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Original Article

Variation in the management of ductal carcinoma in situ in the UK: Results of the Mammary Fold National Practice Survey

The Mammary Fold Academic and Research Collaborative*

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Abstract

Introduction

Ductal carcinoma in situ (DCIS) accounts for approximately 10% of all newly-diagnosed breast cancers in the UK. The latest national guidelines were published in 2009 and may not reflect current best practice. We aimed to explore variation in the current management of DCIS to support the need for updated guidelines.

Methods

A national practice questionnaire was developed by the Mammary Fold Academic Committee (MFAC) focusing on the pre, intra and post-operative management of DCIS. Trainees at UK breast units were invited to complete the questionnaire at their multidisciplinary team meeting to provide a comprehensive picture of current national practice.

Results

76 of 144 UK breast units (52.8%) participated in the survey. Variation was observed in radiological pre-operative assessment with only 33/76 units (43.4%) performing routine ultrasound assessment of the tumour or axilla. There was no clear consensus regarding indications for mastectomy; multifocality (38.2%) and extensive microcalcifications (34.2%) were the most frequent indications. 34/76 units (44.7%) offered nipple sparing mastectomy. 33/76 units (43.3 %) perform sentinel node biopsy in the presence of a palpable/mass lesion and 51/76 (67.1 %) at the time of mastectomy. The most widely accepted pathological radial margin remained 2mm (36.8%). The commonest factors in decision-making for radiotherapy were tumour grade (51.3%) and size (35.5%). Only 12 units (15.8 %) routinely used the Van Nuys prognostic index. Approximately half of all breast units offer clinical long-term follow-up.

Discussion

There is marked variation in the management of DCIS in the UK. Updated evidence-based guidelines may standardise practice and improve outcomes for patients.

Keywords

Ductal carcinoma in situ; survey; management; national practice

Introduction

Ductal carcinoma in situ (DCIS) is a pre-invasive breast cancer defined as the malignant clonal proliferation of cells within the basement membrane bound structures of the breast with no evidence of invasion[1]. A condition rarely diagnosed before the introduction of the national breast screening programme as the majority of lesions are impalpable[2], the age standardised incidence of DCIS has increased seven-fold from 3.3 per 100,000 in 1979 to 21.0 per 100,000 in 2012[3] due to the detection of lesions as microcalcifications on screening mammograms. DCIS now represents 20% of all screen-detected cancers and almost 13% of all new breast cancers in the UK with approximately 6400 new cases diagnosed in 2012 alone[3].

Although thousands of women are diagnosed with DCIS each year, there is uncertainty regarding its optimal treatment as DCIS is a heterogeneous disease with variable malignant potential[4]. Evidence suggests that if left untreated, up to 35% of lesions may become invasive cancers within 10 years[5], however not all lesions will progress. Data from the NHS Breast Screening Programme has failed to demonstrate any associated decrease in the incidence of invasive cancers that may have been expected with increased detection and treatment of pre-invasive disease[2]. This has led to concerns regarding both ‘overdiagnosis’ and ‘overtreatment’ particularly for low grade lesions. The benefits of diagnosis and treatment of DCIS, however, were recently identified in a study suggesting a decrease in the rate of interval cancers in this group[6].

In the absence of data to definitively support a conservative approach, surgery aiming to excise the primary lesion and prevent recurrence remains the mainstay of treatment for DCIS. This is important, as although DCIS has low metastatic potential, up to 50% of all recurrences will be invasive disease[7] with the associated risk of metastases and death. Local recurrence rates may be as high as 8% following mastectomy and 21.5% following breast conserving surgery alone[7]. Recent Cochrane reviews have highlighted reductions in local recurrence rates with adjuvant radiotherapy[8] and also with adjuvant tamoxifen[9] in women with ER positive disease managed with breast conservation.

Effective evidence-based guidelines for the management for DCIS are therefore vital if outcomes for patients are to be improved. Both the National Institute of Health and Care Excellence (NICE)[10] and the Association of Breast Surgery (ABS) at the British Association of Surgical Oncology (BASO)[11]

have produced guidelines for the management of breast cancer which include recommendations for the management of DCIS (table 1). However, there are no guidelines specific to the condition and both these publications date from 2009. They therefore do not reflect new evidence regarding the optimal management of DCIS, the development of new surgical techniques such as therapeutic mammoplasty or new prognostic technologies such as Oncotype DX DCIS[12] and may therefore not reflect best practice.

