National Breast and Ovarian Cancer Centre and Royal Australasian College of Surgeons

National Breast Cancer Audit

Public Health Monitoring Series

2007 Data

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Overview

A total of 4,979 Australian women with early invasive breast cancer were treated by breast surgeons participating in the National Breast Cancer Audit (NBCA) in 2007, the majority of whom were full members of the Breast Section of the Royal Australasian College of Surgeons. Details of these cancers and of their management are described in this report by age at diagnosis, treatment centre location, and referral source. In situ lesions, and invasive cancers recorded by the NBCA among New Zealand women, are not addressed.

Results and Discussion

By age

(Table 1; Figure 1)

Of the 4,979 women, 281 were under 40 years of age. Their cancers had a range of adverse prognostic characteristics that distinguished them from cancers of older women. Data from Australian cancer registries indicate that women of this age have lower five-year survivals from breast cancer than women in the 40-69 year age range, although higher than for women aged 80 years or more.[1,2] NBCA data provide an opportunity to investigate cancer and cancer treatment profiles of these younger women.

The proportion with ductal cancers was 91%, which was much higher than the 79% for older women. It is relevant that previous analyses of Australian clinical data have shown lower survivals for ductal than other histology types, after adjusting for age at diagnosis, stage, grade and hormone receptor status.[3]

Tumour size, grade and nodal status are well-recognized prognostic indicators.[4-6] Women under 40 years had less desirable features according to each indicator. The proportion with small diameters (<15 mm) was 28%, which was a much lower figure than the corresponding 39% for 40-79 year old women. Only women aged 80 years or more had a lower proportion of cancers classified as small at 20%.

The proportion of cancers that were high grade was 58% for women under 40 years compared with 30% for older women. This proportion reduced with age before stabilizing in the age range over 60 years. Also the proportion of cancers that were node positive was 49% for women under 40 years, with only 40-49 year olds having a similar proportion (47%), which compared with the lower figure of 35% for older women.

In general, hormone receptor positive tumours are associated with higher survivals.[3,7] It is notable that the proportion of women under 40 years with positive oestrogen receptor status was low (65%) compared with the figure for older women (82%). The same pattern applied for progesterone receptor status, in that the proportion with a positive status was 56% in this younger age range compared with 69% for older women.

Negative prognostic indicators more common in women under 40 years than older women also included:

- Positive HER-2 status (20% compared with 14%)[8]
- Vascular invasion (47% compared with 28%)[9]

Another difference in characteristics of tumours between older women related to multifocal cancers. The percentage multifocal among women under 40 years was 23%, which although similar to the 25% for 40-49 year olds, was higher than the 16% for older women. Multifocal cancers have been shown in the NBCA database to have lower survivals than other cancers.[5]

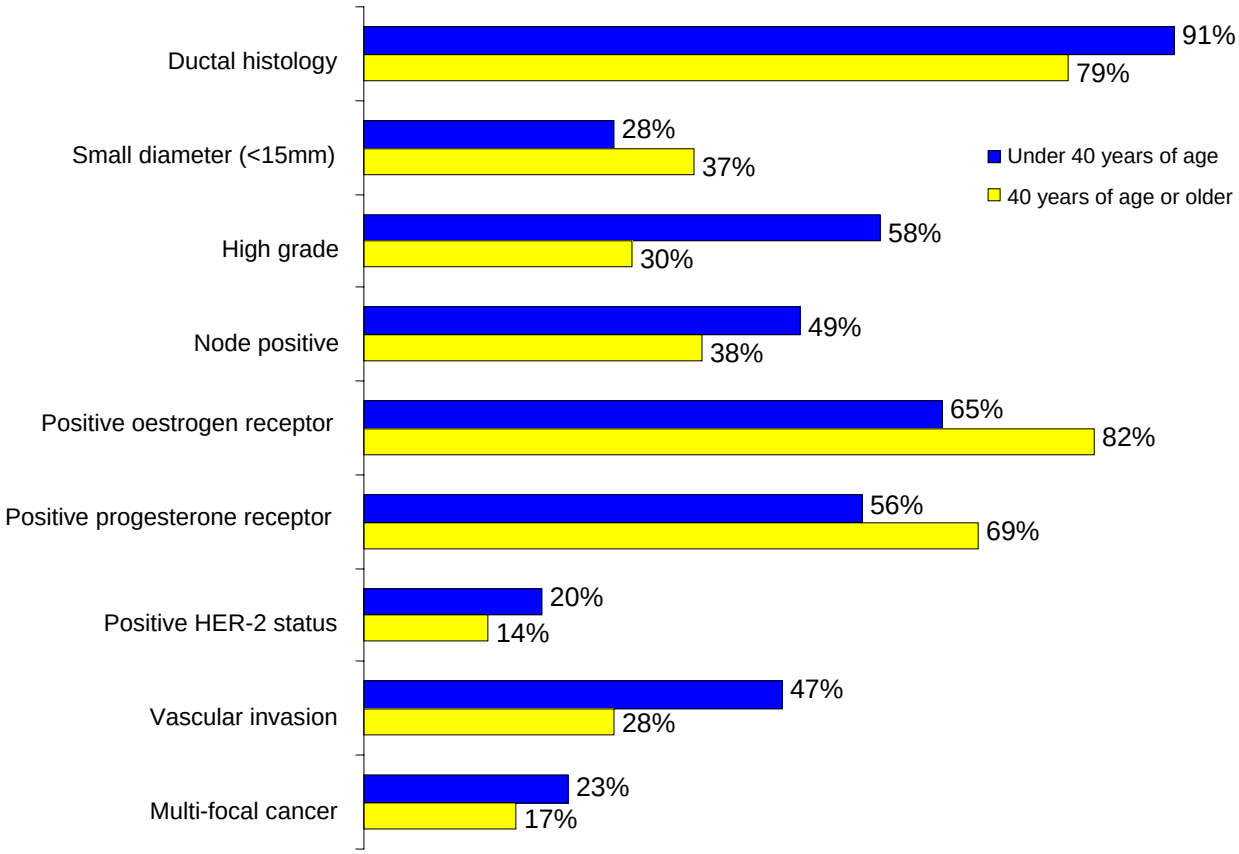
The treatment of women less than 40 years also was distinctive in that:

