BreastScreen Aotearoa Annual Report 2014

EARLY AND LOCALLY ADVANCED BREAST CANCER
PATIENTS DIAGNOSED IN NEW ZEALAND IN 2014

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1 ACKNOWLEDGMENTS AND FUNDING

This report was produced by the BreastSurgANZ Quality Audit (formerly known as the National Breast Cancer Audit).

The audit is funded and directed by the Breast Surgeons of Australia and New Zealand Inc. and operated by the Royal Australasian College of Surgeons (RACS).

The report was prepared by RACS with assistance from the University of South Australia:

- Dr Liz Buckley, Research Fellow, University of South Australia (analysis and report development),
- Michelle Ogilvy, Team Leader, Morbidity Audits, RACS (data extraction, editorial review), and
- Katherine Economides, Manager, Morbidity Audits, RACS (final review).

Clinical review was provided by Mr David Walters FRACS, Chair, BreastSurgANZ Quality Audit Steering Committee.

Funding for the data analysis and development of the report was provided by the Ministry of Health New Zealand, through BreastScreen Aotearoa.

2 INTRODUCTION

The National Breast Cancer Audit (NBCA) began in 1998, collecting data on the surgical care of early and locally advanced breast cancer patients in Australia and New Zealand. The audit is now funded and directed by the Breast Surgeons of Australia and New Zealand Inc. (BreastSurgANZ) and in 2013 was renamed the BreastSurgANZ Quality Audit (BQA).

An extract was prepared containing New Zealand data with a diagnosis date of 2014 (if diagnosis date was not provided, first surgery date was used) from the restored BQA online database on 20 June 2017.

There were 14,943 cases reported to the BQA in 2014; of which, 2,884 cases were from New Zealand. Out of the 294 surgeons who contributed to the audit in 2014, 58 were from New Zealand.

In the report, percentage case volumes for New Zealand data have been reported by referral source under the following main headings:

1. Background information
2. Invasive tumour characteristics
3. DCIS tumour characteristics
4. Breast surgery treatment
5. Axillary surgery treatment
6. Margins of excision for breast surgery
7. Radiotherapy treatment
8. Hormonal treatment
9. Chemotherapy treatment
10. Trastuzumab treatment

The number of cases reported from Breast Screen Aotearoa (BSA) and other referral sources for each category were compared using a chi-square test via the statistical package Stata 14. A statistical significance level of $p<0.05$ was used. (P-value was not calculated if the number of observations per category was zero, denoted 'NC'.) Differences between groups with continuous measures were tested by independent t-test for normally distributed variables, or Wilcoxon Rank sum test for skewed data.

Results are reported to two decimal places in tables, and rounding may cause some row totals to not equal 100%.

Background information, tumour characteristics and breast cancer treatments that are significantly different between "BSA" referred patients and "non-BSA" referred patients are listed in the summary section.

Definitions of the terms provided in the report are from the BreastSurgANZ Quality Audit Data Dictionary, available from www.surgeons.org/bqa.

In this report, "Unknown", "Not yet" and missing data are reported as "not known".

3 SUMMARY

While the highest proportion of breast cancer cases from New Zealand were referred as symptomatic from a general practitioner (48.5%), BreastScreen Aotearoa (BSA) was the second most common referral source (41.8%).

The majority of New Zealand breast cancer episodes were invasive (84.9%). There was a significantly higher proportion of ductal carcinoma in situ (DCIS) cases in the BSA referral group (22.7%) than in the non-BSA referral groups (9.7%).

The majority of New Zealand patients were public (73.4%). The proportions of public and private patients were significantly different between the BSA and non-BSA groups with the BSA group having a proportionately greater number of public patients. Similar distributions of tumour grade, and hormone receptor status across referral sources were seen in Australian and New Zealand breast cancers.

The distribution of age groups differed significantly by referral source with BSA screening proportionately higher numbers of patients aged 45–69 when compared to non-BSA sources.

Comparison with Australian data indicate similarities with New Zealand breast cancers for the distribution of hormone receptor status and axillary procedures by referral status.

There is some evidence of smaller tumour size by progesterone hormone receptor status in New Zealand (compared to Australia), as well as a greater proportion of intermediate grade DCIS tumours and a lower proportion of high grade DCIS tumours; however this would require formal testing to determine if these are statistically signficiant differences.

Since 2008, trends in tumour size, grade, first breast surgery, axillary procedures, and chemotherapy therapy treatment appear relatively stable, however formal testing would be required to determine any significant trends.

There were some significant differences between BSA and non-BSA patients for invasive and DCIS tumour characteristics and, accordingly, there were differences in some of the breast cancer treatments between BSA and non-BSA patients. These are detailed in sections 3.1 and 3.2 but can be summarised as follows: BSA patients had smaller, lower grade tumours, and less likely to be pre-menopausal when compared to non-BSA patients. BSA patients were more likely to have breast-conserving surgery as their first surgery, and sentinel node biopsy as their only axillary surgery.

3.1 Significant differences between BSA and non-BSA patients for invasive tumours

Characteristics

Tumour size

Higher proportion of BSA patients (55.8%) had smaller (<15 mm) tumours compared to non-BSA patients (27.6%).

Lower proportion of BSA patients (26.3%) had larger tumours (≥20 mm) compared to non-BSA patients (57.0%).

Grade

Higher proportion of BSA patients (31.1%) had invasive Grade 1 tumours compared to non-BSA patients (18.1%).

Lower proportion of BSA patients (20.1%) had Grade 3 tumours compared to non-BSA patients (37.2%).

Menopausal status

Lower proportion of BSA patients (17.9%) were pre-menopausal compared non-BSA patients (32.6%).

Higher proportion of BSA patients (70.5%) were post-menopausal compared non-BSA patients (62.4%).

Higher proportion of BSA patients (11.6%) were peri-menopausal compared non-BSA patients (5.0%).

Receptor status

Higher proportion of BSA patients (91.2%) had oestrogen positive tumours compared to non-BSA patients (83.4%).

Higher proportion of BSA patients (79.1%) had progesterone positive tumours compared to non-BSA patients (69.9%).

Higher proportion of BSA patients (87.1%) had HER2 negative tumours compared to non-BSA patients (82.3%).

Lower proportion of BSA patients (4.7%) had triple negative tumours compared to non-BSA patients (10.7%).

Treatments

Breast surgery
The majority of BSA patients (67.4%) had a complete local excision (CLE) as their first breast surgery. The majority of non-BSA patients had a mastectomy as their first breast surgery (55.7%).

The majority of New Zealand mastectomy patients (85.0%) did not have a reconstruction. The proportion of BSA patients having a reconstruction (19.1%) was higher than non-BSA patients (13.7%).

Axillary surgery
For ≤3cm tumours, a higher proportion of BSA patients (79.4%) had sentinel node biopsy (SNB) as their only axillary surgery compared with non-BSA patients (59.6%).

Margins

The proportion of patients with margins ≥2mm was higher for BSA patients (91.2%) than non-BSA patients (85.9%).

Proportionately, there were less BSA patients with involved margins (2.0%) when compared to non-BSA patients (3.4%).

Radiotherapy treatment

A higher proportion of BSA patients (93.3%) were referred for radiotherapy after breast conserving surgery compared to non-BSA patients (87.8%).

A lower proportion of BSA patients (38.8%) were referred for radiotherapy after mastectomy compared to non-BSA patients (52.1%).

Hormone treatment

A lower proportion of BSA patients (34.5%) with oestrogen positive tumours were referred for SERMS only treatment compared to non-BSA patients (47.1%).

Chemotherapy treatment

The proportion of patients 70 years old or less who received chemotherapy treatment was significantly lower in the BSA group (28.7%) than in the non-BSA group (55.7%). The proportion of BSA patients aged 70 years or less and who were not prescribed chemotherapy was higher than the equivalent non-BSA patients (59.8% and 35.0%, respectively).

3.2 Significant differences between BSA and non-BSA patients for DCIS tumours

Characteristics

Tumour size
Higher proportion of BSA patients (29.6%) had smaller (<10 mm) tumours compared to non- BSA patients (22.4%).

Lower proportion of BSA patients (24.1%) had larger (>40 mm) tumours compared to non- BSA patients (31.1%).

Treatments

Breast Surgery
A higher proportion of BSA patients (68.3%) had CLE as their first breast surgery compared to non-BSA patients (54.9%).

The proportion of patients with mastectomy as their first surgery for DCIS tumours was significantly lower in the BSA group (27.7%) than in the non-BSA group (37.0%).

3.3 Key performance indicators for the management of New Zealand breast cancers during the period 2012–2014

All key performance indicators (KPI) for all New Zealand surgeons are summarized below.

