Breast cancer in Western Australia: clinical practice and clinical guidelines

Suzanne P McEvoy, David M Ingram, Michael J Byrne, David J Joseph, Joanna Dewar, James Trotter, Chris Harper, Claire Haworth, Jennett M Harvey, Greg F Sterrett, Konrad Jamrozik and Lin Fritschi

ABSTRACT

Objectives: To review changes in patterns of care for women with early invasive breast cancer in Western Australia from 1989 to 1999, and compare management with recommendations in the 1995 National Health and Medical Research Council guidelines.

Design and setting: Population-based surveys of all cases listed in the Western Australian Cancer Registry and Western Australian Hospital Morbidity Data System.

Main outcome measures: Congruence of care with guidelines.

Results: Data were available for 1649 women with early invasive breast cancer (categories pT1or pT2; pN0 or pN1; and M0). In 1999, 96% had a preoperative diagnosis by fine-needle aspiration or core biopsy (compared with 66% in 1989), with a synoptic pathology report on 95%. Breast-conserving surgery was used for 66% of women with mammographically detected tumours (v 35% in 1989) and 46% of those with clinically detected tumours (v 28% in 1989), with radiotherapy to the conserved breast in 90% of these cases (83% in 1989). Adjuvant chemotherapy was given to 92% of premenopausal women with node-positive disease and 63% with poor-prognosis node-negative tumours (v 78% and 14%, respectively, in 1989). Among postmenopausal women with receptor-positive tumours, tamoxifen was prescribed for 91% of those with positive nodes (85% in 1989) and 79% of those with negative nodes (30% in 1989). Among postmenopausal women with receptor-negative tumours, chemotherapy was prescribed for 70% with positive nodes (v 33%) and 58% with negative nodes (v none).

Conclusions: Patterns of management of women with early invasive breast cancer in Western Australia during the 1990s changed significantly in all respects toward those recommended in the 1995 guidelines.

MJA 2004; 181: 305–309

The National Health and Medical Research Council (NHMRC), through the National Breast Cancer Centre, has published a series of guideline documents.[1,2] These are designed to inform medical practitioners and the public of the best information currently available on the management of women with breast cancer. The documents recommend certain practices, but also allow evaluation of the level of the evidence that informs such recommendations.

Monitoring of outcomes is an essential part of the guidelines process. In 1995, the House of Representatives Standing Committee report on the management and treatment of breast cancer in Australia noted the lack of monitoring at that time, and urged a comprehensive national monitoring system.[3]

We collected detailed information for all women diagnosed with breast cancer in the state of Western Australia (WA) in 1989, 1994 and 1999.[4-9] Using data from these surveys, we have examined the changes in the management of breast cancer in WA over the decade spanning the publication of the initial guideline document in 1995. We chose relevant recommendations from the *Clinical practice guidelines for the management of early breast cancer*[1] and measured clinical practice against these recommendations.

METHODS

Setting

These population-based studies were conducted in WA, which in 1996 had a population of 1.8 million people. About 70% of the population lived in the capital city, Perth, and the remainder lived in regional and remote settings. A full range of screening, diagnostic and treatment facilities for breast cancer is available in Perth. Many of these services are also available in larger regional centres. Mobile mammography units provide screening in remote areas.

Case ascertainment

For each of the three study years (1989, 1994 and 1999), the Western Australian Cancer Registry provided a list of all women diagnosed with breast cancer in the calendar year. The registry also provided any available pathology results for these cases. To maximise case ascertainment, we conducted additional searches of the Western Australian Hospital Morbidity Data System, which contains information on all hospitalisations throughout the state.

Data collection

A pre-coded data form containing information on the presentation, investigation and management of breast cancer was completed for all women diagnosed with breast cancer in the state during each study year. While the structure of the questionnaire remained unchanged throughout the study, adjustments were made in 1999 to capture additional information on family history, disease management and histopathology.

