

<b>Title:</b>	Is Step Down Assessment of Screen Detected Lesions as Safe as Workup at a Metropolitan Assessment Centre?				
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## ABSTRACT

### Introduction

Due to Western Australia's large geographic size and low rural population density few breast imaging diagnostic services are available outside the metropolitan area. BreastScreen WA offers population mammographic screening via fixed clinics in the metropolitan area and mobile clinics that visit country areas every two years. If an abnormality is suspected following mobile clinic screening, women undergo Step Down Assessment; diagnostic further views are performed at the mobile clinic and if a possibly significant abnormality persists, country women are referred to a Perth Metropolitan Breast Assessment Centre. The purpose of this retrospective cohort study was to determine if Step Down Assessment in country Western Australia offered women the same diagnostic effectiveness as screening and assessment in the metropolitan area.

### Methods

The study used all screening episodes at BreastScreen WA between 1999 and 2008. Screening episodes from metropolitan and mobile clinics were compared according to the primary outcomes of cancer detection rates, recall and further investigations, cancer size, return to screen rates and interval cancers.

### Results

Overall, the cancer detection rate per 1000 screening episodes was lower for the country program than the metropolitan program (3.07 (2.84-3.31) versus 7.04 (6.82-7.27)). The false negative (interval cancer) rate was lower for Step Down Assessment than for the metropolitan program. The size of cancers detected was the similar for both screening services. Return to screen rates were comparable between both groups.

### Conclusion

The results indicate that the current service model is providing appropriate diagnostic effectiveness as well as comparable client satisfaction, for country and metropolitan women.

## KEYWORDS

Mammography; Rural health; Mass screening; Western Australia

## INTRODUCTION

BreastScreen WA has been part of the national BreastScreen Australia program since 1991 (1). Only 30% of West Australians reside outside the metropolitan area and generally experience lower access to health-care services than their metropolitan counterparts (2). Due to Western Australia's large geographic size and low rural population density few breast imaging diagnostic services are available outside the metropolitan area. Women residing in rural areas often have to travel hundreds of kilometres to access breast diagnostic services. While the overall effectiveness of population mammographic screening in Western Australia has been demonstrated (3), the purpose of this study is to determine if women in country and metropolitan locations are benefiting to the same degree from the screening services offered by BreastScreen WA.

BreastScreen WA offers population mammographic screening via fixed clinics in the metropolitan area and mobile clinics that visit country areas every two years (figure 2). If an abnormality is suspected following mobile clinic screening, women undergo Step Down Assessment; diagnostic further views are performed at the mobile clinic and if a possibly significant abnormality persists, country women are referred to a Perth Metropolitan Breast Assessment Centre (figure 1).

Only NT and WA have a Step-Down Assessment programme. Other states and territories do have a mobile van, however women screened are sent straight to a metropolitan BAC for further investigation. In NSW, Victoria and Queensland some of the larger rural towns in each state have assessment centres. In South Australia all women have to go to Adelaide for mammographic screening.

The BreastScreen WA program involves two view mammography performed by trained medical imaging technologists and interpreted independently by two radiologists (Figure 1). If the results are discordant, a third radiologist is consulted. If the mammogram is normal the woman returns to routine biennial screening. If the mammogram is possibly abnormal the woman is contacted for further assessment. Metropolitan women may undergo

assessment at a Breast Assessment Centre (BAC) where diagnostic further views (DFV), clinical examination, ultrasound, fine needle aspiration, core biopsy and diagnostic open biopsy are available. Rural women may also attend screening at metropolitan fixed clinic, and if an abnormality is detected, be invited to attend a BAC. Most rural women attend mammographic screening on the BreastScreen mobile van clinic and if an abnormality is suspected they undergo Step Down Assessment involving DFVs performed at the van. If a possibly significant abnormality persists on DFV country women are referred to a Perth metropolitan BAC. Alternatively both country and metropolitan women can opt out of the program and attend a GP for private referrals.

