BREAST CANCER TREATMENT GROUP

QUALITY ASSURANCE PROJECT Ten-year report
July 1997–June 2007
Gathering of the ACT and SE NSW Breast Cancer Treatment Group at one of the 2008 meetings
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Foreword

In the era of evidence-based medicine, the collection and analysis of clinical data provide the framework to determine what constitutes best practice.

In the ACT and SE NSW region, we are very fortunate that a dedicated group of clinicians, supported by generous assistance from ACT Health, have diligently kept a complete prospective audit of breast cancer patients treated over a 10-year period.

Analysis of these data demonstrates that breast cancer treatment in the region meets best practice guidelines and that patient outcomes are excellent. The ongoing study demonstrates the importance of having the ability to measure and evaluate clinical decision-making. It is hoped that this important work will continue to be supported and that similar studies might be encouraged in other areas of medical practice.

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Acting Chief Executive
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Dr Maggie Jamieson
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Greater Southern Area Health Service
Acknowledgements

This 10-year report has been prepared by Carolyn Cho, John Buckingham, Paul Craft, Ian Clark, Jane Dahlstrom, George Jacob, Jeremy Price, Angela Rezo and Robin Stuart-Harris on behalf of the ACT & SE NSW Breast Cancer Treatment Group (BCTG). The BCTG Quality Assurance Project team, Yanping Zhang and Robyn A Bradley, would like to thank the authors as well as the Breast Cancer Treatment Group Data Management Sub-Committee for reviewing the draft.

This report was produced as part of the BCTG Quality Assurance Project which was funded for the first twelve months by the Commonwealth Department of Health and Aged Care Cancer Screening Unit, with ongoing funding by ACT Health.

Special thanks to go Bosom Buddies, a non-profit, volunteer organisation which supports breast cancer patients and their supporters in Canberra. Their generous contribution and ongoing support to the Project is much appreciated.

This report would not have been possible without the voluntary provision of data by participants who consent for their data to be collected and by all the participating clinicians and general practitioners in the ACT and SE NSW. All clinicians also contribute their time voluntarily to this project. In addition, the Registries of Births, Deaths and Marriages in the ACT and NSW have provided valuable assistance with information about patients’ outcomes.

The contribution of Breastscreen ACT and SE NSW, ACT Pathology and Capital Pathology is also greatly appreciated. Thanks are extended to the secretaries, medical reception staff, registered practice nurses, and breast care nurses in breast cancer treatment clinics who assisted with follow-up and data collection over the past 10 years. A special thank you to the Canberra Hospital Radiation Oncology Private Practice Fund for their generous funding of this publication.

Finally, the authors are grateful to the Cancer Statistics Unit, The Cancer Council South Australia who performed the outcome data analysis.
Key participating clinicians

Below is a list of the clinicians who signed an agreement to participate in the BCTG Quality Assurance Project, from 1997 to present.

The voluntary contribution of these clinicians in the ACT and SE NSW regions to the Quality Assurance Project is acknowledged below:

**Surgeons:**

**Canberra, ACT**
- Peter Barry (since 2002)
- John Buckingham
- Carolyn Cho (since 2003)
- Guan Chong
- Ian Davis
- Dennis Dyason (until 2001)
- Molham Hassan
- Donald MacLellan (until 1998)
- Diarmid McKeown (until 1998)
- John Stuchbery (until 1998)
- Noel Tait (until 2007)
- Hanh Tran (until 2003)

**Bega, NSW**
- Allen-John Collins (since 2001)
- Robert Hartemink
- Andrew Thomson

**Goulburn, NSW**
- Margaret Beevors
- Jarvis Hayman (until 1998)
- Tom Lyttle

**Moruya, NSW**
- Peter Gough (until 2000)
- John Groome (until 2001)
- Sanjay Singh (since 2004)
- David Thomson (until 2001)

**Medical Oncologists:**

**Canberra, ACT**
- William Coupland (until 1999)
- Paul Craft
- Alison Davis (since 2002)
- David Leong
- Richard Pembrey (until 1998)
- Robin Stuart-Harris (since 1998)
- Desmond Yip (since 2002)
- Nicole Gorddard (since 2005)

**Radiation Oncologists:**

**Canberra, ACT**
- Lyn Austen (since 2003)
- Hany Elsaleh (since 2006)
- George Jacob
- Michael McKay (since 2008)
- Angela Rezo (since 2006)
- Lisa Sullivan (since 2009)
- Ken Sunderland
- Deborah Thornton (until 2003)
Executive summary

The following document is a comprehensive report on the treatment of invasive breast cancer and ductal carcinoma in situ (DCIS) in the Australian Capital Territory (ACT) and South Eastern New South Wales (SE NSW) over the 10-year period between 1997–2007. Data from the Australian cancer registries indicate that while the incidence of breast cancer in women is increasing, mortality is decreasing. The ACT has the highest age-standardised incidence of breast cancer in Australia, with approximately 200 new cases of breast cancer diagnosed per year in women, and 1 new case per year in men.

The ACT and SE NSW Breast Cancer Treatment Group (BCTG) was established in 1995 and developed the Breast Cancer Treatment Quality Assurance Project. The broad aim of this project was to monitor the treatment of breast cancer and DCIS in the ACT and SE NSW region and these data have been collected since May 1997. This has required voluntary participation by breast cancer clinicians and patients and has resulted in a comprehensive 10-year dataset which is presented in this report. The data collected by the Project has been used to monitor concordance with clinical practice guidelines to improve patient outcomes, to provide confidential feedback to individual clinicians and to collaborate with other groups such as the National Breast Cancer Audit (NBCA). It has resulted in several publications which are listed in Appendix 1, including a five-year report of the data1.

During the 10-year period, 37 clinicians participated in the Project and a total of 3,035 patients were notified to the Project between 1 July 1997 and 30 June 2007. Of these patients, 2,911 were included in the study and 124 patients were excluded from the study for various reasons. After correlation with ACT Cancer Registry figures, the participation rate of patients in the study was approximately 96%, which is remarkably high for a voluntary study.

Of all invasive breast cancers, 38% were detected through BreastScreen Australia or by private screening, while DCIS was also more often detected by a screening program than by other means. The use of stereotactic vacuum-assisted biopsy and magnetic resonance imaging (MRI) in the diagnosis of breast malignancy increased during the 10 years. Screen-detected malignancies were more likely to be smaller, to have fewer lymph nodes involved and to be treated by breast-conserving surgery rather than mastectomy.

The proportion of patients undergoing mastectomy and breast-conserving surgery was relatively stable over the 10-year period. Of all surgical patients, 77% required only one operation. Patients needing further surgery were more likely to require a mastectomy. Sentinel lymph node biopsy has been performed with increasing frequency as well as breast reconstruction, to a lesser degree. The use of adjuvant radiotherapy after breast-conserving surgery or mastectomy has increased slightly over time and falls well within current guidelines. Adjuvant chemotherapy regimens and endocrine treatments have changed significantly within the study period, in particular with the introduction of trastuzumab and aromatase inhibitors.
As data have accrued during the study period, we have been able to analyse particular subgroups, including males with breast cancer, women with bilateral (synchronous or metachronous) tumours, patients with distant metastases at presentation and those with pure DCIS. Most importantly, with up to 10 years of follow-up available, it has been possible to analyse data in relation to breast cancer survival. This analysis indicates that breast cancer outcomes in the ACT are excellent, both in terms of disease-free survival and overall mortality from breast cancer. Nine-year analysis of the data indicates that over 80% of patients in the Project are alive and disease free, with 3.4% alive with recurrence and 7.3% who have died due to breast cancer. This compares extremely favourably with international and national figures on breast cancer outcomes.

Conclusions

The 10-year report produced by the BCTG demonstrates the feasibility of collecting comprehensive data (by voluntary participation of clinicians and patients) on the treatment of breast cancer from a single region of Australia. The Project has been able to demonstrate high compliance with Australian and international guidelines on the treatment of breast cancer. Due to the high participation rate and ongoing data collection, the Project will continue to provide significant information on long-term patient outcomes from the ACT and surrounding NSW region.
1 Introduction

Breast cancer is the most common reportable cancer in Australian women, followed by colorectal cancer and melanoma, and is the second most common cause of cancer-related death after lung cancer. The incidence of breast cancer is increasing and at present, 1 in 9 women will develop breast cancer by the age of 85 years. The average age at diagnosis in females is 60 years, but 26% of new breast cancers occur in women younger than 50 years, 49% occur in women aged 50–69 years and 25% in women 70 years or older.

Male breast cancer accounts for 1% of all breast cancers, with approximately 100 new cases being diagnosed each year in Australia. The average age at diagnosis in males is 68 years. Although the mortality from breast cancer in women is decreasing, there has been no significant change in mortality from breast cancer in males.

The Australian Capital Territory (ACT) has the highest age-standardised incidence of female breast cancer in Australia at 129.2 cases per 100,000 females, followed by Tasmania and Western Australia. In the ACT there are approximately 200 new cases of breast cancer diagnosed per year in women and 1 new case per year in men.

The treatment of breast cancer in Australia has been facilitated by the development of clinical practice guidelines. Guidelines for the treatment of early breast cancer were first published by the National Health and Medical Research Council (NHMRC) in 1995. These guidelines were based on the best available evidence at the time, in order to provide optimal care for breast cancer patients and to improve outcomes. The task of developing and updating clinical practice guidelines has been continued by the National Breast and Ovarian Cancer Centre (NBOCC) and a range of clinical practice guidelines related to breast cancer care are available from the NBOCC website. It is important to recognise that these publications serve as guidelines and that treatment must be tailored to individual patients. However, these guidelines have provided benchmarks which can be used for quality assurance activities.

Similar guidelines are available in the United States and Europe. These include the clinical practice guidelines for the treatment of breast cancer published by the American Society of Clinical Oncology (ASCO) and the 2009 St Gallen consensus report, which are reviewed and updated every second year.

The ACT and South East New South Wales (SE NSW) Breast Cancer Treatment Group (BCTG) was established in 1995. One of its objectives was to facilitate the implementation of clinical practice guidelines for breast cancer in the ACT. The terms of reference of the BCTG and a list of its members are shown in Appendix 2.

As part of its work, the BCTG developed the Breast Cancer Treatment Quality Assurance Project. Since 1997, this project has collected comprehensive data on the treatment of patients with breast cancer within the ACT and the surrounding region of SE NSW. The BCTG now has a 10-year dataset of information regarding breast cancer patient characteristics, treatments and outcomes, which are presented in this report.
2 The Quality Assurance Project: project design

Aims

The Project aims to collect information on the treatment of both women and men with breast cancer in the ACT and SE NSW region. It has the following specific objectives:

• to record the treatments received by women and men for early invasive breast cancer and ductal carcinoma in situ (DCIS) and to compare this with evidence-based guidelines
• to assist in the implementation of such guidelines and to improve patient outcomes
• to monitor the treatment of advanced breast cancer
• to measure treatment outcomes including disease recurrence and mortality from breast cancer over time
• to provide confidential feedback to individual participating clinicians for comparison with their peers
• to collaborate with and assist other professional groups, for example, by providing de-identified confidential data to the National Breast Cancer Audit (NBCA) run by the Royal Australasian College of Surgeons (RACS).

