SOUTH AUSTRALIAN SCREENING MAMMOGRAPHY PILOT PROJECT

AN INTERIM REPORT

Central Co-ordinating Unit
SOUTH AUSTRALIAN BREAST X-RAY SERVICE
April 1990

SA BREAST X-RAY SERVICE CENTRAL CO-ORDINATING UNIT

STAFF MEMBERS

Dr Margaret Dorsch, Program Director

Dr Helen Ingham, Senior Breast Clinician

Dr Angela McLean, Breast Clinician

Mrs Michelle Ward, Administrative Assistant

Mrs Carolyn Sutherland, Bookings Clerk

Mrs Marion Anderson, Clerical Assistant

Miss Kaye Williams, Key Punch Operator

Mrs Frida Cheok, Senior Project Officer (Economist)

Mrs Meryl Barreira, Casual Clerk

Acknowledgements

Staff of The Queen Elizabeth Hospital, Flinders Medical Centre, and the Royal Adelaide Hospital, as well as private medical practitioners, are thanked for the provision of data for this report. The contributions of Dr David Roder and Mr Richard Rohrsheim of the Epidemiology Branch, SA Health Commission, in the retrieval and analyses of these data are also gratefully acknowledged. Every effort has been made to ensure that the data presented in this interim report are as accurate and up-to-date as possible for women screened to 31 December, 1989. However, given reporting from multiple centres, the data should be treated as provisional at this stage.

CONTENTS

Introduction

Results of five prospective trials have indicated that mammographic screening - with or without concurrent physical examination - can lead to reductions in breast cancer mortality. [1-8] Sufficient details of four of these studies have been published to show that benefits mostly arise about five years after the commencement of screening and lead to subsequent reductions in breast cancer mortality of approximately 34% in women to whom screening has been offered. [1-7,9] Since only about two thirds of women offered screening in these trials have, in fact, participated, the overall reduction in mortality among participants after this initial five-year period is likely to have been greater than 34% - possibly around 50% (i.e., 34 / 0.66). [1-7]

More recently, results of another randomised trial have pointed to reductions in mortality from screening. [8] In addition, three case-control studies - two in Holland and one in Italy - have found the risk of breast cancer death to be from 40% to 70% lower in screened women. [10-12] While evidence from case-control studies generally is regarded as less conclusive than that from randomised prospective studies, [13] due mostly to the potential for selection bias, the results are consistent with those of prospective trials in pointing to reductions in mortality.

The body of evidence supporting the efficacy of mammographic screening is considerable and, in fact, exceeds that for other primary and secondary measures for cancer control. [14] Yet there are still major differences in opinion as to the relative costs and benefits of the procedure.

In the United States, the National Cancer Institute concluded in 1987 that the benefits of early detection by mammography could no longer be questioned. [14] In August 1989, the Journal of the Institute reported that 11 US medical organizations had joined forces to urge all women aged 40 years and older to obtain regular screening. [15] This reflected a broad base of support for mammographic screening in the United States. In the same month, a Symposium of the Nordic Cancer Union also acknowledged that screening for breast cancer by mammography alone can reduce mortality from the disease. [13]

The Australian Cancer Society, by comparison, is now taking a more cautious position. After advocating in 1987 that a national program be developed with a target of 70% coverage of eligible women by 1995, [16] the Society has subsequently adopted a more conservative policy as of February, 1990. [17] While continuing to support pilot programs, the Society indicated that there were grounds for caution in the expansion of services. Although accepting that there was 'reasonable evidence of benefit from screening in research settings for women over 50 years of age', the Society nonetheless drew attention to the unnecessary anxiety and surgery that would arise from false positives in some women.

Eleven pilot screening mammography programs are currently operating in Australia. In South Australia, the pilot screening program, known as the South Australian Breast X-Ray Service (SABXRS), was first established in November, 1988.

Screening for the SABXRS is currently undertaken at three teaching hospitals - The Queen Elizabeth Hospital, the Royal Adelaide Hospital, and Flinders Medical Centre. Recruitment, public education and appointments for screening are arranged through a Central Co-ordinating Unit (CCU). Routine screening x-rays are examined independently by two radiologists at the CCU, after which staff of the CCU arrange for women with radiographic abnormalities to receive follow-up appointments for further assessment.

Each hospital has a multidisciplinary clinical assessment team which helps ensure that few tumours will be missed and that the ratio of malignant to benign biopsies will be maximized. The CCU monitors recruitment, outcomes of screens and follow-up tests, and stage of progression at diagnosis of the breast cancers detected. These can all then be compared with overseas results. Through this means, a close monitoring of the general quality of performance of the program is maintained. Notification of women and their general practitioners is also arranged through the CCU.