The aim of this study was therefore to explore variations in national practice regarding the management of pure DCIS to support the need for new evidence-based guidelines to standardise practice and improve outcomes for women diagnosed with the condition in the future.

Methods

The Mammary Fold is the UK national breast trainees association. A national practice questionnaire was developed by members of the Mammary Fold Academic Committee (MFAC) with expert multidisciplinary input from surgeons (Mr Stewart Nicholson), pathologists (Professor Andrew Hanby) and oncologists (Professor David Dodwell) involved in the Sloane Project, a UK wide prospective audit of the management and long term outcomes of screen-detected in situ carcinoma and atypical hyperplasia of the breast[13-16]. The survey covered all aspects of the management of DCIS including pre-operative assessment and decision-making; intra-operative management and post-operative pathological assessments; decision-making for adjuvant therapy, and follow-up. The survey was piloted by committee members at local units to ensure completeness and determine face and content validity of the survey prior to study initiation.

Trainee research collaboratives[17] consisting of surgical trainees at different units working together to design and deliver of high-quality research[18] and audit[19, 20] are well-established in general surgery and increasingly in sub-specialities such as breast surgery[21]**.** Trainees working at breast units across the UK were invited to participate in the study via the Mammary Fold and local deaneries. All trainees were medically-qualified doctors in general surgical training. Participants were asked to complete the survey at their unit's multidisciplinary team meeting (MDT) to ensure the responses reflected practice in the unit as a whole rather than the views of individual practitioners.

Study data were collected and managed using REDCap electronic data capture tools hosted at University of Edinburgh[22]. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.

Simple summary statistics were calculated for each survey item to evaluate variations in pre, intra and post-operative assessment and treatment. Appropriate non-parametric statistics were used to explore variables that may influence practice. STATA V13.1 (www.stata.com) was used for all analyses.

Results

A total of 133 records were entered onto the REDCap database. Of these, 15 lacked identifiable unit name and were excluded from the analysis. Of the remaining 118 records, 42 were identified as partially completed duplicates and excluded. A total of 76 units therefore contributed data to the study of which 52 units entered complete data sets.

Unit demographics

Of the 76 participating units, 66 (86.8%) treated both symptomatic patients and those referred from NHS Breast Screening Programme while 9 (11.8%) managed symptomatic patients only. Units treated a median of 200 new invasive symptomatic cancers per year (inter-quartile range 143-336) with no difference in case volume between screening and symptomatic units (table 2).

Unit guidelines for the management of DCIS

A total of 47/76 units reported having written guidelines for the management of DCIS. These were most commonly combined with those for invasive disease (n=44) with only three reporting stand-alone guidance for pre-invasive lesions (table 2).

Pre-operative imaging

Pre-operative assessment varied widely between units. Ultrasound was used routinely for planning surgery in 33/76 units, but five units did not routinely scan patients pre-operatively and a further 16 did so only in selected cases, most commonly when the lesion was palpable (n=8).

In line with NICE guidance[10], MRI was not routinely used in pre-operative planning for DCIS and over a third of units (n=27) reported that they never used this imaging modality in patients with pre-invasive disease. A number of units (n=27) reported using MRI in specific circumstances including when there is uncertainty about the extent of the DCIS (n=5); mammographically occult lesions (n=5); size discrepancies between imaging modalities (n=4) or if invasive foci were anticipated in high-grade (n=2) or large lesions (n=3).

The axilla was routinely imaged by USS in almost half of responding units (n=33) with only 3 units reporting that the axilla was never imaged pre-operatively in DCIS patients. A further 15 units imaged the axilla selectively. Indications for axillary imaging in these units included the presence of a palpable mass (n=6), other features that may predict invasion (n=18), or if a mastectomy was planned (n=3).

Pre-operative pathological diagnosis

Core biopsy was the first line for establishing a diagnosis of DCIS in many of the units surveyed (n=17). The use and availability of vacuum-assisted biopsy (VAB) was much more restricted with only 8 units reporting that it was first line for the diagnosis of microcalcifications. VAB was not available in seven units and available but not used in a further 11. Eight units used VAB in selected cases including small lesions and lesions in which the diagnosis was difficult.