Methods

A minimum dataset was developed and a standard data collection form was created which is used by all participating clinicians (see Appendix 3).

Ethics approval for the Project was obtained from the ACT Health Human Research Ethics Committee and it was notified as a Quality Assurance Project under section 7 of the ACT Health Act 1993 in May 1997.

All clinicians in the ACT and Greater Southern Area Health Service (GSAsH) of NSW who treat breast cancer patients were invited to participate. Participation is voluntary. Clinicians were asked to enrol all patients with a new diagnosis of breast cancer into the Project. This included patients with DCIS, invasive breast cancer, bilateral breast cancer or a second primary cancer. New patients presenting with recurrent breast cancer, either locoregional recurrence or metastatic breast cancer were excluded from the Project.
Potential participating patients with a new diagnosis of breast cancer are notified to the Project using a brief notification card (Appendix 4). Information pamphlets (Appendix 5) are made available for patients. Consent to participate in the Project is subsequently obtained from eligible patients using an information sheet and a consent form (Appendix 6). Consent can be obtained by any participating clinician or specialist breast care nurse. Individual patients’ data are not entered into the project database until the consent form is received by the project officer.

Follow-up data for each patient are obtained by sending a follow-up data form to the reporting clinician and the patient’s general practitioner (GP), one year after diagnosis and then at two-yearly intervals. These forms are shown in Appendix 7.

The collected data are stored in a secure database, which was specifically developed for this Project by the project coordinator and constructed using Microsoft Access. The data can be accessed for the purpose of research or audit in a de-identified form. Potential users need to apply to the Data Management Sub-Committee (DMSC) of the BCTG, in accordance with the National Privacy Act. The project staff are responsible for data entry, storage and management of the database. As the number of patients enrolled has increased, additional staff are required to maintain the accuracy of the data. Data are routinely checked for accuracy, consistency and completeness.

Data analysis was performed using Statistical Package for Social Sciences (SPSS) Version 15 (Microsoft Office). The data are used for research, to provide feedback to individual clinicians (see Appendix 8) and to generate individual surgeons’ audit reports for the NBCA of the RACS (Appendix 9). Results are presented at meetings of the BCTG, which take place four times per year and summary results are published in the annual newsletter of the BCTG which is distributed to clinicians, GPs and consumer groups.
3 Overview of results and project demographics

The 10-year dataset consists of information collected by the Quality Assurance Project between July 1997 and June 2007. As the Project is ongoing, data accrual after this date has continued up to the present. As of October 2009, over 3,660 patients have consented to participate in the Project and 3,860 have been notified to the Project.

Clinician participation

A total of 37 clinicians recruited patients to the Project, including 13 who are no longer practicing medicine. Figure 3.1 shows the participating clinicians by specialty group. All the medical oncologists and radiation oncologists involved in the Project are based in the ACT, but some also attend oncology clinics in rural centres in the SE NSW region. Of the surgeons currently participating in the Project, most are based in the ACT, but others practice in regional NSW centres such as Bega, Moruya and Goulburn. As professional awareness of the Project has increased, so has participation, with clinicians new to the region now more likely to recruit patients to the Project. Increasingly, breast surgery is performed by surgeons with a specialty interest in breast cancer. Accordingly, although there were 23 participating surgeons in the ACT (including some no longer practicing), there are four surgeons who currently perform the majority of breast cancer surgery in the ACT.

Figure 3.1: Participating clinicians, n=37

<table>
<thead>
<tr>
<th>Clinician Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiation oncologists</td>
<td>16%</td>
</tr>
<tr>
<td>Medical oncologists</td>
<td>22%</td>
</tr>
<tr>
<td>Surgeons</td>
<td>62%</td>
</tr>
</tbody>
</table>
Patient participation

Between 1 July 1997 and 30 June 2007, a total of 3,035 patients were notified to the Project. Of these patients, 124 (4%) patients were excluded as no consent forms were received from them. Thus, the total number of patients included in the study was 2,911.

Table 3.1 shows an overview of all patients included in the 10-year study. The groups shown will be discussed in further detail later in this report. The categories are not mutually exclusive and so it is possible for a patient to be included in two or more categories.

It is difficult to obtain an accurate number of new breast cancer cases in the ACT, as a proportion of patients living in the ACT elect to have their surgery elsewhere and conversely patients from NSW are treated in the ACT. Figure 3.2 shows the number of cases of newly diagnosed breast cancer in the 10-year period and the distribution of cases between the ACT and NSW. While the incidence in NSW has remained reasonably constant, there has been a clear upward trend in new cases in the ACT and this is predicted to increase further over time. In 2006–2007, over 200 new cases were notified to the Project from the ACT alone. Comparison with cancer incidence figures from the ACT in 2001–2005 shows that there were on average 200 new cases of breast cancer in women per year in the ACT. This correlation indicates that the Project has a high patient participation rate.

Table 3.1: Overview of breast cancer treatment in ACT and NSW July 1997 – June 2007
Breast cancer outcomes

For patients in the Project, the median length of follow-up was 5.5 years. The overall outcomes for all patients are presented in Table 3.2. A total of 234 deaths due to breast cancer were recorded.

The outcomes of the 2,371 women with unilateral invasive breast cancer who had their initial surgery during the study period are summarised in Figure 3.3. Of the 2,371 patients with unilateral invasive breast cancer, 121 (5%) have been lost to follow up. Of the remaining 2,250, 1,907 (85%) remain alive and free from recurrence. However, 247 women developed recurrent disease. In 49 the recurrence was locoregional only, in 18 the recurrence was both locoregional and distant and in 148 the recurrence was distant only. Seventy-one women (3%) remain alive with recurrent disease. A total of 272 deaths has been recorded. Of these, 176 (65%) are known to be due to breast cancer.

Table 3.2: Summary of outcomes of breast cancer patients (n=2,829) as at 30 June 2009

<table>
<thead>
<tr>
<th>Type of breast cancer patient</th>
<th>Number in each category</th>
<th>Alive and disease free</th>
<th>Alive with disease</th>
<th>Deceased</th>
<th>Death due to breast cancer</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasive</td>
<td>2,371</td>
<td>1,907</td>
<td>71</td>
<td>272</td>
<td>176</td>
<td>121</td>
</tr>
<tr>
<td>DCIS</td>
<td>293</td>
<td>257</td>
<td>4</td>
<td>7</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Synchronous bilateral</td>
<td>58</td>
<td>46</td>
<td>1</td>
<td>10</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Male patients</td>
<td>19</td>
<td>15</td>
<td>0</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Metastatic disease at diagnosis</td>
<td>49</td>
<td>12</td>
<td>3</td>
<td>32</td>
<td>29</td>
<td>2</td>
</tr>
<tr>
<td>No surgery</td>
<td>39</td>
<td>8</td>
<td>4</td>
<td>25</td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>2,829</strong></td>
<td><strong>2,245</strong></td>
<td><strong>83</strong></td>
<td><strong>350</strong></td>
<td><strong>234</strong></td>
<td><strong>151</strong></td>
</tr>
</tbody>
</table>
Figure 3.3: Summary of outcomes of women with unilateral invasive breast cancer as at 30 June 2009

- Alive, disease free: SE NSW (600) and ACT (1,200)
- Recurrent disease or death due to breast cancer: SE NSW (200) and ACT (100)
- Died without evidence of breast cancer: SE NSW (50) and ACT (100)
- Lost to follow-up: SE NSW (50) and ACT (100)
- Cause of death unknown, n=5

Number of patients
4 Patient characteristics and methods of cancer detection

The age distribution of patients with invasive unilateral breast cancer is shown in Figure 4.1. The majority of women were postmenopausal, without any history of breast or other cancer, and with an average risk of developing the disease based on family history (Figures 4.2–4.4). Approximately 9% of patients were classed as having a potentially high risk of developing breast cancer, based on their family history. This is similar to published data that suggest up to 5% of breast cancers can be attributed to the inheritance of a mutated gene\(^\text{12}\). Referral for high-risk surveillance, genetic counselling and possible genetic testing should be considered for these “high risk” patients.

Figure 4.1: Proportion of patients with invasive unilateral breast cancer by age and region

![Proportion of patients with invasive unilateral breast cancer by age and region](chart1.png)

Figure 4.2: Menopausal status of women with invasive breast cancer

![Menopausal status of women with invasive breast cancer](chart2.png)
The method of diagnosis for patients in the Project with invasive breast cancer is presented in Figure 4.5. Asymptomatic breast cancers accounted for 38% of cases and were detected either by the BreastScreen program (31%) or another type of screening (7%) while 62% of cases were symptomatic and detected by the patient, GP, specialist or by other means.
Screen-detected (i.e. asymptomatic cancers) were more likely to be small (20mm or less) and were less likely to have involved lymph nodes as shown in Figures 4.6 and 4.7. Figure 4.8 compares the method of detection of invasive breast cancers with DCIS and suggests that DCIS cases are more likely to be detected by screening than by other means.

**Figure 4.6: Tumour size of screen detected cancers**

![Figure 4.6: Tumour size of screen detected cancers](image)

**Figure 4.7: Nodal status of screen detected cancers**

![Figure 4.7: Nodal status of screen detected cancers](image)
The combination of diagnostic investigations has changed during the 10-year period. Increasingly, ultrasound is used in conjunction with mammography. Ultrasound can be particularly helpful in younger women and those with dense breast tissue, where the sensitivity of mammography is decreased. Targeted ultrasound can also be used to identify and guide biopsy of some lesions detected by breast magnetic resonance imaging (MRI). Breast MRI has been shown to be a valuable screening tool in women at high risk of developing breast cancer, with a sensitivity more than double that of mammography\textsuperscript{13–15}. The use of screening MRI is expected to increase following the introduction of a Medicare rebate for women under age 50 years who are at high risk based on the NBocc criteria. Breast MRI can also be used as a problem-solving tool and in surgical planning.

Figure 4.9 shows pre-operative investigations for patients in the Project over the 10-year period. The use of core biopsy (including mammotome biopsy) for diagnosis has increased while fine needle aspiration cytology (FNAC) has decreased. This is because only histological rather than cytological samples are able to differentiate in situ from invasive disease, which will alter patient management. FNAC tends to be used more selectively, particularly for assessing suspicious axillary lymph nodes. Stereotactic vacuum-assisted biopsy (also known as mammotome biopsy) is increasingly used for screen-detected impalpable lesions associated with microcalcification.
Figure 4.9: Preoperative investigations by year

Note: Other includes: MRI, nipple biopsy, whole body scan
5 The treatment of invasive breast cancer

5.1 Neo-adjuvant treatment

A proportion of patients require pre-operative chemotherapy, endocrine therapy, or radiotherapy. The number of patients over the 10-year study period that had pre-operative treatment is small, relative to the total number of patients presenting with this disease. Predominantly, these are patients whose tumour is surgically unresectable, including patients with inflammatory breast carcinoma or locally advanced (T4) tumours which are fixed to the chest wall or have skin involvement. Some patients are unfit for surgery due to comorbidities and may be commenced on endocrine treatment instead, whereas other patients may wish to avoid mastectomy, if possible.

5.2 Surgery

Surgery is usually the first treatment modality for breast cancer. Axillary surgery is discussed below. A total of 2,371 patients with a new diagnosis of breast cancer had surgery as part of their treatment in the 10-year study period. Figure 5.1 shows the location where surgery was performed during this time. Most patients (86%) had surgery in the ACT, followed by SE NSW and locations outside the region.