School of Population Health, University of Western Australia, Perth, WA.
Suzanne P McEvoy, MAppEpid, FAFPHM, Medical Epidemiologist;
Claire Haworth, RN, Research Nurse; **Jennett M Harvey**, FRCPA, Associate Professor;
Lin Fritschi, PhD, FAFPHM, Associate Professor.
Sir Charles Gairdner Hospital, Perth, WA.
David M Ingram, MS, FRACS, Surgeon, and Research Associate, Breast Centre;
Michael J Byrne, BMedSci, FRACP, Head of Medical Oncology; **Joanna Dewar**, FRACP, Medical Oncologist; **David J Joseph**, FRANZCR, Head of Radiation Oncology.
Royal Perth Hospital, Perth, WA.
James Trotter, MD, FRACP, Head of Medical Oncology.
Perth Radiation Oncology Centre, Perth, WA.
Chris Harper, FRANZCR, Radiation Oncologist.
Pathcentre, Perth, WA.
Greg F Sterrett, FRCPA, FIAC, Pathologist.
Department of Primary Care and Social Medicine, Imperial College, London, UK.
Konrad Jamrozik, DPhil, FAFHM, Professor of Primary Care Epidemiology.
Reprints will not be available from the authors. Correspondence: Dr Michael J Byrne, Department of Medical Oncology, Sir Charles Gairdner Hospital, Nedlands, WA 6009.
mjbyrne@cyllene.uwa.edu.au

1 Key recommendations and statements on management of early breast cancer from the 1995 National Health and Medical Research Council guidelines[1]

Diagnostic procedures

1. The use of either fine needle aspiration or core biopsy to establish a preoperative diagnosis allows detailed discussion with the woman about surgical management, and may permit a one-stage surgical procedure (*page 39*).*
2. Frozen-section histological examination has a very limited application in the management of primary breast cancer. It should not be performed for mammographically detected impalpable lesions (*page 40*).

Pathology reports

3. Pathology reports should contain information on the following: tumour size, type, histological grade, tumour margins, presence or absence of multifocality, presence or absence of ductal carcinoma *in situ*, presence or absence of vessel space invasion in the main tumour, examination of all removed axillary nodes, oestrogen-receptor status and progesterone-receptor status (*page 42*).

Surgical management

4. About 70% of mammographically detected cancers and 50% of clinically detected cancers are suitable for breast conservation (*page 50*).

Radiotherapy

5. Radiotherapy after lumpectomy reduces the risk of local recurrence (*page 60*).

Adjuvant therapy

6. Tamoxifen significantly improves recurrence-free survival at all ages (*page 82*).
7. Premenopausal node-positive tumours: combination chemotherapy with six cycles of CMF (cyclophosphamide, methotrexate and 5-fluorouracil) or four cycles of doxorubicin and cyclophosphamide. In women with receptor-positive tumours, ovarian ablation may be considered as an alternative (*page 88*).
8. Premenopausal, node-negative tumours: as above, but only for tumours with poor prognostic features (*page 88*).
9. Postmenopausal, node-positive, receptor-positive: tamoxifen for 2–5 years. In women aged under 65 or those with poor prognostic features, chemotherapy given before tamoxifen adds benefit (*page 89*).
10. Postmenopausal, node-positive, receptor-negative tumours: combination chemotherapy (*page 89*).
11. Postmenopausal, node-negative, receptor-positive tumours: tamoxifen for 2-5 years (*page 89*).
12. Postmenopausal, node-negative, receptor-negative tumours: chemotherapy should be considered for younger postmenopausal women and those whose tumours have poor prognostic features (*page 89*).

---

* In the document *Clinical practice guidelines for the management of early breast cancer.*[1]

For each study year, trained research personnel (research nurses or doctors) collected the data from hospital medical records and practice notes. For some cases managed in rural and remote areas, the questionnaire was completed by treating surgeons or general practitioners. For the 1999 cohort, one of us (S P McE) reviewed a sample of the patient hospital records to ensure data reliability.

Guideline review

We reviewed the 1995 *Clinical practice guidelines for the management of early breast cancer*[1] and identified 12 key recommendations and statements that related to diagnosis and management and were assessable by retrospective audit (Box 1). We reviewed clinical practice in WA relative to these guidelines for the three study years, with particular reference to changes in the pattern of management.

Definitions

The analysis was confined to women with early invasive breast cancer. This was defined on the basis of the pTNM classification system for staging of the International Union Against Cancer (5th edition)[10] as categories pT1 or pT2, pN0 or pN1, and M0. As sentinel-node biopsy was being used experimentally in 1999, at least one node had to have been removed and assessed by a histopathologist for nodal status to be determined.