- 49% of surgical cases had a mastectomy compared with 38% of older women
- 79% had radiotherapy compared with 70% of older women
- 89% had chemotherapy compared with 47% of older women
- 9% had ovarian ablation, which although equivalent to the figure for 40-49 year olds, was higher than the 1% for older women
- 20% had immunotherapy compared with 9% of older women

By comparison, the proportion treated with aromatase inhibitor was lower in these younger (8%) than older women (43%).

Breast reconstruction was recorded for 20% of women less than 40 years of age who received a mastectomy, compared with a similar 19% of 40-49 year olds, 4% of 60-69 year olds, 2% of 70-79 year olds, and 0% of women aged 80 years or more. These would have been the more immediate reconstructions reported for periods following soon after treatment. They clearly were more common for younger than older women.

Figure 1: Characteristics of invasive breast cancers in women under 40 years of age at diagnosis compared with older women; NBCA, 2007 diagnoses



By treatment centre location

(Table 2)

In general, cancer profiles were very similar irrespective of treatment centre location, although there was the indication of a higher proportion of high-grade lesions oestrogen and progesterone receptor negative cancers treated in the more remote locations. The extent to which this reflects selective referral patterns is not known.

More pronounced differences were evident in clinical management in relation to the proportion of women having following:

- Sentinel node biopsy: The percentage was 65% for major city locations, 54% for inner regional and 47% for more remote locations
- Mastectomy: The percentage of surgical cases having a mastectomy as opposed to breast conserving surgery was 37% for major cities, 45% for inner regional and 54% for more remote locations
- Radiotherapy: The proportion receiving this care was highest for major cities (71%), lower for inner regional (67%) and lowest for more remote locations (60%)
- Tamoxifen: This treatment was more common in major cities (43%) than inner regional (35%) and more remote locations (34%)
- Aromatase inhibitor: More women treated in inner regional centres received this treatment (47%) than those treated in major cities (40%) or more remote locations (38%)
- Breast reconstruction: The proportion of women receiving a mastectomy who gained a breast reconstruction soon afterwards was higher in major cities (13%) than inner regional (5%) and more remote locations (2%).

By referral source

(Tables 3 & 4; Figure 2)

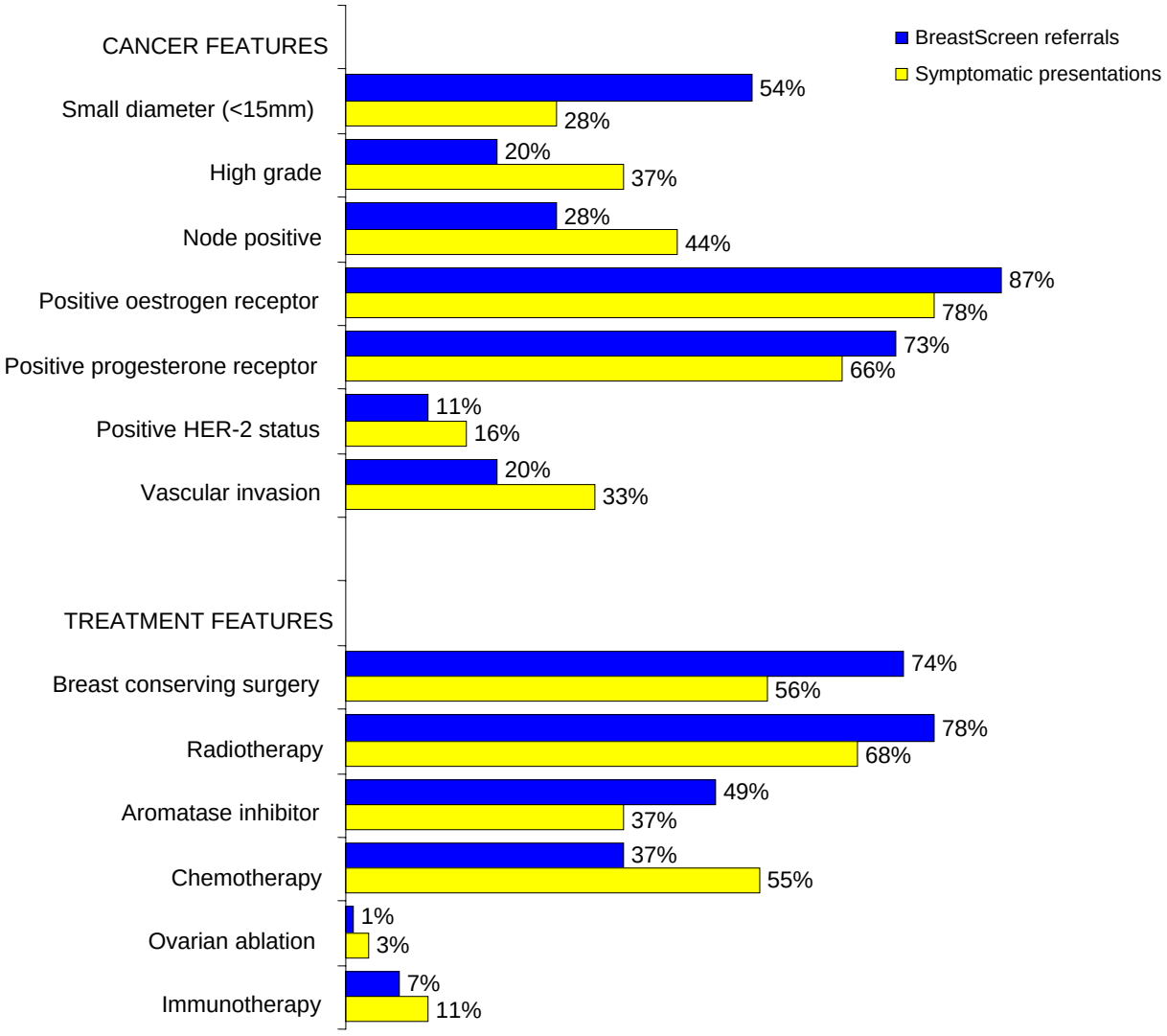
Cancer characteristics differed according to source of referral. Compared with symptomatic cases, BreastScreen referrals had a higher proportion of small diameters (<15mm) (54% Vs 28%) and fewer high grade (20% Vs 37%), node positive (28% Vs 44%), oestrogen receptor negative (13% Vs 22%), progesterone receptor negative (27% Vs 34%), HER-2 positive (11% Vs 16%), and lesions with evidence of vascular invasion (20% Vs 33%).