**Figure 5.1: Place of surgery by year**
5.2.1 Breast surgery

The choice between breast-conserving surgery and mastectomy can often be difficult. The decision is based on several factors including the tumour characteristics (size, grade, position, stage), the patient’s wishes, and other factors including the size of the tumour in relation to the size of the breast.

A total of 1,823 patients (76.9%) in the Project required only one operation and 46% of these patients had breast-conserving surgery. There were 506 patients (21.4%) who required two operations, which may have been further surgery on the breast or the axilla. Reasons for requiring further surgery included inadequate clearance of the tumour or the discovery of occult disease, or a positive sentinel lymph node. Forty-two patients (1.8%) required three operations, for similar reasons. Patients needing two or three operations were much more likely to require a mastectomy compared to those with one operation.

Figures 5.2 and 5.3 indicate that the proportion of patients undergoing mastectomy has remained relatively stable over time. Patients were more likely to have a mastectomy if they had a previous breast cancer, if the tumour was located in a central position or was multicentric or multifocal (75.1% of central tumours and 91.4% of multi-quadrant tumours), if the tumour was greater than 20mm in size (of the 1,214 patients who had a mastectomy, 644 patients had a tumour greater than 20mm), or if the patient was less than 40 years of age. Mastectomy was less common than local excision, particularly if the cancer was detected through screening, as shown in Figure 5.4.

Figure 5.2: Proportion of patients undergoing breast conserving surgery or mastectomy in the ACT
5.2.2 Axillary surgery

Excision of the axillary lymph nodes provides information on the nodal status for staging and prognosis, helps to determine the need for adjuvant therapy and also treats any axillary disease to achieve locoregional disease control. More recently, the technique of sentinel lymph node biopsy (SLNB) has been introduced in order to minimize the morbidity from axillary clearance. In selected cases, sampling of axillary lymph nodes or no axillary surgery is performed.

Figure 5.5 shows that the number of patients undergoing SLNB has increased steadily over the 10-year period, from 15 in 1998–1999 to 190 in 2006–2007. The sentinel lymph node or nodes are the first regional lymph nodes to receive lymphatic drainage from the breast and therefore are the first lymph nodes to which breast cancer will spread\textsuperscript{16}. They can be identified with an accuracy of approximately 95% through the use of a
radioactive tracer and/or blue dye. Patients in whom the sentinel lymph node/s are negative for metastases do not require further axillary surgery, whereas those with positive sentinel lymph nodes require an axillary nodal clearance. This may sometimes occur at the initial operation or as a second procedure. Although the effect of SLNB on overall or disease-free survival is still unknown\textsuperscript{17, 18} it has become increasingly available as experience with the technique has increased.

**Figure 5.6** demonstrates the types of axillary procedures performed in relation to the tumour size. Larger tumours 20mm and greater in size were more likely to have positive lymph nodes and require an axillary clearance. Smaller tumours less than 20mm were less likely to have lymph node metastases and these patients were more likely to require only SLNB. This follows the NBOCC guidelines\textsuperscript{19} regarding sentinel node surgery.

**Figure 5.5**: Number of patients undergoing sentinel node biopsy

**Figure 5.6**: Types of axillary procedures performed in relation to tumour size
5.2.3 Breast reconstruction

Breast reconstruction may be performed immediately at the time of the initial surgery or as a delayed procedure. There are many different types of reconstructive techniques available and the decision on the type and timing of reconstruction is complex.

It is estimated that up to 20% of patients having a mastectomy consider or undergo some type of reconstruction. In the ACT this rate is much lower, with 169 patients in the Project documented to have had a reconstructive procedure in the 10-year period. This equates to less than 25 reconstructive procedures performed each year of the 10-year Project. Table 5.1 shows that the majority (78%) of breast reconstructions are performed as a delayed procedure. Table 5.2 demonstrates also that most reconstructive surgery (72%) was performed in private hospitals. It is difficult to obtain an accurate picture as many patients have reconstruction interstate and delayed procedures may not be accurately reported to the Project.

Table 5.1: Breast reconstruction surgery (delayed or immediate) by type of disease

<table>
<thead>
<tr>
<th>Type of disease</th>
<th>Time of breast reconstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Immediate</td>
</tr>
<tr>
<td>Invasive</td>
<td>27</td>
</tr>
<tr>
<td>DCIS</td>
<td>7</td>
</tr>
<tr>
<td>Synchronous bilateral patient</td>
<td>3</td>
</tr>
<tr>
<td>Totals</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 5.2: Place where breast reconstruction was performed

<table>
<thead>
<tr>
<th>Type of disease</th>
<th>Place of breast reconstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public</td>
</tr>
<tr>
<td>Invasive</td>
<td>29</td>
</tr>
<tr>
<td>DCIS</td>
<td>7</td>
</tr>
<tr>
<td>Synchronous bilateral patient</td>
<td>2</td>
</tr>
<tr>
<td>Totals</td>
<td>38</td>
</tr>
</tbody>
</table>

Figure 5.7 illustrates that breast reconstruction was performed much less often in patients aged 60 years or more compared with younger patients. Patients younger than 40 years also had reconstruction performed less frequently than those aged 40–59 years, especially when it was delayed. It is interesting to note that patients with bilateral synchronous tumours were more likely to have immediate reconstruction compared with patients with unilateral tumours.
5.3 Radiotherapy

Adjuvant radiotherapy has been shown to reduce the rates of locoregional recurrence and to improve overall survival in the treatment of breast cancer\textsuperscript{22}. Breast radiotherapy is indicated after breast conservation surgery and chest wall radiotherapy is recommended for women with a high risk of chest wall recurrence. Regional nodal radiotherapy may be indicated in high-risk patients to the supra-clavicular fossa, and in certain scenarios, to the axilla and internal mammary chain.

5.3.1 Adjuvant breast radiotherapy

Adjuvant breast radiotherapy is recommended for all patients who undergo breast conserving surgery in order to reduce the risk of local recurrence. There are highly selected patients who are unlikely to benefit from adjuvant radiotherapy during their lifetime for whom adjuvant breast radiotherapy may not be strongly recommended. This group of women includes those with a shortened life expectancy (for reasons other than their breast cancer) who are typically over 70 years old and have small, stage I receptor-positive breast cancers\textsuperscript{23}. In this project, a total of 1,061 out of 1,157 patients with invasive breast cancer were offered and received breast radiotherapy after breast conserving surgery. Thirty-eight patients were offered radiotherapy and refused and 58 were not offered radiotherapy. The majority of patients in the latter group were aged 70 years or older, as shown in Figure 5.8.
5.3.2 Post-mastectomy radiotherapy

Postmastectomy radiotherapy may be indicated in patients with a higher risk of local recurrence. According to Australian guidelines chest wall radiotherapy (with or without regional nodal irradiation) may be considered when the tumour is larger than 5cm, when there is axillary involvement of more than three nodes or in the presence of positive tumour margins. If the tumour is smaller or fewer lymph nodes are involved, post-mastectomy radiotherapy may be considered when there is lymphovascular invasion and/or a high grade tumour. Figure 5.9 shows the number of patients who received post-mastectomy radiotherapy by age. Patients aged 70 years or older were much less likely to be offered chest wall radiotherapy, particularly if they were older than 80 years.
Figures 5.10 to 5.12 demonstrate the number of patients treated with post-mastectomy radiotherapy based on the number of positive axillary lymph nodes, the size of the primary tumour and the surgical margin status. Post-mastectomy radiotherapy was more likely to be offered and received where there was a greater degree of lymph node invasion, larger tumour size, and smaller margin.

**Figure 5.10: Post-mastectomy radiotherapy by nodal status**

<table>
<thead>
<tr>
<th>Number of lymph nodes involved</th>
<th>0</th>
<th>1-4</th>
<th>&gt;4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offered and received</td>
<td>100%</td>
<td>80%</td>
<td>60%</td>
</tr>
<tr>
<td>Not offered</td>
<td>0</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>Offered but patient refused</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Figure 5.11: Post-mastectomy radiotherapy by tumour size**

<table>
<thead>
<tr>
<th>Tumour size (mm)</th>
<th>0-10</th>
<th>11-20</th>
<th>21-50</th>
<th>&gt;50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offered and received</td>
<td>100%</td>
<td>80%</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Not offered</td>
<td>0</td>
<td>20%</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Offered but patient refused</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
5.3.3 Regional nodal radiotherapy

Post-mastectomy or breast radiotherapy may also be combined with radiotherapy to the regional lymph node fields. The aim is to reduce the risk of both local and regional recurrence. In addition to this, it is also difficult to irradiate the lymph node regions at a later date (should it be required) without excluding the chest wall area. Supraclavicular radiotherapy following axillary surgery may be considered if more than three lymph nodes are involved.

Indications for axillary and internal mammary chain radiotherapy are more controversial. The risk of axillary recurrence is low after surgery, even when there is extensive lymph node involvement. Axillary radiotherapy should be considered if there is likely to be disease remaining in the axilla following surgery (for example if the tumour is transected or incompletely removed) or if there are positive pathological margins. Extranodal extension is a poor prognostic feature that has not been conclusively linked with a high risk of axillary recurrence. Internal mammary nodal irradiation may be recommended if there is a positive sentinel node in this nodal region or if there is a large medially located tumour associated with extensive axillary nodal involvement. In studies of post-mastectomy radiotherapy that showed a survival benefit, radiotherapy was delivered to the chest wall, axilla and internal mammary chain. The decision to treat these additional lymph node regions may be difficult as it has the potential to increase morbidity significantly.

According to evidence-based guidelines, Delaney et al. (2003) estimated that 84–91% of women with stage I–III invasive breast cancer should receive radiotherapy early in the course of their disease. The actual utilisation rates of radiotherapy according to Australian registers are between 34–60% (South Australian and Western Sydney populations with stage I–III disease). This compares with 65.6% of breast cancer patients in this study who received early radiotherapy. Although this figure compares favourably to other population-based studies there is still evidence of under-utilisation of adjuvant radiotherapy in the ACT and SE NSW region.
5.4 Chemotherapy and trastuzumab

Chemotherapy for the treatment of early breast cancer has been shown to reduce the risk of cancer recurrence and improve overall survival. The original regimen containing cyclophosphamide, methotrexate and 5-fluorouracil (CMF) was first described in 1976 and this was followed by further trials which showed that anthracycline containing regimens were more effective. Although chemotherapy has the greatest benefit in node-positive cancers, it is also of benefit in node negative patients. In these patients, other prognostic factors such as patient age, tumour grade and size, the oestrogen receptor status and the presence or absence of lymphovascular invasion are also used to estimate the benefit from chemotherapy.

Figure 5.13 shows the types of chemotherapy used during the 10-year period. As newer and more effective adjuvant chemotherapy regimens have been developed, the use of CMF has declined. The use of chemotherapy in relation to nodal status, the presence of lymphovascular invasion, tumour grade, tumour size, and hormone receptor status are illustrated in Figures 5.14 to 5.19. As with radiotherapy, chemotherapy is less likely to be offered to older patients and those with no lymph node invasion, and is more likely to be offered with increasing tumour grade and size (up to 50 mm).