KPI	Threshold for BQA	Episodes meeting KPI
KPI 1: Percentage of invasive cancer episodes undergoing breast conserving surgery which have been referred for radiotherapy	85%	95.75%
KPI 2: Percentage of invasive oestrogen positive cases referred for hormonal therapy treatment	85%	85.83%
KPI 3: Percentage of invasive cases undergoing axillary surgery	90%	93.38%
KPI 4: Percentage of in situ cases undergoing breast surgery without axillary clearance	90%	98.52%
KPI 5: Percentage of high risk invasive cases undergoing mastectomy and referred for radiotherapy	85%	89.83%
KPI 6: Percentage of high risk cases referred for chemotherapy	90%	89.59%

4 BACKGROUND INFORMATION

4.1 Referral source for New Zealand episodes

Referral source		Percentage
BSA (n=1206)		41.82%
Non-BSA (n=1673)	Symptomatic from GP (N=1400)	48.54%
	Breast Screen Australia (N=8)	0.28%
	Other (N=265)	9.19%
Not known (n=5)		0.17%
Total (N=2884)		**100%**

Comments
While the majority of breast cancer cases from New Zealand were referred as symptomatic from a general practitioner, GP (48.54%), BSA was the second most common referral source (41.82%).

Audit data used
Information is derived from the audit question "referral source" which allows the options of "symptomatic (from GP)", "Breast Screen Australia", "Breast Screen Aotearoa" and "Other".

Definitions
Referral source records the source from which the person was referred to the surgeon.

Symptomatic patients are referred to a breast surgeon when presenting to a GP or other physician with symptoms such as a breast lump, pain, or discharge.

Patients referred from "Other" sources may include private screening programs.

4.2 Episodes by referral source

Referral source	Invasive breast cancer	DCIS
BSA (n=1206)	77.28%	22.72%
Non-BSA (n=1673)	90.32%	9.68%
p value	<0.001	

Comments
The majority of New Zealand breast cancer episodes were invasive (84.86%). There was a significantly higher proportion of ductal carcinoma in situ (DCIS) cases in the BSA referral group (22.72%) than in the non-BSA referral group (9.68%).

Audit data used
Information is derived from the audit question "invasive/in situ cancer".

Definitions
Invasive: cancer which has grown beyond its site of origin and invaded neighbouring tissue.

DCIS: the presence of any malignant tumour which has not yet become invasive but is confined to the layer of cells from which it arose. A form of pre-invasive cancer.

4.3 Private and public status of the episodes by referral source

Referral source	Private	Public
BSA (n=1206)	21.39%	78.61%
Non-BSA (n=1672)	30.32%	69.68%
p value	< 0.001	

Private/public status was unknown for 1 non-BSA breast cancer

Comments
The majority of New Zealand patients were public (73.42%). The proportions of public and private patients were significantly different between the BSA and non-BSA groups with the BSA group having a proportionately greater number of public patients.

Audit data used
Information is derived from the audit question “public/private” which allows the options of private and public.

Definitions
Public—a person eligible for public healthcare who, on admission to a recognised hospital or soon after:

- receives a public hospital service free of charge
- elects to be a public patient
- has their treatment contracted to a public hospital

Private—a person who, on admission to a recognised hospital or soon after:

- elects to be a private patient treated by a medical practitioner of his or her choice
- elects to occupy a bed in a single room (where such an election is made, the patient is responsible for meeting certain hospital charges as well as the professional charges raised by the treating medical practitioner)
- chooses to be admitted to a private hospital, although eligible for public healthcare.

4.4 Age of patients by referral source

Referral source	Mean (years)	Standard deviation (years)	P value
BSA (n=1206)	58.27	7.61	<0.001
Non-BSA (n=1673)	60.75	15.65	

Referral source	<35 years	35–39 years	40–44 years	45–49 years	50–54 years	55–59 years	60–64 years	65–69 years	70+ years
BSA (n=1206)	0 (0%)	1 (0.1%)	6 (0.5%)	214 (17.7%)	214 (17.7%)	239 (19.8%)	247 (20.5%)	255 (21.1%)	30 (2.5%)
Non-BSA (n=1673)	55 (3.3%)	81 (4.8%)	172 (10.3%)	199 (11.9%)	193 (11.5%)	151 (9.0%)	115 (6.9%)	145 (8.7%)	562 (33.6%)
p value					<0.001				

Comments
The age distribution of women diagnosed with breast cancer differed by referral source (p<0.001). The proportion of women from BSA sources within the target screening age range (45–69 years) was more than double that of non-BSA sources (97% (n=1169) and 48% (n=803), respectively; p<0.001).

Audit data used
Information is derived from a calculation using audit questions “diagnosis date” and “date of birth”. If diagnosis date was not available, the first surgery date was used.

Definitions
Diagnosis date: The date upon which the cancer diagnosis was made.

Surgery date: The date upon which breast cancer surgery was performed.

Date of birth: Patient’s date of birth.

5 INVASIVE TUMOUR CHARACTERISTICS

5.1 Type of invasive tumour by referral source

Referral source	Ductal NOS[1]	Invasive Lobular	Other Invasive of mixed type	Other neoplasm	Tubular	Medullary	Mucinous	Basal-like
BSA (n=925)	76.32%	12.22%	4.32%	2.70%	2.81%	0.22%	1.30%	0.11%
Non-BSA (n=1485)	76.84%	12.53%	2.36%	4.18%	1.01%	0.40%	1.75%	0.94%
p value				<0.001				

[1] ductal carcinoma not otherwise specified
Tumour types were not known for 5 BSA and 14 non-BSA patients.

Comments
New Zealand invasive tumours were 'ductal carcinoma, not otherwise specified'(Ductal NOS) in 76.6% of cases. There was little variation in proportion of Ductal NOS and invasive lobular tumour types between the BSA and non-BSA referral sources. There was some variation in the distribution of other invasive tumour types between BSA and non-BSA referral sources which has likely contributed to the statistically significant difference detected.

Audit data used
Information is derived from the audit question "invasive histological type of tumour" which allows the options of ductal carcinoma NOS, invasive lobular, tubular, medullary, mucinous, other invasive of mixed type, other neoplasm and basal-like.

Definitions
Tumour type defines the microscopic appearance of the invasive breast cancer cells in the principal tumour.

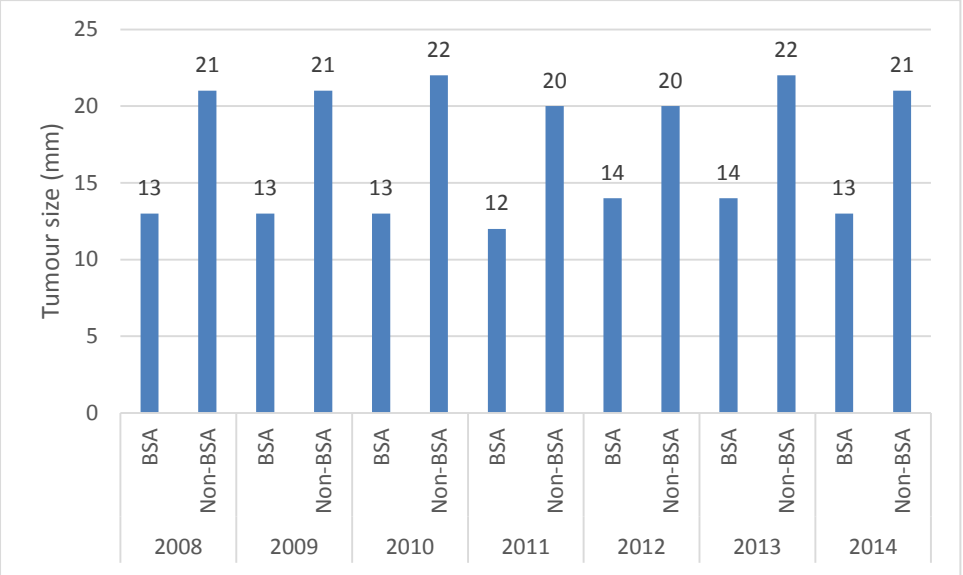
5.2 Size of invasive tumour by referral source

Referral source	Median (mm)	IQR (mm)	P value
BSA	13.0	9, 20	<0.001*
Non-BSA	21.0	14, 31	

IQR=interquartile range; *Wilcoxon rank-sum test

Referral source	<10 mm	10-14 mm	15-19 mm	20-29 mm	30-39 mm	≥40 mm
BSA (n=923)	29.90%	25.89%	17.88%	16.25%	4.66%	5.42%
Non-BSA (n=1456)	14.15%	13.46%	15.38%	26.58%	14.08%	16.35%
p value			<0.001			

Tumour size was unknown for 9 BSA and 55 non-BSA patients.



Graph 1 Median invasive tumours size by year and referral source

Comments

The distribution of invasive tumour size differed between BSA and non-BSA referral sources (p<0.001). The percentage of breast cancers less than 15 mm was greater in those referred from BSA (55.8%) compared with those referred from non-BSA resources (27.6%). The percentage of breast cancers equal to, or larger than, 20 mm was greater in those referred from non-BSA sources (57.0%) than in those referred from BSA (26.3%).