Indications for mastectomy

To reduce the risk of recurrence, the ABS at BASO guidelines recommend patients with ‘extensive’ (greater than 40mm) or multicentric disease should usually undergo a mastectomy[11]. Multifocality was considered an indication for mastectomy by many units (n=29), but size criteria were less consistently applied. Eleven units used 40mm as an indication for mastectomy but seven units reported offering breast conservation for up to 50mm of DCIS. A further 13 units reported that they considered the size of the lesion in relation to the size of the breast rather than applying an absolute size criterion

when considering whether breast conservation was feasible. A quarter of units (n=19) reported having no specific indications for mastectomy and assessed patients on a case by case basis (table 2).

Breast reconstruction was offered to women requiring mastectomy by the majority of units (57/76) with 34/76 units offering women the possibility of nipple sparing procedures if the lesion was away from the nipple-areolar complex (n=9) or a subareolar biopsy was clear of disease (n=6). Therapeutic mammoplasty was also widely offered (n=49).

Sentinel node biopsy

Current guidelines recommend performing a sentinel lymph node biopsy (SLNB) in patients at high risk of invasive disease or those undergoing mastectomy[11]. Although the majority of units (n=51/76) reported undertaking SLNB when mastectomy was performed, there was a lack of consistency regarding other indications. Those reported were variable but included performing SLNB for mass-forming/palpable (n=33); high-grade (n=8) or multifocal (n=6) lesions (table 2).

Intra-operative assessment of excision specimens

The ABS at BASO guidelines[11] recommend that intra-operative specimen radiography should be performed in all cases of DCIS treated with breast conserving surgery (BCS). Only 27 units, however, routinely imaged their excision specimens intra-operatively. Twenty-three units used specimen radiography for wire-guided excisions only. One unit reported that intraoperative imaging was not available and a further unit reported that it was never performed. Portable imaging devices and departmental imaging were used with equal frequency (table 2).

For those patients undergoing SLNB, One Step Nucleic Acid Amplification (OSNA) was used routinely in DCIS in seven units, but was not available in the majority of the remainder (n=42).

Pathological assessment

NICE guidance recommends a minimum of a 2mm excision margin in patients with DCIS to reduce the risk of local recurrence[10]. Twenty-eight units followed this guidance, but there was a lack of consensus regarding what was considered an acceptable margin. Following the recent ABS consensus process, 17 units reported using a 1mm margin and a further six units used ‘no tumour on ink’ consistent

with the SSO (Society of Surgical Oncology)/ASTRO (American Society for Radiation Oncology) guidelines for invasive disease[23]. One unit reported that 5mm was the minimum acceptable margin and a further unit reported that margin width depended on the grade of disease with a 10mm margin required for high-grade DCIS.

Routine receptor status testing in DCIS was very variably applied. Oestrogen receptor status was routinely assessed by 22 units; progesterone receptor status by 17 units and HER-2 status by only eight. Where receptor status was determined, this was predominantly on the core biopsy specimen (n=15) with a minority using tissue from the excision specimen itself (n=3). Seven units assessed receptor status on both the biopsy and excision specimens.

In terms of risk stratification, the Van Nuys Prognostic Index was only used routinely by 12 units. A further five units used it in certain circumstances such as when considering radiotherapy or for high grade disease. The newly developed Oncotype DX DCIS recurrence score was only used routinely by one unit and was not available in the remainder.

Adjuvant therapy

Although NICE guidelines recommend against offering patients with DCIS endocrine therapy[10], six units routinely did so and a further 12 offered treatment to patients considered to be a high risk of recurrence such as young patients with high-grade disease.

The offer of radiotherapy (RT), including a discussion of the risks and benefits of treatment, is currently recommended for all women having BCS for DCIS[10]. Although ten units routinely offer RT on this basis, other units offer RT to selected patients only. A lack of consensus was demonstrated regarding the indications for treatment with tumour grade (n=39), size (n=27), patient age (n=23), presence of comedo necrosis (n=21) and margin width most frequently influencing recommendations for RT. The Van Nuys Prognostic Index was used infrequently in decision making (n=10) and when it was calculated, there was a lack of consistency with regard to the scores that would determine whether RT would be beneficial (table 2).

Follow-up

There was similar variability in the way patients with DCIS were followed up across the UK. Thirty-seven units reviewed patients in clinic annually, often for five years (n=26) while 20 units offered women open access appointments for variable periods of time (five years (n=13) to life-long access (n=3)). Mammographic follow up was offered by 52 units, most commonly on an annual basis for between 5 and 10 years as recommended in the NICE guidelines[10].