Figure 5.13: Number of patients undergoing post-operative chemotherapy

![Graph showing chemotherapy usage](image)

Note: Other includes taxotere, caelyx and AI/taxol
Figure 5.14: Post-operative chemotherapy by age

![Bar chart showing post-operative chemotherapy by age group.](image)

Figure 5.15: Post-operative chemotherapy by nodal status

![Bar chart showing post-operative chemotherapy by nodal status.](image)
Figure 5.16: Post-operative chemotherapy by lymphovascular invasion

Figure 5.17: Post-operative chemotherapy by grade
More recently, the use of taxane (paclitaxel and docetaxel) containing chemotherapy regimens have resulted in further improvements in disease-free and overall survival. Figure 5.20 demonstrates that the use of taxanes in the Project has also increased with time, particularly for the second part of the 10-year period. Taxanes can be given either sequentially or concurrently with an anthracycline, or a taxane regimen can be added to or used in place of part of a chemotherapy regimen. At present, the most effective regimen (in terms of sequencing, timing and duration of treatment) has not been determined. Taxanes are associated with an increased risk of febrile neutropenia but may reduce cardiac toxicity by reducing the exposure to anthracyclines.
The introduction of trastuzumab (Herceptin) has been the newest addition to the chemotherapy regimens. It is estimated that up to 25% of breast cancers have amplification of the HER2 gene (also known as the C-ERB2 gene). HER2 over-expression is associated with a reduction in disease-free and overall survival. Trastuzumab is a monoclonal antibody which binds to the HER2 receptor. Studies have shown that patients with HER2 overexpressing breast cancers who are treated with trastuzumab in combination with chemotherapy have significant improvement in both disease-free and overall survival. Trastuzumab is also of benefit in patients with HER2 positive metastatic breast cancer and may also have a role in the neoadjuvant setting.

The use of trastuzumab has only been studied in patients with node positive cancers, or node negative tumours greater than 1cm. Trastuzumab is associated with an increased risk of congestive cardiac failure and therefore, is not used concurrently with anthracycline based regimens. In the Quality Assurance Project, data on HER2 receptor status has been officially collected since 2001 and this is shown in Figure 5.21. Figure 5.22 demonstrates that the use of Herceptin treatment has increased steadily in the later years of the Project.
5.5  Endocrine therapy

There is good evidence that in patients with oestrogen receptor (ER) or progesterone receptor (PR) positive breast cancers, the use of adjuvant endocrine therapy improves both disease free and overall survival\textsuperscript{29,32}. Thus, it is recommended that all breast cancer patients who are receptor positive be offered adjuvant endocrine therapy. The two main groups of adjuvant endocrine therapies are the selective oestrogen receptor modulators (SERMs) of which tamoxifen is the main drug used; and the aromatase inhibitors which include anastrozole, letrozole and exemestane.
In the 10-year period between 1997–1998 and 2006–2007, 94.6% of patients who were ER and/or PR positive received adjuvant endocrine therapy. Figure 5.23 illustrates that the number of hormone-receptor positive patients who received a combination of chemotherapy and endocrine therapy increased and conversely, the number of patients who were not offered any systemic adjuvant therapy decreased. Interestingly Figure 5.24 shows that a small proportion of receptor-negative patients included in the Project also received adjuvant endocrine therapy, either alone or in combination with chemotherapy.

**Figure 5.23: Number of patients with ER or PR positive tumours undergoing systemic therapy n=1,955**

**Figure 5.24: Number of patients with ER or PR negative tumours undergoing adjuvant therapy**
Aromatase inhibitors (AIs) have been shown to be more effective than tamoxifen in reducing recurrence as well as preventing contralateral breast cancers in postmenopausal women\textsuperscript{13}, but are contraindicated in premenopausal women. Thus, in postmenopausal women with a high risk of recurrence, endocrine treatment with an AI initially should be considered, whereas premenopausal women should be started with tamoxifen. There is also evidence that switching to an AI after 2–3 years of tamoxifen or extending treatment beyond 5 years with an AI further reduces the risk of recurrence\textsuperscript{32,34}.

Both classes of drugs are associated with significant side effects and these should be taken into account when offering tamoxifen or an AI as adjuvant endocrine therapy. There are also many areas of uncertainty regarding treatment with AIs, including: the optimal duration of treatment; the most effective AI; the use of AIs in premenopausal patients combined with ovarian suppression (the Suppression of Ovarian Function Trial, or SOFT); the role of AIs in the treatment of DCIS and in the chemoprevention of breast cancer. Figure 5.25 shows that over the Project period, the use of AIs has increased steadily while tamoxifen usage has decreased. Figures 5.26 and 5.27 demonstrate this in relation to age and menopausal status.

**Figure 5.25: Use of tamoxifen and aromatase inhibitor by year**

![Figure 5.25](image-url)
An additional treatment for receptor-positive premenopausal women is ovarian ablation, which can be achieved by surgical oophorectomy, radiotherapy or the use of a gonadotropin-releasing hormone (GnRH) analogue to suppress ovarian function. Figures 5.28 and 5.29 illustrate the other types of endocrine therapy used in combination with tamoxifen. The proportion of patients undergoing oophorectomy remained very small throughout the 10-year time period.
Figure 5.28: Number of patients undergoing endocrine therapy

![Number of patients undergoing endocrine therapy chart]

- **Tamoxifen**: 81%
- **Aromatase inhibitors**: 17%
- **Oophorectomy**: 1%
- **Zoladex**: 1%

Figure 5.29: Types of endocrine therapy

![Types of endocrine therapy pie chart]
6 Special groups

6.1 Breast cancer in males

As stated previously, male breast cancer accounts for 1% of all breast cancers. This incidence is thought to be increasing in the United States, Canada and United Kingdom but is thought to be stable in Australia\textsuperscript{5,35}. In the ACT, the age-standardised incidence of male breast cancers is 0.7 per 100,000 males which equates to approximately 1 new case per year\textsuperscript{6}. The average age at diagnosis is 66 although some studies have reported the peak incidence at 71 years\textsuperscript{16}. In the Quality Assurance Project, the median age of males was 62 years and the age range was 23–81 years.

The prognosis of breast cancer in males is similar to that of females stage for stage, with overall survival at 5 years estimated at 79.7%\textsuperscript{4}. As with female breast cancer, the nodal status remains the most important prognostic factor for disease-free survival. For males, the 10-year disease-specific survival is 77% for node-negative patients and 39% for node-positive patients\textsuperscript{37}. Figures 6.1 and 6.2 show that over the 10-year period, 19 male breast cancers were treated, with the majority aged 50–69 at diagnosis. Male breast cancer patients alive at the end of the 10-year period were more likely to have fewer positive nodes or a negative nodal status compared with those who died.

Male breast cancers tend to present at a more advanced stage, with up to 56% having involved nodes at diagnosis. Approximately 90% are ductal carcinomas\textsuperscript{36} and about 75% of patients are oestrogen and/or progesterone receptor positive\textsuperscript{17}. Treatment recommendations include surgery, usually mastectomy and axillary clearance, chest wall radiotherapy and tamoxifen in receptor-positive patients. However, breast-conserving surgery and sentinel node biopsy have also been used. The use of AIs is controversial\textsuperscript{36,37}. The patterns of treatment of the 19 male patients in this project are shown in Figures 6.3 and 6.4 according to their nodal and receptor status. Mastectomy was the most common form of treatment, especially where there was negative nodal status or when the patient was receptor positive.

DCIS in males is extremely uncommon but accounts for 7% of all male breast cancers. Mastectomy is usually recommended as surgical treatment\textsuperscript{38}. In this project, 5 male patients had DCIS. All were treated by mastectomy and none received any adjuvant treatment.
Figure 6.1: Number of male patients by age and tumour type

![Bar chart showing the number of male patients by age group and tumour type.]

Figure 6.2: Number of male patients by current status and nodal status

![Bar chart showing the number of male patients by current status and nodal status.]

Legend:
- --- DCIS/Non-invasive
- --- Invasive ductal
- --- Other type
Figure 6.3: Treatment received by male patients by nodal status

Figure 6.4: Treatment received by male patients by receptor status
6.2 Bilateral breast cancer (synchronous or metachronous)

In the 10-year study period, 58 patients were diagnosed with bilateral synchronous breast cancers and 40 with metachronous tumours. Figure 6.5 shows that the majority of tumours were ductal carcinomas and Figure 6.6 demonstrates that most patients were treated with mastectomy. Figure 6.7 illustrates that patients were more likely to be offered adjuvant chemotherapy and/or endocrine treatment rather than radiotherapy. Figures 6.8 to 6.10 demonstrate that metachronous tumours were also more likely to be ductal carcinomas. Most patients with metachronous tumours also underwent mastectomy, however, these patients were more likely to be treated with endocrine therapy rather than other adjuvant modalities (for ages 50 and over).

Figure 6.5: Number of patients with bilateral synchronous breast cancers by tumour and surgery type

![Figure 6.5: Number of patients with bilateral synchronous breast cancers by tumour and surgery type](image)

Figure 6.6: Number of patients with bilateral synchronous breast cancers by age and surgery type

![Figure 6.6: Number of patients with bilateral synchronous breast cancers by age and surgery type](image)
Figure 6.7: Number of patients with bilateral synchronous breast cancers by age and adjuvant treatment

Figure 6.8: Number of patients with bilateral metachronous breast cancers by tumour and surgery type
Figure 6.9: Number of patients with bilateral metachronous breast cancers by age and surgery type

Number of patients

<table>
<thead>
<tr>
<th>Age group</th>
<th>No surgery</th>
<th>Breast conserving</th>
<th>Mastectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-69</td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>&gt;=70</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 6.10: Number of patients with bilateral metachronous breast cancers by age and adjuvant treatment

Number of patients

<table>
<thead>
<tr>
<th>Age group</th>
<th>Radiotherapy</th>
<th>Chemotherapy</th>
<th>Endocrine therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>50-69</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>&gt;=70</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>
6.3 Patients with distant metastases at presentation

Forty-nine patients were found to have distant metastases at the time of presentation. At the time of this report, 30 had died and 26 of these deaths were due to breast cancer. The management of metastatic breast cancer is complex, as the type and nature of the disease in individual patients is variable. In general, the aim is to prolong survival and maximize quality of life.

In hormone-receptor-positive metastatic breast cancer, endocrine therapy is usually used before chemotherapy. In hormone-negative cases, chemotherapy can be used however the timing, regimen and duration of treatment need to be individualized. Trastuzumab should be considered for all patients with HER2 overexpressing tumours. Radiotherapy and surgery can be used selectively for local palliation or for specific sites\textsuperscript{39, 40}.

Figures 6.11 to 6.13 show the number of patients with metastatic breast cancer and the types of treatment received. The majority were patients with ductal carcinoma and the majority of these patients underwent a mastectomy. A mastectomy was the most common surgery type for patients aged younger than 70, whereas those aged over 70 were less likely to have any surgery.