Audit data used

Information is derived from the audit question "invasive tumour size in mm".

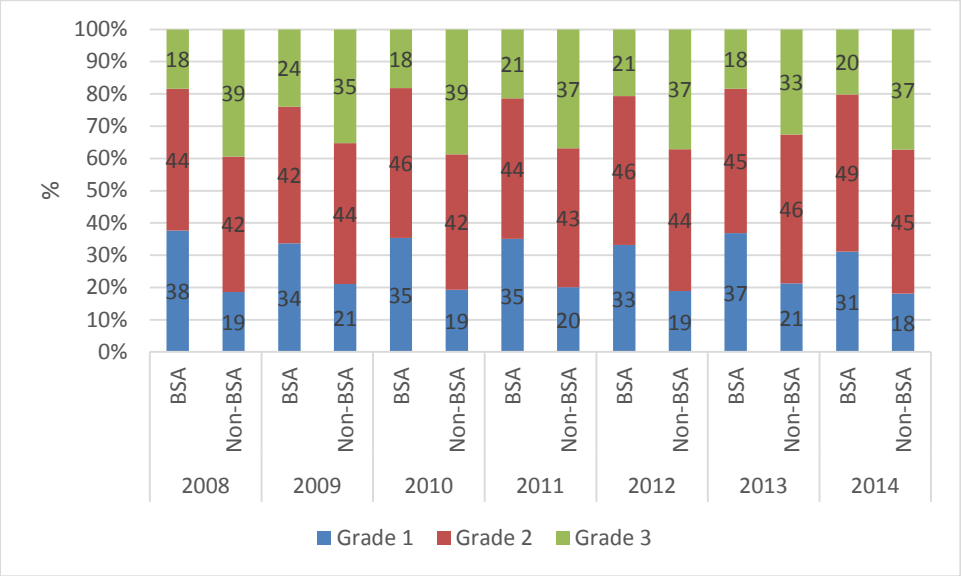
Definitions

Tumour size refers to the maximum diameter in millimetres of the furthest points of extension of the invasive tumour cells in the principal tumour.

5.3 Histological grade of invasive tumour by referral source

Referral source	Grade 1	Grade 2	Grade 3
BSA (n=914)	31.07%	48.80%	20.13%
Non-BSA (n=1456)	18.06%	44.71%	37.23%
p value		<0.001	

Histological grade of invasive tumours was not known for 18 BSA and 55 non-BSA patients



Graph 2 Grade of invasive tumours by referral source and year of diagnosis

	Australia			New Zealand		
Referral source	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 1**	**Grade 2**	**Grade 3**
BreastScreen	26.11%	51.52%	22.37%	31.07%	48.80%	20.13%
Non- BreastScreen	15.25%	44.70%	40.05%	18.06%	44.71%	37.23%
p value		<0.001			<0.001	

Comments

The distribution of histological grade of invasive breast tumours differed significantly according to the referral source (p<0.001).

For New Zealand breast cancers, the percentage of Grade 1 invasive tumours was higher in those referred from BSA (31.1%) compared with those referred from non-BSA sources (18.1%). In contrast, the percentage of Grade 3 tumours was higher in those breast cancers referred from non-BSA sources (37.2%) compared with those referred from BSA (20.1%).

A greater percentage of New Zealand invasive breast cancers were Grade 1 compared to Australian Grade 1 invasive breast cancer (23.1% and 18.9%, respectively, data not shown). Similar percentages of Grade 2 cancers were seen in 2014 between the two countries, and a greater percentage of invasive breast cancers were Grade 3 in Australian compared to New Zealand (34.2% and 30.6%, respectively, data not shown).

Audit data used

Information is derived from the audit question “invasive histological grade of tumour” which allows the options of grade 1, grade 2, and grade 3.

Definitions

Histological grade is the degree of differentiation of the breast cancer, or the degree to which it resembles normal tissue as assessed by the pathologist according to Pathology Reporting Guidelines. The

histological grade is calculated by adding three scores (mitosis score, nuclear score and tubular differentiation score):

Grade 1: Total score of 3–5

Grade 2: Total score of 6–7

Grade 3: Total score of 8–9

5.4 Menopausal status for invasive tumour by referral source

Referral source	Pre	Peri	Post
All women (n=2432)	26.97%	7.61%	65.42%
BSA (n=931)	17.94%	11.60%	70.46%
Non-BSA (n=1498)	32.64%	5.01%	62.35%
p value		<0.001	

Referral status was not known for 1 postmenopausal and 2 perimenopausal patients.

Comments

More than half (65.4%) of New Zealand female patients were post-menopausal. There were fewer pre-menopausal women in the BSA group (17.9%) than in the non-BSA group (32.6%). The BSA group had greater proportions of peri- and post-menopausal patients than those women referred from non-BSA sources (11.6% v 5.0% and 70.5% v 62.4%, respectively).

Audit data used

Information is derived from the audit question “menopausal status” which allows the options of pre, peri, post and male.

Definitions

Pre: an individual who has not yet experienced the menopause

Post: an individual who has experienced the menopause and the occurrence of greater than one year of spontaneous amenorrhoea

Peri: an individual who is either in the period just prior to the menopause or the subsequent one year of amenorrhoea following the menopause

5.5 Hormone receptor status of invasive tumour by referral source

New Zealand referral source	ER Positive	PR Positive	ER+PR Positive
BSA (n=911)	91.21%	79.14%	78.81%
Non-BSA (n=1474)	83.38%	69.94%	69.13%
p value[1]	<0.0001	<0.0001	<0.0001

ER: oestrogen receptor. PR: progesterone receptor.
[1] Two sample test of proportions comparing the proportion of each referral source within the hormone receptor positive group. Note that the table displays percentage of receptor positive breast cancers within each referral source.

Australian referral source	ER Positive	PR Positive	ER+PR Positive
BreastScreen Australia (n=3268)	91.01%	81.61%	80.88%
Non-BreastScreen Australia (n=6598)	82.51%	72.75%	72.07%
p value[1]	<0.0001	<0.0001	<0.0001

ER: oestrogen receptor. PR: progesterone receptor.
[1] Two sample test of proportions comparing the proportion of each referral source within the hormone receptor positive group. Note that the table displays percentage of receptor positive breast cancers within each referral source.

Mean invasive tumour size (mm) and standard deviation by receptor status

New Zealand referral source	ER Positive	PR Positive	ER+PR Positive
BSA	16.4 ± 14.70	26.0 ± 6.93	15.78 ± 11.64
Non-BSA	23.66 ± 16.13	34.83 ± 24.96	25.06 ± 18.46

Australian referral source	ER Positive	PR Positive	ER+PR Positive
BreastScreen Australia	17.24 ± 13.93	15.33 ± 8.18	16.66 ± 13.00
Non- BreastScreen Australia	27.23 ± 23.40	29.02 ± 36.68	24.79 ± 19.49

Comments

Most (87.4%) New Zealand patients had oestrogen positive tumours. The majority (74.3%) of New Zealand patients had progesterone positive tumours. The majority had tumours that were both oestrogen and progesterone positive (72.5%).

The proportion of patients with either oestrogen positive or progesterone positive tumours was significantly higher in the BSA group than in non-BSA group.

Comparisons with breast cancers diagnosed in Australia indicate similar patterns of oestrogen and progesterone receptor status by referral source.

Audit data used
Information is derived from the audit questions “Oestrogen receptor status” and “progesterone receptor status” which allow the options of positive, negative, ordered but not known and not done.

Definitions
The presence or absence of oestrogen receptors or progesterone receptors on the tumour cells.

5.6 HER2 Receptor status of invasive tumour by referral source

New Zealand referral source	Positive	Negative
BSA (n=912)	12.94%	87.06%
Non-BSA (n=1415)	17.67%	82.33%
p value	0.002	

HER2 status was not known for 20 BSA and 96 non-BSA patients.

Australian referral source	Positive	Negative
BreastScreen Australia (n=3231)	9.94%	90.06%
Non-BreastScreen Australia (n=6528)	14.35%	85.65%
p value	<0.001	

Comments

Most (84.2%) New Zealand invasive breast cancers were HER2 negative tumours. The percentage of patients with HER2 negative tumours was slightly higher in the BSA group (87.1%) than in non-BSA group (82.3%). This difference was significant (p=0.002).

Comparison with Australian invasive breast cancers indicates that there are a similar proportion of HER2 negative tumours as in New Zealand (90.1% and 85.7%, respectively).

Audit data used

Information is derived from the audit question “HER2 receptor status” which allows the options of positive, negative, ordered but not known and not done.