## MATERIALS AND METHODS

### Study Participants

This study includes all screening episodes for women who attended a BreastScreen WA clinic between 1999 and 2008. Women aged 50-69 years enrolled on the Western Australian electoral roll receive a letter of invitation to participate in the screening program. All women aged above 40 may also participate in the screening program however are not actively recruited. Women aged 50-69 residing in country areas participated in the BreastScreen program at a rate of 59.3% and metropolitan women at a rate of 56.5% in 2005, participation rates are similar for all years analysed.

### Data Collection

The electoral roll does not provide information on demographic details, comorbidities or previous cancers. Women complete a standard information sheet at the time of screening including information on country of birth, language spoken at home, HRT use and previous breast cancer. No data is collected on menopausal status. The State Coordination Unit collects information regarding the outcome and treatment of all screen-detected abnormalities including those where the woman elects to have assessment conducted privately or at another public facility.

Data was extracted from the BreastScreen database according to the clinic location of the first mammogram of a particular screening episode. Data from 1999-2008 was merged and evaluated. This data included the number of women screened, the number of women receiving DFVs, the number of women receiving further investigations, the number of invasive cancers detected, the size of detected cancers, the number of women returning to screen within 27 months and the number of interval cancers. An interval cancer is defined as “the number of invasive breast cancers detected in women screened through BreastScreen Australia that arise during an interval between two screening rounds, per 10 000 women years.”(4) Only women aged 50-67 were included in the rescreen rate as only they remained in the target age group 27 months after their index screen. The screening interval of 27 months is used instead of the recommended 2 year interval to allow for potential delays in screening availability and data transfer.

Women who attend for annual screening are included in the study. Rural women who screen annually with the program will have one of their screens at Perth, every two years. This will not affect the return to screen rate, interval cancer rate or cancer detection rates as only the site of screening is differentiated only for the index screen not the subsequent screen.

#### Data analysis

Outcomes of screening for country and metropolitan locations were compared for percentage of screens going on to DFVs and further investigations; cancer detection rate overall and among screens going on to DFV and further investigation; average cancer size; interval cancer rate; and return to screen within 27 months overall and among screens going on to DFV and further investigation. All rates are not age standardised.

Interval cancers were identified by matching the names of women screened by BreastScreen WA with those listed on the Western Australian Cancer Registry. Cases are automatically matched by name, address and date of birth and then checked manually. Interval cancers from 1999-2007 were calculated in terms of women years at risk and include all women screened aged 50-69 years who at the time of screening were resident in the area in which they were screened and did not report a personal history of invasive cancer or DCIS.

## RESULTS

The study included a total of 760 027 screening episodes. 71.8% of screening episodes took place at a metropolitan clinic and 28.2% at a rural location.

Overall, the cancer detection per 1000 screening episodes was lower for the country program than the metropolitan program (3.07 (2.84-3.31) versus 7.04 (6.82-7.27)) (Table 1). Sensitivity of cancer detection at the metropolitan clinic was 0.91 and at the country clinic 0.95. Sensitivity was calculated by dividing the number of cancers detected by the number of cancers detected plus the interval cancer rate.

Conversely, the rate of cancer detection among women recalled for assessment after a DFV was 289.9 (271.2-308.5) per 1000 country screens (figure 1, group (j+k), stage 3 assessment) versus 185.8 (180.5-191.1) per 1000 metropolitan screens (figure 1, group (i)). Of those country women who had assessment following DFV, 71.8% underwent further work up at an affiliated BAC and 28.2% locally at a public or private hospital or radiology facility.