Figure 6.11: Number of patients with distant metastases by tumour and surgery type

![Bar chart showing number of patients with distant metastases by tumour and surgery type.](image)
Figure 6.12: Number of patients with distant metastases by age and surgery type

Figure 6.13: Number of patients with distant metastases by age and adjuvant treatment
6.4 Breast cancer recurrence

Locoregional recurrence of breast cancer increases the risk of distant metastases. After mastectomy or breast conserving surgery, 80–90% of these recurrences occur in the first 5 years\(^3\). Axillary recurrences after sentinel lymph node biopsy occur in less than 0.5% of patients if the sentinel lymph node is negative, but in around 1.4% in patients with a positive sentinel lymph node who decline further surgery.

In the 10-year dataset, 247 of the 2,371 patients with invasive disease and 4 of the 293 patients with DCIS had recurrence of their cancer. Of the patients with invasive disease, 71 were alive with disease but 176 have died as a consequence of their breast cancer. There have been no deaths due to breast cancer in patients with a recurrence following initial treatment of DCIS. Figures 6.14 to 6.18 relate to patients initially treated for invasive breast cancer and show the patterns of recurrence in relation to the initial tumour characteristics and the types of treatment received. Patients with recurrent invasive breast cancer tended to have a mastectomy more often than breast-conserving surgery, especially with younger ages, larger tumours, higher grades, and/or lymphovascular invasion.

Treatments that minimise the risk of locoregional recurrence in the first five years also improve overall survival\(^4\). These include factors such as good surgical technique in axillary dissection, adequate surgical margins in breast conserving procedures, the use of radiotherapy postoperatively and the use of appropriate systemic adjuvant therapies.

Locoregional recurrences should be biopsied to obtain histological confirmation prior to treatment and the patient should also have restaging investigations to exclude the presence of distant metastases\(^3\).

The treatment of locoregional recurrence is often multidisciplinary. Recurrences should be excised surgically where feasible to reduce the tumour load and prevent distant metastases. Radiotherapy, chemotherapy, endocrine treatment and trastuzumab may all be used, although there are no clear guidelines as to the optimal timing or duration of treatment\(^3,4\).
Figure 6.14: Number of patients with recurrent invasive breast cancer by age and surgery type

Figure 6.15: Number of patients with recurrent invasive breast cancer by tumour size and surgery type
Figure 6.16: Number of patients with recurrent invasive breast cancer by grade and surgery type

Figure 6.17: Number of patients with recurrent invasive breast cancer by lymphovascular invasion and surgery type
Figure 6.18: Number of patients with recurrent invasive breast cancer by age and type of recurrence

![Bar chart showing the number of patients with different types of recurrence by age group.](chart.png)
7 Breast cancer outcomes

The data provided by the 10-year Project demonstrate that the outcomes of breast cancer treatment in the ACT and SE NSW correlate well with those published nationally by the Australian Institute of Health and Welfare. Prospective audits are established to measure and monitor aspects of treatment such as the type of surgery undertaken and the use of chemotherapy and radiotherapy. These results have already been outlined in this 10-year report. The most important measure of the quality of treatment of a patient is the analysis of the outcome of such treatments.

In order to look at 5-year median survival rates, the results of patients treated in the first nine years of this study were analysed, specifically from July 1997 to June 2006. Five-year overall survival was 93.4%: 1,674 of the 2,081 women (80.4%) were known to be alive and free of disease, 70 (3.4%) were alive with recurrence and 151 (7.3%) had died from breast cancer. Surgery in the rural setting was associated with an increased risk of breast cancer mortality compared with treatment in metropolitan centres (HR=1.84, p<0.01).

Factors associated with breast cancer deaths were examined and these are outlined in Table 7.1. As expected, larger size, high grade, lymph node positive, oestrogen receptor negative cancers had a higher death rate. Also mortality rates were higher if the treatment received fell outside the recommended guidelines.

Similar factors were associated with breast cancer recurrence when this same nine-year group of patients were analysed and this is demonstrated in Table 7.2. Overall 221 recurrences have been recorded in the first 9 years of the Project.

A total of 67 women had local or regional recurrences. Of these, 49 women (2.4% of the cohort) had local or regional recurrences without metastatic disease and 18 women (0.9%) had local or regional recurrence with simultaneous metastatic disease. Distant (metastatic) recurrence without local or regional recurrent disease occurred in 148 (7.1%) women. The mean time to recurrence was 35 months (SD: 31–38 months).

Local or regional recurrence without simultaneous metastatic disease occurred in 38 of 1,815 women (2.1%) undergoing surgery in a metropolitan centre compared with 11 of 266 women (4.1%) undergoing surgery in a rural centre (p=0.04). Multivariate modelling of time to recurrence (any site) showed a higher risk among women having surgery outside of urban centres, which was statistically significant (HR=1.54; p<0.001) after adjusting for age and clinical factors.

Measuring outcomes has demonstrated to clinicians in this project that women in the region have matched, or better, national and international 5 year survival and recurrence rates. Our analysis has also shown some variation in treatment approaches that may have resulted in a difference between rural and metropolitan survival rates. Long term prospective audits such as this demonstrate the great value of long term data collection. Analysis of outcomes is the key to the value of such audits and our results provide support for the current Federal Government initiative to establish rural specialty centres.
### Table 7.1: Factors associated with breast cancer death

<table>
<thead>
<tr>
<th>Factor</th>
<th>Hazard ratio</th>
<th>95% CI</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong> (years)</td>
<td>1.02</td>
<td>1.01-1.03</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td><strong>Surgery</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast conservation</td>
<td>1.00</td>
<td>0.82-2.67</td>
<td>0.140</td>
</tr>
<tr>
<td>Mastectomy</td>
<td>1.48</td>
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<td><strong>Tumour size</strong></td>
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</tr>
<tr>
<td>0-10</td>
<td>1.00</td>
<td>1.15-2.56</td>
<td>0.019</td>
</tr>
<tr>
<td>11-20</td>
<td>1.64</td>
<td>1.67-3.33</td>
<td>≤0.001</td>
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<tr>
<td>21-50</td>
<td>2.02</td>
<td>2.53-10.35</td>
<td>≤0.001</td>
</tr>
<tr>
<td>&gt;50 mm</td>
<td>4.18</td>
<td>1.15-2.56</td>
<td>0.019</td>
</tr>
<tr>
<td><strong>Tumour grade</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1.00</td>
<td>0.83-2.96</td>
<td>0.598</td>
</tr>
<tr>
<td>II</td>
<td>1.29</td>
<td>2.30-5.11</td>
<td>≤0.001</td>
</tr>
<tr>
<td>III</td>
<td>2.84</td>
<td>2.14-3.67</td>
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<tr>
<td><strong>Axillary nodes</strong></td>
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<tr>
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<tr>
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<td>Differed from guidelines</td>
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<td><strong>Place of surgery</strong></td>
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<tr>
<td>Rural</td>
<td>1.84</td>
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</tbody>
</table>

* Multivariate Cox regression model with breast cancer death as time dependent variable, adjusted for clustering by surgeon.
Table 7.2: Factors associated with breast cancer recurrence

<table>
<thead>
<tr>
<th>Factor</th>
<th>Hazard ratio</th>
<th>95% CI</th>
<th>p-value*</th>
</tr>
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<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td>1.01</td>
<td>1.00-1.01</td>
<td>&lt;0.001</td>
</tr>
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<td><strong>Surgery</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Breast conservation</td>
<td>1.00</td>
<td>1.00-1.01</td>
<td></td>
</tr>
<tr>
<td>Mastectomy</td>
<td>1.32</td>
<td>0.82-2.13</td>
<td>0.258</td>
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<td><strong>Tumour size</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-20</td>
<td>0.95</td>
<td>0.60-1.51</td>
<td>0.827</td>
</tr>
<tr>
<td>21-50</td>
<td>1.47</td>
<td>0.75-2.89</td>
<td>0.264</td>
</tr>
<tr>
<td>&gt;50 mm</td>
<td>2.55</td>
<td>0.95-6.86</td>
<td>0.063</td>
</tr>
<tr>
<td><strong>Tumour grade</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>2.46</td>
<td>1.56-3.88</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>III</td>
<td>3.59</td>
<td>2.71-4.77</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Axillary nodes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>2.18</td>
<td>1.80-2.66</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Unknown</td>
<td>1.02</td>
<td>0.66-1.58</td>
<td>0.928</td>
</tr>
<tr>
<td><strong>Hormone receptor status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ER or PR +ve</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ER and PR –ve</td>
<td>2.03</td>
<td>1.47-2.79</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Vascular invasion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not present</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>1.51</td>
<td>1.02-2.25</td>
<td>0.040</td>
</tr>
<tr>
<td><strong>Cancer management</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As per guidelines</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differed from guidelines</td>
<td>1.53</td>
<td>0.94-2.51</td>
<td>0.088</td>
</tr>
<tr>
<td><strong>Place of surgery</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metropolitan</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>1.54</td>
<td>1.21-1.96</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

* Multivariate Cox model with any recurrence as time dependent outcome variable, adjusted for clustering by surgeon.
8 Pathological features

Histopathological assessment of breast and axillary tissue is essential to complete clinicopathological staging and contributes important information for prognosis and adjuvant treatment. The pathology reporting for invasive breast cancer and DCIS has been standardized since 2001 and includes a descriptive macroscopic and microscopic report, a synopsis, assessment of oestrogen, progesterone and HER2 receptor status of the cancer (utilising in situ hybridisation +/- immunohistochemistry), as well as further immunohistochemistry to look for micrometastatic disease in the sentinel lymph nodes.

Figures 8.1 to 8.4 show the tumour characteristics found in patients with invasive breast cancers. In all age groups 40 years and older, the most common type of tumour grade was grade II. A greater proportion of patients had lymphovascular invasion in younger compared to older age groups. The majority of cancers were invasive ductal carcinomas, especially those that were 50 mm or smaller. Figure 8.5 illustrates that the BreastScreen program plays an important part in cancer detection of asymptomatic disease; however, a large number of ductal carcinomas are also detected by the patient. The oestrogen, progesterone and HER2 receptor status of invasive cancers in this project are shown in Figures 8.6 to 8.8. Again, the information on HER2 status needs to be interpreted with caution, as HER2 testing only commenced halfway through the 10-year period.

Figure 8.1: Number of patients by age and tumour grade
Figure 8.2: Number of patients by lymphovascular invasion (LVI) and age

- Presence of LVI
- Absence of LVI
- Unknown

Figure 8.3: Number of patients by tumour type

- Ductal 80%
- Lobular 10%
- Special type 7%
- Other invasive type 3%

Special types: tubular, cribriform, mucinous, medullary
Other types: phylloides, mixed ductal and lobular, micropapillary
Figure 8.4: Number of patients by tumour size and type

Figure 8.5: Number of patients by tumour type and method of detection
Figure 8.6: Number of patients by age and oestrogen receptor status

Figure 8.7: Number of patients by age and progesterone receptor status
Figure 8.8: Number of patients by age and HER2 status

![Bar chart showing number of patients by age and HER2 status](chart.png)

- **Positive**
- **Negative**
- **Unknown**
9 Ductal carcinoma in situ

Ductal carcinoma in situ (DCIS) is defined as the presence of cytologically malignant breast epithelial cells without evidence of invasion through the basement membrane. DCIS increases the risk of developing invasive breast cancer and DCIS may progress to invasive breast cancer, if left untreated. The incidence of DCIS is increasing due to increased breast screening as well as better reporting. In the 10 years of the Project, 301 women were diagnosed with DCIS. The median age was 58 years (range 28–85 years). Figure 9.1 shows the age distribution of these cases.

