4**	**2314**	**4**

*No data were submitted from Scotland for 16/17 and 17/18 audit

Table 54: Explanations for surgeons with screening caseload less than 10 cases per annual (2015/16-2017/18)								
Sub-region	Number surgeons with screening caseload <10	Sympto matic caseload >30 pa*	Joined NHSBSP	Left NHSBSP	Plastic surgeon	Private practice	No information /data errors	Other reasons
East Midlands	16	0	0	0	2	0	11	3
East of England	32	1	0	2	6	2	14	7
London	72	4	1	2	8	16	23	18
N East, Yorks & Humber	35	0	4	2	4	0	3	22
North West	39	8	1	3	4	9	1	13
South East	34	3	1	2	3	4	6	15
South West	31	4	1	4	3	1	6	12
West Midlands	35	3	0	5	10	2	4	11
Northern Ireland	2	0	1	0	0	0	0	1
Scotland	19	1	6	0	0	0	11	1
Wales	8	1	0	0	1	0	3	3
United Kingdom	**323**	**25**	**15**	**20**	**41**	**34**	**82**	**106**

*pa= per annum

Table 55: Repeat operations of surgically treated invasive and non/micro-invasive cancers						
	Invasive			Non/micro-invasive		
Sub-region	**Total**	**Re-op**	**%**	**Total**	**Re-op**	**%**
East Midlands	1274	232	18	308	67	22
East of England	1352	244	18	294	71	24
London	1511	234	15	446	80	18
N East, Yorks & Humber	1970	314	16	567	97	17
North West	1644	293	18	474	96	20
South East	2053	383	19	584	147	25
South West	1763	311	18	483	132	27
West Midlands	1301	231	18	341	76	22
Northern Ireland	433	84	19	89	12	13
Wales	884	166	19	207	61	29
United Kingdom	**14185**	**2492**	**18**	**3793**	**839**	**22**

Table 56: Repeat operations of surgically treated invasive and non/micro-invasive cancers without a non-op diagnosis						
	Invasive			Non/micro-invasive		
Sub-region	**Total**	**Re-op**	**%**	**Total**	**Re-op**	**%**
East Midlands	5	3	60	22	9	41
East of England	8	6	75	25	8	32
London	4	3	75	21	13	62
N East, Yorks & Humber	9	8	89	23	8	35
North West	8	4	50	38	17	45
South East	10	9	90	70	17	24
South West	13	9	69	62	16	26
West Midlands	7	7	100	25	10	40
Northern Ireland	2	2	100	6	2	33
Wales	8	5	63	7	4	57
United Kingdom	**74**	**56**	**76**	**299**	**104**	**35**

Table 57: Number of therapeutic operations (invasive cancers) with initial BCS and a non-operative diagnosis														
	1		2		3		4+		Unknown		Total cancers		Repeat 2+ ops	
Sub-region	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
East Midlands	880	82	176	16	17	2	1	0	0	0	1074	100	194	18
East of England	924	83	170	15	18	2	1	0	0	0	1113	100	189	17
London	1062	85	175	14	6	0	1	0	0	0	1244	100	182	15
N East, Yorks & Humber	1419	84	243	14	18	1	3	0	0	0	1683	100	264	16
North West	1111	81	234	17	19	1	1	0	0	0	1365	100	254	19
South East	1410	81	307	18	29	2	3	0	0	0	1749	100	339	19
South West	1242	82	225	15	34	2	5	0	0	0	1506	100	264	18
West Midlands	875	81	175	16	21	2	4	0	0	0	1075	100	200	19
Northern Ireland	276	78	71	20	5	1	0	0	0	0	352	100	76	22
Wales	571	81	127	18	10	1	1	0	0	0	709	100	138	19
United Kingdom	**9770**	**82**	**1903**	**16**	**177**	**1**	**20**	**0**	**0**	**0**	**11870**	**100**	**2100**	**18**

Table 58: 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	
Sub-region	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
East Midlands	176	77	47	21	6	3	0	0	0	0	229	100	53	23
East of England	166	75	45	20	9	4	1	0	0	0	221	100	55	25
London	272	83	48	15	5	2	0	0	1	0	326	100	53	16
N East, Yorks & Humber	360	82	65	15	11	3	1	0	0	0	437	100	77	18
North West	279	79	60	17	11	3	2	1	0	0	352	100	73	21
South East	302	71	97	23	22	5	5	1	0	0	426	100	124	29
South West	247	69	85	24	22	6	4	1	0	0	358	100	111	31
West Midlands	188	76	51	21	6	2	3	1	0	0	248	100	60	24
Northern Ireland	58	85	10	15	0	0	0	0	0	0	68	100	10	15
Wales	105	67	43	28	5	3	3	2	0	0	156	100	51	33
United Kingdom	**2153**	**76**	**551**	**20**	**97**	**3**	**19**	**1**	**1**	**0**	**2821**	**100**	**667**	**24**

Table 59: Number of therapeutic operations for invasive cancers with B5b (invasive) core biopsy result												
	1		2		3+		Unknown		Total		Repeat (2+) rate	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	1030	84	181	15	14	1	0	0	1225	100	195	16
East of England	1064	84	183	15	13	1	0	0	1260	100	196	16
London	1223	86	186	13	5	0	0	0	1414	100	191	14
N East, Yorks & Humber	1606	87	229	12	20	1	0	0	1855	100	249	13
North West	1311	85	225	15	13	1	0	0	1548	100	238	15
South East	1615	84	283	15	20	1	0	0	1918	100	303	16
South West	1401	85	208	13	37	2	0	0	1646	100	245	15
West Midlands	1046	84	171	14	21	2	0	0	1238	100	192	16
Northern Ireland	336	83	66	16	5	1	0	0	407	100	71	17
Wales	685	84	121	15	10	1	0	0	816	100	131	16
United Kingdom	**11317**	**85**	**1853**	**14**	**158**	**1**	**0**	**0**	**13327**	**100**	**2011**	**15**

Table 60: Number of therapeutic operations for invasive cancers with B5a (non-invasive) core biopsy result												
	1		2		3+		Unknown		Total		Repeat (2+) rate	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	10	23	29	67	4	9	0	0	43	100	33	77
East of England	35	47	34	45	6	8	0	0	75	100	40	53
London	49	54	37	41	3	3	1	1	90	100	40	44
N East, Yorks & Humber	46	45	55	54	1	1	0	0	102	100	56	55
North West	34	40	45	52	7	8	0	0	86	100	52	60
South East	51	43	56	47	13	11	0	0	120	100	69	58
South West	41	42	50	52	6	6	0	0	97	100	56	58
West Midlands	18	38	26	54	4	8	0	0	48	100	30	63
Northern Ireland	11	50	11	50	0	0	0	0	22	100	11	50
Wales	28	48	29	50	1	2	0	0	58	100	30	52
United Kingdom	**323**	**44**	**372**	**50**	**45**	**6**	**1**	**0**	**741**	**100**	**417**	**56**

Table 61: 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	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	226	80	51	18	6	2	0	0	283	100	57	20
East of England	203	76	53	20	10	4	0	0	266	100	63	24
London	354	84	62	15	5	1	1	0	422	100	67	16
N East, Yorks & Humber	447	84	76	14	12	2	0	0	535	100	88	16
North West	355	82	66	15	13	3	0	0	434	100	79	18
South East	382	75	101	20	27	5	0	0	510	100	128	25
South West	300	73	87	21	26	6	0	0	413	100	113	27
West Midlands	246	79	55	18	10	3	0	0	311	100	65	21
Northern Ireland	72	89	9	11	0	0	0	0	81	100	9	11
Wales	142	71	49	25	8	4	0	0	199	100	57	29
United Kingdom	**2727**	**79**	**609**	**18**	**117**	**3**	**1**	**0**	**3454**	**100**	**726**	**21**