Multiple logistic regression analysis indicated that key predictors of BreastScreen referral as opposed to symptomatic referral were an age at diagnosis of 50-69 years or more, small diameters, low grade, node negativity, and multifocal cancers (>2 tumours). Also, there was the indication of a higher ratio of lobular to ductal cancers among BreastScreen than symptomatic referrals.

The ‘other’ category, which would have included cancers detected through de facto screening, also had a high proportion of small lesions (49%) and comparatively few showing node positivity (33%) and vascular invasion (22%). By comparison, they were more akin to symptomatic presentation with regard to grade and oestrogen receptor status.

Treatment characteristics also varied by referral source. Compared with symptomatic presentations, BreastScreen referrals were more likely to receive breast conserving surgery (74% Vs 56%), radiotherapy (78% Vs 68%), and treatment with aromatase inhibitor (49% Vs 37%), but less likely to have chemotherapy (37% Vs 55%), ovarian ablation (1% Vs 3%) or immunotherapy (7% Vs 11%).

Figure 2: Characteristics of invasive breast cancers and their clinical management according to whether referred from BreastScreen or symptomatic presentations; NBCA, 2007 diagnoses



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* In February 2008, National Breast Cancer Centre (NBCC) changed its name to National Breast and Ovarian Cancer Centre (NBOCC).

Table 1: Percentage distribution of female-breast cancer characteristics and management practices by age at diagnosis: NBCA, 2007 diagnoses

Female-breast cancer characteristics		Age at diagnosis (years)						P value *
		Under 40 [n=281]	40-49 [n=936]	50-59 [n=1,365]	60-69 [n=1,227]	70-79 [n=750]	80+ [n=420]	
Histology	Ductal [n=3,781]	91.4	83.9	81.2	80.3	71.5	74.3	KWp<0.001
	Lobular [n=504]	4.1	8.5	9.5	11.1	16.1	13.0	$X^2_{(10)}$p<0.001
	Other [n=439]	4.5	7.6	9.3	8.7	12.3	12.7	
	Sub-total [n=4,724]	100	100	100	100	100	100	
	Unknown [n=255]	[n=14]	[n=42]	[n=75]	[n=52]	[n=37]	[n=35]	
Diameter (mm)	Under 10 [n=817]	11.8	14.3	19.6	22.5	15.8	9.6	Sp p=0.896
	10-14 [n=908]	16.0	19.9	19.4	22.1	19.9	10.4	$X^2_{(25)}$p<0.001
	15-19 [n=884]	20.2	18.7	19.3	19.1	19.7	15.7	
	20-29 [n=1,041]	23.2	23.9	20.8	18.8	22.1	34.4	
	30-39 [n=494]	11.0	10.2	9.8	9.2	11.3	16.8	
	40+ [n=520]	17.9	13.0	10.6	8.2	11.2	13.1	
	Sub-total [n=4,664]	100	100	100	100	100	100	
	Unknown [n=315]	[n=18]	[n=53]	[n=91]	[n=65]	[n=43]	[n=45]	
Grade	Low [n=1,092]	10.2	18.2	25.1	28.1	26.2	22.5	Sp p<0.001
	Intermediate [n=2,067]	31.7	44.5	42.6	46.9	47.1	50.1	$X^2_{(10)}$p<.001
	High [n=1,465]	58.1	37.3	32.3	25.0	26.7	27.3	
	Sub-total [n=4,624]	100	100	100	100	100	100	
	Unknown [n=355]	[n=16]	[n=60]	[n=101]	[n=73]	[n=58]	[n=47]	
Nodal status	Negative [n=2,667]	51.4	53.3	62.0	67.4	65.4	62.2	MWp <0.001
	Positive [n=1,665]	48.6	46.7	38.0	32.6	34.6	37.8	$X^2_{(5)}$p<0.001
	Sub-total [n=4,332]	100	100	100	100	100	100	
	Unknown [n=647]	[n=24]	[n=94]	[n=138]	[n=137]	[n=109]	[n=145]	
Oestrogen receptor status	Positive [n=3,733]	65.4	81.4	81.2	80.9	84.6	84.8	MWp <0.001
	Negative [n=873]	34.6	18.6	18.8	19.1	15.4	15.2	$X^2_{(5)}$p<0.001
	Sub-total [n=4,606]	100	100	100	100	100	100	
	Unknown [n=373]	[n=18]	[n=64]	[n=102]	[n=77]	[n=67]	[n=45]	
Progesterone receptor status	Positive [n=3,144]	56.2	74.7	67.6	66.3	69.7	66.8	MWp =0.508
	Negative [n=1,464]	43.8	25.3	32.4	33.7	30.3	33.2	$X^2_{(5)}$p<0.001
	Sub-total [n=4,608]	100	100	100	100	100	100	
	Unknown [n=371]	[n=16]	[n=62]	[n=105]	[n=79]	[n=63]	[n=46]	
HER-2 status	Positive [n=595]	20.2	17.0	16.4	11.9	10.6	9.5	MWp <0.001
	Negative [n=3,593]	79.8	83.0	83.6	88.1	89.4	90.5	$X^2_{(5)}$p<0.001
	Sub-total [n=4,188]	100	100	100	100	100	100	
	Unknown [n=791]	[n=39]	[n=135]	[n=228]	[n=188]	[n=128]	[n=73]	
Vascular/ lymphatic invasion	Positive [n=1,281]	46.5	35.0	28.3	23.6	23.2	27.8	MWp <0.001
	Negative [n=3,195]	53.5	65.0	71.7	76.4	76.8	72.2	$X^2_{(5)}$p<0.001
	Sub-total [n=4,476]	100	100	100	100	100	100	
	Unknown [n=503]	[n=27]	[n=90]	[n=136]	[n=109]	[n=70]	[n=71]	
Extensive in-situ component	Positive [n=918]	32.6	32.7	23.8	20.5	18.6	12.7	MWp <0.001
	Negative [n=2,985]	67.4	67.3	76.2	79.5	81.4	87.3	$X^2_{(5)}$p<0.001
	Sub-total [n=3,903]	100	100	100	100	100	100	
	Unknown [n=1,076]	[n=57]	[n=195]	[n=295]	[n=262]	[n=153]	[n=114]	