Figure 9.1: Number of patients with DCIS by age and place of residence

![Figure 9.1: Number of patients with DCIS by age and place of residence](image)

Figures 9.2 and 9.3 show that in the majority of cases, DCIS was asymptomatic and was detected on routine breast screening. Screen-detected lesions were also more likely to be smaller. Less commonly, DCIS may present as a palpable lump, nipple discharge or other symptoms. Most lesions are diagnosed by stereotactic vacuum-assisted biopsy and this is shown in Table 9.1.

Although by definition, DCIS is a non-invasive disease, a small proportion (1–2%) of lesions was found to have positive axillary lymph nodes. This implies that there are areas of microinvasion or early invasion within the lesion, and the risk of this increases as the size of DCIS increases. This is shown in Figure 9.4.
Figure 9.2: Number of patients with DCIS by method of detection

![Bar chart showing number of patients with DCIS by method of detection from 97-98 to 06-07. The chart displays patients detected through Breast Screen, Other screening program, GP/Other, and Patient self.]

Figure 9.3: Number of patients with DCIS by tumour size and method of detection

![Bar chart showing number of patients with DCIS by tumour size (0-10, 11-20, 21-50, >50) and method of detection from 97-98 to 06-07. The chart displays patients detected through Breast Screen, Other screening program, GP/Other, and Patient self.]

Table 9.1: Investigation performed for pre-operative assessment of DCIS breast cancer

<table>
<thead>
<tr>
<th>Investigation</th>
<th>N</th>
<th>% (of all 293 women)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammogram</td>
<td>279</td>
<td>95.2</td>
</tr>
<tr>
<td>Breast ultrasound</td>
<td>165</td>
<td>56.3</td>
</tr>
<tr>
<td>Core biopsy/mammotome</td>
<td>252</td>
<td>86.0</td>
</tr>
<tr>
<td>Fine needle aspiration cytology (FNAC)</td>
<td>52</td>
<td>17.7</td>
</tr>
<tr>
<td>Others</td>
<td>9</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Note: a patient may have more than one test or a patient could appear in more than one group.

Figure 9.4: Number of patients with DCIS by nodal status and method of detection

The mainstay of treatment of DCIS is surgical excision, which aims to completely excise the lesion with adequate margins. Good local control of DCIS is essential to minimise recurrences, as 50% of recurrences appear as invasive breast cancer. Surgery also aims to exclude the presence of invasive cancer and to prevent future progression of DCIS to invasive disease. The two surgical options are breast conserving surgery or mastectomy. Sentinel lymph node biopsy should be considered for lesions greater than 4cm in size, due to the increased risk of the presence of invasive cancer in larger lesions43.

In this project, 161 patients (55%) required one operation, 119 patients (41%) had two surgical procedures and 13 patients (4%) had three procedures. The likelihood of requiring mastectomy increased with the number of operations as shown in Figure 9.5. Patients treated for DCIS were more likely to require more than one operation, compared to patients treated for invasive breast cancers. In addition, Figure 9.6 shows that screen-detected DCIS lesions were more likely to be treated by breast-conserving surgery. The use of SLNB for DCIS has also increased as indications for its use have been broadened and this can be seen in Figure 9.7.
Figure 9.5: Number of surgical treatments required and final outcomes

One operation

- Mastectomy: N=48, 30%
- Breast conserving: N=113, 70%

Two operations

- Mastectomy: N=61, 51%
- Breast conserving: N=58, 49%

Three operations

- Mastectomy: N=13, 100%
Figure 9.6: Number of patients with DCIS by surgery type and method of detection

Figure 9.7: Number of patients with DCIS undergoing sentinel node biopsy
Following breast conserving surgery for DCIS, radiotherapy has been shown to improve local control and reduce the risk of recurrence of both DCIS and invasive cancer. Figure 9.8 illustrates that in some low risk groups, such as low grade lesions smaller than 11mm in size with clear margins greater than 10mm, radiotherapy may have been omitted after discussion of the benefits and risks with the patient. Radiotherapy is not recommended following mastectomy\textsuperscript{43}. 

There are data indicating that tamoxifen may also reduce the risk of recurrence after treatment for DCIS\textsuperscript{44}. Figure 9.9 shows the trend of endocrine therapy in the 10-year period and Figure 9.10 shows this pattern in relation to patients’ receptor status. Interestingly, two patients who were receptor negative were also offered, and received tamoxifen following surgery.

In this project, four patients with DCIS had a recurrence but there were no breast cancer-related deaths in the DCIS group.

\textbf{Figure 9.8: Number of patients with DCIS by tumour size and post-breast conserving radiotherapy}
Figure 9.9: Number of patients with DCIS receiving tamoxifen and aromatase inhibitors

Figure 9.10: Number of patients with DCIS receiving tamoxifen by hormone receptor status
10 Summary and future directions

This report contains a wealth of information on the treatment of breast cancer in the ACT and SE NSW. The high participation rate of patients and clinicians demonstrates the commitment of clinicians in contributing data to this voluntary project. The Project has achieved all of its aims during the first 10 years and is ongoing. One of the challenges is that, as knowledge about pathogenesis of breast cancer increases and further treatments evolve, these new data items must also be captured by the Project.

Changes to the type of data collected will continually occur as new investigations, therapy and drugs are developed. This is demonstrated by the increasing use of breast MRI, HER2 testing and the different chemotherapy regimens. The use of SLNB and breast reconstruction techniques has also changed during the 10 years of the Project.

Gene-expression profiling has the ability to predict the prognosis of individual patients as well as to identify patients who will or will not benefit from adjuvant therapy. To date, four different classes of breast cancers have been identified which correlate clinically to prognosis and the response to treatment. Examples of gene assays which are available in Europe and the United States include Mammaprint, Oncotype DX, Theros and MapQuant Dx. These have been shown to be more accurate when compared to more conventional predictors of prognosis such as Adjuvant! Online (www.adjuvantonline.com). In the future, when such testing is available in Australia, the Quality Assurance Project may also have to include gene-expression profiles within the database.

Accelerated partial breast irradiation (APBI) is a technique in which only the affected breast tissue is treated with radiotherapy therefore enabling a much shorter course of radiotherapy. This significantly reduces the time required for radiotherapy from 6–7 weeks to 4–5 days. As there is less normal tissue irradiated it is likely that long-term toxicities will be reduced. However, the amount of tissue included in the target area, the optimal dose required and the long term efficacy and safety will not be known for many years. There may be a well-defined group of women who can be treated with APBI outside the setting of a clinical trial and these women will form another subset in the database.

Knowledge is also increasing about the human genome and genes specifically associated with an increased risk of developing breast cancer. Currently patients can be stratified into low, intermediate or high risk groups for developing breast or ovarian cancer. This allows genetic counselling and testing to be offered to individuals and it influences the type and frequency of breast screening required. The Project currently asks clinicians to allocate patients to one of three risk categories based on family history. However the information collected on risk will most likely need to become more specific as genetic testing becomes more frequent and risk factors are more objectively stratified.

The Project also aims to extend the use and value of its data through various collaborations. The BCTG has agreed to a collaboration with the NSW Breast Cancer Tissue Bank in the prospective collection of information, blood and tissue samples from breast cancer patients. The Quality Assurance Project continues to provide information to the Royal Australasian College of Surgeons Breast Cancer Audit and is considering a
future participation in BioGrid, another Australian medical research project. Through these and future collaborations, data from the BCTG Project will be able to provide a significant contribution to national and possibly international research. This will firmly establish the Group as an important presence in breast cancer research.
Appendix 1: Related publications and report

1 Papers published in academic journals


Breast cancer guidelines in action: the challenge is to develop and sustain audit programs on an ongoing basis, editorial comment, March 2000, Medical Journal of Australia, 172:196


2 Published abstracts


3 Presentations/Posters at national and international conferences


3.11 Measuring up Multi-focal Breast Cancer – a Retrospective Analysis of Tumour Size and Lymph Node Status in Multi-focal/Multi-centric Breast Cancer in the ACT and South-East NSW. Rezo A, Rodins K, Dahlstrom J, Davis A. Grand Rounds, November 2005, The Canberra Hospital, Canberra, Australia
3.12  A retrospective analysis of tumour size and lymph node status in multifocal breast cancer in Australian Capital Territory and South-East New South Wales. Pathology Update 2006. Rodins K, Rezo A, Davis A, Dahlstrom J. Sydney Convention Centre, Sydney, Australia, 10–12 March [This presentation won the Board of Education poster prize]


4  Research report

Appendix 2: BCTG – terms of reference and membership

2.1 The terms of reference
• To develop and review protocols for the treatment and management of breast cancer for each of the clinical groups.
• To disseminate information about those protocols and assist in educating both individuals and groups in the management and treatment of breast cancer.
• To develop linkages with other national groups.
• To promote research into current breast cancer treatment in the Canberra region, both basic and outcome based.
• To develop an agreed minimum data-set.
Confirmed 9 December 1996

2.2 Chair person(s):
• Doris Zonta (Dec 1996 to Dec 1998)
• Shirley Bowen (May 1999 to June 2000)
• Jenny Brogan (June 2000 to Dec 2003)
• Jane Dahlstrom (chair) and Bev Gow-Wilson (deputy chair) (Dec 2003 to Dec 2005)
• Paul Dugdale (chair) and Anne Bicknell (deputy chair) (Jan 2006 to Dec 2007)
• Carolyn Cho (chair) and Jane Dahlstrom (deputy chair) (Jan 2008 to present)

2.3 Representatives from the following organisations were members of the Breast Cancer Treatment Group
• ACT Continuing Care - Community Health, Social Work Psychosocial Service
• ACT Clinical Genetics, The Canberra Hospital, ACT
• ACT Health, Epidemiology Branch, Population Health Division, ACT
• ACT Health Population Health Research Centre
• Anatomical Pathology, ACT Pathology, The Canberra Hospital, ACT
• Bosom Buddies
• BreastScreen ACT & SE NSW, Canberra, ACT including independent clinicians
• Breast Cancer Network Australia
• Breast Care Nursing Service, Bega Hospital
• Calvary Health Care Lymphoedema Service, Calvary Hospital, ACT
• Calvary Health Care ACT, Specialist Breast Care Nurses, Bruce ACT
• Cancer Council ACT, Fairbairn, ACT
• Cancer Institute NSW Oncology Mobile Social Work Service
• Capital Pathology (Sonic Healthcare), Histopathology Department, ACT
• Capital Region Cancer Service, Medical Oncology and Radiation Oncology, The Canberra Hospital, ACT
• General Practitioners from the ACT and South-Eastern NSW
• Greater Southern Area Health Service, Bega, Moruya, Goulburn, Queanbeyan, Wagga and Yass
• John James Medical Centre, Medical Oncology, Deakin ACT
• Psychosocial Cancer Services, Inpatient Services, The Canberra Hospital, Woden ACT
• Quality Assurance Project, Breast Cancer Treatment Group, Canberra City, ACT
• Social Work Department, Radiation and Medical Oncology, The Canberra Hospital, Woden, ACT
• Surgeons from Calvary Clinic, Calvary Hospital, John James Memorial Hospital, National Capital Private Hospital, and The Canberra Hospital, in the Australian Capital Territory
• Surgeons from Ellesmere Specialist Centre, Goulburn NSW
Appendix 3: Data collection form

<table>
<thead>
<tr>
<th>13. Bilateral/Second primary cancer?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

14. DISEASE HISTORY

- Menopausal status:
  - Pre-menopausal
  - Peri-menopausal
  - Post menopausal
  - NA

- Family history:
  - At or slightly above average risk
  - Moderately increased risk
  - Potentially high risk

- Past history:
  - No previous cancer
  - Previous DCIS
  - Previous breast cancer
  - Other cancer

15. PRE-OPERATION (if answer ‘no’, go to number 15)

- Yes
- No

- Pre-chemotherapy, if yes, date:
- Pre-radiotherapy, if yes, date:
- Pre-hormonal, if yes, date:

16. INVESTIGATIONS/MANAGEMENT

- Mammogram
- Core/Mammotome biopsy
- Ultrasound
- F. N. A. C.
- Other specify:

17. CLINICAL STAGE

- T
- N
- M
- Unknown

18. PROCEDURE (please tick ✓ as appropriate)

- BREAST SURGERY: Yes ☑ No ☐

*If answer yes, provide copy of pathology report for all procedures.