Audit

Although NICE recommend that all breast units should audit their local recurrence rates[10], only 17 units prospectively audited their results. Of these, five entered patients into national studies such as BCCOM, Sloane and 'Forget Me Not' with the remainder auditing their results locally (table 2).

Discussion

This study demonstrates marked variation in the management of pure DCIS across breast units in the UK. There is a lack of consistency with regard to pre-operative planning; intra-operative practice and post-operative management. Indications for mastectomy varied dramatically between units and there was no consistent indication for SLNB at the time of surgery. Despite the recent ABS consensus on margins, few units used 1mm as acceptable pathological margin with the majority retaining the original 2mm margin recommended in the 2009 NICE guidelines[10]. Receptor status was not routinely assessed in the majority of centres and endocrine therapy was rarely used. Radiotherapy was also offered variably with no consistent indications demonstrated. Follow up was variable and few units routinely audited their results.

Variation in the management of DCIS has been previously been demonstrated from both a national[13, 15, 16, 24] and international[25, 26] perspective. Data from the Sloane Project, a multicentre UK wide audit of screen-detected DCIS has demonstrated variation in both the mastectomy rate[15] and the axillary management[16] in women with DCIS and a lack of consensus regarding the duration and frequency of follow-up in these patients[13]. Similarly, data from 12 countries and 15 screening programmes within the International Cancer Screening Network (ICSN) suggested marked variation in BCS rates ranging from 67-90% with radiotherapy following BCS given in between 41 and 100% of cases. Axillary management was similarly variable with 5% of women undergoing BCS and 20% of

those undergoing mastectomy receiving axillary dissection[25] although this practice was not supported by any national guidelines.

One explanation for the lack of adherence to guidelines in the current study may be that as they were published in 2009, UK guidelines[10, 11] are now outdated and do not reflect evidence-based best practice. Updating these or promoting adoption of the National Comprehensive Cancer Network (NCCN) guidelines (http://www.nccn.org/professionals/physician_gls/f_guidelines.asp#breast) which are updated annually may be therefore one way in which variation in the management of DCIS may be addressed. There is, however, currently controversy regarding the optimal management of this heterogeneous disease and the lack of consensus regarding best practice may be equally responsible for the variability seen. Overtreatment, particularly for low grade screen-detected lesions, is an increasing concern and the LORIS (Low Risk DCIS) trial is currently randomising women with low and intermediate grade DCIS to surgery or active monitoring to address this important question[27]. A more targeted approach to the use of adjuvant therapies following breast conservation for DCIS is also likely to be necessary if women are to receive optimal care. The adoption of molecular phenotyping using ER, HER-2 and Ki67 status[28] or commercially available techniques such as the recently validated Oncotype DX DCIS[29] may help effectively stratify patients and identify those at higher risk of recurrence who may benefit from the addition of adjuvant therapies and those who may be effectively managed by local excision alone. The management of DCIS is an evolving field; identifying areas of uncertainty, developing trials to address these and encouraging clinicians to recruit their patients into new and on-going studies will therefore be necessary if the current controversies are to be addressed and the care for patients improved

This study has demonstrated previously significant variability in the current management of DCIS across the UK. This is an important finding, but some aspects of the work require further consideration. Firstly, the results are based on survey data and it may be that actual practice in the individual units differs from the responses provided. There may also be response bias with participating units differing significantly from those that were not involved. The broad variability and general lack of adherence to current guidance observed, however, suggests that this is unlikely. Furthermore, the questionnaires were completed at unit multidisciplinary meetings which makes significant deviation between reported and actual practice doubtful. Concern may be raised, however, regarding the proportion of