Table 62: Repeat BCS (all cancers) with initial BCS and a non-operative diagnosis			
	All cancers with initial BCS (with non-op diagnosis)	**Repeat BCS**	
Sub-region		**No**	**%**
East Midlands	1303	177	14
East of England	1335	136	10
London	1570	146	9
N East, Yorks & Humber	2120	202	10
North West	1717	201	12
South East	2175	308	14
South West	1864	258	14
West Midlands	1323	171	13
Northern Ireland	420	41	10
Wales	865	121	14
United Kingdom	**14692**	**1761**	**12**

Table 63: Converted to mastectomy (all cancers) with initial BCS and a non-operative diagnosis			
	All cancers with initial BCS (with non-op diagnosis)	**Converted to Mx**	
Sub-region		**No**	**%**
East Midlands	1303	32	2
East of England	1335	50	4
London	1570	34	2
N East, Yorks & Humber	2120	69	3
North West	1717	68	4
South East	2175	83	4
South West	1864	60	3
West Midlands	1323	35	3
Northern Ireland	420	20	5
Wales	865	40	5
United Kingdom	**14692**	**491**	**3**

Table 64: Data completeness of margin information				
Sub-region	**Total cases with surgery to the breast**	**Complete margin data**	**% complete margin data**	**Not complete margin data**
East Midlands	1548	1386	90	162
East of England	1599	1521	95	78
London	1883	1836	98	47
N East, Yorks & Humber	2481	2439	98	42
North West	2051	1963	96	88
South East	2578	2427	94	151
South West	2190	2092	96	98
West Midlands	1602	1583	99	19
Northern Ireland	515	495	96	20
Wales	1073	940	88	133
United Kingdom	**17520**	**16682**	**95**	**838**

Table 65: Margin information of final operations for cases treated by BCS							
	Total cases with	**Margin clear**		**Margin not clear**		**Margin unknown**	
Sub-region	**surgery**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	1276	1265	99	10	1	1	0
East of England	1278	1254	98	22	2	2	0
London	1498	1491	100	1	0	6	0
N East, Yorks & Humber	2032	1999	98	20	1	13	1
North West	1637	1591	97	40	2	6	0
South East	2135	2104	99	25	1	6	0
South West	1829	1800	98	26	1	3	0
West Midlands	1296	1261	97	34	3	1	0
Northern Ireland	400	397	99	3	1	0	0
Wales	831	807	97	12	1	12	1
United Kingdom	**14212**	**13969**	**98**	**193**	**1**	**50**	**0**

Table 66: Margin information of final operations for cases treated by mastectomy							
	Total cases with	**Margin clear**		**Margin not clear**		**Margin unknown**	
Sub-region	**surgery**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	272	264	97	7	3	1	0
East of England	321	317	99	4	1	0	0
London	385	379	98	6	2	0	0
N East, Yorks & Humber	449	432	96	14	3	3	1
North West	414	393	95	19	5	2	0
South East	443	422	95	20	5	1	0
South West	361	350	97	9	2	2	1
West Midlands	306	289	94	16	5	1	0
Northern Ireland	115	112	97	1	1	2	2
Wales	242	228	94	6	2	8	3
United Kingdom	**3308**	**3186**	**96**	**102**	**3**	**20**	**1**

Table 67: Axillary ultrasound record for invasive cancers							
	Had axillary ultrasound		Did not have axillary ultrasound		Unknown		Total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	1295	99	12	1	0	0	1307
East of England	1359	98	32	2	0	0	1391
London	1632	99	10	1	2	0	1644
N East, Yorks & Humber	1976	98	34	2	0	0	2010
North West	1648	99	24	1	0	0	1672
South East	2099	100	3	0	0	0	2102
South West	1791	98	30	2	0	0	1821
West Midlands	1324	100	3	0	0	0	1327
Northern Ireland	432	98	8	2	1	0	441
Wales	838	93	47	5	19	2	904
United Kingdom	**14394**	**98**	**203**	**1**	**22**	**0**	**14619**

Table 68: Axillary ultrasound result for invasive cancers					
	Normal		Abnormal		Total
Sub-region	No.	%	No.	%	
East Midlands	1127	87	168	13	1295
East of England	1154	85	205	15	1359
London	1405	86	227	14	1632
N East, Yorks & Humber	1629	82	347	18	1976
North West	1397	85	251	15	1648
South East	1862	89	237	11	2099
South West	1568	88	223	12	1791
West Midlands	1142	86	182	14	1324
Northern Ireland	280	65	152	35	432
Wales	684	82	154	18	838
United Kingdom	**12248**	**85**	**2146**	**15**	**14394**

Table 69: Axillary biopsy for invasive cancers with an abnormal axillary ultrasound result							
	Had axillary biopsy		Did not have axillary biopsy		Unknown		Total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	152	90	16	10	0	0	168
East of England	179	87	24	12	2	1	205
London	216	95	10	4	1	0	227
N East, Yorks & Humber	328	95	16	5	3	1	347
North West	220	88	29	12	2	1	251
South East	213	90	23	10	1	0	237
South West	197	88	26	12	0	0	223
West Midlands	172	95	9	5	1	1	182
Northern Ireland	137	90	14	9	1	1	152
Wales	152	99	2	1	0	0	154
United Kingdom	**1966**	**92**	**169**	**8**	**11**	**1**	**2146**

Table 70: 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
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
East Midlands	5	3	68	45	0	0	0	0	79	52	152
East of England	15	8	89	50	2	1	1	1	72	40	179
London	18	8	93	43	3	1	5	2	97	45	216
N East, Yorks & Humber	14	4	183	56	4	1	3	1	124	38	328
North West	7	3	118	54	1	0	2	1	92	42	220
South East	20	9	83	39	0	0	0	0	110	52	213
South West	32	16	74	38	4	2	0	0	87	44	197
West Midlands	14	8	70	41	1	1	1	1	86	50	172
Northern Ireland	4	3	91	66	2	1	2	1	38	28	137
Wales	4	3	77	51	0	0	2	1	69	45	152
United Kingdom	**133**	**7**	**946**	**48**	**17**	**1**	**16**	**1**	**854**	**43**	**1966**

Table 71: Worst axillary biopsy result for invasive cancer cases with a normal axillary ultrasound result											
Sub-region	C1/B1		C2/B2		C3/B3		C4/B4		C5/B5		Total
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
East Midlands	0	0	2	67	0	0	0	0	1	33	3
East of England	0	0	2	100	0	0	0	0	0	0	2
London	0	0	4	100	0	0	0	0	0	0	4
N East, Yorks & Humber	1	33	1	33	1	33	0	0	0	0	3
North West	0	0	3	75	0	0	1	25	0	0	4
South East	2	22	5	56	1	11	0	0	1	11	9
South West	1	20	2	40	1	20	0	0	1	20	5
West Midlands	0	0	5	71	0	0	0	0	2	29	7
Northern Ireland	1	8	9	75	0	0	0	0	2	17	12
Wales	0	-	0	-	0	-	0	-	0	-	0
United Kingdom	**5**	**10**	**33**	**67**	**3**	**6**	**1**	**2**	**7**	**14**	**49**