**Breast Conservation**

- Open Biopsy, Right ☐ Left ☐ Date: / / 
- Local excision, Complete ☐ Incomplete ☐
- Re-excision, Complete ☐ Incomplete ☐
- Mastectomy, Right ☐ Left ☐ Date: / / 

**Reason for mastectomy**

- Clinical situation (if yes, tick ✓ as appropriate)
  - cosmesis
  - tumour stage
  - inadequate clearance

- Patient choice
- Recurrent disease

**Axillary Surgery**

- Sentinel node biopsy Date: / / 
- Sampling 0-4 nodes Date: / / 
- Clearance (level II at least) Date: / / 

Revised 23 Aug 2005
### A Study of Breast Cancer Treatment in ACT & Surrounding Region

**19. ADJUVANT TREATMENT (tick all appropriate)**

<table>
<thead>
<tr>
<th>Radiotherapy:</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Offered, but refused</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiation Oncologist Name:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Breast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Supraclavicular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Chest wall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Int. mammary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Axilla</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Other specify:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemotherapy:</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Offered, but refused</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Oncologist Name:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ C.M.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ AC/EC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ AC/EC+CMF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ FEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ AC/EC+TAXOL/TAXANE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Other specify:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hormonal:</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Offered, but refused</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinician Name:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Tamoxifen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Oophorectomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Zoladex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Aromatase Inhibitor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Other, specify:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**20. Clinical Trial:**

Has the patient entered a clinical trial?

- Yes
- No

If yes, protocol number: ____________________________

**21. PATHOLOGY (tick all appropriate)**

<table>
<thead>
<tr>
<th>*Multiple Unilateral Tumour?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

*If yes, please record details of the worst tumour.*

<table>
<thead>
<tr>
<th>Microscopic tumour (principal) size:</th>
</tr>
</thead>
</table>

**Invasive**

- 0-10 mm
- 11-20 mm
- 21-50 mm
- >50 mm
- Unknown

**DCIS/Non-Invasive**

- 0-10 mm
- 11-20 mm
- 21-50 mm
- >50 mm
- Unknown

<table>
<thead>
<tr>
<th>Tumour (principal) site:</th>
</tr>
</thead>
</table>

- UOQ
- UIQ
- LIQ
- LOQ
- Central
- Other, specify: ____________________________

**HISTOLOGICAL TYPE OF TUMOUR**

<table>
<thead>
<tr>
<th>Inv &lt;br&gt;Invasive Ductal (NOS)</th>
<th>Inv L</th>
<th>Special types</th>
<th>Other – specify:</th>
</tr>
</thead>
</table>

**Ductal Carcinoma In Situ (DCIS)/Non-Invasive**

- DCIS comedo
- DCIS non-comedo
- Other specify: ____________________________

**Grade: (Bloom and Richardson)**

- I
- II
- III
- Unknown
- N/A

**Nuclear Grade: (DCIS/Non-Invasive)**

- Low
- Intermediate
- High
- Unknown
- NA

**Vessel invasion**

- Yes
- No
- Unknown

**Margin (of excision):**

| Inv <br>DCIS <br>0 | Inv <br>DCIS <br>1-4 | Inv <br>DCIS <br>5-10 | Inv <br>DCIS >10 | N/A |

<table>
<thead>
<tr>
<th>Axillary lymph nodes</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Number of nodes removed/found:</th>
</tr>
</thead>
</table>

- 0
- 1-4
- 5-10
- >10
- N/A

<table>
<thead>
<tr>
<th>Number of nodes involved:</th>
</tr>
</thead>
</table>

- 0
- 1-4
- >4
- N/A

**Metastases:**

<table>
<thead>
<tr>
<th>Bone</th>
<th>Brain</th>
<th>Lung</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td>Other, specify: ____________________________</td>
<td></td>
</tr>
</tbody>
</table>

**Oestrogen receptor (ER) status:**

- Positive
- Negative
- Unknown
- NA

**Progesterone receptor (PR) status:**

- Positive
- Negative
- Unknown
- NA

**C-ERB 2 receptor status:**

- Positive
- Negative
- Unknown
- NA

**Date of form completion:**

**Office use only ☕️**

**Patient ID Number:**

| ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ |

**Date Form Entered:**

| ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ |
# Appendix 4: Breast cancer patient notification card

**BREAST CANCER PATIENT NOTIFICATION CARD**

<table>
<thead>
<tr>
<th>Date of Diagnosis:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Initials:</td>
<td></td>
</tr>
<tr>
<td>Patient Post Code:</td>
<td></td>
</tr>
<tr>
<td>Date of Birth:</td>
<td></td>
</tr>
<tr>
<td>UR Number:</td>
<td></td>
</tr>
<tr>
<td>Hospital:</td>
<td></td>
</tr>
<tr>
<td>Referring GP:</td>
<td></td>
</tr>
<tr>
<td>GP State</td>
<td></td>
</tr>
<tr>
<td>GP PC:</td>
<td></td>
</tr>
<tr>
<td>Clinician in Charge</td>
<td></td>
</tr>
</tbody>
</table>

**To notify:** Please complete this card for all patients newly diagnosed with breast cancer and forward to:

Quality Assurance Project  
ACT & SE NSW Breast Cancer Treatment Group  
Capital Region Cancer Services, ACT Health  
Level 1, Health Building  
GPO Box 825  
ACT 2601

Office Use Only - Patient ID Number:  

---

**Notes:**

- Ensure all fields are completed accurately.
- Forward the completed card to the specified address.
- Use for quality assurance and monitoring purposes.
Where are my results going?

The ACT Breast Cancer Treatment Project collects all information. Your information is strictly confidential. Personal information on any patient is accessible only to the Project Officer and Project Coordinator. Results from the project will not be linked to any individual patient.

What do I do if I decide to leave the project?

You can cease participating in the project at any stage. Please tell your doctor of your decision.

Are there similar projects elsewhere?

Currently, the International Breast Cancer Intervention Study (IBIS) clinical trial is studying the use of Tamoxifen, a drug widely used to treat breast cancer, in the prevention of breast cancer.

The Canberra Hospital Medical Oncology Unit is the Canberra centre for the IBIS trial. For further information about this study call (02) 6244 3645.
What is the Breast Cancer Treatment Project?

The Breast Cancer Treatment Project is conducted by the ACT and South East NSW Breast Cancer Treatment Group. The group is made up of surgeons, oncologists, pathologists, nurses, epidemiologists, social workers, consumers, ACT Cancer Society representatives, GPs, and others involved in the management of patients with breast cancer.

The aim of the project is to collect and examine data on treatment and outcomes for patients with breast cancer. This will lead to improved breast cancer treatment in the ACT and surrounding region.

Why is the project being done?

Breast cancer is the most common cancer effecting women. The project has the potential to improve breast cancer treatment, to reduce the number of deaths from breast cancer and to improve quality of life for breast cancer patients in the ACT and surrounding regions.

What is the intended outcome of the project?

In the short term, the collated data results will assist individual doctors to assess the treatment they give to their patients and compare it to recommended clinical guidelines. In the long run, the result of the study will help to improve cancer treatment by promoting uniformly high standards.

Can this project benefit me?

Although this project may not directly benefit you, studies in Australia and overseas have shown that different treatment practices exist among doctors caring for patients with breast cancer, and this leads to different outcomes.

Any improvement in cancer treatment will benefit patients diagnosed with breast cancer and the community.

How can I find out which treatment is best for me?

The overall aim of the project is to assess current breast cancer treatment in our area. If you want to find out which is the best treatment for yourself, or if you are in doubt about your current treatment, you should discuss this with your doctor. ‘A Guide for Women with Early Breast Cancer’ contains a great deal of information on treatment options and is obtainable from the Cancer Council Helpline on 13 11 20, or from your doctor.

What should I do if I agree to take part in this project?

Before you make a decision, your doctor or nurse will discuss your participation in the project. You will then be asked to sign a consent form. If you decide to take part in the project, information about your treatment will be collected through your doctor and passed on to the Project Officer.
Appendix 6: Patient information sheet and consent form

ACT & SE NSW Breast Cancer Treatment
Quality Assurance Project
Information Sheet & Consent Form

The ACT & SE NSW Breast Cancer Treatment Project
The ACT & SE NSW Breast Cancer Treatment Group, which aims to improve the treatment of breast cancer, is a cooperative group comprised of clinicians and others interested in the management of breast cancer from the ACT & Southern NSW. The group is currently conducting a study to assess how women and men in the ACT region with breast cancer have been treated and how effective that treatment has been. In order to do so, the group is collecting information on women and men treated for breast cancer as part of its project.

How can you help
We are asking you to agree to have information about your illness collected by the breast cancer treatment project. Your treatment and care will not be altered in any way. Most of the information will be provided by your doctor, but some may be sought from the pathologists who reported on your biopsies, and from the hospital in which you were treated. Information will also be sought from Cancer Registry data & other relevant registries. About once a year your doctor will notify the project of any complications you may have experienced.

Confidentiality
The information collected will be used to assess the treatment of breast cancer in the ACT region. The information collected will be kept confidential. No women or men participating in the project will be identified in any way.

Informed Consent
Participation in the project is entirely voluntary. Should you choose not to have your information included; this will not alter the care and treatment you will receive. If you choose to withdraw your consent at any time you need not give a reason, and it will not affect your future health care.

Questions
If you have any queries or concerns regarding your rights as a participant in this project, you may contact the chairperson, Ethics Committee, ACT Department of Health & Community Care, phone (02) 6205 0946. You will be given a copy of this information sheet to keep.

For further information
You may obtain further information about the project from: Project Officer, Cancer Treatment Quality Assurance Project, ACT Health, Tel: (02) 6205 1542, or visit: www.health.act.gov.au/Research/BreastCancerTreatmentQualityAssuranceProject.