Definitions

HER2: Human Epidermal growth factor Receptor 2

Positive: Biopsy revealed abnormally high levels of the HER2 gene or protein

Negative: Biopsy revealed a normal level of the HER2 gene or protein

5.7 Triple negative invasive tumours by referral source

Referral source	Triple negative cancer
BSA (n=932)	4.72%
Non-BSA (n=1511)	10.66%
p value	0.001

Triple negative refers to tumours oestrogen receptor, progesterone receptor and HER2 negative.

Comments

Only 8.4% of New Zealand patients were oestrogen receptor, progesterone receptor and HER2 negative (triple negative). The proportion of triple negative patients was lower in the BSA group (4.7%) than in the Non-BSA group (10.7%).

Audit data used

Information is derived from the audit questions “Oestrogen receptor status”, “progesterone receptor status” and “HER2 receptor status” which allow the options of positive, negative, ordered but not known and not done.

6 DCIS TUMOUR CHARACTERISTICS

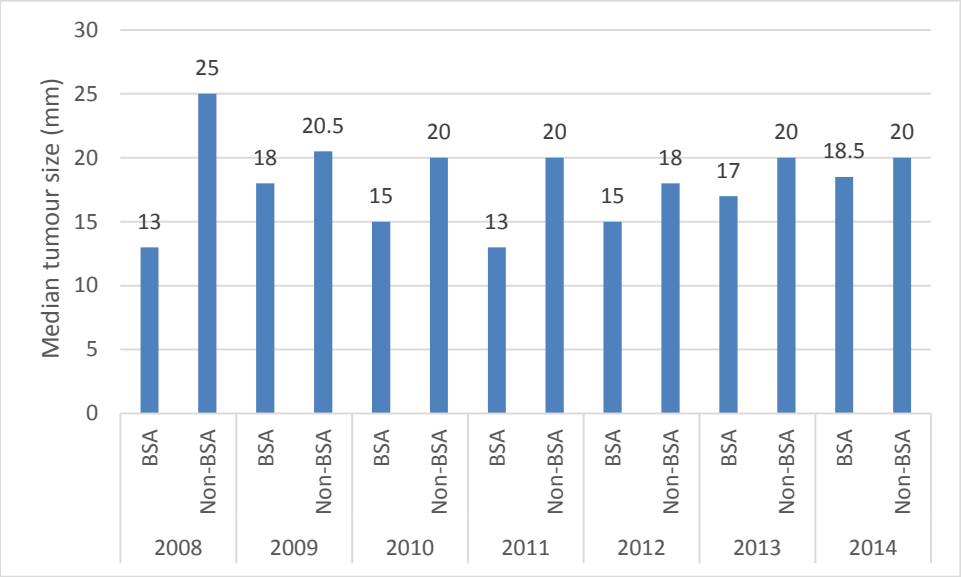
6.1 Size of DCIS tumours by referral source

Referral source	Median (mm)	IQR (mm)	P value
BSA (n=270)	18.5	8, 36	0.0848*
Non-BSA (n=161)	20.0	10, 49	

IQR=interquartile range; * Wilcoxon rank sum test

Referral source	<10 mm	10-14 mm	15-19 mm	20-29 mm	30-39 mm	≥40 mm
BSA (n=270)	29.63%	13.33%	7.41%	12.59%	12.96%	24.07%
Non-BSA (n=161)	22.36%	9.94%	14.91%	13.66%	8.07%	31.06%
p value			0.027			

DCIS tumour size was not known for 4 BSA patients, 1 non-BSA patient



Graph 3 Insitu tumour size by year and referral status

Comments

The percentage of patients with smaller tumours (<20mm) was marginally higher for the BSA group than the non-BSA group (50.4% and 47.2%, respectively; p=0.525). The percentage of patients with larger tumours (≥40mm) was higher in the non-BSA group than the BSA group (31.1% and 24.1%, respectively; p=0.113).

Audit data used

Information is derived from the audit question "DCIS tumour size in mm".

Definitions

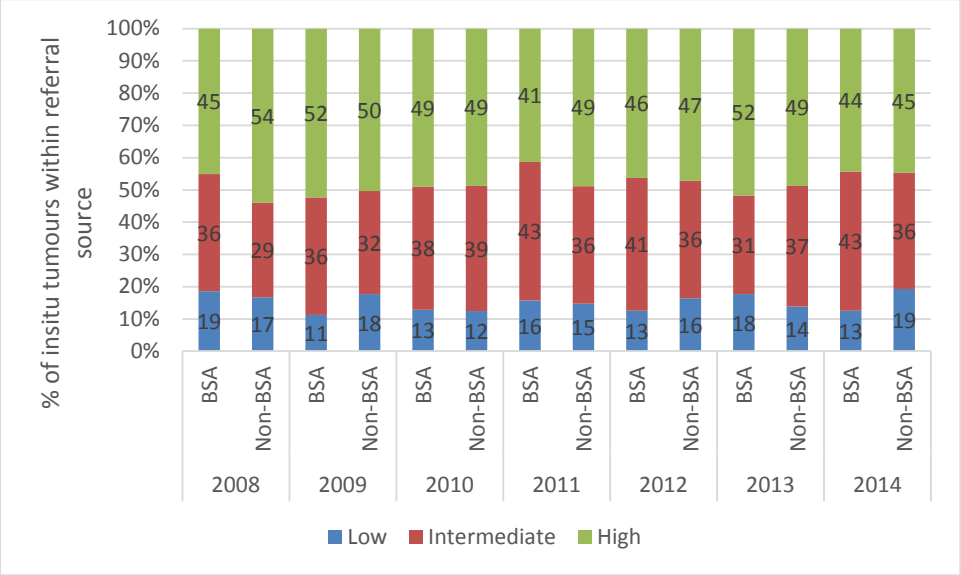
Tumour size refers to the maximum diameter in millimetres of the furthest points of extension of the DCIS tumour cells in the principal tumour.

6.2 Histological grade of DCIS tumour by referral source

Referral source	Low	Intermediate	High
BSA (n=271)	12.55%	43.17%	44.28%
Non-BSA (n=161)	19.25%	36.02%	44.72%
p value		0.117	

DCIS Histological grade was not known for 3 BSA breast cancers, 1 non-BSA breast cancer and 1 breast cancer of unknown referral source.

	Australia			New Zealand		
Referral source	**Low**	**Intermediate**	**High**	**Low**	**Intermediate**	**High**
BreastScreen	10.07%	31.98%	57.94%	12.55%	43.17%	44.28%
Non-BreastScreen	18.09%	30.04%	51.87%	19.25%	36.02%	44.72%
p value		<0.001			0.117	



Graph 4 Insitu tumour grade by referral source and year

Comments

The greater percentage of DCIS were high grade (44.4%) followed by intermediate and low grades (40.5% and 15.1%, respectively).

Comparison of histological grade by referral source indicated no statistically significant difference between BSA and non-BSA referral sources (p=0.117).

Within each referral source, low and intermediate insitu tumours are more common in New Zealand compared to Australia, and high grade tumours are less common in New Zealand compared to Australia.

Audit data used

Information is derived from the audit question "DCIS histological grade of tumour" which allows the following options: low, medium and high.

Definitions

The degree of differentiation of the breast cancer or the degree to which it resembles normal tissue as assessed by the pathologist.

Low: well differentiated

Intermediate: moderately differentiated

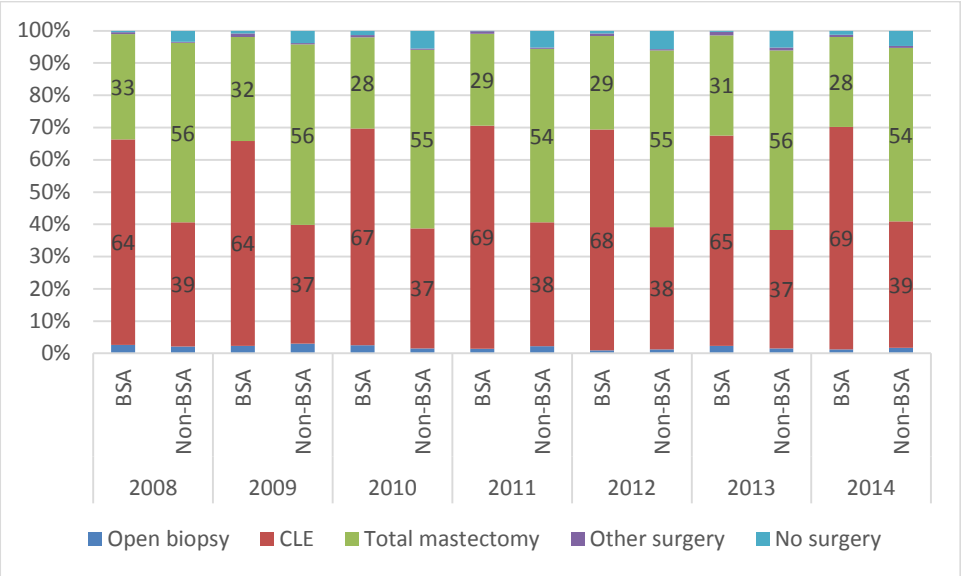
High: poorly differentiated

7 BREAST SURGERY TREATMENT

7.1 First breast surgery performed for invasive cancer by referral source

Referral source	None	Open Biopsy	CLE	Mastectomy	Other
BSA (n=927)	1.19%	1.19%	67.42%	29.45%	0.76%
Not BSA (n=1503)	4.52%	1.60%	37.92%	55.69%	0.27%
p value			<0.001		

CLE = complete local excision (breast conserving surgery)



Graph 5 First surgery by referral source and year
Note: Data labels have not been applied for surgeries comprising less than 5% of all first surgeries in invasive breast cancer

Comments
There was a significant difference in the distribution of first breast surgery for invasive breast cancer by referral source (p<0.001). BSA patients were more likely to have complete local excision (67.4%) than mastectomy (29.5%) as their first surgery. The reverse was true for non-BSA patients (37.9% and 55.7%, respectively).