Table 72: Positive predictive value of the axillary biopsy results for invasive cancers with an abnormal or normal axillary ultrasound result*										
Sub-region	C1/B1		C2/B2		C3/B3		C4/B4		C5/B5	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	2	50	10	16	0	-	0	-	41	95
East of England	2	15	17	22	1	50	0	-	38	97
London	7	54	20	24	3	100	2	100	54	98
N East, Yorks & Humber	3	20	27	15	3	60	2	67	96	98
North West	1	14	17	16	0	0	2	100	52	95
South East	5	26	14	19	0	0	0	-	78	100
South West	7	25	9	13	0	0	0	-	60	100
West Midlands	5	38	13	22	0	0	0	-	48	94
Northern Ireland	3	60	11	12	0	0	1	100	31	78
Wales	1	33	15	21	0	-	1	50	49	96
United Kingdom	**36**	**30**	**153**	**18**	**7**	**37**	**8**	**80**	**547**	**96**

*Excluded cases with neo-adjuvant therapy

Table 73: Positive predictivity for invasive cancers with positive nodal status*			
Sub-region	Total with positive nodal status	Had positive pre-op ax assessment	
		No	%
East Midlands	204	41	20
East of England	210	38	18
London	280	54	19
N East, Yorks & Humber	335	96	29
North West	249	52	21
South East	372	78	21
South West	285	61	21
West Midlands	226	48	21
Northern Ireland	80	31	39
Wales	146	50	34
United Kingdom	**2387**	**549**	**23**

*Excluded cases with neo-adjuvant therapy

Table 74: Nodal positivity for invasive cancers without neo-adjuvant therapy and without/with unknown pre-op axillary assessment			
Sub-region	Total without/unknown pre-op ax	Positive nodal status	
		No	%
East Midlands	1091	151	14
East of England	1096	152	14
London	1252	194	15
N East, Yorks & Humber	1596	204	13
North West	1365	176	13
South East	1740	275	16
South West	1475	208	14
West Midlands	1068	160	15
Northern Ireland	280	34	12
Wales	686	78	11
United Kingdom	**11649**	**1632**	**14**

*Excluded cases with neo-adjuvant therapy

Table 75: Axillary biopsy results for invasive cancers with positive nodal status											
Sub-region	C1/B1		C2/B2		C3/B3		C4/B4		C5/B5		Invasive cases with positive nodal status
	No.	%	No.	%	No.	%	No.	%	No.	%	
East Midlands	2	1	10	5	0	0	0	0	41	20	204
East of England	2	1	17	8	1	0	0	0	38	18	210
London	7	3	20	7	3	1	2	1	54	19	280
N East, Yorks & Humber	3	1	27	8	3	1	2	1	96	29	335
North West	1	0	18	7	0	0	2	1	52	21	249
South East	5	1	14	4	0	0	0	0	78	21	372
South West	7	2	9	3	0	0	0	0	61	21	285
West Midlands	5	2	13	6	0	0	0	0	48	21	226
Northern Ireland	3	4	11	14	0	0	1	1	31	39	80
Wales	1	1	16	11	0	0	1	1	50	34	146
United Kingdom	**36**	**2**	**155**	**6**	**7**	**0**	**8**	**0**	**549**	**23**	**2387**

Table 76: 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	
Sub-region		No.	%	No.	%	No.	%	No.	%
East Midlands	1274	1266	99	0	0	8	1	0	0
East of England	1352	1340	99	0	0	12	1	0	0
London	1511	1484	98	0	0	27	2	0	0
N East, Yorks & Humber	1970	1957	99	0	0	13	1	0	0
North West	1644	1635	99	0	0	9	1	0	0
South East	2053	2032	99	0	0	21	1	0	0
South West	1763	1740	99	0	0	23	1	0	0
West Midlands	1301	1296	100	0	0	5	0	0	0
Northern Ireland	433	425	98	0	0	8	2	0	0
Wales	884	862	98	0	0	22	2	0	0
United Kingdom	**14185**	**14037**	**99**	**0**	**0**	**148**	**1**	**0**	**0**

Table 77: Sentinel lymph node procedure for invasive cancers with axillary surgery								
	With SLNB		Without SLNB		Unknown nodal procedure type		Total	
Sub-region	No.	%	No.	%	No.	%	No.	%
East Midlands	1173	92	97	8	0	0	1270	100
East of England	1209	90	132	10	0	0	1341	100
London	1363	92	121	8	0	0	1484	100
N East, Yorks & Humber	1798	92	156	8	0	0	1954	100
North West	1540	94	98	6	0	0	1638	100
South East	1894	93	137	7	0	0	2031	100
South West	1643	94	99	6	0	0	1742	100
West Midlands	1196	92	101	8	0	0	1297	100
Northern Ireland	376	88	49	12	0	0	425	100
Wales	777	90	89	10	0	0	866	100
United Kingdom	**12969**	**92**	**1079**	**8**	**0**	**0**	**14048**	**100**

Table 78: Nodal status of invasive cancers with known status					
	Total known nodal status	Positive		Negative	
Sub-region		No.	%	No.	%
East Midlands	1266	228	18	1038	82
East of England	1340	247	18	1093	82
London	1484	304	20	1180	80
N East, Yorks & Humber	1957	353	18	1604	82
North West	1635	281	17	1354	83
South East	2032	403	20	1629	80
South West	1740	315	18	1425	82
West Midlands	1296	257	20	1039	80
Northern Ireland	425	80	19	345	81
Wales	862	159	18	703	82
United Kingdom	**14037**	**2627**	**19**	**11410**	**81**

Table 79: Number of nodes taken for invasive cases without SLNB/ with unknown nodal procedure type									
Sub-region	Total with axillary surgery	0 node obtained		1,2,3 nodes obtained		≥4nodes obtained		Unknown	
		No.	%	No.	%	No.	%	No.	%
East Midlands	97	0	0	4	4	93	96	0	0
East of England	132	0	0	9	7	123	93	0	0
London	121	0	0	1	1	120	99	0	0
N East, Yorks & Humber	156	0	0	8	5	148	95	0	0
North West	98	1	1	4	4	93	95	0	0
South East	137	0	0	4	3	133	97	0	0
South West	99	0	0	8	8	91	92	0	0
West Midlands	101	0	0	4	4	97	96	0	0
Northern Ireland	49	0	0	4	8	45	92	0	0
Wales	89	1	1	0	0	88	99	0	0
United Kingdom	**1079**	**2**	**0**	**46**	**4**	**1031**	**96**	**0**	**0**

Table 80: Nodal status of invasive cancers with/without SLNB								
	With SLNB				Without SLNB			
	Positive		Negative		Positive		Negative	
Sub-region	No.	%	No.	%	No.	%	No.	%
East Midlands	168	14	1001	85	60	62	37	38
East of England	171	14	1037	86	76	58	56	42
London	204	15	1159	85	100	83	21	17
N East, Yorks & Humber	244	14	1555	86	109	70	49	31
North West	205	13	1333	87	76	78	21	21
South East	291	15	1602	85	112	82	27	20
South West	239	15	1402	85	76	77	23	23
West Midlands	186	16	1009	84	71	70	30	30
Northern Ireland	41	11	335	89	39	80	10	20
Wales	96	12	678	87	63	71	25	28
United Kingdom	**1845**	**14**	**11111**	**86**	**782**	**72**	**299**	**28**