Female-breast cancer characteristics		Age at diagnosis (years)						P value *
		Under 40 [n=281]	40-49 [n=936]	50-59 [n=1,365]	60-69 [n=1,227]	70-79 [n=750]	80+ [n=420]	
Laterality	Left [n=2,493]	49.8	50.3	53.1	51.0	50.1	52.0	MW p=1.000
	Right [n=2,365]	50.2	49.7	46.9	49.0	49.9	48.0	$X^2_{(5)}$p=0.719
	Sub-total [n=4,858]	100	100	100	100	100	100	
	Unknown [n=121]	[n=10]	[n=31]	[n=26]	[n=32]	[n=12]	[n=10]	
Number of invasive cancers	1 [n=3,806]	77.3	75.5	83.1	84.4	85.6	87.2	Sp p<0.001
	2 [n=376]	7.4	9.4	7.8	8.2	8.0	7.2	$X^2_{(10)}$p<0.001
	3+ [n=437]	15.2	15.1	9.1	7.5	6.4	5.6	
	Sub-total [n=4,619]	100	100	100	100	100	100	
	Unknown [n=360]	[n=25]	[n=70]	[n=96]	[n=74]	[n=51]	[n=44]	
Sentinel node biopsy reported	Yes [n=3,052]	56.9	62.9	66.4	67.7	56.0	34.5	MWp<0.001
	No [n=1,927]	43.1	37.1	33.6	32.3	44.0	65.5	$X^2_{(5)}$p<0.001
	Total [n=4,979]	100	100	100	100	100	100	
Surgery	Breast conserving [n=2,896]	50.6	56.2	64.7	66.7	59.3	56.7	MWp =0.027
	Mastectomy [n=1,823]	49.4	43.8	35.3	33.3	40.7	43.3	$X^2_{(5)}$p<0.001
	Sub-total [n=4,719]	100	100	100	100	100	100	
	Any surgery [n=4,719]	100	99.9	99.8	99.7	99.2	94.5	MWp <0.001
	No surgery [n=35]	0	0.1	0.2	0.3	0.8	5.5	$X^2_{(LR)}$p<0.001
	Sub-total [n=4,754]	100	100	100	100	100	100	
	Unknown [n=225]	[n=14]	[n=44]	[n=53]	[n=43]	[n=32]	[n=39]	
Radiotherapy	Yes [n=3,159]	78.6	75.4	76.2	75.7	60.7	33.5	MWp <0.001
	No [n=1,333]	21.4	24.6	23.8	24.3	39.3	66.5	$X^2_{(5)}$p<0.001
	Sub-total [n=4,492]	100	100	100	100	100	100	
	Not yet [n=111]	[n=7]	[n=15]	[n=37]	[n=17]	[n=21]	[n=14]	
	Unknown [n=376]	[n=26]	[n=59]	[n=108]	[n=78]	[n=60]	[n=45]	
Chemotherapy	Yes [n=2,177]	88.8	75.7	58.0	40.5	21.2	6.4	MWp <0.001
	No [n=2,253]	11.2	24.3	42.0	59.5	78.8	93.6	$X^2_{(5)}$p<0.001
	Sub-total [n=4,430]	100	100	100	100	100	100	
	Not yet [n=92]	[n=4]	[n=8]	[n=27]	[n=20]	[n=27]	[n=6]	
	Unknown [n=457]	[n=27]	[n=77]	[n=129]	[n=95]	[n=77]	[n=52]	
Tamoxifen	Yes [n=1,692]	57.4	65.1	35.4	29.4	34.3	42.7	MWp <0.001
	No [n=2,437]	42.6	34.9	64.6	70.6	65.7	57.3	$X^2_{(5)}$p<0.001
	Sub-total [n=4,129]	100	100	100	100	100	100	
	Not yet [n=220]	[n=15]	[n=61]	[n=61]	[n=38]	[n=35]	[n=10]	
	Unknown [n=630]	[n=43]	[n=119]	[n=181]	[n=152]	[n=86]	[n=49]	
Ovarian ablation	Yes [n=114]	9.2	8.6	1.5	0.6	0.8	0.6	MWp <0.001
	No [n=4,000]	90.8	91.4	98.5	99.4	99.2	99.4	$X^2_{(LR)}$p<0.001
	Sub-total [n=4,114]	100	100	100	100	100	100	
	Not yet [n=98]	[n=36]	[n=25]	[n=7]	[n=10]	[n=2]	[n=18]	
	Unknown [n=767]	[n=56]	[n=145]	[n=224]	[n=181]	[n=102]	[n=59]	
Aromatase inhibitor	Yes [n=1,643]	7.5	19.3	43.7	54.2	51.1	40.6	MWp <0.001
	No [n=2,379]	92.5	80.7	56.3	45.8	48.9	59.4	$X^2_{(5)}$p<0.001
	Sub-total [n=4,022]	100	100	100	100	100	100	
	Not yet [n=295]	[n=13]	[n=66]	[n=84]	[n=55]	[n=58]	[n=19]	
	Unknown [662]	[n=54]	[n=139]	[n=191]	[n=146]	[n=83]	[n=49]	