Poor-prognosis tumours were defined as tumours >20 mm, or tumours 11–20 mm with at least one of the following features: oestrogen and progesterone receptor-negative; oestrogen or progesterone receptor-negative in the presence of "unknown" status for the other receptor; vessel space invasion; or high histological grade.[1]

As specific information on menopausal status was missing for many cases, we defined postmenopausal women as those aged over 50 years.[11]

Statistical analysis and ethical approval

The data were analysed to assess changes in management using the Statistical Package for Social Sciences (SPSS).[12] For discrete variables, frequency tables were generated to describe the data, and cross-tabulations performed. Changes in proportions over time were assessed with χ^2 for linear trend.

The study protocol was approved by the Confidentiality of Health Information Committee of the Western Australian Department of Health and the human research ethics committees of the participating hospitals and the University of Western Australia. Permission was also obtained from treating clinicians before viewing patients' medical records in their consulting rooms.

RESULTS

Patient demographic characteristics

Data were available for 1649 women diagnosed with early invasive breast cancer: 385 in 1989, 584 in 1994, and 680 in 1999. Age at diagnosis ranged from 22 to 99 years (mean, 56.7 years), with 522 women classified as premenopausal, and 1123 as postmenopausal (age was unknown for four). Most women (79.1%) were from metropolitan Perth and its surrounds, with the remainder from rural and remote regions of WA.

Diagnosis and reporting

Changes in the pattern of preoperative diagnostic procedures are shown in Box 2. Over the study period, there was an increase in the proportion of women who underwent fine needle aspiration and/or core biopsy, and an associated decrease in the use of frozen sections. In 1999, 96% of women diagnosed with early breast cancer had undergone either a fine-needle aspiration or

2 Use of diagnostic procedures and histopathology reporting among women with early breast cancer in Western Australia

	1989 (*n* = 385)	1994 (*n* = 584)	1999 (*n* = 680)
Diagnostic procedures			
Fine needle aspiration	247 (64.3%)	480 (82.5%)	623 (91.6%)
Core biopsy	13 (3.4%)	29 (5.0%)	183 (27.0%)
Fine needle aspiration or core biopsy*	255 (66.4%)	500 (85.8%)	651 (95.7%)
Frozen section (all early breast cancers)	203 (52.9%)	162 (27.7%)	58 (8.5%)
Frozen section (mammographically detected cancers)	19 (51.4%)	48 (23.5%)	10 (3.6%)
Histopathology reporting			
Tumour size†	385 (100%)	584 (100%)	680 (100%)
Grade	193 (50.1%)	503 (86.1%)	663 (97.5%)
Type†	385 (100%)	584 (100%)	680 (100%)
Margins	na	na	634 (93.2%)
Multifocality	378 (98.2%)	569 (97.4%)	680 (100%)
Extent of in-situ component	385 (100%)	559 (95.7%)	678 (99.7%)
Vascular invasion	120 (31.2%)	390 (66.8%)	6 59 (96.9%)
Lymph nodes examined†	385 (100%)	584 (100%)	680 (100%)
Oestrogen-receptor status	323 (83.9%)	395 (67.6%)	671 (98.7%)
Progesterone-receptor status	322 (83.6%)	393 (67.3%)	488 (71.8%)
Synoptic reporting‡	na	262 (46.0%)	644 (94.7%)

na = data not available. * Percentages do not add up, as some women had both fine needle aspiration and a core biopsy. † As tumour size, type and lymph node status were required to classify cases as early breast cancer, percentages were 100% in all years. ‡ Report included a summary of prognostic features in checklist form.

a core biopsy, or both. These changes are consistent with the recommendations in the guideline document (Box 1).

Changes in patterns of histopathology reporting are also shown in Box 2. Significant increases were noted in the reporting of tumour grade, vascular invasion and oestrogen-receptor status (*P* value for linear trend < 0.001 for each). By 1999, 95% of reports included a synoptic summary (a synopsis of the prognostic features in checklist form).

Management

Changes in management of early breast cancer are summarised in Box 3.