7.2 Further breast surgery after breast conserving surgery for invasive cancer by referral source

Referral source	Mastectomy only	Mastectomy + re-excision	Re-excision only	Other surgery	Any further surgery	No further breast surgery
BSA (n=628)	5.74%	0.96%	11.96%	0%	**18.79%**	**81.21%**
Non-BSA (n=567)	8.66%	0.35%	8.13%	0.18%	**17.32%**	**82.68%**
p value					**0.552**	

Comments
The majority of New Zealand patients (81.2%) treated with breast conserving surgery (BCS) for invasive cancer had no further surgery. The proportion of patients undergoing mastectomy after BCS for invasive cancer was lower for the BSA group (5.7%) when compared to the non-BSA group (8.7%).

7.3 Reconstruction after mastectomy for invasive cancer by referral source

Referral source	Reconstruction	No reconstruction
BSA (n=273)	19.05%	80.95%
Non-BSA (n=837)	13.74%	86.26%
p value	0.033	

Comments
The majority of New Zealand mastectomy patients (85.0%) with invasive tumours had no reconstruction. The distribution of patients receiving reconstruction surgery after mastectomy for invasive tumours differed significantly according to BSA and non-BSA referral sources.

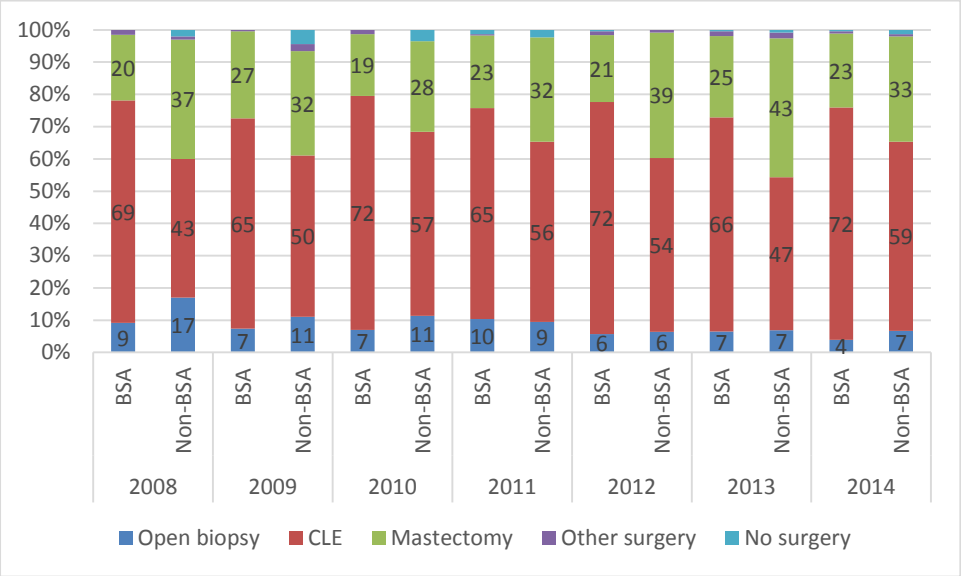
Audit data used
Information is derived from the audit question "surgical procedures" which allows the following options: no surgery, ABBI, open biopsy, CLE, re-excision, total mastectomy, reconstruction and other.

Definitions

Open biopsy:	surgical procedure in which a sample of breast tissue for histological examination is obtained in a conventional surgical procedure, using an open excision
CLE:	the complete excision of an entire tumour mass
ABBI:	the process whereby an Advanced Breast Biopsy Instrumentation System (or similar) technique is used to excise non-palpable breast lesions
Total mastectomy:	the surgical removal of the breast
Re-excision:	a secondary surgical procedure conducted to obtain a rim of normal breast tissue around the periphery of the previously removed primary tumour
Reconstruction:	the use of a prosthesis or tissue from other parts of the body to re-build a breast
Other:	other surgery

7.4 First breast surgery performed for DCIS by referral source

Referral source	None	Open biopsy	CLE	Mastectomy	Other
BSA (n=274)	0.36%	3.65%	68.25%	27.74%	0.00%
Non-BSA (n=162)	1.23%	6.17%	54.94%	37.04%	0.62%
p value			0.042		



Graph 6 First surgery for DCIS by referral source and year
Note: Data labels have not been applied for surgeries comprising less than 2% of all first surgeries in invasive breast cancer

Comments
The distribution of first breast surgery differed according to the referral source (p=0.042). Over two thirds of New Zealand patients (67.9%) had breast conserving surgery (open biopsy or CLE) as their first surgery for DCIS. The percentage of patients who had breast conserving surgery for DCIS was higher in the BSA group (71.9%) than in the non-BSA group (61.1%). The percentage of patients with mastectomy as their first surgery for DCIS tumours was lower in the BSA group (27.7%) than in the non-BSA group (37.0%).

7.5 Further surgery after breast conserving surgery for DCIS by referral source

Referral source	Mastectomy only	Mastectomy + re-excision	Re-excision only	Other	Any further surgery	No further breast surgery
BSA (n=186)	12.37%	1.61%	17.20%	0.00%	**32.80%**	**67.20%**
Non-BSA (n=88)	6.82%	5.68%	19.32%	0.00%	**34.09%**	**65.91%**
p value					**0.832**	

Comments
Almost two thirds (67.2%) of New Zealand patients who had breast conserving surgery for DCIS received no further surgical treatment.
The proportion of patients treated with mastectomy after breast conserving surgery for DCIS was higher in the BSA group (12.4%) than in the non-BSA group (6.8%); however, small numbers (n=32 and n=17, respectively) limit the interpretation of these results. Fewer DCIS referred from BSA sources were treated with both further re-excision and mastectomy compared to DCIS referred from non-BSA sources (1.6% and 5.7%, respectively), again small numbers (n=3 and n=5, respectively) make interpretation difficult.

7.6 Reconstruction performed after mastectomy for DCIS by referral source

Referral source	Reconstruction	No reconstruction
BSA (n=76)	36.84%	63.16%
Non-BSA (n=60)	25.00%	75.00%
p value	0.140	

Comments
At least two thirds (68.4%) of New Zealand DCIS patients treated with mastectomy had no reconstruction. There was no significant difference between BSA and non-BSA patients.

Audit data used
Information is derived from the audit question "surgical procedures" which allows the following options: no surgery, ABBI, open biopsy, CLE, re-excision, total mastectomy, reconstruction and other.

Definitions

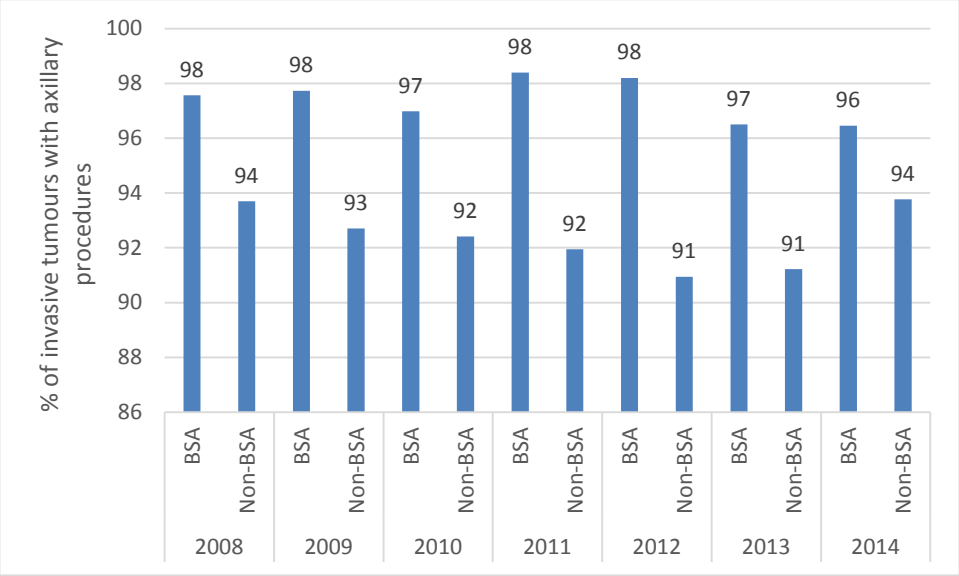
Open biopsy:	surgical procedure in which a sample of breast tissue for histological examination is obtained in a conventional surgical procedure, using an open excision
CLE:	the complete excision of an entire tumour mass
ABBI:	the process whereby an Advanced Breast Biopsy Instrumentation System (or similar) technique is used to excise non-palpable breast lesions
Total mastectomy:	the surgical removal of the breast
Re-excision:	a secondary surgical procedure conducted to obtain a rim of normal breast tissue around the periphery of the previously removed primary tumour
Reconstruction:	the use of a prosthesis or tissue from other parts of the body to re-build a breast
Other:	other surgery