It is the policy of the SABXRS to **actively** recruit only asymptomatic women aged 50-64 years. Women who do not fit these criteria are usually advised to see their general practitioners for referral to other service providers as appropriate. During the first nine months of operation, a combination of "opportunistic bookings" and personalised invitations was used in the client recruitment process.

In this report, statistical information collected by the Central Co-ordinating Unit is presented to show the operational characteristics and performance of the program for the first nine months of screening activity to December, 1989. During that period 5 965 women were screened.

Participation by Age

Emphasis is given in the SABXRS to screening women aged 50 years and over, and particularly women in the 50-64 year age range, since evidence supporting the efficacy of mammography has been more conclusive for women over 50 years than for younger women. [13]

In fact, the age distribution of women screened in 1989 was as follows:

* Under 50 years	0.3%
* 50-64 years	93.1%
* 65-69 years	6.2%
* 70+ years	0.3%

Notably, the 93% aged 50-64 years comprised approximately 6% of all South Australian women in that age range.

Participation by Place of Residence

Adelaide postcodes can be classified by median household income into three categories to infer socio-economic status. This procedure has been described elsewhere. [18]

From Table 1, it is evident that screening participation was highest for women resident in the upper socio-economic areas of Adelaide. Compared with this group, screening participation was:

* 9.5% lower in middle socio-economic areas of Adelaide
* 27.4% lower in lower socio-economic areas of Adelaide
* 73.8% lower in country areas.

Participation by Country of Birth

It is apparent from Table 2 that Australian-born women, and British-Irish migrants tended to participate more during these first nine months of the pilot screening program than other women born outside Australia. For both residents of Adelaide and the country areas, there was a relatively low level of participation of women of Southern European origin.

Outcome of Screen

Of the 5 965 women screened, 11% were found to have an abnormality on their screening x-ray that warranted further assessment (Table 3). This percentage did not vary appreciably by age within the target group and was broadly consistent with the 10% predicted in the Forrest Report to require assessment following a base-line screen. [19]

Further Assessment

A total of 675 women had a screen-detected abnormality that required further assessment (Table 3). The percentages of these women who subsequently received specified diagnostic procedures were as follows:-

Procedure	% of women assessed	(% of total women screened)
* Further mammography	99%	(11.2%)
* Ultrasound	5%	(0.6%)
* Fine needle aspirations	20%	(2.3%)
* Hookwire localisation	17%	(1.9%)
* Open biopsy	21%	(2.4%)

Biopsy Outcome

A total of 146 women (2.4%) were considered to require an open biopsy. This was a little higher than the 1.5% predicted for the base-line screen in the Forrest Report. [19]

Of these 146 women, one preferred not to seek a biopsy and another was given a referral for this procedure to be undertaken interstate due to her imminent emigration from South Australia. In a third case, the biopsy was not performed because the initial indications for the procedure had changed. In the remaining 143 women, biopsy outcomes were as follows:

Benign	80 (55.9%)
'Premalignant' lesions	8 (5.6%)
Ductal carcinoma in situ	12 (8.4%)
Invasive cancers	43 (30.1%)

The percentage of all women screened who were found to have invasive cancer (43 cases) or ductal carcinoma "in situ" (12 cases) was 0.9% (95% confidence range: 0.68% to 1.16%). Of these 55 women, 22% had "in situ" lesions. Hence, the percentage of all women found to have an invasive cancer was 0.7% (95% confidence range: 0.51% to 0.94%). These figures reflect a slightly higher cancer detection rate than the 0.6% predicted in the Forrest Report for the base-line screen. [19]

This cancer detection rate of 9.2 per 1 000 women screened, also compares favourably with the cancer detection rates of 7.5 and 9.8 per 1 000 reported for the Sydney and Melbourne pilot screening programs respectively. [20]

The ratio of benign biopsies to those showing specified pathology was 1.9 to 1 for invasive disease, but reduced to 1.5 to 1 if ductal carcinoma "in situ" was included in addition to invasive disease. For every one biopsy showing an invasive cancer or ductal carcinoma "in situ", there were 1.6 biopsies with a benign outcome or indication of a non-invasive lesion that would warrant clinical monitoring only. These figures correspond well with the benign to malignant ratio predicted by Forrest of 1.7 to 1, and do not suggest an excessive number of biopsies for benign as opposed to malignant lesions in South Australia. [19]

Stage at Diagnosis

Of the 43 **invasive** cancers, post-surgical histopathological stage (UICC) was available for 40, as follows:

Stage	% of Cases
1	75%
2	22%
3	3%
4	0%

Such data as are available on stage for breast cancer cases among **non-screened** women in South Australia are broadly consistent with published data for Western Australia, [18, 21] that is: 22% stage 1; 64% stage 2; 10% stage 3; and 4% stage 4.