'missing/unknown' responses which ranged from 1-33% across items in the study. Using the MDT approach should have made the data more robust, but if there was disagreement between MDT participants, the trainee, as a junior member of the team, may not have felt empowered to request a definitive response, question senior colleagues or know where to find additional data such as number of cases, if these were not available at the meeting. This could explain why the missing data rates were comparatively high. Although 76 units contributed to the study, only 52 provided complete data sets. The responses presented therefore only represent between 36 and 53% of the 144 breast units in the UK. This study was conducted as a trainee-led collaborative project and unit participation was dependant on a motivated trainee engaging the MDT. Not all UK breast units have a trainee and the project may have benefited from a 'dual prong' approach to engage consultants through the professional associations as well as trainees in order to optimise participation. Using the trainee model may, however, have unintentionally introduced bias into the study as larger units with higher case volume would be more likely to host trainees and therefore may have been more likely to participate than smaller, lower volume centres which may have practiced differently. Collaborative research, however, is a relatively new concept in breast surgery and the best strategy for optimising the potential of this methodology is still being explored. Establishing a strong and reliable research network will be necessary for completion of future projects. Finally, there was a significant 'drop-out' rate in the study with over 30% of participants starting, but not completing the survey. This may reflect the complexity and length of the questionnaire and inclusion of data items regarding the unit's activity, which may not have been immediately available at the point of completion. This was not identified during the piloting phase, but would be an important learning point for future studies. Although less than anticipated, however, results from over a third of UK breast units provides an insight into national practice and the need to standardise the management of this important condition.

This study has demonstrated marked variability in the management of pure DCIS. Updating existing guidelines to reflect best practice and promoting active participation in research and audit to address areas of uncertainty may be one way in which this variability may be addressed. Developing these guidelines and identifying the areas where new research is needed will be the next important step in this process. Involvement and engagement of trainees in collaboration with multidisciplinary experts may be a novel means by which this guidance and new trial ideas may be developed. Trainee research collaboratives are integral to the Royal College of Surgeons Surgical Trials Initiative[30] and have an

excellent track record in the design and delivery of well-designed prospective cohort studies[19-21, 31, 32] and randomised clinical trials[18], but have yet to be involved in generating best-practice guidelines. Developing new guidelines for the management of DCIS based on the results of this study may provide trainees with an exciting opportunity to shape practice and impact on care for patients across the UK. Trainees could also play a valuable role in the design and delivery of future DCIS studies, siting on steering groups and learning about trial methodology in a practical way. Educating and empowering trainees in individual units to recruit to new and ongoing DCIS trials may also be a useful way in which they may contribute to improving patient care. Furthermore, involving trainees at an early stage in their careers so they understand the need for RCTs may generate research capacity by creating a new generation of research active consultant surgeons who will engage in and recruit to trials to improve the future care of women with breast cancer.

Collaborators

The Mammary Fold Academic and Research Collaborative (MFAC) DCIS Study Steering Group comprised*:* L Ashken, C Ives, B Kim, S Potter, T Rattay, D Remoundos, B Zeidan and K Williams. KW conceived the study design; KW, CI, BK, DR and SP developed the questionnaire; LA, BK, DR and TR co-ordinated centre participation and data collection. SP had access to the full data set, performed the analysis and drafted the manuscript. All steering group members contributed to data interpretation, edited the manuscript, and approved the final version for submission. The local investigators completed the questionnaire with the support of the local unit multidisciplinary team.

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Table 1 – Summary of UK Guidelines relating to the management of ductal carcinoma in situ (DCIS)

Referral, diagnosis and preoperative assessment of patients with DCIS	
The routine use of MRI of the breast is not recommended in the preoperative assessment of patients with biopsy-proven DCIS	NICE CG80
Patients with DCIS should be fully informed of the surgical treatment options available to them - When appropriate, patients should be given an informed choice between BCS and mastectomy. This includes the difference in local recurrence rates between the two approaches. If a choice of breast conservation surgery is not offered the reasons should be documented in the patient's case notes	ABS at BASO
Patients with DCIS should have access to BCS - All patients having treatment by mastectomy (by choice or on advice) should have the opportunity to discuss their breast reconstruction options and have immediate breast reconstruction if appropriate. If breast reconstruction is not offered the reasons should be documented in the patient's case notes	ABS at BASO
To minimise local recurrence after BCS for DCIS - Patients with extensive (>40 mm diameter) or multi-centric disease should usually undergo treatment by mastectomy	ABS at BASO
Surgical management of DCIS	
Intra-operative specimen radiography should be carried out for all cases of DCIS treated by BCS	ABS at BASO
For all patients treated with BCS for DCIS a minimum of 2 mm radial margin of excision is recommended with pathological examination to NHSBSP reporting standards. Re-excision should be considered if the margin is less than 2 mm, after discussion of the risks and benefits with the patient.	NICE CG80
All patients should have their tumours removed with no evidence of disease at the microscopic radial margins and fulfilling the requirements of local guidelines If, after MDT meeting discussion, the margin of excision is deemed to be inadequate then further surgery to obtain clear margins should be recommended	ABS at BASO
Axillary staging surgery is not routinely recommended for patients having treatment for DCIS alone. It may be considered in patients considered to be at high risk of occult invasive disease. The decision to carry out an axillary staging procedure should be discussed at the pre-operative MDT meeting and recorded in the patient's case notes.	ABS at BASO
Do not perform SLNB routinely in patients with a preoperative diagnosis of DCIS who are having BCS, unless they are considered to be at a high risk of invasive disease (high risk of invasive disease includes those with a palpable mass or extensive microcalcifications)	NICE CG80
Offer SLNB to all patients who are having a mastectomy for DCIS	NICE CG80