8 AXILLARY SURGERY TREATMENT

8.1 Axillary procedures for invasive cancer by referral source

Referral source	SNB only	Level 1 only	Level 2 only	Level 3 only	SNB & any axillary surgery	Any axillary surgery	No axillary surgery
BSA (n=931)	75.73%	1.18%	8.16%	2.15%	9.24%	**96.46%**	**3.54%**
Non-BSA (n=1508)	49.67%	1.59%	22.55%	6.43%	11.80%	**92.04%**	**7.96%**
p value						**<0.001**	

Australian referral source	SNB only	Level 1 only	Level 2 only	Level 3 only	SNB & any axillary surgery	Any axillary surgery	No axillary surgery
BreastScreen (n=3390)	79.65%	1.18%	5.60%	2.86%	7.08%	**96.37%**	**3.63%**
Non-BreastScreen (n=6875)	58.63%	2.71%	12.84%	6.76%	12.22%	**93.24%**	**6.76%**
p value						**<0.001**	



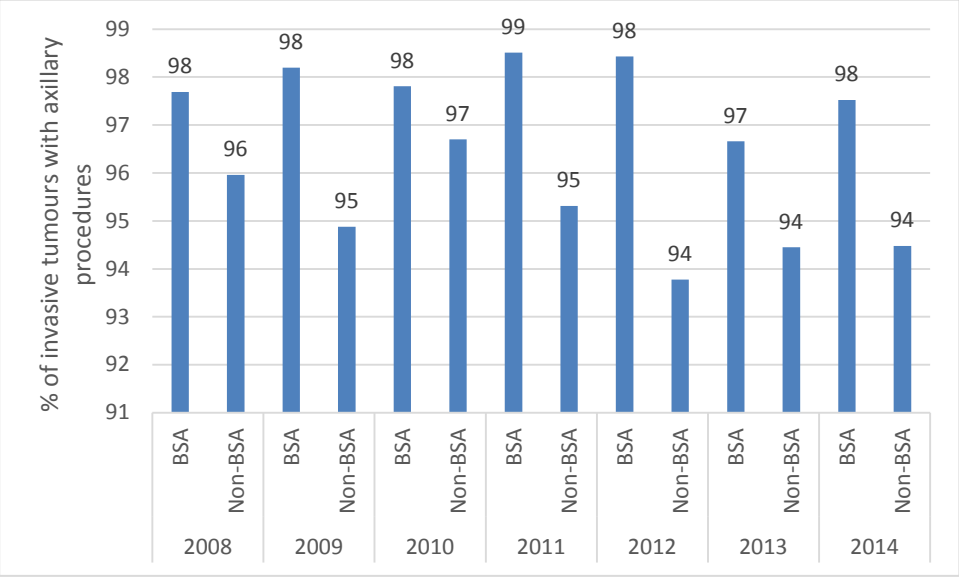
Graph 7 Axillary procedures in invasive tumours by referral source and year in New Zealand

8.2 Axillary procedures for ≤3cm invasive cancer by referral source

New Zealand referral source	SNB only	Level 1 only	Level 2 only	Level 3 only	SNB & any axillary surgery	Any axillary surgery	No axillary surgery
BSA (n=855)	79.42%	1.17%	6.55%	1.52%	8.42%	**97.08%**	**2.92%**
Non-BSA (n=1100)	59.55%	1.73%	17.82%	4.27%	10.64%	**94.00%**	**6.00%**
p value						**<0.001**	

Tumour size was not known for 4 BSA patients and 61 non-BSA patients.

Australian referral source	SNB only	Level 1 only	Level 2 only	Level 3 only	SNB & any axillary surgery	Any axillary surgery	No axillary surgery
BreastScreen Australia (n=3036)	83.63%	1.09%	4.31%	2.27%	5.67%	**96.97%**	**3.03%**
Non-BreastScreen Australia (n=5094)	66.84%	2.34%	9.36%	4.38%	10.78%	**93.70%**	**6.30%**
p value						**<0.001**	



Graph 8 Axillary procedures in invasive tumours ≤ 3cm by referral source and year in New Zealand

8.3 Axillary procedures for >3cm invasive cancer by referral source

Referral source	SNB only	Level 1 only	Level 2 only	Level 3 only	SNB & any axillary surgery	Any axillary surgery	No axillary surgery
BSA (n=85)	34.12%	2.35%	23.53%	8.24%	16.47%	**84.71%**	**15.29%**
Non-BSA (n=427)	22.72%	1.41%	35.13%	12.18%	14.29%	**85.71%**	**14.29%**
p value						**0.142**	

Tumour size was not known for 4 BSA patients and 61 non-BSA patients.

Comments on sections 8.1 to 8.3

For smaller invasive tumours, there was a statistically significant difference in the distribution of axillary surgery by referral source ($p<0.001$) with a greater proportion of BSA-referred tumours undergoing axillary surgery than non-BSA referred tumours (97% v 94%, respectively). Patterns of axillary surgery in smaller tumours were similar to larger tumours in that a greater proportion of BSA referred tumours received SNB only compared with non-BSA referred tumours (79% v 60%, respectively).

For >3cm tumours, a higher proportion (34.1%) of BSA patients had SNB as their only axillary surgery compared with non-BSA patients (22.7%). Although there was no difference in the distribution of axillary surgery according to referral status, women referred from non-BSA sources were more likely to have level 2 or level 3 surgery compared to women referred from BSA sources.

Audit data used

Information on axillary procedure is from the audit question "axillary surgery" which allows the following options: sentinel node biopsy; level 1 sampling, level 2, level 3 and no axillary surgery.

Definitions

Sentinel node biopsy: Identification and excision of the sentinel lymph node (the first node(s) draining the primary tumour in the regional lymphatic basin).

Axillary surgery: Surgical excision of the axillary contents (fat and lymph nodes).

Level 1: Excision of a single, low axillary node or the excision of the axillary contents up to the inferior border of the pectoralis minor muscle, includes sampling.

Level 2: Excision of the axillary contents up to the superior border of the pectoralis minor muscle.

Level 3: Excision of the axillary contents up to the apex of the axilla.

8.4 Axillary procedures for DCIS treated with breast conserving surgery only by referral source

Referral source	SNB only	Level 1 only	Level 2 only	Level 3 only	SNB & any axillary surgery	Any axillary surgery	No axillary surgery
BSA (n=118)	6.78%	0.00%	0.0%	0.00%	0.00%	**6.78%**	**93.22%**
Non-BSA (n=50)	10.00%	0.00%	0.00%	2.00%	0.00%	**12.00%**	**88.00%**
p value						**0.230**	

Referral source was unknown for 6 DCIS with further axillary surgeries and 9 DCIS that underwent no further axillary surgery after BCS.

Comments

The majority (91.7%) of New Zealand patients with DCIS treated by BCS did not have axillary surgery, as expected from the guidelines. Fewer BSA patients (6.8%) had axillary surgery than non-BSA patients (12.0%) although this difference was not significant.

8.5 Axillary procedures for DCIS treated with mastectomy by referral source

Referral source	SNB only	Level 1 only	Level 2 only	Level 3 only	SNB & any axillary surgery	Any axillary surgery	No axillary surgery
BSA (n=106)	81.13%	0.00%	0.00%	0.00%	0.00%	**81.13%**	**18.87%**
Non-BSA (n=80)	70.00%	1.25%	2.5%	0.00%	3.75%	**77.50%**	**22.50%**
p value						**0.034**	

Comments

The majority (79.6%) of New Zealand patients with DCIS treated by mastectomy also had axillary surgery. The proportions of axillary surgery performed did differ significantly between the BSA and non-BSA referral sources.

Audit data used

Information on axillary procedure is from the audit question "axillary surgery" which allows the following options: sentinel node biopsy; level 1 sampling, level 2, level 3 and no axillary surgery.