Table 81: 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
Sub-region	No.	%	No.	%		No.	%	No.	%	
East Midlands	100	99	1	1	101	18	27	49	73	67
East of England	59	100	0	0	59	39	35	73	65	112
London	84	100	0	0	84	40	33	80	67	120
N East, Yorks & Humber	114	100	0	0	114	54	42	76	58	130
North West	100	99	1	1	101	27	26	77	74	104
South East	139	99	1	1	140	82	54	69	46	151
South West	112	100	0	0	112	65	51	62	49	127
West Midlands	84	99	1	1	85	34	34	67	66	101
Northern Ireland	4	100	0	0	4	7	19	30	81	37
Wales	39	100	0	0	39	9	16	48	84	57
United Kingdom	**835**	**100**	**4**	**0**	**839**	**375**	**37**	**631**	**63**	**1006**

Table 82: 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	
Sub-region		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	1266	995	78.6	101	8.0	0	0.0	890	70	4	0.3	0	0
East of England	1340	914	68.2	59	4.4	1	0.1	846	63	8	0.6	0	0
London	1484	1104	74.4	84	5.7	0	0.0	1019	69	1	0.1	0	0
N East, Yorks & Humber	1957	1470	75.1	114	5.8	2	0.1	1347	69	7	0.4	0	0
North West	1635	1247	76.3	101	6.2	1	0.1	1142	70	3	0.2	0	0
South East	2032	1565	77.0	140	6.9	2	0.1	1419	70	4	0.2	0	0
South West	1740	1344	77.2	112	6.4	0	0.0	1224	70	8	0.5	0	0
West Midlands	1296	984	75.9	85	6.6	0	0.0	895	69	4	0.3	0	0
Northern Ireland	425	292	68.7	4	0.9	0	0.0	284	67	4	0.9	0	0
Wales	862	655	76.0	39	4.5	0	0.0	616	71	0	0.0	0	0
United Kingdom	**14037**	**10570**	**75**	**839**	**6.0**	**6**	**0.0**	**9682**	**69**	**43**	**0.3**	**0**	**0**

Table 83: Availability of lymph node status for surgically treated non-invasive cancers									
	Total non-invasive cancers	Nodal status known		Nodes obtained but status unknown		No nodes obtained		Unknown if nodes obtained	
Sub-region		No.	%	No.	%	No.	%	No.	%
East Midlands	295	58	20	0	0	237	80	0	0
East of England	270	63	23	0	0	207	77	0	0
London	440	116	26	0	0	324	74	0	0
N East, Yorks & Humber	546	133	24	0	0	413	76	0	0
North West	453	112	25	0	0	341	75	0	0
South East	558	123	22	0	0	435	78	0	0
South West	464	99	21	0	0	365	79	0	0
West Midlands	328	89	27	0	0	239	73	0	0
Northern Ireland	88	19	22	0	0	69	78	0	0
Wales	203	56	28	0	0	147	72	0	0
United Kingdom	**3645**	**868**	**24**	**0**	**0**	**2777**	**76**	**0**	**0**

Table 84: Treatment for non-invasive cancers with known nodal status						
	Conservation with known nodal status		Total Conservation	Mastectomy with known nodal status		Total mastectomy
Sub-region	No.	%		No.	%	
East Midlands	9	4	230	49	75	65
East of England	12	6	214	51	91	56
London	7	2	325	109	95	115
N East, Yorks & Humber	16	4	418	117	91	128
North West	17	5	349	95	91	104
South East	22	5	453	101	96	105
South West	26	7	377	73	84	87
West Midlands	22	9	254	67	91	74
Northern Ireland	4	6	71	15	88	17
Wales	6	4	147	50	89	56
United Kingdom	**141**	**5**	**2838**	**727**	**90**	**807**

Table 85: Nodal status of non-invasive cancers					
	Total known nodal status	Positive		Negative	
Sub-region		No.	%	No.	%
East Midlands	58	0	0	58	100
East of England	63	0	0	63	100
London	116	2	2	114	98
N East, Yorks & Humber	133	3	2	130	98
North West	112	1	1	111	99
South East	123	5	4	118	96
South West	99	0	0	99	100
West Midlands	89	2	2	87	98
Northern Ireland	19	0	0	19	100
Wales	56	0	0	56	100
United Kingdom	**868**	**13**	**1**	**855**	**99**

Table 86: Sentinel lymph node procedure for non-invasive cancers with a mastectomy and known nodal status													
	With SLNB		Without SLNB								Total with mastectomy	Total known nodal status	% determined on basis of SLNB
			Ax sampling		Ax clearance		Unknown procedure		No intended Ax procedure				
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%			
East Midlands	47	72	2	3	0	0.0	0	0.0	0	0.0	65	49	96
East of England	48	86	2	4	0	0.0	0	0.0	1	1.8	56	51	94
London	109	95	0	0	0	0.0	0	0.0	0	0.0	115	109	100
N East, Yorks & Humber	115	90	2	2	0	0.0	0	0.0	0	0.0	128	117	98
North West	94	90	0	0	1	1.0	0	0.0	0	0.0	104	95	99
South East	98	93	3	3	0	0.0	0	0.0	0	0.0	105	101	97
South West	69	79	1	1	1	1.1	0	0.0	2	2.3	87	73	95
West Midlands	66	89	0	0	1	1.4	0	0.0	0	0.0	74	67	99
Northern Ireland	15	88	0	0	0	0.0	0	0.0	0	0.0	17	15	100
Wales	50	89	0	0	0	0.0	0	0.0	0	0.0	56	50	100
United Kingdom	**711**	**88**	**10**	**1**	**3**	**0.4**	**0**	**0.0**	**3**	**0.4**	**807**	**727**	**98**

Table 87: Sentinel lymph node procedure for non-invasive cancers with BCS and known nodal status													
	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				
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%			
East Midlands	9	4	0	0	0	0	0	0	0	0.0	230	9	100
East of England	12	6	0	0	0	0	0	0	0	0.0	214	12	100
London	6	2	1	0	0	0	0	0	0	0.0	325	7	86
N East, Yorks & Humber	16	4	0	0	0	0	0	0	0	0.0	418	16	100
North West	17	5	0	0	0	0	0	0	0	0.0	349	17	100
South East	22	5	0	0	0	0	0	0	0	0.0	453	22	100
South West	26	7	0	0	0	0	0	0	0	0.0	377	26	100
West Midlands	20	8	2	1	0	0	0	0	0	0.0	254	22	91
Northern Ireland	4	6	0	0	0	0	0	0	0	0.0	71	4	100
Wales	5	3	0	0	0	0	0	0	1	0.7	147	6	83
United Kingdom	**137**	**5**	**3**	**0**	**0**	**0**	**0**	**0**	**1**	**0.0**	**2838**	**141**	**97**

Table 88: Mean, median & maximum number of nodes obtained (non-invasive cancers)							
	Total known nodal status	Conservation			Mastectomy		
Sub-region		Mean	Median	Maximum	Mean	Median	Maximum
East Midlands	58	2	2	4	2	2	6
East of England	63	2	2	3	3	2	7
London	116	2	2	6	2	2	7
N East, Yorks & Humber	133	2	2	3	2	2	8
North West	112	2	2	5	2	2	19
South East	123	2	1	5	2	2	21
South West	99	2	2	7	2	2	10
West Midlands	89	2	2	5	2	2	20
Northern Ireland	19	2	2	3	2	2	5
Wales	56	1	1	2	2	2	4
United Kingdom	**868**	**2**	**2**	**7**	**2**	**2**	**21**