Thus whereas approximately 20-30% of **all** invasive cancers diagnosed in South Australia would be Stage 1, 75% of screen-detected cases were in this category and additional lesions were found at an earlier "in situ" stage.

Comparisons with data on stage at diagnosis from overseas projects must be tentative due to scope for methodological differences and sampling variability. Nonetheless, at the least it can be concluded from the data so far available that the tumours detected through the South Australian pilot screening program have been found:

* at a much earlier stage than generally would apply for non-screened women

* with a stage distribution comparable to that reported from overseas screening projects. [22-26]

Tumour Size - Invasive Cancers

Of the 39 screen-detected invasive cancers of known diameter, the distribution was:

<10mm	33%
10-19mm	44%
≥20mm	23%

Again, these diameters were much smaller than generally would apply for non-screened women and at least as small as reported from overseas screening projects. [18,23,25]

Conclusions

Overall, these figures point to a highly satisfactory level of performance during the pilot phase of the South Australian screening program, and augur well for the future implementation of a statewide screening program.

From the data presented in Tables 1, 2 and 3, it is nevertheless clear that there is still scope for improvement in a number of performance indices, including recruitment from disadvantaged groups (e.g., women in country areas), and call-back rates for the follow up of screen-detected abnormalities. These issues are being addressed progressively as the pilot program develops and expands, and will be the subject of future reports.

REFERENCES

1. Shapiro S, Venet W, Strax P, et al. Ten to fourteen-year effect of screening on breast cancer mortality. **JNCI** 1982; **69**: 349-355.

2. Habbema JDF, van Oortmarssen GJ, van Putten DJ, et al. Age-specific reduction in breast cancer mortality by screening: An analysis of the results of the Health Insurance Plan of Greater New York study. **JNCI** 1986; **77**: 317-320.

3. Chu KC, Smart CR, Tarone RE. Analysis of breast cancer mortality and stage distribution by age for the Health Insurance Plan clinical trial. **JNCI** 1988; **80**: 1125-1132.

4. Shapiro S, Venet W, Strax P, Venet L. Current results of the Breast Cancer Screening Randomised Trial: The Health Insurance Plan (HIP) of Greater New York Study. PP 3-16 (In: Day NE, Miller AB (eds). Screening for breast cancer. Toronto: Hans Huber, 1988).

5. Tabar L, Fagerberg G, Duffy SW, Day NE. The Swedish two county trial of mammographic screening for breast cancer: recent results and calculation of benefit. **J Epidemiol Community Health** 1989;**43**:107-114.

6. UK Trial of Early Detectionof Breast Cancer Group. First results on mortality reduction in the UK trial of early detection of breast cancer. **Lancet** 1988;**2**: 411-416.

7. Andersson I, Aspegren K, Janzon L, et al. Mammorgraphic screening and mortality from breast cancer: the Malmo mammographic screening trial. **BMJ** 1988; **297**: 943-948.

8. Frisell J, Glas U, Hellstrom L, Somell A. Randomized mammographic screening for breast cancer in Stockholm. Methods, first round results and comparisons. **Breast Cancer Res Treat** 1986;**8**: 45-54.

9. Knox EG. Evaluation of a proposed breast cancer screening regimen. **BMJ** 1988; **297**: 650-654.

10. Collette HJA, Day NE, Rombach JJ, De Waard F. Evaluation of screening for breast cancer in a non-randomised study (the DOM Project) by means of a case-control study. **Lancet** 1884; **1**: 1224-1226.

11. Verbeek ALM, Hendricks JHCL, Holland R, et al. Mammographic screening and breast cancer mortality: age-specific effects in the Nijmegen project 1975-82. **Lancet** 1985; **1**:865-866.

12. Palli D, Del Turco Mr, Buiatti E, et al. A case-control study of the efficacy of a non-randomized breast cancer screening program in Florence (Italy). **Int J Cancer** 1986; **38**: 501-504.

13. Workshop in conjunction with Nordic Cancer Union Symposium on Breast Cancer, August, 1989. Reduced breast cancer mortality with mammography screening? An assessment of currently available data. Stockholm: **In press**.

14. National Cancer Institute, Division of Cancer Prevention and Control, Early Detection Branch. Working guidelines for early cancer detection. Rationale and supporting evidence to decrease mortality. Bethesda: NCI, 1987.

15. National Cancer Institute. Medical groups' message to women: If 40 or older, get regular mammograms. **JNCI** 1989; **81**: 1126-1127.

16. MacLennan R (ed). A national cancer prevention policy for Australia. Vol. 1. Sydney: Australian Cancer Society, 1987: 1-5.

17. Australian Cancer Society. Endorsement of statement by National Breast Study Committee. Sydney: Australian Cancer Society, February 1990.

18. Bonett A, Dorsch M, Roder D, Esterman A. Infiltrating ductal carcinoma of the breast in South Australia. Implications of trends in tumour diameter, nodal status and case-survival rates for cancer control. **Med J Aust** 1990; **152**: 19-23.