Definitions

Sentinel node biopsy:	Identification and excision of the sentinel lymph node (the first node(s) draining the primary tumour in the regional lymphatic basin).
Axillary surgery:	Surgical excision of the axillary contents (fat and lymph nodes).
Level 1:	Excision of a single, low axillary node or the excision of the axillary contents up to the inferior border of the pectoralis minor muscle, includes sampling.
Level 2:	Excision of the axillary contents up to the superior border of the pectoralis minor muscle.
Level 3:	Excision of the axillary contents up to the apex of the axilla.

9 MARGINS OF EXCISION FOR BREAST SURGERY

9.1 Margins of excision for invasive cancer by referral source

Referral source	Involved margin	1mm margin	≥2mm margin	Clear but unspecified margin
BSA (n=854)	1.99%	4.10%	91.22%	2.69%
Non-BSA (n=1226)	3.43%	5.71%	85.89%	4.98%
p value		0.002		

Margin size was not known for 78 BSA and 285 non-BSA patients.

Comments

Most (91.2%) of BSA referred patients had margins of at least 2mm after surgery for invasive cancer. There were fewer patients from BSA referral sources with involved margins (2.0%) compared to non-BSA referral sources (3.4%).

9.2 Margins of excision for DCIS cancer by referral source

Referral source	Involved margin	1mm margin	≥2mm margin	Clear but unspecified margin
BSA (n=252)	3.97%	6.35%	85.71%	3.97%
Non-BSA (n=133)	4.51%	8.27%	84.21%	3.01%
p value		0.858		

Margin size was not known for 22 BSA and 29 non-BSA patients for DCIS cases.

Comments

Most (85.7%) BSA referred patients had margins of at least 2mm after surgery for DCIS. There were marginally more BSA patients with margins of at least 2mm for DCIS cancers when compared to non-BSA patients (84.2%).

Audit data used

Information on margin size is derived from the audit question “distance (in mm) to closest circumferential margin”. Margin is measured in whole numbers; an entry of 0 is an involved margin; margins between 0.1 and 0.9 must be rounded up to 1mm. For cases where the pathologist has indicated a “clear margin” without specifying a specific value, a code of “99” can be used in the system. This is interpreted as “clear but unspecified margin”.

10 RADIOTHERAPY TREATMENT

10.1 Radiotherapy for invasive cancer treated with breast conserving surgery by referral source

Referral source	Referred for radiotherapy
BSA (n=642)	93.30%
Non-BSA (n=600)	87.83%
p value	0.001

Radiotherapy was not known for 2 BSA and 1 non-BSA patients. Please note that the patients who had mastectomy or other breast surgery after breast conserving surgery were not included in this group.

Comments

The proportion of New Zealand patients referred for radiotherapy treatment for invasive cancers was slightly higher for BSA (93.3%) patients when compared to non-BSA patients (87.8%). This difference was significant ($p<0.001$). The percentage of patients that were referred for radiotherapy but did not receive it were 3.6% and 6.7% for the BSA and non-BSA referral sources, respectively (data not shown).

Audit data used

Information on patients undergoing radiotherapy is derived from the audit question "did you prescribe or refer for any of the following adjuvant therapies?" where one of the options is radiotherapy. The options were: yes, no, not yet, referred but not used, not known.

Definitions

Radiotherapy is the use of radiation, usually X-rays or gamma rays, to kill tumour cells.

10.2 Radiotherapy for invasive cancer treated with mastectomy by referral source

Referral source	Referred for radiotherapy
BSA (n=322)	38.82%
Non-BSA (n=903)	52.05%
p value	<0.001

Radiotherapy status was not known for 3 non-BSA patients.

Comments

The percentage of patients referred for radiotherapy treatment after mastectomy for invasive cancer was significantly lower in the BSA group (38.8%) than in the non-BSA group (52.1%).

10.3 Radiotherapy for high risk invasive cancer treated with mastectomy by referral source

Referral source	Referred for radiotherapy
BSA (n=9)	88.89%
Non-BSA (n=55)	89.09%
p value	0.986

Comments
Proportions of patients referred for radiotherapy treatment after mastectomy for high-risk invasive cancer did not differ significantly between BSA and non-BSA groups. Proportionately, patients with high-risk invasive cancers were far more likely to receive radiotherapy treatment after mastectomy than those with lower-risk tumours.

Audit data used
Information on patients undergoing radiotherapy is derived from the audit question "did you prescribe or refer for any of the following adjuvant therapies?" where one of the options is radiotherapy. The options were: yes, no, not yet, referred but not used, not known.

Definitions
Radiotherapy is the use of radiation, usually X-rays or gamma rays, to kill tumour cells.

10.4 Radiotherapy for DCIS treated with breast conserving surgery by referral source

Referral source	Referred for radiotherapy
BSA (n=187)	72.73%
Non-BSA (n=94)	73.40%
p value	0.904

Radiotherapy status was not known for 3 BSA patients. Please note that the DCIS patients who had mastectomy after breast conserving surgery were excluded in this group.

Comments
The majority (73.0%) of New Zealand DCIS patients treated with breast conserving surgery were referred for radiotherapy. Referral for radiotherapy treatment after breast conserving surgery for DCIS did not differ significantly between BSA and non-BSA groups.

10.5 Radiotherapy for DCIS cancer which had mastectomy by referral source

Referral source	Referred for radiotherapy
BSA (n=106)	6.60%
Non-BSA (n=80)	10.0%
p value	0.40

Comments
Only a small percentage (8.1%) of New Zealand DCIS patients treated with mastectomy were referred for radiotherapy. Referral for radiotherapy treatment did not differ significantly between the BSA and non-BSA groups.

Audit data used
Information on patients undergoing radiotherapy is derived from the audit question "did you prescribe or refer for any of the following adjuvant therapies?" where one of the options is radiotherapy. The options were: yes, no, not yet, referred but not used, not known.

Definitions
Radiotherapy is the use of radiation, usually X-rays or gamma rays, to kill tumour cells.

11 HORMONAL TREATMENT

11.1 Hormonal treatment type: oestrogen positive invasive tumours

Referral source	SERMs only	SERMs & Aromatase inhibitors	Aromatase inhibitors only
BSA (n=679)	28.33%	10.77%	43.10%
Non-BSA (n=1046)	40.54%	7.81%	37.66%
p value		<0.001	

SERMS: Selective Oestrogen Receptor Modulators

Comments
The distribution of hormonal treatment in oestrogen positive invasive tumours differed by referral source (p<0.001). Invasive tumours from BSA referral sources were more likely to receive Selective Oestrogen Receptor Modulators (SERMs) and aromatase inhibitors than those from non-BSA sources (10.8% and 7.8%, respectively). Invasive tumours from non-BSA referral sources were more likely to be treated with only one hormonal treatment (SERMS or Aromatase inhibitors) compared to tumours from BSA sources.

Audit data used
Information for oestrogen receptor positive status is derived from the audit questions relating to "receptor status" where information is recorded for oestrogen and progesterone status, as well as HER2, with options of positive, negative, ordered but not known and not done.

Information for number of patients prescribed and/or referred for hormonal therapy is derived from the question "did you prescribe or refer for any of the following adjuvant therapies?" The following options apply: yes, no, not yet and referred but not used.

Definitions
Oestrogen Receptors are prognostic indicators. They are an intracellular receptor protein that binds oestrogens and anti-oestrogens, mediating their effects by binding to DNA and altering the expression of specific genes.

Hormonal treatment includes SERMs, aromatase inhibitors and ovarian ablation.

SERMs refers to the use of Selective Oestrogen Receptor Modulators to inhibit the growth of hormone responsive cancer cells after primary treatment, either by surgery or radiotherapy or a combination of these, to eradicate micro metastatic cancer.

Aromatase inhibitors refer to the class of drugs which lower the level of oestrogen in the tumour. They are primarily used in post-menopausal patients.