<table>
<thead>
<tr>
<th>Patient Consent Form</th>
<th>Birthdate: [ ] [ ] [ ] [ ] [ ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Name:</td>
<td>(Family name) (Other names)</td>
</tr>
<tr>
<td>I have read and understand the Information Sheet for volunteers participating in the study.</td>
<td></td>
</tr>
<tr>
<td>I agree to take part in this study.</td>
<td>I would prefer not to participate in this study.</td>
</tr>
<tr>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Clinician’s signature</td>
<td>Date</td>
</tr>
</tbody>
</table>
Appendix 7: Follow-up form

ACT and SE NSW Breast Cancer Treatment Quality Assurance Project

Breast Cancer Patient Follow-Up Form

CONFIDENTIAL

Patient ID:

To be completed at 12 months, and then biannually. Send to: PO Box 825, ACT 2601 (reply-paid envelope is attached)

Date form sent: Patient Name:
Clinician Name: Date of Birth:
GP Name: Date Notified:
Surgery place: Date form due:

Date you last saw this patient:

PATIENT’S CURRENT STATUS (tick as appropriate):
1. Alive disease free? If yes, date next appointment:
2. Alive with recurrent disease?
   If yes, date first progression:
   Site(s) of recurrent disease (tick as appropriate):
   Local: Distant: Treatment for progression:
   Regional: Unknown: Date treatment started:
3. Has this patient deceased? If yes, date of death:
   Cause of death (tick as appropriate):
   Breast cancer disease related:
   Others (please specify details):
4. Unknown

Has breast reconstruction been done? Yes No Unknown
   If Yes, Date breast reconstruction (approx date)
   Type breast reconstruction:
   Place reconstruction performed

Form completed by (tick as appropriate):
1 (1) Clinician in charge: 2 (2) General practitioner: 3 (3) Others:
Date of form completed: Specify
**ACT and SE NSW Breast Cancer Treatment Quality Assurance Project**

**Breast Cancer Patient First Follow-Up Report**

**CONFIDENTIAL**

- **Date:**
- **Patient ID:** [redacted]
- **Patient Name:** First name, SURNAME
- **Patient post code:**
- **Date of Birth:**
- **Date Notification:**

**ClinID:**
**GPID:**

Our records show that patient had the following treatment when registered, details below:

<table>
<thead>
<tr>
<th>Breast Surgery</th>
<th>Date</th>
<th>Adjuvant Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biopsy</td>
<td></td>
<td>Radiotherapy:</td>
</tr>
<tr>
<td>Local excision</td>
<td></td>
<td>Chemotherapy:</td>
</tr>
<tr>
<td>Re-excision</td>
<td></td>
<td>Hormonal therapy:</td>
</tr>
<tr>
<td>Mastectomy</td>
<td></td>
<td>Tamoxifen:</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>Aromatase Inhibitor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trastuzumab (Herceptin):</td>
</tr>
</tbody>
</table>

Did we miss any details on the treatment for the primary breast cancer during the last year?
Appendix 8: Individual clinician summary report

Below is a table summarizing individual clinician feedback reports. The report includes information on patient demographics, clinical disease status, and treatment details such as Tumor Types, Grade, Margin, Vessel invasion, and Hormone receptor status. The table is organized to provide a comprehensive overview of the patient's medical history and treatment outcomes.

### Individual Clinician Summary Feedback Report

**July 1997 - June 2007**

<table>
<thead>
<tr>
<th>Demographic Health Status</th>
<th>Clinical Disease Status: Invasive</th>
<th>DCIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age distribution of patients</td>
<td>Yours</td>
<td>All</td>
</tr>
<tr>
<td>&lt;50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Menopausal status</td>
<td>Yours</td>
<td>All</td>
</tr>
<tr>
<td>Pre-menopausal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-menopausal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-menopausal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place of residence</td>
<td>Yours</td>
<td>All</td>
</tr>
<tr>
<td>ACT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE NSW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>Yours</td>
<td>All</td>
</tr>
<tr>
<td>The Canberra Hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calvary Hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>John James Hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ourcal ACT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer detection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen detected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BreastScreen Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None-Screen detected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior investigations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic Mammogram</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast ultrasound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core biopsy/Mammotome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. N. A. C.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (eg CT/ech, MRI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biopsy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local excision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Re-excision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastectomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axillary dissection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No axillary surgery/NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sentinel node biopsy only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sentinel node biopsy + clearance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjuvant treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiotherapy offered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemotherapy offered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hormone therapy offered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Targeted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hormone inhibitor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latest follow-up results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alive and disease free</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alive with disease/recurrent disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death due to breast cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Died without evidence of breast cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lost to follow-up</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Clinician ID:**

**Update:** dd/mm/yyyy
# Appendix 9: RACS report–Breast cancer audit requirements

**ACT SE NSW Breast Cancer Treatment Quality Assurance Project**

<table>
<thead>
<tr>
<th>Description</th>
<th>Data print:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case ID:</td>
<td>Patient ID:</td>
</tr>
<tr>
<td>URRno:</td>
<td>Surgeon ID:</td>
</tr>
<tr>
<td>Consent to BCTG Project:</td>
<td>Clinician ID:</td>
</tr>
</tbody>
</table>

1. **Tumour Type - Invasive/in situ:**
2. **Bilateral Synchronous Cancer:**
3. **Previous Surgery:**
4. **Date Diagnosis:**
5. **Menopausal Status:**
6. **Pre-operative diagnosis by:**
   - **Technique**
     - Mammography:
     - Ultrasound:
     - FNA, Cytology:
     - Core Biopsy:
     - Other:
   - **Tick yes, if done**
   - **Positive? Y/N**
7. **Laterality of principal breast cancer:**
8. **Location of principal tumour:**
   - Upper Outer Quadrant:
   - Lower Outer Quadrant:
   - Upper Inner Quadrant:
   - Lower Inner Quadrant:
   - Central:
   - Others:
     - **Specify:**
9. **Surgical Intervention(s):**
   - **If yes, Date**
   - Open Biopsy:
   - CLE:
   - Re excision:
   - Mastectomy:
   - Reconstruction:
10. **Auxiliary Surgery:**
    - **Sentinel Node Biopsy:**
      - **No**
      - **Date Sentinel:**
      - **Date Sampling 0-4:**
      - **Clearance - Local excision:**
      - **Clearance - Re-excision:**
      - **Clearance - Mastectomy:**
11. **Histological type of invasive Tumour:**
    - Ductal NOS:
    - Infiltrating Lobular:
    - Special type:
    - Other type:
    - **Specify:**
12. **DCIS only:**
    - DCIS comedo:
    - If yes, tumour Size:
    - DCIS non-
13. **Histological grade-principal tumour:**
14. **Vascular/Lymphatic Invasion:**
15. **Tumour (principal) size in mm:**
16. **Number of invasive breast cancer:**
    - Multiple Unilateral Tumor:
17. **EIC in or contiguous with invasive tumour:**
18. **Margin Assessment:**
19. **Lymph Nodes examined:**
   - **Nodes Positive:**
20. **Clinical TNM stage:**
   - **T:**
   - **N:**
   - **M:**
   - **Unknown:**
21. **Receptor status:**
   - Oestrogen:
   - Progesterone:
   - C-ERB 2:
22. **Adjuvant Therapy referred:**
    - Radiotherapy
    - Chemotherapy
    - Tamoxifen
    - Ovarian Ablation
    - Aromatase Inhibitor
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Adriamycin and cyclophosphamide</td>
</tr>
<tr>
<td>ACT</td>
<td>Australian Capital Territory</td>
</tr>
<tr>
<td>ADH</td>
<td>Atypical ductal hyperplasia</td>
</tr>
<tr>
<td>AIHW</td>
<td>Australian Institute of Health and Welfare</td>
</tr>
<tr>
<td>AI</td>
<td>Aromatase inhibitor</td>
</tr>
<tr>
<td>APBI</td>
<td>Accelerated partial breast irradiation</td>
</tr>
<tr>
<td>ASCO</td>
<td>American Society of Clinical Oncology</td>
</tr>
<tr>
<td>ASTRO</td>
<td>American Society for Radiation Oncology</td>
</tr>
<tr>
<td>BCS</td>
<td>Breast conserving surgery</td>
</tr>
<tr>
<td>BCTG</td>
<td>Breast Cancer Treatment Group</td>
</tr>
<tr>
<td>BIG</td>
<td>Breast International Group</td>
</tr>
<tr>
<td>CMF regimen</td>
<td>Cyclophosphamide, methotrexate and 5-fluorouracil</td>
</tr>
<tr>
<td>DCIS</td>
<td>Ductal carcinoma in situ</td>
</tr>
<tr>
<td>DMSC</td>
<td>Data Management Sub Committee</td>
</tr>
<tr>
<td>EC</td>
<td>Epirubicin and cyclophosphamide</td>
</tr>
<tr>
<td>ER</td>
<td>Oestrogen receptor</td>
</tr>
<tr>
<td>FEC</td>
<td>5-Fluorouracil, epirubicin and cyclophosphamide</td>
</tr>
<tr>
<td>FEC-D</td>
<td>FEC (3 cycles) followed by 3 cycles of docetaxel (Taxotere) sometimes called PACSO1</td>
</tr>
<tr>
<td>FNAC</td>
<td>Fine needle aspiration cytology</td>
</tr>
<tr>
<td>GnRH</td>
<td>Gonadotropin releasing hormone</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>GSAHS</td>
<td>Greater Southern Area Health Service</td>
</tr>
<tr>
<td>HER2</td>
<td>Human epidermal growth factor receptor – Type 2 (herceptin receptor gene, also known as C-ERB2 gene)</td>
</tr>
<tr>
<td>HR</td>
<td>Hazard ratio</td>
</tr>
<tr>
<td>M</td>
<td>Mastectomy</td>
</tr>
<tr>
<td>MMM</td>
<td>Mitomycin C, methotrexate and mitrozantrone</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>MO</td>
<td>No distant metastases</td>
</tr>
<tr>
<td>MRI</td>
<td>Magnetic resonance imaging</td>
</tr>
<tr>
<td>n</td>
<td>number</td>
</tr>
<tr>
<td>NA</td>
<td>Not applicable</td>
</tr>
<tr>
<td>NBCA</td>
<td>National breast cancer audit</td>
</tr>
<tr>
<td>NBOCC</td>
<td>National Breast and Ovarian Cancer Centre</td>
</tr>
<tr>
<td>NC</td>
<td>Novantrone and cyclophosphamide</td>
</tr>
<tr>
<td>NHMRC</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>NOS</td>
<td>Not otherwise specified</td>
</tr>
<tr>
<td>PR</td>
<td>Progesterone receptor</td>
</tr>
<tr>
<td>QAP</td>
<td>Quality Assurance Project</td>
</tr>
<tr>
<td>RACS</td>
<td>Royal Australasian College of Surgeons</td>
</tr>
<tr>
<td>SD</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>SE NSW</td>
<td>South Eastern New South Wales</td>
</tr>
<tr>
<td>SERMS</td>
<td>Selective oestrogen receptor modulators</td>
</tr>
<tr>
<td>SLNB</td>
<td>Sentinel lymph node biopsy</td>
</tr>
<tr>
<td>SOFT</td>
<td>The suppression of ovarian function trial</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical package for social sciences</td>
</tr>
<tr>
<td>TAC</td>
<td>Taxotere, adriamycin and cyclophosphamide</td>
</tr>
<tr>
<td>TNM</td>
<td>Primary tumour (T), lymph node (N), distant metastasis (M)</td>
</tr>
</tbody>
</table>
References