Table 89: 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	
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
East Midlands	1225	100	1221	100	2	0	0	-	0	-	0	-	43	98	10	23	32	74
East of England	1260	100	1257	100	0	0	0	-	0	-	0	-	75	92	39	52	30	40
London	1414	99	1404	99	0	0	0	-	0	-	0	-	90	81	43	48	30	33
N East, Yorks & Humber	1855	100	1847	100	1	0	0	-	0	-	0	-	102	92	49	48	45	44
North West	1548	100	1546	100	1	0	1	100	1	100	0	0	86	95	35	41	47	55
South East	1918	99	1908	99	0	0	0	-	0	-	0	-	120	92	51	43	59	49
South West	1646	99	1632	99	2	0	0	-	0	-	0	-	97	95	42	43	50	52
West Midlands	1238	100	1236	100	0	0	0	-	0	-	0	-	48	96	22	46	24	50
Northern Ireland	407	99	401	99	0	0	2	100	2	100	0	0	22	91	9	41	11	50
Wales	816	98	803	98	0	0	0	-	0	-	0	-	58	93	29	50	25	43
United Kingdom	**13327**	**100**	**13255**	**99**	**6**	**0**	**3**	**100**	**3**	**100**	**0**	**0**	**741**	**92**	**329**	**44**	**353**	**48**

Table 90: 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
Sub-region	No	%	No	%			
East Midlands	49	21	2	1	228	51	96
East of England	73	30	1	0	247	74	99
London	80	26	0	0	304	80	100
N East, Yorks & Humber	76	22	2	1	353	78	97
North West	78	28	0	0	281	78	100
South East	70	17	0	0	403	70	100
South West	62	20	0	0	315	62	100
West Midlands	68	26	0	0	257	68	100
Northern Ireland	30	38	1	1	80	31	97
Wales	48	30	0	0	159	48	100
United Kingdom	**634**	**24**	**6**	**0**	**2627**	**640**	**99**

Appendix 5: Adjuvant therapy data tables (91 – 116)

ADJUVANT THERAPY AUDIT WITH TUMOUR DATA FROM THE 2016/17 AUDIT OF SCREEN-DETECTED BREAST CANCERS

Table 91: Number of cases with previous cancers							
	Total submitted cases	Total pt matched	% matched	Had previous cancers		No previous cancers	
Sub-region				No.	%	No.	%
East Midlands	1619	1618	100	178	11	1440	89
East of England	1882	1881	100	206	11	1675	89
London	2222	2209	99	204	9	2005	91
N East, York's & Humber	2926	2926	100	433	15	2493	85
North West	2466	2465	100	289	12	2176	88
South East	2535	2530	100	357	14	2173	86
South West	2819	2818	100	346	12	2472	88
West Midlands	1929	1929	100	292	15	1637	85
Northern Ireland	466	429	92	81	19	348	81
United Kingdom	**18864**	**18805**	**100**	**2386**	**13**	**16419**	**87**

Table 92: Type of previous cancers									
		Total previous cancers	Invasive/micro-invasive*					Non-invasive*	
Sub-region	Total matched		Breast	Gynae-cological	Bowel	Haema-tological	Other	Breast	Other
East Midlands	1618	178	65	23	15	7	16	20	40
East of England	1881	206	81	18	9	10	16	29	57
London	2209	204	73	18	10	10	25	28	57
N East, York's & Humber	2926	433	148	47	25	15	50	42	141
North West	2465	289	106	29	15	10	49	16	82
South East	2530	357	125	26	22	18	47	55	85
South West	2818	346	94	40	23	18	51	39	107
West Midlands	1929	292	91	32	11	13	33	20	120
Northern Ireland	429	81	7	6	1	1	4	2	64
United Kingdom	**18805**	**2386**	**790**	**239**	**131**	**102**	**291**	**251**	**753**
% of previous cancers	**-**	**100**	**33**	**10**	**5**	**4**	**12**	**11**	**32**
% of matched	**100**	**13**	**4**	**1**	**1**	**1**	**2**	**1**	**4**

* a patient can have more than one previous cancer

Table 93: Adjuvant treatment of cases with previous breast cancers							
	Women with previous breast cancers	Had RT		Had CT		Had ET	
Sub-region		No.	%	No.	%	No.	%
East Midlands	84	39	46	16	19	54	64
East of England	110	51	46	28	25	68	62
London	98	39	40	19	19	35	36
N East, York's & Humber	188	63	34	40	21	129	69
North West	122	53	43	41	34	86	70
South East	197	78	40	29	15	111	56
South West	112	51	46	31	28	73	65
West Midlands	107	49	46	25	23	66	62
Northern Ireland	8	6	75	4	50	6	75
Wales	0	0	-	0	-	0	-
United Kingdom	**1026**	**429**	**42**	**233**	**23**	**628**	**61**

Table 94: 2016/17 cases supplied to the NHSBSP adjuvant audit									
Sub-region	Total Cancers	No data supplied		Excluded cases		Total Eligible		Complete data*	
		No.	%	No.	%	No.	%	No.	%
East Midlands	1619	0	0	84	5	1535	95	352	22
East of England	1882	0	0	110	6	1772	94	381	20
London	2222	0	0	98	4	2124	96	335	15
N East, York's & Humber	2926	0	0	188	6	2738	94	681	23
North West	2466	0	0	122	5	2344	95	597	24
South East	3013	0	0	197	7	2816	93	417	14
South West	2341	0	0	112	5	2229	95	423	18
West Midlands	1929	0	0	107	6	1822	94	367	19
Northern Ireland	466	80	17	8	2	378	81	373	80
Wales	1185	0	0	0	0	1185	100	1171	99
United Kingdom	**20049**	**80**	**0**	**1026**	**5**	**18943**	**94**	5097	**25**

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

Table 95: Data completeness for adjuvant therapy									
Sub-region	Total Eligible	Complete RT		Complete CT		Complete ET		Complete RT, CT & ET	
		No.	%	No.	%	No.	%	No.	%
East Midlands	1535	1162	76	412	27	1533	100	352	23
East of England	1772	1365	77	446	25	1771	100	381	22
London	2124	1429	67	434	20	2120	100	335	16
N East, York's & Humber	2738	2102	77	796	29	2735	100	681	25
North West	2344	1593	68	736	31	2342	100	597	25
South East	2816	1949	69	495	18	2813	100	417	15
South West	2229	1643	74	490	22	2226	100	423	19
West Midlands	1822	1429	78	426	23	1822	100	367	20
Northern Ireland	378	373	99	376	99	376	99	373	99
Wales	1185	1178	99	1179	99	1176	99	1171	99
United Kingdom	**18943**	**14223**	**75**	**5790**	**31**	**18914**	**100**	**5097**	**27**

Table 96: Radiotherapy														
	Invasive							Non-invasive						
Sub-region	RT		No RT		Unknown RT		Invasive total	RT		No RT		Unknown RT		Non-invasive total
	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	
East Midlands	1028	82	0	0	220	18	1248	133	48	0	0	147	53	280
East of England	1190	82	0	0	256	18	1446	168	54	0	0	142	46	310
London	1205	75	0	0	406	25	1611	221	43	0	0	288	57	509
N East, York's & Humber	1844	83	0	0	368	17	2212	245	49	0	0	260	51	505
North West	1425	76	0	0	451	24	1876	162	36	0	0	291	64	453
South East	1684	78	0	0	487	22	2171	245	40	0	0	372	60	617
South West	1431	81	0	0	333	19	1764	197	45	0	0	242	55	439
West Midlands	1219	84	0	0	225	16	1444	202	55	0	0	164	45	366
Northern Ireland	254	85	40	13	5	2	299	46	61	30	39	0	0	76
Wales	725	79	192	21	5	1	922	111	43	146	56	2	1	259
United Kingdom	**12005**	**80**	**232**	**2**	**2756**	**18**	**14993**	**1730**	**45**	**176**	**5**	**1908**	**50**	**3814**