12 CHEMOTHERAPY TREATMENT

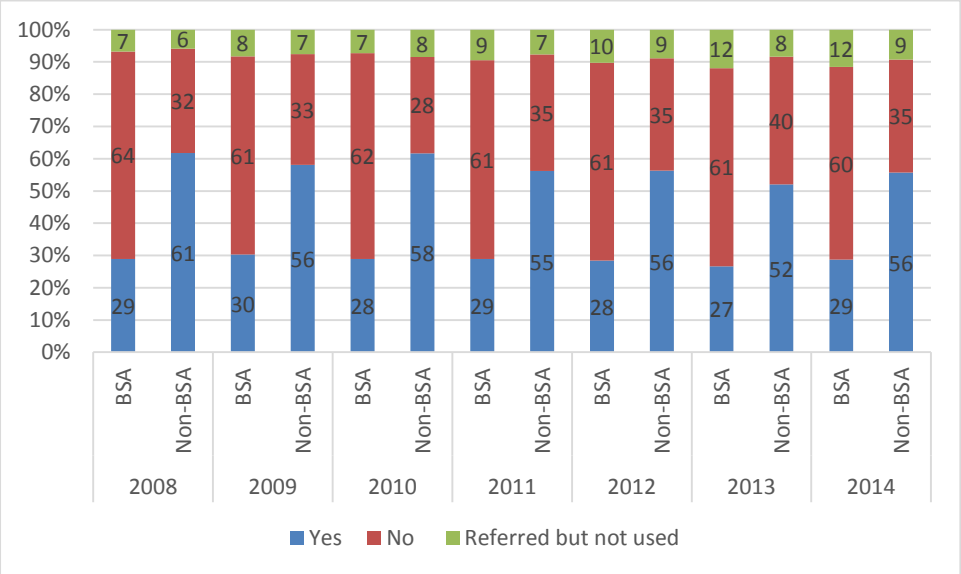
12.1 Chemotherapy treatment for invasive cancer in patients ≤ 70 years old by referral source

Referral source	Chemotherapy prescribed	No chemotherapy prescribed	Referred but not used
BSA (n=903)	28.68%	59.80%	11.52%
Non-BSA (n=988)	55.67%	35.02%	9.31%
p value		<0.001	

Chemotherapy status was not known for 4 BSA and 4 non-BSA patients. Referral status was not known for 4 patients.

Comments

The proportion of all patients 70 years old or younger who received chemotherapy treatment was significantly lower in the BSA group (28.7%) than in the non-BSA group (55.7%).



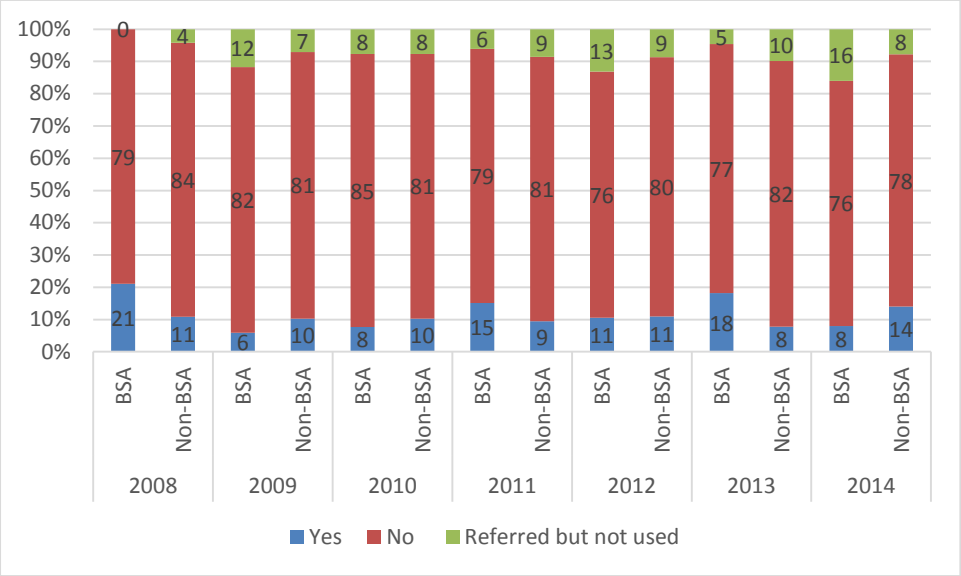
Graph 9 Chemotherapy treatment for patients aged ≤70 yrs by referral source

12.2 Chemotherapy treatment for invasive cancer for patients >70 years old by referral source

Referral source	Chemotherapy prescribed	No chemotherapy prescribed	Referred but not used
BSA (n=25)	8.00%	76.00%	16.00%
Non-BSA (n=514)	14.01%	78.21%	7.78%
p value		0.271	

Comments

A small percentage of over 70 year old New Zealand patients had chemotherapy treatment. The distribution of prescribed chemotherapy treatment did not differ significantly between BSA and non-BSA groups for patients over the age of 70 years (p=0.271).



Graph 10 Chemotherapy treatment for patients aged >70 yrs by referral source

Audit data used

Information on chemotherapy was derived from the audit question "did you prescribe or refer for any of the following adjuvant therapies?" where one choice is chemotherapy. The following options apply: yes, no, not yet, referred but not used.

Definitions

Chemotherapy is the use of cytotoxic drugs that aim to kill, prevent or slow the growth rate of cancer cells.

13 HERCEPTIN TREATMENT

Relevant Clinical Practice Guidelines
Patients with early breast cancer and HER-2 positive tumours, either node positive or with tumours larger than 1cm, should be offered trastuzumab with chemotherapy following surgery[4].

13.1 Herceptin treatment for >1cm HER2 positive OR node positive HER2 positive invasive cancer by referral source

Referral source	Herceptin prescribed			Not prescribed
	Chemotherapy yes	Chemotherapy no	Chemotherapy unknown	
BSA (n= 75)	77.33%	1.33%	0.00%	21.33%
Not BSA (n= 202)	78.71%	5.94%	0.00%	15.35%
P value	0.8271	NC	NC	0.6082

Herceptin treatment was not known for 19 BSA patients.

Comments
The majority of New Zealand patients with HER2 positive tumours over 1cm or with HER2 positive tumours and positive nodes received Herceptin treatment. Proportions of Herceptin treatment did not differ significantly between BSA and non-BSA groups whether they had chemotherapy or not.

Audit data used
Information on chemotherapy and Herceptin was derived from the audit question "did you prescribe or refer for any of the following adjuvant therapies?" where one choice is Herceptin or other immunotherapy and another is chemotherapy. The following options apply: yes, no, not yet, referred but not used.

Definitions
Herceptin is a drug aimed at women who show HER2 gene amplification and/or protein over expression.

14 KEY PERFORMANCE INDICATORS FOR THE MANAGEMENT OF NEW ZEALAND BREAST CANCERS DURING THE PERIOD 2012–2014

KPI 1: Percentage of invasive cancer episodes undergoing breast conserving surgery which have been referred for radiotherapy (threshold 85%)

All NZ surgeons	Number of episodes	Episodes meeting KPI
Referred for radiotherapy	2945	
Episodes of breast conserving surgery in invasive cancer	3083	95.52%
Excluded cases:	2	

BSA accredited surgeons	Number of episodes	Episodes meeting KPI
Referred for radiotherapy	512	
Episodes of breast conserving surgery in invasive cancer	539	94.99%
Excluded cases:	0	

KPI 2: Percentage of invasive oestrogen positive cases referred for hormonal therapy treatment (threshold 85%)

All NZ surgeons	**Number of episodes**	**Episodes meeting KPI**
Referred for hormone therapy	5160	
Episodes of ER+ invasive cancer	6035	85.52%
Excluded cases:	815	

BSA accredited surgeons	**Number of episodes**	**Episodes meeting KPI**
Referred for hormone therapy	794	
Episodes of ER+ invasive cancer	984	80.69%
Excluded cases:	815	

KPI 3: Percentage of invasive cases undergoing axillary surgery (threshold 90%)

All NZ surgeons	**Number of episodes**	**Episodes meeting KPI**
Underwent axillary surgery	6665	
Episodes of invasive cancer	7127	93.52%
Excluded cases:	16	

BSA accredited surgeons	**Number of episodes**	**Episodes meeting KPI**
Underwent axillary surgery	1066	
Episodes of invasive cancer	1151	92.62%
Excluded cases:	0	

KPI 4: Percentage of in situ cases undergoing breast surgery without axillary clearance (threshold 90%)

All NZ surgeons	Number of episodes	Episodes meeting KPI
Without axillary surgery	843	
DCIS and breast surgery	851	99.06%
Excluded cases:	868	

BSA accredited surgeons	Number of episodes	Episodes meeting KPI
Without axillary surgery	141	
DCIS and breast surgery	142	99.30%
Excluded cases:	143	

KPI 5: Percentage of high risk invasive cases undergoing mastectomy and referred for radiotherapy (threshold 85%)

All NZ surgeons	Number of episodes	Episodes meeting KPI
High risk invasive cancers referred for RT	946	
High risk invasive cancers	1072	88.25%

BSA accredited surgeons	Number of episodes	Episodes meeting KPI
High risk invasive cancers referred for RT	140	
High risk invasive cancers	155	90.32%

KPI 6: Percentage of high risk cases referred for chemotherapy (threshold 90%)

All NZ surgeons	Number of episodes	Episodes meeting KPI
High risk of invasive cancers referred for chemotherapy	5387	
High risk invasive cancers	6019	89.50%

BSA accredited surgeons	Number of episodes	Episodes meeting KPI
High risk of invasive cancers referred for chemotherapy	330	
High risk invasive cancers	382	86.39%

15 REFERENCES

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