19. Forrest P. Breast cancer screening. Report to the Health Ministers of England and Wales, Scotland and Northern Ireland. London: Her Majesty's Stationery Office, 1987.

20. Anonymous. College pushes for mass mammographic screening. **Aust Med** 1989;**1**: 424.

21. Chleboun JO, Gray BN. The conservative management of primary breast cancer. **Aust NZ J Surg** 1988; **58**:105-109.

22. Collette HJA, et al. The DOM Project for the Early Detection of Breast Cancer (In: Day NE, Miller AB (eds). Screening for breast cancer. Toronto: Hans Huber, 1988).

23. Roberts MM, Alexander FE, Anderson TJ, et al. Edinburgh trial of screening for breast cancer: mortality at seven years. **Lancet** 1990;**335**: 241-246.

24. Tabar L, Gad A, Holmberg LH, et al. Reduction in mortality from breast cancer after mass screening with mammography. **Lancet** 1985;**1**: 829-832.

25. Andersson I, Aspegren K, Janzon L, et al. Mammographic screening and mortality from breast cancer: the Malmo mammographic screening trial. **BMJ** 1988; **297**: 943-948.

26. Chu KC, Smart CR, Tarone RE. Analysis of breast cancer mortality and stage distribution by age for the Health Insurance Plan clinical trial. **J Natl Cancer Inst** 1988; **80**: 1125-1132.

Table 1

Relative Participation in Mammographic Screening by Residential Area of South Australia*

Reference Category: Adelaide Upper SES

Residential Area	Percent Difference from Reference Category (95% confidence limits)
Adelaide	
- upper SES	--
- middle SES	- 9.5%(- 17.4%, - 0.9%)
- lower SES	- 27.4%(- 33.5%, - 20.6%)
- Non-Adelaide	- 73.8%(- 76.6%, - 20.7%)

*...As inferred from odds ratio.
...Data provided by SA Breast X-Ray Service.

Table 2

Relative Participation in Mammographic Screening in South Australia by Country of Birth*

Reference Category: Australian-born Residents of Adelaide

Country of Birth	Percent Difference from Reference Category (95% confidence limits)	
Adelaide Residents		
- Australia	-	
- UK or Ireland	- 3.9%	(- 10.5%, + 3.2%)
- Germany or Netherlands	- 19.3%	(- 30.5%, - 6.3%)
- Southern Europe	- 45.8%	(- 51.8%, - 39.1%)
- Other	- 23.9%	(- 31.1%, - 15.9%)
Non-Adelaide Residents		
- Australia	- 69.2%	(- 71.9%, - 66.3%)
- UK or Ireland	- 66.7%	(- 73.6%, - 58.1%)
- Germany or Netherlands	- 75.1%	(- 85.1%, - 58.5%)
- Southern Europe	- 96.4%	(- 99.1%, - 85.6%)
- Other	- 84.2%	(- 90.9%, - 72.7%)

*...As inferred from odds ratio.
...Data provided by SA Breast X-ray Service.

Table 3

Number of South Australian Women Screened by Mammography in 1989 by Outcome of Screen*

Age (years)	Number Screened		Outcome of Screen: No Abnormality on X-ray		Outcome of Screen: X-ray Indicates Need for Further Assessment	
<50	20	(100%)	16	(80%)	4	(20%)
50 - 54	1843	(100%)	1613	(88%)	230	(12%)
55 - 59	1945	(100%)	1742	(90%)	203	(10%)
60 - 64	1765	(100%)	1564	(89%)	201	(11%)
65 - 69	372	(100%)	336	(90%)	36	(10%)
70+	19	(100%)	18	(95%)	1	(5%)
Sub-total	5964	(100%)	5289	(89%)	675	(11%)
Unknown	1	(100%)	1	(100%)	0	(0%)
Total	5965	(100%)	5290	(89%)	675	(11%)

* Data provided by SA Breast X-Ray Service

A Review of the Operation of the Breast Health Screening Programme

Report presented to the Screening Evaluation Co-ordination Unit of the Australian Institute of Health, May 1990

Michael Legg PhD
Executive Director

Abstract

In November 1988, after 17 years involvement in breast cancer screening, Medicheck and the Sydney Square Diagnostic Breast Clinic combined to establish "Breast Health" a service specifically to provide to well women, 40 years and older, breast cancer screening by two-view, double read, mammography, for which a fee of $42.00 has been charged since starting.

To the end of March 1990 (17 m) there have been 1720 women seen for first round screening and 60 re-screened. 58% of women presented directly to Breast Health while the remainder were screened in association with more comprehensive health evaluation at Medicheck. Of those coming direct to Breast Health 27% came from the Eastern Sydney Health Area (which was targeted in our promotion), 39% were from elsewhere in the metropolitan area and 34% came from outside the metropolitan area including 17 from interstate and 15 from overseas. 82% of the clients were "referred" by a doctor.