Table 97: Radiotherapy							
	Overall						
	RT		No RT		Unknown RT		Overall total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	1162	76	0	0	373	24	1535
East of England	1365	77	0	0	407	23	1772
London	1429	67	0	0	695	33	2124
N East, York's & Humber	2102	77	0	0	636	23	2738
North West	1593	68	0	0	751	32	2344
South East	1949	69	0	0	867	31	2816
South West	1643	74	0	0	586	26	2229
West Midlands	1429	78	0	0	393	22	1822
Northern Ireland	300	79	73	19	5	1	378
Wales	839	71	339	29	7	1	1185
United Kingdom	**13811**	**73**	**412**	**2**	**4720**	**25**	**18943**

Table 98: Chemotherapy														
	Invasive							Micro/non-invasive						
	CT		No CT		Unknown CT		Invasive total	CT		No CT		Unknown CT		Micro/non-invasive total
Sub-region	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	
East Midlands	408	33	0	0	840	67	1248	4	1	0	0	282	99	286
East of England	443	31	0	0	1003	69	1446	3	1	0	0	322	99	325
London	427	27	0	0	1184	73	1611	7	1	0	0	506	99	513
N East, York's & Humber	792	36	0	0	1420	64	2212	4	1	0	0	521	99	525
North West	730	39	0	0	1146	61	1876	6	1	0	0	461	99	467
South East	492	23	0	0	1679	77	2171	3	0	0	0	641	100	644
South West	486	28	0	0	1278	72	1764	4	1	0	0	460	99	464
West Midlands	420	29	0	0	1024	71	1444	6	2	0	0	372	98	378
Northern Ireland	66	22	231	77	2	1	299	0	0	77	100	0	0	77
Wales	228	25	690	75	4	0	922	0	0	261	99	2	1	263
United Kingdom	**4492**	**30**	**921**	**6**	**9580**	**64**	**14993**	**37**	**1**	**338**	**9**	**3567**	**90**	**3942**

Table 99: Chemotherapy							
	Overall						
	CT		No CT		Unknown CT		Overall total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	412	27	0	0	1123	73	1535
East of England	446	25	0	0	1326	75	1772
London	434	20	0	0	1690	80	2124
N East, York's & Humber	796	29	0	0	1942	71	2738
North West	736	31	0	0	1608	69	2344
South East	495	18	0	0	2321	82	2816
South West	490	22	0	0	1739	78	2229
West Midlands	426	23	0	0	1396	77	1822
Northern Ireland	66	17	310	82	2	1	378
Wales	228	19	951	80	6	1	1185
United Kingdom	**4529**	**24**	**1261**	**7**	**13153**	**69**	**18943**

Table 100: Endocrine Therapy														
	Invasive							Micro/non-invasive						
	ET		No ET		Unknown ET		Invasive total	ET		No ET		Unknown ET		Micro/non-invasive total
Sub-region	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	
East Midlands	1038	83	210	17	0	0	1248	8	3	276	97	2	1	286
East of England	1189	82	257	18	0	0	1446	23	7	301	93	1	0	325
London	734	46	877	54	0	0	1611	38	7	471	92	4	1	513
N East, York's & Humber	1893	86	319	14	0	0	2212	25	5	497	95	3	1	525
North West	1569	84	307	16	0	0	1876	119	25	347	74	1	0	467
South East	1637	75	533	25	1	0	2171	69	11	573	89	2	0	644
South West	1533	87	231	13	0	0	1764	86	19	375	81	3	1	464
West Midlands	1222	85	222	15	0	0	1444	6	2	372	98	0	0	378
Northern Ireland	268	90	29	10	2	1	299	9	12	68	88	0	0	77
Wales	829	90	86	9	7	1	922	11	4	250	95	2	1	263
United Kingdom	**11912**	**79**	**3071**	**20**	**10**	**0**	**14993**	**394**	**10**	**3530**	**90**	**18**	**0**	**3942**

Table 101: Endocrine Therapy							
	Overall						
	ET		No ET		Unknown ET		Overall total
Sub-region	No.	%	No.	%	No.	%	
East Midlands	1046	68	487	32	2	0	1535
East of England	1212	68	559	32	1	0	1772
London	772	36	1348	63	4	0	2124
N East, York's & Humber	1918	70	817	30	3	0	2738
North West	1688	72	654	28	2	0	2344
South East	1706	61	1107	39	3	0	2816
South West	1620	73	606	27	3	0	2229
West Midlands	1228	67	594	33	0	0	1822
Northern Ireland	278	74	98	26	2	1	378
Wales	840	71	336	28	9	1	1185
United Kingdom	**12308**	**65**	**6606**	**35**	**29**	**0**	**18943**

Table 102: 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	Total
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		No.
East Midlands	0	0	2	0	296	44	620	92	668	99	674	100	62	675
East of England	0	0	14	2	490	61	751	93	790	98	803	100	56	806
London	0	0	3	0	534	63	807	95	840	98	849	100	56	853
N East, York's & Humber	0	0	0	0	693	60	1099	94	1152	99	1163	100	57	1164
North West	0	0	6	1	512	62	795	96	825	99	828	100	57	830
South East	0	0	8	1	544	43	1163	92	1242	98	1262	100	63	1264
South West	0	0	1	0	449	45	942	94	994	99	1004	100	62	1006
West Midlands	0	0	0	0	250	29	739	87	835	98	853	100	68	854
Northern Ireland	0	0	6	4	90	53	157	92	170	99	170	99	59	171
Wales	0	0	0	0	185	38	435	89	478	98	488	100	64	488
United Kingdom	**0**	**0**	**40**	**0**	**4043**	**50**	**7508**	**93**	**7994**	**99**	**8094**	**100**	**61**	**8111**

Table 103: Time from final surgery to radiotherapy (excluding neo-adjuvant and intra-operative RT cases and cases with chemotherapy) – non -invasive														
	≤ 14 days		≤ 30 days		≤ 60 days		≤ 90 days		≤ 120 days		≤ 200 days		Median	Total
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		No.
East Midlands	0	0	0	0	56	43	121	93	128	98	130	100	62	130
East of England	0	0	1	1	96	58	153	92	164	99	166	100	58	166
London	0	0	2	1	137	63	197	90	210	96	216	99	56	218
N East, York's & Humber	0	0	0	0	142	58	237	98	241	99	243	100	56.5	243
North West	0	0	3	2	107	68	150	96	154	98	155	99	55	157
South East	0	0	1	0	109	45	217	89	237	97	240	98	62	244
South West	0	0	1	1	78	40	183	94	190	98	193	99	63	194
West Midlands	0	0	0	0	58	29	176	89	195	99	196	99	68	197
Northern Ireland	0	0	0	0	14	39	32	89	36	100	36	100	66	36
Wales	0	0	1	1	44	42	95	90	106	100	106	100	62.5	106
United Kingdom	**0**	**0**	**9**	**1**	**841**	**50**	**1561**	**92**	**1661**	**98**	**1681**	**99**	**61**	**1691**