Post-operative adjuvant therapy in DCIS	
Do not offer adjuvant tamoxifen after breast conserving surgery to patients with DCIS	NICE CG80
Offer adjuvant radiotherapy to patients with DCIS following adequate BCS and discuss with them the potential benefits and risks	NICE CG80
Follow-up in DCIS	
Offer annual mammography to all patients with early breast cancer, including DCIS, until they enter the NHSBSP/BTWSP. Patients diagnosed with early breast cancer who are already eligible for screening should have annual mammography for 5 years	NICE CG80
Do not offer ultrasound or MRI for routine post-treatment surveillance	NICE CG80
Audit and quality control	
Enter patients with screen-detected DCIS into the Sloane Project (UK DCIS audit)	NICE/ABS
All breast units should audit their recurrence rates after treatment for DCIS (<10% BCS for DCIS should develop local recurrence at 5 years (ABS at BASO standard)	NICE CG80

ABS – Association of Breast Surgery; BASO – British Association of Surgical Oncology; BCS – breast conserving surgery; BTWSP – Breast Test Wales Screening Programme; MRI – magnetic resonance imaging; NHSBSP – National Health Service Breast Screening Programme; NICE – National Institute of Health and Care Excellence; SLNB – sentinel lymph node biopsy

Table 2 – Summary of DCIS survey data

Breast unit demographics	N=76 (%)
Unit type	
Symptomatic only	9 (11.8)
Screening and symptomatic	66 (86.8)
Missing	1 (1.3)
Unit volumes (median, IQR)	
Symptomatic invasive (n=42)	200 (143-336)
Symptomatic non-invasive (n=37)	20 (10-40)
Screen-detected invasive (n=37)	90 (45-134)
Screen-detected non-invasive (n=35)	25 (14-50)
Availability of breast reconstruction	
Yes, in same Trust	25 (32.9)
Yes, in same hospital	29 (38.2)
Yes, at another hospital Trust	3 (3.9)
Not offered	0 (0.0)
Don't know/Missing	19 (25.0)
Pre-operative assessment and planning	
Written guidelines for DCIS	
As part of breast cancer guidelines	44 (57.9)
Separate guideline	3 (3.9)
No guidelines	7 (9.2)
Don't know/Missing	22 (28.9)
Use of pre-operative USS for surgical planning for DCIS	
Not used	5 (6.6)
Used routinely	33 (43.4)
Used in selected cases	16 (21.1)
Don't know/Missing	22 (28.9)
Use of pre-operative MRI for surgical planning for DCIS	
Not used	27 (36.5)
Used routinely	0 (0.0)
Used in selected cases	27 (36.5)
Don't know/Missing	22 (28.9)
Use of vacuum assisted biopsy for DCIS	
First line for microcalcifications	8 (10.5)
Second-line after core biopsy	17 (22.4)
Not available	7 (9.2)
Available but not routinely used	11 (14.5)
In selected cases	8 (10.5)