Of the first round screenees, 222 (13%) were recommended for further assessment of which 195 (88%) are known to have had further assessment; 183 (94%) at the Sydney Square Diagnostic Breast Clinic. Assessment resulted in biopsy being recommended for 22 (11%). Cancer was confirmed by histology in 10 cases giving a benign to malignant ratio of 1.2 : 1 and a cancer detection rate of 5.8 per 1000 women screened.

The two major barriers to participation in the programme for both doctors and women are thought to be a perception that a medical service which is not covered by Medicare or otherwise subsidised is expensive, the other is the lack of understanding of the difference between screening and diagnosis.

The following conclusions have been drawn with some reservation: GPs are important and promotion through education should begin with them; The protocol must fit into the established medical network and involve GPs; Better co-ordination of the message to the profession and public from opinion leaders is required; The "not get anything from Government" barrier should be removed; The linkage from screening programme to assessment centre needs to be tight; The minimum age for entry to the programme ought to be no more than 45 years; Single reading of mammograms may "cost" 2 in 10 cancers detected; Women, except those with the most obvious symptoms, should not be excluded from the screening programme; Clinical details of symptomatic patients should not be made available to screening radiologists; A fee higher than $42 will need to be charged (in the range of $50-$60); High quality breast cancer screening can be achieved in a private setting.

Aims

The principle aim of Breast Health has been and continues to be to provide a service in breast cancer detection for women. Additional aims are, as for the wider organisation, to set standards for service delivery in the private sector, to provide an extension to existing teaching activities, and to contribute to research including participation in the National Evaluation Project.

Background

Breast Health, like Medicheck and the Sydney Square Diagnostic Breast Clinic is an activity of the AW Tyree Foundation. Screening for breast cancer with modern mammography was introduced into Australia by Medicheck in 1971 with the installation of a CGR Senographe 1 dedicated mammography unit. From then and until changes to the Medicare Schedule in August 1987, around 15 women (range 13-21), aged 40 and older, were screened each day for breast cancer by Medicheck. Since 1976 there has been follow-up of the outcome of this screening and these results have been presented over the years.

Low-dose film-screen mammography was introduced into Australia in 1976 when Medicheck commenced using a Dupont Lo-dose film. Later improvements in mammographic film-screen technique including the use of grids and dedicated film processing have been incorporated as they have become available.

The need for a multi-disciplinary diagnostic centre for breast disease became apparent from the experience at Medicheck. Under the guidance of a steering committee of eminent specialists, the Sydney Square Diagnostic Breast Clinic (SSDBC) was established in 1978 as a separate entity. The organisational model which was adopted utilising senior consultant surgeons and radiologists with GP co-ordination has been used in the establishment of similar facilities in Australia and the USA.

The screening protocol was determined by an advisory committee comprising an executive of Drs R Melville (Surgeon), M Legg (Administrator), J Croll (Radiologist), H Freilich (Radiologist), R Reznick (Epidemiologist) and with members Profs I Webster (Physician, Community Medicine), R Blacket (Physician), and Drs S Renwick (Surgeon), J Forbes (Surgeon), D Moir (Pathologist), A Beard (GP) and Ms H Cleland (Consumer Advocate). Those not employed by the organisation gave generously of their time in an honorary capacity. Dr Melville was appointed Medical Director and Dr Croll Director of Radiology for Breast Health.

Breast Health was officially opened by the Minister for Health in NSW, Mr Peter Collins, on the 23rd of November 1988. It was originally established in the Medicheck premises and so physically independent of the Assessment Centre, the SSDBC. The intention was to have a facility easy to replicate as the growth of screening demanded greater capacity. With low client numbers, it became economically unfeasible to continue in this manner and so in September 1989, after 10 months operation, the unit was incorporated into the SSDBC. Despite the temptation to change the protocol under such circumstances it has been largely maintained.

Marketing

Drawing on the experience of Medicheck in attracting clients for health screening, a broad based marketing programme using direct mail, advertising and PR was undertaken with most activity occurring between March and July 1989. What was done and the results are summarised in Table 1. Both because the Eastern Sydney Health Area is a natural catchment and because analysis of a discreet population group was desirable, emphasis was placed on promotion in this area. This is indicated as appropriate in Table 1.

Table 1 The Marketing of Breast Health from March to July 1989. The results shown in the third column are from a survey of 100 women conducted in September and October 1989 and from a telephone survey of doctors in the Eastern Sydney Health Area conducted in August 1989.