Table 104: Time from assessment to radiotherapy (excluding cases with chemotherapy) - invasive														
	≤ 14 days		≤ 30 days		≤ 60 days		≤ 90 days		≤ 120 days		≤ 200 days		Median	Total
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		No.
East Midlands	0	0	0	0	7	1	265	39	541	80	665	98	96	678
East of England	0	0	0	0	29	4	359	44	646	80	784	97	93	811
London	0	0	1	0	12	1	246	28	647	74	836	96	102	872
N East, York's & Humber	0	0	0	0	13	1	461	40	965	83	1148	99	96	1165
North West	0	0	0	0	28	3	346	42	684	82	819	99	94	831
South East	0	0	0	0	11	1	272	21	864	68	1234	97	108	1267
South West	0	0	2	0	5	0	296	29	777	77	995	99	101	1010
West Midlands	0	0	0	0	1	0	194	23	582	68	833	97	107	856
Northern Ireland	0	0	0	0	17	10	77	45	143	83	169	98	93.5	172
Wales	0	0	1	0	6	1	159	32	385	79	480	98	100	490
United Kingdom	**0**	**0**	**4**	**0**	**129**	**2**	**2675**	**33**	**6234**	**76**	**7963**	**98**	**100**	**8152**

Table 105: Time from assessment to radiotherapy – Non - invasive														
	≤ 14 days		≤ 30 days		≤ 60 days		≤ 90 days		≤ 120 days		≤ 200 days		Median	Total
Sub-region	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		No.
East Midlands	0	0	0	0	1	1	45	34	92	70	128	98	103	131
East of England	0	0	0	0	3	2	60	36	138	83	167	100	98	167
London	0	0	0	0	0	0	36	16	133	61	208	95	112	219
N East, York's & Humber	0	0	0	0	2	1	74	30	192	79	240	98	98	244
North West	0	0	0	0	3	2	63	40	126	79	155	97	98	159
South East	0	0	0	0	3	1	57	23	148	60	232	95	110	245
South West	0	0	0	0	0	0	38	19	119	61	190	97	112	195
West Midlands	0	0	0	0	1	1	44	22	122	62	195	98	112	198
Northern Ireland	0	0	0	0	1	3	13	36	21	58	36	100	113	36
Wales	0	0	0	0	0	0	30	28	73	69	104	98	106	106
United Kingdom	**0**	**0**	**0**	**0**	**14**	**1**	**460**	**27**	**1164**	**68**	**1655**	**97**	**105**	**1700**

Table 106: Median days from final surgery to radiotherapy for women with invasive breast cancer			
Sub-region	**Median**	**First quartile**	**Third quartile**
East Midlands	62	54	72
East of England	56	48	68
London	56	49	66
N East, York's & Humber	57	50	68
North West	57	48	66
South East	63	54	75
South West	62	54	72
West Midlands	68	58	79
Northern Ireland	59	47.75	73
Wales	64	56	77
United Kingdom	**61**	**51**	**71**

Table 107: 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**
Sub-region	**No**	**%**	
East Midlands	153	23	654
East of England	273	35	783
London	318	39	818
N East, York's & Humber	399	35	1143
North West	315	39	799
South East	287	24	1211
South West	220	23	972
West Midlands	102	12	820
Northern Ireland	63	38	164
Wales	88	19	469
United Kingdom	**2218**	**28**	**7833**

Table 108: Invasive status of cancers										
	Invasive		**Micro-invasive**		**Non-invasive**		**Unknown**		**Total**	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	1248	81	6	0	280	18	1	0	1535	100
East of England	1446	82	15	1	310	17	1	0	1772	100
London	1611	76	4	0	509	24	0	0	2124	100
N East, York's & Humber	2212	81	20	1	505	18	1	0	2738	100
North West	1876	80	14	1	453	19	1	0	2344	100
South East	2171	77	27	1	617	22	1	0	2816	100
South West	1764	79	25	1	439	20	1	0	2229	100
West Midlands	1444	79	12	1	366	20	0	0	1822	100
Northern Ireland	299	79	1	0	76	20	2	1	378	100
Wales	922	78	4	0	259	22	0	0	1185	100
United Kingdom	**14993**	**79**	**128**	**1**	**3814**	**20**	**8**	**0**	**18943**	**100**

Table 109: Treatment of invasive cancers										
	Conservation surgery		Mastectomy		No Surgery		Unknown		Total	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	980	79	243	19	25	2	0	0	1248	100
East of England	1158	80	249	17	39	3	0	0	1446	100
London	1207	75	315	20	86	5	3	0	1611	100
N East, York's & Humber	1822	82	353	16	37	2	0	0	2212	100
North West	1483	79	351	19	42	2	0	0	1876	100
South East	1758	81	359	17	54	2	0	0	2171	100
South West	1446	82	283	16	35	2	0	0	1764	100
West Midlands	1151	80	268	19	25	2	0	0	1444	100
Northern Ireland	249	83	48	16	2	1	0	0	299	100
Wales	684	74	220	24	18	2	0	0	922	100
United Kingdom	**11938**	**80**	**2689**	**18**	**363**	**2**	**3**	**0**	**14993**	**100**

Table 110: Radiotherapy for invasive cancers treated by conservation surgery						
	Radiotherapy		No/unknown radiotherapy		Total	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	936	96	44	4	980	100
East of England	1088	94	70	6	1158	100
London	1056	87	151	13	1207	100
N East, York's & Humber	1734	95	88	5	1822	100
North West	1309	88	174	12	1483	100
South East	1530	87	228	13	1758	100
South West	1325	92	121	8	1446	100
West Midlands	1101	96	50	4	1151	100
Northern Ireland	234	94	15	6	249	100
Wales	660	96	24	4	684	100
United Kingdom	**10973**	**92**	**965**	**8**	**11938**	**100**

Table 111: Radiotherapy for non-invasive cancers treated by conservation surgery						
	Radiotherapy		No/unknown radiotherapy		Total	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	129	65	68	35	197	100
East of England	163	71	66	29	229	100
London	211	57	159	43	370	100
N East, York's & Humber	243	64	136	36	379	100
North West	156	48	168	52	324	100
South East	241	51	228	49	469	100
South West	194	56	153	44	347	100
West Midlands	198	71	81	29	279	100
Northern Ireland	45	75	15	25	60	100
Wales	110	63	66	38	176	100
United Kingdom	**1690**	**60**	**1140**	**40**	**2830**	**100**

Table 112: Cytonuclear grade of non-invasive cancers treated by conservation surgery with no/unknown radiotherapy												
	High		Intermediate		Low		Not assessable		Unknown		Total	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	9	13	35	51	18	26	6	9	0	0	68	100
East of England	15	23	20	30	15	23	15	23	1	2	66	100
London	34	21	65	41	45	28	10	6	5	3	159	100
N East, York's & Humber	22	16	76	56	29	21	7	5	2	1	136	100
North West	33	20	92	55	32	19	9	5	2	1	168	100
South East	48	21	87	38	57	25	33	14	3	1	228	100
South West	33	22	66	43	34	22	19	12	1	1	153	100
West Midlands	18	22	45	56	15	19	3	4	0	0	81	100
Northern Ireland	1	7	4	27	7	47	3	20	0	0	15	100
Wales	5	8	26	39	33	50	2	3	0	0	66	100
United Kingdom	**218**	**19**	**516**	**45**	**285**	**25**	**107**	**9**	**14**	**1**	**1140**	**100**