Surgical management and radiotherapy

Use of breast-conserving surgery increased over the decade. In 1989, 28% of women with clinically detected and 35% with mammographically detected early breast cancer were managed with a breast-conserving procedure, compared with 46% and 66%, respectively, in 1999 (*P* value for the linear trend < 0.001 for both groups). These proportions are consistent with the estimates of those suitable for breast conservation in the guideline document (Box 1, point 4).

Most women who underwent breast-conserving surgery were treated with radiotherapy to the residual breast, with the proportion increasing from 83% in 1989 to 90% in 1999 ($P = 0.005$).

Adjuvant therapy

The use of adjuvant tamoxifen and chemotherapy increased over the decade (Box 3). The type of chemotherapy used also changed (data not shown). In 1989, CMF/CMFp regimens predominated (cyclophosphamide, methotrexate and 5-fluorouracil, with or without prednisolone). By 1999, regimens containing an anthracycline (doxorubicin or epirubicin) were more common (no women in 1989, 69% in 1999).

Premenopausal women: Of the 522 women who were classified as premenopausal, 231 had node-positive disease and 291 had node-negative disease (165 with poor-prognosis and 126 with good-prognosis tumours). Most of those with node-positive disease received chemotherapy, with the proportion rising significantly over the decade, from 78% in 1989 to 92% in 1999 (*P* for trend = 0.02). Among those with node-negative disease, fewer women received chemotherapy, but the proportion also increased over the decade, significantly in those with poor-prognosis tumours (from 14% in 1989 to 63% in 1999; *P* for trend < 0.001).

The use of adjuvant tamoxifen also increased significantly over the decade in premenopausal women with receptor-positive tumours (from 21% in 1989 to 72% in 1999; $P < 0.001$).

Postmenopausal women: Of the 1123 women classified as postmenopausal, 325 had node-positive disease and 798 had node-negative disease.

Tamoxifen is recommended for postmenopausal women with receptor-positive tumours, and, in all years, was given to most of the women in this group who were node-positive (85% in 1989, and 91% in 1994 and 1999), and to increasing proportions of those who were node-negative (30% in 1989 to 79% in 1999; $P < 0.001$).

Chemotherapy is recommended for postmenopausal women with receptor-negative tumours if they are node-positive. Its use in this group increased significantly, from 33% in 1994 to 70% in 1999 (*P* for trend = 0.02). Chemotherapy should also be considered in postmenopausal women with receptor-negative, node-negative disease, if they are younger or have poor-prognosis tumours (Box 1, point 12). The proportions of those under 65 years and of those with poor-prognosis tumours who received chemotherapy rose significantly, from none in 1989 to 58% and 40%, respectively, in 1999.

DISCUSSION

Our data show a significant change in the patterns of diagnostic and therapeutic management of women with early invasive breast cancer in WA during the decade of the 1990s. In all respects, patterns of care have moved towards those recommended in the 1995 guidelines.

By 1999, nearly all women had either a fine needle aspiration or core biopsy diagnosis before surgery. In addition, a histopathology report containing a synopsis of the essential features of the tumour and nodes was available in 95% of cases.

Sixty-five per cent of women with mammographically detected cancers and 46% of those with clinically detected tumours had breast-conserving surgery, with radiotherapy to the conserved breast in 90% of cases.

Regarding all guidelines on adjuvant therapy (Box 1, points 6–12), the practice of WA oncologists improved significantly over the decade 1989 to 1999. For some subgroups,