Recall rates following a screening mammogram were comparable between country and metropolitan women (Table 2). A country woman recalled for assessment was more likely to have a DFV only and be returned to routine biennial screening (62.4%) than to be referred for additional investigations (37.6%). Conversely among metropolitan women recalled for assessment, 29.6% received a DFV only and 70.4% were referred for additional investigations. Country women recalled to the BreastScreen van for DFVs were less likely than metropolitan women to go on to additional diagnostic procedures (37.6% (36.4-38.4) versus 70.4% (69.9-70.9)). Of particular note, metropolitan women receive more ultrasounds than country women (54.2% vs. 26.4%).

The average size of screen detected cancers was similar for country and metropolitan women. Cancers detected at the BAC following a metropolitan screening episode had an average size of 17.4 mm and those detected following a mobile clinic screening episode had an average size of 17.1mm. The percentage of cancers below 15mm in size was 57.8% (56.2-59.4) in metropolitan women, 60.6% (56.3-64.8) in country women who had workup at the BAC.

Interval cancer rates were lower among country women screened than metropolitan women screened. The interval cancer rate from 0-12 months per 10000 women years at risk

was 0.16 (0.02-0.34) for country women and 0.70 (0.46-0.94) for metropolitan women. The interval cancer rate from 13-24 months per 10000 women years at risk was 0.54 (0.18-0.89) for country women and 0.76 (0.49-1.03) for metropolitan women. These rates are well below the BSA performance standard for this age group of < 7.5 interval cancers per 10,000 women aged between 50-69.

Rescreening participation rates within 27 months of the index screening episode were 64.9% (64.7-65.1) among all country women and 68.3% (68.2-68.4) among all metropolitan women (Table 3). Fewer women who go on to more intensive assessment return to screen within 27 months, but these values are comparable between the country and metropolitan cohorts.

## DISCUSSION

Breast cancer is the most common life threatening cancer diagnosed in Australian women (5). BreastScreen WA detects tumours that are smaller in size, display less lympho-vascular invasion, are of lower histological grade and have a higher incidence of DCIS than cancers detected in Western Australia women outside the program (3). BreastScreen WA is the only state based program in Australia to undertake Step Down Assessment.

The results of this study demonstrate that in terms of cancer detection accuracy, women in country and metropolitan locations are benefiting to the same degree from the screening and assessment processes. While rates of cancer detection are higher in metropolitan women than country women (7.04 per 1000 vs 3.07 per 1000), the authors believe this does not reflect cancers being missed by the Step Down Assessment process as evidenced by the lower rate of interval cancers among country women screened. It would appear that there is a lower incidence of breast cancer in country versus metropolitan Western Australian women. The National Breast and Ovarian Cancer Centre has recently noted that the incidence of breast cancer is significantly lower in women living in rural and remote regions, when compared with women living in metropolitan areas of Australia (6). The BreastScreen Australia monitoring report(4) found that the incidence of invasive breast cancer from 2004-2008 in women aged 50-69 years decreased with increasing level of remoteness from the metropolitan area nationally. There are various measures used to indicate the efficacy of a breast cancer screening program. The development of interval cancers in the 12 month time

period following a negative screen is a particularly important performance indicator (4). The lower interval cancer rate among country women than metropolitan women supports the diagnostic effectiveness of the BreastScreen WA Screening and Step Down Assessment process.

The reasons for the higher rate of breast cancer among the metropolitan women included in this study are currently unknown. Without data matching, underlying differences between country and metropolitan women in terms of age and menopausal status may be contributing to the differences in cancer detection rates between the two groups. Although an Australia wide study showed that country women were less likely than metropolitan women to participate in mammographic screening programs (7) this is not the case in Western Australia. BreastScreen WA data shows that metropolitan and country programs are achieving similar rates of participation within the target age range of 50-69 years (56.5% vs 59.3% in 2005) (1). The results of our study showed the average size of cancers detected at metropolitan and country clinics to be comparable.