What was done	How much and to whom	Results
Networking - general direct mail - letters and brochures	112 Women's Organisations 78 appropriate Trade Unions and Employer Organisations 35 Local Government Authorities	3 from Women's Organisations 5 from receiving pamphlets 14 from friends or relatives
Networking - Health Professionals direct mail - letters and brochures	2 different mailings to 4,500 doctors currently referring to the SSDBC 1,800 doctors currently referring to Medicheck Family Planning, STD,Menopause clinics, NSW Cancer Council and Community Health Centres (esp ESHA) 500 doctors in Eastern Sydney Health Area with specific reference to the emphasis on the area in for research	79 were referred by their GP

What was done	How much and to whom	Results
Telephone follow-up	One month after the mailing described above the first 100 ESHA doctors on the mailing list that could be contacted were surveyed	27 doctors said they would not refer; 4 have 14 doctors said they had already referred; 6 had 19 doctors said may be; 7 have 64 doctors said they would; 10 have 15 asked for more brochures From these 100 doctors 27 "referred" a total of 31 patient
Lectures and Talks	5 lectures to GP's and 2 to Radiologists including eastern Suburbs AMA	
Advertising Magazines & journals	3 women's journals 1 women's magazine 2 newspapers (5 issues ESHA)	9 responded to magazine advertisements and 2 to newspaper ads
Radio	4 radio stations (5 weeks exposure 2 spots per day revolving sessions	8 women from radio
General PR TV editorial Magazines and Newspapers Displays	6 sequences on national TV 4 articles (one in ESHA) 3 booths at major exhibitions in the city	6 from TV editorial 7 from newspaper editorial 1 from Medical Research Week display

In September 1989 one hundred women coming only for Breast Health were surveyed with an instrument developed in conjunction with the Queensland Department of Health and SECU aimed at determining what influences people to come for screening. Results from this survey are given in Tables 1 and 2.

Table 2 Results of a survey of 100 Breast Health clients in September and October 1989 - The client was asked to indicate for each of the options how much each one did or did not influence their decision.

It influenced me	Not at all	Only a little	Quite a bit	A great deal
I felt concerned about breast cancer	12	22	27	32
I believe if cancer is there, it's best to find it early	2	1	7	84
I wanted to be reassured that nothing was wrong	3	8	20	63
It was recommended by the doctor	23	10	15	50
I thought it was worth paying the fee for a screening mammogram	11	3	13	69
I did not have to travel far to the clinic	42	22	11	16
I have regular mammograms and was due for another	67	6	3	8
I had found a lump	79	3	1	1
I have a family history of breast cancer	73	3	3	7
A friend was attending so I joined her	84	0	0	3
I was "pressured" by a friend or family member to attend	76	4	4	3
Something that had been holding me back, changed	73	8	3	2
The publicity/promotion of mammograms	38	10	17	23
Relative/friend had breast cancer	58	3	12	12
Other	5	1	1	9

9% of clients did not arrive for their appointment which is comparable with other services in the organisation. To the end of March 1990 (17 months) there have been 1720 women seen for first round screening and 60 re-screened. While there would appear to be a recent significant upswing in throughput (Figure 1), overall attendance has been disappointing.

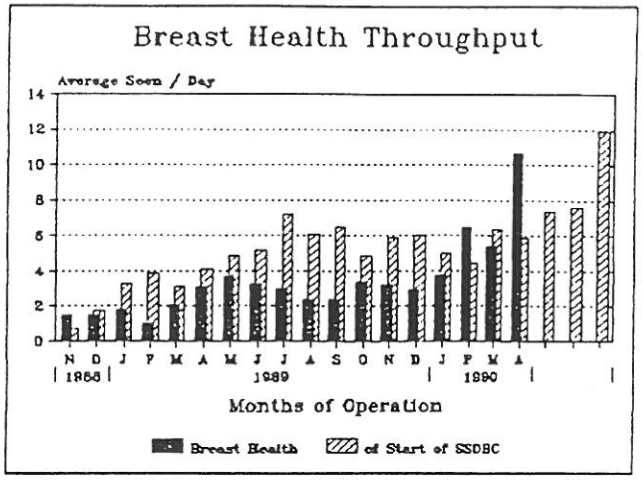

Figure 1 Average daily patient numbers for Breast Health compared with those of the SSDBC in its first 21 months

Throughput is, however, comparable with that of the establishment phase of the Sydney Square Diagnostic Breast Clinic and also shown in Figure 1.

58% of women presented directly to Breast Health while the remainder were screened in association with more comprehensive health evaluation at Medicheck. Of those coming direct to Breast Health 27% came from the Eastern Sydney Health Area (ESHA), 39% were from elsewhere in the metropolitan area and 34% came from outside the metropolitan area including 17 from interstate and 15 from overseas. 82% of those attending came either directly or indirectly from a doctor. Only 6% came direct to Breast Health without contact with a doctor.