3 Changes in management of early breast cancer in Western Australia

Management/subgroup	1989	1994	1999	*P**
Breast-conserving surgery				
Clinically detected cases	94 (28%)	174 (50%)	186 (46%)	< 0.001
Screen-detected cases	13 (35%)	104 (51%)	180 (66%)	< 0.001
Radiotherapy				
After breast-conserving surgery	92 (83%)	235 (82%)	331 (90%)	0.005
Chemotherapy				
Premenopausal, node +ve	45 (78%)	70 (91%)	88 (92%)	0.02
Premenopausal, node -ve				
Poor prognosis	5 (14%)	25 (39%)	41 (63%)	< 0.001
Good prognosis	1 (3%)	10 (22%)	9 (20%)	0.06
Postmenopausal				
< 65 years, poor prognosis	14 (15%)	30 (26%)	75 (48%)	< 0.001
Node +ve, receptor -ve	6 (33%)	10 (50%)	16 (70%)	0.02
Node -ve, receptor -ve, < 65 years	0	5 (19%)	22 (58%)	< 0.001
Node -ve, receptor -ve, poor prognosis	0	5 (15%)	18 (40%)	0.001
Tamoxifen				
All cases	155 (40%)	323 (56%)	458 (68%)	< 0.001
Premenopausal	26 (20%)	62 (34%)	116 (56%)	< 0.001
Receptor +ve	19 (21%)	36 (42%)	109 (72%)	< 0.001
Receptor -ve	3 (14%)	7 (19%)	5 (10%)	0.5
Postmenopausal				
Node +ve, receptor +ve	64 (85%)	62 (91%)	109 (91%)	0.3
Node -ve, receptor +ve	31 (30%)	92 (63%)	206 (79%)	< 0.001

* *P* for linear trend. +ve = positive. -ve = negative.

particularly premenopausal women with node-positive disease, over 90% of cases are now treated according to the guidelines. Further improvements in meeting the guidelines are still possible for women with node-negative, poor-prognosis tumours, both pre- and postmenopausal. Our data do not allow us to determine whether the constrained use of chemotherapy in these patients is due to community or clinician reluctance to use it.

Tamoxifen is now given to most postmenopausal women with receptor-positive tumours. Although the guidelines do not highlight the use of tamoxifen in premenopausal women, by 1999 this drug was included in the adjuvant therapy of most premenopausal women with receptor-positive tumours.

It is not possible to dissect the reasons for the changes in the patterns of care we observed. They are likely to reflect a constellation of influences, including the publication of primary data, which preceded and informed the guideline process,[13,14] the publication of meta-analyses of treatment,[15,16] the publication and publicity surrounding National Institutes of Health consensus conferences,[17] and the consensus statements[18] released in Australia before the guideline document. The introduction of breast cancer screening after 1989, and the more recent inception of systematic screening, probably also affected patterns of care.

However, surveys attest to the popularity, penetration and public acceptance of the 1995 guideline document. The initial response of clinicians was very positive; 97% of surgeons regarded it as a good summary of recent evidence, and 80% believed it would be useful in improving management.[19] In addition, surveys conducted by the National Breast Cancer Centre showed that two-thirds of women with early breast cancer were given the guideline document at the time of diagnosis.[20]

Increasing scrutiny of the quality of healthcare is likely to prompt more surgeons and oncologists to systematically document their patterns of investigation, management and outcome in breast cancer. However, such series are open to referral bias and residual uncertainty related to modest numbers. Furthermore, while audit reports from the state-based breast screening programs will provide useful information on some aspects of care of a subset of the population, the level of informal screening in the community and the targeted nature of the screening programs limit the scope of such data. Population-based reviews are therefore necessary if we are to obtain a clear picture as to trends in practice and its outcomes.

Ongoing monitoring of trends in the management of breast cancer is essential. In 1995, the House of Representatives Standing Committee concluded that this monitoring needs to be national,[12] and such a survey was completed for the 6 months before release of the national guidelines,[21] although it has not yet been repeated. Undertaking statewide,[4-8,22] much less national, surveys is a major and expensive exercise, and for these reasons is probably not the ideal way of gathering data. Funding bodies are sceptical that such projects constitute "research", while health departments are reluctant to conduct such elaborate audits.

The planned breast cancer audit program of the Royal Australasian College of Surgeons may provide an alternative. This novel audit relies on all surgeons sending data on the patients with breast cancer they have treated on computer disk to a central registry (soon to be online). As surgeons treat virtually all cases of early breast cancer, they are a logical collection point. While the system is voluntary, there is considerable pressure on surgeons to comply; entry of 100% of cases will be a condition of continuing membership of the Royal Australasian College of Surgeons Breast Section. Even then, this process may need to be supplemented by input from other specialist groups if comprehensive data on the management and outcomes of breast cancer are to emerge.

ACKNOWLEDGEMENTS

We thank staff at the Western Australian Cancer Registry, the Western Australian Department of Health, the participating hospitals, doctors and medical records staff, data collectors and biostatisticians for their involvement during the project.