Female-breast cancer characteristics		Age at diagnosis (years)						P value *
		Under 40 [n=281]	40-49 [n=936]	50-59 [n=1,365]	60-69 [n=1,227]	70-79 [n=750]	80+ [n=420]	
Immunotherapy	Yes [n=376]	19.5	13.9	12.1	7.3	5.1	1.2	MWp <0.001
	No [n=3,535]	80.5	86.1	87.9	92.7	94.9	98.8	$X^2_{(LR)}$p<0.001
	Sub-total [n=3,911]	100	100	100	100	100	100	
	Not yet [n=132]	[n=8]	[n=27]	[n=43]	[n=24]	[n=6]	[n=8]	
	Unknown [n=936]	[n=58]	[n=183]	[n=270]	[n=234]	[n=120]	[n=71]	
Reconstruction	All cases:							MW p<0.001
recorded	Yes [n=171]	9.3	7.9	3.7	1.2	0.7	0	$X^2_{(LR)}$p<0.001
	No [n=4,808]	90.7	92.1	96.3	98.8	99.3	100	
	Total [n=4,979]	100	100	100	100	100	100	
	Mastectomy cases:							MW p<0.001
	Yes [n=171]	19.7	19.0	11.0	3.8	1.7	0	$X^2_{(LR)}$p<0.001
	No [n=1,652]	80.3	81.0	89.0	96.2	98.3	100	
	Total [n=1,823]	100	100	100	100	100	100	

* MW = Mann-Whitney; KW = Kruskal-Wallis: Sp = Spearman; $X^2_{(df)}$ = Pearson chi-square; $X^2_{(LR)}$ =Likelihood-ratio chi-square

Table 2: Percentage distribution of female-breast cancer characteristics and management practices by location of treatment centre: NBCA, 2007 diagnoses

Female-breast cancer characteristics		Treatment centre location			P value *
		Major cities [n=3,317]	Inner regional [n=828]	More remote [n=192]	
Histology	Ductal [n=3,341]	80.5	79.6	77.2	$X^2_{(4)}$p=0.393
	Lobular [n=435]	10.6	9.7	11.7	
	Other [n=390]	8.9	10.8	11.1	
	Sub-total [n=4,166]	100	100	100	
	Unknown [n=171]	[n=138]	[n=21]	[n=12]	
Diameter (mm)	Under 10 [n=728]	18.0	16.4	17.8	KW p=0.261
	10-14 [n=813]	19.3	21.9	16.7	$X^2_{(10)}$p=0.033
	15-19 [n=781]	19.1	18.3	18.4	
	20-29 [n=929]	22.8	22.4	18.4	
	30-39 [n=420]	10.3	10.0	8.6	
	40+ [n=454]	10.5	11.0	20.1	
	Sub-total [n=4,125]	100	100	100	
	Unknown [n=212]	[n=164]	[n=30]	[n=18]	
Grade	Low [n=951]	22.6	26.8	19.9	KW p=0.038
	Intermediate [n=1,838]	45.8	42.5	41.5	$X^2_{(4)}$p=<0.031
	High [n=1,296]	31.6	30.6	38.6	
	Sub-total [n=4,085]	100	100	100	
	Unknown [n=252]	[n=193]	[n=380]	[n=21]	
Nodal status	Negative [n=2,355]	61.7	61.7	60.0	$X^2_{(2)}$p=0.909
	Positive [n=1,464]	38.3	38.3	40.0	
	Sub-total [n=3,819]	100	100	100	
	Unknown [n=518]	[n=397]	[n=84]	[n=37]	
Oestrogen receptor status	Positive [n=3,301]	81.8	78.2	74.1	$X^2_{(2)}$p=0.005
	Negative [n=785]	18.2	21.8	25.9	
	Sub-total [n=4,086]	100	100	100	
	Unknown [n=251]	[n=189]	[n=40]	[n=22]	
Progesterone receptor status	Positive [n=2,783]	69.0	66.4	61.3	$X^2_{(2)}$p=0.058
	Negative [n=1,300]	31.0	33.6	38.7	
	Sub-total [n=4,083]	100	100	100	
	Unknown [n=254]	[n=194]	[n=36]	[n=24]	
HER-2 status	Positive [n=529]	14.5	12.2	17.3	$X^2_{(2)}$p=0.135
	Negative [n=3,201]	85.5	87.8	82.7	
	Sub-total [n=3,730]	100	100	100	
	Unknown [n=607]	[n=503]	[n=74]	[n=30]	
Vascular/ lymphatic invasion	Positive [n=1,140]	29.2	26.9	31.9	$X^2_{(2)}$p=0.320
	Negative [n=2,813]	70.8	73.1	68.1	
	Sub-total [n=3,953]	100	100	100	
	Unknown [384]	[n=295]	[n=63]	[n=26]	
Extensive in-situ component	Positive [n=823]	24.2	21.3	21.3	$X^2_{(2)}$p=0.213
	Negative [n=2,684]	75.8	78.7	78.8	
	Sub-total [n=3,507]	100	100	100	
	Unknown [n=830]	[n=684]	[n=114]	[n=32]	