Country women are receiving fewer investigations overall without compromising cancer detection rates. This likely reflects the higher incidence of significant abnormalities present in metropolitan women who require more work up. It would appear that metropolitan women are being subjected to a degree of opportunistic screening ultrasound examinations while at the BAC. A formal economic analysis of the metropolitan and country programs has not been conducted and would provide valuable information regarding their comparative cost effectiveness. Previous research has suggested that high use of assessment investigations may increase anxiety associated with screening without conferring benefit in terms of accuracy of assessment (8, 9). Despite this consideration, rescreen participation rates are comparable between metropolitan and country women irrespective of how extensively they are investigated before being returned to the routine biennial screening schedule. This suggests that both groups are equally satisfied with the service provided to them; however, a qualitative study examining the attitudes of country and metropolitan West Australian women towards the Step Down Assessment and standard assessment procedures would provide more evidence on this matter.

## CONCLUSION

This study described the Step Down Assessment process provided to country women by BreastScreen WA. The diagnostic effectiveness of Step Down Assessment was compared to that of the standard screening and assessment protocol offered to metropolitan women. The study found that Step Down Assessment lead to the detection of cancers at a comparable size to the standard metropolitan screening and assessment protocol and was associated with a lower false negative (interval cancer) rate. The lower cancer detection rate in rural versus metropolitan women was attributed to lower cancer incidence rates for rural versus metropolitan women in Australia (6). These findings support the continuation of the Step Down program as an effective way to deliver breast cancer screening and assessment in country areas without the need for women to travel thousands of kilometres for assessment at a metropolitan clinic.

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#### ETHICAL APPROVAL

All BreastScreen WA clients consent at each screening episode for de-identified data to be used for research and publication.

#### CONFLICT OF INTERESTS STATEMENT

There are no conflicts of interest to declare.

#### FOOTNOTES

##### ABBREVIATIONS

BAC – Breast Assessment Centre

CI – Confidence Interval

DFV – Diagnostic Further Views

FNA – Fine Needle Aspiration

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Table 1 – Cancer Detection Rates in women presenting to BreastScreen WA clinics in metropolitan and country locations.

	Metropolitan Clinics	Country Clinics	BAC	Outside BreastScreen
	Total Rate/1000 CI	Total Rate/1000 CI	Rate/1000 CI	Rate/1000 CI
Rate per all screens	7.04 6.82-7.27	3.07 2.82-3.31		
Rate per those recalled for DFV	130.81 126.95-134.67	109.05 101.18-116.91		
Rate per those recalled for further assessment	185.85 180.55-191.15	289.87 271.20-308.53	314.3 291.76- 336.85	227.77 195.3-260.24

Table 2 – Proportion of women recalled who received further investigations.

Type of investigation	Metropolitan clinics	Country Clinics
	Percent CI	Rate of use CI
Clinical examination	47.4 46.9-48.0	32.2 31.0-33.4
Ultrasound	54.2 53.6-54.8	26.4 25.3-27.5
FNA	19.6 19.2-20.1	12.5 11.7-13.3
Core biopsy	29.9 29.4-30.4	22.1 21.1-23.2
Diagnostic open biopsy	3.7 3.5-3.9	3.9 3.4-4.4

Table 3 – Percent of women at metropolitan and country BreastScreenWA clinics who returned for repeat screening within 27 months between 1999-2007

	Metropolitan clinics	Country clinics		
	Total	Total	BAC	Outside BreastScreen
Percent who returned for repeat screening	% CI	% CI	% CI	% CI
Of total screened	68.3 68.2-68.4	64.9 64.7-65.1		
Of women recalled for assessment	62.6 62.0-63.2	66.3 65.0-67.5		
Of women who had DFV but no further investigations	68.6 67.6-69.6	72.7 71.2-74.1		
Of women who had other further investigations	60.1 59.40-60.81	55.3 53.1-57.5	57.3 54.7-59.8	50.3 46.2-54.4