Our attempts at marketing to the ESHA failed. We were able to attract only 4 out of every 1000 eligible women. Furthermore the proportional breakdown according to geographic origin (ESHA, 27%; other metropolitan, 39%; and country, 34%) of Breast Health clients corresponds with that for clients at Medicheck (which was not promoted during this period) and interestingly the same as for general patients at the Royal Hospital for Women, Paddington.

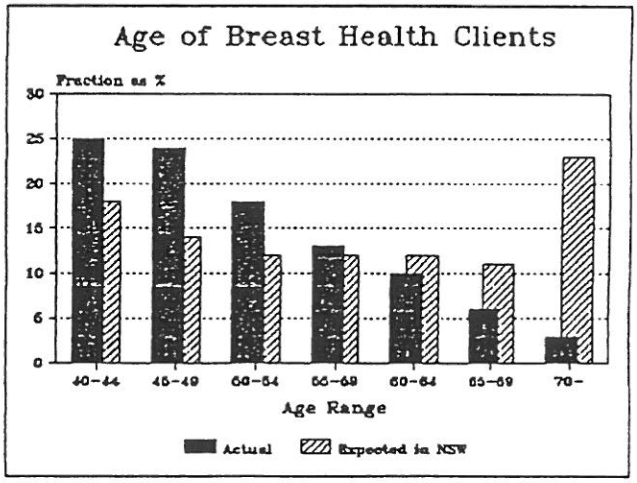

Figure 2 Numbers of Breast Health clients in age ranges expressed as a percentage of the total and compared with 1986 NSW census figures

As shown in Figure 2 and Table 3 the population coming for screening is strongly biased in age toward the young. This bias is even greater in the ESHA; particularly in the 40-49 year group.

Both from the data above and from our experience with general screening it is clear that doctors are very important in determining whether women come or not. There would appear to be two major barriers for doctors. Pre-eminent is the perception that a medical service which is not covered by Medicare or otherwise subsidised is expensive. The fact is, however, that the fee for Breast Health is around the same as the sum of the patient moieties in fees for referral for diagnostic mammography; especially true of the ESHA. The second barrier is a lack of understanding of the differentiation between a screening and a diagnostic service. As a corollary to this barrier the mixed messages coming from opinion leaders such as the Cancer Councils and Departments of Health has not been helpful. These barriers, together with the omnipresent "fear of knowing" also apply to the clients. Concerns relating to radiation, discomfort and other matters are small by comparison.

Table 3 Numbers of clients by age at Breast Health for the whole group and for those from the Eastern Sydney Health Area compared with the proportions expected on the basis of 1986 census data for NSW.

age range	total number	total %	NSW expected %	ESHA number	ESHA %	ESHA expecte d
40-44	428	25%	18%	87	33%	40-49y
45-49	419	24%	14%	65	25%	27%
50-54	314	18%	12%	37	14%	11%
55-59	226	13%	12%	34	13%	12%
60-64	166	10%	12%	25	10%	12%
65-69	111	6%	11%	9	3%	11%
70-	56	3%	23%	6	2%	27%
total	1720			263		

The Process and Medical Outcomes

Breast Health is a service in breast cancer screening by mammography open to all women 40 years and older. Women under 40 or those with symptoms are encouraged to seek alternate care. Assessment of positive screens is expected to take place at the associated assessment centre the Sydney Square Diagnostic Breast Clinic but this is dependent on doctor referral. A summary of the Breast Health process and the outcome for those seen from commencement to March 31, 1990 is shown in Figure 3 while screening performance indicators such as those used by SECU are shown in Table 4.

Table 4 SECU Screening Performance Measures

% of eligible women from the selected target population screened	0.4%
% of all screened women recalled for technically unsatisfactory films	0.1%
% of all screened women recommended for further assessment	13%
% of all screened women referred for open biopsy	1.3%
Women /1000 screened in whom cancer was detected	5.8
Women /1000 screened in whom cancer detected was >= 1cm	3.5
Benign to malignant biopsy ratio	1.2:1
% recommended for further assessment in whom cancer was detected	4.5%
% of open biopsies in which cancer is detected	45%

Of the 1720 first round screenees, 222 (13%) were recommended for further assessment of which 196 (88%) have had further assessment. Assessment resulted in biopsy being recommended for 22 (11%). Cancer was confirmed by histology in 10 cases giving a benign to malignant ratio of 1.2 : 1 and a cancer detection rate of 5.8 per 1000 women screened.

These results can be compared with the 1985 Medicheck mammographic screening of 3672 women of the same age group where 9% were recommended to have further assessment, and 17 women had malignancy confirmed yielding a detection rate of 4.6 / 1000. At Medicheck films were double read by a radiologist and GP and expert physical examination was part of the protocol. There has been a progressive improvement in Screening Performance Measures over the period of operation of the Breast Health Programme.