This work was supported by a National Health and Medical Research Council grant and the Cancer Council of Western Australia.

COMPETING INTERESTS

None identified.

REFERENCES

1 National Health and Medical Research Council. Clinical practice guidelines for the management of early breast cancer. Canberra: AGPS, 1995.

2 National Health and Medical Research Council. Early breast cancer: a consumer's guide. Canberra: AGPS, 1995

3 House Of Representatives Standing Committee On Community Affairs. Report on the management and treatment of breast cancer in Australia. Canberra: AGPS, 1995.

4 Jamrozik K, Byrne M, Fitzgerald C, et al. Presentation of breast cancer in Western Australia in 1989. *ANZ J Surg* 1993; 63: 617-623.

5 Byrne M, Jamrozik K, Parsons R, et al. Breast cancer in Western Australia in 1989. II: Diagnosis and primary management. *ANZ J Surg* 1993; 63: 624-629.

6 Harvey JM, Sterrett GF, Parsons RW, et al. Breast cancer in Western Australia in 1989: IV. Summary of histopathological assessment in 655 cases. *Pathology* 1995; 27: 12-17.

7 Sterrett G, Harvey J, Parsons RW, et al. Breast cancer in Western Australia in 1989: III. Accuracy of FNA cytology in diagnosis. *ANZ J Surg* 1994; 64: 745-749.

8 Stevenson JM, Bochenek P, Jamrozik K, et al. Breast cancer in Western Australia in 1989. V: Outcome at 5 years after diagnosis. *ANZ J Surg* 1997; 67: 250-255.

9 Jamrozik K, Byrne MJ, Dewar JM, et al. The effect of mammographic screening on invasive breast cancer in Western Australia. *Med J Aust* 2000; 172: 203-206.

10 Sobin LH, Wittekind CH, editors. TNM classification of malignant tumours. 5th ed. New York: Wiley–Liss, 1997.

11 Morabia A, Costanza MC. International variability in ages at menarche, first livebirth and menopause. *Am J Epidemiol* 1998; 148: 1195-1205.

12 SPSS Inc. Statistical Package for the Social Sciences. Version 11.0. Chicago Ill: SPSS Inc, 2002.

13 Veronesi U, Saccozzi R, del Vecchio M, et al. Comparing radical mastectomy with quadrantectomy, axillary dissection and radiotherapy in patients with small cancers of the breast. *N Engl J Med* 1981; 305: 6-11.

14 Fisher B, Bauer M, Margolese R, et al. Five-year results of a randomized clinical trial comparing total mastectomy and segmental mastectomy with or without radiation in the treatment of breast cancer. *N Engl J Med* 1985; 312: 665-673.

15 Early Breast Cancer Trialists' Collaborative Group. Systemic treatment of early breast cancer by hormonal, cytotoxic or immune therapy: 133 randomised trials involving 31,000 recurrences and 24,000 deaths among 75,000 women. *Lancet* 1992; 339: 1-15.

16 Early Breast Cancer Trialists' Collaborative Group. Systemic treatment of early breast cancer by hormonal, cytotoxic or immune therapy: 133 randomised trials involving 31,000 recurrences and 24,000 deaths among 75,000 women. *Lancet* 1992; 339: 71-85.

17 Treatment of early-stage breast cancer. NIH consensus statements. Available at: consensus.nih.gov/cons.htm. (accessed May 2004).

18 Breast cancer consensus report. *Med J Aust* 1994; 161 (9 Suppl 7 Nov: S1-S16).

19 Carrick SE, Bonevski B, Redman S, et al. Surgeons' opinions about the NHMRC clinical practice guidelines for the management of early breast cancer. *Med J Aust* 1998; 169: 300-305.

20 Williams P, Redman S, Rankin N, et al. Is breast cancer care in accord with clinical practice guidelines: a consumer audit. *Breast* 2002; 11: 509-515.

21 Hill D, Jamrozik K, White V, et al. Surgical management of breast cancer in Australia in 1995. Sydney: NHMRC National Breast Cancer Centre, 1999.

22 White VM, Pruden M, Giles G, et al. The management of early breast cancer before and after the introduction of clinical practice guidelines. *Cancer*. In press.

(Received 10 May 2004, accepted 6 Jul 2004) ❑