Female-breast cancer characteristics		Treatment centre location			P value *
		Major cities [n=3,317]	Inner regional [n=828]	More remote [n=192]	
Laterality	Left [n=2,188]	52.1	50.9	46.3	$X^2_{(2)}$p=0.266
	Right [n=2,052]	47.9	49.1	53.7	
	Sub-total [n=4,240]	100	100	100	
	Unknown [n=97]	[n=87]	[n=6]	[n=4]	
Number of invasive cancers	1 [n=3,355]	81.8	84.2	83.1	KW p=0.218
	2 [n=335]	8.2	8.3	8.1	$X^2_{(4)}$p=0.325
	3+ [n=385]	10.0	7.5	8.7	
	Sub-total [n=4,075]	100	100	100	
	Unknown [n=262]	[n=212]	[n=30]	[n=20]	
Sentinel node biopsy reported	Yes [n=2,682]	64.7	54.0	46.9	$X^2_{(2)}$p<0.001
	No [n=1,655]	35.3	46.0	53.1	
	Total [n=4,337]	100	100	100	
Surgery	Breast conserving [n=2,525]	63.3	55.3	45.6	$X^2_{(2)}$p<0.001
	Mastectomy [n=1,615]	36.7	44.7	54.4	
	Sub-total [n=4,140]	100	100	100	
	Any surgery [n=4,140]	99.4	99.9	98.4	$X^2_{(LR)}$p=0.037
	No surgery [n=23]	0.6	0.1	1.6	
	Sub-total [n=4,163]	100	100	100	
	Unknown [n=174]	[n=139]	[n=26]	[n=9]	
Radiotherapy	Yes [n=2,810]	71.1	67.3	60.2	$X^2_{(2)}$p=0.003
	No [n=1,208]	28.9	32.7	39.8	
	Sub-total [n=4,018]	100	100	100	
	Not yet [n=98]	[61]	[27]	[10]	
	Unknown [n=221]	[n=157]	[n=48]	[n=16]	
Chemotherapy	Yes [n=1,914]	48.9	46.0	48.5	$X^2_{(2)}$p=0.342
	No [n=2,047]	51.1	54.0	51.5	
	Sub-total [n=3,961]	100	100	100	
	Not yet [n=83]	[58]	[18]	[7]	
	Unknown [n=293]	[n=227]	[n=44]	[n=22]	
Tamoxifen	Yes [n=1,511]	42.6	35.4	34.4	$X^2_{(2)}$p=0.001
	No [n=2,184]	57.4	64.6	65.6	
	Sub-total [n=3,695]	100	100	100	
	Not yet [n=194]	[144]	[37]	[13]	
	Unknown [n=448]	[n=325]	[n=98]	[n=25]	
Ovarian ablation	Yes [n=108]	3.0	2.9	2.5	$X^2_{(2)}$p=0.953
	No [n=3,587]	97.0	97.1	97.5	
	Sub-total [n=3,695]	100	100	100	
	Not yet [n=94]	[76]	[12]	[6]	
	Unknown [n=548]	[n=395]	[n=125]	[n=28]	

Female-breast cancer characteristics		Treatment centre location			P value *
		Major cities [n=3,317]	Inner regional [n=828]	More remote [n=192]	
Aromatase inhibitor	Yes [n=1,484]	39.8	46.8	37.5	$X^2_{(2)}$p=0.003
	No [n=2,136]	60.2	53.2	62.5	
	Sub-total [n=3,620]	100	100	100	
	Not yet [n=264]	[195]	[57]	[12]	
	Unknown [453]	[n=329]	[n=96]	[n=28]	
Immunotherapy	Yes [n=346]	10.0	8.6	11.8	$X^2_{(2)}$p=0.362
	No [n=3,181]	90.0	91.4	88.2	
	Sub-total [n=3,527]	100	100	100	
	Not yet [n=120]	[95]	[15]	[10]	
	Unknown [n=690]	[n=555]	[n=114]	[n=21]	
Reconstruction recorded	All cases:				$X^2_{(2)}$p<0.001
	Yes [n=167]	4.5	1.9	1.0	
	No [n=4,170]	95.5	98.1	99.0	
	Total [n=4,337]	100	100	100	
	Mastectomy cases:				$X^2_{(2)}$p<0.001
	Yes [n=167]	13.0	4.5	2.0	
	No [n=1,605]	87.0	95.5	98.0	
	Total [n=1,772]	100	100	100	