Table 113: Size of non-invasive cancers treated by conservation surgery with no/unknown radiotherapy												
	<15mm		15-≤40mm		>40mm		Not assessable		Unknown		Total	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	42	62	14	21	1	1	6	9	5	7	68	100
East of England	29	44	11	17	2	3	15	23	9	14	66	100
London	75	47	32	20	8	5	10	6	34	21	159	100
N East, York's & Humber	73	54	24	18	0	0	7	5	32	24	136	100
North West	100	60	33	20	2	1	8	5	25	15	168	100
South East	121	53	49	21	6	3	32	14	20	9	228	100
South West	92	60	22	14	3	2	19	12	17	11	153	100
West Midlands	46	57	19	23	2	2	3	4	11	14	81	100
Northern Ireland	8	53	3	20	0	0	3	20	1	7	15	100
Wales	44	67	13	20	1	2	2	3	6	9	66	100
United Kingdom	**630**	**55**	**220**	**19**	**25**	**2**	**105**	**9**	**160**	**14**	**1140**	**100**

Table 114: ER status of all cases								
	ER Positive		ER Negative		Unknown		Total	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	1144	75	121	8	270	18	1535	100
East of England	1355	76	140	8	277	16	1772	100
London	1607	76	171	8	346	16	2124	100
N East, York's & Humber	2071	76	243	9	424	15	2738	100
North West	1941	83	228	10	175	7	2344	100
South East	2118	75	192	7	506	18	2816	100
South West	1841	83	163	7	225	10	2229	100
West Midlands	1347	74	117	6	358	20	1822	100
Northern Ireland	291	77	30	8	57	15	378	100
Wales	876	74	90	8	219	18	1185	100
United Kingdom	**14591**	**77**	**1495**	**8**	**2857**	**15**	**18943**	**100**

Table 115: Invasive status of ER positive cases										
	Invasive		Micro-invasive		Non-invasive		Unknown		Total	
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
East Midlands	1129	99	2	0	13	1	0	0	1144	100
East of England	1314	97	3	0	38	3	0	0	1355	100
London	1445	90	3	0	159	10	0	0	1607	100
N East, York's & Humber	1985	96	4	0	82	4	0	0	2071	100
North West	1691	87	7	0	243	13	0	0	1941	100
South East	1994	94	12	1	112	5	0	0	2118	100
South West	1639	89	13	1	189	10	0	0	1841	100
West Midlands	1328	99	2	0	17	1	0	0	1347	100
Northern Ireland	269	92	1	0	20	7	1	0	291	100
Wales	840	96	2	0	34	4	0	0	876	100
United Kingdom	**13634**	**93**	**49**	**0**	**907**	**6**	**1**	**0**	**14591**	**100**

Table 116: Chemotherapy for node positive invasive cancers							
	CT		No CT		Unknown CT		Total
Sub-region	**No.**	**%**	**No.**	**%**	**No.**	**%**	
East Midlands	152	63	0	0	88	37	240
East of England	155	57	0	0	116	43	271
London	171	57	0	0	129	43	300
N East, York's & Humber	270	66	0	0	139	34	409
North West	237	67	0	0	115	33	352
South East	222	53	0	0	199	47	421
South West	184	56	0	0	146	44	330
West Midlands	162	64	0	0	91	36	253
Northern Ireland	32	60	21	40	0	0	53
Wales	108	52	95	46	3	1	206
United Kingdom	**1693**	**60**	**116**	**4**	**1026**	**36**	**2835**

Appendix 6: Survival analysis data tables (117-122)

DATA OBTAINED FROM THE SURVIVAL AUDIT OF SCREEN-DETECTED BREAST CANCERS FOR CANCER PATIENTS SCREENED BETWEEN 1 APRIL 2002 AND 31 MARCH 2003

Table 117: 15-year relative survival by region – primary invasive cancers diagnosed 2002/03	
	Screen-detected
N East, Yorks & Humber	84.7 (81.3,87.8)
West Midlands	86.4 (82.3,90.0)
Northern Ireland	87.1 (78.3,94.2)
London	87.5 (83.7,90.9)
North West	89.6 (86.2,92.6)
Scotland	89.8 (85.4,93.8)
East Midlands	90.4 (86.3,93.9)
South West	90.6 (87.0,93.9)
Wales	90.8 (85.8,95.1)
East of England	91.7 (88.2,94.9)
South East	93.9 (90.9,96.7)
United Kingdom	**89.4 (88.3,90.5)**

Table 118: 15-year relative survival by age for primary invasive cancers		
	Screen-detected	**Symptomatic**
49-54y	89.1 (87.3,90.7)	72.7 (70.8,74.5)
55-59y	89.5 (87.6,91.3)	71.9 (69.7,74.0)
60-65y	89.7 (87.5,91.8)	66.2 (63.7,68.7)
All invasive cancer	**89.4 (88.3,90.5)**	**70.5 (69.2,71.7)**

Table 119: 15-year relative survival by invasive tumour size for primary invasive cancers		
	Screen-detected	**Symptomatic**
<15mm	95.3 (93.8,96.6)	90.9 (88.4,93.2)
15-≤20mm	88.6 (86.3,90.8)	82.0 (79.3,84.5)
>20-≤35mm	78.5 (75.3,81.5)	70.2 (67.5,72.7)
>35-≤50mm	74.3 (66.1,81.4)	50.1 (45.1,55.1)
>50mm	66.1 (54.7,76.0)	40.9 (34.9,46.9)
Unknown	57.5 (46.0,68.1)	59.1 (56.7,61.4)
All invasive cancer patients	**89.4 (88.3,90.5)**	**70.5 (69.2,71.7)**

Table 120: 15-year relative survival by grade for primary invasive cancers		
	Screen-detected	**Symptomatic**
Grade 1	97.5 (95.7,99.0)	92.1 (89.3,94.7)
Grade 2	89.2 (87.5,90.8)	73.8 (71.8,75.8)
Grade 3	76.7 (73.6,79.7)	62.1 (59.9,64.2)
Not Assessable	83.2 (68.0,94.6)	92.0 (50.3,106.9)
Unknown	71.7 (61.9,80.1)	60.5 (57.2,63.8)
All invasive cancer patients	**89.4 (88.3,90.5)**	**70.5 (69.2,71.7)**

Table 121: 15-year relative survival by nodal status for primary invasive cancers		
	Screen-detected	**Symptomatic**
Positive	77.4 (74.8,79.8)	60.7 (58.0,63.2)
Negative	93.4 (92.2,94.6)	87.2 (84.6,89.6)
Unknown	82.8 (63.3,96.1)	69.1 (67.4,70.7)
All invasive cancer patients	**89.4 (88.3,90.5)**	**70.5 (69.2,71.7)**

Table 122: 15-year relative survival by NPI prognostic group		
	Screen-detected	**Symptomatic**
EPG	98.4 (96.5,100.2)	97.2 (90.8,102.0)
GPG	95.7 (93.9,97.4)	92.7 (88.5,96.3)
MPG1	86.3 (83.7,88.6)	83.0 (79.1,86.5)
MPG2	76.6 (72.4,80.5)	72.6 (68.4,76.4)
PPG	52.3 (46.7,57.8)	43.8 (39.7,47.9)
NPI Unknown	76.9 (69.5,83.3)	68.7 (67.2,70.3)
All invasive cancer patients	**89.4 (88.3,90.5)**	**70.5 (69.2,71.7)**