Assessment was performed at the Sydney Square Diagnostic Breast Clinic for 184 of the 196 for whom assessment results are known. That is to say 38 (17%) of the 222 recommended to have further assessment did not return to the SSDBC. Of these 38, 26 (12%) have been lost to follow-up as at April 26, 1990. This would infer that there may be around one cancer in 10 not found because they have not been assessed, strong evidence that there should be a tighter relationship between the screening programme and the assessment centre than relying on GP referral. One of the cancers found was in a woman who was assessed elsewhere.

53% of those for whom further assessment was recommended had the reports from the first two readers disagree. From this group came 4 biopsies with 1 cancer while the other 47% (ie where both readers agreed) had 18 biopsies with 9 cancers. A single reader (JC) read 1590 or 92% of all films as the first reader. In 219 (14%) of these cases the second reading conflicted, thereby requiring a third reading. This third and determining reading was not "blinded" and was generally by one of the first two readers after discussion. Of the 219 in conflict JC was attributed with the third reading in 166 (76%) cases. Of these her first reading was changed in 38 (23%) cases, in 21 to a final recommendation of "further assessment".

Figure 3 The process and outcomes of the Breast Health Screening Programme - November 1988 to March 1990

The outcome of assessment from these 21 was 2 biopsies, 2 lost to follow-up, and no cancers. On this basis one would conclude that double reading of mammograms is not called for, however, in the 53 read first by JC where the second reader disagreed but JC was not the third reader, there were two biopsies recommended and one was malignant. If there had been only a single reader a cancer would have been missed.

The 10 cancers comprising 7 invasive ductal, 2 intraduct insitu and 1 tubular carcinoma were found in women with ages spread evenly across the range (2 45-49, 3 50-54, 2 55-59, 2 60-64, 1 65-70). Multiple cancers were evident in 3 cases but the largest tumour in all cases was 20mm or less in size with 6 where it was 10mm or less. Nodes were involved in 4 cases and no metastases were reported.

Despite encouragement to seek alternate care, 114 of the screenees were considered symptomatic by the radiographer following interview; the symptomatic women had a significantly higher rate of recall for further assessment (25, 22%, p=0.005 on X^2) but were no more likely to have biopsy recommended (2, 8% p=0.0.98 on X^2) and none had cancer. It would seem that having the clinical history available to the radiologists causes an inappropriate bias in reporting.

Table 5 Outcome of first round screening and assessment for symptomatic and asymptomatic clients

	total	sympt-omatic	asympt-omatic	total %	sympt-omatic %	asympt-omatic %
outcome of screen						
routine	1496	89	1407	87%	78%	88%
further assessment	222	25	197	13%	22%	12%
	1718	114	1604			
outcome of assessment						
routine	170	20	150	87%	91%	87%
early recall	3	0	3	2%	0%	2%
biopsy	23	2	20	11%	9%	12%
	197	22	175			
outcome of biopsy						
benign	12	2	10	55%	100%	50%
indeterminate	0	0	0	0%	0%	0%
malignant	10	0	10	45%	0%	50%
	22	2	20			

Finance

A fee of $42.00 has been charged since the commencement of Breast Health for those coming direct. Because of the low throughput the programme has had to be supported by the other operations of the organisation. For the same reason financial data from the programme is difficult to interpret and probably unreasonable to extrapolate. The price for Breast Health was originally determined by budget with the intention of holding the figure as low as possible to limit that entry barrier. On a variable cost basis break-even was to occur at 26 patients per day with full profit at 36 patients per day. In market terms the fee was pitched to be around the same as the cost of a visit to the hair dresser. The fee was first set in June 1988. The current fee for screening should be in the range of $50 to $60.

Conclusions & Implications for a National Programme

The strength of the conclusions that one can draw from this study are weakened by three factors viz: the relatively small number of screenees; having no knowledge of the false negatives for screening or assessment; and in terms of marketing, not having data on the attitudes of those who did not present for screening. Given these limitations, however, conclusions are presented in Table 6. The results from other programmes in the National Evaluation should help to validate as appropriate the conclusions.

Table 6 Conclusions

GPs are important and promotion through education should begin with them
The protocol must fit into the established medical network and involve GPs
Better co-ordination of the message to the profession and public from opinion leaders is required
The "not get anything from Government" barrier should be removed
The linkage from screening programme to assessment centre needs to be tight
The minimum age for entry to the programme ought be no more than 45 years
Single reading of mammograms may "cost" 1 in 10 cancers detected
Women, except those with the most obvious symptoms, should not be excluded from the screening programme
Clinical details of "symptomatic" patients should not be made available to screening radiologists
A fee higher than $42 will need to be charged (in the range of $50-$60)
High quality breast cancer screening can be achieved in a private setting