* KW = Kruskal-Wallis: Sp = Spearman; $X^2_{(df)}$ = Pearson chi-square; $X^2_{(LR)}$ =Likelihood-ratio chi-square

Table 3: Percentage distribution of female-breast cancer characteristics and management practices by referral source: NBCA, 2007 diagnoses

Female-breast cancer characteristics		Referral source			P value *
		BreastScreen [n=1,341]	Symptomatic presentation [n=2,956]	Other [n=308]	
Histology	Ductal [n=3,488]	78.6	79.8	83.4	$X^2_{(4)}$p=0.461
	Lobular [n=473]	11.4	10.7	9.0	
	Other [n=415]	10.1	9.4	7.6	
	Sub-total [n=4,376]	100	100	100	
	Unknown [n=229]	[n=49]	[n=162]	[n=18]	
Diameter (mm)	Under 10 [n=753]	28.0	11.7	24.6	KW p=0.001
	10-14 [n=838]	26.0	15.8	24.3	$X^2_{(10)}$p<0.001
	15-19 [n=825]	18.5	19.2	20.8	
	20-29 [n=965]	17.0	25.8	13.0	
	30-39 [n=445]	5.0	13.1	7.0	
	40+ [n=493]	5.5	14.3	10.2	
	Sub-total [n=4,319]	100	100	100	
	Unknown [n=286]	[n=55]	[n=207]	[n=24]	
Grade	Low [n=1,004]	35.1	18.6	18.4	KW p<0.001
	Intermediate [n=1,922]	45.3	44.1	50.3	$X^2_{(4)}$p<0.001
	High [n=1,356]	19.5	37.3	31.3	
	Sub-total [n=4,282]	100	100	100	
	Unknown [n=323]	[n=77]	[n=226]	[n=20]	
Nodal status	Negative [n=2,481]	72.5	56.2	67.3	$X^2_{(2)}$p<0.001
	Positive [n=1,534]	27.5	43.8	32.7	
	Sub-total [n=4,015]	100	100	100	
	Unknown [n=590]	[n=110]	[n=398]	[n=82]	
Oestrogen receptor status	Positive [n=3,451]	87.1	78.3	76.2	$X^2_{(2)}$p<0.001
	Negative [n=822]	12.9	21.7	23.8	
	Sub-total [n=4,273]	100	100	100	
	Unknown [n=332]	[n=69]	[n=241]	[n=22]	
Progesterone receptor status	Positive [n=2,903]	73.5	66.0	61.7	$X^2_{(2)}$p<0.001
	Negative [n=1,372]	26.5	34.0	38.3	
	Sub-total [n=4,275]	100	100	100	
	Unknown [n=330]	[n=70]	[n=239]	[n=21]	
HER-2 status	Positive [n=550]	11.0	15.5	12.7	$X^2_{(2)}$p<0.001
	Negative [n=3,390]	89.0	84.5	87.3	
	Sub-total [n=3,940]	100	100	100	
	Unknown [n=665]	[n=147]	[n=469]	[n=49]	
Vascular/ lymphatic invasion	Positive [n=1,187]	20.3	33.2	22.0	$X^2_{(2)}$p<0.001
	Negative [n=2,959]	79.7	66.8	78.0	
	Sub-total [n=4,146]	100	100	100	
	Unknown [n=459]	[n=96]	[n=323]	[n=40]	

Female-breast cancer characteristics		Referral source			P value *
		BreastScreen [n=1,341]	Symptomatic presentation [n=2,956]	Other [n=308]	
Extensive In-situ Component	Positive [n=861]	23.2	24.0	19.6	$X^2_{(2)}$p=0.333
	Negative [n=2,809]	76.8	76.0	80.4	
	Sub-total [n=3,670]	100	100	100	
	Unknown [n=935]	[n=232]	[n=619]	[n=84]	
Laterality	Left [n=2,300]	51.6	50.4	53.6	$X^2_{(2)}$p=0.525
	Right [n=2,212]	48.4	49.6	46.4	
	Sub-total [n=4,512]	100	100	100	
	Unknown [n=93]	[n=24]	[n=56]	[n=13]	
Number of invasive cancers	1 [n=3,529]	83.2	82.1	84.5	KW p=0.441
	2 [n=356]	8.7	8.4	6.3	$X^2_{(2)}$p=0.404
	3+ [n=389]	8.1	9.6	9.2	
	Sub-total [n=4,274]	100	100	100	
	Unknown [n=331]	[n=65]	[n=229]	[n=37]	
Sentinel node biopsy reported	Yes [n=2,808]	73.2	56.3	52.3	$X^2_{(2)}$p<0.001
	No [n=1,797]	26.8	43.7	47.7	
	Total [n=4,605]	100	100	100	
Surgery	Breast conserving [n=2,685]	73.5	56.0	60.6	$X^2_{(2)}$p<0.001
	Mastectomy [n=1,680]	26.5	44.0	39.4	
	Sub-total [n=4,365]	100	100	100	
	Any surgery [n=4,365]	100	98.9	99.3	$X^2_{(LR)}$p=0.001
	No surgery [n=33]	0	1.1	0.7	
	Sub-total [n=4,398]	100	100	100	
	Unknown	[n=40]	[n=140]	[n=27]	
Radiotherapy	Yes [n=2,930]	78.2	68.1	59.5	$X^2_{(2)}$p<0.001
	No [n=1,225]	21.8	31.9	40.5	
	Sub-total [n=4,155]	100	100	100	
	Not yet [n=110]	[n=21]	[n=82]	[n=7]	
	Unknown [n=340]	[n=83]	[n=230]	[n=27]	
Chemotherapy	Yes [n=2,010]	37.0	54.6	47.6	$X^2_{(2)}$p<0.001
	No [n=2,093]	63.0	45.4	52.4	
	Sub-total [n=4,103]	100	100	100	
	Not yet [n=88]	[n=32]	[53]	[n=3]	
	Unknown [n=414]	[n=113]	[n=271]	[n=30]	
Tamoxifen	Yes [n=1,539]	37.1	41.9	38.5	$X^2_{(2)}$p=0.021
	No [n=2,284]	62.9	58.1	61.5	
	Sub-total [n=3,823]	100	100	100	
	Not yet [n=213]	[n=48]	[n=153]	[n=12]	
	Unknown [n=569]	[n=146]	[n=379]	[n=44]	