Don’t know/Missing	25 (32.9)
Indications for mastectomy	
>40mm DCIS on imaging	11 (14.5)
>50mm DCIS on imaging	7 (9.2)
Multifocal	29 (38.2)
‘Extensive’ microcalcification on mammography	26 (34.2)
No specific indications	19 (25.0)
Nipple sparing mastectomy offered	
Yes	34 (44.7)
No	19 (25.0)
Don’t know/missing	23 (30.3)
Therapeutic mammoplasty offered	
Yes	49 (64.5)
No	4 (5.3)
Don’t know/missing	23 (30.3)
Pre-operative imaging of axilla in DCIS	
Routinely performed	33 (43.4)
Never performed	3 (3.9)
Performed in certain circumstances	15 (19.7)
Don’t know/missing	25 (32.9)
Indications for sentinel node biopsy in DCIS	
Performed in all cases	0 (0.0)
For palpable/mass lesions	33 (43.4)
For multifocal DCIS	6 (7.9)
When performing a mastectomy	51 (67.1)
For high grade DCIS	8 (10.5)
For extensive microcalcification	4 (5.7)
Timing of SNB when immediate reconstruction planned	
Before reconstruction (stand-alone SNB)	17 (22.4)
At time of reconstruction	31 (40.8)
Don’t know/missing	28 (36.8)
Intra-operative assessment	
Use of intra-operative specimen radiography	
For all lesions treated by wide local excision	27 (36.5)
For lesions requiring radiological localisation only	23 (30.3)
Not routinely available	1 (1.3)
Not performed	1 (1.3)
Don’t know/missing	24 (31.6)
Type of specimen radiography	
Departmental XR	25 (32.9)

Portable device e.g. Faxitron	27 (36.5)
Not applicable	1 (1.3)
Don't know/missing	23 (30.3)
Use of OSNA in DCIS	
Used routinely	7 (9.2)
For invasive lesions only	4 (5.3)
OSNA not available	42 (55.3)
Don't know/missing	23 (30.3)
Pathological assessment	
Acceptable radial margin	
No ink on margin	5 (6.6)
1mm	17 (22.4)
2mm	28 (36.8)
5mm	1 (1.3)
Dependant on grade of DCIS (10mm for HG-DCIS)	1 (1.3)
Don't know/missing	24 (31.6)
Routine ER receptor testing on DCIS	
Yes	22 (28.9)
No	30 (39.5)
Don't know/missing	24 (31.6)
Routine PR receptor testing on DCIS	
Yes	17 (22.4)
No	35 (46.1)
Don't know/missing	24 (31.6)
Routine HER-2 receptor testing on DCIS	
Yes	8 (10.5)
No	43 (56.6)
Don't know/missing	25 (32.9)
Specimen used for assessing receptor status (n=25)	
Core biopsy	15 (60.0)
Pathological specimen	3 (12.0)
Both	7 (28.0)
Use of Van Nuys Prognostic Index in patients with DCIS	
Routinely used	12 (15.8)
Not used	36 (47.4)
Used in certain circumstances	5 (6.6)
Don't know/missing	23 (30.3)
Use of Oncotype DX DCIS recurrence score	
Routinely used	1 (1.3)
Not used	51 (67.1)

Used in certain circumstances	1 (1.3)
Don't know/missing	23 (30.3)
Use of SNB if micro-invasion detected on resection specimen, if SNB not originally performed	
Yes	32 (42.1)
No	7 (9.2)
In certain circumstances	12 (15.8)
Don't know/missing	25 (32.9)
Treatment of patients with DCIS	
Use of endocrine therapy in patients who are ER +ve	
Yes	6 (7.9)
No	34 (44.7)
In certain circumstances	12 (15.8)
Don't know/missing	24 (31.6)
Factors considered when recommending radiotherapy to patients treated with breast conserving surgery	
All women offered RT	10 (13.2)
Van Nuys Prognostic Index only	10 (13.2)
Tumour size	27 (35.5)
Presence of comedo necrosis	21 (27.6)
Margin width	20 (26.3)
Patient age	23 (30.3)
Tumour grade	39 (51.3)
Multifocality	16 (21.1)
Other	7 (9.2)
Van Nuys cut off for recommending RT	Range 3-10
Follow up of patients with DCIS	
Follow up of patients after treatment for DCIS	
Breast clinic follow-up with clinical review annually	37 (48.7)
For 1 year	3
For 2 years	2
For 3 years	2
For 5 years	26
Other	2
Open access clinic	20 (26.3)
For 5 years	13
For 10 years	1
Lifelong	3
As requested by GP	1
Mammographic follow up	52 (68.4)

For 5 years	39
For 10 years	10
Other	7
Mammographic frequency	
Annual	48
Every 2 years	2
Audit	
Prospective audit of treatment of patients with DCIS	
Yes	15 (19.7)
No	38 (50.0)
Details	
National audit (BCCOM, Sloane, Forget me not etc)	5 (33.3)
Local audit	9 (60.0)