Figure 1

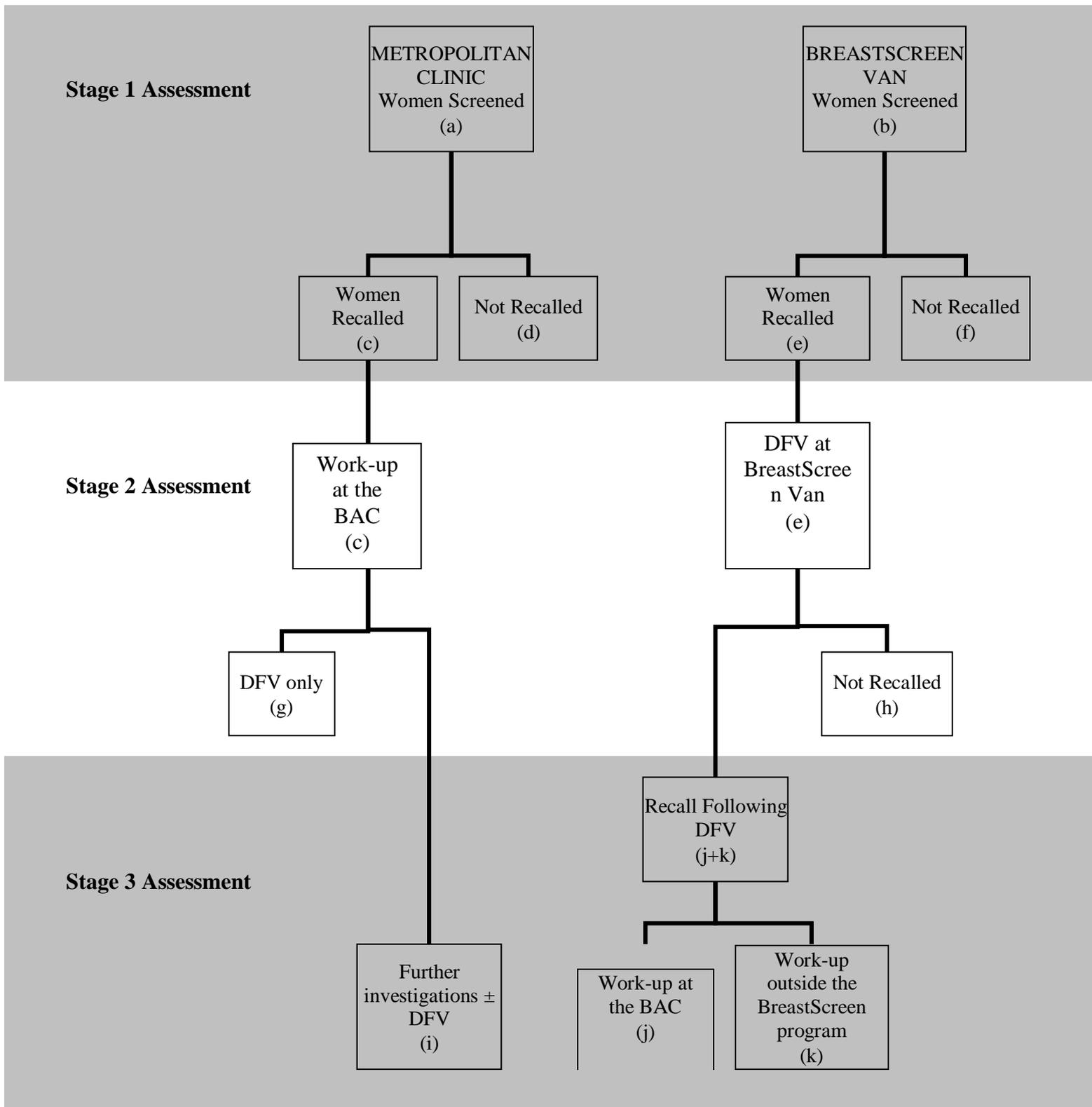


Figure 2

Map of Western Australia showing the location of the towns visited by the mobile screening units