Female-breast cancer characteristics		Referral source			P value *
		BreastScreen [n=1,341]	Symptomatic presentation [n=2,956]	Other [n=308]	
Ovarian ablation	Yes [n=106]	1.4	3.4	3.2	$X^2_{(2)}$p=0.004
	No [n=3,712]	98.6	96.6	96.8	
	Sub-total [n=3,818]	100	100	100	
	Not yet [n=91]	[n=19]	[n=66]	[n=6]	
	Unknown [n=696]	[n=187]	[n=457]	[n=52]	
Aromatase inhibitor	Yes [n=1,514]	48.7	37.0	40.8	$X^2_{(2)}$p<0.001
	No [n=2,206]	51.3	63.0	59.2	
	Sub-total [n=3,720]	100	100	100	
	Not yet [n=277]	[n=82]	[n=178]	[n=17]	
	Unknown [608]	[n=157]	[n=398]	[n=53]	
Immunotherapy	Yes [n=358]	6.8	11.0	7.6	$X^2_{(2)}$p<0.001
	No [n=3,391]	93.2	89.0	92.4	
	Sub-total [n=3,749]	100	100	100	
	Not yet [n=124]	[n=27]	[n=91]	[n=6]	
	Unknown [n=732]	[n=188]	[n=491]	[n=53]	
Reconstruction recorded	All cases:				$X^2_{(2)}$p=0.011
	Yes [n=161]	2.2	4.1	3.6	
	No [n=4,444]	97.8	95.9	96.4	
	Total [n=4,605]	100	100	100	
	Mastectomy cases:				$X^2_{(2)}$p=0.798
	Yes [n=161]	8.7	9.9	10.3	
	No [n=1,519]	91.3	90.1	89.7	
	Total [n=1,680]	100	100	100	

* KW = Kruskal-Wallis: Sp = Spearman; $X^2_{(df)}$ = Pearson chi-square; $X^2_{(LR)}$= Likelihood-ratio chi-square

Table 4: Relative odds (95% confidence limits) of BreastScreen referral compared with symptomatic presentation: NBCA, 2007 diagnoses

– Logistic regression analysis –

	Relative odds
Histology:	
Ductal (reference) [n=3,247]	1.00
Lobular [n=446]	1.30 [1.01, 1.66]
Other [n=590]	1.00 [0.79, 1.27]
Unknown [n=15]	0.34 [0.07, 1.61]
Size (mm):	
Under 10 (reference) [n=685]	1.00
10-14 [n=769]	0.75 [0.60, 0.95]
15-19 [n=768]	0.47 [0.37, 0.59]
20-29 [n=928]	0.36 [0.29, 0.46]
30-39 [n=423]	0.21 [0.15, 0.29]
40+ [n=464]	0.22 [0.16, 0.31]
Unknown [n=261]	0.41 [0.24, 0.71]
Grade:	
Low (reference) [n=951]	1.00
Intermediate [n=1,779]	0.71 [0.59, 0.85]
High [n=1,266]	0.51 [0.40, 0.65]
Unknown [n=302]	1.01 [0.65, 1.58]
Nodal involvement:	
No (reference) [n=2,418]	1.00
Yes [n=1,460]	0.80 [0.67, 0.96]
Unknown [n=420]	0.53 [0.38, 0.74]
Vascular/lymphatic invasion:	
No (reference) [n=2,750]	1.00
Yes [n=1,128]	0.95 [0.78, 1.15]
Unknown [n=420]	0.84 [0.59, 1.18]
Oestrogen receptor status:	
Positive (reference) [n=3,235]	1.00
Negative [n=754]	0.80 [0.63, 1.01]
Unknown [n=309]	1.19 [0.76, 1.85]
HER-2 receptor status:	
Positive (reference) [n=519]	1.00
Negative [n=3,165]	0.98 [0.77, 1.26]
Unknown [n=614]	0.55 [0.39, 0.78]
Tumour numbers:	
One (reference) [n=3,299]	1.00
Two [n=340]	1.16 [0.89, 1.51]
Three [n=365]	1.31 [1.00, 1.72]
Unknown [n=294]	1.15 [0.70, 1.91]
Laterality:	
Left (reference) [n=2,140]	1.00
Right [n=2,078]	0.97 [0.84, 1.12]
Unknown [n=80]	1.05 [0.59, 1.88]
Age at diagnosis (years):	
Under 50 (reference) [n=1,050]	1.00
50-69 [n=2,225]	5.47 [4.43, 6.76]
70+ [n=1023]	1.98 [1.54, 2.54]